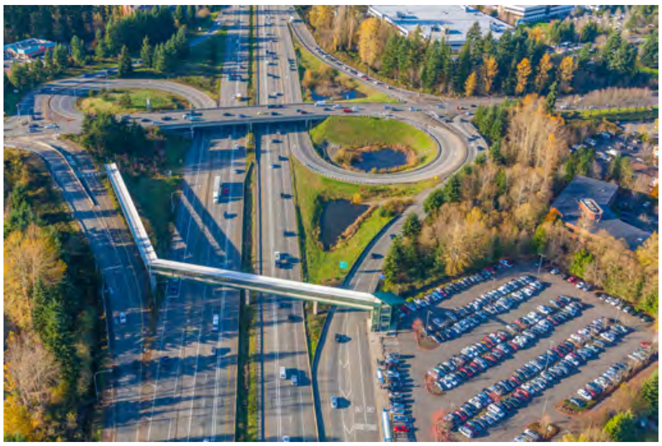
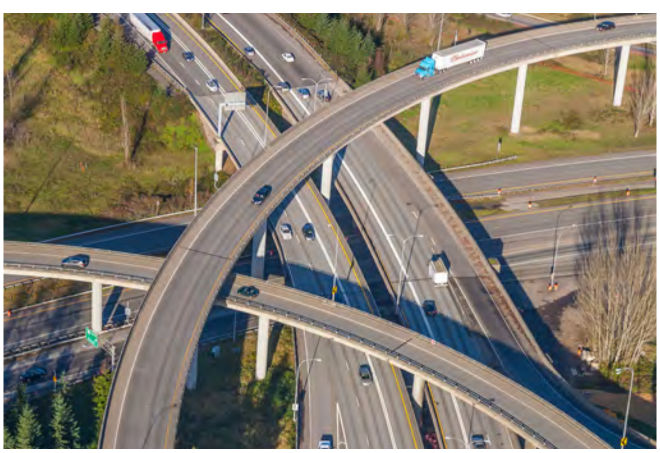
MAY 2020

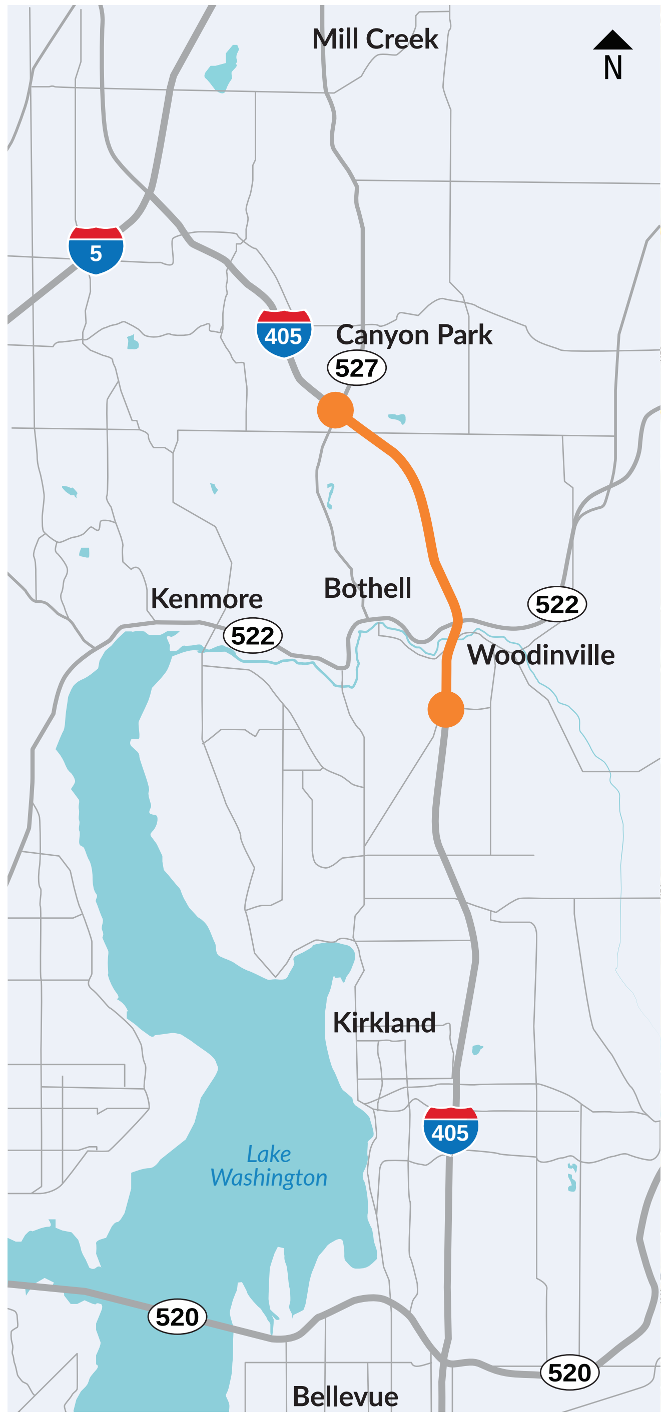
ENVIRONMENTAL ASSESSMENT

Appendix A: Transportation Discipline Report

I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (MP 21.79 to 27.06)







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SECTION 1 SUMMARY

The *Transportation Discipline Report* was prepared in support of the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project (Project) Environmental Assessment (EA). This report describes the environmental effects of proposed improvements on Interstate 405 (I-405) from milepost (MP) 21.79 to MP 27.06 (just south of Juanita Creek in Kirkland to just south of the 9th Avenue SE overpass in Bothell) in support of the EA.

1.1 Purpose of the Report

This report describes the freeway and local traffic, safety performance, transit, freight, and nonmotorized conditions in the study area; identifies and assesses potential effects of the Project on these conditions; and identifies measures to avoid or reduce effects resulting from the Project.

1.2 Study Approach

WSDOT analyzed the transportation and traffic effects of the Project, including freeway and SR 522 operations and local street intersections. The Project study area includes I-405 from south of NE 160th Street to I-5 (I-5) in Lynnwood, State Route (SR) 522 from Campus Way to 131st Avenue NE/132nd Avenue NE, and Bothell–Everett Highway/SR 527 from 228th Street SE to SR 524. WSDOT analyzed 2018 traffic conditions to represent existing conditions, as well as conditions in an opening year of 2025 and a design year of 2045 without the Project (No Build Alternative) and with the Project (Build Alternative). The design year is consistent with the federal requirements for environmental documentation because it is 20 or more years from the year the Project would open to traffic.

1.3 Existing Conditions Overview

Traffic on I-405 in the study area is congested due to high regional traffic demands in both directions for many hours of the day. Congestion is present in both the general purpose (GP) lanes and express toll lanes (ETL), with high volumes and low operating speeds. Transit vehicles that use the ETLs have reduced reliability due to congestion and federal performance requirements for high occupancy toll (HOT) lanes.

1.4 Operational Effects Overview

1.4.1 No Build Alternative

Under the No Build Alternative, the growth in regional traffic demand would further degrade traffic operations in the study area. This change would be especially noticeable near the NE 160th Street interchange where traffic (southbound in the morning and northbound in the evening) would continue to worsen with longer queues and more hours of congestion. Drivers unable to access the freeway due to congestion would seek alternate routes, including adjacent local roadways for regional trips, which would add more congestion on these facilities. Transit reliability would continue to degrade, and travel times would increase.

1.4.2 Build Alternative

The Project would add freeway capacity, improve travel time reliability, increase travel speeds, and benefit overall operations on I-405 through widening the ETL system to two lanes between NE 160th Street and SR 527, and adding ETL direct access ramps at SR 522 and just south of SR 527 at 17th Avenue SE. The Project would improve safety performance in the study area by reducing the number of congestion-related crashes.

1.5 Construction Effects Overview

Temporary lane, ramp, and roadway closures would be necessary during construction, which is expected to occur between 2021 and 2024. These temporary closures would occur primarily during weekday off-peak periods and weekends. Increases in vehicle delay are expected to occur through construction areas and roadways identified as detour routes.

Construction vehicles for the Project are expected to cause temporary increases in traffic delay and volumes in the study area. Additional delays are also expected to occur on freeways and arterials identified as haul routes. When possible, construction sites would be accessed from the freeway; however, construction traffic on local streets would be unavoidable.

Construction would require adjustments to the existing lane and intersection configurations on some local roadways. As a result, buses would be affected by increased delay and longer travel times. Bus stops may need to be temporarily relocated or closed during construction. Some bus routes may require rerouting when streets are closed. Construction activities may also limit pedestrian and bicyclist movements on local roadways. The Project is not expected to affect tolling operations during construction.

SECTION 2 PROJECT DESCRIPTION

2.1 Proposed Project Elements

The Project begins on I-405 south of the I-405/SR 522 interchange at milepost (MP) 21.79 and continues to just north of the I-405/SR 527 interchange at MP 27.06. Exhibit 2-1 lists improvements proposed with the Project. Exhibit 2-2, Sheets 1 through 5, show the locations of the proposed improvements.

Exhibit 2-1. Improvements Proposed with the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

Project Element	Proposed Improvements
I-405 lanes and shoulders from SR 522 to SR 527	– Create a dual express toll lane (ETL) system from MP 21.79 (south of the I-405/SR 522 interchange) to MP 27.06 (just north of the I-405/SR 527 interchange). • From MP 21.79 to MP 22.30: Restripe existing lanes to create a dual ETL system. • From MP 22.30 to MP 26.30: Resurface and widen I-405 to add one ETL in each direction. • From MP 26.30 to MP 27.06: Widen I-405 to construct direct access ramps and connect to the existing single ETL starting near MP 26.30.
I-405 tolling from SR 522 to SR 527	– Construct new tolling gantries to collect tolls for the ETLs and direct access ramps.
I-405/SR 522 interchange area	– Construct new direct access ramps and two inline transit stations (one in each direction) in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines, and site furnishing such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Construct a bus station and turnaround loop, pick-up and drop-off facilities, and new nonmotorized connection to the North Creek Trail near the SR 522 interchange. Funding and construction timeline to be coordinated with local transit agencies. – Construct new northbound bridge through the SR 522 interchange. • Reconfigure the northbound I-405 to eastbound SR 522 ramp from one lane to two lanes. – Reconfigure I-405 on- and off-ramps. • Realign the southbound I-405 to westbound SR 522 ramp. • Realign the eastbound and westbound SR 522 ramps to northbound I-405.
SR 522 roadway	– Add three signalized intersections, which would change where the freeway portion of SR 522 begins and ends. Signals would be added at the following locations: • The northbound I-405 to westbound SR 522 off-ramp and the eastbound SR 522 to northbound I-405 on-ramp. • The southbound I-405 to eastbound SR 522 ramp. • Between the above two locations where the new I-405 ETL direct access ramps connect with SR 522.
228th Street SE	– Widen the northbound I-405 bridge over 228th Street SE.

Exhibit 2-1. Improvements Proposed with the I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project

Project Element	Proposed Improvements
SR 527 interchange area	– Construct new direct access ramps to the north, south and east just south of SR 527 at 17th Avenue SE. – Construct two inline transit stations (one in each direction) in the I-405 median. Transit stations would include station platforms, signage, artwork, lighting, fare machines, and site furnishing such as shelters, lean rails, benches, bollards, bicycle parking, and trash receptacles. – Reconstruct the pedestrian bridge over I-405.
17th Avenue SE, 220th Street SE, SR 527	– Reconfigure 17th Avenue SE and portions of 220th Street SE and SR 527 to include a roundabout at the Canyon Park Park and Ride, bicycle and pedestrian improvements, and improvements at the SR 527 and 17th Avenue SE intersections with 220th Street SE.
Fish barrier corrections	– Replace five fish barriers with restored stream connections at the following streams: • Par Creek (WDFW ID 993083) • Stream 25.0L (WDFW ID 993104) • North Fork of Perry Creek (WDFW ID 08.0070 A0.25) • Two fish barriers at Queensborough Creek (WDFW ID 993084 and 993109)
Sammamish River bridges	– Remove the existing northbound I-405 to eastbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. – Remove the existing northbound I-405 to westbound SR 522 bridge over the Sammamish River, including two bridge piers within the OHWM. – Build a new bridge for northbound I-405 traffic over the Sammamish River. – Build a new bridge over the Sammamish River for the new direct access ramp at SR 522. – Build a new bridge over the Sammamish River for the northbound I-405 to SR 522 ramp.
Noise and retaining walls	– Construct 3 new noise walls near NE 160th Street and SR 527. See Exhibit 2-2, Sheets 1, 4, and 5. – Construct several new retaining walls. See Exhibit 2-2, Sheets 1 through 5.
Stormwater management	– Provide enhanced treatment for an area equivalent to 100 percent of new PGIS (approximately 24 acres). – Retrofit about 23 acres of existing untreated PGIS and continue to treat stormwater from the approximately 44 acres of PGIS that currently receives treatment. – Construct three new stormwater outfalls, one on the Sammamish River and two on the North Fork of Perry Creek.
Construction duration	– Construction is expected to last 3 to 4 years, beginning in 2021.

ETL = express toll lane; ID = identification number; MP = milepost; OHWM = ordinary high water mark; PGIS = pollution-generating impervious surfaces; WDFW = Washington Department of Fish and Wildlife

Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 1 of 5

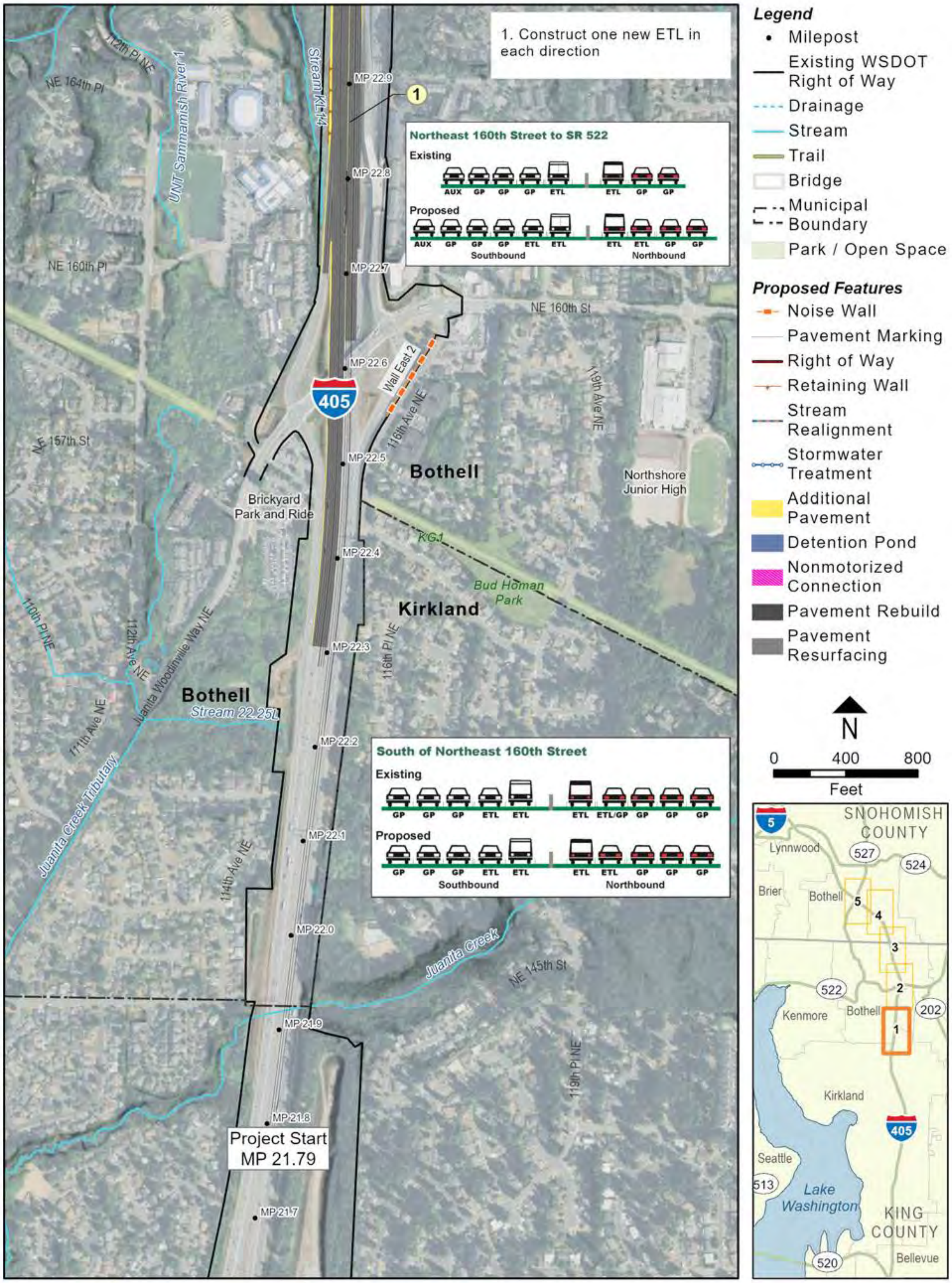

Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 2 of 5

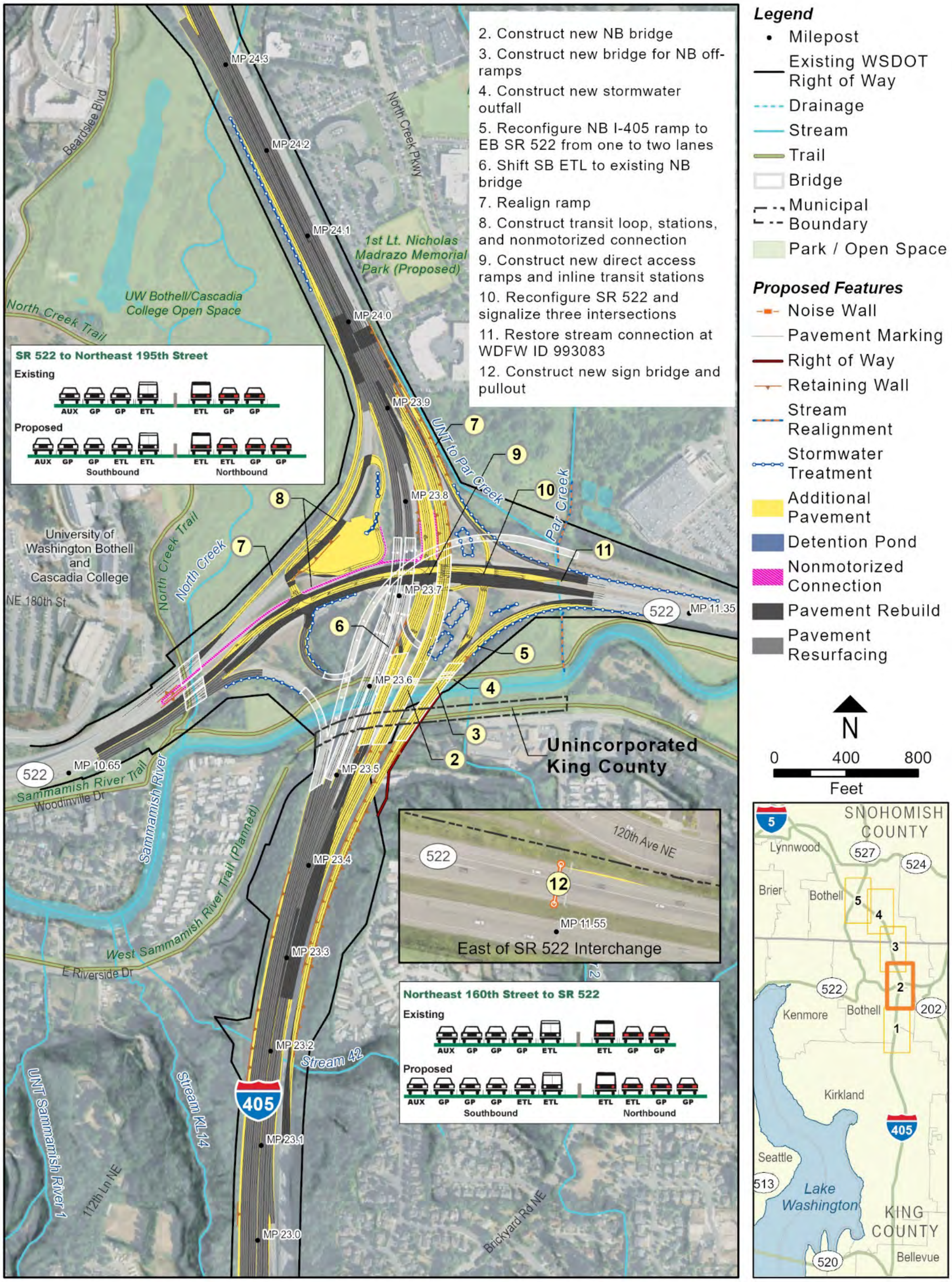

Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 3 of 5

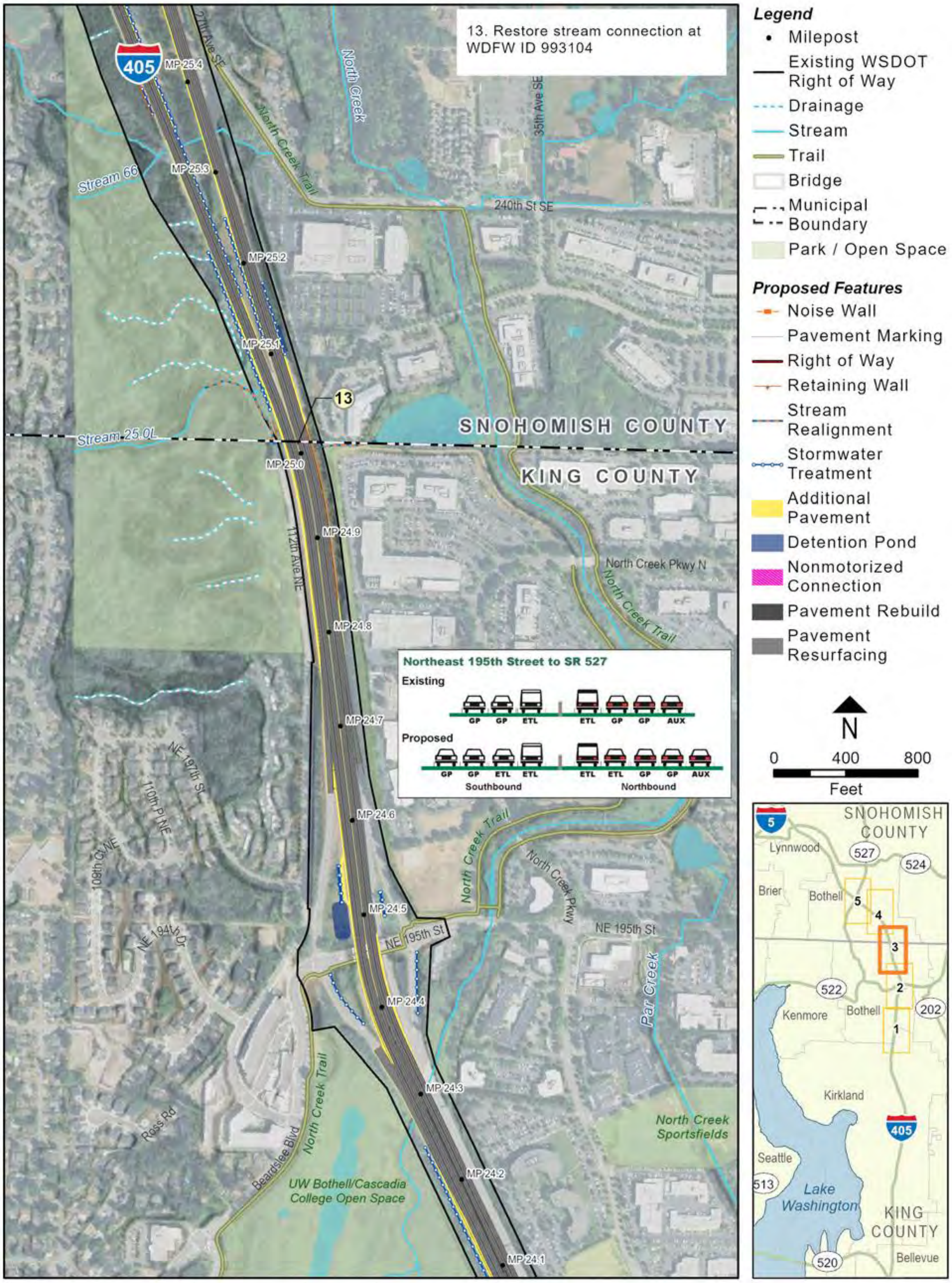

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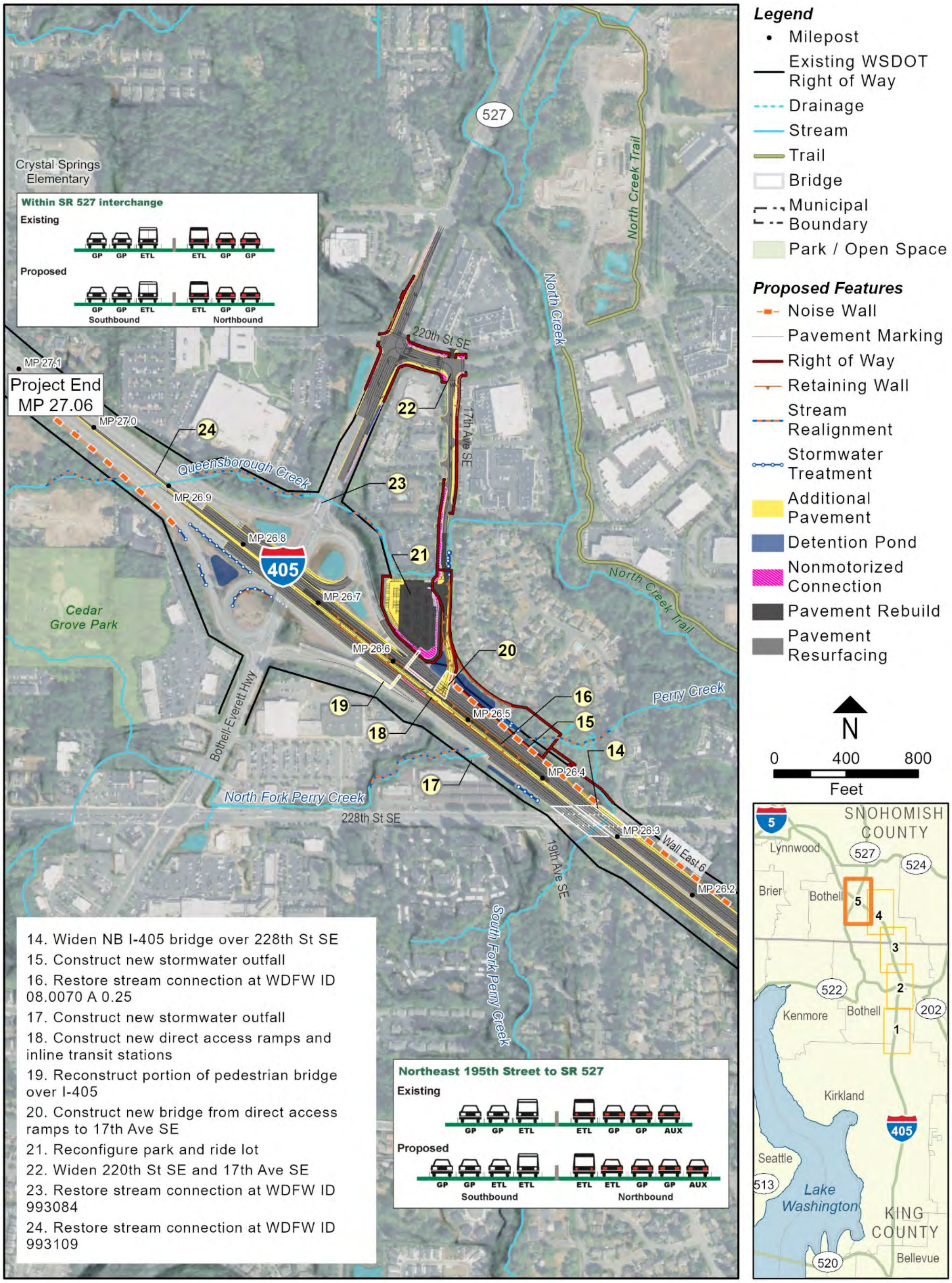
Exhibit 2-2. I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project, Sheet 5 of 5



2.2 Express Toll Lanes Overview

Currently, there is one ETL in each direction of I-405 between SR 522 and SR 527. WSDOT expects that the new ETL in this section would operate in the same way as the existing ETL, from 5 a.m. to 7 p.m. on weekdays. At all other times and on major holidays, the ETLs would be free and open to all without a *Good To Go!* pass. During operating hours:

> How do I get more information about ETLs on I-405?
>
> https://wsdot.wa.gov/Tolling/405/

- **Single-occupancy vehicles** would pay a toll to use the ETLs with or without a *Good To Go!* pass.
- **Transit, High-Occupancy Vehicles (HOV) 3+, and motorcycles** would travel for free with a *Good To Go!* flex or motorcycle pass.
- **HOV 2+** would travel for free from 9 a.m. to 3 p.m. with a *Good To Go!* flex pass. From 5 a.m. to 9 a.m. and 3 p.m. to 7 p.m. HOV 2+ would pay a toll to use the ETLs with or without a *Good To Go!* flex pass.
- **Large vehicles** over 10,000 pounds gross vehicle weight would not be able to use the ETLs at any time.

2.3 Project Construction Overview

WSDOT expects to construct the Project using a design-build delivery method, in which WSDOT executes a single contract with one entity for design and construction services. With design-build projects, contractors have the flexibility to offer innovative and cost-effective alternatives to deliver the project, improve project performance, and reduce project effects. If the contractor proposes design modifications not covered by this Environmental Assessment, additional environmental review would be conducted as needed.

Construction would generally occur between 2021 and 2025, but construction activities in some areas would be complete prior to 2025. Once a contractor is selected for the Project, they could use multiple work crews in multiple locations to reduce the overall construction period. Work would include removing existing asphalt and concrete surfaces, clearing and grading adjacent areas, laying the aggregate roadway foundation, placing new asphalt and concrete surfaces, replacing culverts, and building and demolishing bridges. Removing bridge piers from the Sammamish River could require the construction of temporary work bridges and would require in-water work, which may include temporary use of cofferdams and a work barge, depending on the contractors' chosen means and methods. Realigning the I-405 mainline would require approximately 170,000 cubic yards of excavation and 166,000 cubic yards of fill.

Construction equipment would include backhoes, excavators, front-end loaders, pavement grinders, jack hammers, trucks, vactor trucks, cranes, drilling rigs and augers, concrete pumping equipment, and slurry processing equipment. Specific haul routes and the number of construction vehicles would not be known until a construction contract is signed. When possible, the work sites would be accessed from I-405 and SR 522. Construction staging areas for employee parking, large equipment storage, and material stockpiles would be located within WSDOT and Bothell right of way to the extent possible. The contractor may also find other locations for construction staging.

SECTION 3 STUDY APPROACH

This section presents the analysis approach including the study area, data sources, methods and assumptions, and evaluation criteria. Section 4, Existing Conditions, documents the existing conditions in the study area, and Section 5, Operational Effects, presents the results of the analysis.

3.1 Study Area

Exhibit 3-1 and Exhibit 3-2 show the major roadways and local intersections studied. The safety analysis included mainline and ramp facilities on I-405 from south of NE 160th Street to SR 527 as well as SR 522 between Campus Way and SR 202. For some measures of effectiveness, including travel times and freeway speeds, the reporting limits were expanded to describe more of the operational effects of the Project from NE 116th Street in Kirkland to I-5 in Lynnwood. The study area includes intersections at the I-405 interchanges at NE 160th Street, SR 522, NE 195th Street, and SR 527. In addition, the highway analysis included SR 522 from Campus Way NE on the west to SR 202 on the east.

WSDOT also analyzed local streets and intersections along I-405 from NE 160th Street to SR 524. The local intersection analysis in this report focused primarily on operations at ramp terminal intersections and those intersections that would be affected by the Project's proposed direct access ramps. The analysis included 32 local intersections at the ramp terminal intersections, as well as the following immediately adjacent intersections:

- Juanita-Woodinville Way NE west of I-405 and NE 160th Street east of I-405.
- SR 522 between Kaysner Way west of I-405 and SR 202 east of I-405 (SR 202 includes intersections to the south of SR 522 on 131st Avenue NE and 132nd Avenue NE).
- Beardslee Boulevard west of I-405 and NE 195th Street east of I-405.
- Bothell-Everett Highway/SR 527: SR 527 is commonly called the Bothell-Everett Highway. Specifically, the Bothell-Everett Highway is only designated as SR 527 from the I-405 interchange to the north. This document refers generally to SR 527 when discussing this facility. The analysis included intersections in the SR 527 area between 228th Street SE on the south and SR 524 on the north. Intersections were also evaluated along 228th Street SE, 17th Avenue SE, and 220th Street SE.
- Five private street intersections in the Canyon Park Business Center (CPBC), indicated with a "P" prior to the intersection number in Exhibit 3-1. These intersections are currently unsignalized (stop-controlled, in each case) and are owned and maintained by the Canyon Park Business Center Owners Association (CPBCOA). They are generally located on streets that would provide access to the proposed Project direct access ramps south of SR 527 at 17th Avenue SE. These intersections were selected in collaboration with the CPBCOA.

Exhibit 3-1. Major Roadways Studied

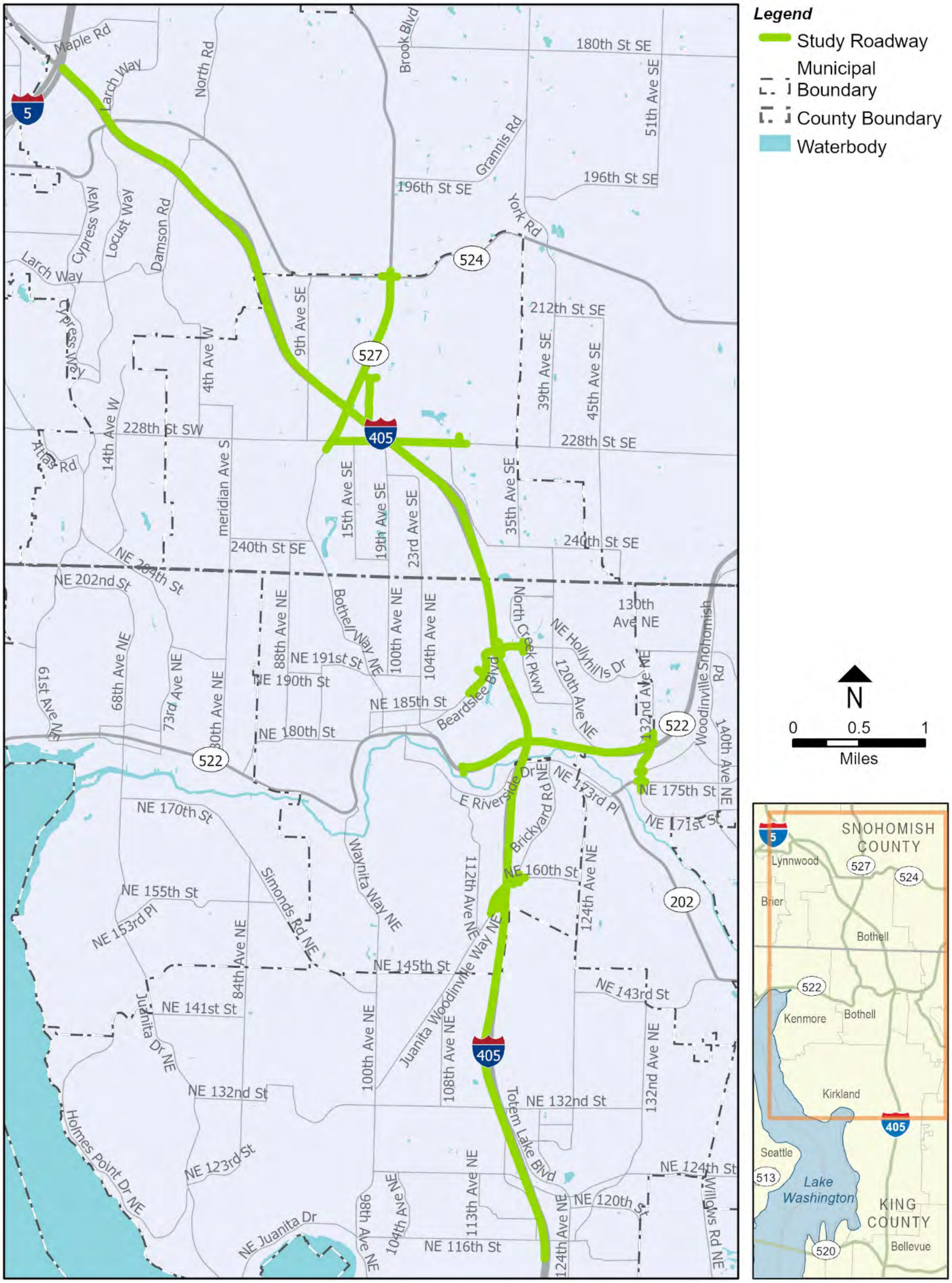
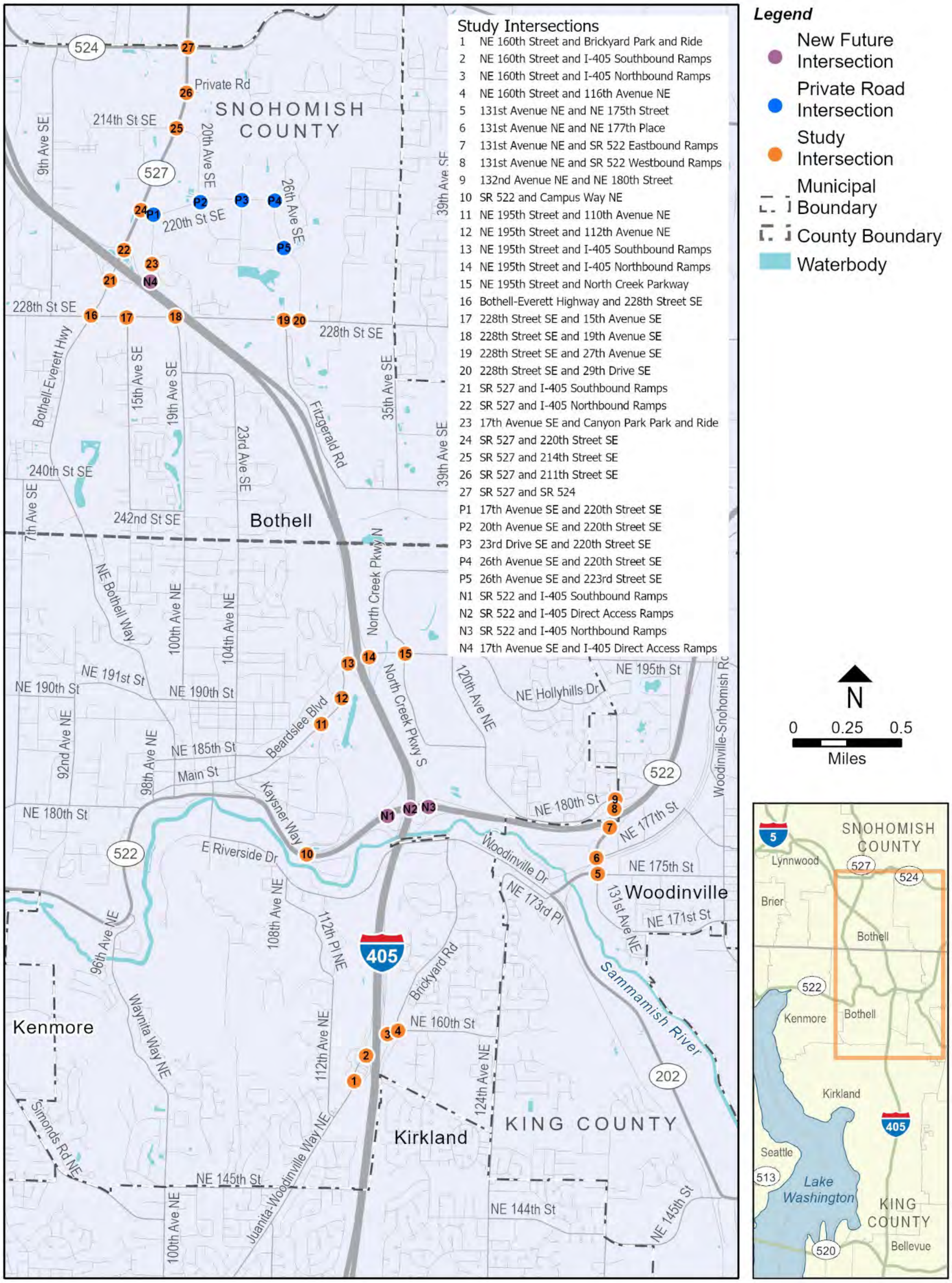


Exhibit 3-2. Intersections Studied



3.2 Data Sources

WSDOT obtained and reviewed the following data to perform the analysis.

3.2.1 Freeways

- Volume, speed, and congestion data for general purpose (GP) lanes, high-occupancy vehicle (HOV) lanes, express toll lanes (ETLs), high-occupancy toll (HOT) lanes, on-ramps, and off-ramps. These data come from permanent loop detectors embedded in the roadway that collect continuous data. On freeways, loops are typically spaced every 0.5 mile.
- Truck data from several permanent data recorders in the study area.
- Information about where motorists are coming from and going to, commonly referred to as origin-destination data.
- Volume and origin-destination patterns within existing ETLs from transaction data.

3.2.2 Intersections

- Peak-period turning-movement traffic volumes for public roadways from May 2018 and for private roadways from September 2019.
- 2017 turning-movement volumes for two locations along SR 202 adjusted to existing conditions.
- Other transportation data, including traffic impact studies and information regarding future transportation projects, for developing future year traffic projections (City of Bothell 2015; City of Bothell 2018; City of Kirkland 2009; City of Kirkland 2018; City of Kirkland 2019).

3.2.3 Safety Performance

- Crash data from the WSDOT Crash Data and Reporting Branch.
- Crash data from freeways, ramps, intersections, and city streets for the latest 5-year period available (2013–2017).

3.2.4 Transit Operations

- Existing bus route information, including location, service type (peak, off-peak, weekend), and frequency from Sound Transit, King County Metro Transit (King County Metro), and Community Transit websites from winter 2018 and the general transit feed specification.
- Future planned transit service from Sound Transit, King County Metro, and Community Transit long-term plans and data from the transit agencies' service planning groups.

3.2.5 Freight Mobility

- Freight and goods route information from the WSDOT Freight and Goods Transportation System (FGTS).

3.2.6 Nonmotorized Network

- Nonmotorized data from King County, the City of Kirkland, and the City of Bothell.

3.3 Area Transportation Plans

A number of ongoing studies, plans, and projects in the area have varying degrees of influence on the study area. The Project would align with the long-range vision of the plans presented in this section.

3.3.1 I-405 Master Plan

The I-405 Master Plan, as documented in the *I-405 Corridor Program NEPA/SEPA Final Environmental Impact Statement* (WSDOT 2002), describes a 20-year-plus vision of multimodal improvements to the freeway, transit systems, and arterials along the I-405 corridor from Tukwila to Lynnwood.

The current vision to complete the *I-405 Master Plan* includes two additional lanes of capacity in each direction along the corridor, accommodations for Bus Rapid Transit (BRT), new direct access ramps, and additional park and ride spaces. The Project would add a lane to the ETL system in each direction between north of NE 160th Street and SR 527. The Project would also provide inline transit stops at the new direct access ramps at SR 522 and near SR 527. Instead of park and ride spaces, the Project would add a new SR 522 interchange bus station with pick-up/drop-off facilities and a nonmotorized connection to the North Creek Trail and nearby University of Washington Bothell/Cascadia College campus. The Project is consistent with the *I-405 Master Plan*.

3.3.2 Sound Transit

In November 2016, voters passed a funding program to expand the regional mass transit system, collectively known as the Sound Transit 3 Plan (ST3). The ST3 package of projects includes funding for BRT along I-405 between Lynnwood and south Renton. ST3 provides funding for freeway stations that would allow buses to stop in the freeway right of way to pick up and drop off riders. This analysis assumes BRT would operate in the ETLs wherever feasible and is included in the Build Alternative forecasting and analysis. WSDOT will continue to coordinate with Sound Transit and its consultants and contractors, as well as Community Transit and King County Metro, throughout development and implementation of the Project.

3.3.3 Local Municipalities

The Project would pass through or near three cities – Kirkland, Bothell, and Woodinville – which are located in King and Snohomish counties. The cities of Kirkland, Bothell, and Woodinville provided land use and transportation input for the regional planning process. WSDOT will continue to coordinate with these municipalities throughout the development and implementation of the Project.

The City of Bothell is currently updating the Canyon Park Subarea Plan to guide redevelopment and infrastructure planning in the Canyon Park regional growth center, which is located in the study area east of SR 527 and north of I-405 and 228th Street SE. The plan is designed to facilitate opportunities for employment, residential, and mixed-use development. The City describes the community's vision for Canyon Park as a regional economic driver, a multifaceted neighborhood, and a transportation hub with connections to the natural environment (City of Bothell 2019). In December 2019, Bothell published the *Canyon Park Subarea Planned Action Draft EIS* (City of Bothell 2019). The *Draft EIS* evaluates a no action alternative that would maintain growth established in the city's currently adopted comprehensive plan, *Imagine Bothell* (City of Bothell 2015) and three build alternatives that would increase development densities over currently planned growth. The *Draft EIS* also identifies possible transportation improvements that may be needed to accommodate growth beyond currently adopted comprehensive plan. The *Draft EIS* does not identify a preferred alternative. The outcome of Bothell's Draft EIS and comprehensive plan update process is currently unknown.

Per the Draft EIS, the following City of Bothell actions would be required before any of the build alternatives could be implemented:

- Select a preferred alternative, respond to comments on the Draft EIS and issue a Final EIS.
- Adopt the updated Canyon Park Subarea Plan as part of the *Imagine Bothell* Comprehensive Plan.
- Adopt zoning and development regulation amendments within the Bothell Municipal Code.
- Adopt a planned action ordinance.

As documented in the *Draft EIS*, the City plans to select a preferred alternative and issue a Final EIS in the first half of 2020. The timeline for other actions listed above is currently unknown, but would be expected to occur after the Final EIS is issued. This EA evaluates land use densities in Bothell's currently approved and adopted comprehensive plan, *Imagine Bothell* (City of Bothell 2015). Throughout the development of this EA, WSDOT has been coordinating with Bothell on the Canyon Park Subarea Plan update and *Draft EIS* as the City's plan progresses. The I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project would not preclude the City's proposal to increase land use densities in the Canyon Park Subarea.

3.4 Study Methods and Assumptions

WSDOT used several tools to conduct the transportation analysis. Models included Emme, a regional travel demand model; VISSIM, a freeway operations simulation model (WSDOT 2014); Synchro, an intersection operations model (WSDOT 2018a); and Sidra, a roundabout operations model.

Traffic analyses are necessary for Federal Highway Administration (FHWA) approval of interstate system access modifications and to provide traffic data for air and noise analyses for project-level environmental documentation. These tools were also used to provide the traffic operations basis for the Project design. Exhibit 3-3 lists the assumptions for the freeway analysis, intersection analysis, and safety analysis.

Exhibit 3-3. Analysis Assumptions for Freeways, Intersections, and Safety

Assumption	Freeway	Intersection	Safety
Analysis Tool(s)	VISSIM Version 10.07	Signalized and Unsignalized Intersections: Synchro Version 10.2 Roundabouts: Sidra Version 7.0	I-405 Program Crash Summary Spreadsheets
Study Years	Existing Conditions (2018) Year of Opening (2025) Design Year (2045)	Same as Freeway Analysis	Existing Conditions (2013–2017) Year of Opening
Analysis Period	Weekday AM peak period: 5 a.m. to 11 a.m. Weekday PM peak period: 2 p.m. to 8 p.m.	Weekday AM Peak Hour: Typically, 7 a.m. to 8 a.m. Weekday PM Peak Hour: Typically, 4 p.m. to 5 p.m.	Yearly Average: Peak Weekday Periods (5–9 a.m., 3–7 p.m., Monday–Friday)
Study Area	I-405 from NE 116th Street to I-5 SR 522 from Campus Way to NE 195th Street	See Exhibit 3-2 for intersections studied	Freeway: I-405 from south of NE 160th Street to I-5 SR 522 from Campus Way to SR 202 Local: See Exhibit 3-2 for intersections studied
Reporting Methodology	Not applicable	Signals and Stop Control: HCM 2016 (TRB 2016) [where not applicable, HCM 2000] Roundabouts: Per WSDOT Sidra Policy Settings (WSDOT 2018c)	Existing: Historical Crash Data Summaries For the Build Alternative: Qualitative analysis using Crash Modification Factors
Performance Metrics	Speeds, vehicle throughput, person throughput, and travel times	Level of service and delay by overall intersection and approach	Historical crash data by frequency, severity, and type

3.4.1 Traffic Volumes

Existing Conditions

Freeways

WSDOT volume and speed data were reviewed to determine typical operations under existing conditions. To develop a consistent dataset in the study area for simulation modeling, WSDOT used data from typical weekdays (Monday through Friday) from March 21 through May 31, 2016 and eliminated holidays and days when traffic conditions changed due to regional road closures. As a result of these assumptions, 46 days of loop data were used to generate the data set. Seasonal variation in traffic patterns indicates that spring typically represents an average condition. Regional facilities often show higher volumes in summer, due to more light and less rain, despite most schools being out of session. Winter, which has less light and more effects from weather, typically shows higher congestion despite lower volumes.

WSDOT used a 6-hour AM and 6-hour PM VISSIM freeway model and compiled 12, 30-minute average freeway and ramp volumes to use for the AM and PM models. Many factors affect traffic operations from day to day, such as weather, commute patterns, crashes, and events. An average value better accounts for this variability in congestion. The analysis involved an extensive review of each ramp and mainline volume to confirm that the data aligned with expected volumes and removing erroneous data from the dataset. WSDOT then incorporated these volumes into a freeway model, which was then calibrated using industry standard practices and validated to existing field conditions.

As noted above, the existing conditions freeway model was developed in 2016. For this effort, the model was updated to incorporate completed projects, specifically the northbound I-405 peak-use shoulder lane between SR 527 and I-5 in Lynnwood. A review of the model indicated it accurately reflects the current existing conditions (2018) in the study area.

Intersections

The analysis used local intersection peak hour turning-movement data to establish traffic volumes for existing conditions. The intersection AM peak hour is generally 7 a.m. to 8 a.m., and the PM peak hour is generally 4 p.m. to 5 p.m. Because the turning-movement data were from a variety of sources, including single-day data-collection efforts, WSDOT compared freeway ramp volumes to intersection ramp turning-movement volumes and adjusted volumes between the two sources to be consistent. Traffic volumes were balanced where appropriate (for example, between intersections where there are no driveways) and rounded up to the nearest five vehicles.

Traffic Forecasts

The analysis used the Puget Sound Regional Council (PSRC) travel demand forecast model to develop future year traffic projections. This model predicts traffic volumes and travel patterns based on adopted land use plans and the expected transportation network within the region. The PSRC model was refined to include detailed network resolution for the I-405, SR 522, and

SR 527 corridors, as well as portions of SR 520, Interstate 90 (I-90), and I-5. Supplemental data were incorporated from other travel demand models from cities located along the study area.

WSDOT refined housing, employment, and land use projections for future year modeling. Included in the analysis were future network improvements, such as planned roadway and transit projects, including ST3-funded improvements to the corridor. Some projects were assumed to be constructed by 2025, and others by 2045, based on their current completion schedule and whether they are funded.

The analysis used opening year and design year forecasts for the No Build Alternative and Build Alternative scenarios. Freeway and local street forecasts were derived based on growth from the PSRC forecast model and a review of land development projects in the study area. Attachment C, Travel Demand Forecasts, details the forecasting process used to update the PSRC model for existing conditions and the No Build Alternative and includes a list of the assumed future year roadway projects. In the Canyon Park Subarea, the transportation analysis assumed the land use projections identified in Bothell's currently approved and adopted comprehensive plan, *Imagine Bothell…*.(City of Bothell 2015).

Near the study area, WSDOT has several planned and programmed projects, including four operational improvement projects: two separate auxiliary lanes on southbound I-405 in Kirkland and Bellevue, a northbound auxiliary lane on I-5 in Lynnwood, and restriping improvements on westbound SR 520 between I-405 and 108th Avenue NE. Two new interchanges would also be constructed: a new half-diamond interchange at NE 132nd Street, and a reconstructed NE 85th Street interchange with direct access ramps. The one assumed local future roadway project in the study area would add one eastbound lane on NE 195th Street between 110th Avenue and the I-405 southbound ramp terminal intersection in Bothell.

See Section 5, Operational Effects, for a discussion of operational characteristics of both the No Build Alternative and the Build Alternative.

The Project would add one additional ETL between the NE 160th Street interchange area and SR 527 interchange area and new direct access ramps to 17th Avenue SE and SR 522, which would induce new ETL trips. This analysis used refined modeling forecasts that included driver willingness to pay tolls to develop forecasted volumes and revenue for the full ETL system. The modeling reflects the dynamically priced ETL system and assumes toll rates adjusted to optimize ETL use and overall mobility. This includes a detailed origin and destination volume dataset that was used in the freeway and local intersection analysis. Additional information about how WSDOT would operate the ETL system is provided in Section 5, Operational Effects.

3.4.2 Freeway Analysis

Methodology

The analysis team used VISSIM (Version 10.00-07), a traffic modeling software commonly used to model existing and future year freeway operations. The analysis involved using VISSIM to assign vehicles to trip paths based on travel demand patterns in the study area freeway network. The team calibrated the existing conditions model to accurately represent field conditions, such as volumes and speeds from field data collected from WSDOT traffic sensors (loops), and used it as the base for evaluating future conditions. It should be noted that the freeway VISSIM model is used to report existing conditions instead of field data to maintain analysis tool consistency when comparing existing and anticipated future conditions.

The morning and evening commutes on freeways in the study area last for several hours. The traffic models replicate the AM and PM peak commute periods, including the buildup and dissipation of congestion using a 6-hour VISSIM model (5 a.m. to 11 a.m., and 2 p.m. to 8 p.m.). Each model also has a 1-hour warm up, or “seeding” period, prior to the 6-hour evaluation period.

The I-405 VISSIM model is used for many analyses along the I-405 and SR 167 corridors and contains each corridor in their entirety. For this Project, WSDOT is reporting freeway performance metrics further south of the study area on I-405 to capture the impact of congestion spilling back from the SR 522 interchange area.

Evaluation Criteria

To capture the peak freeway operations during each commute period, data from a 3-hour period in both the morning (7 a.m. to 10 a.m.) and afternoon (4 p.m. to 7 p.m.) were reported. In general, the AM and PM peak periods identified above represent, on average, the periods with the most congestion throughout the entire study area. The analysis team selected a 3-hour average because the corridor has variable peaking characteristics and using a typical 1-hour peak reporting interval would under-represent the worst traffic conditions. For example, special trip generators such as Seattle-Tacoma International Airport and Boeing shift changes have an early peak hour. Other generators, such as the Microsoft campus in Redmond, have a peak hour during the latter part of each period.

The team evaluated freeway operations using vehicle throughput (volume), travel times, person throughput, and speeds as measures of effectiveness on mainline roadways. Differing facilities types were considered separately (such as GP, HOV, or ETL facilities). Speeds were evaluated for a 6-hour AM and PM peak period, while the remaining measures were evaluated for a 3-hour peak period. Exhibits showing temporal speeds for the AM and PM peak periods on I-405 were created using the VISSIM model speed output, averaged across all lanes for each facility type (GP lanes or ETLs). Areas of congestion can be seen by the increasing presence of yellow, red, and black coloring. These exhibits are shown in Attachment D, Congestion Profiles.

3.4.3 Intersection Analysis

Methodology

The local intersection analysis involved using Synchro (Version 10.2, rev 45) to calculate the unsignalized and signalized intersection delay and to develop future year signal timings. Geometric layouts, volume, and signal timing information from WSDOT, City of Bothell, City of Woodinville, and Snohomish County was used. Intersections were evaluated using the latest *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis* (HCM) methodologies (TRB 2016). At locations where current HCM methodologies are not valid, the analysis team used the HCM 2000 methodology. The future year scenarios maintained the intersection timing parameters from the existing analysis while cycle lengths and signal timings were optimized by Synchro.

The team used SIDRA (Version 7) to analyze roundabout intersections. The roundabout analysis assumes the same level of service (LOS) criteria as used for signalized intersections. The analysis followed the WSDOT SIDRA methodology (WSDOT 2018c).

Evaluation Criteria

The quality of traffic operations at intersections is measured using a LOS system as defined in the HCM (TRB 2016). LOS refers to the degree of congestion measured in average delay per vehicle. LOS A is the best operating condition, with motorists experiencing minimal delays. LOS F is the worst condition, with motorists experiencing very high delays, and at signals, often waiting through multiple signal cycles. Exhibit 3-4 shows the LOS and average vehicle delay criteria for signalized and unsignalized intersections.

Exhibit 3-4. Level of Service Criteria for Intersections

LOS	Average Delay per Vehicle (seconds)		Description
	Signals and Roundabouts	Stop-Controlled	
A	0–10	0–10	Little or no delay
B	10–20	10–15	Short delays
C	20–35	15–25	Moderate delays
D	35–55	25–35	Long delays
E	55–80	35–50	Very long delays
F	>80	>50	Failure - extreme congestion

Source: TRB 2016

Intersection delays were estimated for both individual approach legs and the overall intersection as a whole for the purpose of assigning LOS grades using the table above. The overall delay is a volume-weighted average of the delays on the approach legs that make up the intersection.

3.4.4 Safety Performance Analysis

Methodology

The analysis team collected and summarized WSDOT crash data for January 1, 2013, through December 31, 2017, for the I-405 and SR 522 freeway, ramps, local street segments, and intersections based on severity and type. The team also reviewed summarized crash data on the I-405 mainline between NE 132nd Street and I-5, and on SR 522 between Campus Way and SR 202. The team analyzed crashes that occurred during weekday peak periods (5 a.m. to 9 a.m. and 3 p.m. to 7 p.m.), when the freeway is typically most congested. Intersection and local street segment crashes were analyzed within the study area at intersections and between intersections. The analysis follows the *WSDOT Safety Analysis Guide* for mobility improvement projects (WSDOT 2017a).

Evaluation Criteria

To inform and develop the Project design, the analysis team assessed and used the characteristics and contributing factors of crashes on segments with high crash numbers over the 5-year study period, focusing on factors identifiable for fatal and serious injury crashes. The crash analysis also documented different crash types, such as rear end, angle, and fixed object. A crash type analysis is useful to identify groups of crashes that can be addressed by a specific countermeasure. On local street segments and at intersections, the analysis also focused on nonmotorized (pedestrian and bicycle) crashes.

SECTION 4 EXISTING CONDITIONS

This section documents existing conditions in the study area as of spring 2018, including traffic volumes, freeway and local street operations, safety performance, transit service, freight, and nonmotorized (pedestrian and bicycle) facilities.

4.1 Study Roadways

I-405 begins at I-5 in Tukwila and terminates approximately 30 miles to the north at another junction with I-5 in Lynnwood. The Project extends from just south of the NE 160th Street interchange in Bothell to just north of the SR 527 interchange in Bothell. Approaching the NE 160th Street interchange, there are three general purpose (GP) lanes and two express toll lanes (ETLs) in each direction. Between SR 522 and just south of I-5, there are two GP lanes and one ETL in each direction. The ETL ends less than a mile south of the I-5 interchange. An auxiliary lane is also provided on northbound I-405 between NE 195th Street and SR 527.

The study area contains several special use lanes on I-405. A peak-use shoulder lane on northbound I-405 is located between SR 527 and I-5. As the name implies, drivers may use the shoulder as an additional lane during times with heavy congestion. It typically operates on weekdays between 2 p.m. and 7 p.m. Fixed-route transit vehicles are also allowed to operate on the outside shoulder of southbound I-405 between the SR 522 on-ramp and the NE 160th Street off-ramp and between the SR 527 on-ramp and the NE 195th Street off-ramp. These lanes are open weekdays between 6 a.m. and 9 a.m., allowing transit vehicles to bypass stop-and-go traffic in the GP lanes. The maximum allowable speed in these lanes is 35 miles per hour (mph).

I-5 is a major north-south interstate through Washington, running from the Oregon state border, through the Seattle metro area, and to the Canadian border. In the Project area between the 44th Avenue NE and 164th Avenue SW interchanges, I-5 has three GP lanes and one high occupancy vehicle (HOV) lane in each direction. Auxiliary lanes are provided between the I-405 and 164th Street SW interchanges.

SR 525 starts as a continuation of the I-405 corridor just north of the I-405/I-5 interchange in Lynnwood. Within the Project study area between I-5 and Alderwood Mall Parkway, SR 525 has four lanes (two in each direction) and is a limited access freeway with a 60 mph speed limit. Auxiliary lanes are provided within this segment. Just north of the Project study area near Lincoln Avenue, SR 525 transitions into a highway with signalized intersections and a posted speed limit of 40 mph.

SR 522 begins at I-5 in Seattle and terminates at US 2 in Monroe. SR 522 is a four-lane freeway with an auxiliary lane in each direction between the I-405 interchange and SR 202 to the east and has a posted speed limit of 60 mph. West of I-405, SR 522 transitions to a four-lane arterial street and with a speed limit of 35 mph.

Many of the north-south roadways in the study area are discontinuous, and as a result, I-405 carries a large number of non-regional trips. Exhibit 4-1 describes the key roadways in the study area.

Exhibit 4-1. Key Roadways in the Study Area

Facility	Functional Classification	Number of Lanes	Speed Limit	Sidewalks	Bicycle Lanes
I-405	Limited Access Highway	6-10[a]	60	NA	NA
I-5	Limited Access Highway	8-10	60	NA	NA
SR 525	Limited Access Highway	4	60	NA	NA
NE 160th Street	Minor Arterial	5	35	Yes	Yes
SR 522 (west of I-405)	Principal Arterial	4	35	No	No
SR 522 (east of I-405)	Limited Access Highway	4-6	60	NA	NA
131st Avenue NE/ 132nd Avenue NE	Arterial	4-5	35	Yes	No
Beardslee Blvd/ NE 195th Street	Minor Arterial	4	30	Yes	Yes
228th Street SE	Minor Arterial	3-5	30	Yes	Yes
Bothell-Everett Highway/ SR 527	Principal Arterial	6	45	Yes	Yes
17th Avenue SE	Private	2	25	Yes	No
220th Street SE	Private	4	25	Yes	No

Blvd = Boulevard; NA = not applicable; NE = northeast; SE = southeast; SR = State Route

[a] Six lanes north of SR 527 and 10 lanes south of SR 522.

4.2 Freeway Operations

4.2.1 Daily Traffic Volumes

The existing average weekday traffic volumes were compiled from available data. In the analysis, these volumes represent two-directional total volumes (for all lane types), with northbound and southbound traffic added together. On I-405 south of NE 160th Street, traffic volumes are approximately 197,000 vehicles per day, while between NE 195th Street and SR 527, traffic volumes are approximately 143,000 vehicles per day. The ETLs account for up to 18 percent of the average weekday traffic volume, and truck traffic makes up approximately 6 percent of the average weekday traffic volume across all lanes. On SR 522, daily traffic volumes are approximately 96,000 vehicles per day east of I-405 and approximately 49,000 vehicles per day west of I-405.

4.2.2 Peak Period Traffic Volumes

Peak period traffic volumes were compiled and averaged from available data for the AM and PM peak 3-hour period. Southbound I-405 south of NE 160th Street carries an average of approximately 7,400 vehicles per hour during the AM peak hour, with approximately 37 percent in the ETLs. Southbound I-405 north of NE 195th Street carries an average of approximately 3,700 vehicles per hour during the AM peak hour, with approximately 36 percent in the ETLs. Northbound I-405 south of NE 160th Street has approximately 7,400 vehicles per hour, with 19 percent in the ETLs during the PM peak hour. Northbound I-405 north of NE 195th Street has approximately 5,600 vehicles per hour, with 26 percent in the ETLs during the PM peak hour.

Peak period volumes on surrounding freeways, including I-5 and SR 525, were also compiled and averaged. Southbound I-5 north of the I-405/I-5 interchange has an average of 6,700 vehicles per hour with approximately 11 percent in the HOV lane during the AM peak period. Southbound SR 525 within the I-405/I-5 interchange has approximately 1,200 vehicles per hour. During the PM peak period, northbound I-5 north of the I-405 interchange has an average of 7,600 vehicles per hour, with approximately 18 percent in the HOV lane. Northbound SR 525 within the I-405/I-5 interchange has approximately 1,700 vehicles per hour.

Peak hour volumes are constrained by congestion within the corridor. Congestion affects the total volume of traffic able to access both the GP lanes and ETLs. The NE 160th Street interchange constricts southbound traffic during the AM peak period, while the SR 522 interchange constricts northbound traffic during the PM peak period. Both locations limit the number of vehicles able to pass through the center of the study area. Effects from congestion-related constraints are discussed in the following sections.

4.2.3 Person Throughput

Person throughput is the number of persons moved through various freeway sections. It is measured as the number of vehicles in a particular class (single-occupancy vehicles [SOVs], high-occupancy vehicles [HOVs], buses, and trucks) multiplied by the average number of persons in each vehicle class. Two segments were selected to report person throughput: I-405 south of NE 160th Street, which has two ETLs in each direction, and I-405 north of NE 195th Street, which has one ETL in each direction. This location was also chosen as representative of the Project for its proximity to the revised northern end of the two-lane ETL system. The traffic volumes shown are for the higher-volume direction in each peak hour.

South of NE 160th Street, during the AM peak hour, I-405 carries an average of approximately 9,900 persons traveling southbound. During the PM peak hour, this section carries an average of approximately 9,800 persons traveling northbound.

North of NE 195th Street, during the AM peak hour, I-405 carries an average of approximately 5,100 persons traveling southbound. During the PM peak hour, this section carries an average of approximately 7,600 persons traveling northbound.

4.2.4 Operations, Speeds, Congestion, and Travel Times

Because of high regional traffic demand in both directions, I-405 currently experiences congestion in the study area many hours of the day in both the GP lanes and ETLs. This congestion results in the ETL facility struggling to meet FHWA performance criteria (peak-direction traffic moving at 45 mph for 90 percent of the peak period) regularly on southbound I-405 on most days and occasionally on northbound I-405.

Key locations, or "recurring bottlenecks," create congested conditions during both the AM and PM peak periods. A bottleneck is a localized constriction of traffic flow that occurs on a frequent and predictable basis, regardless of weather conditions, crashes, or events. A bottleneck causes congestion because of too much traffic in one area. It can be exacerbated by the roadway configuration, such as roadway narrowing or the presence of on- or off-ramps. Generally, slower-than-posted speeds form upstream of a bottleneck, while speeds closer to posted limits occur downstream of a bottleneck.

ETL capacity is reduced when the adjacent GP lanes are congested because traffic volumes are generally high, and slower GP lanes cause ETL users to drive more cautiously. A related factor is that drivers access the ETLs in the study area at limited locations, and ETL drivers reduce speeds in these access areas out of concern of sudden lane changes to and from the ETL.

Attachment D, Congestion Profiles, contains exhibits showing existing peak period operations by direction and lane type. These exhibits depict congestion using vehicle speeds and bottlenecks. The colors yellow, red, and black indicate increasing levels of congestion.

Freeway travel times were also used to assess freeway operations and were determined from the VISSIM modeling efforts. In order to account for Project effects, travel times are reported for the ETL and GP lanes. Two separate travel time trips were reported because the ETL system ends south of the I-5 interchange. The first section includes both GP and ETL travel times and is located between NE 116th Street in Kirkland and the end of the ETL just south of I-5 in Lynnwood. The second section is composed of all GP lanes and is located between the ETL end and I-5. Exhibit 4-2 shows the approximate locations of each of the travel time segments but is not to scale.

Exhibit 4-2. Location of Sections for Travel Time Analysis

When traveling at the posted speed limit, the trip on I-405 between I-5 (Lynnwood) and the ETL start/end should take slightly less than 1 minute. The trip on I-405 between the ETL start/end and NE 116th Street should take about 9 minutes. The model considers actual field-measured vehicle speeds, so for some segments and lane types, modeled travel times can be faster than speed limit travel times. Exhibit 4-3 shows simulated travel times for existing conditions. The travel times indicated are averages (in minutes) for the 3-hour AM and PM peak periods.

Exhibit 4-3. Existing I-405 3-Hour Peak Period Average Travel Times

Direction of Travel	I-405 Section	AM Peak		PM Peak	
		GP	ETL	GP	ETL
Southbound	I-5 (MP 29.7) to ETL Start (MP 28.9)	3	NA[a]	1	NA[a]
	ETL Start (MP 28.9) to NE 116th Street (MP 19.8)	33	13	9	9
Northbound	NE 116th Street (MP 19.8) to ETL End (MP 29.0)	9	9	19	10
	ETL End (MP 29.0) to I-5 (MP 29.7)	1	NA[a]	2	NA[a]

ETL = express toll lanes; GP = general purpose lanes; NA = not applicable
AM Peak 3-hour average = 7 to 10 a.m.; PM Peak 3-hour average = 4 to 7 p.m.
Travel times are rounded to the nearest minute.
[a] No ETL exists in the short section; all traffic uses the GP lanes.

AM Peak Period

During the AM peak period, some areas experience congestion because bottlenecks in the study area affect operations in both the GP lanes and ETLs. A bottleneck occurs in the GP lanes on southbound I-405 between the SR 522 and NE 160th Street interchange because of high traffic volumes entering I-405 from SR 522 and limited capacity approaching the NE 160th Street interchange. Congestion in the GP lanes from the bottleneck regularly extends north to the I-5 (Lynnwood) interchange. This congestion also spills back onto westbound SR 522 approaching the I-405 interchange.

A second bottleneck in the southbound I-405 GP lanes forms at the SR 527 on-ramp to southbound I-405 because of vehicles merging into a freeway segment with limited capacity. Congestion also forms in the southbound ETLs at the ETL access point between SR 527 and NE 195th Street because of ETL vehicles slowing down next to stopped GP lane traffic and stopped ETL vehicles trying to exit the ETL and merge into the GP lane. During the southbound AM peak period, the ETLs experience congestion and meet WSDOT's performance standard of maintaining a speed of 45 mph 75 percent of the time (WSDOT 2018b). The combination of both of these bottlenecks results in southbound vehicle travel times that are much greater than the free-flow travel time.

There is generally no northbound I-405 congestion in the study area during the AM peak period. Congestion on southbound I-5 typically extends through the I-405 interchange during the AM peak period due to bottlenecks outside of the study area. Congestion on northbound I-5 and on SR 525 does not occur regularly through the study area.

PM Peak Period

Similar to the AM peak period, bottlenecks in the study area during the PM peak period affect operations and vehicle travel times in both the GP lanes and ETLs.

A bottleneck occurs in the GP lanes on northbound I-405 near NE 160th Street approaching the SR 522 interchange because the off-ramp to eastbound SR 522 is over capacity. Congestion from the bottleneck extends south into the I-405 GP lanes and continues to the NE 116th Street interchange.

A second bottleneck forms in the GP lanes at the northbound I-405 off-ramp to northbound I-5. The queue from this bottleneck frequently extends about 1 mile south in the GP lanes toward SR 527. Some localized slowing may also occur on southbound I-405 at the SR 522 and SR 527 interchanges. The northbound ETLs in the PM peak period operate at higher speeds than during the AM peak period, meeting WSDOT's performance standard 88 percent of the time (WSDOT 2018b).

Northbound I-5 has PM peak period congestion related to two bottlenecks in the Project study area: one bottleneck approaching the I-405 interchange and a secondary bottleneck near the 164th Street SW on-ramp to I-5. Southbound I-5 and both directions of SR 525 do not typically have congested conditions during the PM peak period.

4.2.5 Existing Ramp Queuing

Under existing conditions, most I-405 off-ramps generally do not regularly spill back onto the I-405 mainline in the study area during either peak hour; however, the northbound I-405 off-ramp to SR 527 spills back on to the I-405 mainline occasionally due to congestion on SR 527.

Queues at on-ramps can frequently spill back on to arterials. In particular, queues from the SR 522 and SR 527 interchange ramps were observed during the AM and PM peak periods extending on to local streets. Heavy ramp traffic volumes, inadequate vehicle storage, and poor mainline operations all contribute to this condition.

4.3 Intersections

Exhibit 4-4 shows the existing approach and overall intersection level of service (LOS) results for each of the 36 intersections evaluated in the study area. See Section 3.4.3 for an explanation of the LOS categories. Attachment E, Peak Hour Intersection Analysis Results, shows detailed LOS and delay results for each of the study area intersections.

In the AM peak period, four intersections currently operate at LOS E or worse. The intersection of NE 160th Street and 116th Avenue NE operates at LOS F because left-turning vehicles from 116th Avenue NE struggle to find adequate gaps in opposing traffic. The all-way stop controlled intersection of 23rd Drive SE and 220th Street SE in the Canyon Park Business Center (CPBC) operates at LOS E due to a single through lane that serves high traffic volumes on the eastbound approach. The intersection of Bothell Everett Highway and 228th Street SE operates at LOS E due to heavy north-south volume. The intersection of SR 527 and 214th Street SE operates at LOS E due to high southbound through and left-turn volumes. Twelve intersections in the study area operate with at least one approach at LOS E or worse, while the remaining intersections operate at LOS D or better for all approaches.

In the PM peak period, five intersections currently operate at LOS E or worse. Similar to the AM peak period, left-turning vehicles at the NE 160th Street and 116th Avenue NE intersection struggle to find adequate gaps in the opposing traffic. In the CPBC, the all-way stop controlled 20th Avenue SE and 220th Street SE intersection currently operates at LOS F with several approaches over capacity. Three of these intersections are located along SR 527/Bothell Everett Highway, where traffic volumes are high and the intersections are operating over capacity. Twelve intersections operate with at least one approach at LOS E or worse while the remaining intersections operate at LOS D or better for all approaches.

While only a few intersections operate at an overall LOS E or F during the AM and PM peak periods, many specific intersection approaches operate at LOS E or F. These approaches can create congested conditions for many users, with queuing that affects adjacent intersections. Of note, the northbound approach at the SR 527 and SR 524 intersection often spills back through multiple upstream intersections during the PM peak period. Queuing and delay from adjacent intersections may not always be reflected in LOS performance as measured using the *Highway Capacity Manual* (HCM) methodologies (TRB 2016).

Exhibit 4-4. Existing Intersection Analysis Results, Sheet 1 of 3

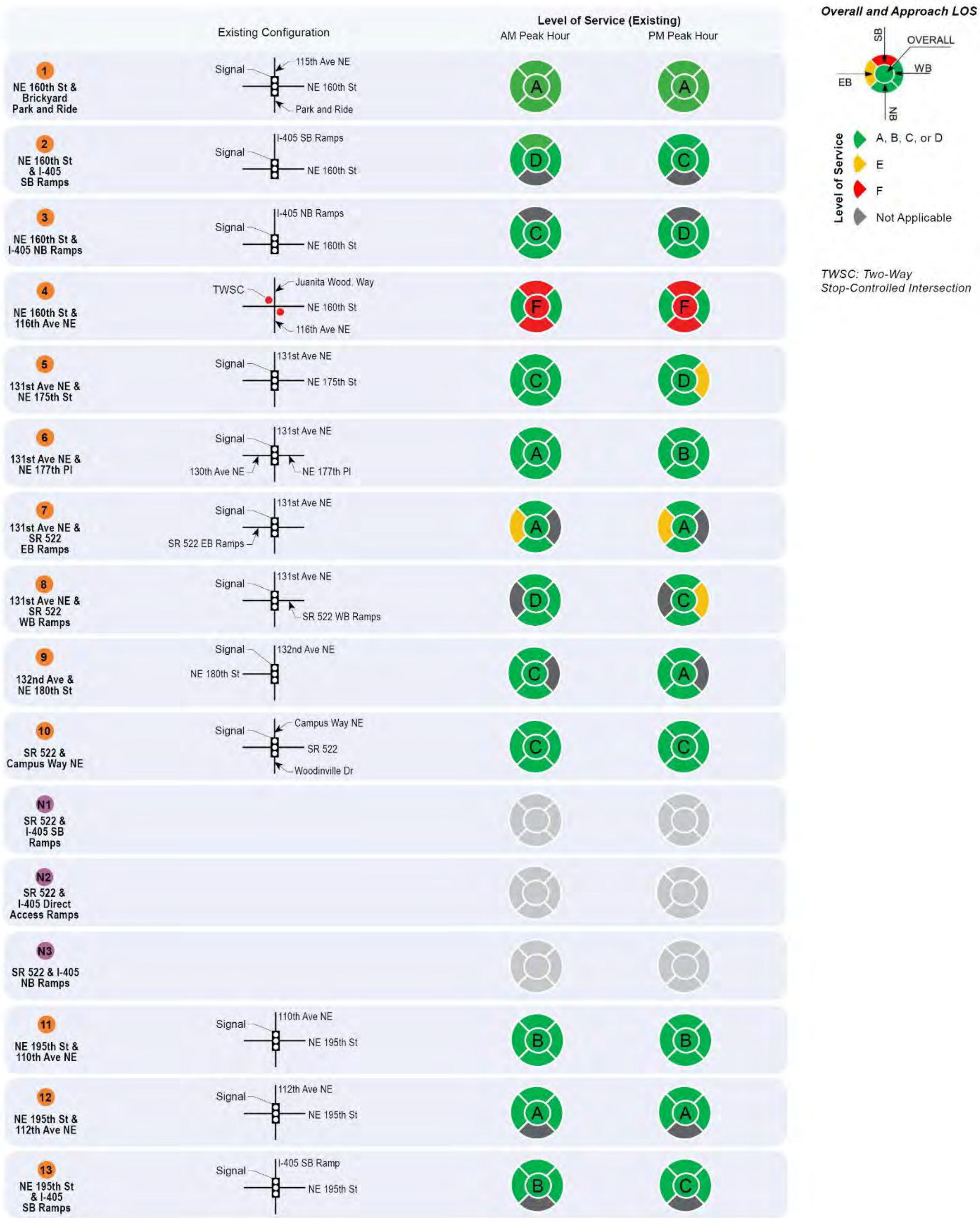


Exhibit 4-4. Existing Intersection Analysis Results, Sheet 2 of 3

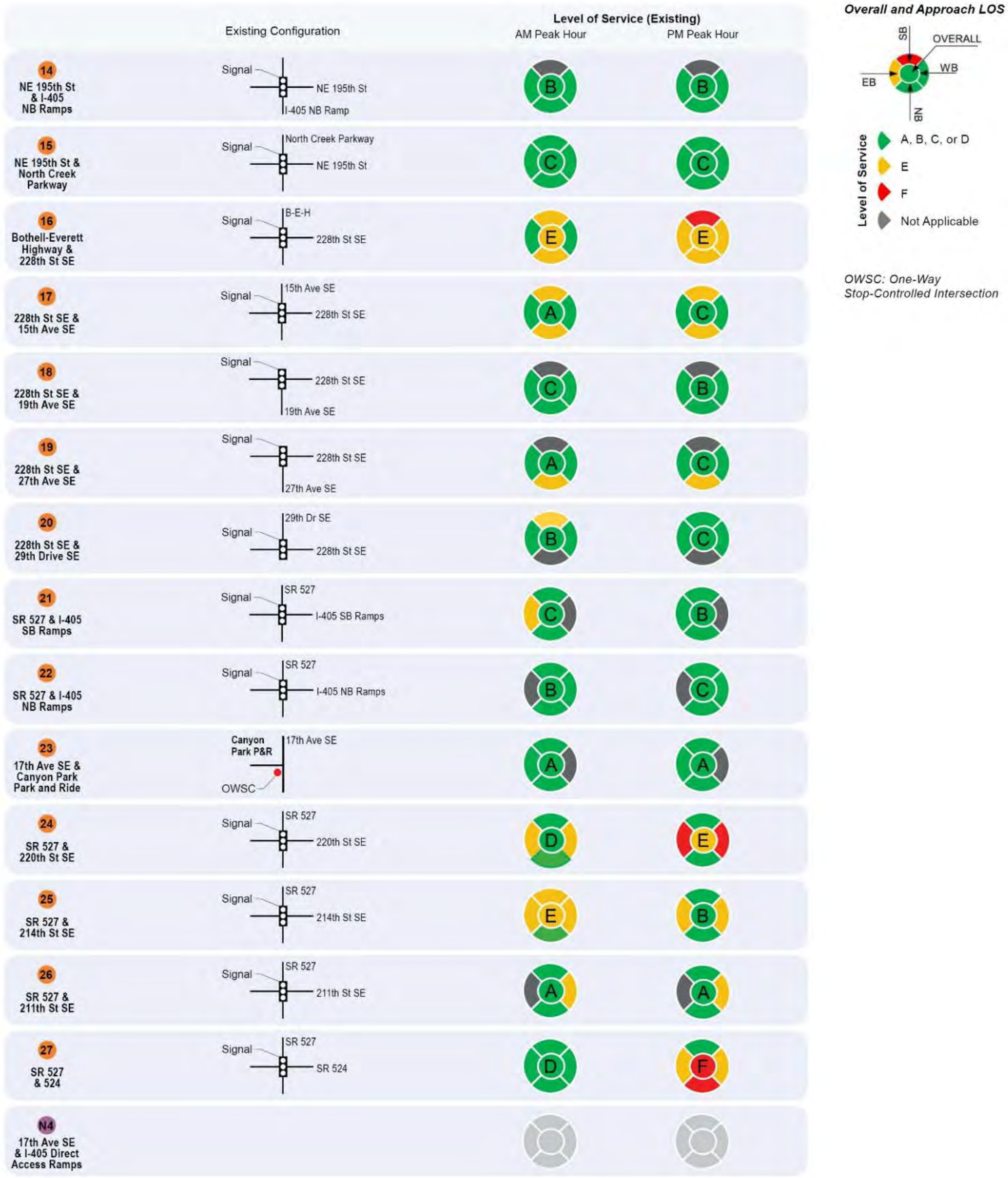


Exhibit 4-4. Existing Intersection Analysis Results, Sheet 3 of 3

4.4 Safety Performance

4.4.1 Freeways

A total of 2,863 crashes occurred on the freeway portions of the study area during the 5-year analysis period with 2,697 reported crashes on the approximately 9-mile-long I-405 section, and 166 reported crashes on the approximately 3-mile-long SR 522 section.

Exhibit 4-5 and Exhibit 4-6 show the summary of freeway crashes on I-405 and SR 522 by type during the peak and off-peak periods. (Note that the peak period for safety analysis corresponds to the times when free use of the ETL is restricted to 3+ HOVs, rather than the 3-hour peak period used in simulation.)

Rear-end and sideswipe/angle crashes are predominant during peak periods, which typically represent the most congested conditions of the day. The off-peak period crashes on SR 522 indicate a high proportion of fixed-object crashes. Upon closer inspection, one segment of westbound SR 522 has a high proportion of fixed object crashes near where the roadway transitions from a freeway to an arterial. This segment is on a curve where vehicles are typically changing speed from 60 mph to 35 mph.

Exhibit 4-5. Existing Safety Performance – I-405 Mainline Crashes by Type

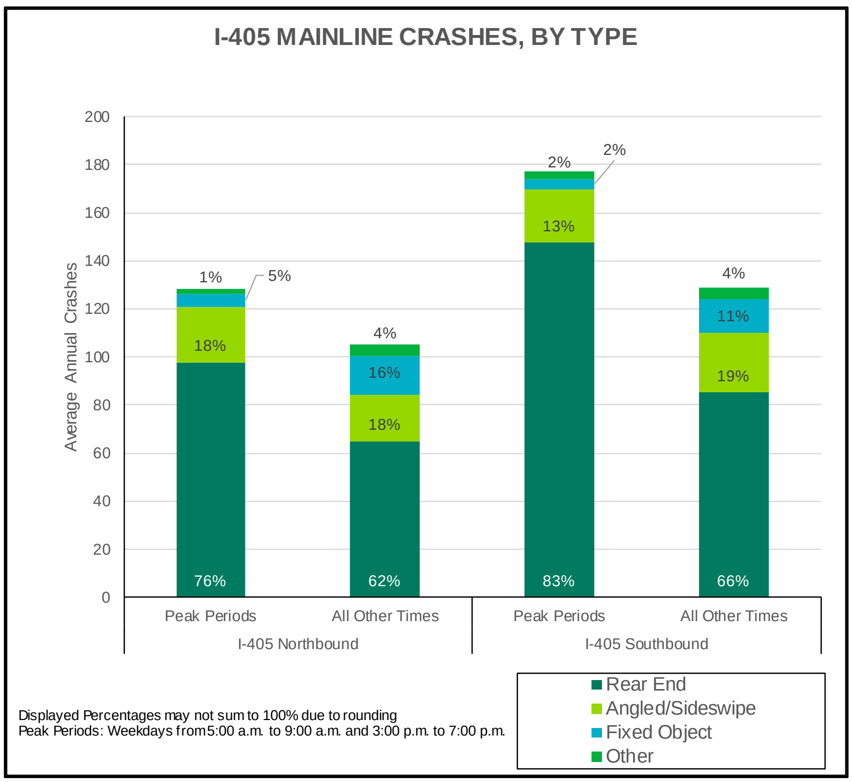
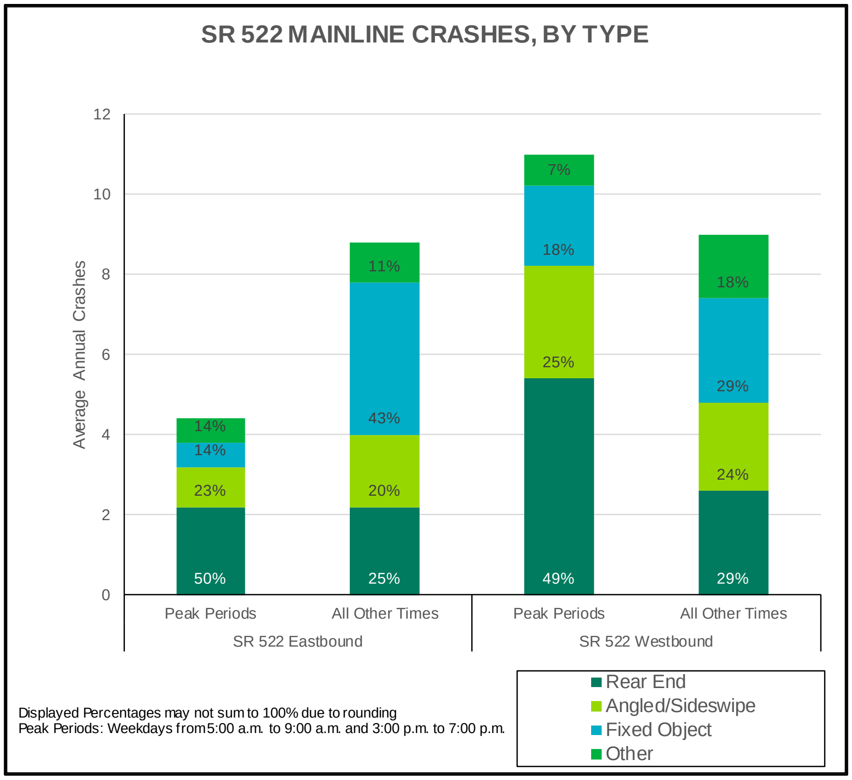


Exhibit 4-6. Existing Safety Performance – SR 522 Mainline Crashes by Type



Crashes on the freeway segments were also analyzed based on three levels of severity: property damage only, fatal and serious injury, and other injury. As shown in Exhibit 4-7 and Exhibit 4-8, most of the reported crashes on I-405 and SR 522 in the study area were property damage only. Up to 35 percent of crashes on the freeway segments resulted in an injury.

Exhibit 4-7. Existing Safety Performance – I-405 Mainline Crashes by Severity

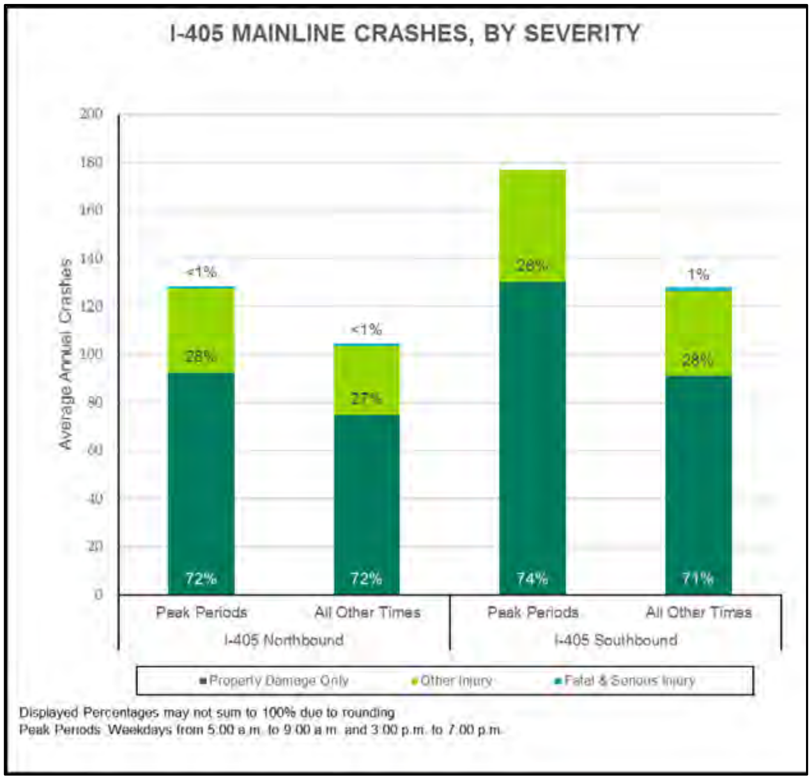
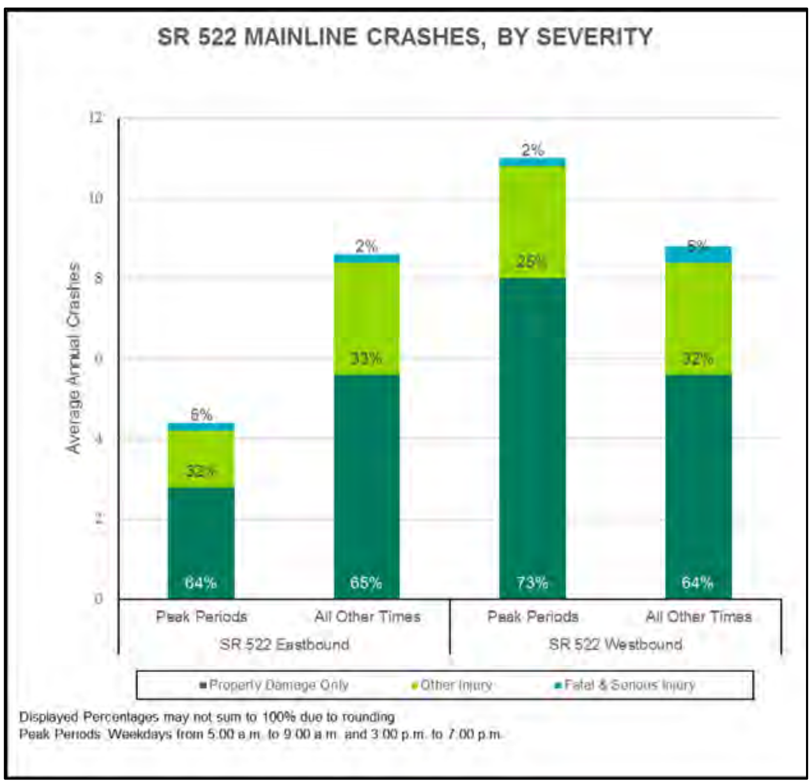


Exhibit 4-8. Existing Safety Performance – SR 522 Mainline Crashes by Severity



Over the 5-year reporting period (2013 to 2017), a total of 19 fatal and serious injury crashes were reported on the freeway segments in the study area. Two of the fatal and 12 of the serious injury crashes were reported on I-405, and one fatal and four serious injury crashes were reported on SR 522.

4.4.2 Ramps

A total of 608 crashes occurred on the 39 ramps in the study area during the 5-year analysis period. Nearly 35 percent of all ramp crashes in the study area were fixed-object crashes, with some individual ramps exhibiting approximately 70 percent fixed-object crashes.

Thirteen out of the 39 ramps had more than 20 crashes annually. The southbound off-ramp from I-5 (Lynnwood) to southbound I-405 had the most with 105 crashes.

Two fatal and six serious injury crashes were reported on the interchange ramps in the study area. See Attachment F, Existing Safety Performance, for more detailed information.

4.4.3 Intersections

A total of 902 crashes were reported at intersections or were intersection-related, and 528 crashes were reported on local street segments. In general, intersections with higher entering traffic volumes experienced a higher number of crashes. The intersections with the most crashes were as follows:

- Bothell–Everett Highway and 228th Street SE (140 crashes)
- SR 527 and SR 524 (114 crashes)
- SR 527 and 220th Street SE (64 crashes)

One fatal and 12 serious injury crashes occurred at intersections and on streets in the study area. Attachment F, Existing Safety Performance, provides more detailed information about the number of crashes at each of the study area intersections by four levels of severity: fatal, serious injury, injury (all others), and property damage only.

4.5 Transit Network

Currently, transit service is available throughout the study area on arterial streets, SR 522, SR 527, and I-405 from King County Metro Transit (King County Metro), Community Transit, and Sound Transit. Together they have 14 routes that serve or pass through the study area (Community Transit 2018; KCM 2018; Sound Transit 2018). All bus routes in the study area offer weekday service, and five routes also offer weekend service. Exhibit 4-9 shows a map of existing transit service in the study area, and Attachment G, Current Transit Routes, describes transit service in more detail.

Bus routes traveling on I-405 provide service to three main park and ride lots located near I-405 in the study area: Brickyard, Bothell, and Canyon Park. Exhibit 4-10 documents each park and ride's capacity, utilization, and routes served. All three park and ride facilities have a utilization of over 90 percent, indicating they are approaching or at capacity (KCM 2017).

Exhibit 4-9. Existing Transit Routes and Facilities near the Study Area

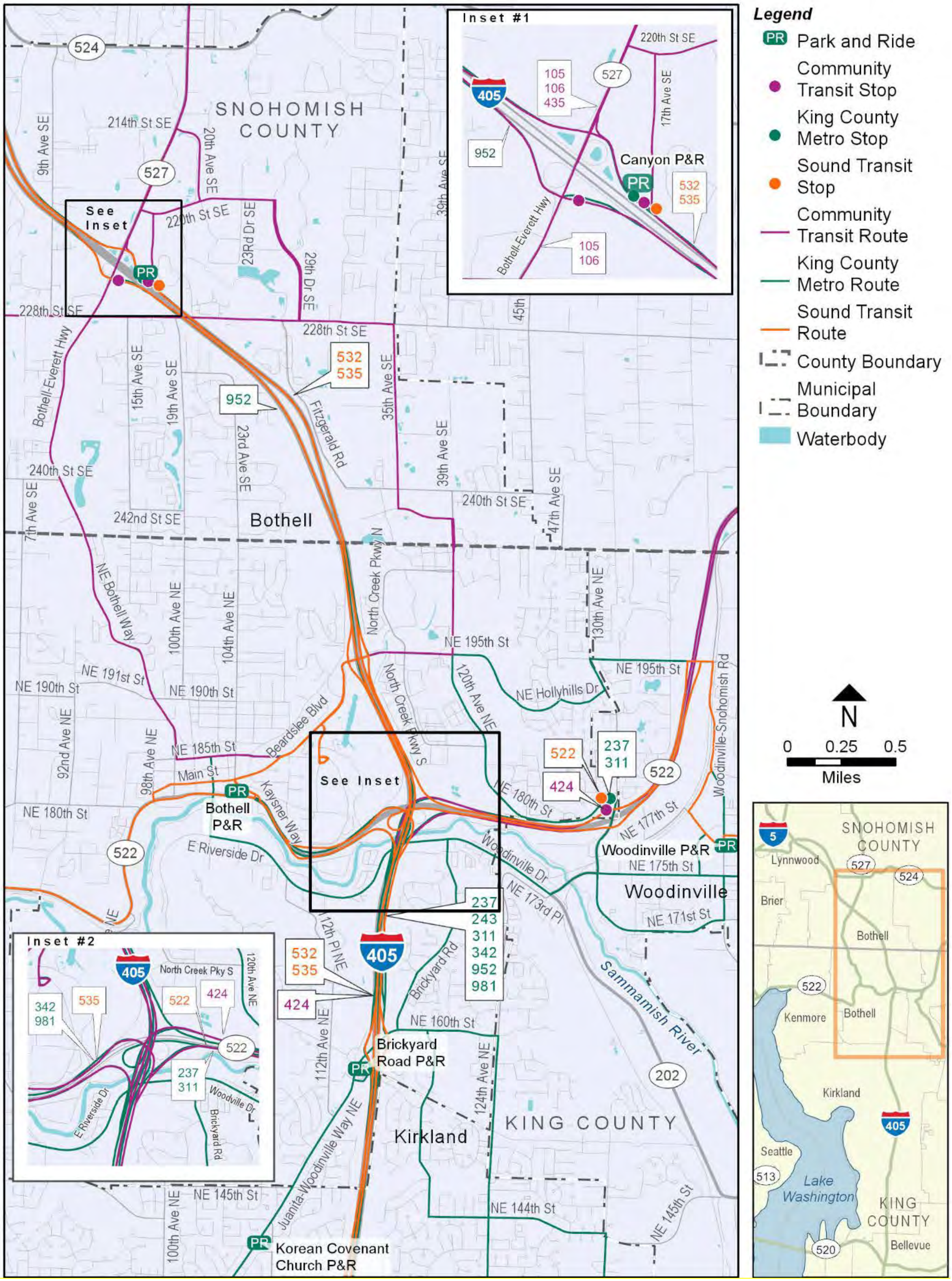


Exhibit 4-10. Study Area Park and Ride Facilities

Park and Ride	Capacity (stalls)	Utilization (%)	Transit Routes Served
Brickyard	443	90	Metro: 236, 237, 238, 255, 311, 342, 952 Sound Transit: 532, 535
Bothell	220	99	Metro: 238, 243, 312, 342, 372 Sound Transit: 522, 535
Canyon Park[1]	295	100	Community Transit:105, 106, 120, 435 Metro: 952 Sound Transit: 532, 535

[1] The Canyon Park Park and Ride capacity and percent utilization is based on the 2017 park and ride utilization study. This facility was recently modified to accommodate the Community Transit SWIFT Green Line and now has a capacity of 282 stalls.

I-405 bus routes servicing the Brickyard and Canyon Park park and ride lots use "flyer stops" on the freeway ramps. Freeway flyer stops on the NE 160th Street ramps serve Brickyard, and stops on the SR 527 ramps serve Canyon Park.

Where possible, transit vehicles on I-405 use the ETLs. For example, nine bus routes use the ETLs and the ETL direct access ramps located at NE 128th Street in Kirkland. During congested peak periods, several bus routes drive on the southbound I-405 shoulder from the SR 527 on-ramp to the NE 195th Street off-ramp, and from the SR 522 on-ramp to the NE 160th Street off-ramp. Transit vehicles can also use the HOV bypass lanes located at many freeway on-ramp locations in the study area. These lanes allow transit vehicles to bypass ramp meters to minimize delay and exist at most metered on-ramps in the study area.

Transit vehicles experience delay because congestion is present throughout peak periods under existing conditions in the ETLs (and in the GP lanes where transit vehicles use them) throughout the study area. This congestion reduces transit reliability and creates more travel time variability. Transit agencies that use the corridor must account for this variability in their budgeting and service schedules.

4.6 Existing Freight Mobility

I-405 is a major freight carrier in King and Snohomish counties. Trucks compose about 6 percent of existing daily traffic on I-405 in the study area and approximately 8 percent of existing daily traffic on SR 522 in the study area, with major freight origins and destinations throughout the area.

Freight mobility within the Seattle metropolitan area is largely supported by a system of designated freight routes connecting streets to major freight destinations. WSDOT uses the Freight and Goods Transportation System (FGTS) to classify roadways based on freight tonnage. Corridors are classified into five categories, T-1 through T-5, based on annual gross tonnage. The classifications range from at least 20,000 tons in 60 days (T-5) to more than 10 million tons per year (T-1).

I-405 carried over 37 million tons of freight in 2017 and is designated as a T-1 corridor. Other corridors in the study area with an FGTS classification include SR 522 (T-2), SR 527 (T-2), Juanita-Woodinville Way NE (T-3), NE 160th Street (T-3), and 228th Street SE (T-3) (WSDOT 2017b).

4.7 Existing Nonmotorized Network

Exhibit 4-11 and Exhibit 4-12 describe the existing nonmotorized facilities in the study area.

Sidewalks are provided on one or both sides of all major streets in the study area. SR 522 does not have sidewalks east of the Campus Way NE/Woodinville Drive intersection. Bicycle lanes exist on Bothell–Everett Highway/SR 527 except at the I-405 overcrossing. Bicycle lanes are also located on Juanita Woodinville Way N, NE 160th Street, Beardslee Boulevard, NE 195th Street, and 228th Street SE. A pedestrian bridge over I-405 at the SR 527 interchange connects the southbound I-405 flyer bus stop (on the west side of I-405) and the Canyon Park Park and Ride (on the east side of I-405).

In addition to sidewalks and bicycle lanes, portions of two regional trails pass through the study area. The North Creek Trail is a 7.25-mile-long asphalt and dirt trail that begins in Bothell at the Sammamish River Trail near SR 522 and ends at McCollum Pioneer Park in Mill Creek. The North Creek Trail passes through much of the study area. The Sammamish River Trail runs 10.1 miles along the Sammamish River from Bothell to Marymoor Park in Redmond as part of the Locks to Lakes Corridor. The entire length of the Sammamish River Trail is paved and used extensively by commuters as a nonmotorized corridor between Eastside cities and Seattle.

Exhibit 4-11. Existing Sidewalks and Bicycle Lanes in the Study Area

Facility	Segment[a]	Sidewalks	Bicycle Lanes
Juanita Woodinville Way N/ NE 160th Street	Brickyard Park and Ride to 116th Avenue NE	Yes	Yes
131st Avenue NE/132nd Avenue NE	NE 182nd Place to NE 175th Street	Yes	No
SR 522	Campus Way NE to I-405	No	No
Beardslee Blvd/NE 195th Street	110th Avenue SE to North Creek Parkway	Yes	Yes
220th Street SE	SR 527 to 17th Avenue SE	Yes	No
228th Street SE	Bothell–Everett Highway to 29th Drive SE	Yes	Yes
17th Avenue SE	220th Street SE to Canyon Park Park and Ride	Yes	No
Bothell-Everett Highway	I-405 to 228th Street SE	Yes	Yes
SR 527	I-405 overcrossing	Yes	No
SR 527	SR 524 to I-405	Yes	Yes

[a] Existing sidewalks and bicycle lanes have only been identified for segments located within the study area.

Exhibit 4-12. Map of Existing Nonmotorized Facilities

SECTION 5 OPERATIONAL EFFECTS

This section compares the long-term (operational) effects of the Project using the evaluation criteria described in Section 3, Study Approach, for the No Build and Build Alternatives for both the opening year in 2025 and design year in 2045.

5.1 No Build Alternative

The No Build Alternative would include the continuation of WSDOT routine maintenance in the study area, which would consist of any short-term minor construction necessary for continued operation of the existing I-405 facility. It would also include minor safety improvements and fish barrier correction projects as required within the study area.

The No Build Alternative analysis includes assumed future-year roadway projects, as discussed in Section 3, Study Approach, and Attachment C, Travel Demand Forecasts. The assumed projects also include major I-405 projects, including the reconstruction of the NE 85th Street interchange to include direct access ramps, a new half-diamond interchange at NE 132nd Street, various auxiliary lanes, and the construction of express toll lanes (ETLs) on I-405 between Renton and Bellevue.

5.2 Build Alternative

The Build Alternative analysis includes all of the future-year roadway projects assumed for the No Build Alternative and the elements discussed in Section 2, Project Description. In addition, the Project would modify several elements of the existing ETL system. Exhibit 5-1 shows the extent of the ETL system in the study area, ETL direct access ramps, access point locations, and fare zones with the No Build and Build Alternatives. Modifications to the system under the Build Alternative include ETL operations, ETL access, and fare zones.

5.2.1 Express Toll Lane Operations

The analysis assumed that the requirements for the current I-405, Bellevue to Lynnwood ETL system—including destination/dynamic pricing, vehicle occupancy, user exemptions, hours of operation, vehicle weight restrictions, and electronic tolling systems—would remain in place for the Project, as they represent the most recent operating guidance from the Washington State Transportation Commission (WSTC).

Federal Highway Administration (FHWA) performance metrics require the ETLs to operate so that carpools, transit, and paid users receive a reliable trip at 45 miles per hour (mph), 90 percent of the time. The analysis projected tolled volume, rates, and revenue for the full 40-mile ETL system. Peak-period, peak-direction toll rates were projected to exceed the current $10 toll cap in place for the Bellevue to Lynnwood ETL system in both 2025 and 2045. The ETLs are expected to operate at capacity through congested sections of the I-405 corridor. This analysis allowed toll rates to exceed the WSTC's current $10 maximum toll rate to represent a condition in which the ETLs would be expected to meet the WSTC's policy to manage demand so that carpools, transit, and paid users receive a reliable trip and to meet FHWA's performance requirements. If future tolling policy differs from these assumptions, operations in the ETLs and adjacent general purpose (GP) lanes could differ from what is described here.

5.2.2 Express Toll Lane Access

ETL access would be provided via a combination of direct access ramps and mainline access points, as shown in Exhibit 5-1. Two interchanges, at SR 522 and south of SR 527 at 17th Avenue SE, would provide new direct access to and from the ETLs. These access points would provide access to all eligible vehicles (see Section 2.2) to and from both directions of I-405. Inline transit stations (one in each direction) would also be constructed at the direct access ramps at SR 522 and south of SR 527 at 17th Avenue SE.

Where direct access ramps are not present, travelers would continue to have access between the ETLs and GP lanes on mainline I-405. Each location would have a skip stripe between an ETL and adjacent GP lane, indicating that entry and exit are allowed. Advance signage for direct access ramps and access points would show the appropriate freeway exit destinations and the associated toll rate(s) to enter the ETLs. In addition to the new direct access ramps, existing ETL access would be modified at three locations:

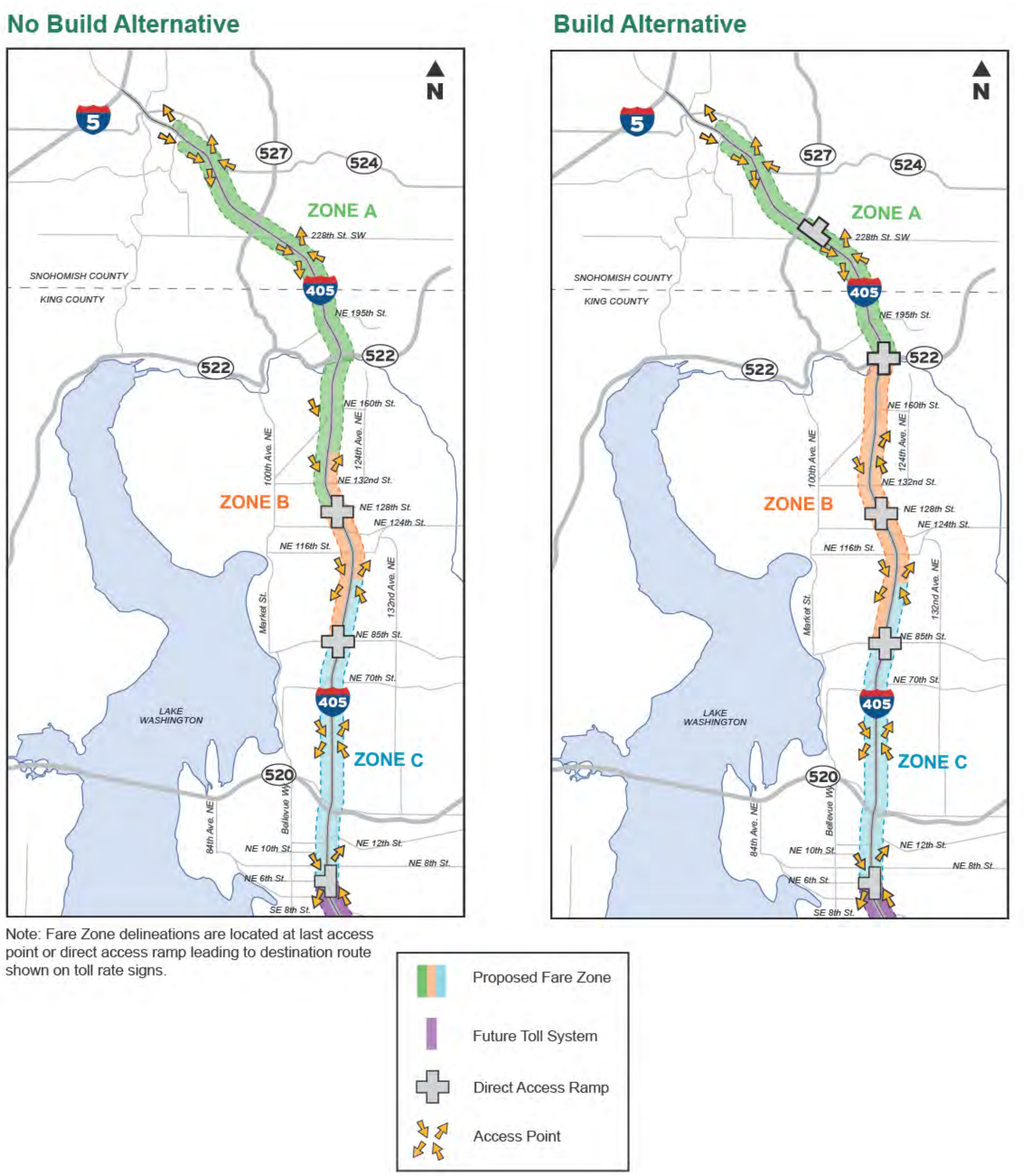
- The southbound I-405 ETL entrance-only access point in the NE 160th Street interchange vicinity, where the second ETL currently begins, would be closed. The new direct access ramps at the SR 522 interchange would replace the need for this access. ETL users from SR 522 would use the new direct access ramps, while southbound ETL users who enter I-405 at the NE 195th Street interchange would be able to access the ETLs at the SR 522 interchange or remain in the GP lanes for an additional 0.8 mile and enter the ETLs south of NE 160th Street. The elimination of this access point would reduce the number of vehicles weaving across several GP lanes and would improve operations.
- The northbound I-405 ETL exit-only access point south of the NE 160th Street interchange vicinity, where the second northbound ETL currently ends, would be modified to allow both entry and exit. This access would be modified to allow traffic from the NE 124th Street and new NE 132nd Street interchange to enter the ETLs while maintaining the egress to NE 160th Street, which is necessary for transit to serve the Brickyard Park and Ride. This new access point would allow trips originating at the NE 124th Street and planned NE 132nd Street interchanges to enter the toll lanes 3.8 miles farther south than under the No Build Alternative.
- The northbound ETL access point south of the SR 527 interchange would be modified from a weave lane access point to a skip stripe access point to accommodate the new northbound ETL. This configuration change would remove the need to widen I-405 to accommodate the second northbound ETL in this segment.

5.2.3 Fare Zones

The ETLs would continue to have dynamic, destination-based pricing and have three fare zones between NE 6th Street in Bellevue and I-5 in Lynnwood as shown in Exhibit 5-1. A user's trip would still be assigned the toll rate associated with a destination fare zone as displayed on the sign when the vehicle entered the ETL. Any ETL exit in that zone would be charged the same toll rate until a user passes the next listed road and enters a new fare zone. However, the Project would move the northern limit of Zone B to SR 522. The southbound I-405 toll rate signs would be modified to replace the NE 128th Street destination with SR 522. The northbound I-405 toll rate signs would not change.

WSDOT owns and operates the I-405 tolling algorithm and regularly adjusts the algorithm to maintain toll lane performance. The zone changes described here would affect the toll rate calculation for some I-405 ETL users that have destinations in Zone A or B; however, all other ETL users would not be affected.

Exhibit 5-1. Express Toll Lane Access Points and Fare Zones



5.3 Freeway Operations

5.3.1 Daily Traffic Volumes

The transportation analysis defined weekday daily traffic volumes as two-directional totals (ETLs and GP lanes) with northbound and southbound freeway traffic added together. Future regional population and employment growth is anticipated in the region, so freeway traffic demand would continue to increase in the future.

No Build Alternative

In 2025, daily traffic volumes on I-405 south of NE 160th Street would increase by 3 percent compared to existing conditions, reaching approximately 203,000 vehicles. Between NE 195th Street and SR 527 on I-405, daily traffic volumes would increase by about 5 percent compared to existing conditions to 150,000 vehicles in 2025.

In 2045, daily traffic volumes would increase to 217,000 vehicles south of NE 160th Street, and 161,000 vehicles south of SR 527. Congestion during the peak commute periods would limit growth. Most daily traffic volume growth would occur outside the peak travel periods.

Build Alternative

In 2025, daily traffic volumes on I-405 between south of NE 160th Street would increase by 4 percent compared to the No Build Alternative, reaching 211,000 vehicles. Between NE 195th Street and SR 527 on I-405, daily traffic volumes would also increase by 4 percent compared to the No Build Alternative to 156,000 vehicles per day in 2025.

In 2045, volumes on I-405 south of NE 160th Street would increase about 4 percent compared to the No Build Alternative, reaching 225,000 vehicles. Between NE 195th Street and SR 527 on I-405, daily traffic volumes would also increase by about 4 percent compared to the No Build Alternative, to 167,000 vehicles per day.

5.3.2 Peak Period Traffic Volumes

The analysis used the VISSIM model to analyze freeway operations for the 2025 and 2045 scenarios. Limited volume growth between 2025 and 2045 is forecasted for the No Build and Build Alternatives, as shown in Exhibits 5-2 through 5-5. Attachment H, Three-Hour Vehicle and Person Throughput, provides this information in tabular format for I-405, SR 525 and I-5.

No Build Alternative

With the No Build Alternative, travel demand would increase; however, congestion on I-405 would limit the number of vehicles able to travel through certain portions of the study area as compared to existing conditions, particularly during peak travel periods. Regional congestion limits the number of vehicles able to access I-405 with existing conditions, and this would remain true for future years with the No Build Alternative. Therefore, limited traffic volume growth would occur during the peak period, especially in the peak direction.

In the southbound AM peak period on I-405, the 2025 No Build Alternative throughput volumes would be slightly higher than existing conditions because a few more vehicles would be able to get through the existing bottleneck. However, by 2045, volumes would decrease to approximately existing levels because congestion would lower volume throughput. The southbound AM peak period throughput volumes north of NE 195th Street would increase from an existing 3,700 vehicles per hour to 3,900 vehicles per hour for the 2025 No Build Alternative and then decrease to 3,600 vehicles per hour for the 2045 No Build Alternative. The southbound AM peak period throughput volumes south of NE 160th Street would decrease from an existing 7,400 vehicles per hour to 7,100 vehicles per hour for the 2025 No Build Alternative and then remain at 7,100 vehicles per hour for the 2045 No Build Alternative.

Southbound I-5 and SR 525 volume trends would be similar to southbound I-405. Traffic volumes would be higher in the 2025 No Build Alternative compared with existing conditions, but by 2045, volumes would be the same or decrease because congestion would limit volume throughput. On southbound I-5 north of the I-405 interchange, the 2025 No Build Alternative volumes would increase to approximately 7,000 vehicles per hour but would decrease to 6,000 vehicles per hour in the 2045 No Build Alternative. Congestion on southbound I-5 extending from the King/Snohomish County line and congestion from southbound I-405 would extend onto I-5 and would limit vehicle throughput in this segment. On southbound SR 525 within the I-405/I-5 interchange, traffic volumes would be approximately 1,400 vehicles per hour in both the 2025 and 2045 No Build Alternative, an increase of 100 vehicles per hour compared with existing conditions.

In the northbound PM peak direction on I-405, the No Build Alternative throughput volumes would be lower than existing conditions. The northbound PM peak period throughput volumes north of NE 195th Street would decrease from an existing 5,600 vehicles per hour to 5,200 vehicles per hour for the 2025 No Build Alternative and decrease to 5,400 vehicles per hour for the 2045 No Build Alternative. The northbound PM peak period throughput volumes north of NE 160th Street would decrease from an existing 7,400 vehicles per hour to 6,800 vehicles per hour for the 2025 No Build Alternative and decrease to 7,000 vehicles per hour for the 2045 No Build Alternative.

Similar trends would occur in the northbound PM peak direction of SR 525. Within the I-405/I-5 interchange, traffic volumes would be approximately 3,000 vehicles per hour for both the 2025 and 2045 No Build Alternative, a decrease of 300 vehicles per hour compared to existing conditions. Conversely, traffic volumes on northbound I-5 north of the I-405/I-5 interchange would continue to increase, with approximately 7,900 vehicles per hour in the 2025 No Build Alternative and 8,500 vehicles per hour in the 2045 No Build alternative.

Build Alternative

The Build Alternative would increase capacity, which would allow more vehicles to use I-405 during both peak periods. The southbound AM peak period throughput volumes north of NE 195th Street would increase from an existing 3,700 vehicles per hour to 4,600 vehicles per hour for the 2025 Build Alternative and would increase to 4,700 vehicles per hour for the 2045 Build Alternative. The southbound AM peak period throughput volumes south of NE 160th Street would increase from an existing 7,400 vehicles per hour to 7,800 vehicles per hour for the 2025 Build Alternative and then remain at 8,100 vehicles per hour for the 2045 Build Alternative.

The southbound AM peak period volume throughput would increase on I-5 and SR 525 with the Build Alternative compared with the No Build Alternative. Southbound I-5 north of the I-405/I-5 interchange would have an average of approximately 5,300 vehicles per hour in the 2025 Build Alternative and approximately 5,700 vehicles per hour in the 2045 Build Alternative. The Project would eliminate congestion on southbound I-405 that extends back to I-5 in the No Build Alternative; therefore, vehicle throughput would increase with the Build Alternative. Southbound SR 525 within the I-405/I-5 interchange would also have a modest increase in average vehicle throughput compared to the No Build Alternative. Average vehicle throughput volumes would be approximately 1,400 vehicles per hour in 2025 and approximately 1,500 vehicles per hour in 2045 at this location.

The northbound PM peak period throughput volumes north of NE 195th Street would increase from an existing 5,600 vehicles per hour to 5,900 vehicles per hour for the 2025 Build Alternative and would increase to 6,200 vehicles per hour for the 2045 Build Alternative. The northbound PM peak period throughput volumes south of NE 160th Street would increase from an existing 7,400 vehicles per hour to 8,000 vehicles per hour for the 2025 Build Alternative and then would increase to 8,300 vehicles per hour for the 2045 Build Alternative.

On northbound SR 525 within the I-405/I-5 interchange in the PM peak period, the Build Alternative traffic volumes would be lower than existing conditions due to increased congestion approaching the I-5 interchange area; however, these volumes would be higher than the No Build Alternative. Average traffic volumes would be approximately 3,200 vehicles per hour in both 2025 and 2045, which is an increase of 200 vehicles per hour compared to the No Build Alternative for each analysis year. Northbound I-5 north of the I-405/I-5 interchange would increase to an average of approximately 8,300 vehicles per hour in the 2025 Build Alternative. By 2045, I-5 would not be able to accommodate additional vehicle demand during the PM peak period and would accommodate approximately 8,400 vehicles per hour.

Exhibit 5-2. Southbound I-405/SR 525 AM Peak Period 3-Hour Average Volumes

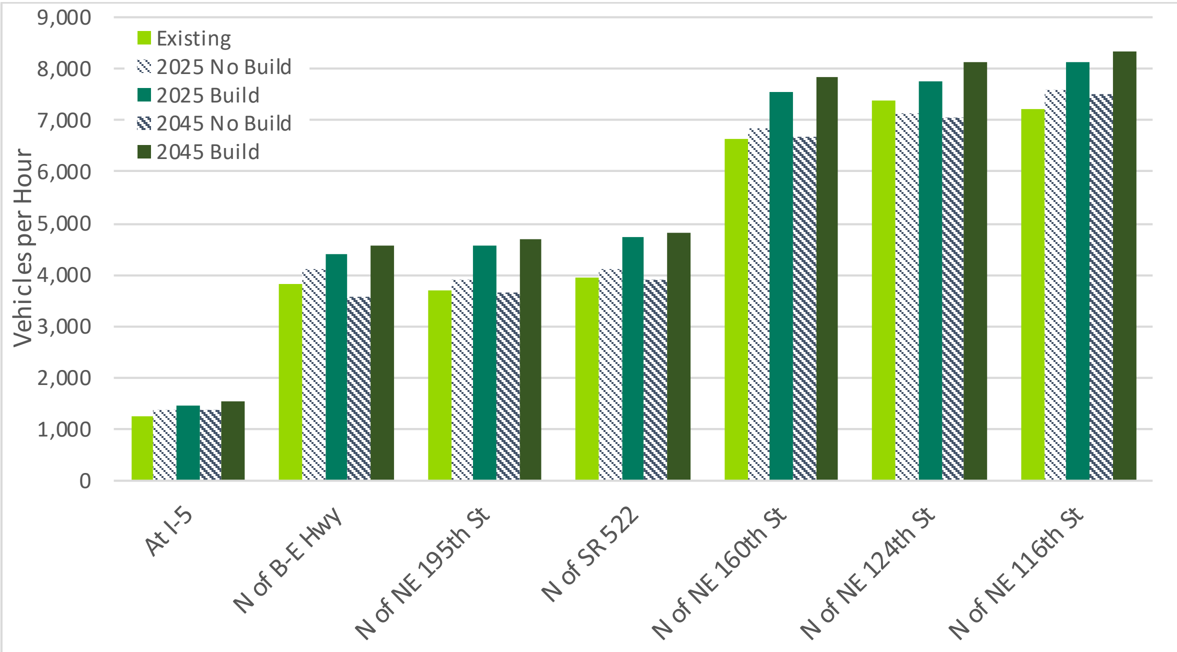


Exhibit 5-3. Northbound I-405/SR 525 AM Peak Period 3-Hour Average Volumes

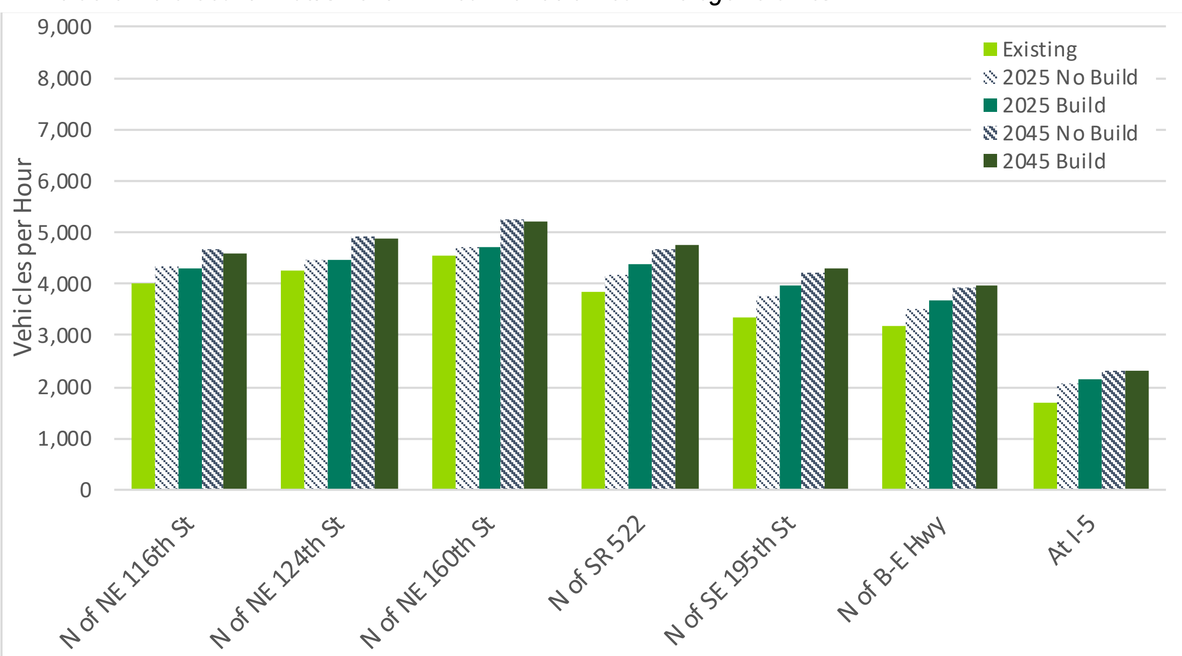


Exhibit 5-4. Southbound I-405/SR 525 PM Peak Period 3-Hour Average Volumes

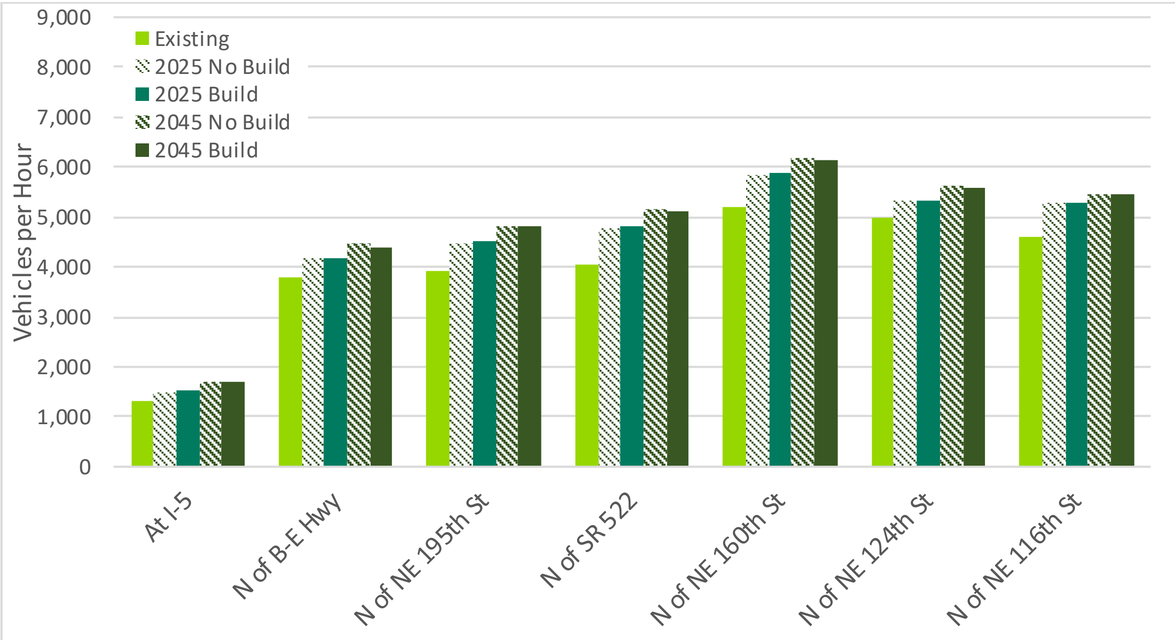
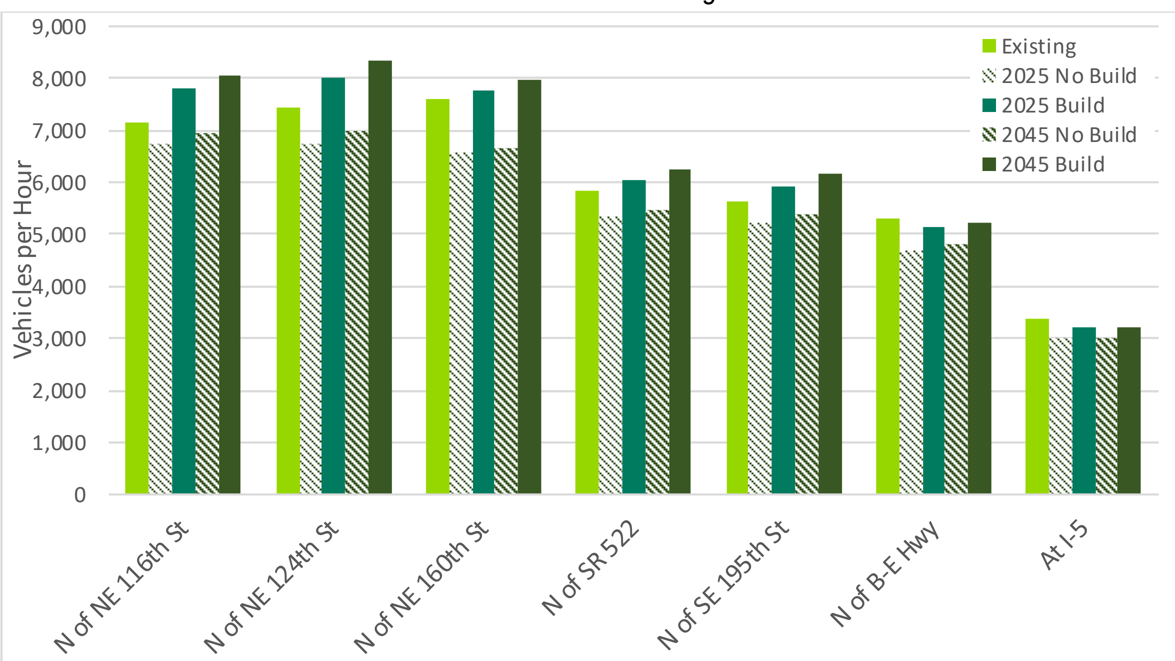


Exhibit 5-5. Northbound I-405/SR 525 PM Peak Period 3-Hour Average Volumes



5.3.3 Person Throughput

Person throughput is the number of persons moved through various freeway sections, which accounts for the occupancy of the different vehicles using the system. The GP lanes have an average of 1.2 persons per vehicle and the ETLs have an average of 1.7 persons per vehicle based on observed occupancy data for both GP and ETLs. Exhibits 5-6 through 5-9 show peak 3-hour, directional person throughput on I-405 for existing conditions, the No Build Alternative, and the Build Alternative. Attachment H, Three-Hour Vehicle and Person Throughput, provides this information in tabular format.

No Build Alternative

Under the No Build Alternative, congestion in the study area would limit person throughput during the peak periods. Similar to vehicle throughput, person throughput would be lower at some locations than existing conditions because congestion would limit the number of persons able to travel through the study area.

The southbound AM peak period person throughput north of NE 195th Street would increase from an existing 5,000 persons per hour to 5,400 persons per hour for the 2025 No Build Alternative and then return to 5,000 persons per hour for the 2045 No Build Alternative. The southbound AM peak period person throughput south of NE 160th Street would maintain the existing 9,900 persons per hour for the 2025 No Build Alternative and then decreases to 9,800 persons per hour for the 2045 No Build Alternative.

The northbound PM peak period person throughput north of NE 195th Street would decrease from an existing 7,500 persons per hour to 7,100 persons per hour for the 2025 No Build Alternative and would decrease to 7,300 persons per hour for the 2045 No Build Alternative. The northbound PM peak period person throughput north of NE 160th Street would decrease from an existing 9,800 persons per hour to 9,000 persons per hour for the 2025 No Build Alternative and would decrease to 9,400 persons per hour for the 2045 No Build Alternative.

Build Alternative

Freeway person throughput with the Build Alternative assumes the same vehicle classes as the No Build Alternative. As shown in the Exhibits 5-6 through 5-9, person throughput is expected to increase with the Project compared to the No Build Alternative.

The southbound AM peak period person throughput north of NE 195th Street would increase from an existing 5,000 persons per hour to 6,300 persons per hour for the 2025 Build Alternative and would increase to 6,400 persons per hour for the 2045 Build Alternative. The southbound AM peak period person throughput south of NE 160th Street would increase from an existing 9,900 persons per hour to 10,400 persons per hour for the 2025 Build Alternative and then 10,900 persons per hour for the 2045 Build Alternative.

The northbound PM peak period person throughput north of NE 195th Street would increase from an existing 7,500 persons per hour to 8,200 persons per hour for the 2025 Build Alternative and increase to 8,500 persons per hour for the 2045 Build Alternative. The northbound PM peak period person throughput south of NE 160th Street would increase from an existing 9,800 persons per hour to 11,200 persons per hour for the 2025 Build Alternative and then increase to 11,700 persons per hour for the 2045 Build Alternative.

Exhibit 5-6. Southbound I-405 AM Peak Period 3-Hour Average Person Throughput

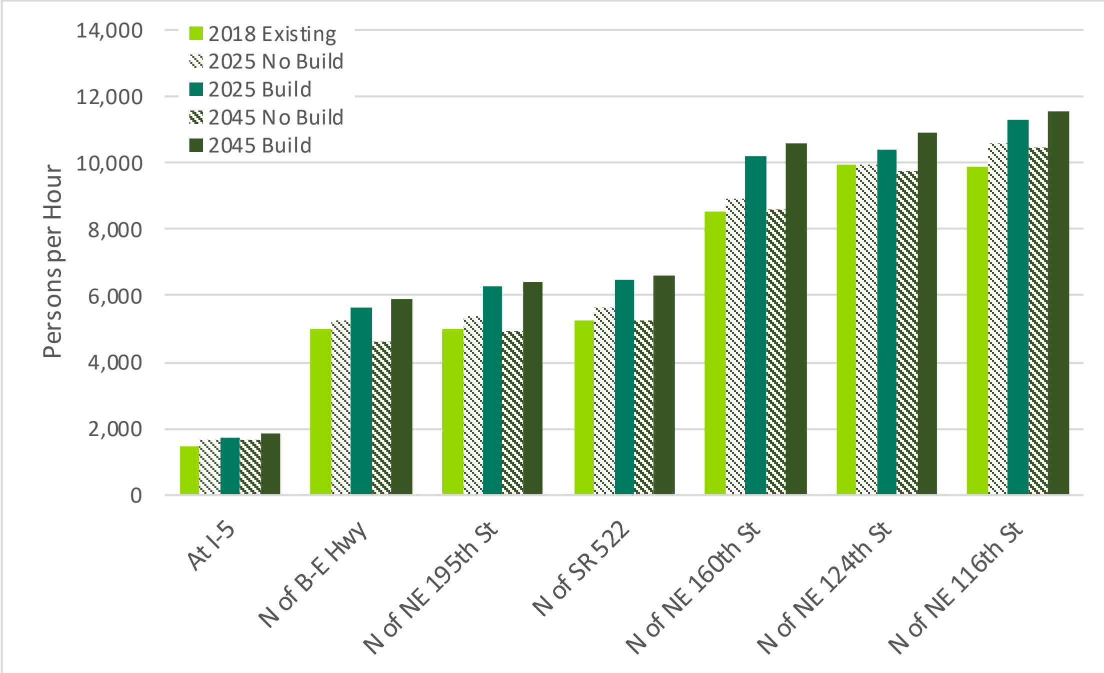


Exhibit 5-7. Northbound I-405 AM Peak 3-Hour Average Person Throughput

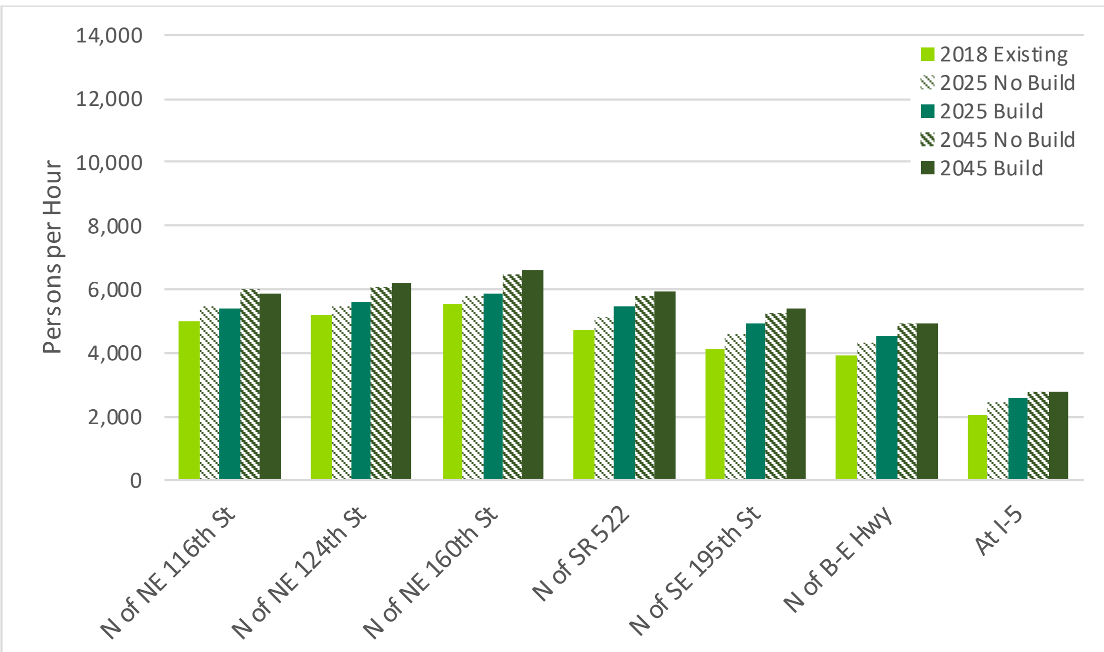


Exhibit 5-8. Southbound I-405 PM Peak Period 3-Hour Average Person Throughput

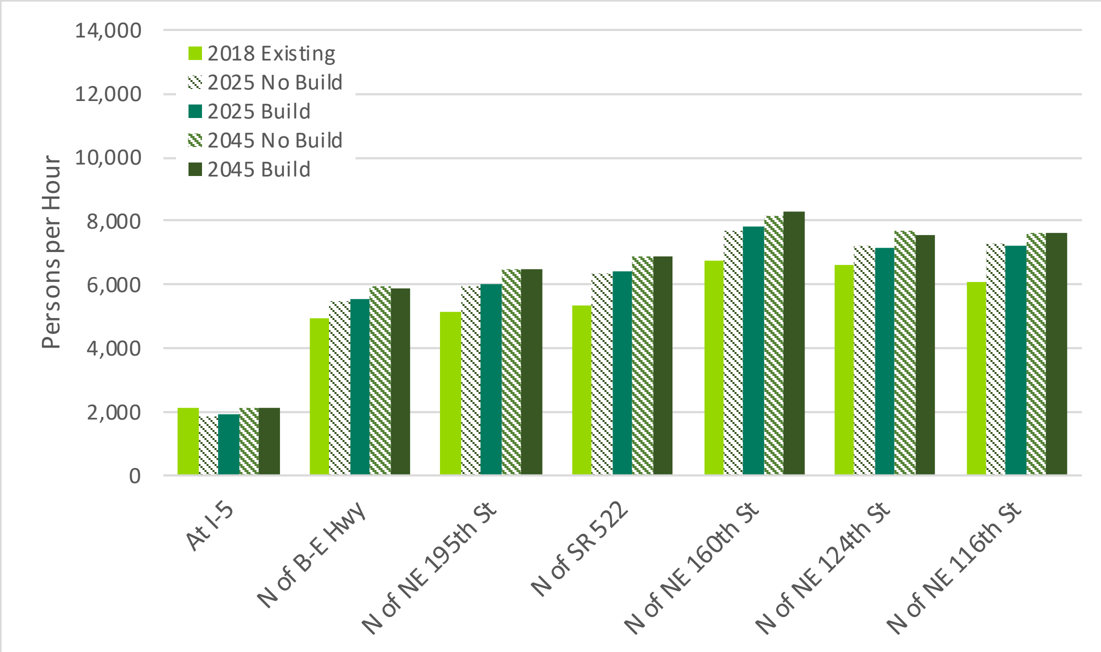
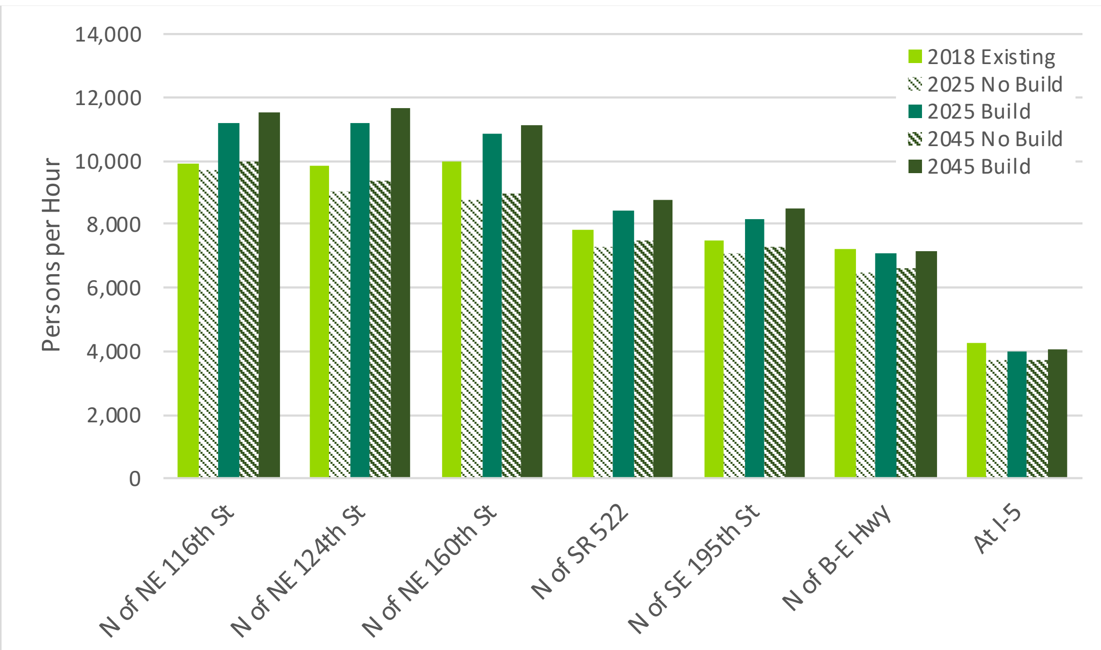


Exhibit 5-9. Northbound I-405 PM Peak Period 3-Hour Average Person Throughput



5.3.4 Operations, Speeds, Congestion, and Travel Times

Attachment D shows congestion data for the 2025 and 2045 No Build and Build Alternatives, including AM and PM peak period speeds by direction and lane type. These "congestion profiles" represent expected typical operations. Some days would have less congestion than discussed in this report, while other days would have additional congestion. Crashes, weather, and major events would contribute to this variability. Higher congestion days and other event effects would produce further spillback in congestion areas and would degrade operations.

In addition, freeway travel times from the VISSIM modeling efforts were collected on I-405 from near the NE 116th Street interchange in Kirkland to I-5 in Lynnwood and are reported for the same sections identified in Section 4.2.4 between NE 116th Street and the ETL start/end and between the ETL start/end and I-5.

Exhibit 5-10 and Exhibit 5-11 show the estimated average 3-hour travel times (rounded to the nearest minute) for the 2025 and 2045 No Build and Build Alternatives for GP and ETL trips during the AM and PM peak periods. When traveling at the posted speed limit (60 mph), the trip between NE 116th Street in Kirkland and the ETL start/end should take about 9 minutes in either direction of travel. The trip between the ETL start/end and I-5 in Lynnwood should take slightly less than 1 minute in either direction.

Exhibit 5-10. Comparison of Average I-405 Travel Times – AM Peak

Direction of Travel	I-405 Section	Existing		2025 GP		2025 ETL		2045 GP		2045 ETL	
		GP	ETL	No Build	Build	No Build	Build	No Build	Build	No Build	Build
Southbound	I-5 (MP 29.7) to ETL Start (MP 28.9)	3	NA[a]	2	1	NA[a]	NA[a]	11	1	NA[a]	NA[a]
Southbound	ETL Start (MP 28.9) to NE 116th Street (MP 19.8)	33	13	40	9	16	9	46	9	15	9
Northbound	NE 116th Street (MP 19.8) to ETL End (MP 29.0)	9	9	9	9	9	9	9	9	9	9
Northbound	ETL End (MP 29.0) to I-5 (MP 29.7)	1	NA[a]	1	1	NA[a]	NA[a]	1	1	NA[a]	NA[a]

ETL = express toll lanes; GP = general purpose lanes; NA = not applicable; MP = milepost

AM Peak 3-hour average = 7 to 10 a.m. Travel times are rounded to the nearest minute.

[a] No ETL exists in the short section; all traffic uses the GP lanes.

Exhibit 5-11. Comparison of Average I-405 Travel Times – PM Peak

Direction of Travel	I-405 Section	Existing		2025 GP		2025 ETL		2045 GP		2045 ETL	
		GP	ETL	No Build	Build	No Build	Build	No Build	Build	No Build	Build
Southbound	I-5 (MP 29.7) to ETL Start (MP 28.9)	1	NA[a]	1	1	NA[a]	NA[a]	5	1	NA[a]	NA[a]
	ETL Start (MP 28.9) to NE 116th Street (MP 19.8)	9	9	11	9	9	9	16	9	10	9
Northbound	NE 116th Street (MP 19.8) to ETL End (MP 29.0)	19	10	26	17	11	10	24	20	10	10
	ETL End (MP 29.0) to I-5 (MP 29.7)	2	NA[a]	1	3	NA[a]	NA[a]	1	3	NA[a]	NA[a]

ETL = express toll lanes; GP = general purpose lanes; NA = not applicable; MP = milepost
PM Peak 3-hour average = 4 to 7 p.m. Travel times are rounded to the nearest minute.
[a] No ETL exists in the short section; all traffic uses the GP lanes.

No Build Alternative

With the No Build Alternative, travel speeds and traffic volumes would decrease in 2025 and 2045 at many existing bottleneck locations in both the GP lanes and ETLs throughout the study area. While demand would increase in these congested sections, the total throughput volume during congested periods would typically be similar to existing conditions and, in some cases, would decrease because of reduced capacity caused by bottlenecks.

AM Peak Period

With the No Build Alternative during the AM peak period, freeway speeds would be slower, and travel times would increase in the southbound I-405 GP lanes and ETLs compared with existing conditions. The extent and duration of AM peak period congestion would continue to increase, and queues on southbound I-405 and westbound SR 522 would get longer compared to existing conditions. In the southbound I-405 GP lanes, congestion would extend to NE 160th Street from I-5, and spill back to southbound and northbound I-5, westbound SR 522, and southbound SR 525. By 2045, increasing congestion would impact these facilities for most of the AM peak period, which would reduce the rate that vehicles can enter the ETLs on this section of southbound I-405. Therefore, southbound vehicle travel times in the ETLs would slightly decrease during the AM peak period in 2045 compared to 2025. However, in both 2025 and 2045, the southbound ETL would continue to operate with slow speeds in the single lane ETL segment. Travel times would increase in both the southbound GP lanes and ETLs compared to existing conditions.

The northbound I-405 GP lanes and ETLs would continue to operate near posted speeds, and vehicle travel times would continue to be similar to existing conditions, even with anticipated growth.

PM Peak Period

With the No Build Alternative during the PM peak period, freeway speeds would continue to degrade, and vehicle travel times would increase in the northbound GP lanes and ETLs compared to existing conditions. The existing bottleneck at the northbound I-405 off-ramp to SR 522 in the GP lanes would remain with the No Build Alternative. By 2045, congestion from this bottleneck would spill back from SR 522 to downtown Bellevue, which would further limit the number of vehicles able to enter the Project study area. The northbound ETL lanes would operate at slower speeds compared to existing conditions, especially where the ETL system transitions from two lanes to one lane near the NE 160th Street interchange. Because congestion outside of the study area would limit the volume of GP and ETL traffic, speeds in 2045 would be slightly higher, and travel times would decrease in this area compared to 2025.

The southbound I-405 GP lanes would continue to experience congestion at the on-ramp merge from SR 527, resulting in slower speeds and higher vehicle travel times in 2025 and 2045.

Build Alternative

Within the study area, higher traffic demand is expected with the Build Alternative compared to the No Build Alternative. With the No Build Alternative, the freeway would be too congested to handle additional traffic during the AM and PM peak periods; whereas with the Project, new capacity would be added. The additional capacity on the freeway system with the Build Alternative would reduce the number of trips that use local roadways to bypass freeway congestion. The Project's additional capacity would improve operations for some sections of the freeway in the study area, while some congestion would shift to other areas. Overall, there would be more vehicles traveling at higher speeds and with lower travel times with the Build Alternative.

AM Peak Period

With the Build Alternative in the AM peak period, the existing southbound I-405 GP lane bottleneck at NE 160th Street would be removed because of increased GP and ETL capacity. Specifically, the Project would provide additional GP capacity through the NE 160th Street interchange and eliminate a major weave between the SR 522 on-ramps and the I-405 ETLs by removing the existing ETL access at NE 160th Street. Because of the elimination of this bottleneck, GP lane operations would improve not only on southbound I-405, but also on westbound SR 522, southbound SR 525, and on I-5 approaching the I-405 interchange in Lynnwood. The southbound ETLs would operate near posted speed limits throughout the study area. In 2045, southbound I-405 travel times between the ETL start and NE 116th Street would decrease by 37 minutes in the GP lanes and by 6 minutes in the ETLs compared to the No Build Alternative.

The northbound I-405 GP lanes and ETLs would continue to operate at free-flow speeds with the Build Alternative.

PM Peak Period

With the Build Alternative in the PM peak period, the existing northbound I-405 bottleneck at the off-ramp to SR 522 in the GP lanes would be improved. Northbound I-405 congestion in the

GP lanes would improve between downtown Bellevue and SR 522. Travel times between NE 116th Street and the end of the ETLs would improve by 4 minutes in the GP lanes compared to the No Build Alterative in 2045. However, the Project's addition of ETL capacity would allow more traffic in all lanes to reach I-5 at a faster rate and would contribute to increased congestion approaching the I-5 interchange. As a result, the northbound I-405 GP lane queue would extend back approximately 3 miles from the northbound I-5 off-ramp to near the SR 527 interchange. In 2045, GP travel times between the end of the ETLs and I-5 would increase by approximately 2 minutes.

Northbound ETL operations would improve in some areas, including near the NE 160th Street interchange. Some localized slowing would continue to occur at ETL access points, including at the new full access on northbound I-405 just south of the NE 160th Street interchange and at the end of the ETLs where ETL vehicles would be required to merge into more congested GP lanes. Overall, the ETLs would operate better with the Build Alternative than with the No Build Alternative because the Project improvements would reduce GP lane congestion and allow for more space for ETL users to enter and exit the lanes at access points. PM peak period travel times in the ETLs between NE 116th Street and the end of the ETLs would remain similar to or slightly lower than the No Build Alternative. This segment would operate near free-flow speeds 2025 and 2045.

The southbound I-405 GP lanes and ETLs would operate near free-flow speeds with the Build Alternative. In 2045, travel times in the southbound I-405 GP lanes between the ETL start and NE 116th Street would decrease by 7 minutes compared to the No Build Alternative because the roadway capacity would increase at the SR 527 interchange. The existing bottleneck at the SR 527 on-ramp merge would be relieved because some entering GP traffic would divert to the new ETL direct access ramp near SR 527 at 17th Avenue.

5.3.5 Ramp Queuing

WSDOT monitors and manages ramp terminal signals to minimize the effects of ramp queueing on I-405 mainline operations. Under existing conditions, ramp queueing at ramp terminal intersections can queue back and affect traffic operations on the mainline.

No Build Alternative

Queue lengths with the No Build Alternative are expected to be longer than existing conditions due to increased demand. While some signalized ramp terminal approaches may operate at level of service (LOS) E or F, the anticipated queue length would not exceed provided capacities, except for the SR 527 interchange ramps, where queues would still occasionally extend onto the I-405 mainline.

Build Alternative

The addition of the direct access ramps near SR 527 at 17th Avenue SE would redistribute traffic and decrease demand at the SR 527 interchange ramps, reducing the probability that the SR 527 off-ramp queues would spill back onto the freeway.

The ETL direct access ramps at SR 522 and just south of SR 527 at 17th Avenue SE would reduce demand at the on-ramp meters at those two interchanges because ETL trips would move from the metered GP lane on-ramps to the new ETL direct access on-ramps. The northbound GP on-ramp at the SR 522 interchange would be modified from a single metered lane and one high occupancy vehicle (HOV) bypass to two metered lanes with no HOV bypasses. HOV and bus trips would not likely use this ramp but would instead use the ETL direct access ramps at the SR 522 interchange.

5.4 Local Intersection Operations

The analysis studied 32 intersections for the No Build Alternative and 36 intersections for the Build Alternative. Attachment E, Peak Hour Intersection Analysis Results, shows the results of the local intersection analysis, with both Synchro and Sidra results presented for the 2025 and 2045 scenarios.

The analysis team developed Synchro models that considered volume forecasts and optimized signal timings for both alternatives. Timings were also adjusted to minimize off-ramp queues from spilling back from the intersections to the I-405 and SR 522 mainlines. As with existing conditions, queuing from adjacent intersections may not always be reflected in LOS performance as measured using HCM methodologies (TRB 2016).

5.4.1 No Build Alternative

Higher volumes are expected at all study intersections, which would degrade operations compared to existing conditions. However, most of the projected growth would occur outside of the peak periods because network congestion would limit the amount of additional volume during these times. The No Build Alternative Synchro analysis results show similar failing intersections as existing conditions, despite higher demand. Major corridors including SR 527 and 228th Street SE would continue to operate poorly during both the AM and PM peak hours under the No Build Alternative.

By 2025, three intersection improvements are expected to be constructed. One eastbound lane would be added on NE 195th Street between 110th Avenue NE and the I-405 southbound ramp terminal intersection. These intersections are expected to operate better than existing conditions.

For the No Build Alternative in the 2025 AM peak hour, five intersections would operate at LOS E or worse. These intersections all operate at LOS E or worse in existing conditions (see Section 4.3) with one exception, 20th Avenue SE and 220th Street SE. This Canyon Park Business Center (CPBC) intersection would operate at LOS E due to increased volume and limited capacity for eastbound traffic. Additionally, 15 intersections would operate with at least one approach at LOS E or worse. The remaining intersections would operate at LOS D or better. In the 2045 AM peak hour, eight intersections would operate at LOS E or worse, and 19 intersections would have at least one approach operating at LOS E or worse. The intersections that degrade to LOS E or worse in 2045 are located in the SR 527 interchange area, primarily located along SR 527, 228th Avenue SE, and 220th Street SE. These corridors have high forecasted traffic volumes and do not have planned improvement projects. The remaining intersections would operate at LOS D or better.

In the 2025 PM peak hour, five intersections would operate at LOS E or worse, which is the same as existing conditions. Fourteen intersections would have at least one approach operating at LOS E or worse. The remaining intersections would operate at LOS D or better. In the 2045 PM peak hour, eight intersections would operate at LOS E or worse (three more than 2025), and 19 intersections would have at least one approach operating at LOS E or worse. Two intersections in the CPBC would operate at LOS E or worse in 2045 along 220th Street SE. The remaining intersections would operate at LOS D or better.

5.4.2 Build Alternative

The Project would include geometric changes to local intersections at the SR 522 and SR 527 interchange areas which would improve operations at some locations compared to the No Build Alternative. These changes are discussed in the following sections. All other study area intersections would not have major geometric changes with the Build Alternative; however, changes in ramp storage lengths, signal operations, and metering would also affect operations at the ramp terminal intersection and were included in the analysis.

Higher traffic volumes are expected at most study intersections with the Build Alternative, compared to existing conditions and the No Build Alternative. The Project would increase freeway volumes and, as such, more vehicles would use ramps to enter and exit the freeway.

Furthermore, the Project would reduce bottlenecks on the freeway present with the No Build Alternative, allowing more traffic to use the freeway, and would result in higher peak hour volumes at freeway off-ramps. These increases in ramp traffic would cause some intersections or specific movements in an intersection to operate worse than the No Build Alternative. While some intersections may degrade, in most cases they would operate at LOS D or better, with a few exceptions described below.

Exhibit 5-12 summarizes the locations where the peak hour intersection LOS would be E or worse. With the Build Alternative in the 2025 AM peak hour, five intersections would operate at LOS E or worse, and 19 intersections would have at least one approach operating at LOS E or worse. In the 2045 AM peak hour, nine intersections would operate at LOS E or worse, and 22 intersections would have at least one approach operating at LOS E or worse.

In the 2025 PM peak hour, four intersections would operate at LOS E or worse and 19 intersections would have at least one approach operating at LOS E or worse. In the 2045 PM peak hour, eight intersections would operate at LOS E or worse and 22 intersections would have at least one approach operating at LOS E or worse.

Exhibit 5-12. Number of Occurrences of Peak Hour Level of Service E or Worse

Time of Day	Existing	2025 No Build	2025 Build	2045 No Build	2045 Build
Overall Intersections Operating at LOS E or Worse					
AM peak hour	4	5	5	8	9
PM peak hour	5	5	4	8	9
Intersections with One or More Approaches Operating at LOS E or Worse					
AM peak hour	12	15	19	19	22
PM peak hour	12	14	19	19	22

LOS = level of service

Some locations would experience worse operations with the Build Alternative compared to the No Build Alternative. The SR 202 and SR 522 westbound off-ramp intersection would operate at LOS D in the 2045 AM peak hour in the No Build Alternative and would degrade to LOS E with the Build Alternative. Because the Project would reduce congestion on westbound SR 522, more traffic would reach this intersection during the AM peak hour. While average vehicle delays would increase at the intersection, there would be noticeably less delay on the SR 522 mainline. Exhibits 5-13 and 5-14 show peak hour intersection LOS comparisons.

SR 522 Interchange

The SR 522 system interchange would be modified to replace the northbound I-405 to westbound SR 522 flyover ramp and the eastbound SR 522 to northbound I-405 on-ramp with a signalized intersection. The southbound I-405 ramp would also be signalized where it connects to SR 522 in order to allow the movement of buses and other authorized vehicles into and out of the new SR 522 bus facility. A third signal would be constructed between these two intersections where the I-405 ETL direct access ramps would connect with SR 522. All of these new signalized intersections would operate at LOS D or better. The three signals would add approximately 1 minute of signal delay to eastbound and westbound SR 522 through trips.

SR 527 Interchange Area

With the Project, the following changes would occur at the SR 527 interchange area and surrounding intersections:

- New direct access ramps would be built for transit and ETL users in the I-405 median just south of SR 527 at 17th Avenue SE.
- To connect the new direct access ramps, 17th Avenue SE would be extended over the northbound I-405 lanes, and the resulting ramp terminal intersection is projected to be signalized.
- A single-lane roundabout would be constructed at the 17th Avenue SE and Canyon Park Park and Ride intersection.
- New channelization, including left- and right-turn lanes, would be provided at the intersections of SR 527 at 220th Street SE, and 17th Avenue SE at 220th Street SE.

With the new direct access ramp connection near SR 527 at 17th Avenue SE and the additional lane on I-405 between SR 522 and SR 527, the SR 527 interchange area would have higher vehicle volumes compared to the No Build Alternative. In particular, many intersections in the interchange area would have specific movements that would operate worse than the No Build Alternative. Although operations at some intersections may degrade, in most cases they would operate at LOS E or better.

Despite volume increases, several intersection approaches would operate better due to the local roadway improvements. For example, the SR 527 and 220th Street SE intersection would improve from LOS E to LOS D in the 2025 PM peak hour due to the increased intersection capacity.

The new direct access ramp terminal intersection and the roundabout intersection at 17th Avenue SE would operate at LOS B or better with the Project. The other two existing intersections with modified channelization would operate at LOS D or better in the AM peak hour and better than the No Build Alternative during the PM peak hour.

The new direct access ramps would remove some traffic from the SR 527 and I-405 GP lane ramp terminal intersections. However, because the I-405 freeway would operate better than the No Build Alternative, more vehicles would reach the ramp terminal intersections faster, and both intersections would operate similar to the No Build Alternative. Other study area intersections are expected to have a modest increase in vehicle delay with the Project due to increased demand to and from the I-405 mainline.

All intersections in the CPBC that operate at LOS E or worse with the Build Alternative would also operate at LOS E or worse in the No Build Alternative. One intersection, 26th Place SE and 220th Street SE, would degrade from a “high” LOS E to a “low” LOS F in the 2045 AM peak hour under the Build Alternative. The direct access ramps south of SR 527 at 17th Avenue SE would lead to a small increase in traffic volumes through the CPBP, mainly along 29th Drive SE and 220th Street SE. As a result, a slight increase in intersection average vehicle delay in expected (see Attachment E).

Exhibit 5-13. AM Peak Hour Intersection Level of Service Results, Sheet 1 of 3

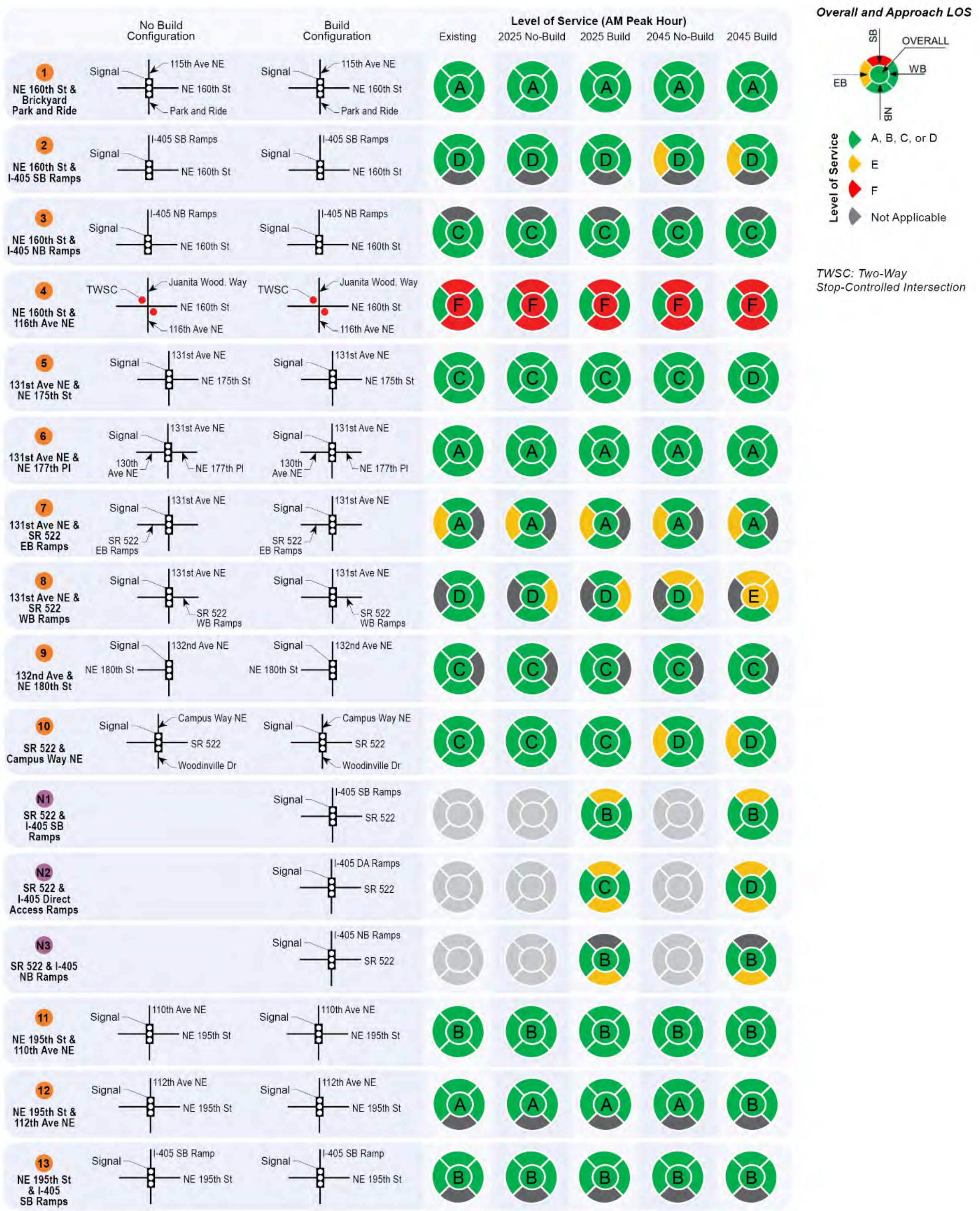


Exhibit 5-13. AM Peak Hour Intersection Level of Service Results, Sheet 2 of 3

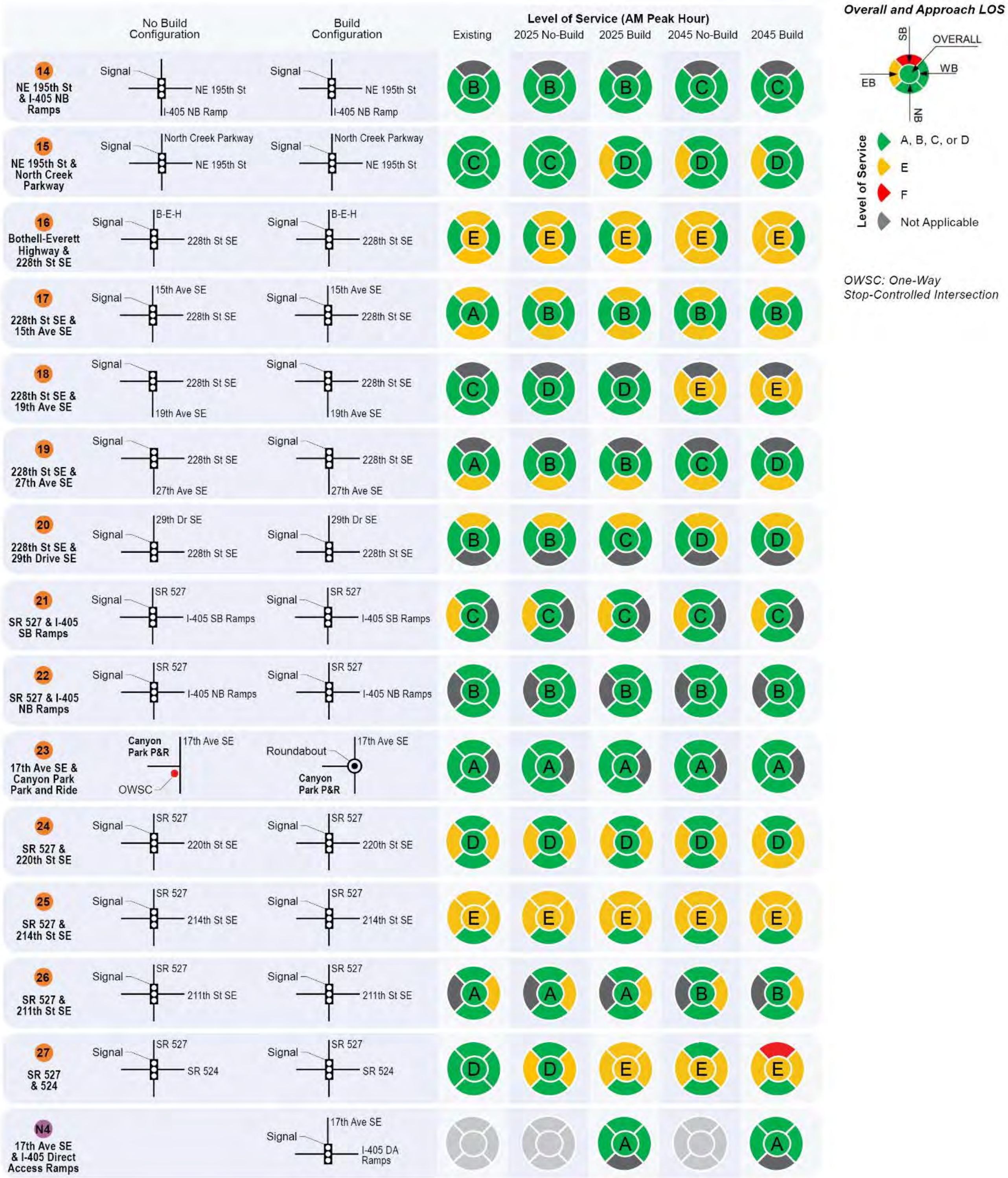


Exhibit 5-13. AM Peak Hour Intersection Level of Service Results, Sheet 3 of 3

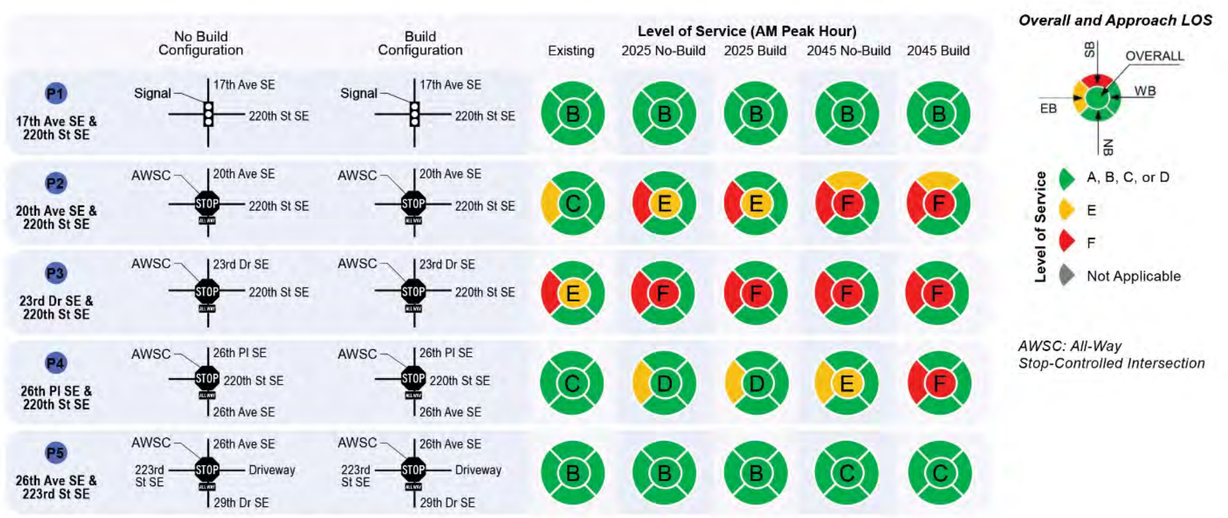


Exhibit 5-14. PM Peak Hour Intersection Level of Service Results, Sheet 1 of 3

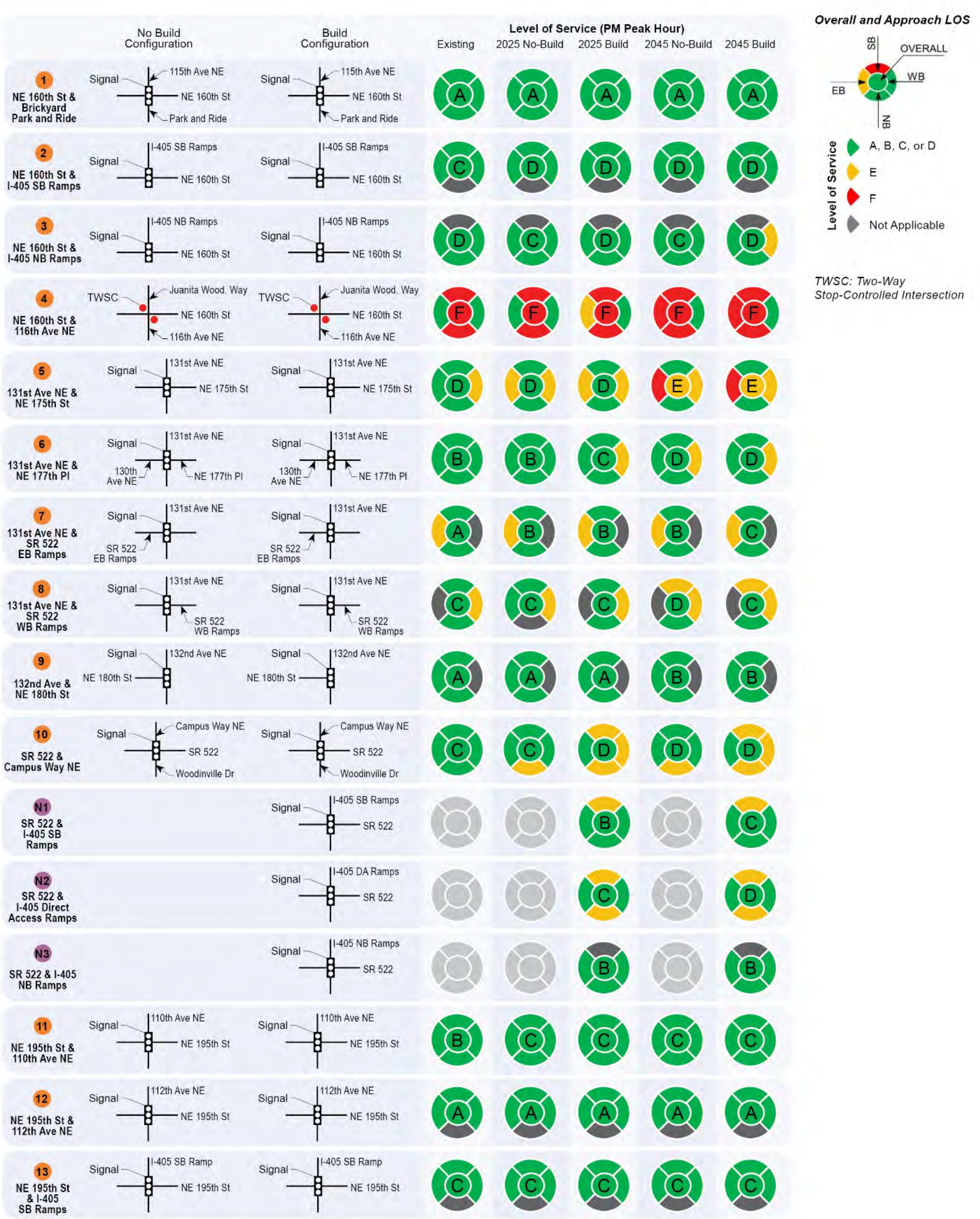


Exhibit 5-14. PM Peak Hour Intersection Level of Service Results, Sheet 2 of 3

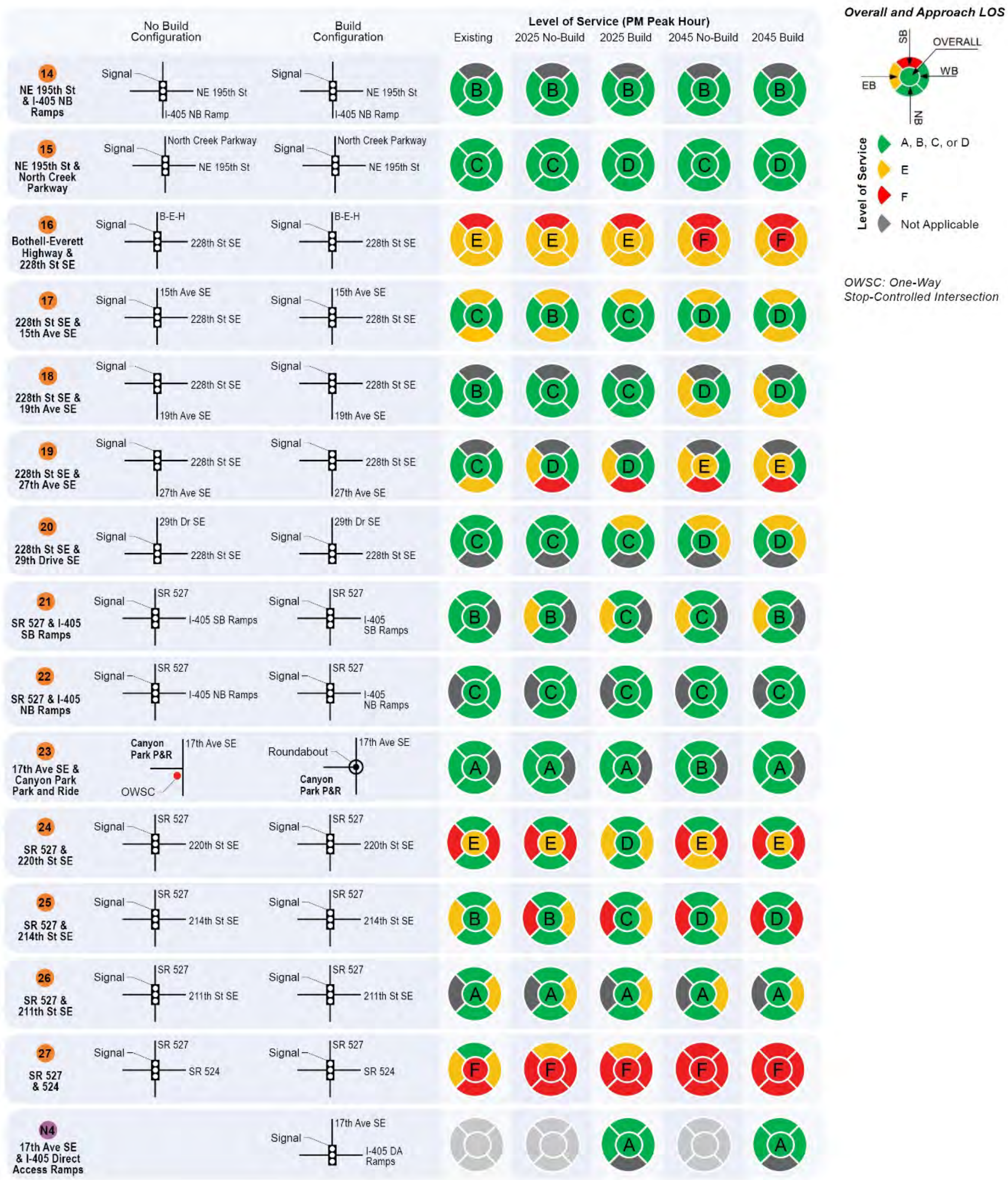
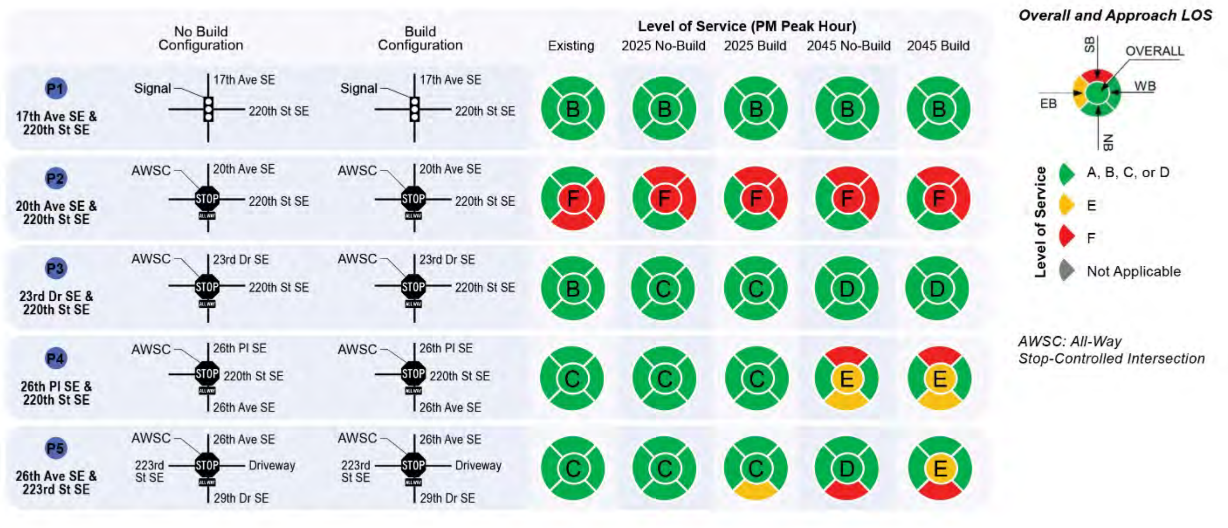


Exhibit 5-14. PM Peak Hour Intersection Level of Service Results, Sheet 3 of 3



5.5 Safety Performance

5.5.1 No Build Alternative

As described previously, study area freeways and intersections are expected to become more congested with the 2025 and 2045 No Build Alternative compared to existing conditions. The increased congestion is expected to increase the number of congestion-related crashes in the study area.

5.5.2 Build Alternative

Freeways

The addition of an ETL in both directions of I-405, new direct access ramps, and targeted GP lane capacity improvements are expected to result in a positive or neutral change in safety performance for congestion-related crashes with the Project. However, the Project is also expected to move I-405 bottleneck locations downstream as described in Section 5.3, Freeway Operations. Some locations, such as northbound I-405 approaching I-5, may experience degraded safety performance due to the potential for changed traffic conditions.

With the Project, lane and shoulder widths would increase compared to the No Build Alternative, in particular on I-405 through the SR 522 interchange. Increased widths for lanes, shoulders, and ETL separation buffers have been shown to correlate with better safety performance. Otherwise, overall safety performance on I-405 and the freeway portions of SR 522 with the Project during off-peak periods is expected to be similar to the No Build Alternative, because there are not as many congestion-related crashes during off-peak times.

Ramps

During peak periods, a majority of existing crashes on the study area ramps were property damage only. The most common type of crash observed was rear-end crashes, and driver distraction/inattention was the most common contributing factor. With the addition of the direct access ramps at the SR 522 and SR 527 interchanges, congestion on many of the existing GP lane ramps at SR 522 and SR 527 is expected to decrease. An improvement in safety performance is expected where congestion decreases. However, the new direct access ramps would affect safety performance in ways that are difficult to predict.

The redesign of the I-405 and SR 522 interchanges is expected to address current issues with the two I-405 northbound exit ramps to SR 522.

- Widening the northbound I-405 to eastbound SR 522 ramp from one lane to two lanes is expected to increase capacity and improve the safety performance for congested-related crashes currently observed on and approaching this ramp.
- The elimination of the northbound I-405 to westbound SR 522 ramp as part of the interchange redesign to a left-turn movement at a proposed new signal terminal for the combined northbound off-ramp is expected to decrease the speed of turning vehicles. This change would help address the high proportion of fixed-object crashes on this

movement. This ramp also had one of the two observed ramp-related fatalities in the study area.

Two of the highest crash-occurrence ramps in the study area are located at the I-405/I-5 interchange in Lynnwood. Both ramps have high fixed-object crashes in the off-peak periods compared to peak periods. The Project would not make any changes to this interchange. Because the Project is expected to increase vehicle throughput in this area, safety performance during peak periods would be affected.

Intersections

The majority of the current crashes observed at local intersections in the study area were property damage only, with the most common types being angled/sideswipe and rear-end crashes. Driver distraction/inattention, following too closely, and disregarding traffic control were the predominant contributors to intersection crashes. These contributors are usually associated with congestion. The presence of congestion was indicated at intersections along SR 527, which include the three highest crash intersection locations in the study area.

With the Project, more vehicles are expected to be present at local ramp terminal intersections because I-405 freeway operations are expected to improve between SR 522 and SR 527. At intersections where volumes increase, reduced safety performance is expected. Conversely, improved safety performance is expected at intersections where volumes would decrease, such as SR 527 and the I-405 ramp terminals.

New signalized intersections at the SR 522/I-405 interchange and just south of SR 527 at 17th Avenue SE would result in new crashes at these locations that would not occur with the No Build Alternative. These new crashes would occur because intersections naturally introduce conflict points, which are correlated with higher numbers of crashes.

5.6 Transit Operations

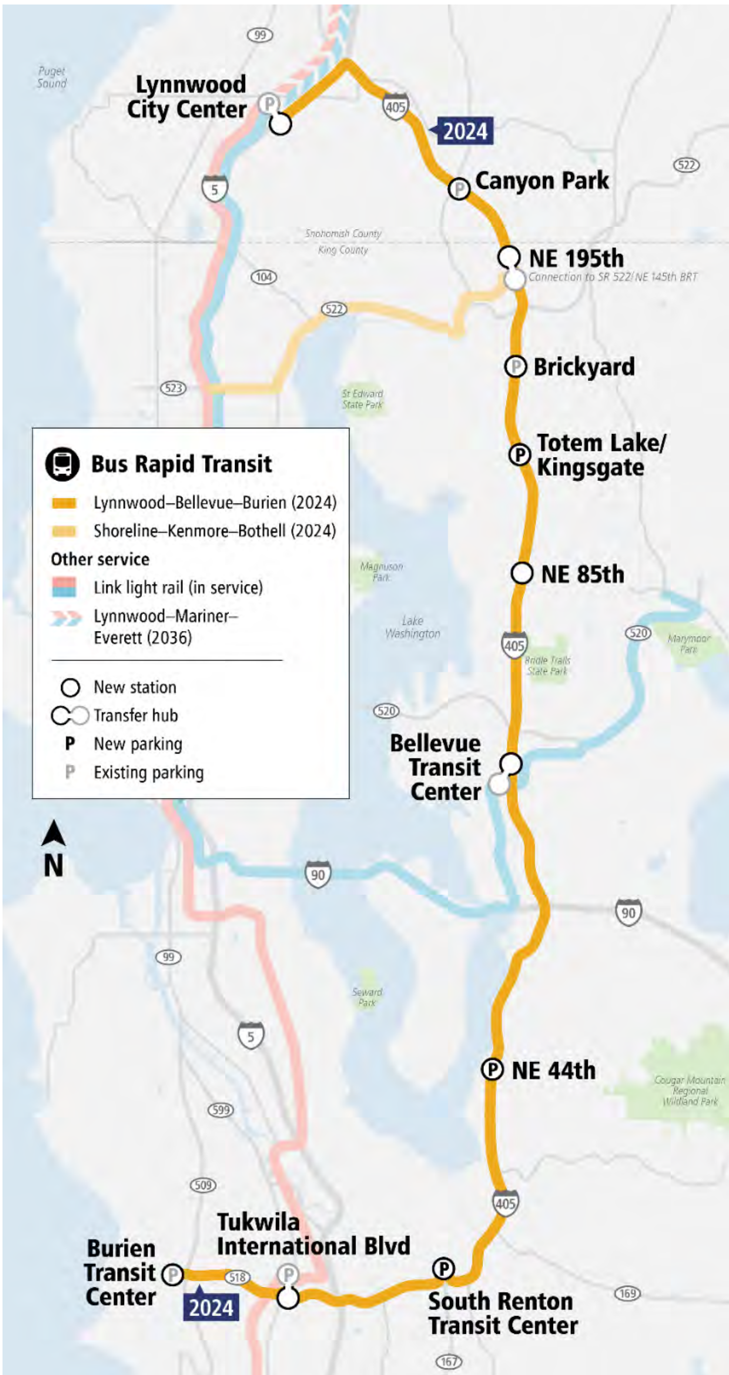
Transit riders experience delay because congestion is present during peak periods under existing conditions in both the GP lanes and ETLs throughout the study area. As discussed in Section 3, Study Approach, King County Metro Transit (King County Metro), Community Transit, and Sound Transit have identified short- and long-term plans to help improve transit mobility, speed, and reliability throughout the study area. These plans, including bus rapid transit (BRT) service on I-405, would be implemented with or without the Project (Sound Transit 2016; KCM 2016). Exhibit 5-15 shows Sound Transit's proposed I-405 BRT routing and station locations as of 2019.

5.6.1 No Build Alternative

Congested conditions would continue throughout the study area with the No Build Alternative, which would further degrade transit operations. This congestion would reduce transit reliability and create more transit travel time variability. Transit agencies that use I-405 in the study area would need to account for this increased variability in future budgeting and bus schedules. Funded transit investments as part of ST3 include BRT in the study area. BRT investments anticipate the use of ETLs for speed and reliability where feasible except between

NE 160th Street and the SR 527, where buses would likely operate using a combination of bus-on-shoulder and GP lanes. The GP lanes would continue to be congested, which would decrease reliability. I-405 BRT would likely serve study area stop locations, including the Brickyard Park and Ride, NE 195th Street, and the Canyon Park Park and Ride via freeway transit flyer stops on the GP interchange ramps.

Exhibit 5-15. I-405 BRT Proposed Routing and Station Locations



Source: Sound Transit 2019

5.6.2 Build Alternative

The Project would provide opportunities for improved transit performance and reliability in the study area. The ETLs would maintain an average minimum travel speed of 45 mph in 2025 and 2045 between NE 160th Street and SR 527. These speeds would be an improvement over existing conditions or the No Build Alternative.

Under the Build Alternative, many transit routes would still operate in the GP lanes for some or all of their trips on I-405 in the study area. The Project would improve GP lane congestion and speeds in the study area, and transit vehicles would operate at similar speeds to other vehicles in these lanes. It is likely that transit vehicles would no longer need to use the bus-on-shoulder lanes on southbound I-405 between SR 522 and SR 527.

Conversely, buses traveling along SR 522 would see both increases and decreases in speed and reliability. For example, routes on westbound SR 522 approaching I-405 during the AM peak period would see improved operations because the Project would eliminate congestion extending from I-405. Other routes, such as those traveling on SR 522 through the I-405 interchange during off-peak periods, would experience more delay because of the three new traffic signals.

The Project would accommodate a bus turnaround loop and station on the northwest quadrant of the SR 522 interchange. This facility would provide transit agencies with a location to facilitate local and regional bus transfers, provide bus layover space, and allow riders to make connections with University of Washington Bothell/Cascadia College. The facility would have no new permanent parking spaces and provide a passenger drop-off/pick-up area. Funding for this facility has not been identified, and the facility would not be constructed by WSDOT. The Project would also construct inline transit stations on the SR 522 direct access ramps (one in each direction) for I-405 BRT. The Project also includes pedestrian connections between these inline stations and the bus turnaround loop and passenger pick-up/drop off facility.

The direct access ramps just south of SR 527 at 17th Avenue SE would allow for buses, in particular I-405 BRT, to remain in the ETLs and continue to serve the Canyon Park Park and Ride. The Project would construct two inline transit stations in the I-405 median (one in each direction). Access to the stations would be provided via a pedestrian bridges over I-405.

5.7 Freight Mobility

5.7.1 No Build Alternative

With the No Build Alternative, freight would be affected by increased congestion and increased travel times compared to existing conditions.

5.7.2 Build Alternative

The Project would not adversely affect freight travel. With the Build Alternative in 2025 and 2045, there would be less congestion in the GP lanes throughout most of the study area; therefore, trucks would experience less delay. Approaching the I-5 (Lynnwood) interchange, freight may experience more delay during the PM peak periods. The ETLs would continue to have the same vehicle weight limits as the No Build Alternative, and most trucks would not be allowed in the ETLs.

5.8 Nonmotorized Network

Pedestrian travel and bicycle travel would continue to be prohibited, as it is now, on I-405. Current pedestrian and bicycle infrastructure provided in the area would remain.

5.8.1 No Build Alternative

The City of Bothell, City of Woodinville, City of Kirkland, King County and other agencies have plans to expand nonmotorized facilities in the study area (Exhibit 5-16). The City of Bothell plans identify an off-road trail improvement within the study area on the west side of SR 527 between 214th Street SE and just south of SR 524. Area agencies are also planning to improve connections for the current North Creek Regional Trail beyond the existing facility. A gap in the North Creek Trail, between 232nd Street SE and 240th Street SE, would be constructed parallel to 27th Avenue SE.

5.8.2 Build Alternative

With the Project, a new sidewalk would be provided along the north side of SR 522 between the SR 522 direct access ramps and the SR 522 bus turnaround loop and station. A crosswalk would be provided across the northern leg of the SR 522 direct access ramp intersection. A nonmotorized connection would also be constructed between the proposed new SR 522 bus station and the University of Washington Bothell/Cascadia College campus.

The Project would construct bicycle lanes on 220th Street SE between SR 527and 17th Avenue SE, and on 17th Avenue SE between 220th Street SE and the Canyon Park Park and Ride. A connection to the North Creek Trail would be provided by others at a location to be determined. However, funding is currently unavailable.

The existing pedestrian bridge over I-405 at SR 527 interchange would be reconstructed as two separate spans. Exhibit 5-17 shows conceptually how these bridges would connect at 17th Avenue SE to the direct access ramps just south of SR 527. Southbound I-405 bus passengers would need to cross the direct access ramps at the ramp terminal intersection crosswalk. WSDOT expects most buses would relocate from the SR 527 interchange ramp flyer stops to the new direct access ramps.

Exhibit 5-16. Nonmotorized Facilities Planned for the Study Area

Exhibit 5-17. Visualization of SR 527 Direct Access Ramps near 17th Avenue SE

5.9 Indirect and Other Effects of the Project

The traffic models included portions of freeways outside the study area specific to the Project, such as I-5, SR 522, and SR 520. The freeway analysis demonstrated effects on these areas. This section discusses other effects that may be delayed or distant from the study area. The Project is expected to reduce congestion at three bottleneck locations. Downstream areas might see changes in volumes and congestion because of this reduction. These are described in more detail in the next sections.

5.9.1 Increased AM Peak Period Congestion on Southbound I-405, South of Downtown Bellevue

With the No Build Alternative, the southbound I-405 bottleneck at the SR 522 interchange would limit the opportunity for some traffic to reach Kirkland and downtown Bellevue at the posted speed. This congestion would be reduced by the Build Alternative, allowing greater volumes to travel south during the AM peak period. Between SR 522 and downtown Bellevue, the I-405 mainline would have enough capacity to handle the increased traffic volume. However, south of downtown Bellevue, some congestion is expected to form in the GP lanes approaching the I-90 and Coal Creek Parkway interchanges. WSDOT has identified projects in the I-405 Master Plan to improve operations near the I-90 and Coal Creek Parkway interchanges. These projects are currently unfunded.

5.9.2 Increased AM Peak Period Congestion on Southbound I-5 in Lynnwood, South of I-405

Southbound I-5 in Lynnwood south of I-405 would experience congestion with both the No Build and Build Alternatives. With the No Build Alternative, congestion on I-405 would extend onto southbound I-5 approaching the I-405 interchange and spill back north past 164th Street SW, slowing down I-5 through traffic. With the Build Alternative, I-405 congestion would no longer extend onto the I-5 mainline, allowing greater traffic volumes to travel farther south during the AM peak period on I-5. Operations approaching the I-405 interchange would improve with the Project; however, south of the I-405 interchange, congestion would increase, and operating speeds would decrease.

5.9.3 Increased PM Peak Period Congestion on I-5 in Lynnwood

Under both the No Build and Build Alternatives, there would be congestion on northbound I-5 in Lynnwood extending south from the 164th Street SW interchange. With the Project, decreased congestion on northbound I-405 would allow more traffic to reach northbound and southbound I-5 and northbound SR 525 during the PM peak period. Because portions of northbound I-5 are already congested without the Project the increase in traffic volumes would further worsen northbound I-5 congestion.

Northbound SR 525 and southbound I-5 south of the I-405 interchange in Lynnwood would have increased volumes with the Build Alternative. Similar to northbound I-5, decreased congestion on I-405 would allow more traffic to reach these corridors during the PM peak period.

The I-405 Master Plan includes a future project to add a second ETL in each direction between SR 527 and I-5 in Lynnwood and provide direct connector ramps between the I-405 ETLs and the I-5 HOV lanes. These improvements would likely reduce congestion and decrease travel times in the ETLs approaching the I-5 interchange and improve congestion on I-5 because most HOV users would no longer need to weave across several lanes of traffic to reach the I-5 HOV lanes. These two Master Plan improvements are currently unfunded and their timing is unknown.

SECTION 6 CONSTRUCTION EFFECTS

6.1 General Effects

The Project would widen I-405 and SR 522 in certain locations; construct new I-405 mainline and ramp bridges over NE Woodinville Drive, the Sammamish River/Sammamish River Trail, and SR 522; widen the I-405 bridge over 228th Street SE; and build direct access ramps near SR 527 at 17th Avenue SE over northbound I-405. Construction would occur between 2021 and 2024, but construction activities in some areas would be complete prior to 2024. Once a contractor is selected for the Project, they could use multiple work crews and zones to reduce the overall construction period.

WSDOT would maintain existing freeway and arterial roadway capacity during construction to the extent possible. Lane or roadway closures would be minimized and scheduled to occur when there would be the least effects on traffic in the study area, such as during overnight and weekend periods. Traffic conditions are expected to remain similar to existing conditions during the most congested times of the day, although some short-term delays may occur.

6.2 Traffic Effects

Construction of the Project would have the following traffic effects on the transportation network, freeways, local streets, transit, freight, and nonmotorized travel.

6.2.1 Transportation Network

Access to the construction areas would occur from the I-405 and SR 522 freeway and from local streets. Construction vehicles for the Project would access work areas for activities such as conducting earthwork, constructing retaining walls, paving, making deliveries, and hauling materials. These construction vehicles are expected to increase traffic volumes and delay and in the study area during the construction period. These increases would occur primarily during weekday off-peak periods and weekends, and impacts would be negligible during weekday peak periods. Additional delays are also expected to occur on freeways and arterials identified as haul routes. The exact haul routes and quantity of construction vehicles would not be known until a construction contract is signed, but most construction vehicles are anticipated to use I-405, SR 522, SR 527, I-5, 220th Street SE, 17th Avenue SE, 228th Street SE, NE 195th Street, NE Woodinville Drive, and NE 160th Street to bring materials to and from construction sites. When possible, the work sites would be accessed from I-405 and SR 522; however, construction traffic on local streets would be unavoidable.

WSDOT will work with the contractor on the development of a Traffic Management Plan to identify potential construction haul routes, staging areas, detour routes, lane closures, and construction techniques among other elements. The Traffic Management Plan would require the WSDOT's approval for impacts on freeway facilities; impacts on local streets would require the review and approval of affected jurisdictions. This approval is required prior to the start of any construction activity that affects traffic and must be updated as the project progresses.

6.2.2 Freeway Travel

During construction of the Project, the existing I-405 general purpose (GP) lanes and express toll lanes (ETLs) and portions of SR 522 would be realigned through the construction area. Temporary night and weekend lane closures would be required to widen the freeway. Freeway ramps would be closed as needed during construction; but closures would also occur on nights and weekends when traffic demand is lower and detour routes can better accommodate additional traffic. Increases in vehicle delay would occur through construction areas and along detour routes.

Full freeway closures in one or both directions of travel would be required during bridge construction and demolition, the setting of bridge girders, and installation of new culverts. Most of these full closures would occur at night. The longer duration closures would occur at night and in some cases, such as installation of culverts or bridge demolitions, would occur over one or more weekends.

Construction activities would be phased at the SR 522 and I-405 interchange and would likely have a negligible impact on I-405 mainline operations. Most of the construction would be completed outside of the existing roadway, including constructing the new northbound I-405 mainline bridge and the northbound I-405 to eastbound SR 522 ramp. Night and weekend closures would be required to make connections to new structures. WSDOT expects temporary signals to be installed on SR 522 to allow drivers to get accustomed to traffic signals and to allow ramp connections during different construction phases.

Multiple mainline and ETL shifts would be required to construct the SR 527 direct access ramps in the I-405 median near 17th Avenue SE. Lane shifts would require one or more lanes to be temporarily closed and would generally occur at night.

The Project is not expected to affect tolling operations during construction. WSDOT would continue to operate and manage the ETLs in accordance with the requirements established by the Washington State Transportation Commission (WSTC). New tolling equipment required by the Project would be installed and incorporated into the existing tolling system after testing. WSDOT would continue to operate and monitor the ETLs to maintain performance and would adjust the tolling algorithm, as needed, during construction.

6.2.3 Local Streets

Construction would require adjustments to the existing lane and intersection configurations on some roadways. Construction equipment and activities would be located adjacent to roadways, and construction traffic entering and leaving the work zone would be common. These activities could affect drivers on local streets by increasing vehicle delay and would also reduce roadway capacity.

Construction staging areas would be located within WSDOT and City of Bothell right of way. Most construction staging is expected to be located along NE Woodinville Drive, 112th Avenue NE, 27th Avenue SE, 228th Street SE, 17th Avenue SE, and SR 527; however, the final construction staging areas would be determined after a contractor is selected for the Project.

Construction activities expected to have local roadway impacts would be utility relocations, street reconstruction, building stormwater facilities, bridge work, culvert and noise wall construction, and construction of the new roundabout at 17th Avenue SE. Any major closures would occur during nights and weekends, as needed. The selected contractor may propose a longer-term closure to reduce the overall construction period. WSDOT would work with affected residences, businesses, and the traveling public to minimize impacts. Access to private businesses would always be maintained during construction. Depending on the construction methods used, alternative access could be provided via detour routes, consolidated driveway access, or temporary access roads.

Temporary closures to arterials would be required for erecting the bridge girders, demolishing existing bridges, and placing concrete deck slabs. Other closures would be needed for constructing new intersections, building walls, correcting fish barriers, and installing new utilities. These closures would be of short duration and limited to nights or weekends to the extent possible, with the exceptions described below.

- Construction related to fish barrier correction would require closures of SR 527 for multiple nights and/or full weekends. Depending on the construction method used, the contractor may be able to reduce the duration of the impact.
- Roundabout construction at the Canyon Park Park and Ride on 17th Avenue SE would be phased to maintain existing parking capacity to the extent possible. Temporary traffic control, including work-zone traffic-control flaggers, may be used. During construction of the roundabout, existing roadway capacities would be reduced, resulting in increased vehicle delay and travel time through the work zone.

6.2.4 Transit

Construction activities are expected to result in lane closures, reductions in roadway capacity, and sidewalk impacts that could affect transit in the study area. Buses would be affected by increased delay and longer travel times. Bus stops would be maintained when feasible but may need to be temporarily relocated or closed during construction. Some bus routes may require rerouting when streets are closed, including routes that serve the Canyon Park Park and Ride via 17th Avenue SE. WSDOT would coordinate with all affected transit agencies, including Community Transit, King County Metro, and Sound Transit, to minimize impacts and disruptions to bus facilities and service during construction.

The Project would reconstruct the Canyon Park Park and Ride. Construction is not anticipated to reduce the available parking at the park and ride during commute hours (5 a.m. to 7 p.m.) on weekdays. Overnight and weekend parking reductions may be necessary for construction. If parking is temporarily reduced due to construction activities, WSDOT would coordinate with affected transit agencies to determine if and where replacement parking would be provided. Transit service would continue to operate at the Canyon Park Park and Ride and the I-405 flyer stops, but a few weekend closures may be required at the Canyon Park Park and Ride to complete construction. Any weekend closures will be coordinated with affected transit agencies to minimize service disruptions.

Pedestrian access between the Canyon Park Park and Ride and the I-405 inline bus stops would be maintained during construction of the Project. Construction of the direct access ramp near 17th Avenue SE would be staged to allow for the existing pedestrian bridge across I-405 to remain open during construction until the proposed new segment of the pedestrian bridge is completed. Temporary short-term closures of the existing and new pedestrian bridges would be unavoidable; however, closures would occur during nights and weekends to minimize impacts to transit riders. Up to three weekend closures would be required for connecting the new segment of the pedestrian bridge to the existing bridge near the southbound I-405 inline bus stop. Additional nighttime closures of the new pedestrian bridge would be required for painting and other work required to finish the bridge and would occur when transit is not in operation. WSDOT will coordinate with affected agencies to minimize impacts on nonmotorized and transit users. In addition, WSDOT will maintain access across I-405 to the park and ride with an ADA accessible path when either the existing or new pedestrian bridge is closed. This detour route may take longer for some users than the existing bridge.

Transit service modifications will be coordinated with King County Metro, Community Transit, and Sound Transit to minimize impacts and disruptions to bus facilities and service during construction. These measures could include posting informative signage before construction at existing transit stops and developing modified service plans to accommodate park and ride closures during construction.

6.2.5 Freight

Freight vehicles would have the same impacts as general traffic, as described earlier in this section.

6.2.6 Nonmotorized Travel

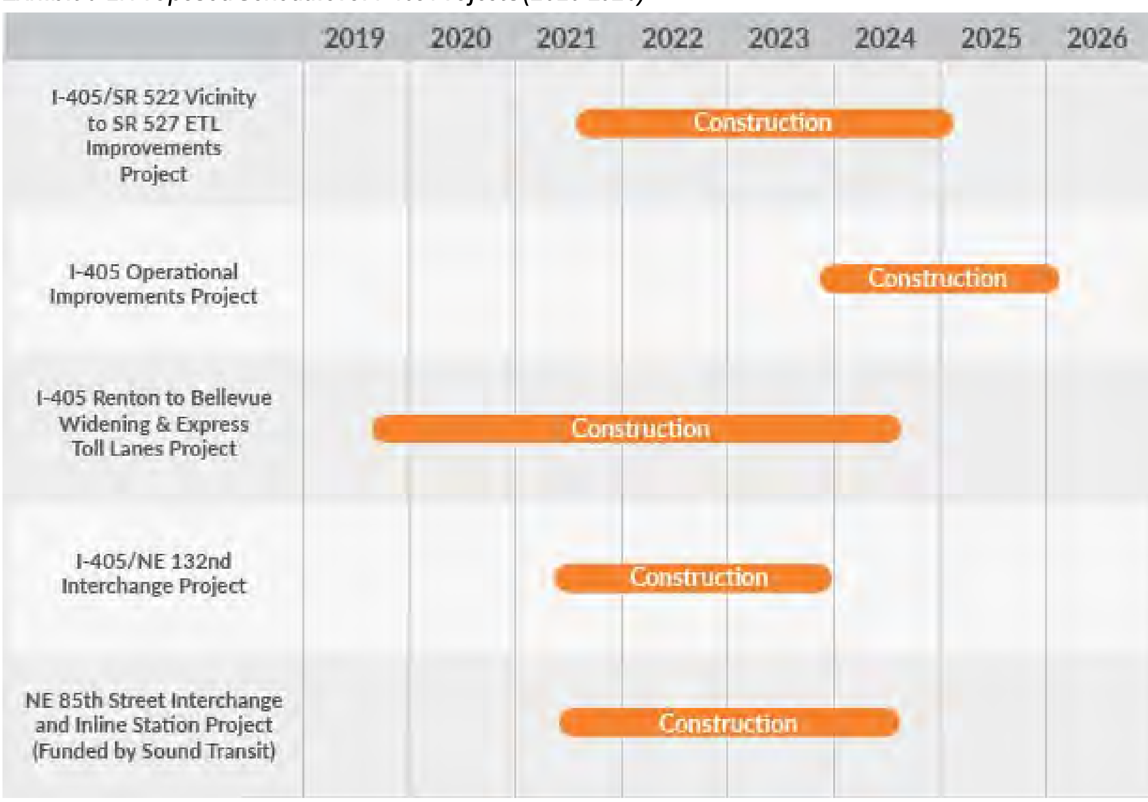
Construction activities may also limit pedestrian and bicyclist movements on local roadways. Routes for nonmotorized users would be maintained to the extent possible, with specified detour routes when needed. There would be some impact on nonmotorized travelers during construction of the I-405 mainline and ramp bridges at the SR 522 interchange. The Sammamish River Trail may be closed or rerouted for short time periods for girder setting, bridge demolition, and other civil construction activities. The North Creek Trail may also require a short-term closure or reroute during construction of a new nonmotorized connection to the planned SR 522 bus station as part of the Project. Any needed closures of the Sammamish River Trail and North Creek Trail would occur during evening hours, and the trails would remain open during the day.

Sidewalk and bicycle lane closures would be unavoidable during new bridge construction over 228th Street SE; however, accessible nonmotorized connections would be available at least on one side on 228th Street SE. Nonmotorized travel would also be affected in areas where roadway reconstruction includes sidewalks along 17th Avenue SE, 220th Street SE and SR 527. Protected sidewalks next to the construction area would be provided when detour routes are not feasible. Short sections of sidewalks may need to be closed during construction of the roadway and would require pedestrians to detour to the closest crossing. Crosswalks would be maintained to the extent feasible.

6.3 Indirect Construction Effects

Construction of the Project would start in 2021 and last 3 to 4 years, which would overlap with one or more other I-405 projects, including the Renton to Bellevue Widening and Express Toll Lanes Project, the NE 85th Street Interchange and Inline Station Project, the NE 132nd Street Interchange Project, and several other planned operational enhancement projects throughout the corridor. The heavy civil construction elements of the Project and other I-405 projects would not intersect; however, other indirect construction-related impacts are expected. Exhibit 6-1 shows the proposed construction schedule for the Project and additional I-405 projects near the study area. The information in Exhibit 6-1 represents the best available information and is subject to change depending on construction funding, contractor means and methods, and/or other unforeseeable project delays. Due to the uncertainty of the time and/or sequencing of major construction activities for both the Project and the additional I-405 projects, the effects discussed in this section are qualitative.

Exhibit 6-1. Proposed Schedule for I-405 Projects (2019-2026)



Indirect construction impacts would likely peak between 2022 and 2023, when the Project and the Renton to Bellevue, NE 85th, and NE 132nd projects would be under construction. With most of the I-405 corridor under construction during this period, regional facilities, including I-5 and SR 99, would have increased traffic volumes and vehicle delay.

6.3.1 Haul Routes

Freeway haul routes for the Project, including I-405, SR 522, and I-5, would also serve as haul routes for one or more other I-405 projects. Truck volumes on these facilities would likely be higher than if the Project was built in isolation. The greatest increase in truck traffic is expected at night, when most construction work would occur. Overall, the increase in truck volumes would result in higher delay on those roadways. Local streets identified as potential haul routes within the Project study area would not likely have any additional truck traffic from other concurrent I-405 projects.

6.3.2 Full Freeway Closures

Full freeway closures, both from the Project and other nearby I-405 projects, would impact regional operations on I-405. For example, a full freeway closure south of the Project study area would likely result in lower traffic volumes and less impacts through the Project study area. WSDOT may choose to coordinate with each project's contractors to schedule concurrent full freeway closures. If a full freeway closure occurred concurrently for the Project and one or more additional projects, a larger portion of I-405 would be affected. Detour routes and other major facilities, including I-5, would have an increase in vehicle delay. However, consolidated freeway closures would likely reduce the quantity and duration of closures required for all of the I-405 projects, potentially resulting in overall less impacts.

6.3.3 Contractor Coordination

WSDOT would coordinate with each project's contractor on the timing of any road and ramp closures to minimize traffic impacts. Concurrent adjacent ramp closures would not likely be allowed between the different I-405 projects. Detour routes may also be impacted by the Project and other I-405 projects. WSDOT and its contractors would coordinate to confirm that detour routes for one project are not affected by another project.

Freeway lane closures from other projects would not likely impact operations in the Project area with the exception of the NE 132nd Street project. Lane closures from the NE 132nd Street project may extend into the Project study area, or vice versa. WSDOT would also coordinate with both project's contractors to avoid lane closures that would result in vehicles making irregular lane changing (e.g., a right side lane closure followed immediately by a left side lane closure in the same area).

SECTION 7 MEASURES TO AVOID AND MINIMIZE EFFECTS

This section identifies proposed measures to avoid or minimize effects to the transportation system during operations and construction.

7.1 Operational Mitigation

WSDOT is proposing mitigation to offset traffic impacts at the intersection of 20th Avenue SE and 220th Street SE, a private street located in the Canyon Park Business Center (CPBC). This intersection currently operates poorly and would continue to operate poorly with the Build Alternative. Final mitigation will be determined by WSDOT with input from the Canyon Park Business Center Owners Association (CPBCOA).

WSDOT will provide signs at key locations outside of the CPBC directing all traffic to or from I-405 to use public streets. While not quantitatively analyzed, the signs could reduce the volume of I-405 direct access ramp traffic using private roads within the CPBC, which could further improve operations under the Build Alternative on 29th Drive SE and 220th Street SE. The locations of the signs will include, but are not necessarily limited to:

- Westbound 228th Street SE approaching 29th Drive SE.
- Northbound 17th Avenue SE approaching 220th Street SE.

7.2 Construction Mitigation

- Maintain existing capacity during construction activities to the extent possible. Lane or roadway closures will be minimized and scheduled to occur when there is the least effect on traffic in the study area, such as overnight and weekend time periods.
- Coordinate with the local agencies and other projects to prepare a Traffic Management Plan prior to making any changes to the traffic flow or lane closures. Local agencies, the public, school districts, emergency service providers, and transit agencies will be informed of the changes in advance through the media, the Project website, and an email listserv. Pedestrian and bicycle circulation will be maintained as much as possible during construction. For any road, bicycle lane, and/or sidewalk closure, clearly marked detours will be provided.

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ATTACHMENT A ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
BRT	bus rapid transit
CPBC	Canyon Park Business Center
CPBCOA	Canyon Park Business Center Owners Association
EA	Environmental Assessment
ETL	express toll lane
FHWA	Federal Highway Administration
GP	general purpose
HCM	*Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis*
HOT	high-occupancy toll
HOV	high-occupancy vehicle
I-405	Interstate 405
I-5	Interstate 5
I-90	Interstate 90
King County Metro	King County Metro Transit Department
LOS	level of service
MP	milepost
mph	miles per hour
Project	I-405, SR 522 Vicinity to SR 527 Express Toll Lanes Improvement Project
PSRC	Puget Sound Regional Council
SOVs	single-occupancy vehicles
SR 202	State Route 202
SR 522	State Route 522
SR 524	State Route 524
SR 527	State Route 527
ST3	Sound Transit 3 Plan
WSTC	Washington State Transportation Commission

ATTACHMENT B GLOSSARY

Term	Meaning
Bottleneck	It causes congestion because of too much traffic in one area. It can be exacerbated by the roadway condition, such as narrowing of the roadway or the presence of on- or off-ramps. Generally, slower-than-posted speeds form upstream of a bottleneck, while speeds closer to posted limits occur downstream of a bottleneck.
Flyer stops	Transit stops inside the freeway boundaries for use by transit vehicles using the freeway. They may be located in the median at the same grade as the main roadway or on a structure, such as a ramp or on the right side of the mainline. Flyer stops are advantageous to transit agencies because they reduce transit delay to serve intermediate destinations, however, in most cases passengers travel greater distances to reach the loading platform.
Express toll lanes (ETL)	Lanes that are available for use by HOV users without a toll and single-occupant vehicles (SOV) users who choose to pay a variable toll.
General purpose (GP) lanes	Lanes that are available to all traffic.
High occupancy vehicle (HOV) lanes	Lanes that are available to buses, motorcycles, vanpools, and vehicles carrying a specified number of occupants. As noted on signs, most HOV lanes require two passengers, while some require three within the study area.
High occupancy toll (HOT) lanes	Lanes that are available for use by HOV users without a toll and single-occupant vehicles (SOV) users who choose to pay a variable toll.
Recurring bottleneck	A localized constriction of traffic flow that occurs on a frequent and predictable basis, regardless of weather conditions, crashes, or events.
Signalized intersection	An intersection that uses a traffic signal to control vehicles, bicyclists, and pedestrian movements
Unsignalized intersection	An intersection that uses signs such as “Stop” and “Yield” to control movements

ATTACHMENT C TRAVEL DEMAND FORECASTS

TECHNICAL MEMORANDUM

Date:

To:

From: Jeff Pierson, Fehr & Peers

Subject: I-405 Model Update

SE16-0478

INTRODUCTION

Fehr & Peers was selected by the Washington State Department of Transportation (WSDOT) to provide support for traffic modeling and analysis for projects along I-405. The key components of travel demand modeling support are as follows:

- Prepare 2015, 2025 and 2045 demand models to allow various options to be analyzed
- Perform with and without tolling scenarios for the design option identified by WSDOT
- Work closely with WSDOT staff to reach agreement on assumptions prior to model runs

Fehr & Peers recently worked with WSDOT to prepare travel modeling analyses for the SR 167 Completion and SR 509 Corridor projects. The project team agreed to build on the models previously used for these WSDOT projects, supplemented by additional detail in the transportation network and transportation analysis zone (TAZ) system in the I-405 study area.

This report begins by describing key components of the development of the SR 167 and SR 509 Travel Models which form the foundation of the I-405 Travel Model. Subsequently, the modifications made to the I-405 study area and validation results are summarized. The I-405 Travel Model was calibrated and validated along the entire I-405 corridor and was previously used to support the I-405 Renton to Bellevue (RTB) project.

This model documentation was prepared in support of the following projects along the corridor's northern portion:

- I-405 – SR 522 to SR 527 Capacity Improvement Project
- I-405 - NE 132nd St Interchange Improvements
- I-405 - NE 85th St Interchange and Inline Station Project

Validation statistics in this memo are limited to locations between SR 520 and I-5 in Lynnwood.

I-405 TRAVEL MODEL DEVELOPMENT

The I-405 Travel Model is based on the Puget Sound Regional Council (PSRC) 4K v4.05 travel model framework. This section summarizes the background and updates made to that model, based on consultation with PSRC and WSDOT staff.

Land Use

An important input variable for the travel demand model is an accurate estimate of current land use data (2015) and future year forecasts. Future year land use estimates used the PSRC's Land Use Vision (LUV, January 2016) forecasts to develop total households and total employment allocations that are consistent with County and local jurisdiction land use allocations. The base and future land use estimates were developed by Stantec.

Generally, the 2015 base year land use estimates were developed using a variety of data sources. The 2015 total household and total employment data was created at the census tract geography. The following sources were used to develop household and employment estimates:

- 2010 U.S. Census
- Year 2000 thru 2014 building permit data at census tract geography (PSRC)
- 2015 census tract housing data (Office of Financial Management)
- 2015 census tract household size data (PSRC)
- 2014 PSRC employment summaries derived from the Quarterly Census of Employment and Wages (QCEW), administrative records employers report, by law, to the Washington State Employment Security Department (ESD)

- PSRC's supplemental data from the Boeing Company, the Office of Washington Superintendent of Public Instruction (OSPI), and governmental units throughout the central Puget Sound region

The 2025 land use estimates are based on the PSRC's January 2016 Land Use Vision forecasts. Efforts were made to ensure that the growth between the base year (2015) and the 2025 PSRC estimates were logical. Minor adjustments were made to 2015 total household and total employment estimates to minimize illogical growth. The 2015 adjustments were made to Forecast Analysis Zones (FAZs) that did not have an exact equivalency between census tract geographies and FAZ geography.

The PSRC LUV future forecasts extend to year 2040. For this study, a year 2045 land use estimate was required. Working closely with PSRC, the project team developed an estimated land use forecast for 2045. The 2045 forecasts were developed by determining the average annual growth between 2025 and 2040 as well as determining the average annual growth rate between 2035 and 2040. The two growth rates were then averaged and applied to the PSRC 2040 forecasts to extend out an additional five years.

Model Framework

The I-405 Travel Model was initially developed based on the PSRC's older Regional Travel Demand 1K Model v1.00b. The PSRC has extensive model documentation and a User's Guide. Rather than re-write the PSRC documentation, this memorandum summarizes the changes Fehr & Peers made to update the I-405 Travel Model. These changes include major updates to the following:

- Expansion of TAZ detail from 938 TAZs to 973 TAZs
- Added detail and refined the roadway network in all four counties
- Updated transit network to include current 2015 transit itineraries for King County Metro, Community Transit, and Everett Transit
- Updated park-and-ride component of the model
- Includes Tideflats truck trip generation component (special generators)
- Updated demographic inputs from the 2010 Census and employment data from the ESD
- Revised trip generation rates based on the PSRC 2006 Household survey
- Updated assignment methods for traffic, transit, and park-and-ride lots

The following sections describe these items in more detail, including the specific changes that were made to develop the I-405 travel model, why they are relevant for the model, and provide some details about key input and output files.

TAZ Updates

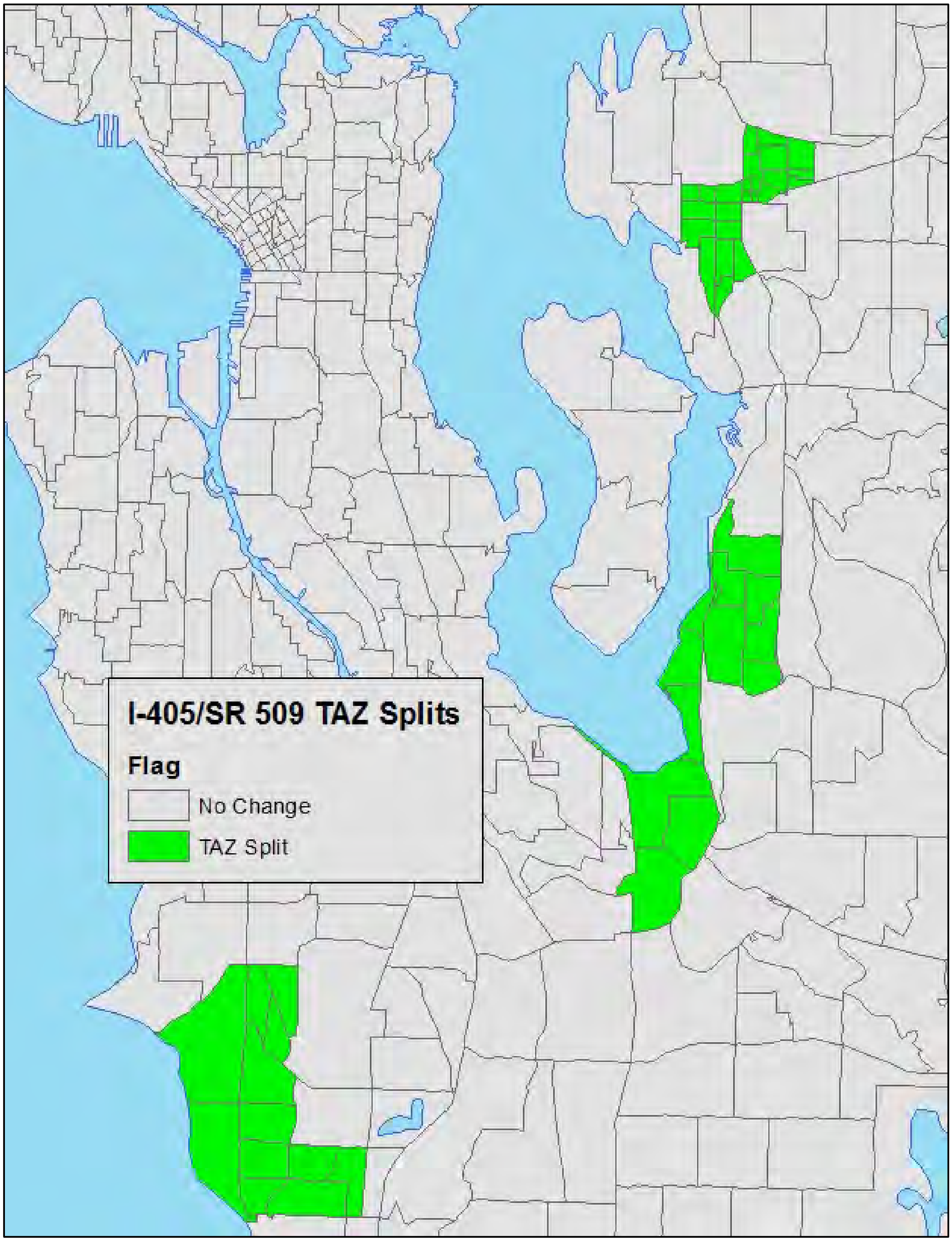
TAZs organize land use development data into specific geographic areas. 12 zones from PSRC's 1K TAZ system were disaggregated into 47 zones for the I-405 Travel Model. The zones were split near SR 509, Renton, and Bellevue. The updated TAZ equivalencies between the PSRC model and I-405 Travel Model are shown in **Table 1**.

TABLE 1. TAZ EQUIVALENCIES

PSRC TAZ	*I-405 TAZs*
289	289, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 953
291	291, 954, 955, 956
293	293, 952
294	294, 951
295	295, 950
310	310, 957, 958, 959, 960, 961, 962
323	323, 963, 965
324	324, 964
372	372, 970, 971, 972
373	373, 969
374	374, 966, 973
375	375, 967, 969

The TAZs that were split are highlighted in **Figure 1.**

FIGURE 1. TAZ SPLITS



Transportation Networks

The highway network developed for the base year model was created by updating the highway network with additional detail in Pierce, King, and Snohomish Counties. Much of the highway network modification was done to accommodate the additional TAZs created in the study area. A generalized summary of the modifications made to the highway network is shown in **Table 2**.

TABLE 2. NETWORK MODIFICATIONS

Network Attributes	***Modifications***
Zone Connectors	The regional TAZs that were split required coding new TAZ connectors to the arterial network. Any TAZ connectors that were connected to intersections were moved to mid-block. Driveway locations were identified with aerial photos and centroid connectors were located appropriately for the small mixed-use center TAZs. Walk access links were added to all regional centers and to park-and-ride lots.
Additional Arterials	Additional base year network detail was added to support the screenline validation effort and future year network assumptions.
Lanes	Modified lanes based on review of aerial photos and field visits. Major changes included coding of center turn lanes (adding 0.2 lanes per the common convention in the area-e.g., a three-lane road is coded as having 1.2 lanes in each direction).
Speed	Speed limits for arterials and collectors in SR 509 and I-405 study area were set to match field conditions.
Capacity	Roadway capacities were modified where appropriate throughout the region (e.g., correcting inconsistent coding from previous modeling efforts.)
Freeway Interchanges	Modified intersection geometries at SR 518, SR 509 and I-5 interchanges to match actual ramp configurations.
Turn Prohibitions	Added turning restrictions at various locations based on network modifications.
Tolls	Updated SR 16 and SR 520 toll to match current rates. Toll rates are in year 2010 dollars and are a blended rate based on a mix of cash and Good To Go pass usage.

The transit network and operations inputs for the model were updated to reflect 2015 service characteristics (routes and headways) for all transit agencies in the region, including Sound Transit, Pierce Transit, King County Metro, Community Transit, Kitsap Transit, and Everett Transit. The modifications were made for peak period and off-peak service.

The process to determine demand at park and ride lots was also modified. The model incorporates a utility factor to differentiate the attractiveness of a park and ride lot based on transit connectivity and capacity of the lot. The PSRC model framework does not assume such a factor.

Sociodemographic Data

As described in Chapter 5 of the PSRC model documentation, a key element of the overall model structure is the sociodemographic characteristics of households. This data influences model components such as vehicle availability, mode choice, and trip generation. Version 1.00b of the PSRC model was based on sociodemographic data from the 2000 US Decennial Census. As part of the I-405 Travel Model development, the sociodemographic data were updated using the most recent 2010 Decennial Census data from the US Census Bureau. This data updates the proportions of the households in each of the 256-household cross-classification categories.

Trip Generation Rates

In conjunction with the updated sociodemographic information, PSRC updated the trip generation rates for their trip base models. The primary source of changes in trip rates for households were derived from the 2006 household travel survey. Trip rates for employment were also modified. Summaries of all the trip rate changes can be found in the PSRC publication, *Puget Sound 4K Model Version 4.03, Draft Model Documentation, June 2015*. The new rates have been incorporated into the I-405 Travel Model.

External Trips

The external trips for the travel models were updated to be reflective of the year 2015 traffic counts. The future year external trips are assumed to grow at approximately two percent a year, to be consistent with PSRC's latest regional model.

Special Generators

The travel models for the two projects used similar special generators as the PSRC trip model. The only differences compared to the PSRC's approach to model special generators are as follows:

- The modeling of Sea-Tac International Airport trips was modified to better reflect origins and destinations of trips to and from the airport. PSRC has recently incorporated the modifications in their 4K framework.

- The travel models also include Bremerton Navy base and the Snohomish County Boeing facility as special generators.

Transit Assignment

The transit assignment process has been modified from the approach used by PSRC in the regional travel model. The transit assignment methodology used in the SR 509 travel models mirrors the methodology used in the Sound Transit Incremental Transit Ridership Model. Specifically, the models incorporate Sound Transit's Boarding Penalty and Wait Time Factors used in the regional transit assignment. The Sound Transit methodology better accounts for passenger bias in selecting both mode and station locations for boarding/alighting based on factors other than transit headways/speeds that are considered in the PSRC 4K model framework. To work with the updates in the transit assignment macro, the transit nodes in the network file have been flagged to identify the following, consistent with the Sound Transit methodology:

- Regular bus stops
- Transit centers
- Rail stations (e.g., Sounder, Central and Tacoma Link)

The approach in the Sound Transit model has been approved by the Federal Transit Administration (FTA) and provides greater flexibility in how different stations are represented in the model and more accurately reflects observed boarding and transfer patterns.

Traffic Assignment

Fehr & Peers updated the volume delay functions (VDFs) to improve the performance of the traffic assignment portion of the I-405 Travel Model. The VDFs were developed based on the Highway Capacity Manual's (2010) recommendations for VDFs for large regional travel demand models (Chapter 30 – Area wide Analysis Appendix C). The VDF changes were initially made in conjunction with WSDOT for Fehr & Peers' earlier work on the I-405 Eastside Tolling Corridors project. The VDFs were specifically developed to reduce the PSRC model's tendency to "over-assign" traffic to the freeway corridors compared to adjacent arterial corridors with less congestion. In other words, the standard PSRC VDFs tend to make major regional roadways more "attractive" compared to typical city arterials and collectors. The new VDFs are based on functional class and speed. The VDFs used in the PSRC 4K Version 4.05 and the I-405 Travel Model are shown in **Table 3**.

TABLE 3. VOLUME DELAY FUNCTIONS

Speed (MPH)	***PSRC Version 4K***	***I-405 Travel Model***
< 30	fd5 = (length * 60 / ul2) * (1 + 0.60 * (HRFAC * volau / (ul1 * lanes))^5.8) + el1 / ((1 - get(1)).max.0.01)	fd1 = (length * 60 / ul2) * (1 + 1.5 * (HRFAC * (volau) / (lanes * ul1))^4)
30		fd2 = (length * 60 / ul2) * (1 + 1.2 * (HRFAC * (volau) / (lanes * ul1))^5)
35		fd3 = (length * 60 / ul2) * (1 + 1 * (HRFAC * (volau) / (lanes * ul1))^5)
40		fd4 = (length * 60 / ul2) * (1 + 0.7 * (HRFAC * (volau) / (lanes * ul1))^5)
45		fd5 = (length * 60 / ul2) * (1 + 0.72 * (HRFAC * (volau) / (lanes * ul1))^5)
50	fd3 = put((length * 60 / ul2) * (1 + 0.56 * (HRFAC * volau / (ul1 * lanes))^6.0)) + length * ((0.5639 + put(get(1) / length) * (0.6398 + get(2) * (- 0.0712 + get(2) * (0.0004 + 0.00009 * get(2)))))	fd6 = (length * 60 / ul2) * (1 + 0.74 * (HRFAC * (volau) / (lanes * ul1))^5)
55		fd7 = (length * 60 / ul2) * (1 + 0.1 * (HRFAC * (volau) / (lanes * ul1))^10)
60	fd1 = put((length * 60 / ul2) * (1 + 0.72 * (HRFAC * volau / (ul1 * lanes))^7.2)) + length * (0.max.(- .5639 + put(get(1) / length) * (0.6398 + get(2) * (- 0.0712 + get(2) * (0.0004 + 0.00009 * get(2))))))	fd8 = put((length * 60 / ul2) * (1 + 0.72 * (HRFAC * (volau) / (lanes * ul1))^7.2)) + length * (0.max.(- 0.5639 + put(get(1) / length) * (0.6398 + get(2) * (- 0.0712 + get(2) * (0.0004 + 0.00009 * get(2))))))
70		fd10 = (length * 60 / ul2) * (1 + .32 * (HRFAC * (volau) / (lanes * ul1))^7)
Centroid	fd9 = (length * 60 / ul2)	fd9 = (length * 60 / ul2) * (1 + 1.5 * (HRFAC * (volau) / (lanes * ul1))^4)or(length * 60 / ul2)

Notes:
fd: Function Definition (part of EMME macro language)
length: Link distance
ul2: Speed in EMME model
HRFAC: EMME Time Period Peak Hour Factor (AM=.375, PM=.350, MD=.184, EV=.354, and NI=.255)
volau: EMME Total Vehicle Demand for Time Period
lanes: Number of Lanes
ul1: EMME Capacity (vphpl)

Base Year Model Validation

The I-405 model validation was done for the AM and PM peak hours. **Figure 2** shows the locations chosen for the validation effort for this portion of the model. The observed data was generally obtained from the WSDOT's 2015 Compact Data Retrieval (CDR) database. **Tables 4-7** show the results of the validation for the AM and PM peak hours by direction.

FIGURE 2. VALIDATION LOCATIONS

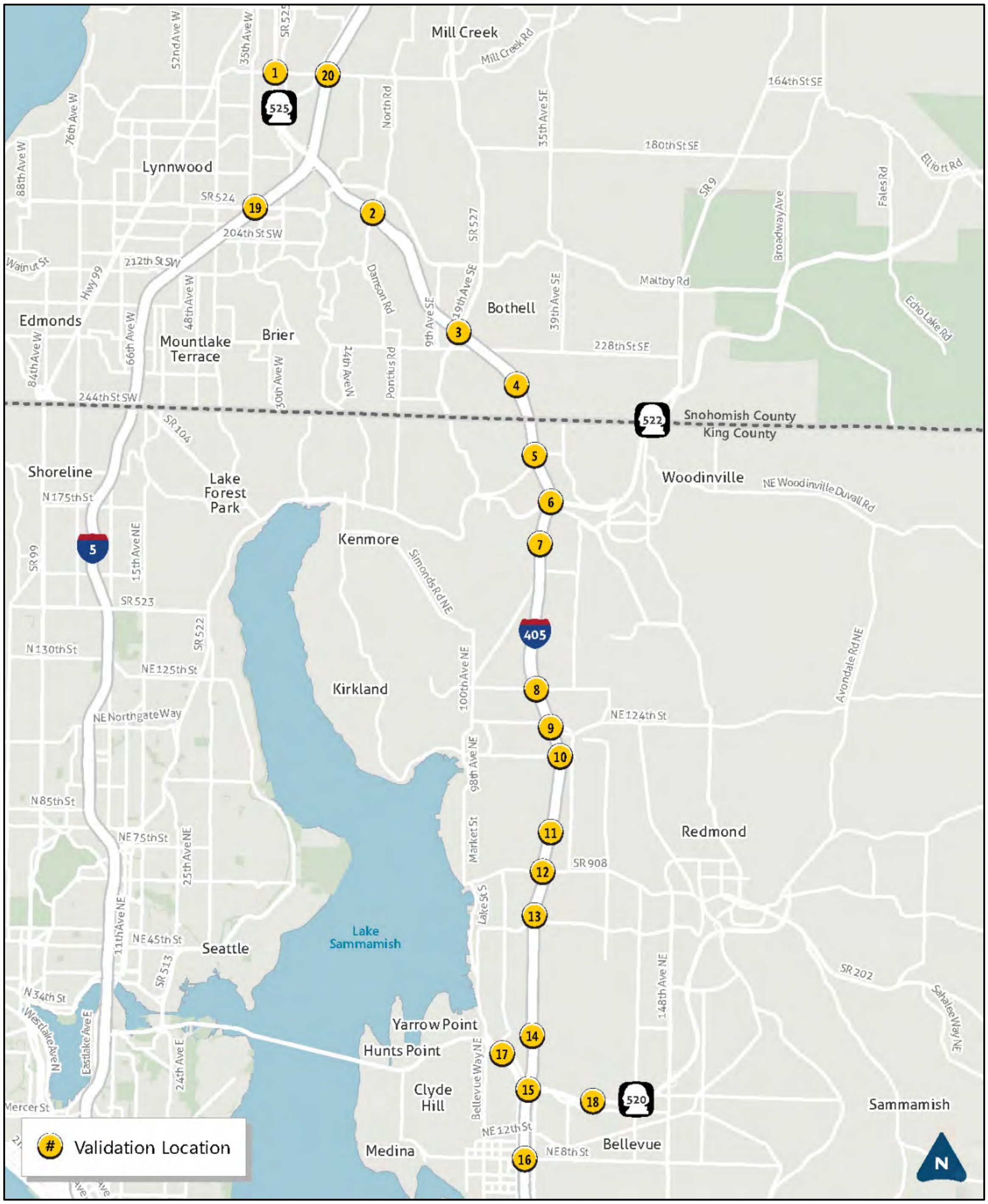


TABLE 4. AM PEAK HOUR NORTHBOUND/EASTBOUND VALIDATION

Location	GP Lanes			HOV Lanes			Total		
	Count	Model	Ratio	Count	Model	Ratio	Count	Model	Ratio
SR 525									
1. 164th St SW	2,093	2,271	1.08	-	-	-	2,093	2,271	1.08
I-405									
2. Damson Rd	3,290	2,811	0.85	139	1,015	7.33	3,428	3,826	1.12
3. SR 527	2,514	2,092	0.83	143	977	6.83	2,657	3,069	1.15
4 236th St SE	3,571	3,268	0.92	142	993	6.99	3,713	4,261	1.15
5. 195th	2,637	2,327	0.88	155	1,171	7.57	2,791	3,498	1.25
6. SR 522	3,234	2,582	0.80	127	1,267	10.00	3,361	3,849	1.15
7. 170th St	4,098	2,532	0.62	172	1,195	6.95	4,270	3,727	0.87
8. NE 132nd St	3,761	3,273	0.87	272	1,410	5.18	4,033	4,682	1.16
9. NE 124th St	2,826	2,431	0.86	201	1,601	7.96	3,028	4,032	1.33
10. NE 116th St	3,671	3,133	0.85	225	1,557	6.92	3,896	4,689	1.20
11. NE 97th St	4,477	4,418	0.99	268	663	2.47	4,745	5,082	1.07
12. NE 85th St	3,695	3,519	0.95	269	669	2.49	3,964	4,189	1.06
13. NE 70th St	3,932	3,533	0.90	277	653	2.35	4,209	4,186	0.99
14. NE 37th St	4,284	3,386	0.79	274	1,536	5.60	4,558	4,922	1.08
15. SR 520	3,261	2,477	0.76	347	1,596	4.60	3,607	4,073	1.13
16. NE 8th St	5,610	3,865	0.69	417	1,575	3.77	6,027	5,440	0.90
SR 520									
17.108th Ave NE	2,963	2,611	0.88	135	230	1.70	3,099	2,841	0.92
18. 140th Ave NE	3,778	3,667	0.97	1,345	614	0.46	5,123	4,281	0.84
I-5									
19. 196th St SW	5,450	5,269	0.97	217	230	1.06	5,668	5,499	0.97
20. 164th St SW	4,394	4,637	1.06	280	351	1.25	4,674	4,988	1.07

TABLE 5. AM PEAK HOUR SOUTHBOUND/WESTBOUND VALIDATION

Location	GP Lanes			HOV Lanes			Total		
	Count	Model	Ratio	Count	Model	Ratio	Count	Model	Ratio
SR 525									
1. 164th St SW	2,245	2,432	1.08	-	-	-	2,245	2,432	1.08
I-405									
2. Damson Rd	3,141	3,130	1.00	1,060	960	0.91	4,201	4,089	0.97
3. SR 527	2,097	2,190	1.04	1,060	1,403	1.32	3,157	3,593	1.14
4 236th St SE	2,731	3,772	1.38	1,370	1,350	0.99	4,101	5,122	1.25
5. 195th	2,439	3,209	1.32	1,352	1,558	1.15	3,791	4,768	1.26
6. SR 522	2,466	3,080	1.25	1,357	1,529	1.13	3,823	4,608	1.21
7. 170th St	4,098	2,532	0.62	172	1,195	6.95	4,270	3,727	0.87
8. NE 132nd St	4,983	5,130	1.03	2,538	2,033	0.80	7,522	7,163	0.95
9. NE 124th St	4,073	4,419	1.09	2,219	2,214	1.00	6,291	6,633	1.05
10. NE 116th St	5,110	4,655	0.91	2,733	2,291	0.84	7,843	6,946	0.89
11. NE 97th St	5,683	5,164	0.91	2,775	2,484	0.90	8,458	7,648	0.90
12. NE 85th St	4,599	4,496	0.98	2,744	2,493	0.91	7,343	6,989	0.95
13. NE 70th St	5,102	4,576	0.90	2,761	2,502	0.91	7,863	7,078	0.90
14. NE 37th St	6,051	4,925	0.81	1,822	2,064	1.13	7,873	6,989	0.89
15. SR 520	5,819	4,758	0.82	1,876	2,071	1.10	7,695	6,829	0.89
16. NE 8th St	5,217	3,815	0.73	1,067	2,082	1.95	6,284	5,897	0.94
SR 520									
17.108th Ave NE	2,719	2,631	0.97	220	249	1.13	2,939	2,879	0.98
18. 140th Ave NE	3,579	2,947	0.82	853	477	0.56	4,432	3,424	0.77
I-5									
19. 196th St SW	3,745	6,450	1.72	1,294	1,132	0.88	5,039	7,582	1.50
20. 164th St SW	4,571	3,476	0.76	1,107	1,100	0.99	5,677	4,577	0.81

TABLE 6. PM PEAK HOUR NORTHBOUND/EASTBOUND VALIDATION

Location	GP Lanes			HOV Lanes			Total		
	Count	Model	Ratio	Count	Model	Ratio	Count	Model	Ratio
SR 525									
1. 164th St SW	2,402	2,719	1.13	-	-	-	2,402	2,719	1.13
I-405									
2. Damson Rd	3,774	3,528	0.93	1,018	1,137	1.12	4,792	4,665	0.97
3. SR 527	2,550	2,752	1.08	1,240	1,220	0.98	3,791	3,972	1.05
4 236th St SE	4,106	4,495	1.09	1,253	1,233	0.98	5,360	5,728	1.07
5. 195th	2,871	3,286	1.14	1,260	1,472	1.17	4,131	4,758	1.15
6. SR 522	3,298	4,035	1.22	1,391	1,481	1.06	4,689	5,516	1.18
7. 170th St	5,337	3,795	0.71	1,066	1,380	1.30	6,402	5,175	0.81
8. NE 132nd St	4,624	5,182	1.12	2,029	2,709	1.34	6,653	7,892	1.19
9. NE 124th St	3,556	4,064	1.14	2,085	2,820	1.35	5,640	6,884	1.22
10. NE 116th St	4,578	4,898	1.07	2,439	2,863	1.17	7,018	7,762	1.11
11. NE 97th St	5,472	5,776	1.06	2,515	2,589	1.03	7,987	8,366	1.05
12. NE 85th St	4,163	4,751	1.14	2,476	2,582	1.04	6,640	7,334	1.10
13. NE 70th St	4,350	4,705	1.08	2,515	2,635	1.05	6,865	7,340	1.07
14. NE 37th St	5,374	5,700	1.06	1,808	1,870	1.03	7,182	7,570	1.05
15. SR 520	3,237	3,677	1.14	1,364	2,119	1.55	4,601	5,796	1.26
16. NE 8th St	5,302	4,812	0.91	1,386	1,931	1.39	6,688	6,742	1.01
SR 520									
17.108th Ave NE	1,952	2,364	1.21	134	314	2.34	2,087	2,679	1.28
18. 140th Ave NE	3,592	3,395	0.95	1,146	806	0.70	4,738	4,201	0.89
I-5									
19. 196th St SW	6,133	6,520	1.06	1,182	1,113	0.94	7,315	7,633	1.04
20. 164th St SW	4,674	3,695	0.79	1,399	1,087	0.78	6,073	4,782	0.79

TABLE 7. PM PEAK HOUR SOUTHBOUND/WESTBOUND VALIDATION

Location	GP Lanes			HOV Lanes			Total		
	Count	Model	Ratio	Count	Model	Ratio	Count	Model	Ratio
SR 525									
1. 164th St SW	2,714	2,650	0.98	-	-	-	2,714	2,650	0.98
I-405									
2. Damson Rd	3,580	3,262	0.91	780	1,188	1.52	4,360	4,450	1.02
3. SR 527	2,470	2,119	0.86	758	1,378	1.82	3,228	3,497	1.08
4 236th St SE	3,427	3,192	0.93	884	1,347	1.52	4,311	4,539	1.05
5. 195th	3,098	2,807	0.91	857	1,328	1.55	3,954	4,135	1.05
6. SR 522	3,013	2,541	0.84	808	1,337	1.65	3,821	3,877	1.01
7. 170th St	4,884	4,332	0.89	814	1,340	1.65	5,698	5,672	1.00
8. NE 132nd St	4,289	3,744	0.87	869	1,769	2.04	5,158	5,513	1.07
9. NE 124th St	3,284	3,061	0.93	761	1,967	2.59	4,045	5,029	1.24
10. NE 116th St	4,352	3,505	0.81	850	1,937	2.28	5,202	5,441	1.05
11. NE 97th St	5,128	4,522	0.88	852	1,527	1.79	5,980	6,049	1.01
12. NE 85th St	3,915	3,816	0.97	860	1,537	1.79	4,775	5,352	1.12
13. NE 70th St	4,536	4,258	0.94	866	1,524	1.76	5,402	5,783	1.07
14. NE 37th St	5,121	4,557	0.89	766	1,746	2.28	5,887	6,303	1.07
15. SR 520	4,424	4,876	1.10	1,321	1,786	1.35	5,744	6,661	1.16
16. NE 8th St	3,873	4,995	1.29	873	1,765	2.02	4,745	6,761	1.42
SR 520									
17.108th Ave NE	2,445	2,866	1.17	278	560	2.01	2,724	3,426	1.26
18. 140th Ave NE	2,806	2,899	1.03	624	744	1.19	3,431	3,643	1.06
I-5									
19. 196th St SW	4,949	5,607	1.13	771	977	1.27	5,720	6,584	1.15
20. 164th St SW	4,836	4,443	0.92	653	697	1.07	5,489	5,140	0.94

PROJECT LIST

The following projects were assumed for the 2025 and 2045 No Build scenarios.

City	*Project Name*	*Description*	*Source*	*Planned Completion Year*
Bellevue	110th Avenue NE/NE 6th Street to NE 8th Street	Five-lane roadway section.	Bellevue 2017-2022 TIP	
Bellevue	120th Ave NE (Stage 3) NE 12th St to NE 16th St	Extend the 120th Avenue NE widening from NE 12th Street to NE 16th Street to consist of five lanes, including two travel lanes in each direction with turn pockets or a center turn lane.	Bellevue 2015-2021 CIP	2017
Bellevue	120th Ave NE Stage 2 - NE 8th St to NE 12th St	Extend, realign, and widen 120th Ave NE. Build a new signalized intersection at Lake Bellevue Drive/Old Bel-Red Road. The section will consist of five lanes, including two travel lanes in each direction with turn pockets or a center turn lane.	Bellevue 2015-2021 CIP	2017
Bellevue	124th Avenue NE/NE 18th Street to Northup Way	Widen the roadway to five lanes.	Bellevue 2017-2022 TIP	
Bellevue	124th Avenue NE/NE 8th Street to NE Spring Blvd	Widen 124th Avenue NE between Bel- Red Road and Spring Boulevard. The roadway cross-section of this segment will consist of five lanes, including two travel lanes in each direction with turn pockets or a center turn lane.	Bellevue 2017-2022 TIP	
Bellevue	130th Avenue NE/NE 20th to NE Bel-Red Road	From NE 20th Street to NE Spring Blvd will include two travel lanes; NE Spring Blvd to Bel-Red Road will include one through lane in each direction, a center turn lane.	Bellevue 2017-2022 TIP	

City	Project Name	Description	Source	Planned Completion Year
Bellevue	143rd Place NE/NE 20th Street to Bel-Red Road/NE 20th Place signal	New two-lane road starting at the NE 20th Street/143rd Place NE traffic signal and extending to the end of the existing NE 20th Place north of Bel-Red Road. Install signal, eastbound to northbound left turn pocket at the existing Bel-Red Road and NE 20th Place intersection.	Bellevue 2017-2022 TIP	
Bellevue	Bel-Red Rd/NE 20th St to NE 24th St	Widen to five lanes, including two travel lanes in each direction, with center turn lane	Bellevue 2017-2022 TIP	
Bellevue	Eastside Rail Corridor Grade Separated Crossing at NE 4th Street	Construct a grade separated crossing over NE 4th Street along the Eastside Rail Corridor.	Bellevue 2017-2022 TIP	
Bellevue	NE Spring Blvd (Zone 1) - 116th to 120th Avenues NE	Construct a new arterial street between NE 12th Street/116th Avenue NE and 120th Avenue NE. NE 12th Street will be widened between 116th Avenue NE and the new street connection west of the Eastside Rail Corridor. The roadway will have two travel lanes in each direction with turn pockets, along with new traffic signals at the NE 12th Street and at 120th Avenue NE intersections	Bellevue 2015-2021 CIP	2021
Bellevue	NE Spring Boulevard - 130th to 132nd Ave NE	Construct the westbound lane and other improvements on the north half of a new arterial roadway connection between 130th Avenue NE and 132nd Avenue NE. The project includes traffic signals at the 130th Avenue NE and 132nd Avenue NE and a single travel lane outside the LRT alignment.	Bellevue 2015-2021 CIP	2021
Bellevue	NE Spring Boulevard – 130th Avenue NE to 132nd Avenue NE (eastbound)	Construct the eastbound lane and other improvements on the south half of a new arterial roadway connection between 130th Avenue NE and 132nd Avenue NE.	Bellevue 2017-2022 TIP	

City	*Project Name*	*Description*	*Source*	*Planned Completion Year*
Bellevue	NorthupWay/156th Avenue NE to 164th Avenue NE	Add median left-turn lane	Bellevue 2017-2022 TIP	
Bothell	228th St SE from 35th Ave SE to 39th Ave	Widen 228th Ave to a 4-lane roadway; add EB right turn pocket at 228th/35th.	Bothell 2017-2022 TIP	
Bothell	Beardslee Boulevard Widening (Campus to I- 405)	Add an EB lane along Beardslee Blvd from 110th Ave NE to I-405.	Bothell 2017-2022 TIP	
Bothell	Main Street Extension	Extends the current Main Street from Bothell Way to 98th Avenue NE.	Bothell 2015-2021 CFP	
Bothell	Multiway Blvd: Phase 2 (SR 522 to NE 188th St - Excluding West Side)	Multiway Boulevard consists of four travel lanes, a left turn lane.	Bothell 2015-2021 CFP	
Bothell	Pop Keeney Way (NE 185th St / 98th Ave NE)	Construct a road that connects the new NE 185th Street near the bend at 98th Avenue NE to Pop Keeney Field.	Bothell 2015-2021 CFP	
Bothell	SR 522 Stage 2B Improvements (Wayne Curve to NE 180th St)	Installation of a BAT lane westbound.	Bothell 2015-2021 CFP	
Bothell	SR 522 Stage 3 Improvements	Widen the GP lanes; add BAT lanes in each direction (including the missing Seattle outbound direction of the BAT lane from 91st Avenue NE to approximately 800 feet west of the 96th Avenue NE intersection).	Bothell 2015-2021 CFP	
Kirkland	124th Ave NE Roadway Improvements (North Section) Design	Widen the existing roadway between intersections at NE 116th Street and NE 124th Street from 3 lanes to 5 lanes, to include 2-way center turn lane.	Kirkland CIP 2017-2022	design phase
Lynnwood	194th St SW - 33rd Ave W to 40th Ave W	Construct a new 2 lane road from 40th Ave W to 33rd Ave W.	Lynnwood CFP 2017-2022	
Lynnwood	196th St SW (SR-524) - 37thAve W to 48th Ave W	Widen 196th St SW from five lanes to seven lanes.	Lynnwood CFP 2017-2022	2019

City	Project Name	Description	Source	Planned Completion Year
Lynnwood	200th St SW - 40th Ave W to 48th Ave W	Widen 200th St SW from three lanes to 5/7 lanes; turning lanes at the 44th Ave W/200th St SW intersection.	Lynnwood CFP 2017-2022	2022
Lynnwood	200th St SW 64th Ave W to Scriber Lk Rd	Widen 200th St SW.	Lynnwood CFP 2017-2022	2022
Lynnwood	36th Ave W Maple Road to 164th St SW	36th Ave W will be widened to a three-lane arterial; roundabout will be installed at 179th St SW; Maple Road and 172nd St SW will be realigned into a single intersection with a traffic signal.	Lynnwood CFP 2017-2022	2020
Lynnwood	42nd Ave W 200th St SW to 194th St SW	Build a new road from Alderwood Mall Blvd. to 194th St SW.	Lynnwood CFP 2017-2022	2020
Lynnwood	44th Ave W I-5 to 194th St SW	Build a new northbound lane from 200th to 194th. Construct a new southbound lane from 194th to 195th.	Lynnwood CFP 2017-2022	2022
Lynnwood	52nd Ave W 168th St SW to 176th St SW	Widen from 2 to 3 lanes	Lynnwood CFP 2017-2022	2022
Lynnwood	Beech Road Extension AMP to Ash Way Underpass	Construct two extensions of Beech Road.	Lynnwood CFP 2017-2022	2022
Lynnwood	Maple Road Extension AMP to 32nd Ave W	Construct a new road.	Lynnwood CFP 2017-2022	2020
Lynnwood	Poplar Extension Bridge Phase I&II	Construct a bridge across I-5 to connect Poplar Way with 33rd Ave W.	Lynnwood CFP 2017-2022	2020
Redmond	Redmond Way and Cleveland St. Couplet Conversion	Convert Redmond Way from 160th Ave NE to Avondale Way to one through lane in each direction and center turn lane. Convert Cleveland Street to one through lane in each direction; A BAT lane will be completed from the Bear Creek Bridge near SR 520 to 168th Ave with a queue jump at Avondale Way.	Redmond TIP 2017-2022	

City	*Project Name*	*Description*	*Source*	*Planned Completion Year*
Renton	SW 27th St/Strander Blvd Connection	Provides a critical four/five-lane arterial that will serve as a connector to West Valley Highway (SR 181) and East Valley Road.	Renton TIP 2017-2022	
Renton	S 7th St - Rainier Ave S to Talbot Rd S	Widen the existing roadway to 3 lanes (2 lanes EB and 1 lane WB; new eastbound right-turn lane at the intersection of S 7th St and Shattuck Ave S and a traffic signal at this location.	Renton TIP 2017-2022	
Renton	Carr Road Improvements	Widen to 5-lane roadway (2 lanes westbound, 3 lanes eastbound).	Renton TIP 2017-2022	
Renton	Park Ave N Extension	Extend Park Ave N to the north of Logan Ave N.	Renton TIP 2017-2022	
Renton	Houser Way N - N 8th St to Lake Washington Blvd	Widen a one lane roadway to a two-lane roadway.	Renton TIP 2017-2022	
Renton	116th Ave SE Improvements	Widen roadway to provide a 3-lane roadway.	Renton TIP 2017-2022	
Renton	Rainier Ave N Corridor Improvements - Phase 5	Narrow the street from 5 to 3 lanes where feasible.	Renton TIP 2017-2022	
Renton	Lind Ave SW - SW 16th St to SW 43rd St	Widen existing roadway to five lanes where required.	Renton TIP 2017-2022	
Renton	Oakesdale Ave SW/Monster Rd SW/68th Ave S to SR 900	Widen existing roadway to four lanes plus two-way-left-turn-lane where needed.	Renton TIP 2017-2022	
Tukwila	Strander Blvd Extension Phase 3	Build a new roadway extending Strander Blvd/SW 27th St from West Valley Highway to Oakesdale Ave in the City of Renton.	Tukwila CIP 2017-2022	2020
Tukwila	West Valley Hwy (I-405 -Strander Blvd)	Design and construct completion of 7 lane sections of West Valley Hwy.	Tukwila CIP 2017-2022	
Woodinville	171st Urban Parkway	Construct three lane urban parkway 131st to 140th.	Woodinville TIP 2017-2022	2019

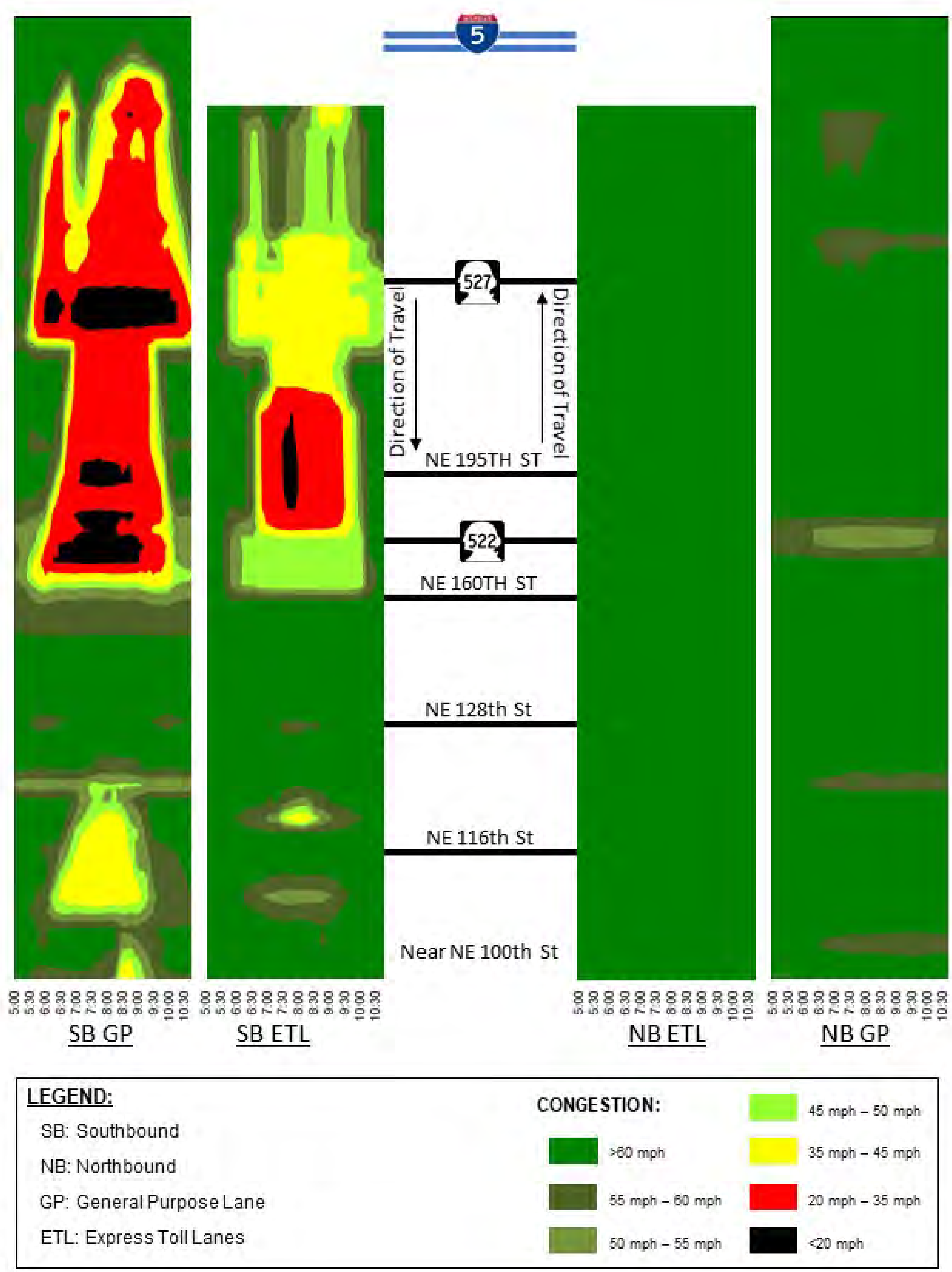
City	Project Name	Description	Source	Planned Completion Year
Woodinville	Trestle Replacement - SR202 Corridor	Widen existing roadway.	Woodinville TIP 2017-2022	
Woodinville	Sammamish Bridge Replacement (SBRP)	Widen existing two-lane road and bridge section from 127th to 131st to provide additional lanes.	Woodinville TIP 2017-2022	2019
Woodinville	140th Ave NE	Widen NE 181st St to Woodinville-Snohomish Road to 5 lanes.	Woodinville TIP 2017-2022	
Woodinville	Woodinville-Snohomish Widening	Widen the road to a 5-lane section.	Woodinville TIP 2017-2022	
Woodinville	NE 173rd St	New 2/3 lane grid road; 135th Ave to 138th Ave.	Woodinville TIP 2017-2022	
Woodinville	135th Ave NE	New 2/3 lane grid road; 175th St to Little Bear Creek Parkway.	Woodinville TIP 2017-2022	
Woodinville	Garden Way	New 2/3 lane grid road; NE 171st St to NE 175th St.	Woodinville TIP 2017-2022	
Woodinville	State Route 202 Corridor Improvement	Add additional lanes from 12th Pl NE to NE 148th.	Woodinville TIP 2017-2022	
Woodinville	Little Bear Creek Parkway	SR 202 to NE 190th -Widen the existing two-lane road sections to provide additional lanes.	Woodinville TIP 2017-2022	
Woodinville	NE 178th St (Mill Place)	140th Ave NE -Wood-Duvall - New three lane grid road.	Woodinville TIP 2017-2022	
Woodinville	1351h Ave NE South	NE 175th lo NE 171st - New 2/3 lane grid road.	Woodinville TIP 2017-2022	

ATTACHMENT D CONGESTION PROFILES

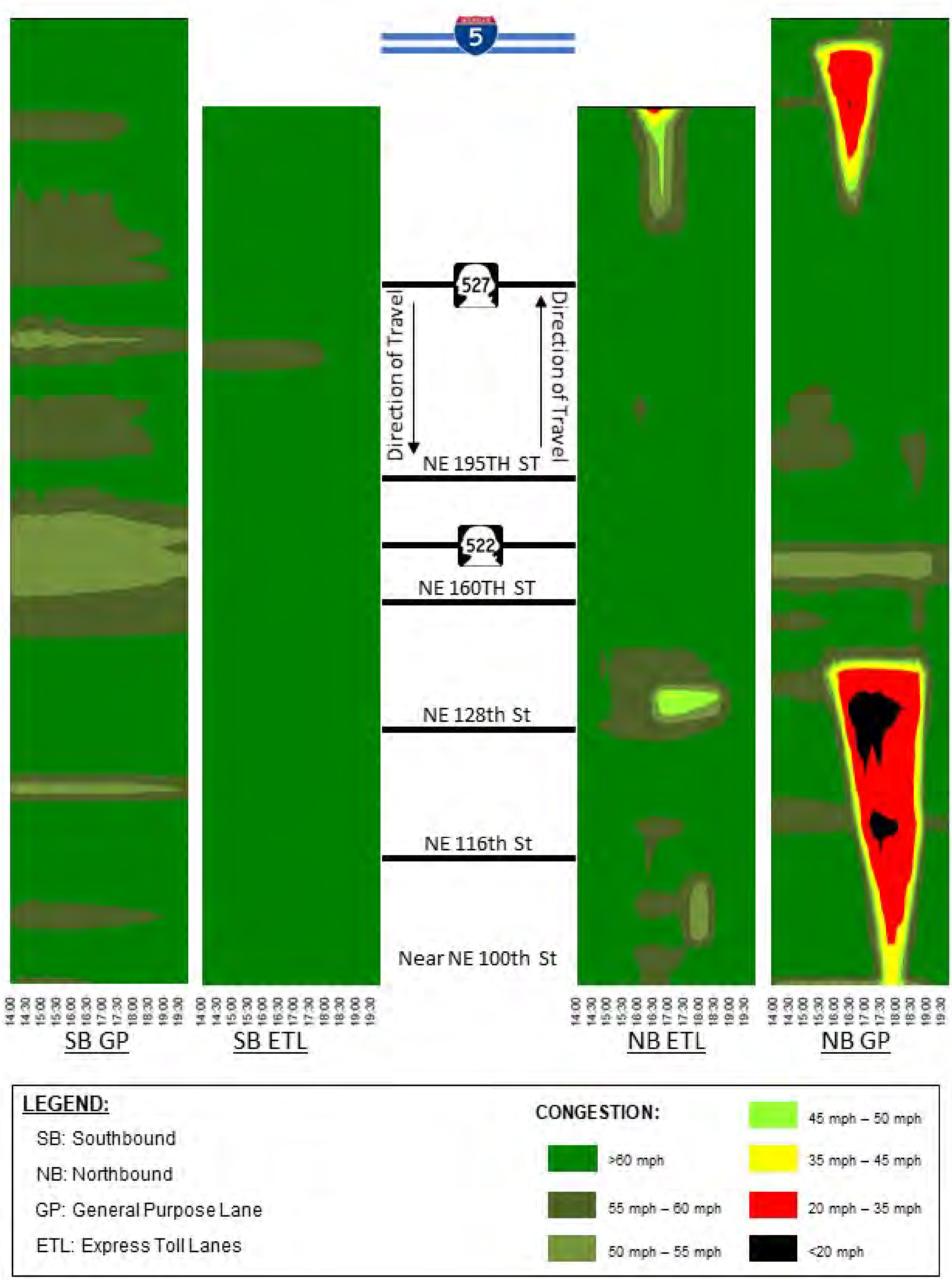
This attachment provides congestion profiles for the I-405 corridor examined for this study as well as small parts of I-5 and SR 522. Congestion profiles in this attachment appear in the following order:

1. Existing AM
2. Existing PM
3. 2025 No Build Alternative AM
4. 2025 No Build Alternative PM
5. 2045 No Build Alternative AM
6. 2045 No Build Alternative PM
7. 2025 Build Alternative AM
8. 2025 Build Alternative PM
9. 2045 Build Alternative AM
10. 2045 Build Alternative PM
11. Existing AM (I-5 and SR 522)
12. Existing PM (I-5 and SR 522)
13. 2025 No Build Alternative AM (I-5 and SR 522)
14. 2025 No Build Alternative PM (I-5 and SR 522)
15. 2045 No Build Alternative AM (I-5 and SR 522)
16. 2045 No Build Alternative PM (I-5 and SR 522)
17. 2025 Build Alternative AM (I-5 and SR 522)
18. 2025 Build Alternative PM (I-5 and SR 522)
19. 2045 Build Alternative AM (I-5 and SR 522)
20. 2045 Build Alternative PM (I-5 and SR 522)

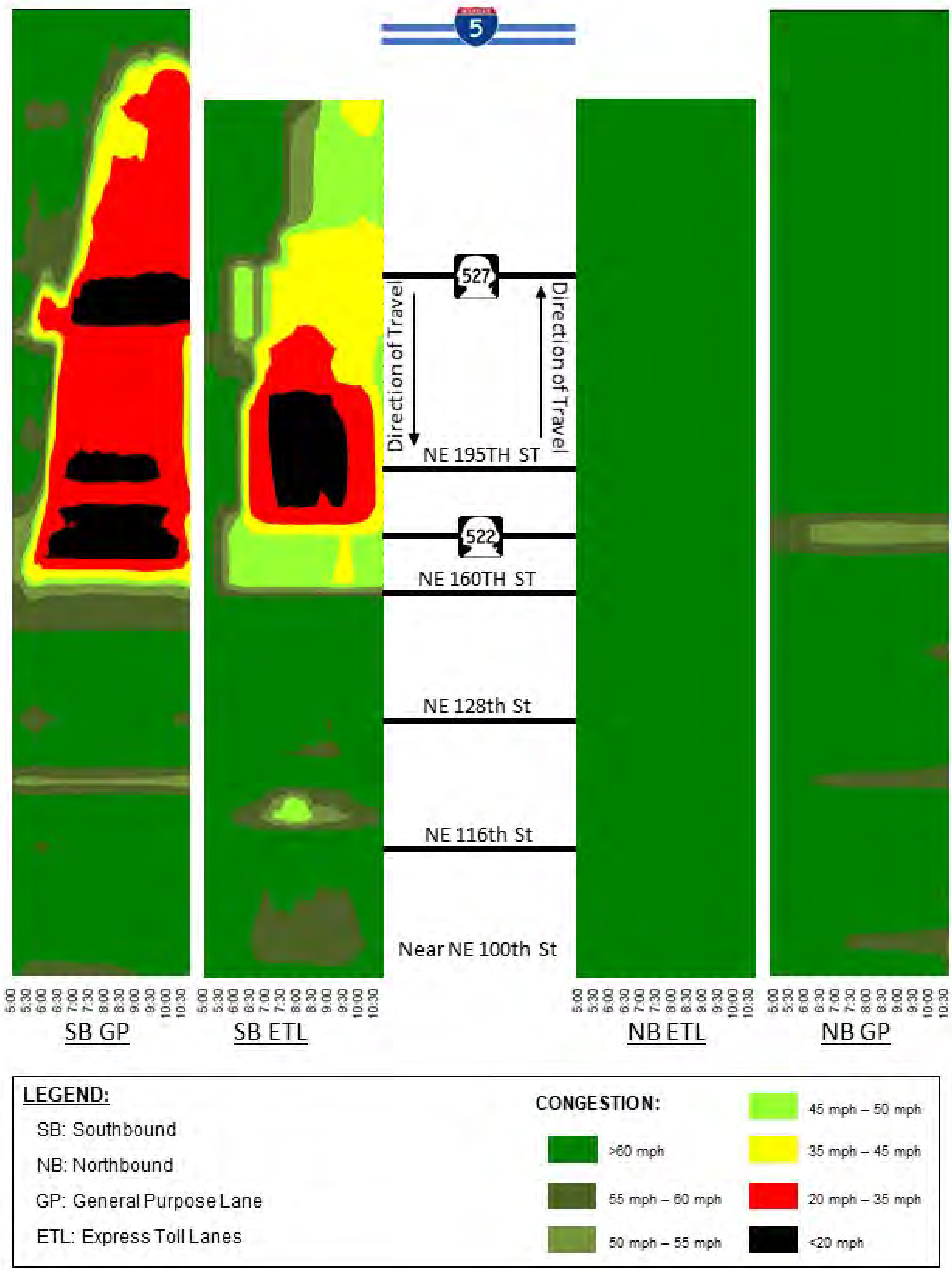
Existing AM


5
527
522
Direction of Travel
Direction of Travel
NE 195TH ST
NE 160TH ST
NE 128th St
NE 116th St
Near NE 100th St
5:00 5:30 6:00 6:30 7:00 7:30 8:00 8:30 9:00 9:30 10:00 10:30
SB GP
SB ETL
NB ETL
NB GP
LEGEND:
SB: Southbound
NB: Northbound
GP: General Purpose Lane
ETL: Express Toll Lanes
CONGESTION:
>60 mph
55 mph – 60 mph
50 mph – 55 mph
45 mph – 50 mph
35 mph – 45 mph
20 mph – 35 mph
<20 mph

Existing PM


5
527
Direction of Travel
Direction of Travel
NE 195TH ST
522
NE 160TH ST
NE 128th St
NE 116th St
Near NE 100th St
14:00 14:30 15:00 15:30 16:00 16:30 17:00 17:30 18:00 18:30 19:00 19:30
SB GP
SB ETL
NB ETL
NB GP
LEGEND:
SB: Southbound
NB: Northbound
GP: General Purpose Lane
ETL: Express Toll Lanes
CONGESTION:
>60 mph
55 mph – 60 mph
50 mph – 55 mph
45 mph – 50 mph
35 mph – 45 mph
20 mph – 35 mph
<20 mph

2025 No Build Alternative AM



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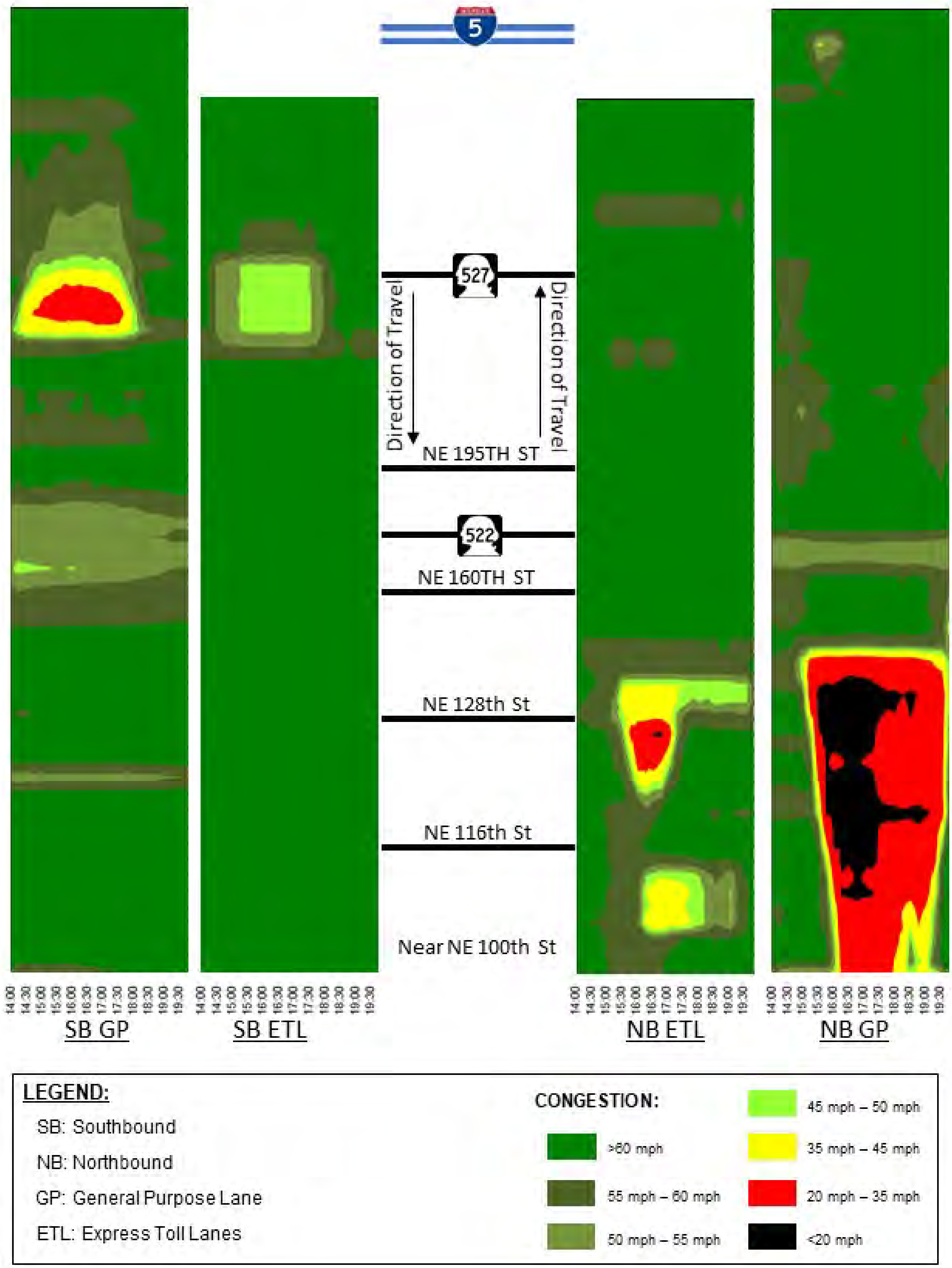

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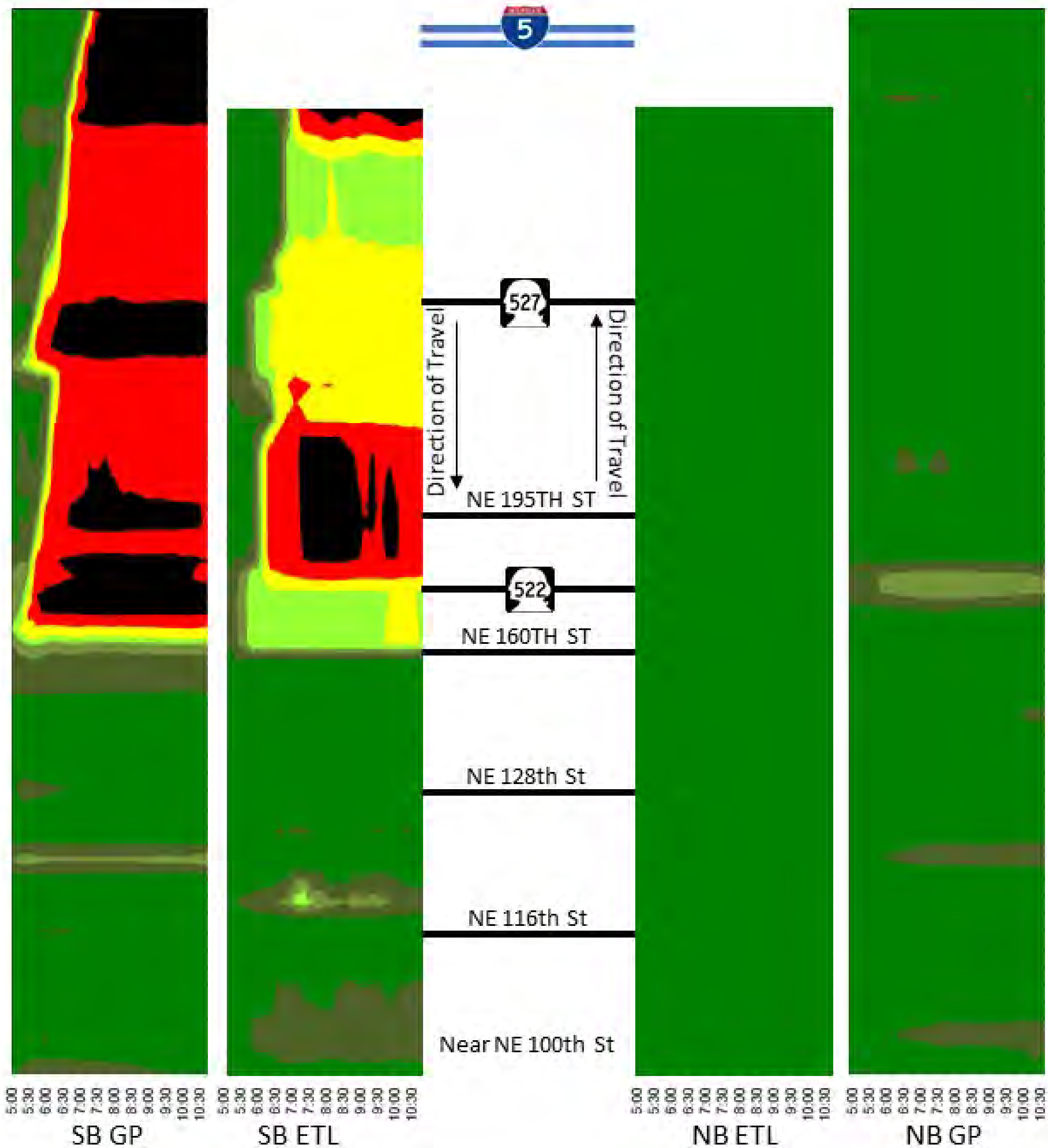


LEGEND:

SB: Southbound

NB: Northbound

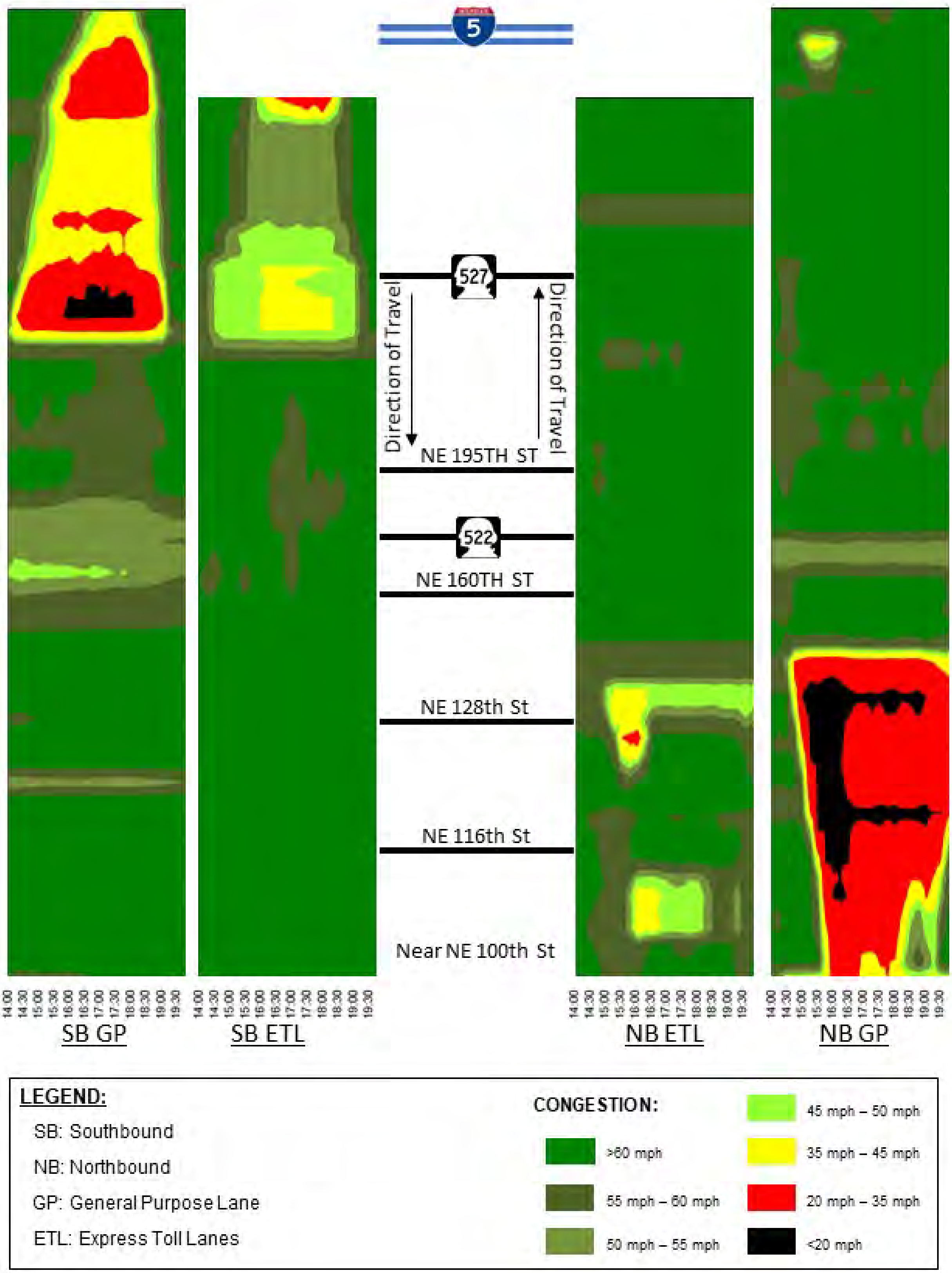
GP: General Purpose Lane

ETL: Express Toll Lanes

CONGESTION:

- >60 mph
- 55 mph – 60 mph
- 50 mph – 55 mph
- 45 mph – 50 mph
- 35 mph – 45 mph
- 20 mph – 35 mph
- <20 mph

2045 No Build Alternative PM



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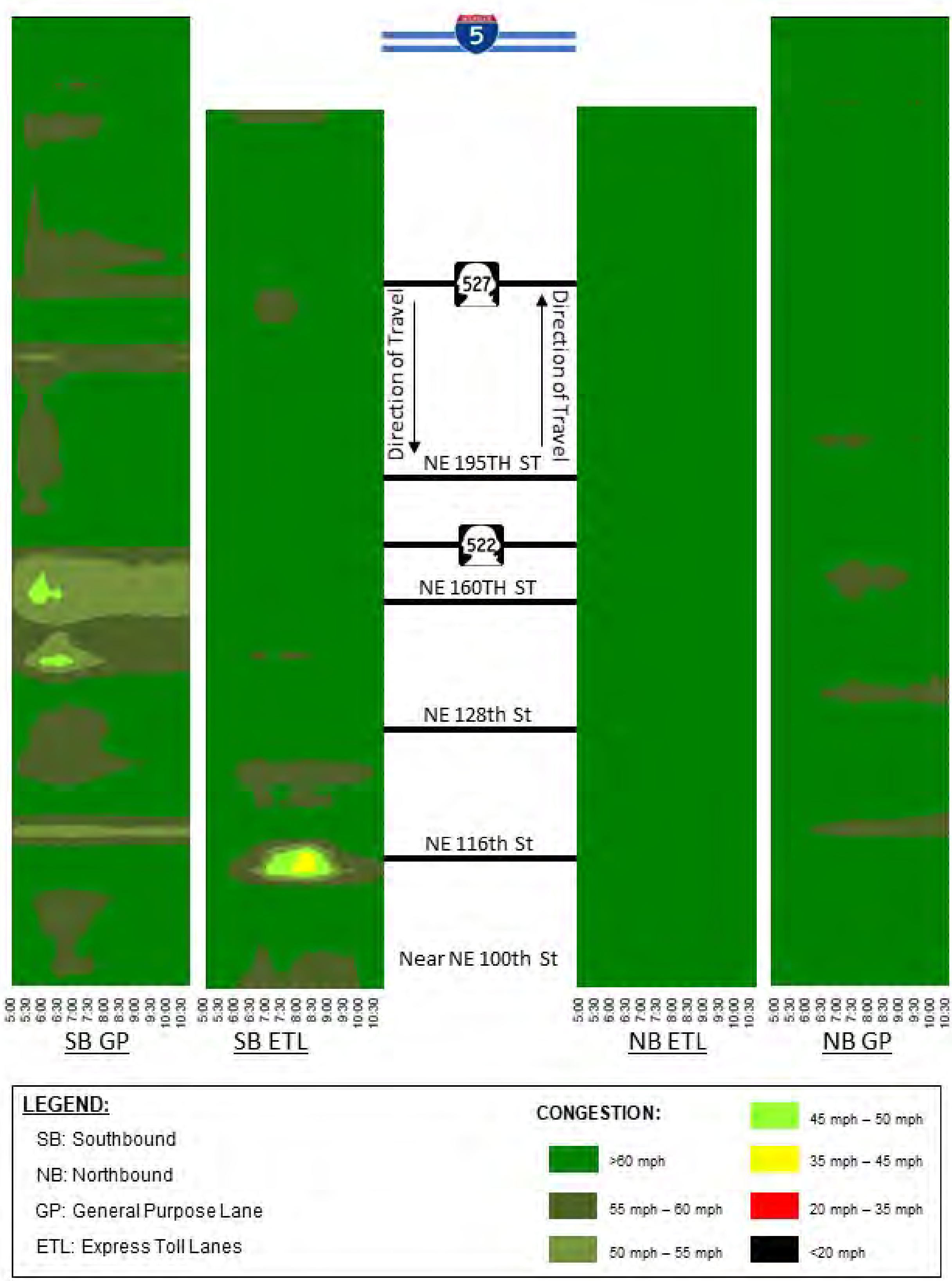

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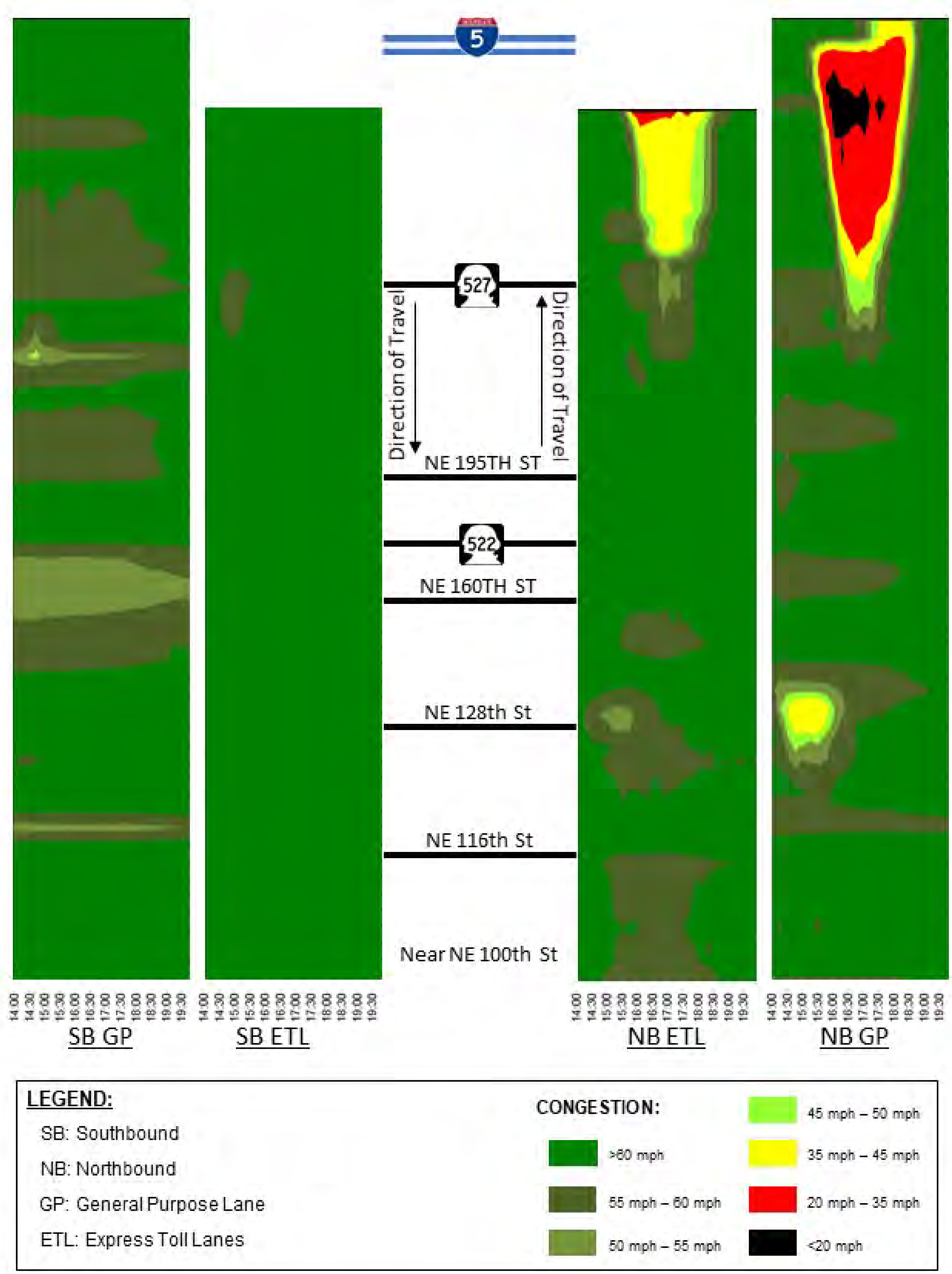

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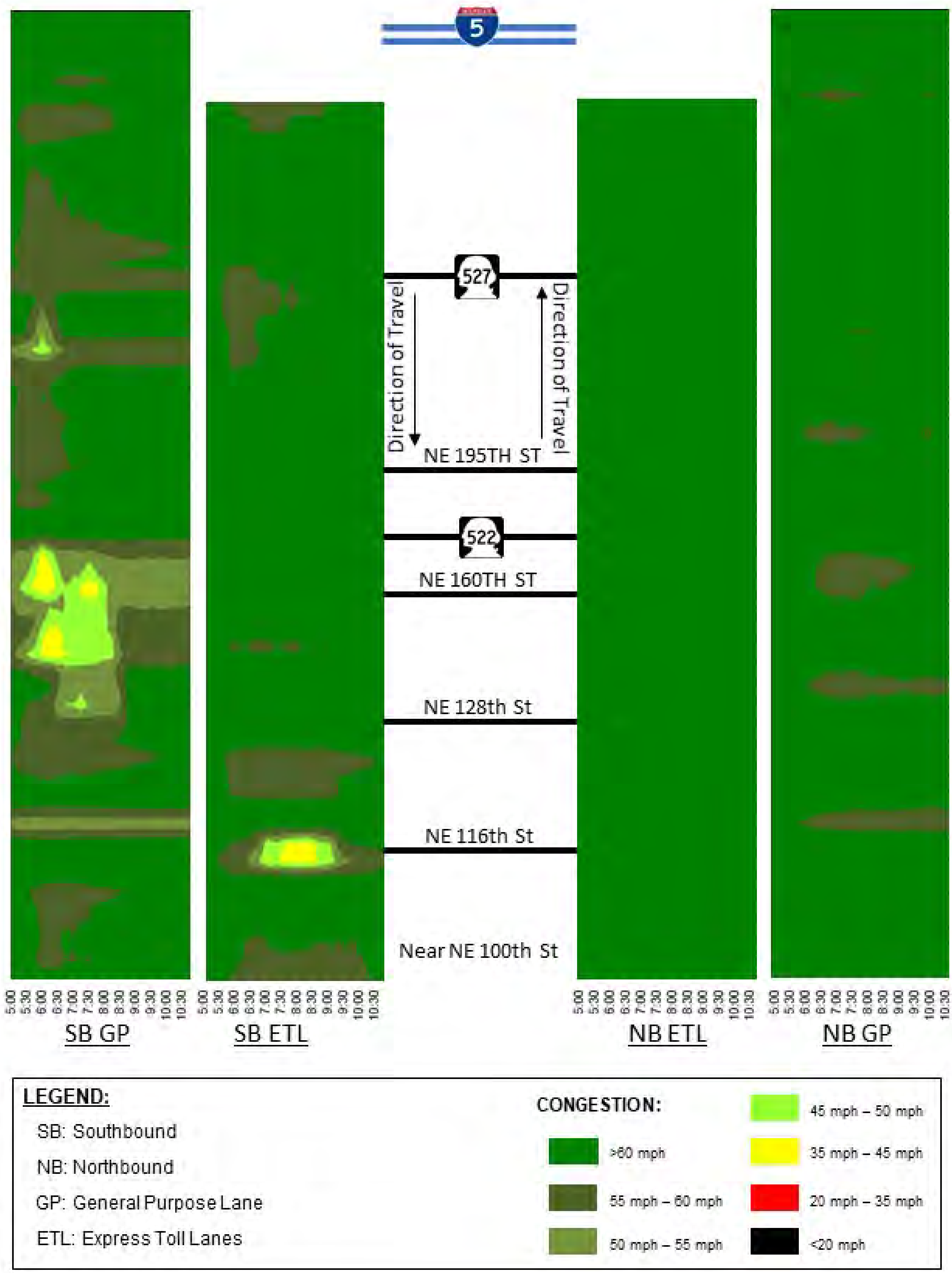
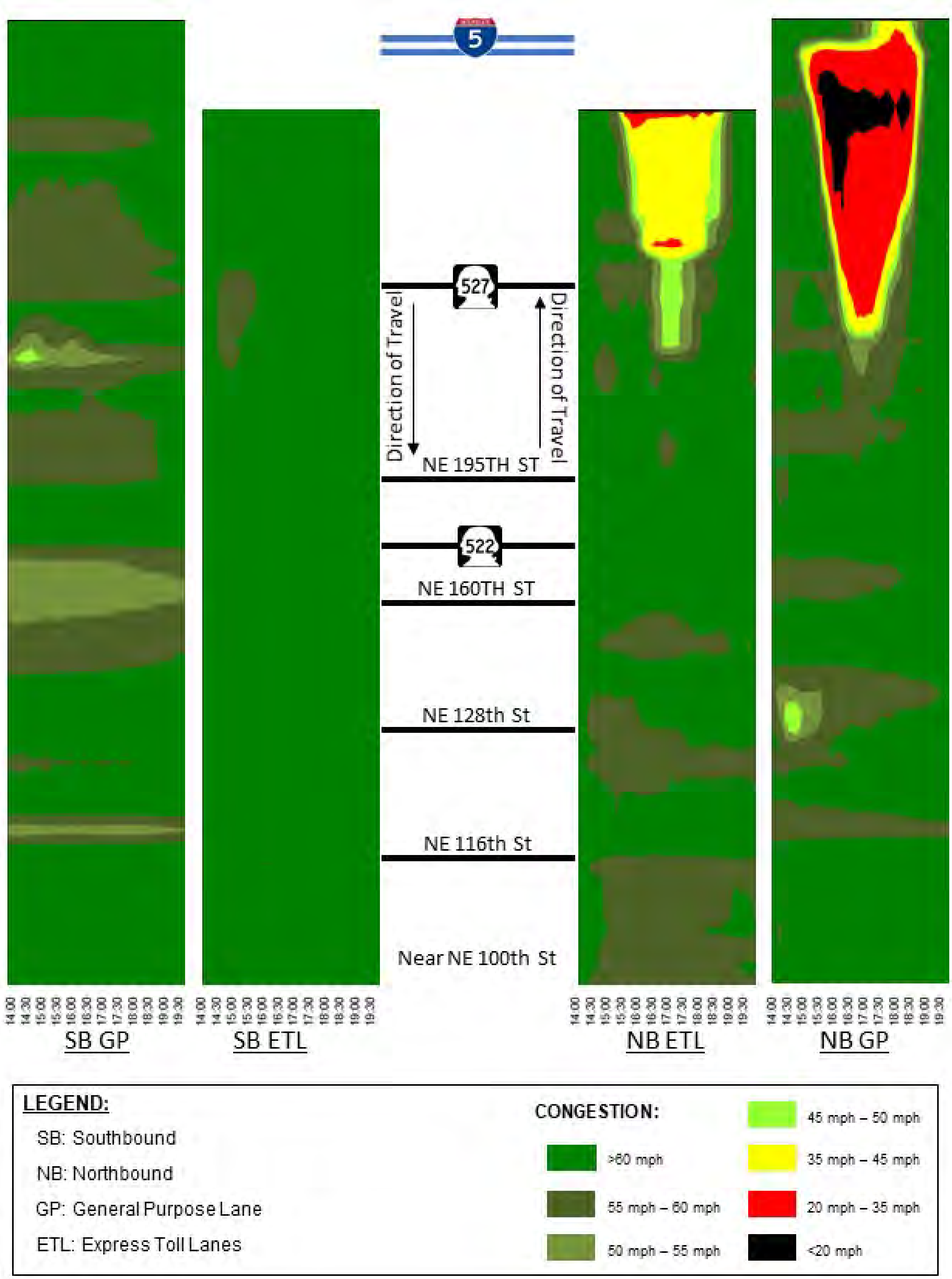
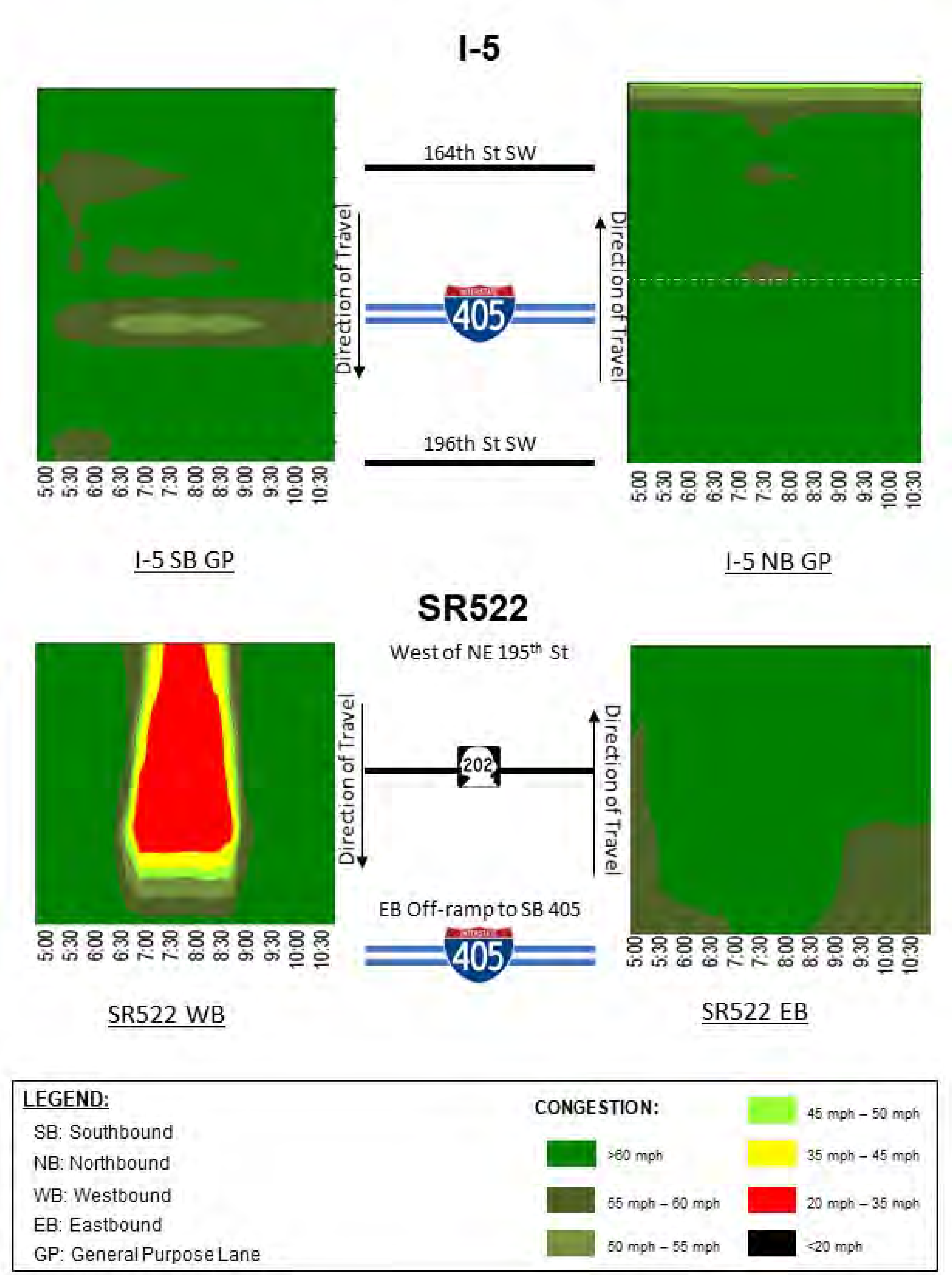


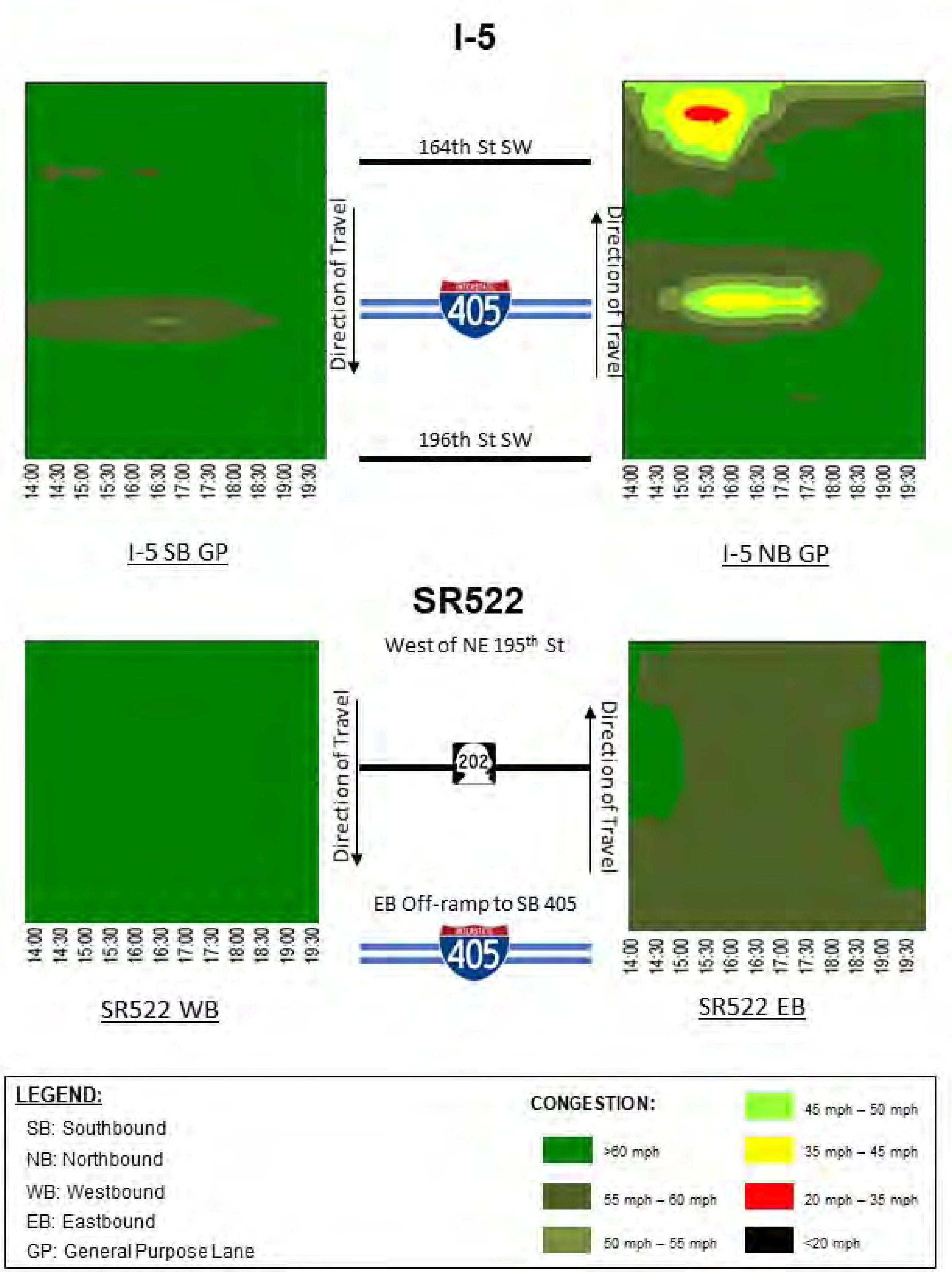
2045 Build Alternative PM



Existing AM (I-5 and SR 522)



Existing PM (I-5 and SR 522)



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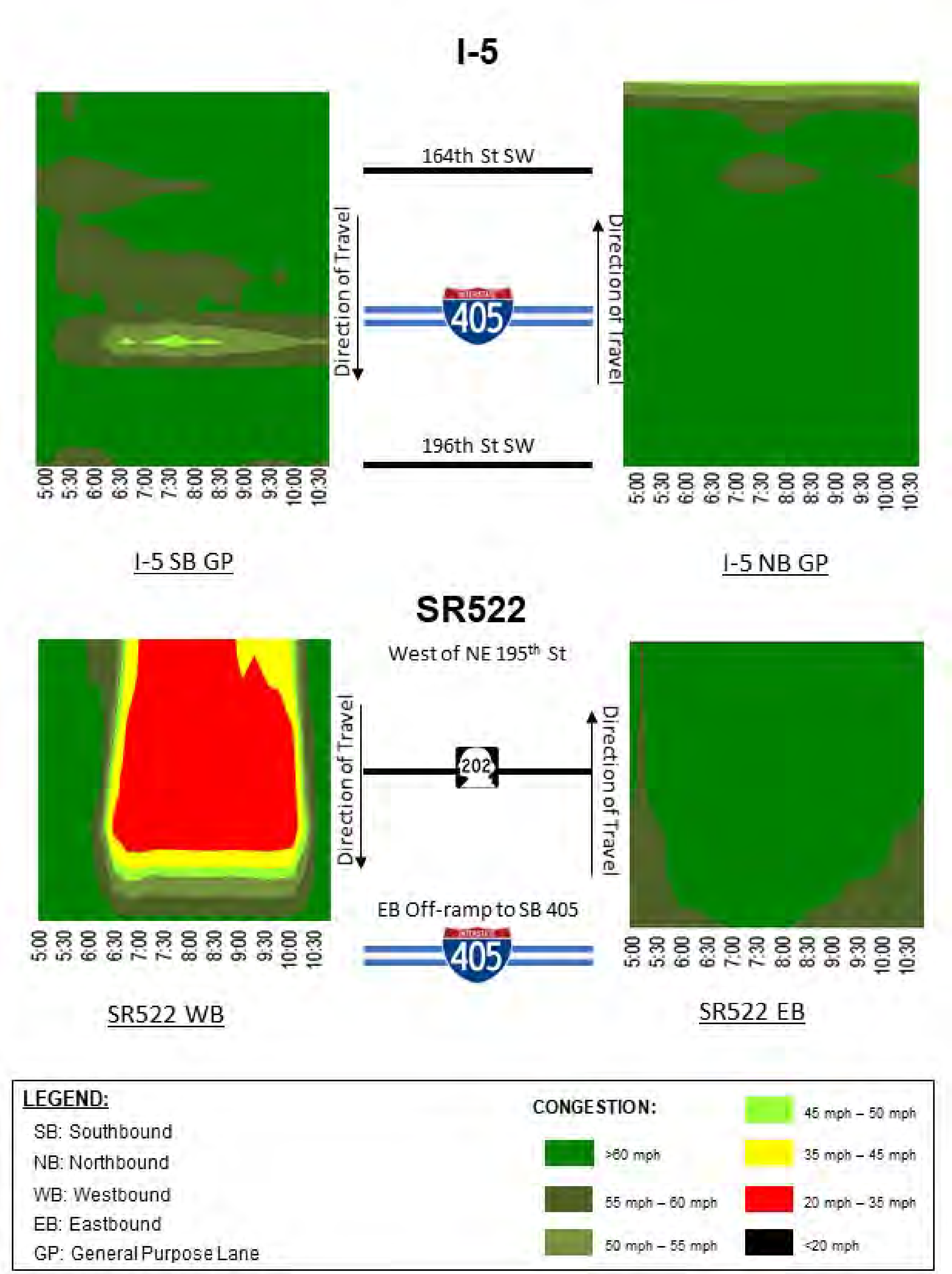

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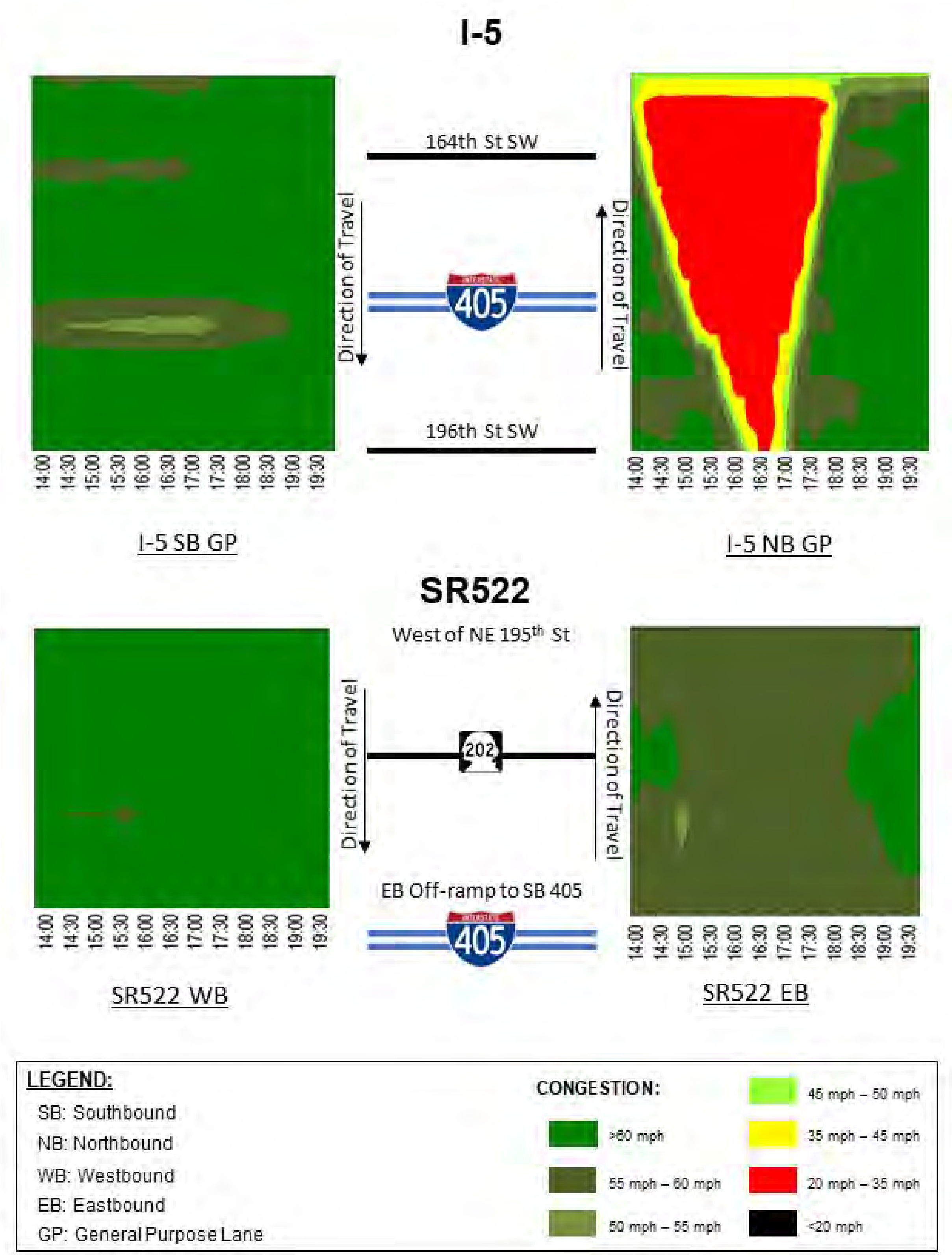

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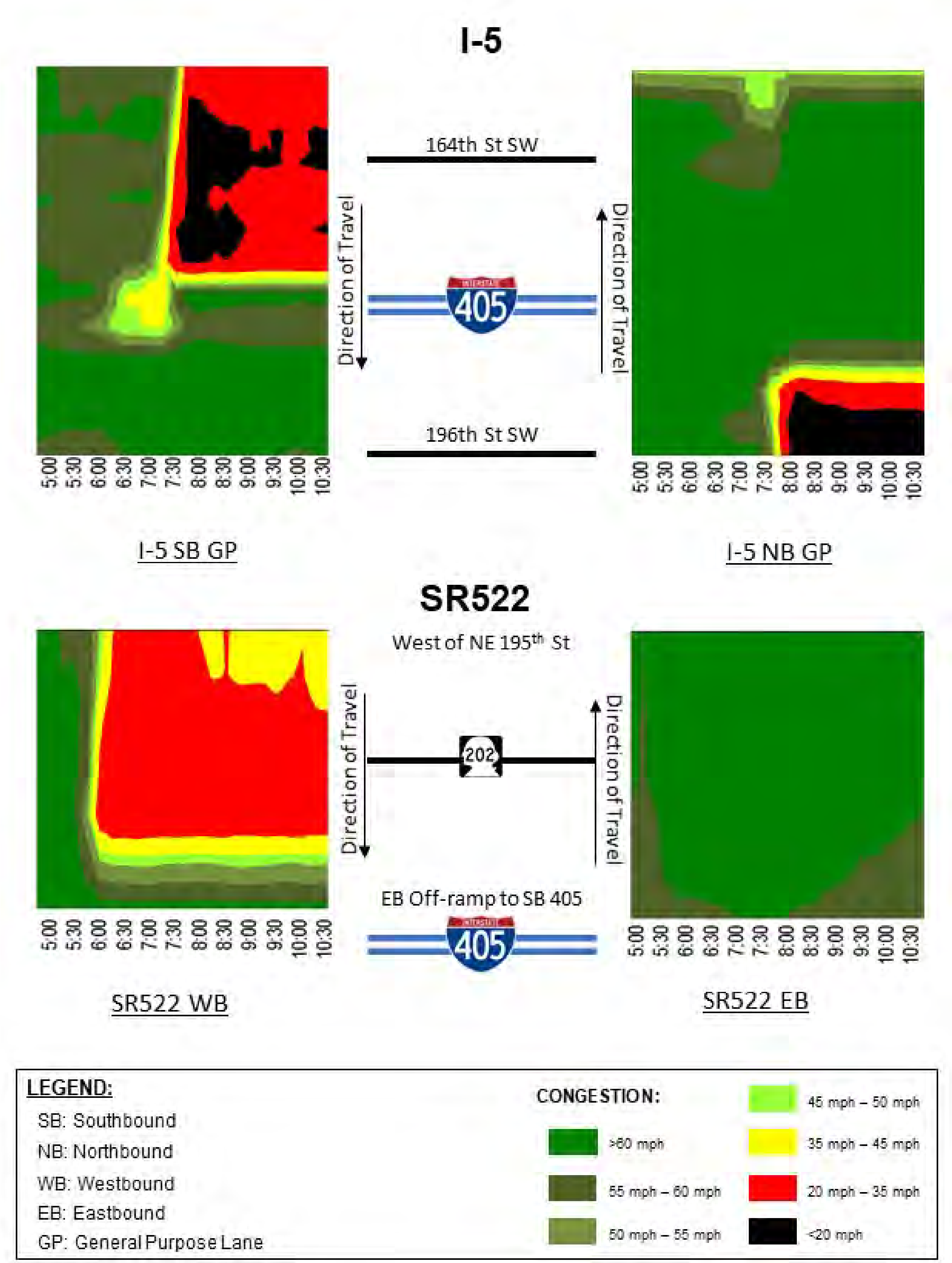
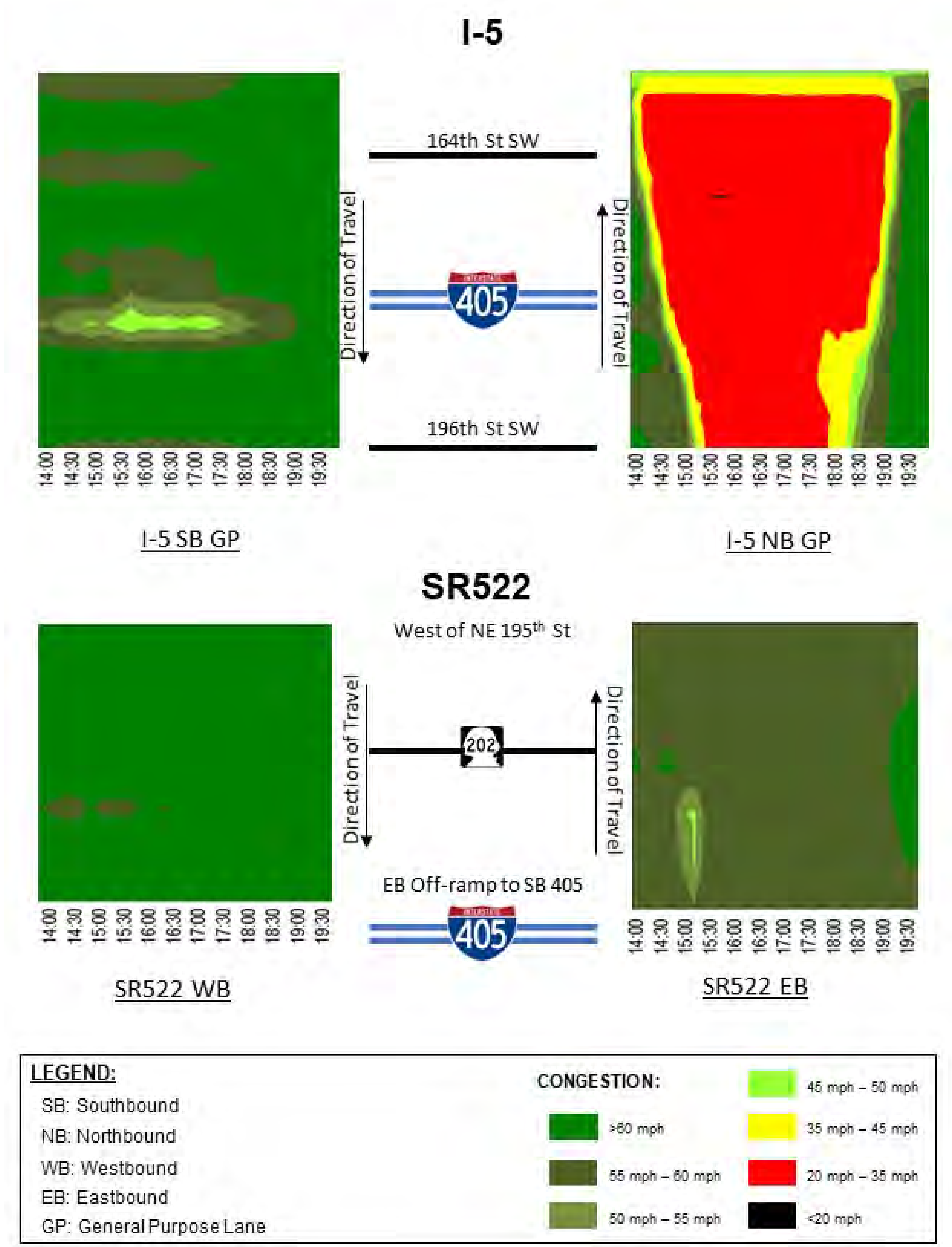
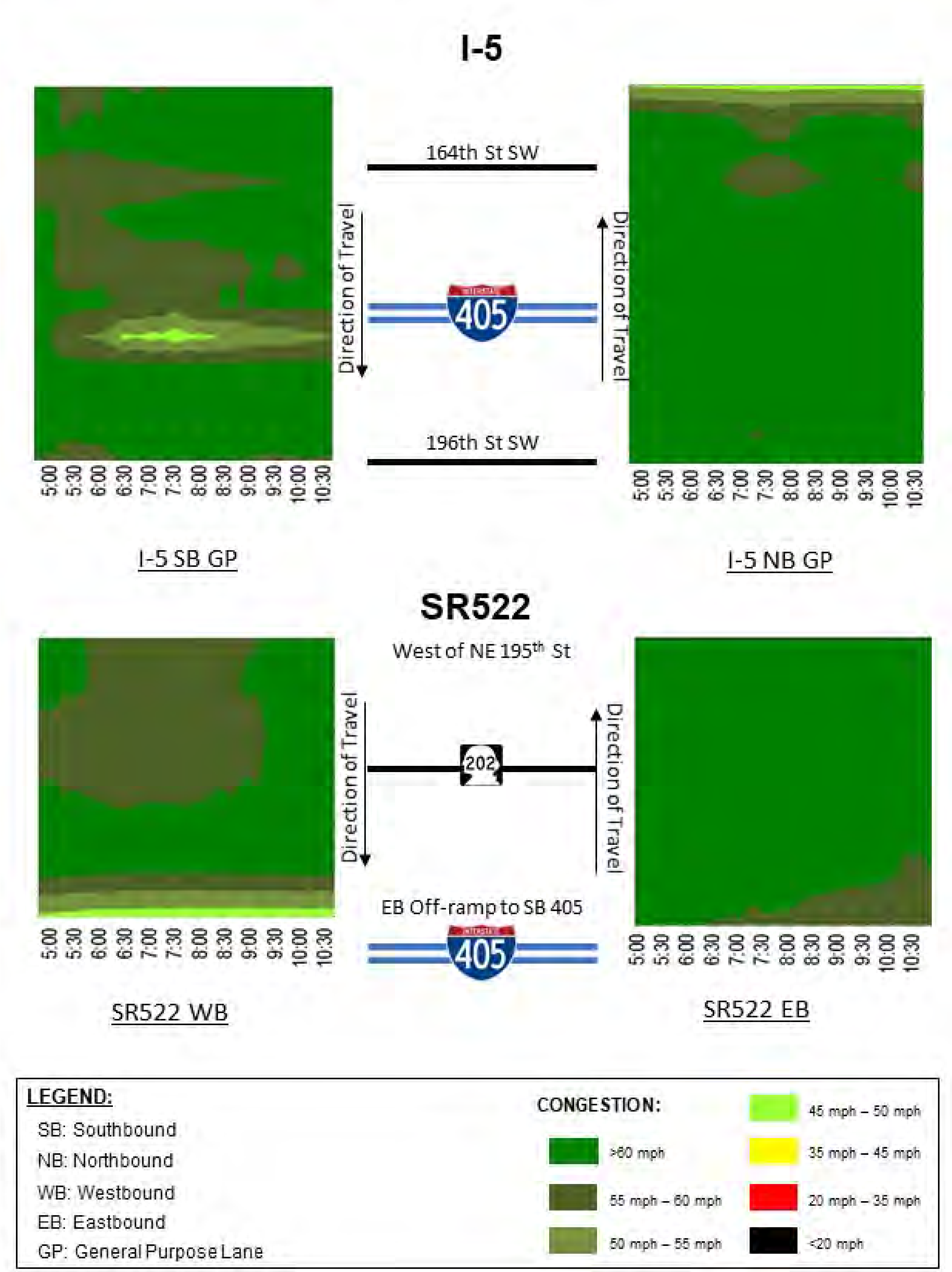


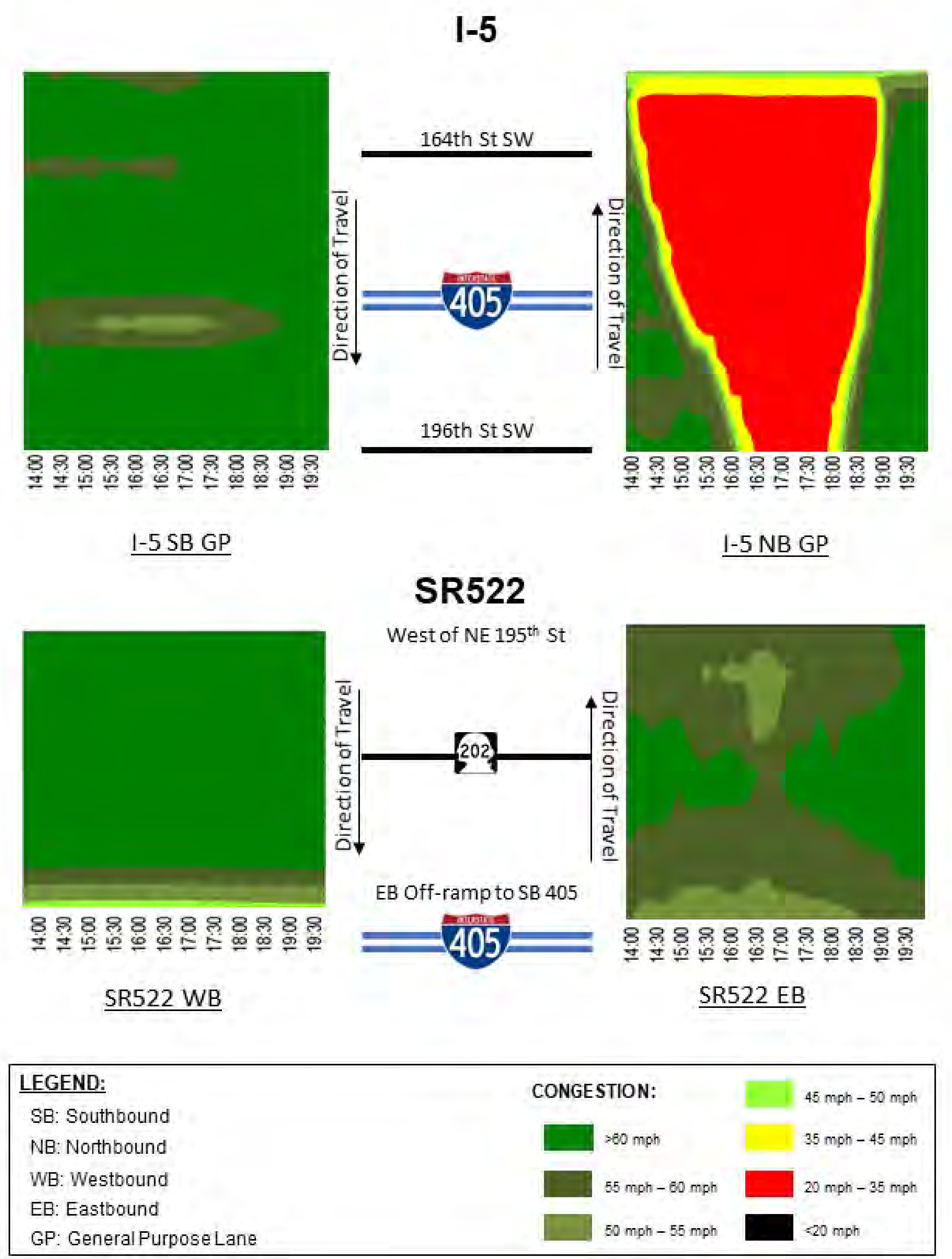
2045 No Build Alternative PM (I-5 and SR 522)



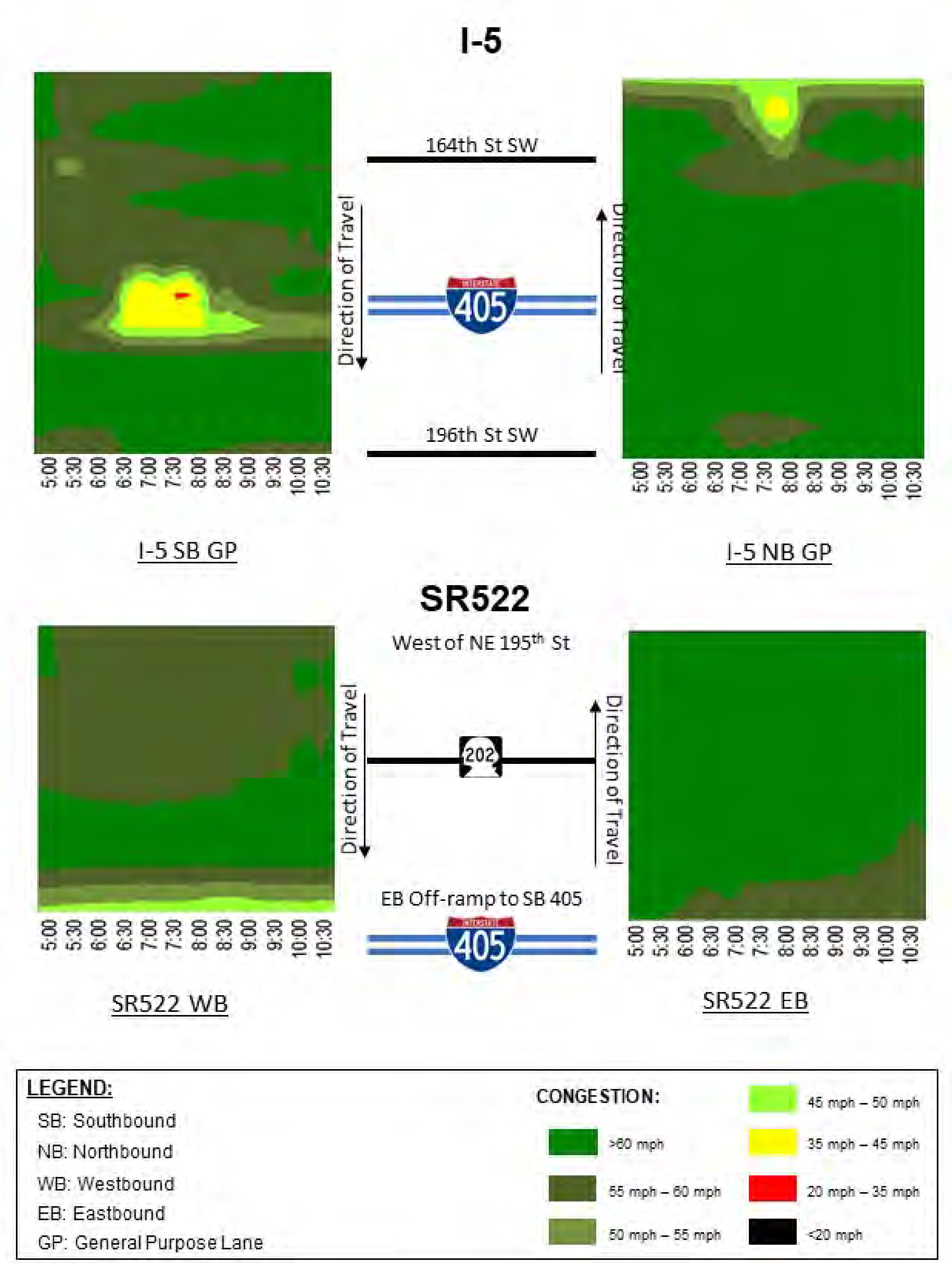
2025 Build Alternative AM (I-5 and SR 522)



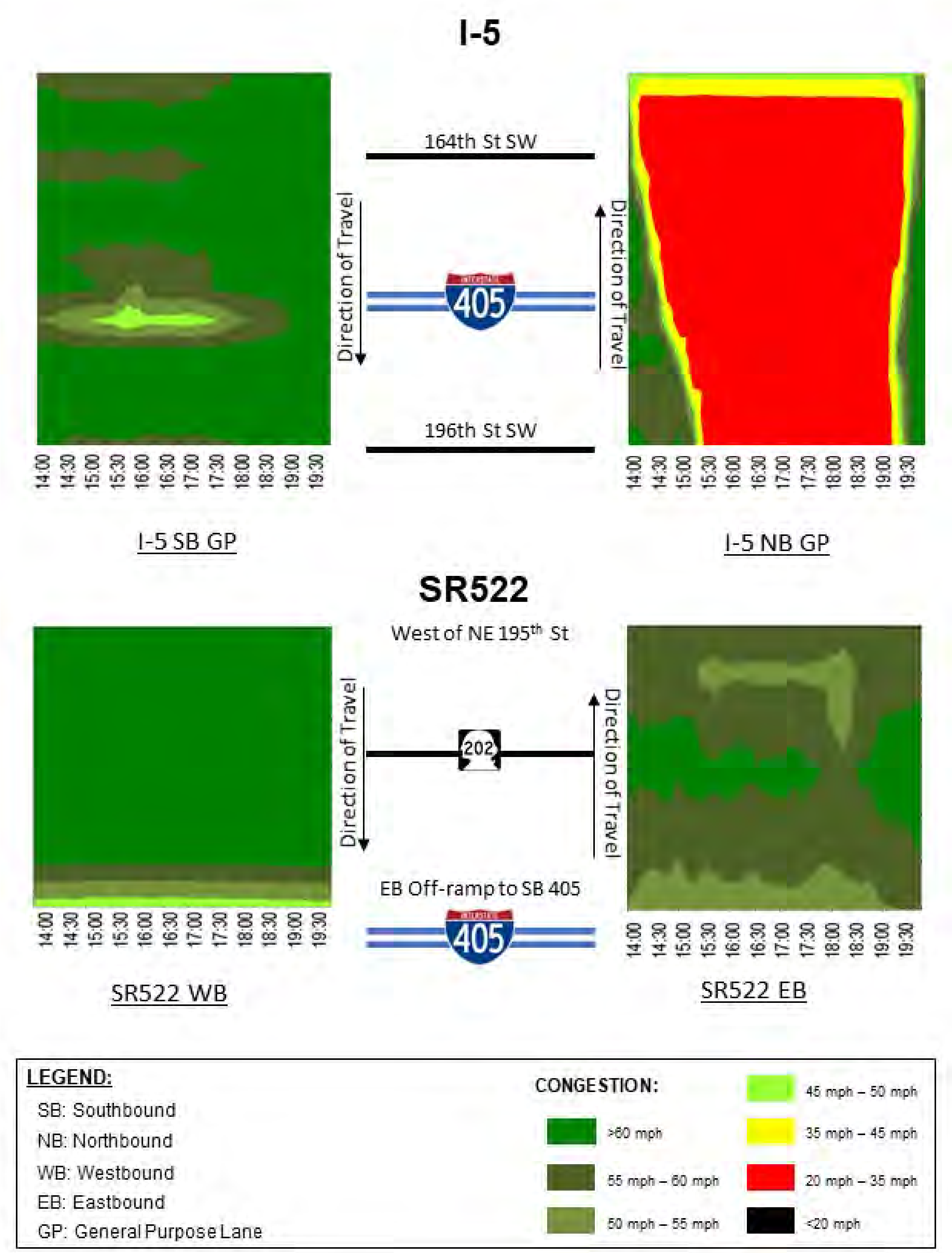
2025 Build Alternative PM (I-5 and SR 522)



2045 Build Alternative AM (I-5 and SR 522)



2045 Build Alternative PM (I-5 and SR 522)



ATTACHMENT E PEAK HOUR INTERSECTION ANALYSIS RESULTS

Existing AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	7	A	5	C	28	C	35	A	7
2	NE 160th Street and I-405 Southbound Ramps	Signal	D	46	C	22	NA	NA	D	46	D	37
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	28	B	16	D	49	NA	NA	C	25
4	NE 160th Street and 116th Avenue NE	TWSC	B	EB L-13	A	WB L-9	F	NB LTR-63	F	SB LT-162	F	SB LT 162
5	131st Avenue NE and NE 175th Street	Signal	D	41	D	45	D	36	B	18	C	31
6	131st Avenue NE and NE 177th Place	Signal	D	50	D	48	A	6	A	1	A	6
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	56	NA	NA	A	0	A	7	A	8
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	D	53	C	33	D	37	D	38
9	132nd Avenue NE and NE 180th Street	Signal	D	44	NA	NA	D	39	A	7	C	25
10	SR 522 and Campus Way NE	Signal	C	30	B	18	D	40	D	39	C	27

Existing AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
11	NE 195th Street and 110th Avenue NE	Signal	A	9	A	4	D	39	D	37	B	10
12	NE 195th Street and 112th Avenue NE	Signal	A	5	B	12	NA	NA	B	20	A	10
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	12	B	18	NA	NA	C	34	B	18
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	6	A	10	C	33	NA	NA	B	14
15	NE 195th Street and North Creek Parkway	Signal	D	41	B	17	C	25	C	32	C	29
16	Bothell-Everett Highway and 228th Street SE	Signal	D	40	D	52	E	63	E	68	E	55
17	228th Street SE and 15th Avenue SE	Signal	A	2	A	6	E	62	E	64	A	9
18	228th Street SE and 19th Avenue SE	Signal	C	32	B	17	D	44	NA	NA	C	28
19	228th Street SE and 27th Avenue SE	Signal	A	9	A	1	E	63	NA	NA	A	10
20	228th Street SE and 29th Drive SE	Signal	A	4	B	11	NA	NA	E	61	B	12
21	SR 527 and I-405 Southbound Ramps	Signal	E	70	NA	NA	C	22	A	7	C	29

Existing AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	15	A	2	B	19	B	12
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	A	EB L-9	NA	NA	A	0	A	0	A	EB L-9
24	SR 527 and 220th Street SE	Signal	E	67	E	77	D	40	C	30	D	39
25	SR 527 and 214th Street SE	Signal	E	69	E	65	D	47	E	72	E	66
26	SR 527 and 211th Street SE	Signal	NA	NA	E	75	A	0	A	5	A	6
27	SR 527 and SR 524	Signal	D	48	D	46	C	28	C	32	D	36
P1	17th Avenue SE and 220th Street SE	Signal	A	10	A	7	C	29	C	22	B	13
P2	220th St SE and 20th Ave SE	AWSC	E	43	B	14	B	15	C	25	D	33
P3	220th St SE and 23rd Dr SE	AWSC	F	53	A	9	B	10	B	10	E	43
P4	220th St SE and 26th Pl SE	AWSC	D	26	NA	NA	B	11	A	10	C	23
P5	223rd St SE and 26th Ave SE	AWSC	B	13	A	9	B	13	B	11	B	12

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

Existing PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	6	A	1	C	29	C	35	A	5
2	NE 160th Street and I-405 Southbound Ramps	Signal	C	21	B	13	NA	NA	D	45	C	26
3	NE 160th Street and I-405 Northbound Ramps	Signal	D	39	C	25	D	49	NA	NA	D	35
4	NE 160th Street and 116th Avenue NE	TWSC	C	EB L-15	A	WB L-10	F	NB LTR-91	F	SB LT-203	F	SB LT-203
5	131st Avenue NE and NE 175th Street	Signal	D	55	E	60	D	43	C	32	D	46
6	131st Avenue NE and NE 177th Place	Signal	D	50	D	49	B	16	A	5	B	16
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	57	NA	NA	A	1	B	14	A	9
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	58	B	20	C	34	C	26
9	132nd Avenue NE and NE 180th Street	Signal	A	9	NA	NA	A	7	A	10	A	8
10	SR 522 and Campus Way NE	Signal	B	20	B	18	D	46	D	39	C	22
11	NE 195th Street and 110th Avenue NE	Signal	B	14	B	12	C	35	D	40	B	20

Existing PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	11	NA	NA	C	29	A	9
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	14	B	18	NA	NA	D	43	C	20
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	6	A	1	D	42	NA	NA	B	11
15	NE 195th Street and North Creek Parkway	Signal	A	8	C	23	D	44	D	47	C	25
16	Bothell-Everett Highway and 228th Street SE	Signal	E	74	E	56	E	56	F	88	E	71
17	228th Street SE and 15th Avenue SE	Signal	C	27	B	10	E	56	E	59	C	22
18	228th Street SE and 19th Avenue SE	Signal	B	19	A	3	C	27	NA	NA	B	12
19	228th Street SE and 27th Avenue SE	Signal	B	18	A	3	E	79	NA	NA	C	21
20	228th Street SE and 29th Drive SE	Signal	A	2	B	15	NA	NA	D	50	C	20
21	SR 527 and I-405 Southbound Ramps	Signal	D	49	NA	NA	B	15	A	9	B	19
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	20	B	12	C	30	C	22

Existing PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	A	EB L-10	NA	NA	A	0	A	0	A	EB L-10
24	SR 527 and 220th Street SE	Signal	F	153	F	83	D	48	D	38	E	61
25	SR 527 and 214th Street SE	Signal	E	74	E	62	B	15	B	13	B	19
26	SR 527 and 211th Street SE	Signal	NA	NA	E	69	A	0	A	10	A	7
27	SR 527 and SR 524	Signal	E	70	E	73	F	180	D	42	F	112
P1	17th Avenue SE and 220th Street SE	Signal	B	17	A	9	C	34	C	20	B	17
P2	220th St SE and 20th Ave SE	AWSC	C	17	F	127	F	62	B	13	F	83
P3	220th St SE and 23rd Dr SE	AWSC	B	10	C	16	B	10	A	10	B	14
P4	220th St SE and 26th Pl SE	AWSC	B	11	NA	NA	C	17	C	16	C	16
P5	223rd St SE and 26th Ave SE	AWSC	A	10	A	9	C	20	A	9	C	15

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2025 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	7	A	5	C	29	C	35	A	7
2	NE 160th Street and I-405 Southbound Ramps	Signal	D	46	C	21	NA	NA	D	47	D	37
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	22	B	16	D	49	NA	NA	C	21
4	NE 160th Street and 116th Avenue NE	TWSC	B	EB L-13	A	WBL-9	F	NB LTR-102	F	SB LT-221	F	SB LT-221
5	131st Avenue NE and NE 175th Street	Signal	D	40	D	48	D	37	C	22	C	33
6	131st Avenue NE and NE 177th Place	Signal	D	49	D	47	A	6	A	2	A	7
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	56	NA	NA	A	0	A	7	A	8
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	57	B	20	D	43	C	35
9	132nd Avenue NE and NE 180th Street	Signal	D	46	NA	NA	C	35	A	8	C	25
10	SR 522 and Campus Way NE	Signal	C	34	C	25	D	48	D	41	C	32
11	NE 195th Street and 110th Avenue NE	Signal	B	14	A	7	C	33	D	38	B	14

2025 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	12	NA	NA	C	22	A	9
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	11	B	15	NA	NA	C	34	B	16
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	7	B	13	D	35	NA	NA	B	18
15	NE 195th Street and North Creek Parkway	Signal	D	41	B	17	C	25	C	33	C	30
16	Bothell-Everett Highway and 228th Street SE	Signal	D	48	D	40	E	63	E	71	E	57
17	228th Street SE and 15th Avenue SE	Signal	A	3	A	8	E	59	E	65	B	12
18	228th Street SE and 19th Avenue SE	Signal	D	45	C	34	D	46	NA	NA	D	42
19	228th Street SE and 27th Avenue SE	Signal	B	13	A	3	E	62	NA	NA	B	13
20	228th Street SE and 29th Drive SE	Signal	A	9	B	18	NA	NA	E	60	B	19
21	SR 527 and I-405 Southbound Ramps	Signal	E	72	NA	NA	B	15	A	6	C	26
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	15	A	5	B	14	B	11

2025 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	A	EB L-10	NA	NA	A	0	A	0	A	EB L-10
24	SR 527 and 220th Street SE	Signal	E	64	E	62	D	39	D	35	D	40
25	SR 527 and 214th Street SE	Signal	E	71	E	66	C	35	E	72	E	64
26	SR 527 and 211th Street SE	Signal	NA	NA	E	75	A	9	A	6	A	9
27	SR 527 and SR 524	Signal	E	67	E	66	D	37	D	42	D	49
P1	17th Avenue SE and 220th Street SE	Signal	B	13	A	8	C	29	C	20	B	15
P2	220th St SE and 20th Ave SE	AWSC	F	61	C	16	C	16	D	33	E	44
P3	220th St SE and 23rd Dr SE	AWSC	F	89	A	9	B	11	B	11	F	70
P4	220th St SE and 26th Pl SE	AWSC	E	37	NA	NA	B	12	A	10	D	31
P5	223rd St SE and 26th Ave SE	AWSC	B	15	A	9	B	14	B	11	B	13

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2025 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	7	A	1	C	30	C	35	A	6
2	NE 160th Street and I-405 Southbound Ramps	Signal	C	22	D	37	NA	NA	D	48	D	35
3	NE 160th Street and I-405 Northbound Ramps	Signal	B	19	C	25	D	53	NA	NA	C	27
4	NE 160th Street and 116th Avenue NE	TWSC	D	EB L-29	A	WB L-9	F	NB LTR- >300	F	SB L- >300	F	NB LTR- >300
5	131st Avenue NE and NE 175th Street	Signal	E	56	E	68	D	43	D	41	D	51
6	131st Avenue NE and NE 177th Place	Signal	D	49	D	47	C	22	A	7	B	19
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	65	NA	NA	A	1	B	15	B	12
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	65	B	17	D	50	C	30
9	132nd Avenue NE and NE 180th Street	Signal	A	8	NA	NA	A	9	B	12	A	9
10	SR 522 and Campus Way NE	Signal	C	24	C	23	E	56	D	48	C	28
11	NE 195th Street and 110th Avenue NE	Signal	C	20	B	18	C	34	D	39	C	23

2025 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
12	NE 195th Street and 112th Avenue NE	Signal	A	3	B	11	NA	NA	C	29	A	9
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	14	C	21	NA	NA	D	42	C	23
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	5	A	1	D	42	NA	NA	B	10
15	NE 195th Street and North Creek Parkway	Signal	A	9	C	23	D	44	D	47	C	26
16	Bothell-Everett Highway and 228th Street SE	Signal	E	75	E	56	E	63	F	97	E	75
17	228th Street SE and 15th Avenue SE	Signal	A	3	C	20	E	55	E	65	B	20
18	228th Street SE and 19th Avenue SE	Signal	C	28	A	10	D	43	NA	NA	C	22
19	228th Street SE and 27th Avenue SE	Signal	E	59	A	3	F	120	NA	NA	D	45
20	228th Street SE and 29th Drive SE	Signal	A	8	C	25	NA	NA	D	52	C	28
21	SR 527 and I-405 Southbound Ramps	Signal	E	55	NA	NA	B	10	A	9	B	19
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	C	30	B	12	C	22	C	21

2025 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	A	EB L-10	NA	NA	A	0	A	0	A	EB L-10
24	SR 527 and 220th Street SE	Signal	F	105	F	85	D	38	D	53	E	58
25	SR 527 and 214th Street SE	Signal	F	102	E	69	A	8	A	7	B	17
26	SR 527 and 211th Street SE	Signal	NA	NA	E	77	A	0	A	10	A	7
27	SR 527 and SR 524	Signal	F	109	F	101	F	217	E	63	F	145
P1	17th Avenue SE and 220th Street SE	Signal	A	9	B	14	C	27	B	16	B	16
P2	220th St SE and 20th Ave SE	AWSC	C	20	F	205	F	111	B	14	F	134
P3	220th St SE and 23rd Dr SE	AWSC	B	11	C	18	B	11	A	10	C	16
P4	220th St SE and 26th Pl SE	AWSC	B	11	NA	NA	C	21	C	20	C	19
P5	223rd St SE and 26th Ave SE	AWSC	B	10	A	10	D	26	A	10	C	19

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2045 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	9	A	5	C	29	C	35	A	9
2	NE 160th Street and I-405 Southbound Ramps	Signal	E	70	C	21	NA	NA	D	45	D	52
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	34	B	17	D	49	NA	NA	C	28
4	NE 160th Street and 116th Avenue NE	TWSC	B	EB L-14	A	WB L-9	F	NB L->300	F	SB L->300	F	SB L->300
5	131st Avenue NE and NE 175th Street	Signal	D	39	D	49	D	37	C	26	C	35
6	131st Avenue NE and NE 177th Place	Signal	D	48	D	46	A	8	A	3	A	8
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	D	55	NA	NA	A	0	A	8	A	8
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	57	B	16	E	71	D	46
9	132nd Avenue NE and NE 180th Street	Signal	D	55	NA	NA	C	34	A	9	C	28
10	SR 522 and Campus Way NE	Signal	E	59	C	27	D	48	D	43	D	50
11	NE 195th Street and 110th Avenue NE	Signal	B	17	A	8	D	37	D	41	B	17

2045 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	13	NA	NA	C	23	A	10
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	12	B	16	NA	NA	C	34	B	17
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	9	B	16	D	38	NA	NA	C	21
15	NE 195th Street and North Creek Parkway	Signal	E	62	B	18	C	26	C	34	D	39
16	Bothell-Everett Highway and 228th Street SE	Signal	E	62	D	55	E	65	E	67	E	63
17	228th Street SE and 15th Avenue SE	Signal	A	6	B	11	E	64	E	65	B	16
18	228th Street SE and 19th Avenue SE	Signal	E	64	E	73	D	47	NA	NA	E	64
19	228th Street SE and 27th Avenue SE	Signal	C	30	A	6	E	65	NA	NA	C	24
20	228th Street SE and 29th Drive SE	Signal	B	19	E	55	NA	NA	E	66	D	44
21	SR 527 and I-405 Southbound Ramps	Signal	E	62	NA	NA	C	23	A	7	C	24
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	19	A	4	B	19	B	14

2045 No Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	A	EB L-9	NA	NA	A	0.0	A	0.0	A	EB L-9
24	SR 527 and 220th Street SE	Signal	E	65	E	61	D	48	D	42	D	47
25	SR 527 and 214th Street SE	Signal	E	71	E	65	D	35	E	79	E	69
26	SR 527 and 211th Street SE	Signal	NA	NA	E	78	B	18	A	7	B	12
27	SR 527 and SR 524	Signal	E	73	E	74	D	42	D	51	E	58
P1	17th Avenue SE and 220th Street SE	Signal	B	14	A	10	C	30	B	19	B	17
P2	220th St SE and 20th Ave SE	AWSC	F	78	C	17	C	17	E	48	F	57
P3	220th St SE and 23rd Dr SE	AWSC	F	128	A	10	B	11	B	11	F	97
P4	220th St SE and 26th Pl SE	AWSC	E	49	NA	NA	B	13	B	10	E	40
P5	223rd St SE and 26th Ave SE	AWSC	C	18	A	10	C	16	B	12	C	15

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2045 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	9	A	1	C	28	C	35	A	7
2	NE 160th Street and I-405 Southbound Ramps	Signal	C	26	D	39	NA	NA	D	49	D	37
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	27	C	33	D	50	NA	NA	C	33
4	NE 160th Street and 116th Avenue NE	TWSC	F	EB L-76	A	WB L-10	F	NB LTR- >300	F	SB LT- >300	F	NB LTR- >300
5	131st Avenue NE and NE 175th Street	Signal	F	86	E	72	D	44	D	44	E	62
6	131st Avenue NE and NE 177th Place	Signal	D	45	E	60	D	49	B	16	D	38
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	69	NA	NA	A	2	C	20	B	16
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	71	B	19	E	79	D	40
9	132nd Avenue NE and NE 180th Street	Signal	A	8	NA	NA	A	10	B	14	B	10
10	SR 522 and Campus Way NE	Signal	C	29	C	24	E	62	D	54	D	32
11	NE 195th Street and 110th Avenue NE	Signal	C	22	B	18	C	34	D	41	C	24

2045 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
12	NE 195th Street and 112th Avenue NE	Signal	A	3	B	12	NA	NA	C	30	A	9
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	15	C	21	NA	NA	D	42	C	23
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	6	A	1	D	41	NA	NA	B	10
15	NE 195th Street and North Creek Parkway	Signal	B	11	C	26	D	43	D	47	C	28
16	Bothell-Everett Highway and 228th Street SE	Signal	E	76	E	79	E	73	F	127	F	95
17	228th Street SE and 15th Avenue SE	Signal	D	38	C	31	E	57	E	71	D	39
18	228th Street SE and 19th Avenue SE	Signal	E	64	C	31	E	65	NA	NA	D	49
19	228th Street SE and 27th Avenue SE	Signal	E	72	A	4	F	213	NA	NA	E	69
20	228th Street SE and 29th Drive SE	Signal	C	26	E	56	NA	NA	E	58	D	46
21	SR 527 and I-405 Southbound Ramps	Signal	E	68	NA	NA	A	9	A	9	C	20
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	D	40	B	11	D	43	C	34

2045 No Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
23	17th Avenue SE and Canyon Park Park and Ride	TWSC	B	EB L-10	NA	NA	A	0	A	0	B	EB L-10
24	SR 527 and 220th Street SE	Signal	F	124	F	91	E	65	D	48	E	72
25	SR 527 and 214th Street SE	Signal	F	124	E	79	D	37	B	13	D	37
26	SR 527 and 211th Street SE	Signal	NA	NA	E	74	A	0	B	12	A	9
27	SR 527 and SR 524	Signal	F	172	F	101	F	223	F	82	F	165
P1	17th Avenue SE and 220th Street SE	Signal	C	21	B	18	C	24	B	14	C	20
P2	220th St SE and 20th Ave SE	AWSC	D	31	F	329	F	220	C	16	F	215
P3	220th St SE and 23rd Dr SE	AWSC	B	12	D	31	B	11	B	11	D	26
P4	220th St SE and 26th Pl SE	AWSC	B	13	NA	NA	E	36	F	50	E	40
P5	223rd St SE and 26th Ave SE	AWSC	B	12	B	10	F	52	B	11	D	33

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

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2025 Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	7	A	5	C	29	C	35	A	7
2	NE 160th Street and I-405 Southbound Ramps	Signal	D	45	C	21	NA	NA	D	46	D	37
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	20	B	15	D	49	NA	NA	C	21
4	NE 160th Street and 116th Avenue NE	TWSC	B	EB L-13	A	WB L-9	F	NB LTR-124	F	SB LT-260	F	SB LT-260
5	131st Avenue NE and NE 175th Street	Signal	D	40	D	48	D	38	C	23	C	33
6	131st Avenue NE and NE 177th Place	Signal	D	49	D	47	A	7	A	2	A	7
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	56	NA	NA	A	0	A	8	A	8
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	59	C	26	D	46	D	40
9	132nd Avenue NE and NE 180th Street	Signal	D	46	NA	NA	C	35	A	8	C	25
10	SR 522 and Campus Way NE	Signal	C	32	C	28	D	52	D	47	C	31
11	NE 195th Street and 110th Avenue NE	Signal	B	15	A	7	C	33	D	39	B	14
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	12	NA	NA	C	23	A	10

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ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	13	B	17	NA	NA	C	33	B	18
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	8	B	14	D	36	NA	NA	B	19
15	NE 195th Street and North Creek Parkway	Signal	E	55	B	18	C	26	C	33	D	36
16	Bothell-Everett Highway and 228th Street SE	Signal	D	43	D	46	E	63	E	73	E	57
17	228th Street SE and 15th Avenue SE	Signal	A	3	A	9	E	60	E	66	B	12
18	228th Street SE and 19th Avenue SE	Signal	D	47	D	38	D	48	NA	NA	D	44
19	228th Street SE and 27th Avenue SE	Signal	B	14	A	3	E	62	NA	NA	B	13
20	228th Street SE and 29th Drive SE	Signal	B	12	C	21	NA	NA	E	63	C	22
21	SR 527 and I-405 Southbound Ramps	Signal	E	73	NA	NA	B	13	A	5	C	26
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	15	A	3	B	19	B	12
23	17th Avenue SE and Canyon Park Park and Ride	Roundabou t	B	13	NA	NA	A	5	A	5	A	6
24	SR 527 and 220th Street SE	Signal	E	64	E	69	D	41	C	28	D	39
25	SR 527 and 214th Street SE	Signal	E	70	E	65	D	53	E	68	E	65

2025 Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
26	SR 527 and 211th Street SE	Signal	NA	NA	E	79	A	0	A	7	A	8
27	SR 527 and SR 524	Signal	E	73	E	72	D	42	E	58	E	60
P1	17th Avenue SE and 220th Street SE	Signal	B	15	B	12	C	22	C	34	B	17
P2	220th St SE and 20th Ave SE	AWSC	F	78	C	17	C	18	E	36	F	53
P3	220th St SE and 23rd Dr SE	AWSC	F	98	A	9	B	11	B	11	F	76
P4	220th St SE and 26th Pl SE	AWSC	E	41	NA	NA	B	12	B	10	D	35
P5	223rd St SE and 26th Ave SE	AWSC	C	16	A	10	C	15	B	11	B	14
N1	SR 522 and I-405 Southbound Ramps	Signal	B	13	A	3	D	48	E	61	B	11
N2	SR 522 and I-405 Direct Access Ramps	Signal	C	32	B	18	E	68	E	74	C	28
N3	SR 522 and I-405 Northbound Ramps	Signal	A	3	C	20	E	58	NA	NA	B	15
N4	17th Avenue SE and I-405 Direct Access Ramps	Signal	A	10	A	9	NA	NA	A	7	A	8

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

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Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2025 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	7	A	1	C	29	C	35	A	6
2	NE 160th Street and I-405 Southbound Ramps	Signal	C	24	D	37	NA	NA	D	48	D	36
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	29	D	37	D	50	NA	NA	D	36
4	NE 160th Street and 116th Avenue NE	TWSC	E	EB L-41	A	WB L-10	F	NB LTR->300	F	SB L->300	F	NB LTR->300
5	131st Avenue NE and NE 175th Street	Signal	E	56	E	70	D	44	D	42	D	52
6	131st Avenue NE and NE 177th Place	Signal	D	44	E	61	D	35	C	23	C	34
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	64	NA	NA	A	10	B	18	B	18
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	60	B	13	D	51	C	27
9	132nd Avenue NE and NE 180th Street	Signal	A	8	NA	NA	A	9	B	12	A	9
10	SR 522 and Campus Way NE	Signal	C	26	E	59	E	69	E	61	D	46
11	NE 195th Street and 110th Avenue NE	Signal	C	20	B	18	C	34	D	39	C	23
12	NE 195th Street and 112th Avenue NE	Signal	A	3	B	11	NA	NA	C	30	A	9

2025 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	14	C	28	NA	NA	D	42	C	26
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	7	A	7	D	44	NA	NA	B	15
15	NE 195th Street and North Creek Parkway	Signal	D	37	C	26	D	54	D	45	D	38
16	Bothell-Everett Highway and 228th Street SE	Signal	E	62	E	61	E	64	F	110	E	80
17	228th Street SE and 15th Avenue SE	Signal	B	10	C	22	D	53	E	65	C	23
18	228th Street SE and 19th Avenue SE	Signal	C	30	B	11	D	44	NA	NA	C	24
19	228th Street SE and 27th Avenue SE	Signal	D	50	A	3	F	165	NA	NA	D	49
20	228th Street SE and 29th Drive SE	Signal	A	10	C	27	NA	NA	E	57	C	31
21	SR 527 and I-405 Southbound Ramps	Signal	E	69	NA	NA	C	24	A	8	C	25
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	C	30	A	7	C	23	C	20
23	17th Avenue SE and Canyon Park Park and Ride	Roundabou t	B	14	NA	NA	B	11	A	5	A	9
24	SR 527 and 220th Street SE	Signal	E	76	E	76	C	33	D	38	D	50
25	SR 527 and 214th Street SE	Signal	F	112	E	72	C	26	A	9	C	27

2025 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
26	SR 527 and 211th Street SE	Signal	NA	NA	E	76	A	0	B	10	A	7
27	SR 527 and SR 524	Signal	F	117	F	105	F	229	E	64	F	155
P1	17th Avenue SE and 220th Street SE	Signal	C	32	C	21	C	22	D	37	C	25
P2	220th St SE and 20th Ave SE	AWSC	C	21	F	222	F	151	B	15	F	149
P3	220th St SE and 23rd Dr SE	AWSC	B	11	C	19	B	11	A	10	C	17
P4	220th St SE and 26th Pl SE	AWSC	B	11	NA	NA	C	21	C	22	C	20
P5	223rd St SE and 26th Ave SE	AWSC	B	12	B	10	E	36	B	10	C	24
N1	SR 522 and I-405 Southbound Ramps	Signal	C	30	B	13	D	46	E	66	C	24
N2	SR 522 and I-405 Direct Access Ramps	Signal	C	24	C	30	E	70	E	67	C	31
N3	SR 522 and I-405 Northbound Ramps	Signal	A	8	B	15	D	54	NA	NA	B	17
N4	17th Avenue SE and I-405 Direct Access Ramps	Signal	B	13	A	3	NA	NA	B	12	A	8

Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2045 Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	10	A	6	C	28	C	35	A	9
2	NE 160th Street and I-405 Southbound Ramps	Signal	E	72	C	24	NA	NA	D	43	D	52
3	NE 160th Street and I-405 Northbound Ramps	Signal	C	34	B	17	D	49	NA	NA	C	29
4	NE 160th Street and 116th Avenue NE	TWSC	B	EB L-14	A	WB L-10	F	NB LTR->300	F	SB LT->300	F	NB LTR->300
5	131st Avenue NE and NE 175th Street	Signal	D	39	D	49	D	38	C	30	D	36
6	131st Avenue NE and NE 177th Place	Signal	D	48	D	46	A	8	A	3	A	8
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	55	NA	NA	A	0	B	11	A	10
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	75	D	47	E	75	E	64
9	132nd Avenue NE and NE 180th Street	Signal	D	49	NA	NA	C	33	B	10	C	27
10	SR 522 and Campus Way NE	Signal	E	56	C	33	D	55	D	50	D	47
11	NE 195th Street and 110th Avenue NE	Signal	B	20	A	9	C	33	D	42	B	18
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	13	NA	NA	C	26	B	11

2045 Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	15	B	16	NA	NA	C	32	B	19
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	10	B	17	D	41	NA	NA	C	23
15	NE 195th Street and North Creek Parkway	Signal	E	79	B	18	C	26	C	34	D	48
16	Bothell-Everett Highway and 228th Street SE	Signal	E	62	D	43	E	66	E	72	E	63
17	228th Street SE and 15th Avenue SE	Signal	A	7	B	11	E	72	E	67	B	17
18	228th Street SE and 19th Avenue SE	Signal	E	75	E	80	D	49	NA	NA	E	73
19	228th Street SE and 27th Avenue SE	Signal	D	49	A	6	E	66	NA	NA	C	34
20	228th Street SE and 29th Drive SE	Signal	C	21	E	69	NA	NA	E	72	D	53
21	SR 527 and I-405 Southbound Ramps	Signal	E	74	NA	NA	B	15	A	9	C	28
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	B	19	A	4	B	19	B	14
23	17th Avenue SE and Canyon Park Park and Ride	Roundabou t	B	13	NA	NA	A	5	A	5	A	5
24	SR 527 and 220th Street SE	Signal	E	66	E	61	D	51	D	39	D	47
25	SR 527 and 214th Street SE	Signal	E	72	E	66	D	54	E	79	E	73

2045 Build Alternative AM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
26	SR 527 and 211th Street SE	Signal	NA	NA	E	76	A	0	A	9	A	10
27	SR 527 and SR 524	Signal	E	80	E	79	D	48	F	88	E	78
P1	17th Avenue SE and 220th Street SE	Signal	B	19	B	17	B	18	D	39	B	19
P2	220th St SE and 20th Ave SE	AWSC	F	120	C	19	C	21	F	54	F	80
P3	220th St SE and 23rd Dr SE	AWSC	F	158	A	10	B	11	B	12	F	120
P4	220th St SE and 26th Pl SE	AWSC	F	62	NA	NA	B	13	B	10	F	50
P5	223rd St SE and 26th Ave SE	AWSC	C	21	A	10	C	18	B	12	C	17
N1	SR 522 and I-405 Southbound Ramps	Signal	B	14	A	4	D	50	E	62	B	13
N2	SR 522 and I-405 Direct Access Ramps	Signal	D	52	C	21	E	66	E	76	D	38
N3	SR 522 and I-405 Northbound Ramps	Signal	A	3	C	22	E	58	NA	NA	B	16
N4	17th Avenue SE and I-405 Direct Access Ramps	Signal	B	12	B	11	NA	NA	A	9	A	10

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

2045 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	NE 160th Street and Brickyard Park and Ride	Signal	A	9	A	1	C	28	C	35	A	7
2	NE 160th Street and I-405 Southbound Ramps	Signal	C	29	D	39	NA	NA	D	49	D	38
3	NE 160th Street and I-405 Northbound Ramps	Signal	D	52	E	58	D	51	NA	NA	D	54
4	NE 160th Street and 116th Avenue NE	TWSC	F	EB L-122	B	WB L-10	F	NB LTR->300	F	SB LT->300	F	NB LTR->300
5	131st Avenue NE and NE 175th Street	Signal	F	88	E	74	D	45	D	45	E	63
6	131st Avenue NE and NE 177th Place	Signal	D	45	E	58	D	53	C	33	D	46
7	131st Avenue NE and SR 522 Eastbound Ramps	Signal	E	68	NA	NA	B	17	C	24	C	26
8	131st Avenue NE and SR 522 Westbound Ramps	Signal	NA	NA	E	64	B	12	E	74	C	34
9	132nd Avenue NE and NE 180th Street	Signal	A	8	NA	NA	A	10	B	14	B	10
10	SR 522 and Campus Way NE	Signal	D	39	E	57	E	76	E	64	D	51
11	NE 195th Street and 110th Avenue NE	Signal	C	22	B	18	C	34	D	41	C	24
12	NE 195th Street and 112th Avenue NE	Signal	A	4	B	12	NA	NA	C	31	A	10

2045 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
13	NE 195th Street and I-405 Southbound Ramps	Signal	B	16	C	21	NA	NA	D	42	C	23
14	NE 195th Street and I-405 Northbound Ramps	Signal	A	10	B	11	D	41	NA	NA	B	18
15	NE 195th Street and North Creek Parkway	Signal	D	37	C	27	D	43	D	47	D	37
16	Bothell-Everett Highway and 228th Street SE	Signal	E	75	E	79	E	69	F	129	F	95
17	228th Street SE and 15th Avenue SE	Signal	D	39	C	32	E	58	E	71	D	41
18	228th Street SE and 19th Avenue SE	Signal	E	60	C	32	E	67	NA	NA	D	49
19	228th Street SE and 27th Avenue SE	Signal	E	63	A	4	F	262	NA	NA	E	74
20	228th Street SE and 29th Drive SE	Signal	C	25	E	65	NA	NA	E	71	D	53
21	SR 527 and I-405 Southbound Ramps	Signal	E	70	NA	NA	A	8	A	10	B	20
22	SR 527 and I-405 Northbound Ramps	Signal	NA	NA	D	43	A	9	D	43	C	34
23	17th Avenue SE and Canyon Park Park and Ride	Roundabout	B	13	NA	NA	A	9	A	5	A	8
24	SR 527 and 220th Street SE	Signal	F	98	F	81	D	45	D	44	E	60
25	SR 527 and 214th Street SE	Signal	F	124	F	107	D	47	B	15	D	47

2045 Build Alternative PM

ID	Intersection	Control Type	Eastbound		Westbound		Northbound		Southbound		Overall	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
26	SR 527 and 211th Street SE	Signal	NA	NA	E	74	A	0	B	12	A	8
27	SR 527 and SR 524	Signal	F	172	F	104	F	260	F	85	F	186
P1	17th Avenue SE and 220th Street SE	Signal	C	29	C	26	B	19	D	39	C	25
P2	220th St SE and 20th Ave SE	AWSC	D	33	F	345	F	277	C	17	F	232
P3	220th St SE and 23rd Dr SE	AWSC	B	13	D	33	B	11	B	11	D	27
P4	220th St SE and 26th Pl SE	AWSC	B	13	NA	NA	E	39	F	56	E	44
P5	223rd St SE and 26th Ave SE	AWSC	B	13	B	11	F	78	B	11	E	47
N1	SR 522 and I-405 Southbound Ramps	Signal	D	37	B	16	D	49	E	67	C	29
N2	SR 522 and I-405 Direct Access Ramps	Signal	D	52	C	39	E	74	E	69	D	48
N3	SR 522 and I-405 Northbound Ramps	Signal	A	9	B	15	D	54	NA	NA	B	17
N4	17th Avenue SE and I-405 Direct Access Ramps	Signal	B	14	A	3	NA	NA	B	13	A	8

NA = Not Applicable; LOS = Level of service; NB = northbound; SB = southbound; EB = eastbound, WB = westbound; AWSC; All-Way Stop Controlled; TWSC: Two-Way Stop Controlled; LOS at these locations is reported for the worst movement [identified in brackets]

Estimates of delay per vehicle are rounded to nearest whole second.

Intersection LOS and delay are reported using HCM 6 methodology, except for intersections 1, 10, 11, 18, 21, 22 , 24, and P1 which are reported using HCM 2000 methodology.

ATTACHMENT F EXISTING SAFETY PERFORMANCE

Intersections

By Severity:

Intersection ID	Intersection Name	Fatality	Serious Injury	Injury	PDO	Unknown	Total
1	SR 524 and SR 527	0	1	31	81	1	114
2	SR 527 & 211th St	0	0	5	19	0	24
3	SR 527 & 214th St SE	0	0	10	20	0	30
4	220th Street SE & SR 527	0	0	15	49	0	64
5	220th Street SE & 17th Ave SE	0	0	0	2	0	2
6	SR 527 & I-405 NB Ramps	0	1	8	21	0	30
7	Canyon Park P&R & 17th Ave SE	0	0	0	0	0	0
8	SR 527 & I-405 SB Ramps	0	0	14	31	2	47
9	SR 527 & 228th St SE	0	0	42	98	0	140
10	228th ST SE & 15th Ave SE	0	1	10	18	0	29
11	228th ST SE & 19th Ave SE	0	0	4	14	0	18
12	228th ST SE & 27th Ave SE	0	0	3	2	0	5
13	228th ST SE & 29th Drive SE	0	0	0	4	0	4
14	NE 195th St & 110th Ave NE	0	0	4	7	0	11
15	NE 195th St & 112th Ave NE	0	0	0	1	0	1

By Severity:

Intersection ID	Intersection Name	Fatality	Serious Injury	Injury	PDO	Unknown	Total
16	NE 195th St & I-405 SB Ramps	0	0	4	17	0	21
17	NE 195th St & I-405 NB Ramps	0	0	6	25	1	32
18	NE 195th St & North Creek Parkway	0	0	3	12	0	15
19	Campus Way & SR 522	0	0	4	12	0	16
20	SR 202 & NE 180th St	0	0	4	19	0	23
21	SR 202 & SR 522 WB Ramps	0	1	9	14	0	24
22	SR 202 & SR 522 EB Ramps	0	0	1	5	0	6
23	SR 202 & NE 177th St	0	0	10	31	0	41
24	SR 202 & NE 175th St	0	1	10	26	1	38
25	NE 160th St & Transit Ac Rd	0	0	0	3	0	3
26	NE 160th St & I-405 SB Ramps	0	1	8	21	0	30
27	NE 160th St & I-405 NB Ramps	0	0	4	24	0	28
28	NE 160th St & 116th Ave NE	0	0	8	13	0	21
29	NE 195th St & 136th Ave NE	0	0	1	4	0	5
30	SR 522 WB Ramp & NE 195th St	0	0	4	14	0	18
31	SR 522 EB Ramp & NE 195th St	0	1	2	10	0	13
32	NE 195th St & Woodinville Snohomish Rd	0	1	13	35	0	49

NB = northbound; SB = southbound; EB = eastbound, WB = westbound; PDO = property damage only

By Type:

Intersection ID	Intersection Name	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
1	SR 524 and SR 527	52	54	4	4	114
2	SR 527 & 211th St	10	14	0	0	24
3	SR 527 & 214th St SE	21	8	1	0	30
4	220th Street SE & SR 527	45	18	0	1	64
5	220th Street SE & 17th Ave SE	0	1	1	0	2
6	SR 527 & I-405 NB Ramps	11	16	1	2	30
7	Canyon Park P&R & 17th Ave SE	0	0	0	0	0
8	SR 527 & I-405 SB Ramps	17	27	3	0	47
9	SR 527 & 228th St SE	82	50	4	4	140
10	228th ST SE & 15th Ave SE	13	12	1	3	29
11	228th ST SE & 19th Ave SE	9	6	2	1	18
12	228th ST SE & 27th Ave SE	2	2	0	1	5
13	228th ST SE & 29th Drive SE	2	2	0	0	4
14	NE 195th St & 110th Ave NE	7	2	1	1	11
15	NE 195th St & 112th Ave NE	0	1	0	0	1
16	NE 195th St & I-405 SB Ramps	6	14	1	0	21
17	NE 195th St & I-405 NB Ramps	10	17	2	3	32

By Type:

Intersection ID	Intersection Name	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
18	NE 195th St & North Creek Parkway	6	8	1	0	15
19	Campus Way & SR 522	7	7	2	0	16
20	SR 202 & NE 180th St	7	15	0	1	23
21	SR 202 & SR 522 WB Ramps	7	15	1	1	24
22	SR 202 & SR 522 EB Ramps	2	0	3	1	6
23	SR 202 & NE 177th St	5	35	1	0	41
24	SR 202 & NE 175th St	8	26	1	3	38
25	NE 160th St & Transit Ac Rd	1	2	0	0	3
26	NE 160th St & I-405 SB Ramps	18	10	0	2	30
27	NE 160th St & I-405 NB Ramps	10	16	1	1	28
28	NE 160th St & 116th Ave NE	3	18	0	0	21
29	NE 195th St & 136th Ave NE	3	1	0	1	5
30	SR 522 WB Ramp & NE 195th St	5	9	4	0	18
31	SR 522 EB Ramp & NE 195th St	9	4	0	0	13
32	NE 195th St & Woodinville Snohomish Rd	16	32	0	1	49

NB = northbound; SB = southbound; EB = eastbound, WB = westbound

Local Street Segments

By Severity:

Facility	Fatality	Serious Injury	Injury	PDO	Unknown	Total
I-405: SR 527/Bothell Everett Highway Local Facilities	0	2	101	235	3	341
I-405: NE 228th St Local Facilities	1	2	23	70	2	98
I-405: NE 195th St Local Facilities	0	0	6	21	0	27
SR 522: SR 202 Local Facilities	0	0	13	38	0	51
SR 522: NE 195th St Local Facilities	0	0	0	0	0	0
I-405: NE 160th St Local Facilities	0	0	2	9	0	11

PDO = property damage only

By Type:

Facility	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
I-405: SR 527/Bothell Everett Highway Local Facilities	271	64	5	1	341
I-405: NE 228th St Local Facilities	58	37	3	0	98
I-405: NE 195th St Local Facilities	9	11	5	2	27
SR 522: SR 202 Local Facilities	11	38	2	0	51
SR 522: NE 195th St Local Facilities	0	0	0	0	0
I-405: NE 160th St Local Facilities	6	5	0	0	11

I-405 Mainline

By Severity:

Facility	Fatality	Serious Injury	Injury	PDO	Unknown	Total
I-405 NB Mainline: from NB I-5 Off-Ramp to SB I-5 Off-Ramp	0	0	9	32	0	41
I-405 NB Mainline: from SR 527 On-Ramp to NB I-5 Off-Ramp	0	1	34	117	1	153
I-405 NB Mainline: between SR 527 Ramps	1	0	37	113	1	152
I-405 NB Mainline: from SR 522/195th St NE On-Ramps to SR 527 Off-Ramp	0	0	83	198	0	281
I-405 NB Mainline: from NE 195th St Off-Ramp to SR 522/NE 195th St On-Ramps	1	1	40	80	1	123
I-405 NB Mainline: from NE 160th St Off-Ramp to NE 195th St Off-Ramp	0	0	16	53	0	69
I-405 NB Mainline: from SR 522 Off-Ramp to NE 160th St On-Ramp	0	1	43	111	0	155
I-405 NB Mainline: from NE 160th St Off-Ramp to SR 522 Off-Ramp (MP 22.32-22.52)	0	1	23	50	0	74
I-405 NB Mainline: from NE 128th St On-Ramp to NE 160th St Off-Ramp (MP 21.29-22.31)	0	1	35	83	0	119
I-405 SB Mainline: from I-5 to I-5 On-Ramps	0	0	11	32	0	43
I-405 SB Mainline: from I-5 On-Ramps to SR 527 Off-Ramp	0	4	65	196	2	267
I-405 SB Mainline: between SR 527 Ramps	0	1	116	275	1	393
I-405 SB Mainline: from SR 527 On-Ramp to NE 195th Off-Ramp	0	0	71	212	0	283
I-405 SB Mainline: between NE 195th St Ramps	0	1	30	99	0	130

By Severity:

Facility	Fatality	Serious Injury	Injury	PDO	Unknown	Total
I-405 SB Mainline: from NE 195th St On-Ramp to WB SR 522 Off-Ramp	0	0	9	21	0	30
I-405 SB Mainline: from WB SR 522 Off-Ramp to EB SR 522 Off-Ramp	0	0	13	41	1	55
I-405 SB Mainline: from EB SR 522 Off-Ramp to SR 522 On-Ramps	0	0	4	22	0	26
I-405 SB Mainline: from SR 522 On-Ramps to NE 160th St Off-Ramp (MP 23.46-22.91)	0	0	26	74	0	100
I-405 SB Mainline: between NE 160th St Ramps (MP 22.90-21.95)	0	1	35	95	0	131
I-405 SB Mainline: from NE 160th St On-Ramp to NE 128th St Off-Ramp (MP 21.94-20.94)	0	0	30	41	1	72
SR 522 EB Mainline: from Campus Way to I-405 Off-Ramp	0	0	0	3	0	3
SR 522 EB Mainline: between I-405 Ramps	0	0	1	7	0	8
SR 522 EB Mainline: from I-405 On-Ramp to SR 202 Off-Ramp	0	0	8	17	0	25
SR 522 EB Mainline: between SR 202 Ramps	0	1	5	9	1	16
SR 522 EB Mainline: from SR 202 On-Ramp to NE 195th St Off-Ramp	0	0	2	3	0	5
SR 522 EB Mainline: from NE 195th St Off-Ramp to NE 195th St	0	1	2	2	0	5
SR 522 EB Mainline: from NE 195th St Off-Ramp to County Line	0	0	3	1	0	4
SR 522 WB Mainline: from County Line to NE 195th St	0	0	2	5	0	7
SR 522 WB Mainline: from NE 195th St to NE 195th On-Ramp	0	0	3	10	0	13

By Severity:

Facility	Fatality	Serious Injury	Injury	PDO	Unknown	Total
SR 522 WB Mainline: between NE 195th St On-Ramp to SR 202 Off-Ramp	0	0	1	3	0	4
SR 522 WB Mainline: between SR 202 Ramps	0	2	7	14	0	23
SR 522 WB Mainline: from SR 202 On-Ramp to I-405 Off-Ramp	0	0	7	10	0	17
SR 522 WB Mainline: from I-405 Off-Ramp to Freeway End	1	0	8	25	1	35
SR 522 WB Mainline: from Freeway End to Campus Way	0	0	0	1	0	1
I-5 NB Mainline: from project limits to I-405 Off-ramps	0	1	14	67	0	82
I-5 NB Mainline: between I-405 Ramps	0	4	21	94	0	119
I-5 NB Mainline: from I-405 NB On-Ramp to project limits	1	4	27	99	0	131
I-5 SB Mainline: from project limits to I-405 SB Off-Ramp	0	0	17	87	0	104
I-5 SB Mainline: between I-405 Ramps	1	0	55	168	1	225
SR 525 NB Mainline: from I-405 to Alderwood Mall Parkway Off-Ramp	0	0	2	8	0	10
SR 525 NB Mainline: between Alderwood Mall Parkway Ramps	0	0	0	3	0	3
SR 525 NB Mainline: from Alderwood Mall Parkway On-Ramp to north project limits	0	0	0	0	0	0
SR 525 SB Mainline: from south project limits to Alderwood Mall Parkway Off-Ramp	0	0	0	0	0	0
SR 525 SB Mainline: between Alderwood Mall Parkway Ramps	0	0	1	10	0	11

By Severity:

Facility	Fatality	Serious Injury	Injury	PDO	Unknown	Total
SR 525 SB Mainline: from Alderwood Mall Parkway On-Ramp to I-405	0	0	3	12	0	15

NB = northbound; SB = southbound; EB = eastbound, WB = westbound; PDO = property damage only

By Type:

Facility	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
I-405 NB Mainline: from NB I-5 Off-Ramp to SB I-5 Off-Ramp	18	12	11	0	41
I-405 NB Mainline: from SR 527 On-Ramp to NB I-5 Off-Ramp	80	37	30	6	153
I-405 NB Mainline: between SR 527 Ramps	120	21	11	0	152
I-405 NB Mainline: from SR 522/195th St NE On-Ramps to SR 527 Off-Ramp	226	36	13	6	281
I-405 NB Mainline: from NE 195th St Off-Ramp to SR 522/NE 195th St On-Ramps	89	15	15	4	123
I-405 NB Mainline: from NE 160th St Off-Ramp to NE 195th St Off-Ramp	41	16	10	2	69
I-405 NB Mainline: from SR 522 Off-Ramp to NE 160th St On-Ramp	99	36	12	8	155
I-405 NB Mainline: from NE 160th St Off-Ramp to SR 522 Off-Ramp (MP 22.32-22.52)	54	14	4	2	74
I-405 NB Mainline: from NE 128th St On-Ramp to NE 160th St Off-Ramp (MP 21.29-22.31)	87	23	5	4	119
I-405 SB Mainline: from I-5 to I-5 On-Ramps	23	8	11	1	43
I-405 SB Mainline: from I-5 On-Ramps to SR 527 Off-Ramp	182	45	29	11	267
I-405 SB Mainline: between SR 527 Ramps	345	42	5	1	393
I-405 SB Mainline: from SR 527 On-Ramp to NE 195th Off-Ramp	242	22	9	10	283
I-405 SB Mainline: between NE 195th St Ramps	111	14	3	2	130

By Type:

Facility	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
I-405 SB Mainline: from NE 195th St On-Ramp to WB SR 522 Off-Ramp	24	5	0	1	30
I-405 SB Mainline: from WB SR 522 Off-Ramp to EB SR 522 Off-Ramp	41	7	5	2	55
I-405 SB Mainline: from EB SR 522 Off-Ramp to SR 522 On-Ramps	14	5	6	1	26
I-405 SB Mainline: from SR 522 On-Ramps to NE 160th St Off-Ramp (MP 23.46-22.91)	54	38	7	1	100
I-405 SB Mainline: between NE 160th St Ramps (MP 22.90-21.95)	81	39	9	2	131
I-405 SB Mainline: from NE 160th St On-Ramp to NE 128th St Off-Ramp (MP 21.94-20.94)	47	11	7	7	72
SR 522 EB Mainline: from Campus Way to I-405 Off-Ramp	2	0	1	0	3
SR 522 EB Mainline: between I-405 Ramps	2	3	3	0	8
SR 522 EB Mainline: from I-405 On-Ramp to SR 202 Off-Ramp	10	6	5	4	25
SR 522 EB Mainline: between SR 202 Ramps	5	2	7	2	16
SR 522 EB Mainline: from SR 202 On-Ramp to NE 195th St Off-Ramp	0	1	3	1	5
SR 522 EB Mainline: from NE 195th St Off-Ramp to NE 195th St	2	1	1	1	5
SR 522 EB Mainline: from NE 195th St Off-Ramp to County Line	1	1	2	0	4
SR 522 WB Mainline: from County Line to NE 195th St	5	1	1	0	7
SR 522 WB Mainline: from NE 195th St to NE 195th On-Ramp	5	2	4	2	13

By Type:

Facility	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
SR 522 WB Mainline: between NE 195th St On-Ramp to SR 202 Off-Ramp	1	2	1	0	4
SR 522 WB Mainline: between SR 202 Ramps	13	4	3	3	23
SR 522 WB Mainline: from SR 202 On-Ramp to I-405 Off-Ramp	8	5	3	1	17
SR 522 WB Mainline: from I-405 Off-Ramp to Freeway End	8	11	10	6	35
SR 522 WB Mainline: from Freeway End to Campus Way	0	0	1	0	1
I-5 NB Mainline: from project limits to I-405 Off-ramps	43	25	9	5	82
I-5 NB Mainline: between I-405 Ramps	66	26	18	9	119
I-5 NB Mainline: from I-405 NB On-Ramp to project limits	74	40	11	6	131
I-5 SB Mainline: from project limits to I-405 SB Off-Ramp	67	27	8	2	104
I-5 SB Mainline: between I-405 Ramps	144	63	12	6	225
SR 525 NB Mainline: from I-405 to Alderwood Mall Parkway Off-Ramp	2	6	1	1	10
SR 525 NB Mainline: between Alderwood Mall Parkway Ramps	0	1	2	0	3
SR 525 NB Mainline: from Alderwood Mall Parkway On-Ramp to north project limits	0	0	0	0	0
SR 525 SB Mainline: from south project limits to Alderwood Mall Parkway Off-Ramp	0	0	0	0	0
SR 525 SB Mainline: between Alderwood Mall Parkway Ramps	4	1	4	2	11

By Type:

Facility	Rear-End	Angled/ Sideswipe	Fixed Object	Other	Total
SR 525 SB Mainline: from Alderwood Mall Parkway On-Ramp to I-405	8	3	3	1	15

NB = northbound; SB = southbound; EB = eastbound, WB = westbound

I-405 Ramps

By Severity:

Ramp	Fatality	Serious Injury	Injury	PDO	Unknown	Total
I-5 NB Off-Ramp to I-405 SB	0	1	7	13	0	21
I-5 NB Off-Ramp to I-405 NB	0	0	12	35	3	50
I-405 NB Off-Ramp to I-5 NB	0	0	6	25	0	31
I-5 SB Off-Ramp to I-405 SB	0	2	17	85	1	105
SR 525 SB Off-Ramp to I-5 SB	0	0	0	0	0	0
I-405 NB Off-Ramp to I-5 SB	0	0	0	0	0	0
I-405 NB Off-Ramp to SR 527	1	0	9	33	0	43
I-405 NB On-Ramp from WB SR 527	0	0	3	8	0	11
I-405 SB Off-Ramp to SR 527	0	0	2	2	0	4
I-405 NB On-Ramp from EB SR 527	0	0	2	1	0	3
I-405 SB On-Ramp from EB SR 527	0	0	5	19	0	24
I-405 SB On-Ramp from WB SR 527	0	0	0	1	0	1
I-405 SB On-Ramp from SR 527	0	0	5	17	0	22
I-405 NB Off-Ramp to NE 195th St	0	0	1	2	0	3
I-405 NB On-Ramp from NE 195th St	0	0	3	6	0	9
I-405 SB Off-Ramp to NE 195th St	0	0	0	2	0	2

By Severity:

Ramp	Fatality	Serious Injury	Injury	PDO	Unknown	Total
I-405 SB On-Ramp from NE 195th St	0	0	2	6	0	8
I-405 NB C-D Roadway at NE 195th St	0	0	6	19	0	25
I-405 NB Off-Ramp to EB SR 522	0	0	17	35	0	52
I-405 NB Off-Ramp to WB SR 522	1	0	2	13	0	16
I-405 NB On-Ramp from WB SR 522	0	0	3	3	0	6
I-405 NB On-Ramp from EB SR 522	0	0	0	0	0	0
I-405 SB Off-Ramp to S Campus Way	0	2	6	15	0	23
I-405 SB Off-Ramp to WB SR 522	0	0	0	4	0	4
I-405 SB Off-Ramp to EB SR 522	0	0	5	19	0	24
I-405 SB On-Ramp from EB SR 522	0	0	10	26	3	39
I-405 SB On-Ramp from WB SR 522	0	1	5	18	0	24
SR 522 EB C-D Roadway at I-405	0	0	1	6	0	7
SR 522 EB Off-Ramp to SR 202	0	0	2	1	0	3
SR 522 WB On-Ramp from SR 202	0	0	1	1	0	2
SR 522 EB On-Ramp from SR 202	0	0	0	2	0	2
SR 522 WB Off-Ramp to SR 202	0	0	0	3	0	3
SR 522 EB Off-Ramp to NE 195th St	0	0	2	3	0	5

By Severity:

Ramp	Fatality	Serious Injury	Injury	PDO	Unknown	Total
SR 522 WB On-Ramp from NE 195th St	0	0	2	3	0	5
I-405 NB Off-Ramp to NE 160th St	0	0	2	3	0	5
SR 522 On-Ramp from NE 160th St	0	0	0	1	0	1
I-405 NB On-Ramp from NE 160th St	0	0	9	5	0	14
I-405 SB Off-Ramp to NE 160th St	0	0	2	2	0	4
I-405 SB On-Ramp from NE 160th St	0	0	1	6	0	7

NB = northbound; SB = southbound; EB = eastbound, WB = westbound; PDO = property damage only

By Type:

Ramp	Rear-End	Angled/Sideswipe	Fixed Object	Other	Total
I-5 NB Off-Ramp to I-405 SB	2	7	10	2	21
I-5 NB Off-Ramp to I-405 NB	1	4	34	11	50
I-405 NB Off-Ramp to I-5 NB	4	13	7	7	31
I-5 SB Off-Ramp to I-405 SB	9	13	71	12	105
SR 525 SB Off-Ramp to I-5 SB	0	0	0	0	0
I-405 NB Off-Ramp to I-5 SB	0	0	0	0	0
I-405 NB Off-Ramp to SR 527	35	3	3	2	43
I-405 NB On-Ramp from WB SR 527	8	3	0	0	11
I-405 SB Off-Ramp to SR 527	3	0	1	0	4
I-405 NB On-Ramp from EB SR 527	3	0	0	0	3
I-405 SB On-Ramp from EB SR 527	20	2	2	0	24
I-405 SB On-Ramp from WB SR 527	0	1	0	0	1
I-405 SB On-Ramp from SR 527	13	5	4	0	22
I-405 NB Off-Ramp to NE 195th St	3	0	0	0	3
I-405 NB On-Ramp from NE 195th St	7	2	0	0	9
I-405 SB Off-Ramp to NE 195th St	1	1	0	0	2
I-405 SB On-Ramp from NE 195th St	6	1	0	1	8

By Type:

Ramp	Rear-End	Angled/Sideswipe	Fixed Object	Other	Total
I-405 NB C-D Roadway at NE 195th St	17	6	1	1	25
I-405 NB Off-Ramp to EB SR 522	32	14	5	1	52
I-405 NB Off-Ramp to WB SR 522	1	0	14	1	16
I-405 NB On-Ramp from WB SR 522	2	0	2	2	6
I-405 NB On-Ramp from EB SR 522	0	0	0	0	0
I-405 SB Off-Ramp to S Campus Way	0	13	9	1	23
I-405 SB Off-Ramp to WB SR 522	0	2	2	0	4
I-405 SB Off-Ramp to EB SR 522	1	1	16	6	24
I-405 SB On-Ramp from EB SR 522	11	3	23	2	39
I-405 SB On-Ramp from WB SR 522	4	11	6	3	24
SR 522 EB C-D Roadway at I-405	1	4	1	1	7
SR 522 EB Off-Ramp to SR 202	2	0	1	0	3
SR 522 WB On-Ramp from SR 202	0	1	0	1	2
SR 522 EB On-Ramp from SR 202	0	2	0	0	2
SR 522 WB Off-Ramp to SR 202	3	0	0	0	3
SR 522 EB Off-Ramp to NE 195th St	5	0	0	0	5
SR 522 WB On-Ramp from NE 195th St	0	0	4	1	5

By Type:

Ramp	Rear-End	Angled/Sideswipe	Fixed Object	Other	Total
I-405 NB Off-Ramp to NE 160th St	2	1	1	1	5
SR 522 On-Ramp from NE 160th St	1	0	0	0	1
I-405 NB On-Ramp from NE 160th St	10	0	4	0	14
I-405 SB Off-Ramp to NE 160th St	3	0	1	0	4
I-405 SB On-Ramp from NE 160th St	5	1	1	0	7

NB = northbound; SB = southbound; EB = eastbound, WB = westbound

ATTACHMENT G CURRENT TRANSIT ROUTES

Route	Provider	Route Name	Service Area	I-405 Influence	Service	Type	Frequency
KCM 237	King County Metro	Woodinville P&R to Bellevue TC	Woodinville P&R, Brickyard Freeway Stop, Totem Lake Freeway Station, Bellevue TC	Use	Weekday	Peak	3 Runs
KCM 243	King County Metro	Kenmore P&R to Overlake TC	Kenmore P&R, Bothell P&R, Totem Lake TC, Redmond TC, Overlake TC	Use	Weekday	Peak	30 minutes
KCM 311	King County Metro	Woodinville to Downtown Seattle	Woodinville P&R, Brickyard P&R, Totem Lake Station, Montlake Station, Downtown Seattle	Use	Weekday	Peak	15 minutes
KCM 342	King County Metro	Shoreline P&R to Renton TC	Shoreline P&R, Kenmore P&R, Totem Lake Freeway Station, Houghton P&R, Bellevue TC, Renton TC	Use	Weekday	Peak	30 minutes
KCM 952	King County Metro	Auburn P&R to Boeing Everett	Auburn P&R, Kennydale Freeway Station, Houghton Freeway Station, Kingsgate Freeway Station, Brickyard Freeway Station, Boeing Everett	Use	Weekday	Peak	30 minutes
CT 105	Community Transit	Hardeson Road to Bothell	UW Bothell, Canyon Park, Mill Creek, Mariner P&R	Cross	All Days	Daily	30 minutes
CT 106	Community Transit	Mariner P&R to Bothell	UW Bothell, Canyon Park, Mill Creek, Mariner P&R	Cross	Weekday	Peak	30 minutes
CT 120	Community Transit	Canyon Park to Edmonds Community College	Canyon Park, Lynnwood Transit Center, Edmonds CC	Cross	All Days	Daily	30 minutes
CT 424	Community Transit	Snohomish to Seattle	Snohomish P&R, Monroe P&R, Totem Lake Freeway Station, Montlake Freeway Station, Downtown Seattle	Use	Weekday	Peak	2 Runs
CT 435	Community Transit	Mill Creek to Seattle	Downtown Seattle, Canyon Park, Mill Creek	Use	Weekday	Peak	20 minutes

Route	Provider	Route Name	Service Area	I-405 Influence	Service	Type	Frequency
Swift Green Line	Community Transit	Canyon Park P&R to Seaway Transit Center	Bothell, Mill Creek, Everett	End at	All Days	Daily	10 minutes
ST 522	Sound Transit	Woodinville - Seattle	Woodinville P&R, UW Bothell/Cascadia College, Kenmore P&R, Royal Brougham Way	Use	Weekday	Peak	10 minutes
ST 532	Sound Transit	Everett - Bellevue	Downtown Bellevue, Kingsgate, Canyon Park, South Everett	Use	Weekday	Peak	10 minutes
ST 535	Sound Transit	Lynnwood - Bellevue	Downtown Bellevue, Kingsgate, UW Bothell, Canyon Park, Lynnwood P&R	Use	Weekday and Saturday	Daily	30 minutes

CT = Community Transit; KCM = King County Metro; P&R = park and ride; ST = Sound Transit; UW = University of Washington

ATTACHMENT H THREE-HOUR VEHICLE AND PERSON THROUGHPUT

I-405/SR 525 3-Hour Average AM Peak Vehicle Throughput

Scenario	Locations	3 Hour -7AM to 10AM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	ETL	GP	ETL	SB	NB	Both
Existing	116th to 124th	4,040	3,160	3,550	470	7,200	4,020	11,220
	124th to 160th	4,660	2,710	3,990	250	7,380	4,240	11,610
	160th to SR 522	5,160	1,460	4,310	250	6,620	4,550	11,180
	SR 522 to 195th	2,540	1,390	3,590	260	3,940	3,850	7,790
	195th to SR 527	2,390	1,310	3,140	220	3,710	3,360	7,070
	SR 527 to I-5	2,790	1,050	2,960	230	3,830	3,190	7,020
	Inside I-5	1,250	NA	1,690	NA	1,250	1,690	2,930
2025 No Build	116th to 124th	4,250	3,320	3,690	640	7,570	4,330	11,900
	124th to 160th	4,180	2,960	4,180	290	7,140	4,470	11,610
	160th to SR 522	5,360	1,490	4,430	290	6,850	4,720	11,570
	SR 522 to 195th	2,630	1,490	3,900	290	4,120	4,190	8,310
	195th to SR 527	2,430	1,490	3,510	250	3,920	3,760	7,680
	SR 527 to I-5	3,330	770	3,240	280	4,100	3,520	7,620
	Inside I-5	1,390	NA	2,050	N/A	1,390	2,050	3,440
2025 Build	116th to 124th	4,790	3,330	3,670	610	8,120	4,280	12,400
	124th to 160th	5,310	2,450	3,980	490	7,760	4,470	12,230
	160th to SR 522	5,110	2,450	4,280	450	7,560	4,730	12,290
	SR 522 to 195th	2,960	1,770	4,000	390	4,730	4,390	9,120
	195th to SR 527	2,780	1,770	3,560	390	4,550	3,950	8,500
	SR 527 to I-5	3,570	840	3,360	300	4,410	3,660	8,070
	Inside I-5	1,440	NA	2,150	NA	1,140	2,150	3,590
2045 No Build	116th to 124th	4,320	3,200	3,930	760	7,520	4,690	12,210

Scenario	Locations	3 Hour - 7AM to 10AM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	ETL	GP	ETL	SB	NB	Both
2045 No Build	124th to 160th	4,230	2,830	4,510	420	7,060	4,930	11,990
	160th to SR 522	5,350	1,310	4,840	420	6,660	5,260	11,920
	SR 522 to 195th	2,600	1,300	4,240	420	3,900	4,660	8,560
	195th to SR 527	2,330	1,310	3,780	430	3,640	4,210	7,850
	SR 527 to I-5	2,800	770	3,440	500	3,570	3,940	7,510
	Inside I-5	1,380	NA	2,320	NA	1,380	2,320	3,700
2045 Build	116th to 124th	4,910	3,410	3,820	780	8,320	4,600	12,920
	124th to 160th	5,580	2,550	4,120	770	8,130	4,890	13,020
	160th to SR 522	5,280	2,550	4,480	730	7,830	5,210	13,040
	SR 522 to 195th	3,030	1,780	4,210	530	4,810	4,740	9,550
	195th to SR 527	2,900	1,770	3,750	540	4,670	4,290	8,960
	SR 527 to I-5	3,670	890	3,470	480	4,560	3,950	8,510
	Inside I-5	1,530	NA	2,330	NA	1,530	2,330	3,860

NA = Not Applicable

I-5 3-Hour Average AM Peak Vehicle Throughput

Scenario	Locations	3 Hour - 7AM to 10AM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	HOV	GP	HOV	SB	NB	Both
Existing	South of I-405	3,430	1,070	4,980	240	4,490	5,220	9,710
	Inside I-405	2,510	820	3,260	240	3,340	3,500	6,840
	North of I-405	5,980	760	4,920	290	6,740	5,210	11,950
2025 No Build	South of I-405	4,330	910	5,490	270	5,240	5,760	11,000
	Inside I-405	3,060	980	3,450	340	4,040	3,790	7,830
	North of I-405	6,190	780	5,030	240	6,970	5,270	12,240
2025 Build	South of I-405	4,350	910	5,560	270	5,260	5,830	11,090
	Inside I-405	3,050	990	3,460	340	4,040	3,800	7,840
	North of I-405	6,370	790	5,070	240	7,160	5,310	12,470
2045 No Build	South of I-405	3,850	820	4,830	380	4,670	5,210	9,880
	Inside I-405	2,570	890	2,980	410	3,460	3,390	6,850
	North of I-405	5,030	970	4,730	270	6,000	5,000	11,000
2045 Build	South of I-405	4,680	1,030	6,060	290	5,710	6,350	12,060
	Inside I-405	3,210	1,180	3,770	380	4,390	4,150	8,540
	North of I-405	6,730	860	5,500	270	7,590	5,770	13,360

I-405/SR 525 3-Hour Average PM Peak Vehicle Throughput

Scenario	Locations	3 Hour - 4PM to 7PM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	ETL	GP	ETL	SB	NB	Both
Existing	116th to 124th	3,570	1,020	4,430	2,730	4,590	7,160	11,750
	124th to 160th	4,020	970	6,000	1,450	4,990	7,450	12,440
	160th to SR 522	4,550	660	6,170	1,420	5,210	7,590	12,800
	SR 522 to 195th	3,410	650	4,380	1,460	4,070	5,830	9,900
	195th to SR 527	3,260	660	4,420	1,220	3,920	5,630	9,560
	SR 527 to I-5	3,260	520	3,700	1,600	3,780	5,290	9,070
	Inside I-5	1,330	NA	3,380	NA	1,330	3,380	4,710
2025 No Build	116th to 124th	3,620	1,650	3,580	3,170	5,270	6,750	12,020
	124th to 160th	3,910	1,410	5,300	1,450	5,320	6,750	12,070
	160th to SR 522	4,920	940	5,120	1,450	5,860	6,570	12,430
	SR 522 to 195th	3,830	930	3,870	1,460	4,760	5,330	10,090
	195th to SR 527	3,530	930	3,950	1,290	4,460	5,240	9,700
	SR 527 to I-5	3,420	740	3,190	1,510	4,160	4,700	8,860
	Inside I-5	1,490	NA	3,000	NA	1,490	3,000	4,490
2025 Build	116th to 124th	3,700	1,570	4,340	3,470	5,270	7,810	13,080
	124th to 160th	4,140	1,200	5,060	2,950	5,340	8,010	13,350
	160th to SR 522	4,690	1,190	4,970	2,800	5,880	7,770	13,650
	SR 522 to 195th	3,860	970	3,850	2,190	4,830	6,040	10,870
	195th to SR 527	3,550	960	4,100	1,840	4,510	5,940	10,450
	SR 527 to I-5	3,400	760	3,520	1,610	4,160	5,130	9,290
	Inside I-5	1,510	NA	3,210	NA	1,510	3,210	4,720
2045 No Build	116th to 124th	3,520	1,940	3,770	3,180	5,460	6,950	12,410
	124th to 160th	3,940	1,680	5,430	1,560	5,620	6,990	12,610

Scenario	Locations	3 Hour - 4PM to 7PM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	ETL	GP	ETL	SB	NB	Both
2045 No Build	160th to SR 522	5,140	1,060	5,090	1,560	6,200	6,650	12,850
	SR 522 to 195th	4,090	1,060	3,920	1,560	5,150	5,480	10,630
	195th to SR 527	3,770	1,050	4,070	1,330	4,820	5,400	10,220
	SR 527 to I-5	3,520	940	3,230	1,570	4,460	4,800	9,260
	Inside I-5	1,720	NA	3,000	NA	1,720	3,000	4,720
2045 Build	116th to 124th	3,580	1,890	4,410	3,640	5,470	8,050	13,520
	124th to 160th	4,200	1,400	5,250	3,080	5,600	8,330	13,930
	160th to SR 522	4,760	1,400	5,030	2,940	6,160	7,970	14,130
	SR 522 to 195th	3,960	1,170	3,970	2,290	5,130	6,260	11,390
	195th to SR 527	3,640	1,170	4,220	1,940	4,810	6,160	10,970
	SR 527 to I-5	3,520	890	3,560	1,650	4,410	5,210	9,620
	Inside I-5	1,710	NA	3,220	NA	1,710	3,220	4,930

NA = Not Applicable

I-5 3-Hour Average PM Peak Vehicle Throughput

Scenario	Locations	3 Hour - 4PM to 7PM – Vehicle Throughput (vehicles/hour)						
		Southbound		Northbound		Total		
		GP	HOV	GP	HOV	SB	NB	Both
Existing	South of I-405	3,430	1,070	4,980	240	4,490	5,220	9,710
	Inside I-405	2,510	820	3,260	240	3,340	3,500	6,840
	North of I-405	5,980	760	4,920	290	6,740	5,210	11,950
2025 No Build	South of I-405	4,330	910	5,490	270	5,240	5,760	11,000
	Inside I-405	3,060	980	3,450	340	4,040	3,790	7,830
	North of I-405	6,190	780	5,030	240	6,970	5,270	12,240
2025 Build	South of I-405	4,350	910	5,560	270	5,260	5,830	11,090
	Inside I-405	3,050	990	3,460	340	4,040	3,800	7,840
	North of I-405	6,370	790	5,070	240	7,160	5,310	12,470
2045 No Build	South of I-405	3,850	820	4,830	380	4,670	5,210	9,880
	Inside I-405	2,570	890	2,980	410	3,460	3,390	6,850
	North of I-405	5,030	970	4,730	270	6,000	5,000	11,000
2045 Build	South of I-405	4,680	1,030	6,060	290	5,710	6,350	12,060
	Inside I-405	3,210	1,180	3,770	380	4,390	4,150	8,540
	North of I-405	6,730	860	5,500	270	7,590	5,770	13,360

I-405 Southbound AM Peak 3-Hour Average - Person Throughput

Locations	2018 Existing	2025 No Build	2025 Build	2045 No Build	2045 Build
Inside I-405/I-5 Interchange	1,492	1,665	1,725	1,653	1,833
North of SR 527	5,017	5,267	5,671	4,632	5,873
North of NE 195th St	4,970	5,383	6,267	4,965	6,411
North of SR 522	5,282	5,623	6,483	5,272	6,583
North of NE 160th St	8,527	8,894	10,186	8,583	10,556
North of NE 124th St	9,934	9,918	10,426	9,762	10,915
North of NE 116th St	9,903	10,599	11,263	10,484	11,539

I-405 Northbound AM Peak 3-Hour Average - Person Throughput

Locations	2018 Existing	2025 No Build	2025 Build	2045 No Build	2045 Build
North of NE 116th St	5,012	5,483	5,409	5,969	5,871
North of NE 124th St	5,179	5,489	5,581	6,100	6,214
North of NE 160th St	5,556	5,789	5,874	6,496	6,579
North of SR 522	4,714	5,154	5,439	5,777	5,923
North of SE 195th St	4,118	4,620	4,912	5,242	5,389
North of SR 527	3,909	4,346	4,523	4,951	4,954
Inside I-405/I-5 Interchange	2,019	2,456	2,576	2,780	2,792

I-405 Southbound PM Peak 3-Hour Average - Person Throughput

Locations	2018 Existing	2025 No Build	2025 Build	2045 No Build	2045 Build
Inside I-405/I-5 Interchange	2,129	1,863	1,888	2,151	2,138
North of SR 527	4,913	5,502	5,510	5,959	5,876
North of NE 195th St	5,139	5,955	6,029	6,453	6,490
North of SR 522	5,316	6,330	6,433	6,870	6,890
North of NE 160th St	6,750	7,709	7,836	8,183	8,271
North of NE 124th St	6,582	7,225	7,165	7,710	7,571
North of NE 116th St	6,104	7,260	7,227	7,615	7,608

I-405 Northbound PM Peak 3-Hour Average - Person Throughput

Locations	2018 Existing	2025 No Build	2025 Build	2045 No Build	2045 Build
North of NE 116th St	9,922	9,728	11,176	9,982	11,545
North of NE 124th St	9,832	9,029	11,214	9,374	11,667
North of NE 160th St	9,994	8,804	10,853	8,949	11,160
North of SR 522	7,812	7,258	8,442	7,486	8,758
North of SE 195th St	7,477	7,076	8,175	7,292	8,491
North of SR 527	7,190	6,490	7,069	6,640	7,185
Inside I-405/I-5 Interchange	4,230	3,751	4,014	3,751	4,026