

Appendix F
Transportation Discipline Report

S. Holgate Street to S. King Street
Viaduct Replacement Project
Environmental Assessment

SR 99: ALASKAN WAY VIADUCT & SEAWALL REPLACEMENT PROGRAM

Transportation Discipline Report S. Holgate Street to S. King Street Viaduct Replacement Project ENVIRONMENTAL ASSESSMENT AGREEMENT NO. Y-7888

Submitted to:

Washington State Department of Transportation

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The SR 99: Alaskan Way Viaduct & Seawall Replacement Program is a joint effort between the Washington State Department of Transportation (WSDOT), the City of Seattle, and the Federal Highway Administration (FHWA). To conduct this project, WSDOT contracted with:

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ACRONYMS

AWV	Alaskan Way Viaduct
AWVSRP	Alaskan Way Viaduct and Seawall Replacement Program
BINMIC	Ballard Interbay Northend Manufacturing and Industrial Center
BRT	bus rapid transit
CBD	central business district
CCTV	closed-circuit television
City	City of Seattle
DMS	Dynamic Message Sign
EA	Environmental Assessment
EB	eastbound
EIS	Environmental Impact Statement
EMAT	Enhancements and Mitigation Advisory Team
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HCT	high-capacity transit
HOV	high-occupancy vehicle
I-5	Interstate 5
ITS	Intelligent Transportation Systems
LOS	level of service
mph	miles per hour
MTP	Metropolitan Transportation Plan
MVMT	million vehicle miles of travel
NB	northbound
Project	SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project
PSRC	Puget Sound Regional Council
SB	southbound
SDOT	Seattle Department of Transportation
SIG	Seattle International Gateway
SODO	South of Downtown
SR	State Route
T-46	Terminal 46
TMP	Traffic Management Plan
UPRR	Union Pacific Railroad
WB	westbound
WOSCA	Washington-Oregon Shippers Cooperative Association
WSDOT	Washington State Department of Transportation

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Chapter 1 INTRODUCTION

State Route (SR) 99 is an important highway facility that serves both local and regional travel demands in the central Puget Sound region. SR 99 passes through downtown Seattle as the Alaskan Way Viaduct (AWV), an elevated double-level structure adjacent to the waterfront.

The Alaskan Way Viaduct and Seawall Replacement Program (AWVSRP) was initiated by the Federal Highway Administration (FHWA), Washington State Department of Transportation (WSDOT), and the City of Seattle (City). This program is composed of the Moving Forward projects, which include column safety, electrical lines relocation, north-end viaduct improvements, south-end viaduct replacement, and transit enhancements. The Moving Forward projects will repair or replace about half of the seismically vulnerable viaduct.

The south end of the viaduct, which accounts for about 40 percent of the entire structure, is included in the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project (the Project). This Transportation Discipline Report is an appendix to the Environmental Assessment (EA) for the Project. The report describes transportation conditions associated with the SR 99 corridor through the project area. It also forecasts transportation performance and the effects of replacing the Alaskan Way Viaduct from S. Holgate Street to S. King Street.

1.1 Overview

This report includes the following chapters:

- Chapter 2, *Methodology*: describes the methods used to assess the Project in this report.
- Chapter 3, *Studies and Coordination*: describes agency participation in refining the Project.
- Chapter 4, *Affected Environment*: discusses current transportation conditions.
- Chapter 5, *Operational Effects and Benefits*: describes projected traffic and transportation conditions for the Project under forecasted year 2030 conditions. This chapter also discusses conditions for the year of opening, which is currently assumed to be 2013 (Section 5.4).
- Chapter 6, *Transportation Conditions During Construction*: reviews the construction plan and anticipated effects for the Build Alternative.
- Chapter 7, *Indirect and Cumulative Effects*: describes the indirect and cumulative effects during construction and after construction is complete.

- Chapter 8, *References*: lists references consulted in preparing this report.

1.2 Study Area

The study area for this report encompasses the project limits on SR 99, and nearby transportation facilities that are closely related to or affected by the SR 99 corridor. The study area is roughly bordered by Fourth Avenue S. to the east, the Duwamish River and Elliott Bay to the west, S. King Street to the north, and S. Spokane Street to the south.

1.3 Alternatives Studied

The Project involves demolishing and replacing the SR 99 mainline from S. Holgate Street to the vicinity of S. King Street, with additional improvements from S. Walker to S. Holgate Streets. The Project would also provide grade-separated access for freight and general purpose traffic traveling between SR 519 (S. Royal Brougham Way and S. Atlantic Street), First Avenue S. and E. Marginal Way S., the BNSF railyard, and the Port of Seattle. These east-west movements would be provided via a U-shaped, lowered roadway (undercrossing) that extends from the intersection of S. Atlantic Street and Colorado Avenue S. to the intersection of S. Atlantic Street and E. Marginal Way S. The undercrossing would improve vehicle access by providing a travel route for east-west traffic when railroad cars on the tail track block the at-grade roadway. At-grade crossing of the tail track would continue to be provided via S. Atlantic Street and used when railroad cars are not occupying the tail track.

The EA describes the configuration of the Build Alternative in detail and provides illustrative figures.

1.3.1 No Build Alternative

The No Build Alternative assumes continued operation and maintenance of the existing viaduct structure.

This report analyzes traffic and transportation conditions for continued operation of the current viaduct. The No Build Alternative is referred to in this report as the 2030 Baseline Scenario. Although this scenario is useful for assessing the Build Alternative's performance and effects relative to the facility in place today, it should be recognized that the current facility is reaching the end of its service life. The current facility is unlikely to remain in satisfactory condition for long-term use and is at risk of catastrophic failure in an earthquake.

1.3.2 Build Alternative

The Build Alternative would replace the viaduct from S. Holgate Street to S. King Street. The SR 99 improvements would begin at S. Walker Street as an at-grade side-by-side roadway with three lanes traveling in each direction. SR 99 would transition to an aerial side-by-side roadway crossing over S. Atlantic Street and the tail track, and would continue to S. Royal Brougham Way, then transition to an at-grade roadway. North of S. Royal Brougham Way, SR 99 would be a side-by-side at-grade roadway for approximately 1,800 feet, and would then transition to a stacked aerial structure connecting with the existing stacked viaduct at about S. King Street.

A new northbound (NB) off-ramp and southbound (SB) on-ramp would be provided south of S. King Street. The existing NB on-ramp and SB off-ramp at First Avenue S. near Railroad Way S. would be maintained.

New roadways and connections would be provided near S. Atlantic Street. These connections include:

- Grade-separated access for freight and general purpose traffic traveling between the BNSF railyard, SR 519, and the Port of Seattle. This new access would be provided via a U-shaped undercrossing, a lowered roadway extending from the intersection of S. Atlantic Street and Colorado Avenue S. to the intersection of S. Atlantic Street and E. Marginal Way S. This facility would improve vehicle access by providing a route for east-west traffic when railroad cars on the tail track block the at-grade roadway.
- NB and SB frontage roads to connect S. Atlantic Street and S. Royal Brougham Way to Alaskan Way S. NB Alaskan Way S. would also provide access to the remote holding area for the Seattle Ferry Terminal. S. Royal Brougham Way would no longer provide the direct, at-grade east-west connection between First Avenue S. and Alaskan Way S. that it does today.
- Improvements to Colorado Avenue S. to enhance access to the new North Seattle International Gateway (SIG) Railyard.

Pedestrian and bicycle access would be maintained and improved where feasible. From S. Holgate Street to S. Atlantic Street, a bike lane would be added in the SB direction, resulting in bike lanes in both the SB and NB directions. Sidewalk improvements would be made west of the E. Marginal Way S. roadway, starting at S. Holgate Street.

Between S. Atlantic Street and S. King Street, bicycle and pedestrian facilities would be provided to the west and east of SR 99. At about S. King Street, the sidewalks and bike lanes would connect with the existing sidewalk on the

west side of Alaskan Way S. and the existing bike/pedestrian path on the east side of Alaskan Way S.

The tail track would be relocated west of the new SR 99 roadway and would extend north from the railyard to the vicinity of S. King Street.

A remote holding area for the Seattle Ferry Terminal would be added between S. Royal Brougham Way and S. King Street along the east side of the corridor.

1.4 Summary of Findings

This report's key findings are summarized here for transportation conditions during the Project's operation and construction.

1.4.1 Operations

After project completion, the following conditions are expected:

- Travel patterns on SR 99 and its ramps would be affected by the Project due to the addition of new access ramps south of S. King Street. Vehicles using these new ramps would be drawn from other ramps in the SR 99 corridor, in particular the Seneca Street/Columbia Street ramps. Some vehicles that currently use the surface street network south of S. King Street (E. Marginal Way S., First Avenue S.) may also switch to SR 99 due to the new access. However, these additional trips are not expected to substantially affect traffic flow along SR 99 south of the new ramps, and operations on SR 99 north of S. King Street may improve somewhat due to redistribution of traffic to the new ramps.
- Project elements would change travel patterns and operating conditions in the study area. The S. King Street/Alaskan Way S. and First Avenue S./S. Royal Brougham Way intersections are locations expected to particularly benefit from improved traffic operations as a result of the Project.
- While travel patterns would change to some degree, the Project elements are not expected to substantially affect traffic conditions at the First Avenue S. and S. Atlantic Street intersection, which is expected to experience similar conditions (level of service (LOS) E during the PM peak) under the 2030 Baseline conditions as with the Project.
- Changes in surface street operations are not expected to affect SR 99 or ramp traffic conditions.
- The Project would provide a new, grade-separated connection under the BNSF tail track. This undercrossing would provide for continuous access across the tracks, which is not possible today or under the

future baseline conditions. The new undercrossing would result in a complex set of intersections at the convergence of E. Marginal Way S., Terminal 46 (T-46), Alaskan Way S., Colorado Avenue S., and S. Atlantic Street. Especially long traffic signal cycle lengths would be needed to accommodate all movements at this location. As a result, average vehicle delays at this location are expected to be relatively high. However, overall conditions are expected to improve relative to the baseline conditions given the uninterrupted availability of access across the tail track.

- The Project would improve SR 99's connectivity to the waterfront and local street grid south of the downtown area by providing new access from NB SR 99 and to SB SR 99.
- Transit travel times are expected to remain the same or to improve for currently routed service. The S. King Street ramps would also offer opportunities to expand transit coverage in the south downtown area for routes using SR 99. If King County Metro Transit chooses to use the S. King Street ramps, some form of transit priority treatment would facilitate transit operations between the ramps and S. Main Street. While this Project does not include the installation of transit priority treatments in this area, it does not preclude their future installation as part of another project.
- With the addition of the new S. King Street ramps, the Project would improve freight connections between SR 99 and the waterfront and the stadium area. With the addition of the U-shaped undercrossing, the Project would also provide more reliable connections for freight traffic traveling between T-46, SR 519/I-90/I-5, and the North SIG Railyard.
- During peak periods, light to moderate congestion (LOS D or better) is expected along Alaskan Way S. between the remote holding area and the Seattle Ferry Terminal.
- The Project would eliminate approximately 1,267 parking spaces. Of these, about 29 are on-street short-term parking spaces and 418 are on-street long-term spaces. About 820 of the affected spaces are off-street spaces. Because parking lots are generally underutilized in the stadium area, parking spaces are not anticipated to be difficult to find during average non-game days. Currently, on the average weekday, about 4,100 off-street parking spaces within a quarter mile of the project area are unused. During events at the stadiums, finding available parking may be more challenging or may cost more than under current conditions. Refer to Exhibit 5-16 for a summary of parking effects.

- The Build Alternative is expected to improve safety due to increased shoulder widths on SR 99 and improved design standards.
- The addition of bike lanes has the potential to reduce vehicle/bicycle conflicts. Improvement of pedestrian facilities on surface streets is expected to reduce vehicle/pedestrian conflicts.
- The Project's long-term cumulative effects on transportation would be limited.

1.4.2 Construction

Given the dynamic nature of construction activities, transportation effects would vary depending on the construction stage. Refer to Chapter 6 for more detail on transportation conditions during construction. Generally, the most severe travel effects would occur during Traffic Stage 3, when SR 99 capacity would be reduced to the greatest extent and construction activities would continue to affect nearby surface roadways:

- Traffic Stage 3 traffic estimates developed for the AM and PM peak hours generally reflected a 30 to 35 percent reduction in normal base year traffic on SR 99.
- Traffic simulation indicates that detour of SR 99 during Traffic Stage 3 can operate reasonably and accommodate most of the projected demand (roughly 65 to 70 percent of normal peak traffic) during both the AM and PM peak hours. Speeds through the detour itself would be in the 8 to 20 miles per hour (mph) range.
- During Traffic Stage 3, the Alaskan Way S./S. Atlantic Street/Colorado Avenue S. intersection is projected to operate at LOS F conditions during the AM peak hour. Resulting congestion would form along SB Alaskan Way S., NB E. Marginal Way S., and NB Colorado Avenue S. The neighboring T-46 intersection would operate at LOS D during the AM peak hour. These intersections would operate somewhat better during the PM peak hour (LOS E and D), and resulting congestion would be lighter.
- Traffic simulation analysis shows stable flow along First Avenue S. during Traffic Stage 3. All intersections along First Avenue S. in the study area are forecasted to operate at LOS D or better, except for First Avenue S./S. Royal Brougham Way (LOS E during the PM peak hour) and First Avenue S./S. Main Street (LOS F during the PM peak hour).
- During the PM peak hour, SB Fourth Avenue S. would be heavily congested north of S. Royal Brougham Way.

- Construction activities would result in disruptions to several streets within the study area, most notably S. Royal Brougham Way, S. Atlantic Street, Alaskan Way S., and E. Marginal Way S.
- Buses using SR 99, which primarily travel between West Seattle and downtown, would experience longer travel times. Although transit access routes would be maintained and SR 99 would remain open, as would all ramps used by buses, King County Metro may decide to make some routing changes to help lessen the expected travel time effects.
- Traffic Stage 1 of construction would experience the largest number of parking space removals. About 569 on-street spaces and 1,064 off-street spaces would be affected. Although this would be a loss of parking compared to today's conditions, ample parking availability is expected in pay lots near the stadiums on average non-event days. During events at the stadiums, finding available parking may be more difficult or may cost more than under current conditions.
- The SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements (described in Section 6.3) are progressing. These enhancements and improvements are independent projects that benefit all pending improvements under the AWVSRP. Their goal is to provide investment funding to develop and deliver projects and strategies within areas potentially affected by construction of the Moving Forward projects. This would help overall travel mobility and keep the system moving during construction.

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Chapter 2 METHODOLOGY

This chapter summarizes the overall study approach and the techniques and tools used to accomplish the following tasks for the Project:

- Develop transportation data.
- Perform operational effect analysis of existing and future traffic conditions.
- Assess multimodal transportation system performance.

2.1 Study Approach

The transportation study followed a conventional corridor-level planning analysis approach that built on previous work completed as part of the AWVSRP, formerly known as the AWV Project. Previously completed work included the 2004 Draft Environmental Impact Statement (EIS), 2006 Supplemental Draft EIS, and preliminary work on the Final EIS. Section 2.2 includes more detail on how previous work was used for each element covered in this report. This study's data collection, investigation of existing traffic and transportation system conditions, and assessment of projected future conditions all used previous work as appropriate to maximize previous coordination and work efforts. The roles and performance of general purpose traffic, transit, freight, and nonmotorized traffic were evaluated.

Chapter 4, *Affected Environment* summarizes existing transportation conditions for SR 99 and other nearby or related transportation facilities. This assessment describes current transportation system components, computes existing operating conditions, and evaluates a number of transportation-related measures to compare effects and benefits. These measures assess performance in a variety of ways and are grouped by focus (mobility, accessibility, and safety). Traffic data supporting these measures are also organized by focus area. The focus areas are described in detail in Section 2.5.

To gauge longer-term functionality and performance for the SR 99 corridor and other affected transportation system components, projected year 2030 roadway conditions were estimated. A 2030 Baseline Scenario (also referred to as the No Build Alternative) was developed to represent the current SR 99 configuration under forecasted 2030 traffic conditions. The No Build Alternative assumes continued operation of the existing viaduct with continued maintenance. This alternative serves as a future basis against which the Build Alternative can be compared. The same performance measures evaluated for existing conditions were again assessed for the 2030 Baseline Scenario.

The Build Alternative was analyzed in the same manner, to determine estimated traffic patterns and system performance under 2030 conditions. This analysis is included Chapter 5, *Operational Effects and Benefits*.

2.2 Data Collection

This section summarizes data collection activities. Unless otherwise noted, data were collected as part of previous work for the AWVSRP and are being used as applicable in this study.

2.2.1 Current Traffic Volumes and Related Traffic Data

Mainline SR 99 Traffic Counts

Existing traffic volumes were previously collected for SR 99, Interstate 5 (I-5), and arterial streets within the study area. Daily and hourly volume estimates for SR 99 ramps and segments are based on traffic counts conducted annually over a one-week period by the City of Seattle during 2004 through 2006. The data were analyzed for consistency, and then balanced to formulate the final 2005 traffic estimates used for the AM and PM peak-hour analysis.

Intersection and Arterial Traffic Counts

AM and PM peak-hour turning movement counts were previously collected for most traffic signal-controlled intersections within the study area. Traffic volumes at intersections for which counts were not available were estimated based on counts at adjacent intersections. Most counts were conducted between 2003 and 2005. These data were supplemented by 24-hour traffic counts conducted by the City of Seattle during 2004 through 2006. The data were analyzed for consistency, and then balanced to formulate the final 2005 traffic estimates used for the AM and PM peak-hour analysis.

Quality control was performed on all turning movement counts by comparing volumes to adjacent intersection count volumes. They were also compared to mid-block arterial counts, where available, to help identify invalid counts. Intersections with unusual counts that could not be otherwise explained were recounted or adjusted based on adjacent intersection data.

For each intersection, the following data were collected:

- Peak-period (AM and PM) turning movement volumes.
- Peak-period heavy vehicle volumes (for full-size buses and heavy commercial trucks only).
- Peak-period pedestrian crossing volumes.
- Peak-period signal timing data, including cycle lengths and phasing information.
- Intersection sketches (intersection geometry).
- Field notes (anything unusual that occurs during the count, such as emergency vehicles, collisions, or nearby construction).

HOV Volumes

High-occupancy vehicle (HOV) volumes were not specifically collected. This is because the SR 99 corridor does not presently contain any HOV facilities within the study area, and the Project does not propose to add HOV facilities.

Nonmotorized Transportation

Pedestrian and bicycle volumes at intersections were collected with the arterial turning movement counts described previously. Supplemental bicycle-related information was collected from the *Seattle Bicycle Master Plan* (City of Seattle 2007a) and the City's "Seattle Bicycling Guide Map" (City of Seattle 2008a).

Trucks

Heavy-vehicle volumes were collected during the arterial turning movement counts described previously. These data were supplemented by video surveys of freight traffic on SR 99 conducted in June 2006. Additional information on heavy trucks' use of the SR 99 corridor is summarized in the project memorandum *Updated SR 99 Truck Volumes* (Parsons Brinckerhoff 2006). It is important to note that following the Nisqually earthquake of February 2001, weight restrictions were established to restrict vehicles weighing over 10,000 pounds to use only the right-hand lane on each level of the viaduct. In addition, vehicles weighing more than 105,000 pounds are prohibited from using the viaduct. These restrictions remain in place today.

Rail

The project team worked with BNSF to understand current and future tail track usage at S. Atlantic Street.

Accidents

The City of Seattle and WSDOT provided SR 99 accident data for 2000 through 2003. Although several years old, these data remain consistent in providing an indication of the location, type, and severity of accidents on SR 99. In addition, the Seattle Department of Transportation (SDOT) provided lists of the high collision intersections for 2005, 2006, and 2007. High-collision intersections included signalized intersections with 10 or more collisions annually or non-signalized intersections with 5 or more collisions annually.

Parking

On-street parking in the Seattle central business district (CBD) and along the waterfront was counted in 2001, with additional counts in 2002 and 2003 and an updated count in 2006. Off-street parking data collected in 2005 by the Puget Sound Regional Council (PSRC) were also obtained. The City of Seattle

provided data on the number of commercial off-street parking spaces in the Pioneer Square and stadium areas. The off-street parking space data were supplemented with field observations in the spring of 2008.

2.2.2 Transit Service

Transit information related to service coverage, frequency, and travel times for buses that use SR 99 was identified through published schedules provided by King County Metro and Sound Transit. Transit ridership data were not specifically collected, although modeled transit ridership statistics from the travel demand model can be used to compare relative levels of transit.

2.2.3 Washington State Ferries Operations

Washington State Ferries operates a major vehicle and pedestrian ferry terminal along Alaskan Way S. between Marion Street and Yesler Way. Washington State Ferries staff provided data relating to current ferry vessel capacities, ferry operating schedules, Seattle Ferry Terminal vehicle holding capacity, and typical loading and unloading procedures. Information on street-level pedestrian activity and actual traffic counts in the area was collected, as previously described.

2.2.4 Roadway Configuration

The SR 99 alignment and geometric data necessary to conduct the traffic operations assessment (e.g., segment length, lanes by segment, lane width, grades, and shoulder width) were taken from mapping information generated for the AWVSRP. Arterial and local roadway configurations were collected during traffic counts and were supplemented by site visits as necessary to determine intersection configurations at study area intersections.

2.2.5 Traffic Speeds

The SR 99 traffic analysis models were calibrated based on observed travel speeds and areas of congestion. Posted speed limits on SR 99 were collected by field observation.

2.3 Traffic Volume Estimates and Forecasts

Existing traffic volumes for this study were compiled from the traffic data described in Section 2.2.1. Traffic forecasts for the year of opening (2013) and year 2030 conditions are based on growth projected by the AWV travel demand model, which is a modified version of PSRC's EMME/2 regional travel forecasting model. Procedures for developing specific volume estimates are summarized in the following subsections.

The AWV travel demand model has been updated since completion of the 2006 Supplemental Draft EIS. The updated model includes improvements in how the model reflects capacity constraints in the road network, reduced

sensitivity to parking cost assumptions, updated population and employment estimates, and verification of network components and their attributes.

The reduced sensitivity to parking costs results in more moderate projections of future transit ridership, which corrects an issue identified as a concern in the 2004 Draft EIS. The newly updated model has been used to provide a more detailed analysis of traffic projections for the Project and conditions during the construction period. Development of the model is detailed in the *Updated Travel Forecasting Model Validation Report for Base-Year (2000)* (Parsons Brinckerhoff 2005a).

The model base year (existing conditions) was also updated to reflect Year 2005 conditions. This effort is documented in the *Addendum to Updated Travel Forecasting Model Validation Report for Base Year (2005)* (PB 2007b).

2.3.1 Existing Conditions AM and PM Peak-Hour and Daily Traffic Estimates

Mainline SR 99 Traffic Volumes

Existing daily and hourly volume estimates for SR 99 ramps and segments are based on traffic counts that the City of Seattle conducted annually during a 1-week period from 2004 through 2006. The count volumes were adjusted to balance AM and PM peak-hour traffic volumes for all SR 99 ramp, side-street, and mainline locations within the study area. The AM peak hour was selected as 8:00 to 9:00 a.m. The PM peak hour was selected as 5:00 to 6:00 p.m. Review of the traffic volume data indicated that the peak traffic volumes for the SR 99 corridor and other study area facilities generally occur between 7:00 and 9:00 a.m. and 4:00 and 6:00 p.m.

AM and PM Peak-Hour Arterial Volumes

AM and PM peak-hour volume estimates are based on traffic counts for major intersections in the study area, using consistent morning and afternoon peak hours.

2.3.2 2030 Traffic Forecasting

Traffic Forecasting Model

A regional travel demand model was used for this study to support the assessment of future conditions. The AWV model is an enhanced version of the PSRC regional planning model, which operates in the EMME/2 software environment. The regional model reflects assumptions for regional population and employment growth, as defined in PSRC's adopted regional plan, *Destination 2030, the Metropolitan Transportation Plan for the Central Puget Sound Region* (PSRC 2001). The AWV model reflects the most recent PSRC population and employment forecasts, which include additional growth in the South Lake Union area.

Model development and validation is detailed in the *Updated Travel Forecasting Model Validation Report for Base Year (2000)* (Parsons Brinckerhoff 2005a).

The AWW travel demand model was used for the following purposes:

- To estimate changes from existing conditions in regional travel demand resulting from population and employment growth and planned transportation system improvements.
- To identify expected demand and traffic distributions for the Build Alternative.
- To develop peak-hour vehicle volumes for use in detailed operational analyses.

2030 Transportation System Components

The future-year scenarios (2030 Baseline and Build Alternative) presume a consistent set of baseline assumptions for 2030 conditions. These assumptions are reflected in the forecasting and analysis models. The 2030 Baseline transportation system consists of today's highway, street, and transit system components and a limited number of new facilities. Only transportation improvements that are currently identified in adopted regional plans and have a funding commitment toward implementation are included in the future baseline. Other planned or proposed (but unfunded) facilities are not included in the 2030 Baseline model.

The following new transportation system components are included in the 2030 Baseline:

- PSRC four-county EMM/2 assumptions
- Sound Transit Phase I System: Sounder Commuter Rail, Express Bus, and Link Light Rail between the University District and Seattle-Tacoma International (Sea-Tac) Airport
- Existing transit service and various agencies' Six-Year Plans
- Continuation of improvements put in place for Sound Transit Tunnel Conversion: Third Avenue transit exclusivity (Stewart Street to Yesler Way), Prefontaine Place S. reconfiguration, and the Fourth Avenue S. bus island north of S. Jackson Street
- King County Metro Transit Now service changes and bus rapid transit (BRT) corridors (called RapidRide)
- SR 519 Intermodal Access Project, Phase 2
- S. Lander Street Overcrossing
- Spokane Street Viaduct Phase 1: widening from SR 99 to First Avenue S.

- Spokane Street Viaduct Phase 3: Fourth Avenue S. Loop Ramp
- Parking cost increases, at a rate of 3 percent annually

2.3.3 2030 Baseline Scenario AM and PM Peak-Hour Traffic Estimates

AM and PM Peak-Hour Volumes on Mainline SR 99

AM and PM peak-hour traffic forecasts for the year 2030 were developed for the SR 99 mainline, ramps, and specified adjacent arterials by applying growth estimates to the existing-year traffic estimates. Growth estimates were derived from EMME/2 model results (primarily daily model results, but peak period results were also used).

To establish traffic volumes for the SR 99 mainline, 2005 and 2030 AWW models were compared to determine a net difference—or growth—in daily volumes between the two time periods, for both the ramp and mainline. Projected growth was added to existing traffic volume counts to estimate 2030 daily volumes. Growth estimates were adjusted as necessary to balance volumes, correct any evident assignment irregularities, and account for differences between observed and modeled existing volumes (calibration).

Daily volumes were translated to hourly volumes, based on the observed existing (2005) ratio of peak-hour volumes to daily traffic volumes for all ramp and segment locations. Further adjustments were made to account for peak spreading (leveling), although these adjustments were modest. Peak-period model forecasts were used to help guide this process.

2030 Peak-Hour Arterial and Local Street Forecasts

Growth rates were applied to existing arterial intersection turning movement counts to establish 2030 Baseline peak-hour volumes. These growth rates were based on an evaluation of sub-area and screenline growth forecasted by the AWW model. The 25-year rates (2005 to 2030) for the Stadium/Pioneer Square area ranged from 5 to 15 percent. Manual traffic volume adjustments were completed to balance volumes at arterial/ramp interface areas. Manual adjustments also accounted for completion of Phase 2 of the SR 519 Intermodal Access Project and for projected 2030 auto access to ferry services at the Seattle Ferry Terminal.

Localized traffic generators, projects, and assumed traffic control modifications were also accounted for in the traffic volume estimates. Specific traffic generators include the Home Plate Development and reorientation of T-46 truck traffic from the SIG Railyard to the North SIG Railyard. Specific traffic volumes and routings were included in the development of projected morning and evening peak-hour traffic volumes. Installation of a traffic signal at the First Avenue S./S. Massachusetts Street intersection was also assumed for future scenarios based on background traffic levels.

2.3.4 2030 Build Alternative Traffic Estimates

Forecasts for the 2030 Baseline established a basis from which traffic estimates for the Build Alternative could be derived. The 2030 Build Alternative forecasts were developed based on the net modeled differences between the Build Alternative and the 2030 Baseline Scenario. Growth estimates were adjusted as necessary to balance volumes, correct any evident assignment irregularities, and account for differences between observed and modeled existing volumes (calibration).

It is assumed that changes to the Alaskan Way Viaduct north of S. King Street will occur in the future. These future conditions may or may not be similar to existing conditions in terms of capacity and access. However, as these changes have not yet been determined, no change in capacity or access was assumed north of S. King Street for this study. This project is designed, however, to be able to accommodate any changes proposed along SR 99/Alaskan Way Viaduct north of S. King Street.

2.3.5 Year of Opening AM and PM Peak-Hour Traffic Forecasts

The year of opening represents traffic conditions at the end of project construction, shortly after the new facility opens. This includes surface street improvements associated with the Project. According to the current conceptual project construction schedule, the opening year is assumed to be 2013. Year-of-opening volumes were developed by interpolating between existing conditions and the 2030 Build Alternative estimates. As with the 2030 Build Alternative, manual adjustments were made to account for localized traffic generation and routings expected to take place prior to or within the year of opening timeframe.

2.4 Traffic Analysis

2.4.1 Traffic Simulation and Analysis Models

Mainline Traffic Operations

The traffic simulation model VISSIM was used to assess traffic operating conditions on the SR 99 mainline and ramps. VISSIM is a micro-simulation model that simulates traffic operations on highway and street facilities and reports measures such as speeds and traffic density. The model network was developed using existing and proposed configuration data for the project area (e.g., lanes, segment lengths, ramp location, and similar data).

Arterial and Local Street Traffic Operations

Traffic operations at selected intersections in the study area were analyzed using Synchro (version 7) software. Synchro is a computer program that is particularly well-suited to analyze intersection traffic operations. It also

allows the optimization of intersection traffic signal timings. In addition, traffic simulations using either SimTraffic (version 7) or VISSIM software were used to further assess the affects associated with train operations crossing S. Atlantic Street and S. Royal Brougham Way. These simulation packages indicate how train activity in the railroad crossing may affect traffic flow on nearby streets.

Selected intersections include ramp termini, new or revised intersections, and heavily congested intersections in the following areas:

- First Avenue S.
- S. Atlantic Street
- Alaskan Way S. and E. Marginal Way S.

These analyses are further described in Section 2.5.1.

2.5 Transportation Data and Performance Measures

Transportation data and performance measures were evaluated for existing conditions, the 2030 Baseline Scenario, and the Build Alternative. The data characterize the relative differences in performance between the Build Alternative and the 2030 Baseline and establish traffic effects that can be expected.

The performance measures address the important travel modes operating in the corridor, both currently and in the future. These include:

- Highway/roadway
- Transit
- Nonmotorized (pedestrian and bicycle)
- Freight (commercial vehicles)

Measures were also identified to evaluate how the Project would influence safety, affect parking, and potentially affect travel during construction. Performance measures are grouped by the three primary themes of the Project's purpose and need: mobility, accessibility, and safety.

2.5.1 Mobility

Measures of mobility include travel demand, traffic patterns, and AM and PM peak-hour traffic operations.

Travel Demand and Traffic Patterns

SR 99 Mainline and Ramp Volumes

Peak-period and daily traffic volumes were projected for existing conditions and the Build Alternative.

Traffic Operations

SR 99 Mainline Levels of Service and Density

SR 99 mainline performance is assessed using VISSIM traffic simulation software. AM and PM peak hour conditions were simulated for SR 99 corridor segments (including ramps and adjacent intersections) between S. Spokane Street and the Columbia/Seneca ramps in downtown Seattle. Average vehicle speeds and traffic density were extracted from the model. Densities were translated to LOS, as shown in Exhibit 2-1, based on thresholds documented in the 2000 HCM on page 21-3 (*Multilane Highway Methodology*) and page 23-3 (*Freeway Segment Methodology*).

Exhibit 2-1. Level of Service Designations for Freeways

LOS (Freeway Segment)	Density Range (pcpmpl)
A	0–11
B	> 11–18
C	> 18–26
D	> 26–35
E	> 35–45
F	> 45

Source: Transportation Research Board (2000), pages 21-3 and 23-3.
pcpmpl = passenger car equivalents per mile per lane

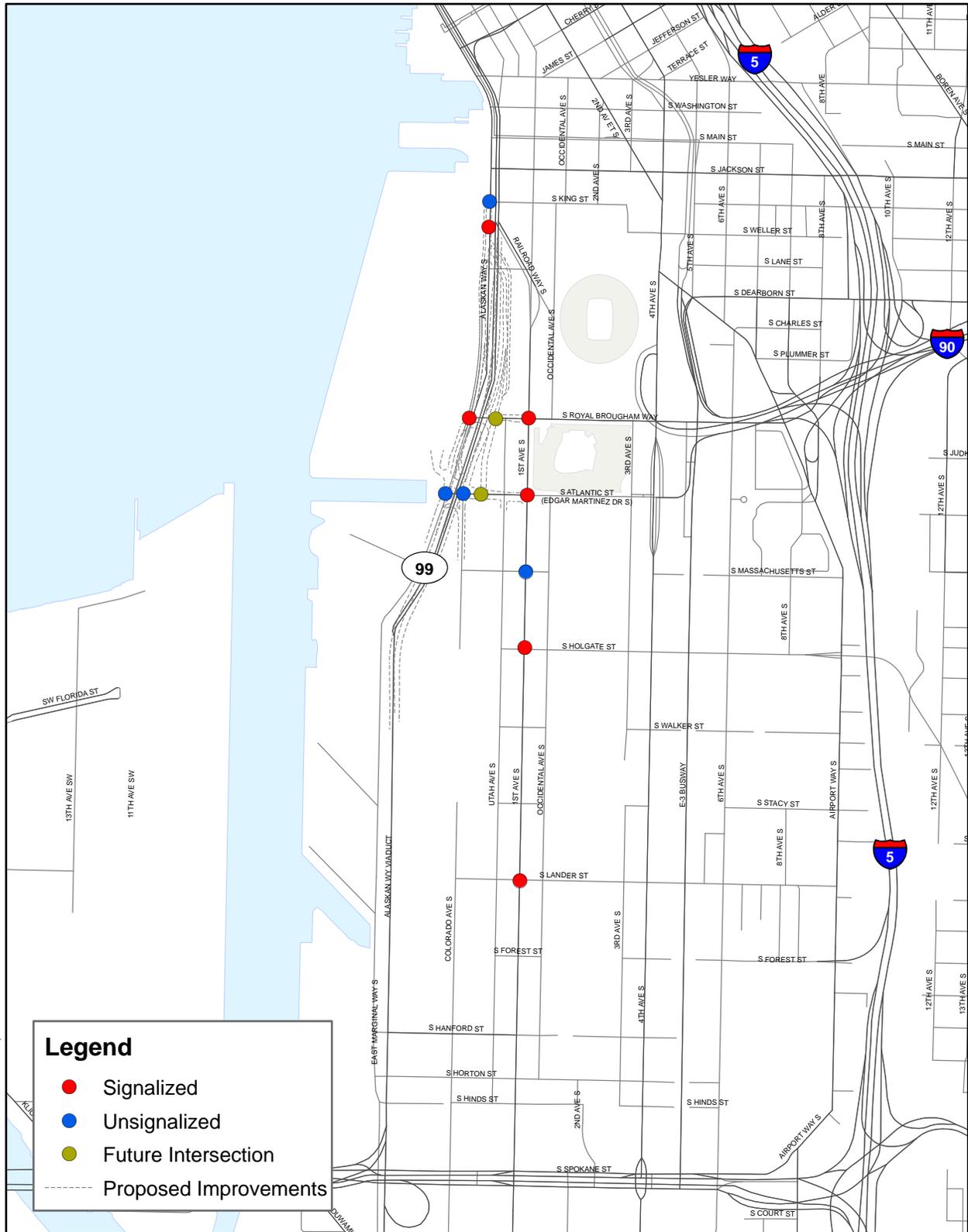
LOS is a measure that characterizes the operating conditions perceived by a driver or user of a highway, street, or other transportation facility. Although LOS is a qualitative measure, it is based on quantitative measures. In the case of limited access facilities, LOS is based on traffic density, expressed as passenger car equivalents per mile per lane. Six LOS designations (from A to F) are defined in the Transportation Research Board's 2000 Highway Capacity Manual (HCM) (Transportation Research Board 2000). LOS A represents ideal, uncongested operating conditions, and LOS F designates extremely congested breakdown conditions. LOS B through LOS D designate intermediate operating conditions, and LOS E denotes congested conditions at the point of maximum service rate.

Five simulations were conducted for each alternative, with the mean results reported for all five runs.

Arterial Intersection Performance

AM and PM peak-hour traffic operations on surface streets adjacent to or near SR 99 were assessed using Trafficware Corporation's Synchro traffic analysis software (Version 7). Intersection LOS and average vehicle delay are reported for key intersections within the study area. These intersections are shown in Exhibit 2-2. Four of these intersections are to be signalized in the future, either as

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0 1,000 2,000 Feet

Basemap Data Source: King County, 2005.

Exhibit 2-2 Intersections Studied

part of the Project or due to background traffic growth. One of the intersections listed does not currently exist but will be created by the Project.

LOS is reported based on the Synchro percentile delay method. This method differs somewhat from 2000 HCM methods, but reports LOS using the same average vehicle delay basis. The percentile delay method was selected because it better models actuated signal timings, coordinated signal timings, operational effects caused by queue backups from adjacent intersections, and highly congested conditions.

Intersection LOS is based on the average delay per vehicle, and is categorized as follows in Exhibit 2-3.

Estimating Effects Associated with Rail Crossings (BNSF Tail Track)

Intersection analysis methods, including those employed by Synchro, estimate delay caused by signalized intersections, but cannot specifically account for delay due to features such as railroad crossings. To estimate the effects associated with BNSF’s tail track from the SIG Railyard (which today crosses S. Atlantic Street and S. Royal Brougham Way east of Alaskan Way S.), a series of traffic simulation sensitivity tests were conducted. These tests replicated three potential levels of rail crossing activity:

- No train crossings occurring during the peak hour.
- One 10-minute crossing during the peak hour.
- Four 10-minute crossings (40-minute total blockage) during the peak hour.

Together, these tests help illustrate how the Baseline and Build Alternatives would be affected by various levels of train activity (see Chapter 5).

Exhibit 2-3. Level of Service Designations for Signalized Intersections

LOS (Signalized Intersection)	Average Vehicle Delay (seconds)
A	0–10
B	> 10–20
C	> 20–35
D	> 35–55
E	> 55–80
F	> 80

Source: Transportation Research Board Highway Capacity manual (2000)

2.5.2 Accessibility

Several measures evaluate the transportation system's performance in terms of connectivity, travel time, and effects to possible high-capacity transit (HCT) implementation in the study corridor.

Roadway Connectivity and Access

This measure consists of providing qualitative ratings for arterial connections to and from locations where SR 99 currently provides access to and from the stadium area.

The Build Alternative's connections were identified by movement (e.g., NB SR 99 to the stadium area) and evaluated qualitatively as providing "good access," "partial or substandard access," or "no access." These designations reflect the degree of connectivity provided (full access, partial access, or no access); the quality of connections (high-speed/capacity ramp connections, low-speed/capacity ramp connections, or arterial connections); and the type of connection provided (direct connection, short indirect connection, or longer indirect connection requiring extended arterial travel).

Transit Connectivity and Coverage

This measure assesses the SR 99 corridor's ability to provide for transit access between the SR 99 corridor and local areas within the study area. It addresses transit service's reliability and predictability. The transit connection assessment focuses on how the Project either maintains connections to and from downtown (currently provided at the Seneca and Columbia Street ramps to the south) or provides these connections in other ways.

Because a number of factors and assumptions not related to the SR 99 facility are involved in estimating actual transit travel times, this measure was assessed qualitatively. The effect of each alternative on transit travel times was evaluated by comparing the routing presumed in the study area and identifying potential changes to travel times for each route. The evaluation does consider the operational analysis performed for streets and highways in assessing how transit travel times in the study area might be affected. This measure focuses on transit routes that use the AWW corridor.

Freight Access

The freight measure evaluates the Project's effect on freight and goods movement. It includes a qualitative assessment of:

- The project design's ability to provide or improve on existing truck connections. This includes the ability to cross the corridor at SR 519 to reach I-90 and I-5. It also includes access to port facilities, Harbor Island, and the Ballard/Interbay area.

- The Project's effect on freight train operations or facilities.

Seattle Ferry Terminal Access

Effects to vehicle access and egress from the Seattle Ferry Terminal and remote holding area were assessed qualitatively as follows:

- For relevant traffic measures, to gauge the local transportation system's ability to accommodate vehicles entering and exiting the Seattle Ferry Terminal.
- An assessment of the ability to move ferry traffic from the remote holding area to the Seattle Ferry Terminal with minimal disruptions to other traffic. This is based on the operations analysis data presented with other measures.

Pedestrian and Bicycle Access

Effects to pedestrian and nonmotorized modes were assessed qualitatively in three ways:

- Accessibility to and the quality of pedestrian and bicycle facilities along Alaskan Way S. through the study area.
- Potential effects of ramp locations on pedestrians.
- The effect of changes in traffic volumes and distribution on pedestrians and bicycles.

Parking Effects

Potential parking effects were assessed for the area that would be directly affected by construction of the Build Alternative. These effects were determined by quantifying the potential effect to the number of parking spaces by type (e.g., long-term, on-street). The location and proximity to dependent uses was also qualitatively examined.

2.5.3 Safety

Safety measures involve identifying major design elements, including facility type, lane widths, geometric configuration, and potential vehicle and pedestrian conflict locations. The safety discussion also assesses how design features might affect existing high-accident locations or potentially introduce new or different safety issues.

As part of the AWVSRP, WSDOT provided collision data for SR 99 between S. Spokane Street and Aloha Street for the years 2001 to 2003. This collision data analysis was presented in the *SR 99 Collision Analysis* report (Parsons Brinckerhoff 2005b). Data relevant to this Project have been extracted. Data were analyzed for collisions on the mainline and on connecting ramps within

250 feet of the mainline. Several analyses were used to measure and assess collision characteristics:

- *Collision Rates:* To allow comparison of crash rates between corridor segments and to average rates on similar facilities, collisions per million vehicle-miles traveled (MVMT) were calculated for each corridor segment.
- *Collision Types:* The share of collisions for major crash types (e.g., fixed-object collisions, rear-end collisions) relative to total collisions, and collision rates by type (per MVMT) were reported. Comparing the proportion of accident types by segment can help identify possible contributing factors to collisions.
- *Collision Severity:* The share of injury collisions (per MVMT) relative to total collisions was reported.

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Chapter 3 STUDIES AND COORDINATION

This section summarizes the studies and adopted plans undertaken in the region that are relevant to the Project. It also summarizes coordination activities undertaken to guide development of the Project's traffic and transportation components, and describes mechanisms for evaluating transportation system performance in support of the Project's EA. Chapters 6 and 7 provide additional information on coordinating with other projects and coordination during construction.

3.1 Relevant Studies and Plans

3.1.1 City of Seattle Comprehensive Plan (2005)

The City of Seattle's Comprehensive Plan, *Toward a Sustainable Seattle*, articulates a vision of how Seattle will grow in ways that sustain its citizens' values. The City first adopted the Comprehensive Plan in 1994 in response to the state Growth Management Act of 1990.

Multimodal transportation policies discussed in the Comprehensive Plan were used to define the Project's system elements. In particular, transportation demand policies and system management strategies were used to guide development of the Project's mitigation plans.

3.1.2 City of Seattle Transportation Strategic Plan (2005)

The *Transportation Strategic Plan* describes SDOT's vision, goals, and policies for achieving the City's long-range objectives. It describes the actions, projects, and programs that SDOT will take to promote economic growth in Seattle and the region, support livable neighborhoods, improve the environment, and address the traveling public's complex demands. Information from this plan was used to help refine the Project's travel demand models.

3.1.3 City of Seattle Bicycle Master Plan (2007)

The *Seattle Bicycle Master Plan* is a planning document used to guide future improvements to Seattle's bicycle network. This master plan focuses on evaluating arterial streets to implement bike lanes and encourage more bicycling throughout the city of Seattle.

3.1.4 City of Seattle Center City Circulation Report (2003)

The City of Seattle conducted a study of transit and nonmotorized circulation and service options in the downtown area. This study is an effort to better integrate numerous independent transportation components and plans in the downtown area.

3.1.5 City of Seattle Center City Access Strategy (2007)

In preparation for construction and growth, including the AWVSRP, SDOT is planning, building, and monitoring the implementation of projects in the city center. This strategy involves creating a livable and walkable city center, integrating and simplifying the transit system, accommodating anticipated growth, maintaining access into downtown during major construction projects, and continuing mobility into the future.

3.1.6 City of Seattle Freight Mobility Strategic Action Plan (2005 Plan Update)

The *Freight Mobility Strategic Action Plan* presents a list of actions that SDOT will implement. These actions or tasks address administrative and functional actions that SDOT will carry out to benefit freight, in accordance with the Seattle Comprehensive Plan and the Seattle *Transportation Strategic Plan*. Actions include railroad grade separations, truck guide signing, street improvements, and ongoing communication with the Seattle freight community via the Seattle Freight Mobility Advisory Committee.

3.1.7 Seattle Intermediate Capacity Transit Study (2001)

The *Seattle Transit Study for Intermediate Capacity Transit* examined a wide range of transit technologies and services that offer higher passenger carrying capacity and greater reliability than buses operating in mixed traffic. It included an assessment of the following transit services:

- Bus Rapid Transit (BRT) – buses that move quickly and reliably because of improvements such as transit-only lanes or transit priority technology, which gives buses a green light at intersections.
- Streetcars and Trams – electric vehicles running on rails in the streets.
- Elevated Transit (like monorail) – electric vehicles that are grade-separated or operate in exclusive rights-of-way, allowing them to avoid traffic congestion and other barriers.

The intermediate capacity transit study examined transit system performance for various types of transit service that may operate in the AWV corridor.

3.1.8 City of Seattle Transit Plan (2005)

The City of Seattle adopted a Transit Plan to define its transit strategies for its *Transportation Strategic Plan*. The Transit Plan's purpose is to provide sound direction on how Seattle can achieve the transit system it needs to meet long-term growth, economic, and transportation objectives for connecting downtown and the emerging set of urban villages. Information from the plan was used to help refine travel networks within the AWVSRP's travel demand models.

3.1.9 *Destination 2030* Metropolitan Transportation Plan (2001)

The *Destination 2030* Metropolitan Transportation Plan (MTP) is the adopted regional long-range transportation plan for the central Puget Sound region. The MTP comprises all transportation projects and programs planned for implementation by 2030 (funded and unfunded). The MTP also describes land use and socioeconomic conditions forecasted for 2030, which form the basis for PSRC's travel demand models (the Project's travel demand model, as described in Chapter 2, is an enhanced version of the PSRC model).

The MTP describes the regional transportation system's performance, given implementation of the full complement of projects identified in the plan. It illustrates the cumulative effects of implementing all of the transportation projects and programs planned throughout the region. Conversely, the analysis conducted for the Project's EA presumes only those projects that have secured funding and are presently programmed for implementation by 2030.

3.1.10 Sound Transit *Sound Move* Vision Plan (1996)

In 1996, voters approved funding for Sound Transit to provide a regional system of transit improvements. This includes Sounder commuter rail, ST Express regional bus service, numerous capital improvements (including park-and-ride lots, transit centers, and direct access ramps), and Link light rail. The plan that details this 10-year mix of projects and services is known as *Sound Move*.

The *Sound Move* plan provides input on transit service assumptions for Link light rail, Sounder commuter rail, and ST Express bus service to operate in the greater downtown Seattle area. The transit investments approved in the *Sound Move* plan are included as part of the baseline definition for the Project's Build Alternative and the 2030 Baseline Scenario.

3.1.11 King County Metro Transit Now (2006)

The Transit Now initiative to expand Metro bus transit service by 15 to 20 percent over the next 10 years was approved by King County voters in the general election on November 7, 2006 (King County Ordinance 2006-0285). Elements of Transit Now are expected to supplement the strategies identified through the Project's construction transportation planning process. Travelers to downtown Seattle will benefit from Transit Now both during and after Project construction.

3.1.12 King County Metro Six-Year Transit Development Plan (2004)

The King County Metro *Six-Year Transit Development Plan for 2002 to 2007* provides the framework for transit service and capital investments. This plan guides transit development for 2002 through 2007. The 6-year transit plan was used to calculate projected annual transit service growth for the regional travel

demand models, including Metro bus service and transportation demand management strategies supplied by King County Metro. In November 2007, the *Strategic Plan for Public Transportation, 2007-2016*, replaced and updated the *Six Year Transit Development Plan*.

3.1.13 King County Metro Transit Tunnel Conversion Project Performance Reports (2005–2007)

King County Metro, under the “Agreement Regarding the Design, Construction and Operation of the Downtown Seattle Transit Tunnel and Related Facilities,” was mandated to provide periodic reports on the downtown transportation system’s performance during the closure of the Downtown Transit Tunnel Conversion project. These reports provided updates on a number of performance measures during the tunnel’s closure. The information in these studies has been helpful in documenting potential traffic effects during Project construction.

3.1.14 Alaskan Way Viaduct Project: Task 1 Report (December 1996)

The Task 1 Report provides insights on travel characteristics of trips made on the Alaskan Way Viaduct. The report led to four distinct approaches (Framework Policies) for seeking a course of action. Information from this report provided comparison information used in developing travel forecasts and traffic analysis activities.

3.1.15 Washington State Transportation Plan 2007–2026 (November 2006)

The *Washington State Transportation Plan 2007–2026* identifies the state transportation system’s needs and deficiencies and includes designated state highways. The plan was the result of a continuous, comprehensive, and coordinated planning and outreach effort with other agencies and the public to identify potential transportation improvements.

3.2 Coordination

3.2.1 Enhancements and Mitigation Advisory Team

The Enhancements and Mitigation Advisory Team (EMAT) is a three-agency committee (WSDOT, King County, and SDOT) formed in September 2007 to oversee the development and selection of the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements.

3.2.2 Other Coordination

Ongoing coordination was conducted as needed with agencies that manage operations or have a stake in particular transportation modes. This included coordination with:

- City of Seattle planning, design, and operations staff for multimodal design and operations input.

- King County Metro staff for transit service and transit capital planning.
- The Port of Seattle and BNSF for freight and rail operations.
- Washington State Ferries for vehicle and pedestrian access issues to and from the Seattle Ferry Terminal.

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Chapter 4 AFFECTED ENVIRONMENT

This chapter describes existing conditions (the 2005 analysis year) for transportation systems within the study area. It also includes information on current transportation facilities, their use, and their performance. This information helps establish an understanding of current conditions and serves as a basis against which projected future conditions for the year of opening (2013), the 2030 Baseline, and the 2030 Build Alternative can be assessed.

4.1 Study Area and Regional Context

The Project involves replacing the SR 99 mainline with a seismically sound structure in the project area. The project limits extend from S. Walker Street in the south to S. King Street in the north.

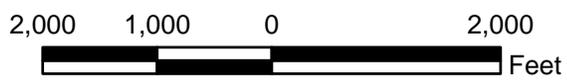
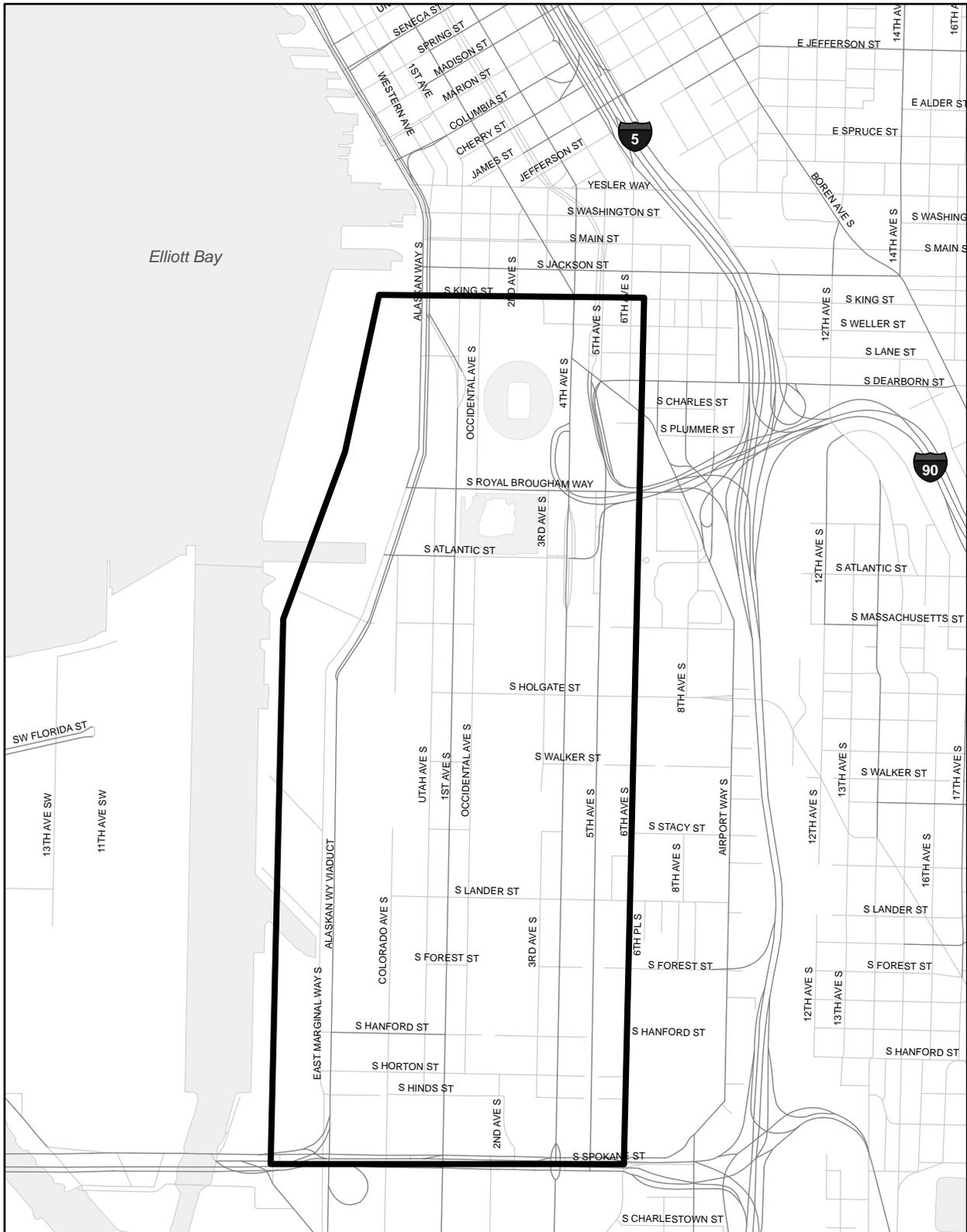
The transportation study area is located just south of downtown Seattle. This is a dense urban area that contains one interstate (I-5), two state routes (SR 99 and SR 519), arterial streets (primary, minor, and collector), and local streets.

The transportation study area, shown in Exhibit 4-1, encompasses the project limits on SR 99 and nearby transportation facilities that are closely related to or affected by the SR 99 corridor. This area is roughly bordered by Fourth Avenue S. to the east, the Duwamish River/Elliott Bay to the west, S. King Street in the north, and S. Spokane Street in the south. It includes a range of multimodal transportation facilities and service types, including limited-access highways, arterial streets, transit services and facilities, ferry traffic access and holding, nonmotorized facilities and routes, rail, and important freight corridors. Although the Seattle Ferry Terminal is located outside of the study area, the study area includes the primary ferry access route. Therefore, a discussion of ferry access and egress is included in this report.

The transportation study area establishes the area for which the Project's transportation performance and effects are assessed. Any information provided that is beyond the study area boundary is meant to give context for the data being presented.

4.2 Transportation Facilities and Services

This section provides an overview of the transportation system components within the study area. This includes highways, arterial roadways, transit services and facilities, pedestrian and bicycle facilities, parking, ferries, railroads, and freight corridors.



Basemap Data Source: City of Seattle, 2006.

Exhibit 4-1 Study Area

4.2.1 SR 99

SR 99 serves important local and regional transportation functions. Within the study area, it provides access to downtown for many of Seattle's western neighborhoods and provides freight access between the south of downtown (SODO) area and the Duwamish and Interbay/Ballard industrial areas. SR 99 is an important alternative route to I-5, the most heavily used highway in the Pacific Northwest. It also provides an important link to major league sports stadiums in the north and south ends of downtown, and access to I-90 for trips coming from northwest Seattle.

Within the study area, SR 99 is classified as "Other Urban Expressway" and designated as part of the Washington State National Highway System. The roadway was designed in the 1940s and was open for traffic in 1953. SR 99 is an at-grade facility as it enters downtown Seattle from both the north and south. However, between S. Holgate Street and the Elliott Avenue/Western Avenue ramps, it is a double-level viaduct facility with three to four lanes available in each direction and no shoulders.

4.2.2 Other Freeways, Highways, and Expressways

SR 519, commonly known as S. Atlantic Street (Edgar Martinez Drive S.), is an important thoroughfare for cars, trucks, and pedestrians in Seattle's SODO district (stadium area). The eastern terminus of SR 519 is the junction with I-90, and the Seattle Ferry Terminal is the western terminus.

The SR 519 S. Atlantic Street on-ramp connects to I-5 and I-90. This overpass separates road and railway traffic and provides access between I-90 and waterfront locations such as the Port of Seattle and the Seattle Ferry Terminal. Currently, westbound traffic from I-5 and I-90 exits at Fourth Avenue S. and follows a circuitous route to the S. Atlantic Street overpass to cross over the BNSF Railway tracks located just east of the stadiums. SR 519 Phase 2 improvements—officially called the SR 519 Intermodal Access Project Phase 2: Atlantic Corridor—will provide a direct westbound route for freight and ferry traffic and separate freight, car, bicycle, and pedestrian traffic from railway operations. SR 519 Phase 2 construction is scheduled to begin in 2008 and is not part of the S. Holgate Street to S. King Street Viaduct Replacement Project.

4.2.3 Arterial and Local Streets

Nearly all downtown area streets are designated as either principal or minor arterials. Principal arterials provide major north-south travelways, with a mixture of minor and collector arterials that provide travel opportunities in the east and west directions.

Although SR 99 is designated as an Urban Expressway, approximately 62 percent of all users (vehicle and transit) on the viaduct have one trip-end in

downtown Seattle on a daily basis. Therefore, connections to the downtown street network are of considerable importance. Section 4.4.2 provides additional information on interchange access on SR 99 and connections to the surrounding study area and roadway facilities.

4.2.4 Transit Services

Exhibit 4-2 summarizes the study area transit facilities. The transit-only E-3 Busway on Fifth Avenue S., between S. Spokane Street and S. King Street, provides transit access south of downtown between I-5 and the Downtown Seattle Transit Tunnel.

Exhibit 4-2. Existing Transit Facilities

Arterial	From	To	Treatment Description
Downtown Seattle Transit Tunnel	S. King Street	Stewart Street/ Ninth Avenue	Transit tunnel
E-3 Busway	Airport Way S.	S. Spokane Street	Transit facility
Second Avenue Ext. S.	Yesler Way	S. Jackson Street	Bus lane/HOV segment

Source: Seattle Department of Transportation.

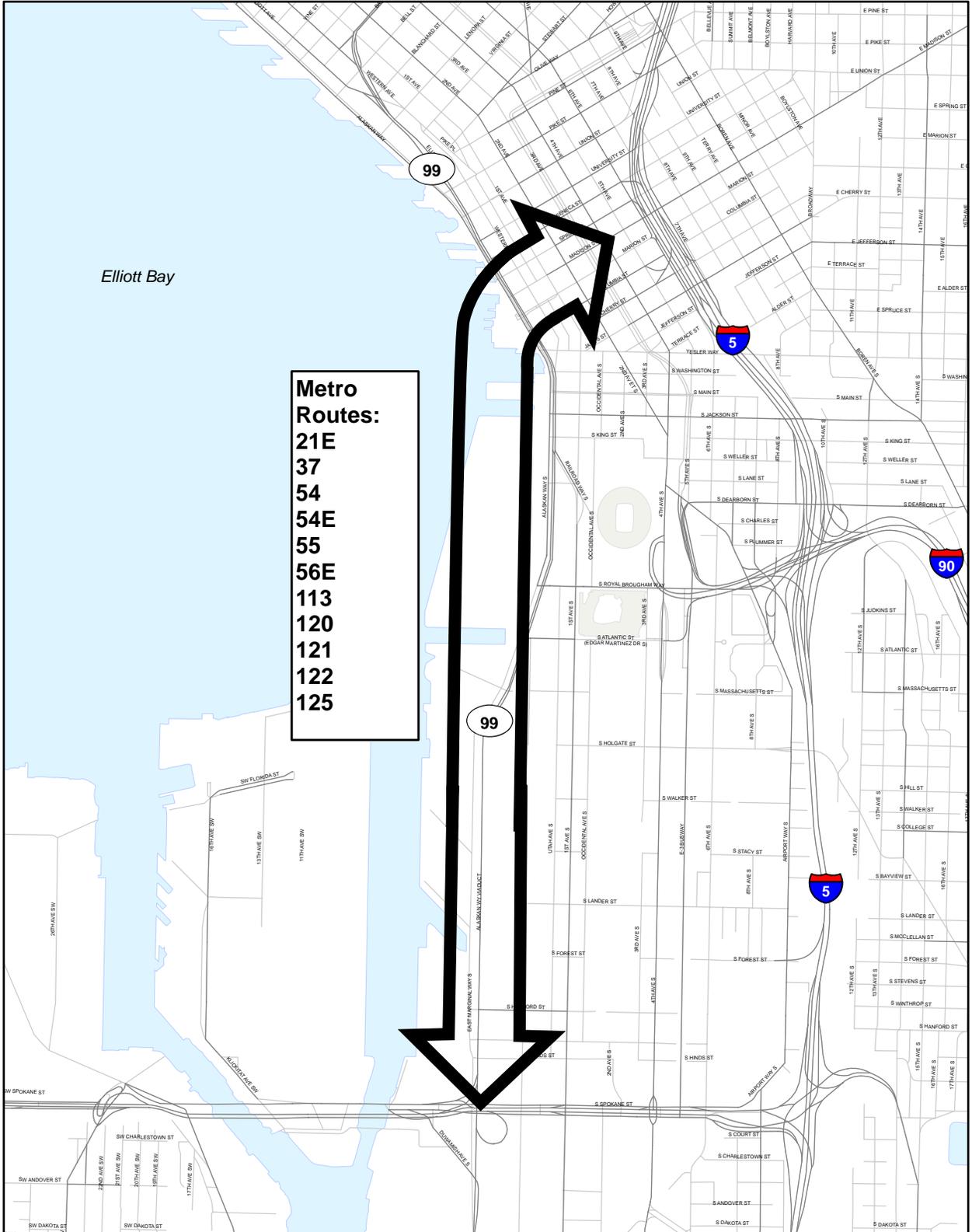
Bus Service

As shown in Exhibit 4-3 and listed in Exhibit 4-4, several King County Metro routes use the southern portion of the SR 99/Alaskan Way Viaduct during peak hours. These transit routes use the NB off-ramp at Seneca Street and the SB on-ramp at Columbia Street to access SR 99. An extensive network of bus routes also converges on downtown Seattle from I-5 and surface streets. Sound Transit and Community Transit also provide bus service within the study area. However, King County Metro is the only regional transit agency that uses SR 99 within the study area.

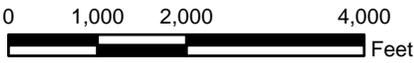
Commuter Rail Service

Sound Transit's commuter rail line, *Souder*, serves commuters both north and south of Seattle. The south line travels between Tacoma and King Street Station in downtown Seattle and also serves the communities of Puyallup, Sumner, Auburn, Kent, and Tukwila. The north line travels between King Street Station and downtown Everett, with an intermediate stop in Edmonds. Park-and-ride facilities in these communities further extend the effective reach of these two commuter rail lines.

FILE: \\stf\viaduct\GIS\ie-3\Maps\EA\Ex 4-3 Bus Transit Connections.mxd



- Metro Routes:**
- 21E
 - 37
 - 54
 - 54E
 - 55
 - 56E
 - 113
 - 120
 - 121
 - 122
 - 125



Source: King County, 2007.

**Exhibit 4-3
SR 99 Bus Transit
Connections**

Exhibit 4-4. Existing Transit Routes Using SR 99/Alaskan Way Viaduct

Route No.	Description	Ramp Usage	Buses Per Hour	
			AM Peak	PM Peak
21E	To Seattle	Seneca Street	3	
	To Arbor Heights	Columbia Street		3
37	To Alaska Junction	Columbia Street		2
54	To Seattle	Seneca Street	3	2
	To White Center	Columbia Street	2	3
54E	To Seattle	Seneca Street	3	
	To White Center	Columbia Street		3
55	To Seattle	Seneca Street	3	2
	To Admiral District	Columbia Street	2	4
56E	To Seattle	Seneca Street	2	
	To Alki	Columbia Street		2
113	To Seattle	Seneca Street	2	1
	To Shorewood	Columbia Street		2
120	To Seattle	Seneca Street	6	3
	To Burien	Columbia Street	4	6
121	To Seattle	Seneca Street	3	2
	To Burien	Columbia Street	2	3
122	To Seattle	Seneca Street	3	
	To Burien	Columbia Street		1
125	To Seattle	Seneca Street	4	4
	To White Center	Columbia Street	3	4
		TOTAL	45	47

Note: "E" indicates Express route.

Sounder currently operates five commuter trips between Tacoma and Seattle during the morning (into Seattle) and evening (out of Seattle) commute periods on weekdays. Occasional weekend or extra trips for special events such as Mariners or Seahawks games also operate.

In the north, Sounder operates three commuter trips between Everett and Seattle during the morning (into Seattle) and evening (out of Seattle) commute periods on weekdays. These Sounder commuter rail trips are in addition to two daily Amtrak regional passenger rail trips that cover the same route, but continue on to points further north and south along the Amtrak Cascades route.

King Street Station interfaces with several other forms of transportation, including the Downtown Seattle Transit Tunnel.

4.2.5 Pedestrian and Bicycle Facilities

The study area includes two stadiums, which are noteworthy pedestrian generators. Bicycles are used in the study area for both recreational and commuting purposes.

Pedestrians

Aside from sidewalks, which are found on most streets in the study area, pedestrian facilities in the study area include a multi-use path on the east side of Alaskan Way that runs the length of the waterfront, from Myrtle Edwards Park to the stadium area. Pedestrian facilities are discussed further in the *Accessibility* section of *Existing Transportation Conditions* (Section 4.3.2).

Bicycles

Bicyclists use routes in the study area for both recreation and commuting. This section describes both existing and planned bicycle facilities and routes, as well as how these facilities and routes relate to the existing SR 99 facility.

Existing Bicycle Facilities and Designated Bike Routes

Seattle features an extensive network of bicycle facilities and routes. A substantial number of commuters travel to jobs in the downtown area via these routes. Exhibit 4-5 lists designated bike lanes within the study area, and Exhibit 4-6 lists roadway facilities within the study area that are commonly used by bicyclists. The multi-use path located east of Alaskan Way is a major bicycle/pedestrian facility that runs the length of the waterfront area from the stadiums to Myrtle Edwards Park. E. Marginal Way S. is a major bicycle route in the study area and is a regional connection that serves as the main route into and out of downtown for West Seattle residents. Second Avenue, just north of the study area, serves as the main route for bicyclists heading SB through downtown, and First, Third, and Fourth Avenues S. are used for NB travel.

Exhibit 4-5. Existing Bicycle Lanes in the Study Area

Arterial	From	To
S. Dearborn Street	Sixth Avenue S.	I-90 Trail
E-3 Busway (Fifth Avenue S.)	S. Royal Brougham Way	S. Forest Street
E. Marginal Way S. (NB only)	S. Royal Brougham Way	S. Spokane Street

Source: Seattle Department of Transportation

Exhibit 4-6. Streets in the Study Area Commonly Used by Bicyclists

Arterial	From	To
First Avenue S.	Yesler Way	S. Spokane Street
Sixth Avenue S.	S. Spokane Street	Airport Way S.
Alaskan Way	Broad Street	E. Marginal Way S.
E. Marginal Way S.	Alaskan Way S.	S. Spokane Street

A new north-south trail has been completed on the east side of the E-3 Busway, in conjunction with construction of Sound Transit’s Link light rail system. This bike/pedestrian path is about 10 feet wide and extends from S. Royal Brougham Way to S. Forest Street (about 1 mile long).

The City of Seattle designated bicycle facilities and routes in the downtown area are shown in Exhibit 4-7.

Existing bicycle counts were collected during the PM peak hour for several corridors. In the stadium area, approximately 15 bicyclists per hour were counted along the First Avenue S. corridor at S. Main Street.

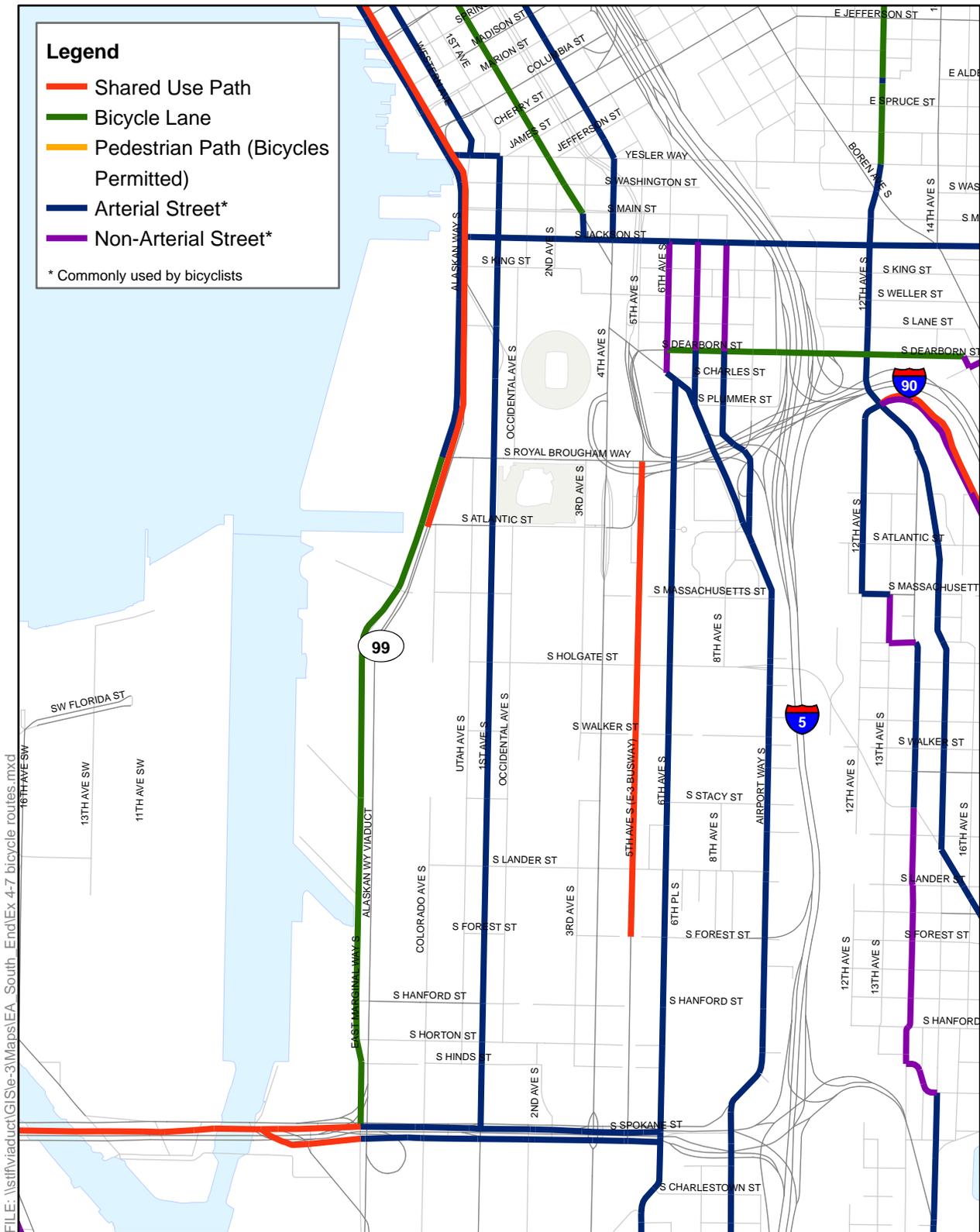
Regional Connections

E. Marginal Way S. connects to S. Spokane Street, along which bicyclists can travel to reach the West Seattle low bridge and a multi-use trail along the water around Alki Point. In the stadium area, S. Dearborn Street connects to the Mountains to Sound/I-90 Trail, which provides connections to Mercer Island and beyond.

Planned Improvements

The City of Seattle adopted a Bicycle Master Plan that was approved May 22, 2007, by the Seattle Bicycle Advisory Board. The plan calls for developing approximately 450 miles of marked or separated bicycle routes over the next 10 years, including multi-use trails, bicycle lanes, and “sharrows,” which are uniquely marked roadways alerting motorists that cyclists may be in the area.

First Avenue S. is designated as a sharrow, and new bicycle lanes are planned in the following locations: on Alaskan Way S. to S. Royal Brougham Way, on S. Royal Brougham Way from Alaskan Way S. to Fourth Avenue S. (on a new overpass over the BNSF tracks), and on S. Holgate Street east from First Avenue S. A new multi-use path is planned for S. Royal Brougham Way from Fourth Avenue S. east to Beacon Hill, where it would connect with the existing Mountains to Sound/I-90 Trail and a new trail that would continue south along the west side of Beacon Hill.



FILE: \\stiffviaduct\GIS\le-3\Maps\EA_South_End\Ex 4-7 bicycle routes.mxd



0 1,000 2,000 4,000 Feet
 Basemap Data Source: City of Seattle, 2006.

Exhibit 4-7
City of Seattle Designated
Bicycle Routes

The final link in the Mountains to Sound/I-90 Trail is currently under design to connect to the intersection of Alaskan Way S. and S. Atlantic Street.

4.2.6 Parking

Public parking is defined as: (1) parking spaces regulated by the City, and (2) pay parking lots where private entities collect money but parking spaces are available to the public. Parking was grouped and summarized into the following three categories:

On-Street Short-Term Parking

Existing short-term parking includes spaces with time restrictions; metered spaces (including pay stations); and taxi, bus, and police parking.

On-Street Long-Term Parking

On-street long-term parking includes unmetered, unrestricted, on-street public parking. These spaces are mostly found under the south portion of the viaduct.

Off-Street Parking

Off-street parking includes privately owned parking lots where the public can park for a fee. In most cases, public parking does not include private business customer or employee parking. The exception is parking under the viaduct that is provided by and for private businesses. Although many of these spaces are marked as private during daytime business hours, they were counted as off-street parking because they are used as public parking at other times.

4.2.7 Washington State Ferries

Washington State Ferries provides direct ferry service between downtown Seattle and both Bainbridge and Bremerton. Alternate transportation connections between Seattle and these communities are by highway through Tacoma (via the Tacoma Narrows Bridge) or by ferry to Edmonds.

The Seattle Ferry Terminal, located on Piers 50 and 52 on Seattle's downtown waterfront, is the Seattle terminus for this ferry service. Access to the Seattle Ferry Terminal is provided from Alaskan Way at Yesler Way, and exits are provided to Alaskan Way at Yesler Way and Marion Street.

Vehicle and Passenger Ferries

Two Jumbo Mark II vessels, each with a capacity of 202 vehicles and 2,500 passengers, operate on the Bainbridge Island route between 4:45 a.m. and 1:35 a.m. daily, with departures and arrivals approximately every 50 minutes. Service to Bremerton is provided by one Super Class ferry with a capacity of 144 vehicles and 2,500 passengers, and one Issaquah 130 Class ferry with a

capacity of 124 vehicles and 1,076 passengers. Bremerton service operates on an approximately 80-minute headway daily between 4:50 a.m. and 12:50 a.m.

Passenger-Only Ferries

Passenger-only ferries connect Seattle and Vashon Island. Service is provided by a Skagit/Kalama Class passenger-only vessel with a capacity of 250 people. Service departs from Pier 50 three times a day at 7:35 a.m., 4:45 p.m., and 6:10 p.m.

4.2.8 Railroads

BNSF maintains three mainline tracks through the study area. These tracks parallel I-5 to the south and run between First and Fourth Avenues S., crossing S. Spokane Street, S. Lander Street, S. Holgate Street, and S. Royal Brougham Way at grade.

North of S. Royal Brougham Way is the King Street Station and a tunnel under the downtown area that emerges north of the Pike Place Market and follows the waterfront to points north. This route serves the Interbay switching and engine maintenance and refueling railyard. The BNSF mainline serves the I-5 corridor south to Long Beach, California and north to British Columbia, Canada. It connects to east–west tracks crossing the Cascades at Everett, Auburn, and along the Columbia River. BNSF has agreements with the state, Amtrak, and Sound Transit to carry intercity and regional commuter rail passenger trips that are accessed at King Street Station. Passenger train switching and staging occur on switching tracks north and south of SR 519.

Union Pacific Railroad (UPRR) maintains a single mainline track heading south from Seattle, which uses a shared alignment with BNSF until it splits at Tukwila. UPRR also serves the I-5 corridor and connects to east–west tracks at the Columbia River. The UPRR Argo intermodal switching railyard is located south of S. Spokane Street and is outside of the study area.

The capacity of the combined UPRR and BNSF tracks is reduced because of operational conflicts caused by the need for UPRR trains to cross the BNSF mainline to access the Argo Railyard. Both of the UPRR and BNSF tracks that serve Terminals 5 and 18 cross E. Marginal Way S. at grade just south of S. Spokane Street, which creates delays for truck traffic in that area. The Port of Seattle’s East Marginal Way Grade Separation Project is currently under construction and will provide a grade separation at this location when completed in late 2009.

Railyard Operations (SIG, Whatcom, and North SIG Railyards)

The SIG Railyard is located on the east side of SR 99, south of S. Atlantic Street. This intermodal railyard is used to load cargo containers onto railroad cars to build freight trains bound for national destinations. Most containers arrive by sea at the port facilities on the west side of SR 99.

BNSF operates a switching track (known as a *tail track*) that facilitates the assembly of railroad cars into trains. The tail track's northern terminus lies just south of S. King Street and crosses S. Atlantic Street and S. Royal Brougham Way at grade. Switching operations from the SIG Railyard frequently block S. Royal Brougham Way and S. Atlantic Street near their intersections with Alaskan Way S. Two additional BNSF tracks pass through the Whatcom Railyard on the west side of SR 99. One track, used for train assembly, continues from the SIG Railyard north across S. Royal Brougham Way just west of the viaduct; this track causes backups for trucks accessing Port terminals along the waterfront.

The North SIG Railyard, located between SR 99 and First Avenue S. south of S. Massachusetts Street, is expected to open in early 2008. It is the project team's understanding that once the North SIG Railyard is functioning, T-46 truck dray routes will switch from the SIG Railyard to the North SIG Railyard, thereby changing the primary truck dray route for T-46.¹ The dray route between T-46 and the North SIG Railyard will be via S. Atlantic Street, Colorado Avenue S., and S. Massachusetts Street, as opposed to the SIG Railyard route, which is via E. Marginal Way S.

4.2.9 Freight

The state of Washington classifies freight routes according to the number of tons of cargo carried per year. Truck freight tonnage classifications on interstates, state routes, and city streets in and near the study area are shown in Exhibit 4-8.

The City of Seattle designates all arterials as truck routes and has also classified certain streets as Major Truck Streets. By policy, the City will "monitor these streets and make operating, design, access and/or service changes, as well as capital investments, to accommodate trucks and to preserve and improve commercial transportation mobility and access on these major truck streets." Seattle's Major Truck Streets within and surrounding the study area are shown in Exhibit 4-9. SR 99 is designated as a Major Truck

¹ "Dray" refers to the transport of intermodal freight over the road. In this reference, the dray route would be the path that trucks use to move freight between the container terminal on T-46 and the railyard.

Street, as are all or portions of E. Marginal Way S., First Avenue S., Fourth Avenue S., Sixth Avenue S., Airport Way S., S. Spokane Street, S. Lander Street, S. Royal Brougham Way, and Alaskan Way S.

Exhibit 4-8. Freight Tonnage Designations

Route Name	Segment	Classification
I-5	Oregon border to Canadian border	T-1
I-5	Express Lanes	T-1
I-90	Fourth Avenue to Idaho border	T-1
SR-99	E. Marginal Way to Elliott Avenue (includes Alaskan Way Viaduct)	T-1
SR 99	Elliott Avenue to Green Lake Way (includes Battery Street Tunnel)	T-2
SR 519	I-90 to Seattle Ferry Terminal	T-2
First Avenue S.	E. Marginal Way S. to Alaskan Way Viaduct Ramps	T-2
Fourth Avenue S.	E. Marginal Way S. to Airport Way S.	T-1
Fourth Avenue S.	Airport Way S. to Yesler Way	T-2

Source: WSDOT Freight and Goods Transportation System Update, 2007.

Classification:

- T-1: more than 10 million tons per year
- T-2: 4 million to 10 million tons per year

Weight Restrictions

Following the Nisqually earthquake of February 2001, roadway restrictions were established on the Alaskan Way Viaduct that apply to trucks that weigh over 10,000 pounds. Restrictions include reduced travel speeds for large vehicles (from 50 mph to 40 mph) and require large vehicles to use only the right-hand lane of the viaduct. These restrictions limit the use of the SB exit to First Avenue S., which is located on the left side of the roadway. In addition, vehicles weighing more than 105,000 pounds are prohibited from using the viaduct. Further deterioration of the viaduct structure could lead to additional restrictions.

Alternative Truck Routes

In case of congestion, incidents, or lack of access to the Alaskan Way Viaduct, different types of trucks have different alternative route options. All vehicles would have the option to use Alaskan Way and Broad Street or I-5 instead of the viaduct.

Trucks less than 30 feet long have the option to divert to city streets to get through the downtown area. Vehicles 30 feet long or longer face certain

conditions associated with the use of streets within the area known as the Downtown Traffic Control Zone (shown in Exhibit 4-9). The conditions associated with the Downtown Traffic Control Zone include:

- Legal vehicles 30 feet long and longer may apply for a permit to travel within the zone from 9:00 a.m. to 3:00 p.m., but do not need a permit from 7:00 p.m. to 6:00 a.m. Curfews are in effect from 6:00 to 9:00 a.m. and 3:00 to 7:00 p.m. except on Saturdays and Sundays.
- On Saturdays, a permit is required for legal vehicles 30 feet long and longer to travel in the zone, but curfews are not in effect.
- The above restrictions are not in effect on Sundays.
- Over-legal vehicles are not allowed to move within the Downtown Traffic Control Zone between the hours of 6:00 a.m. and 7:00 p.m. An over-legal permit and/or validation number is required for movement within the zone between the hours of 7:00 p.m. and 6:00 a.m.

SDOT does not designate over-legal routes. Appropriate routes are selected via the permit approval process. Alaskan Way and Broad Street have a history of permitted over-legal truck trip use, and these routes would likely continue to be permitted routes.

I-5 presents challenges to truckers passing through downtown Seattle. Heavy congestion persists for much of the day. Frequent on- and off-ramps and heavy entering and exiting volumes make truck travel particularly difficult and require trucks to change lanes frequently as they travel through downtown. The Port of Seattle has identified access to and from the north on I-5 and poor operations on I-5 through downtown Seattle as important and problematic freight concerns.

4.3 Existing Transportation Conditions

This section describes existing transportation conditions in terms of current estimated travel demands and performance measures associated with mobility, accessibility, and safety.

4.3.1 Mobility

Mobility can be thought of as the ability for people and goods to move between locations. This section describes measures relating to mobility, including travel demand and traffic patterns, traffic conditions, and AM and PM peak-hour travel times.

Travel Demand and Traffic Patterns

Alaskan Way Viaduct (SR 99) Users

SR 99 travels north-south, passing through downtown Seattle on the Alaskan Way Viaduct. The following sections present data that describes current SR 99 users within the study area.

Existing SR 99 Daily Traffic Patterns

Exhibit 4-10 shows daily traffic patterns on the SR 99 Alaskan Way Viaduct corridor. Arrows indicate locations where traffic enters or exits the corridor. Each arrow represents a ramp movement.

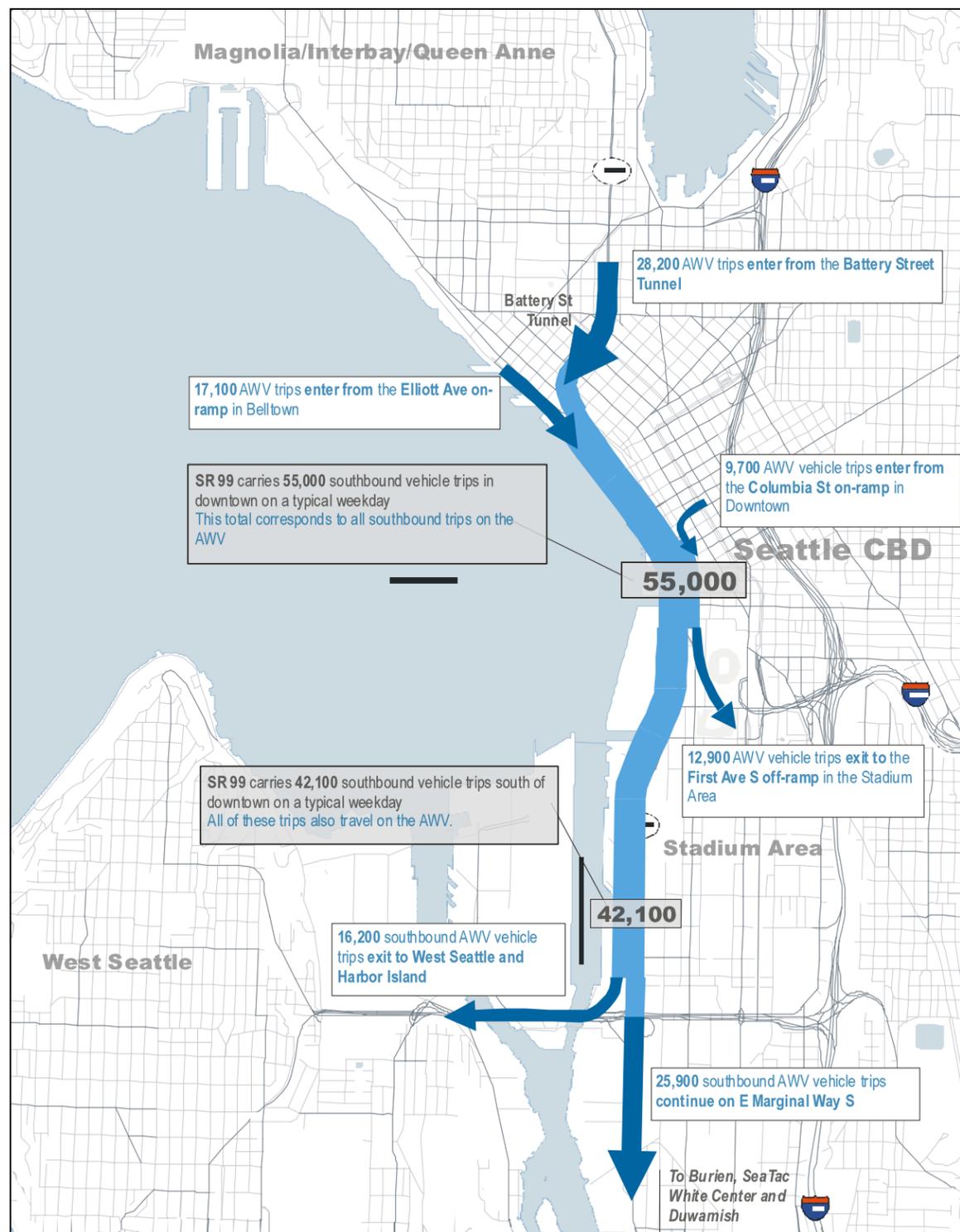
In the downtown area, 9,700 SB vehicles join SR 99 from the Columbia Street on-ramp and 10,100 vehicles exit NB via the Seneca Street off-ramp on a daily basis. South of these ramps, just north of the study area, the viaduct carries its highest volume of traffic: 55,000 SB vehicles and 56,100 NB vehicles on a typical weekday.

Southbound, 12,000 vehicles per day exit in the stadium area on the First Avenue S. off-ramp and 11,300 vehicles per day enter NB on the corresponding on-ramp. This is the last connection in the greater downtown area, as no other connections are provided until S. Spokane Street. At S. Spokane Street, 16,200 vehicles per day exit the corridor to either the West Seattle high bridge or the low bridge to Harbor Island. Northbound, 16,900 vehicles per day enter SR 99 from the West Seattle high bridge. Approximately 25,900 trips continue south to E. Marginal Way S. The corresponding NB volume entering from E. Marginal Way S. is 27,900 vehicles.

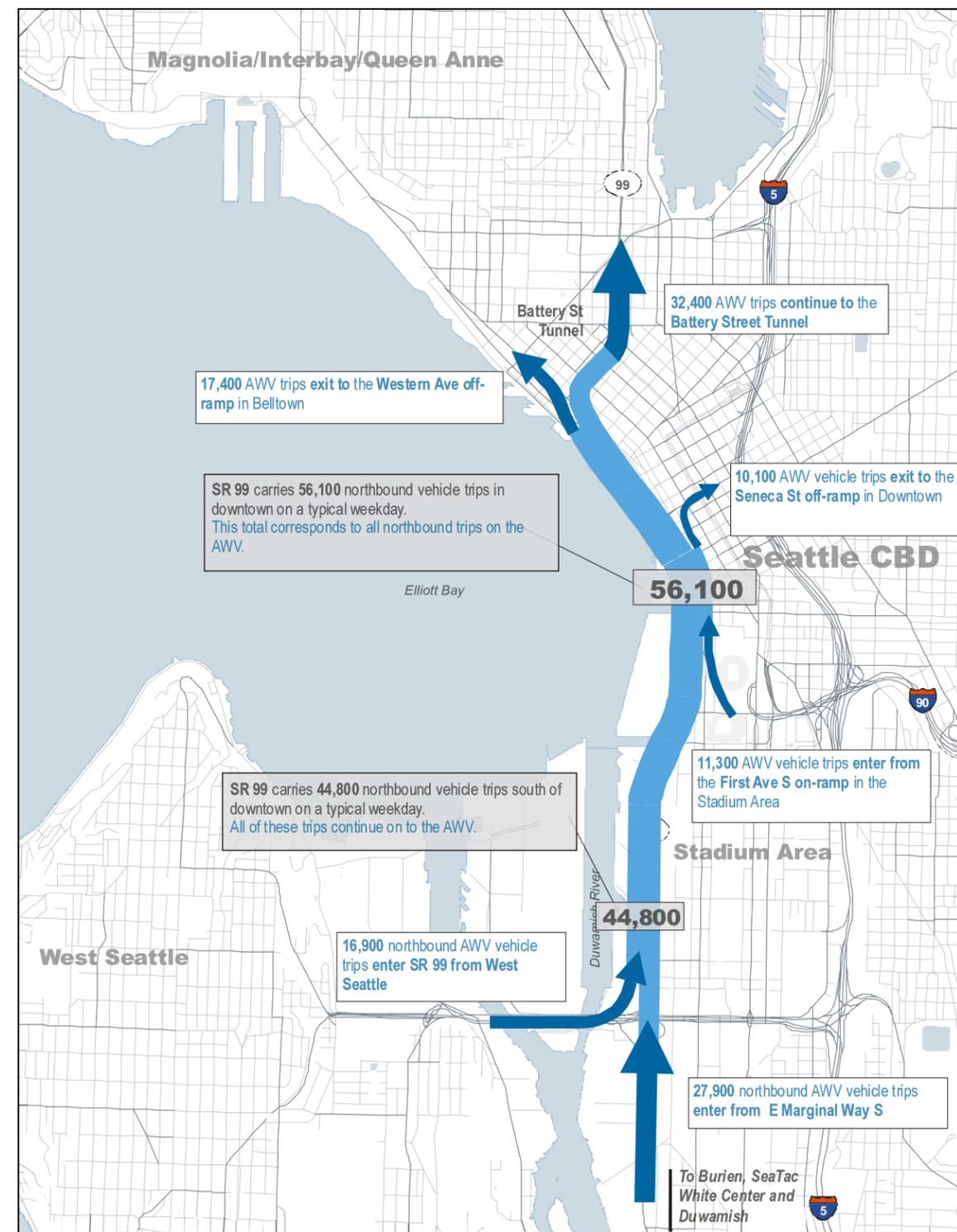
2005 Existing Mainline and Ramp Volumes – AM Peak Hour

Traffic volumes on the SR 99 corridor are highest during commuting hours. In the morning, peak-hour traffic volumes on SR 99 are fairly directional, with heavier volumes entering the central downtown. The First Avenue S. ramps show this directionality, favoring travel to central downtown: 1,410 vehicles exit SB but only 760 vehicles enter NB. South of downtown and the stadium area, mainline volumes are considerably higher in the NB direction (4,320 vehicles) than the SB direction (2,300 vehicles). At S. Spokane Street, volumes entering NB from West Seattle (1,630 vehicles) are more than double those exiting SB to West Seattle (660 vehicles). AM peak-hour mainline and ramp volumes are shown in Exhibit 4-11.

Southbound SR 99



Northbound SR 99

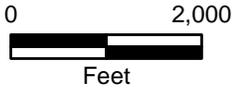
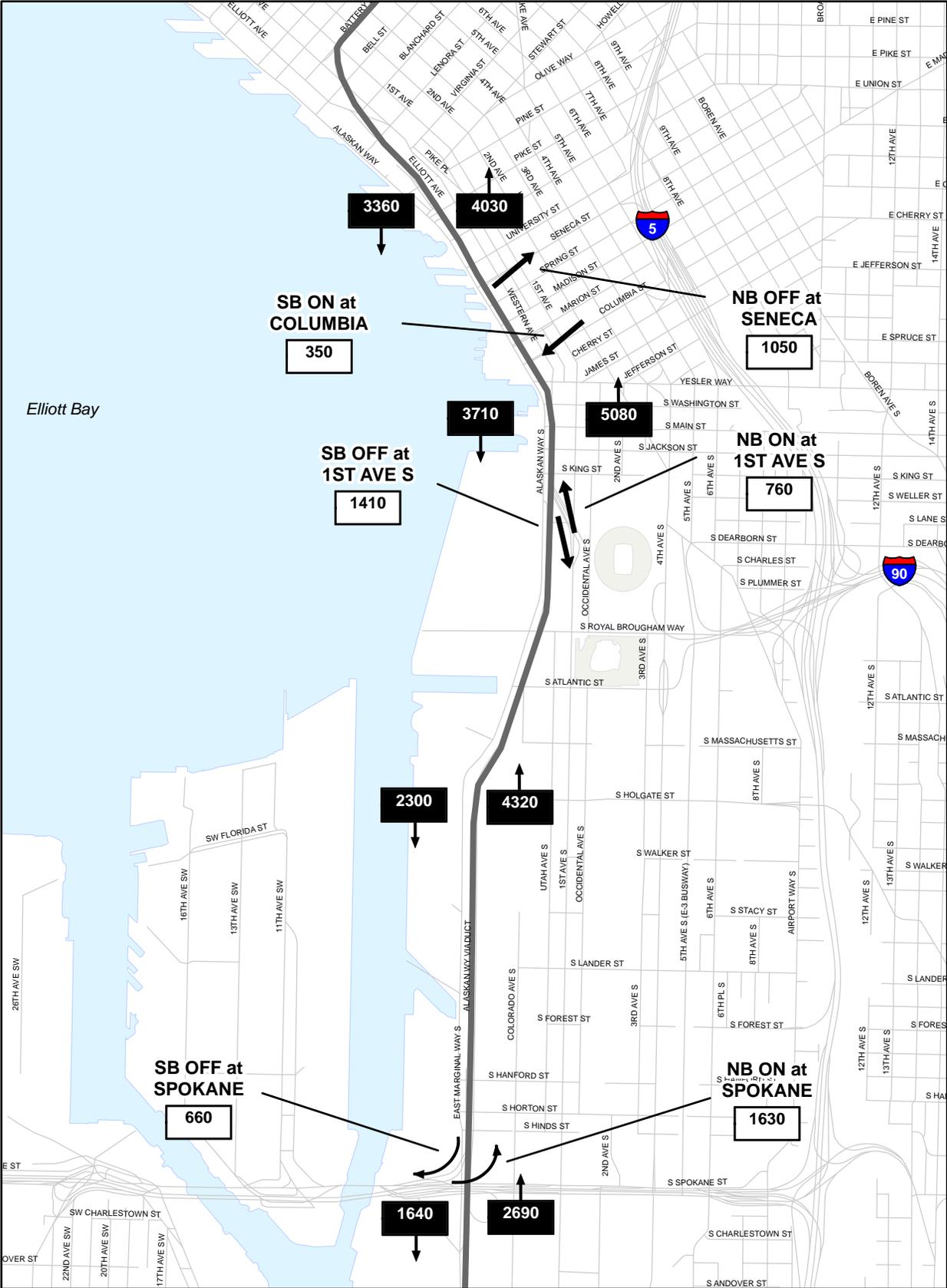


Source: 2004-06 Traffic Counts and AWW Travel Demand Model

Exhibit 4-10
Daily SR 99 Traffic Patterns

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XXX Ramp Volumes
XXX SR 99 Mainline Volumes

**Exhibit 4-11
 AM Peak Hour Mainline
 and Ramp Volumes -
 Existing Facility**

2005 Existing Mainline and Ramp Volumes – PM Peak Hour

Similar to the AM peak, PM peak-hour traffic volumes along SR 99 are directional, with heavier volumes leaving the central downtown. The First Avenue S. ramps show this directionality: 1,200 vehicles enter NB but only 810 vehicles exit SB. South of downtown and the stadium area, mainline volumes are considerably higher in the SB direction (4,330 vehicles) than the NB direction (3,450 vehicles). At S. Spokane Street, volumes exiting SB to West Seattle (1,890 vehicles) are almost double those entering NB from West Seattle (1,110 vehicles). PM peak-hour mainline and ramp volumes are shown in Exhibit 4-12.

Pedestrians and Bicycles

Several major pedestrian corridors and generators are located within the study area. Intersections, particularly those on First Avenue S. near the stadiums, experience substantial pedestrian volumes during events at the following nearby venues: Safeco Field (Major League Baseball), Qwest Field (National Football League, soccer, concerts), and Qwest Field Event Center (exhibition events). During larger events such as a Mariners baseball game, thousands of pedestrians crowd the sidewalks and alleys in the stadium area and Pioneer Square. During these events, traffic control is typically provided to accommodate the very high vehicle and pedestrian volumes.

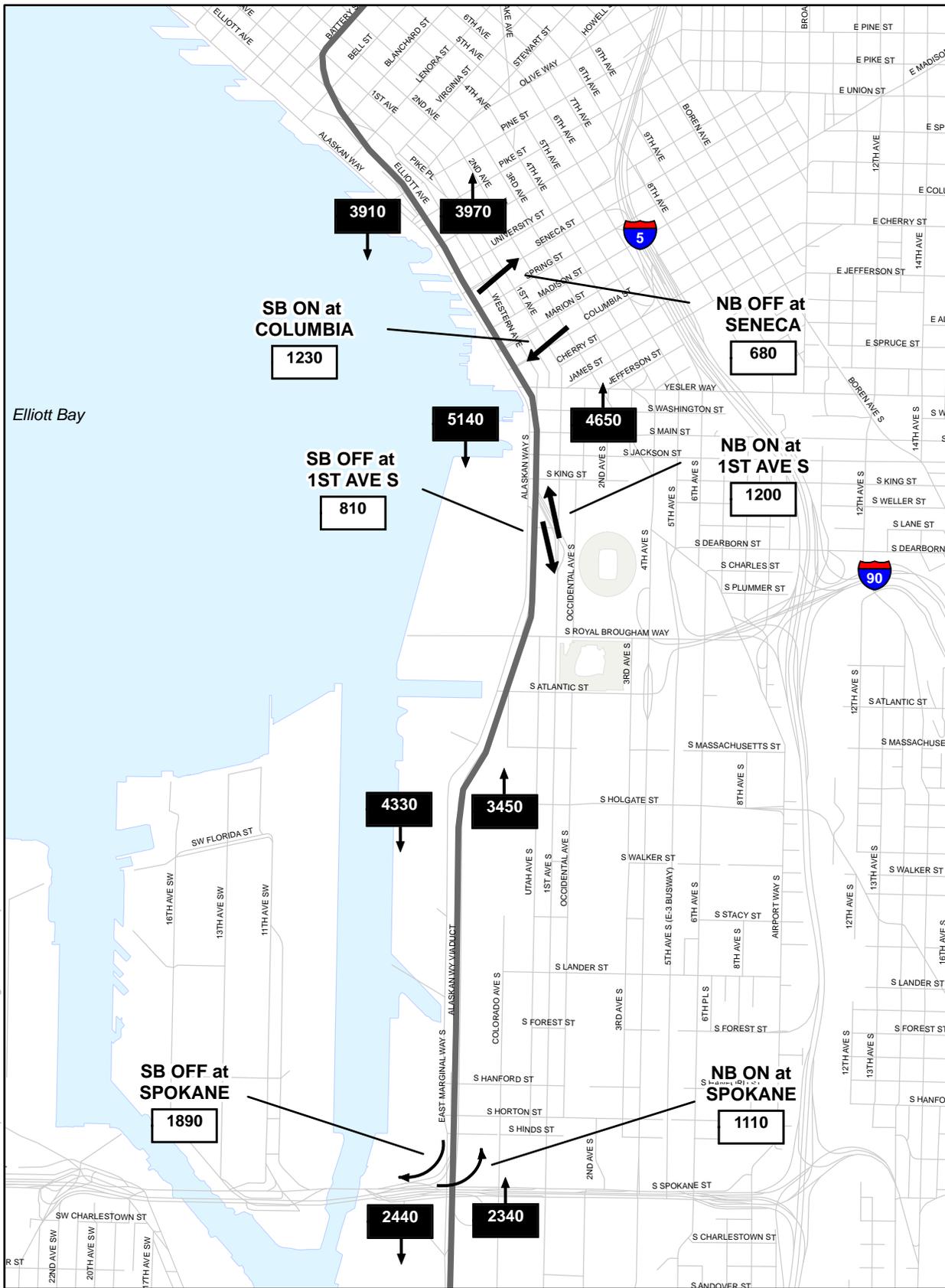
Exhibit 4-13 shows PM peak-hour pedestrian volumes during non-event times. Before and after events, intersections become saturated with pedestrian activity and the traffic level of service becomes severely degraded. Note that the data collected in Exhibit 4-13 were collected in winter and during the PM peak hour.

Washington State Ferry Riders

Although the Seattle Ferry Terminal is located outside of the study area, the study area includes the primary ferry access route. Additionally, a remote holding area for the Seattle Ferry Terminal would be added between S. Royal Brougham Way and S. King Street as part of this Project. Therefore, a discussion of ferry access and egress is included as part of the Project.

For the EA, the analysis of arterial intersections estimates that 360 vehicles exit and 540 vehicles arrive at the Seattle Ferry Terminal during the PM peak hour under current conditions.

FILE: \\sifv\product\GIS\Ex-3\Maps\FEIS\Ex 4-16 Existing mainline+ramp vol PM.mxd



XXX Ramp Volumes
XXX SR 99 Mainline Volumes

**Exhibit 4-12
PM Peak Hour Mainline
and Ramp Volumes -
Existing Conditions**

Exhibit 4-13. Existing PM Peak Hour Estimated Pedestrian Counts (Non-Event)

Street	Cross-Street	North Leg	South Leg	East Leg	West Leg	Control
First Avenue S.	S. Atlantic Street	32	8	42	11	Signalized
First Avenue S.	S. Royal Brougham Way	10	10	10	10	Signalized
First Avenue S.	S. King Street	70	95	85	50	Signalized

The analysis assumes one Bremerton and two Bainbridge route arrivals/ departures, with eastbound (EB) ferries operating at approximately 60-percent capacity and westbound (WB) ferries at about 90-percent capacity. This estimate is based on existing PM peak-hour demand at the Seattle Ferry Terminal for the 30th busiest day of the year, which corresponds to a 92nd-percentile weekday. This magnitude is consistent with traffic counts taken near the Seattle Ferry Terminal. Because these volumes represent a typical traffic day, there are days throughout the year when higher volumes occur.

Freight and Commercial Traffic

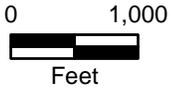
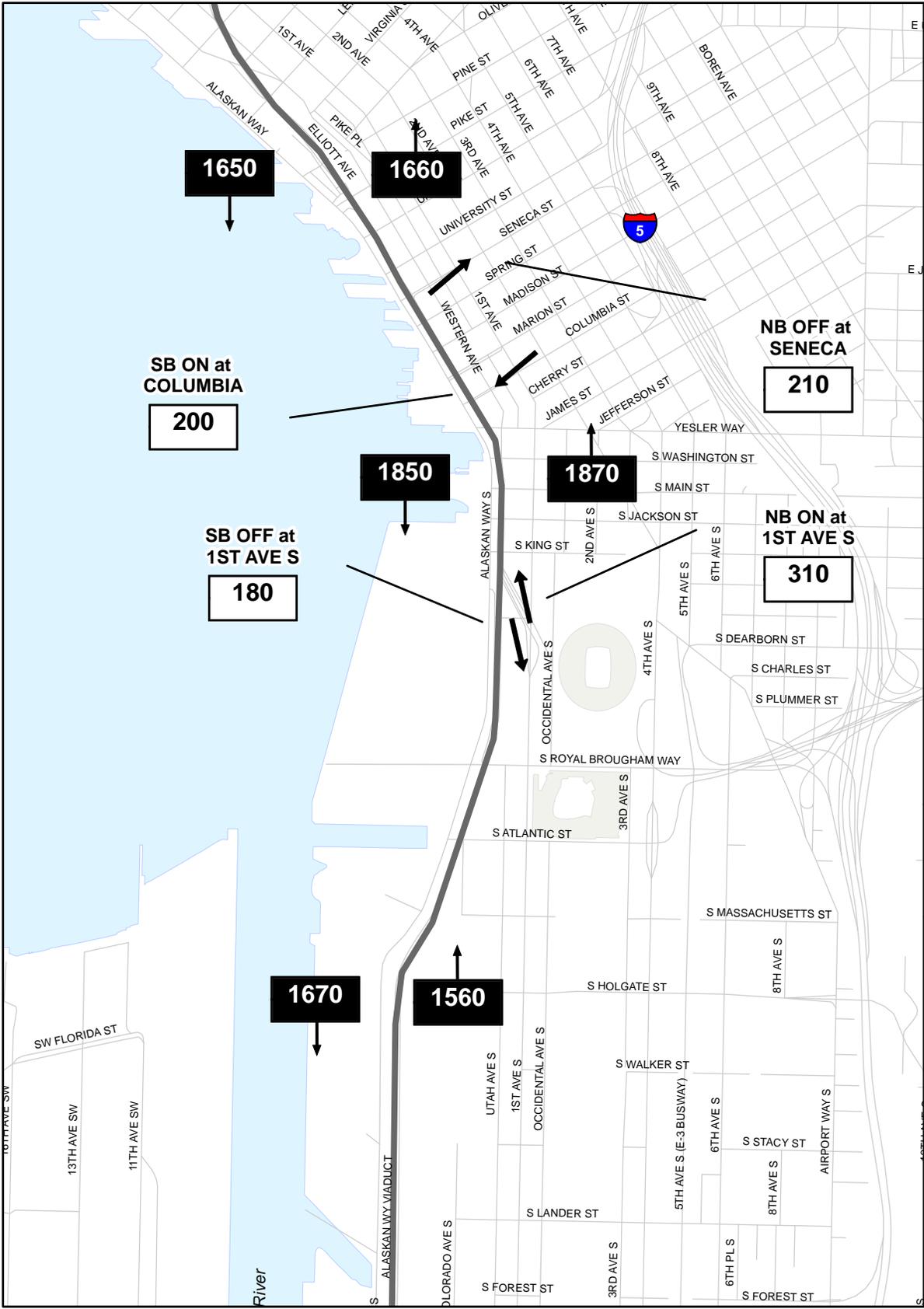
Truck volume and classification counts were collected by video along the SR 99 corridor in downtown Seattle in June 2006. An estimated 3,720 trucks use the Alaskan Way Viaduct through the project area on a typical weekday (see Exhibit 4-14). This includes single-unit trucks (not articulated), combination trucks (an articulated truck pulling one or two trailers), and tanker (liquid transport) trucks. Garbage trucks and concrete trucks were classified as single-unit trucks. The truck data excludes pickup trucks and vans, some of which serve commercial vehicle trip functions.

Travel Patterns

Ten percent of daily SB trucks (180 trucks) exit the corridor, and 17 percent of NB trucks (310 trucks) enter the corridor at the First Avenue S. ramps. The lower SB ramp volumes may be partially due to weight restrictions currently in place that restrict vehicles over 10,000 pounds to use the right-hand lane only, which limits access to the left-side off-ramp.

Daily mainline truck volumes are roughly equal (1,870 NB and 1,850 SB), which could indicate that trucks unable to use the SB off-ramp because of weight restrictions may be continuing to use the corridor, but exiting farther to the south. Most truck trips south of downtown continue south to E. Marginal Way S. or West Seattle/Harbor Island.

FILE: \\sif\viaduct\GIS\Ex-3\Maps\EA\Ex 4-14 Truck Volumes.mxd



XXX Ramp Volumes
XXX SR 99 Mainline Volumes

Exhibit 4-14: Daily Truck Volumes Using the Alaskan Way Viaduct

Classification of Truck Types

The composition of trucks on the viaduct along the central waterfront is approximately 88 percent single-unit trucks, 9 percent combination trucks, and 3 percent tanker trucks (single and combination units).

Tanker/Liquid Transport Trucks

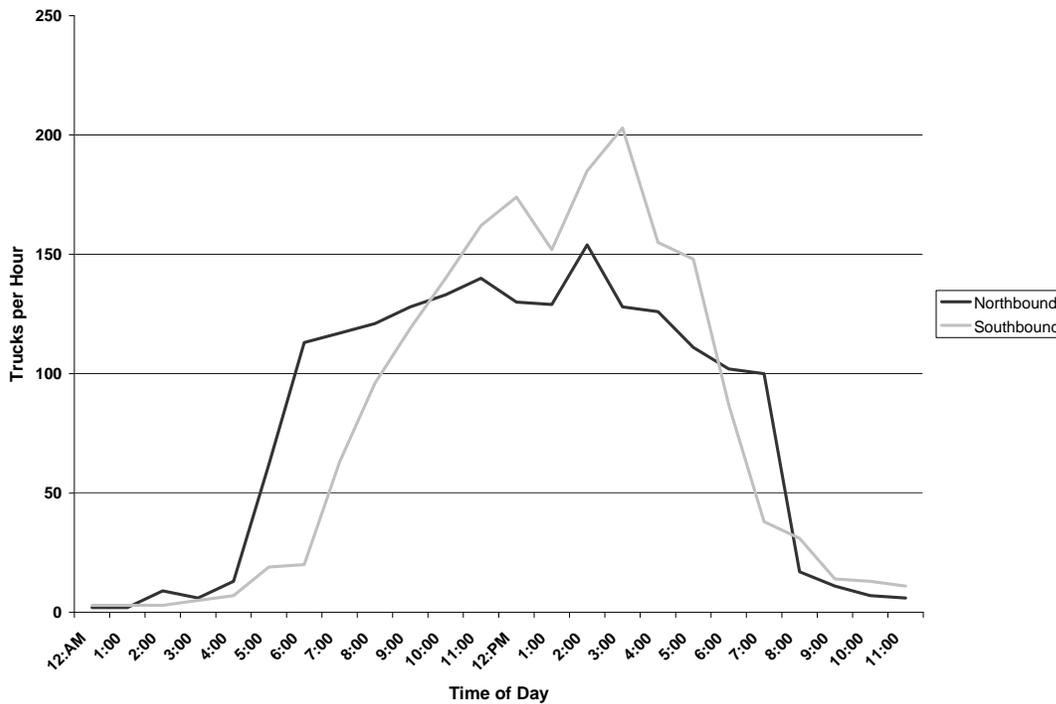
Between 80 and 100 tanker trucks are estimated to use the SR 99 corridor each day (40 to 50 per direction). Tanker trucks may carry hazardous loads, such as fuel or chemicals. Harbor Island is home to several fuel tank farms that serve as a distribution center for the city and regional energy markets. However, not all tanker trucks carry hazardous cargoes. For instance, they could be carrying milk, or water to provide dust control on construction sites.

The data collected did not inventory hazardous materials trips, so the share of these trucks that haul hazardous (including combustible and flammable) materials is unknown. Approximately 15 percent of tanker trucks use the viaduct during times when hazardous cargoes are prohibited anywhere on the viaduct (between 7:00 and 9:00 a.m. and 4:00 and 6:00 p.m.), so are likely to be carrying non-hazardous loads. Up to 70 percent of the observed tanker truck volumes (55 to 70 tankers per day) could therefore be legally carrying flammable or hazardous loads on the viaduct.

Hourly Truck Volumes

Unlike overall traffic volumes that peak during the morning and evening commutes, truck volumes peak during the midday and afternoon. Exhibit 4-15 shows hourly truck volumes on the viaduct between the First Avenue S. ramps and Columbia/Seneca Street ramps (this is the busiest segment of the corridor). Northbound truck volumes are quite steady, generally ranging from 100 to 150 trucks per hour between 6:00 a.m. and 8:00 p.m. They peak at 155 trucks per hour between 2:00 p.m. and 3:00 p.m. Southbound truck traffic peaks more sharply (higher volumes, but for fewer hours). Southbound truck volumes do not reach 100 trucks per hour until 9:00 a.m., and fall below that threshold by 6:00 p.m. However, peak volumes do range from 150 to 200 trucks per hour between 11:00 a.m. and 5:00 p.m., peaking at 205 trucks between 3:00 p.m. and 4:00 p.m. Use of the viaduct by trucks at other times is low.

**Exhibit 4-15. Hourly Truck Volumes on the Alaskan Way Viaduct
(between the First Avenue S. ramps and Columbia/Seneca Street ramps)**



Note: Includes single-unit trucks (not articulated), combination trucks (an articulated truck pulling one or two trailers), and tanker (liquid transport) trucks. The truck data excludes pick up trucks and vans, some of which serve commercial vehicle trip functions.

Traffic Operations

Traffic operations were analyzed for SR 99 and the arterial street system adjacent and proximate to the corridor.

SR 99 Mainline Traffic Operations

Mainline traffic performance was modeled using VISSIM simulation software. The level of service (LOS) for mainline and ramp operations is calculated based on speed and density, as projected in VISSIM. These results are presented in Exhibits 4-16 and 4-17.

The existing 2005 AM and PM peak segment speed results are shown in Exhibits 4-18 and 4-19. These speeds may be compared with posted speed limits, to gauge the level of delay experienced on the mainline during the AM and PM peak hours. The posted speed on the NB mainline is 50 mph between E. Marginal Way S. and the Western Avenue off-ramp. The SB posted speed limit is 50 mph south of the Elliott Avenue on-ramp.

Exhibit 4-16. Existing (2005) AM Peak Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off (SB)	C	D	First Avenue S. On to Seneca Off (NB)
First Avenue S. Off to S. Spokane Street	B	D	S. Spokane Street to First Avenue S.

NB = northbound; SB = southbound

Exhibit 4-17. Existing (2005) PM Peak Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off (SB)	D	C	First Avenue S. On to Seneca Off (NB)
First Avenue S. Off to S. Spokane Street	C	C	S. Spokane Street to First Avenue S.

NB = northbound; SB = southbound

**Exhibit 4-18. Modeled Existing (2005) AM Peak Hour SR 99 Segment Speeds
(miles per hour)**

Southbound		Northbound	
Columbia On to First Avenue S. Off (SB)	45	40	First Avenue S. On to Seneca Off (NB)
First Avenue S. Off to S. Spokane Street	55	50	S. Spokane Street to First Avenue S.

NB = northbound; SB = southbound

**Exhibit 4-19. Modeled Existing (2005) PM Peak Hour SR 99 Segment Speeds
(miles per hour)**

Southbound		Northbound	
Columbia On to First Avenue S. Off (SB)	40	25	First Avenue S. On to Seneca Off (NB)
First Avenue S. Off to S. Spokane Street	40	50	S. Spokane Street to First Avenue S.

NB = northbound; SB = southbound

During the AM peak hour, SB mainline speeds are generally higher than NB speeds. Speeds for the SB direction on the mainline operate within 10 mph of the posted speed during the AM peak hour, but NB speeds are affected by congestion in the downtown area.

As would be expected, speeds during the PM peak are generally slower in the SB direction than in the NB direction. During the PM peak hour, speeds are expected to operate at 40 mph in the SB direction (10 mph below the posted speed), due to congestion caused by the ramps to the West Seattle Bridge near S. Spokane Street.

Northbound speeds are affected by congestion at the downtown ramps. Congestion resulting from high volumes on the NB mainline north of First Avenue S. and from ramp congestion at the Seneca Street and Western Avenue off-ramps affect the flow between First Avenue S. and Seneca Street, which results in slow speeds.

Arterial Traffic Operations

Traffic operations at signalized intersections in the study area were assessed to determine intersection LOS and average vehicle delay. Intersections that are currently unsignalized, but expected to be signalized in the future were also included in the analysis. Exhibit 4-20 presents traffic operations for the intersections within the project area. Currently, study area intersections operate at LOS D or better, with the exception of the unsignalized intersection of First Avenue S. and S. Massachusetts Street, which operates at LOS E during the AM and PM peak. The other exception is the unsignalized intersection at Alaskan Way S. and S. King Street, which operates at LOS F during the PM peak period.

During events at Safeco Field or Qwest Field, local travel demand in the area increases, travel patterns change as patrons search for parking, and pedestrian activity becomes very intensive. As a result, local traffic conditions are typically much more congested prior to and after events (compared to typical, non-event conditions presented here).

Exhibit 4-20. Existing (2005) AM and PM Peak-Hour Detailed Traffic Operations

Street	Cross Street	AM Peak Hour		PM Peak Hour	
		LOS	Avg Veh Delay (sec)	LOS	Avg Veh Delay (sec)
First Avenue S.	S. Holgate Street	B	17	C	21
First Avenue S.	S. Lander Street	B	14	C	25
First Avenue S.	S. Atlantic Street	C	28	D	45
First Avenue S.	S. Royal Brougham Way	C	33	D	54
Alaskan Way S.	S. Royal Brougham Way ¹	B	13	C	22
Alaskan Way S.	Railroad Way S.	A	4	A	4
Alaskan Way S.	S. King Street ¹	C	24	F	68
First Avenue S.	S. Massachusetts Street ¹	E	48	E	38

1. Intersections that are unsignalized under existing conditions, but are expected to be signalized in the future.

Intersection traffic operations analysis does not specifically account for potential effects associated with train crossings on the BNSF tail track east of E. Marginal Way S. at S. Atlantic Street. Currently, these crossings have minimal effect on traffic operations on First Avenue S., but can affect conditions on Alaskan Way S. and E. Marginal Way S. to a greater extent. When the tail track is occupied, traffic on these corridors cannot directly access the stadium area or SR 519 corridor. This is particularly a problem for southbound traffic on Alaskan Way S., including ferry traffic exiting the Seattle Ferry Terminal, in that S. Royal Brougham Way and S. Atlantic Street are the last two connections from these corridors east to the stadium area. Northbound traffic on E. Marginal Way S. may continue to travel north to

S. King Street and loop around to the stadium area, though many vehicles—particularly larger trucks—choose to wait the crossing out. As a result, queuing on SB Alaskan Way S. and NB E. Marginal Way S. during train switching operations on the tail track is a common occurrence.

4.3.2 Accessibility

Travelers’ ability to reach (or access) destinations is the basic definition of the concept of *accessibility*. The various forms of accessibility described here include roadway connectivity and access, transit connectivity and coverage, freight access, Seattle Ferry Terminal access, access to adjacent land uses, pedestrian and bicycle access, and parking effects.

Roadway Connectivity and Access

SR 99 is a regional facility, but primarily serves shorter regional trips and intracity trips. Between S. Spokane Street and the Battery Street Tunnel, all access is provided via ramps. North of the Battery Street Tunnel, arterial connections to the SR 99 mainline provide access (right turns on and off only). This section describes the SR 99 corridor through the study area.

Travel Lanes

The SR 99 facility comprises three or more general purpose lanes in each direction through the study area. Northbound, the SR 99 corridor carries three lanes from S. Spokane Street to the First Avenue S. ramps and four lanes to the Seneca Street off-ramp. Southbound, three lanes are carried through the corridor, merging to a two-lane segment south of S. Spokane Street.

Access to SR 99

Exhibit 4-21 summarizes the connections currently provided between SR 99 and other facilities within the study area. To summarize the quality of access that these connections provide, a qualitative rating system grades the degree (full access, partial access, or no access) and quality of connections (ranging from direct ramp connections to indirect connections).

Exhibit 4-21. Existing Connections

	Good Access	Partial or Substandard Access	No Access
SB SR 99 to Stadium Area	First Avenue S. off-ramp		
Stadium Area to SB SR 99			None
NB SR 99 to Stadium Area			None
Stadium Area to NB SR 99	First Avenue S. on-ramp		

NB = northbound; SB = southbound

As shown in Exhibit 4-21, the ramps at First Avenue S. provide access to NB SR 99 and egress from SB SR 99. Connections to the south are not provided in this area.

Access outside the immediate study area includes a NB off-ramp to Seneca Street and an on-ramp from Columbia Street, which provide access to/from downtown to and from the south. These midtown ramps provide access to the heart of downtown Seattle and the financial district, and are also the downtown transit access point for routes traveling to and from the south. No direct access to and from the north is provided in the downtown area.

At S. Spokane Street, an EB-to-NB on-ramp provides access from West Seattle. In the opposite direction, a SB-to-WB off-ramp provides for reciprocal movement to the West Seattle high bridge. The SB off-ramp also provides access to Harbor Island and the West Seattle low bridge.

Design Constraints

Lane widths, shoulder widths, acceleration and deceleration lanes, and other geometric features on SR 99 generally conform to a lesser standard than those found on newer highway facilities. Throughout the study area, the mainline provides narrow travel lanes and limited shoulders. Additionally, the left-side off-ramp at First Avenue S. provides a short deceleration lane.

Speed Limits

Posted speed limits on the SR 99 mainline are shown in Exhibit 4-22.

Exhibit 4-22. Posted Speed Limits on SR 99 (miles per hour)

Mainline Segment	Posted Speed Limit (NB and SB)
Seneca/Columbia Ramps to First Avenue S. Ramps	50
First Avenue S. Ramps to S. Spokane Street	50 (40 trucks)
South of S. Spokane Street	50

NB = northbound; SB = southbound

Transit Connectivity and Coverage

Transit Connections

Downtown Seattle is served by a well-developed bus transit system and supplemented by a large, regionally implemented vanpool program. The downtown area is also served by the South Lake Union Streetcar between the South Lake Union area and Westlake, the Seattle Monorail between Seattle Center and Westlake, and Sound Transit commuter rail, which connects Everett, Edmonds, Seattle, Tukwila, Kent, Auburn, Sumner, Puyallup, and

Tacoma. Light rail service between downtown Seattle and Sea-Tac Airport is currently under construction and scheduled to begin in 2009.

Currently, all transit service on SR 99 in the study area travels to or from downtown Seattle. Transit routes using SR 99 from West Seattle or points south access the downtown area at the Seneca Street off-ramp. This ramp provides fast service to the financial and retail core, but passengers must transfer to other buses or walk to reach offices or other destinations in the southern portion of downtown. Buses leaving downtown via SR 99 access the southbound roadway by using the Columbia Street on-ramp.

Transit Travel Times and Coverage Area

Since HOV or transit-only facilities are not provided in the corridor, transit routes are subject to SR 99's overall operating conditions and performance.

As mentioned previously, transit services that serve the downtown have direct access into and out of the financial and retail core via the Seneca Street off-ramp and the Columbia Street on-ramp. However, these transit services that use the Seneca/Columbia ramps cannot effectively provide access to or from the southern portions of downtown or to the Pioneer Square and stadium areas.

Freight Access

The project corridor serves areas that generate substantial freight and truck traffic. Exhibit 4-23 shows the boundaries of the Duwamish/SODO manufacturing and industrial area and the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC), as determined by the City of Seattle.

The project area falls within the Duwamish/SODO manufacturing and industrial area. Freight using the viaduct through the project area is often destined for the BINMIC area. Light industrial and warehouse uses north and south of downtown Seattle in the SODO neighborhood also generate substantial truck traffic. Historically, freight-related businesses have clustered north and south of downtown Seattle to be near both marine and railroad access.

In addition to the industrial areas, trucks using the project corridor are destined to consumer markets throughout the city and the region.

Duwamish Industrial Area

The Duwamish Manufacturing and Industrial Center stretches over 4,974 acres from the area south of downtown Seattle, following the Duwamish River to unincorporated King County south of the Seattle city limits. It includes Boeing's Plant 2, most of the Port of Seattle, and over 1,700 businesses just within the city of Seattle. In 2000, 67,919 employees worked in the Duwamish Manufacturing and Industrial Center—an increase from 57,349 employees only 5 years earlier.

Marine access to the Duwamish industrial area is provided through the Port of Seattle and along the Duwamish Waterway. Railroad access is provided at the SIG and UPRR Argo Railyards. As described in Section 4.2.8 *Railroads*, the North SIG Railyard will be operational in 2008.

Highway access from this area to I-5 is provided in several locations: SR 519 from Fourth Avenue S., at S. Spokane Street from Sixth Avenue S. and the S. Spokane Street surface route, and at Industrial Way. Alternative access routes to I-5 south include SR 99 to SR 599, SR 99 to SR 509 and SR 518, and Airport Road S. Access to I-90 is provided from Fourth Avenue S. at SR 519 or from S. Spokane Street and from I-5 to I-90.

Freight trips in the North Duwamish area, including port-related trips, must share the street system with other uses, including stadium event and ferry access traffic—both of which can overwhelm the street network at times. Roads and rail lines intersect at many locations, and rail traffic preempts use of the roadway when train activity is present. Because trains are assembled at rail switching yards in the area, some train activity consists of switching movements that can block intersections for an extended time. This causes truckers to rely heavily on existing grade-separated facilities to avoid conflicts with rail or heavy traffic conflicts. These facilities include the Alaskan Way Viaduct, the Spokane Street Viaduct, and overpasses on Airport Way S., First Avenue S., and Fourth Avenue S. Phase 1 of the SR 519 Intermodal Access Project added a new grade separation at S. Atlantic Street to provide grade-separated access in the EB direction between First Avenue S. and Fourth Avenue S., I-90, and I-5. Phase 2 of the SR 519 Intermodal Access Project would add a corresponding WB connection by 2010.

Port of Seattle and Intermodal Railyards

The Port of Seattle is one of the largest west coast cargo centers, serving as the entry and exit point for marine cargo to and from the Pacific Rim and Alaska. Exhibit 4-24 shows Port of Seattle facilities, including marine cargo terminals at the following locations:

- Harbor Island and the SW Harbor (Terminals 5 and 18) south of the project area.
- Along Alaskan Way S. in the SE Harbor (Terminals 25, 30, 37, and 46).
- In the Interbay area north of the study area (Terminals 86 and 91).

The BNSF and UPRR intermodal railyards are also shown.

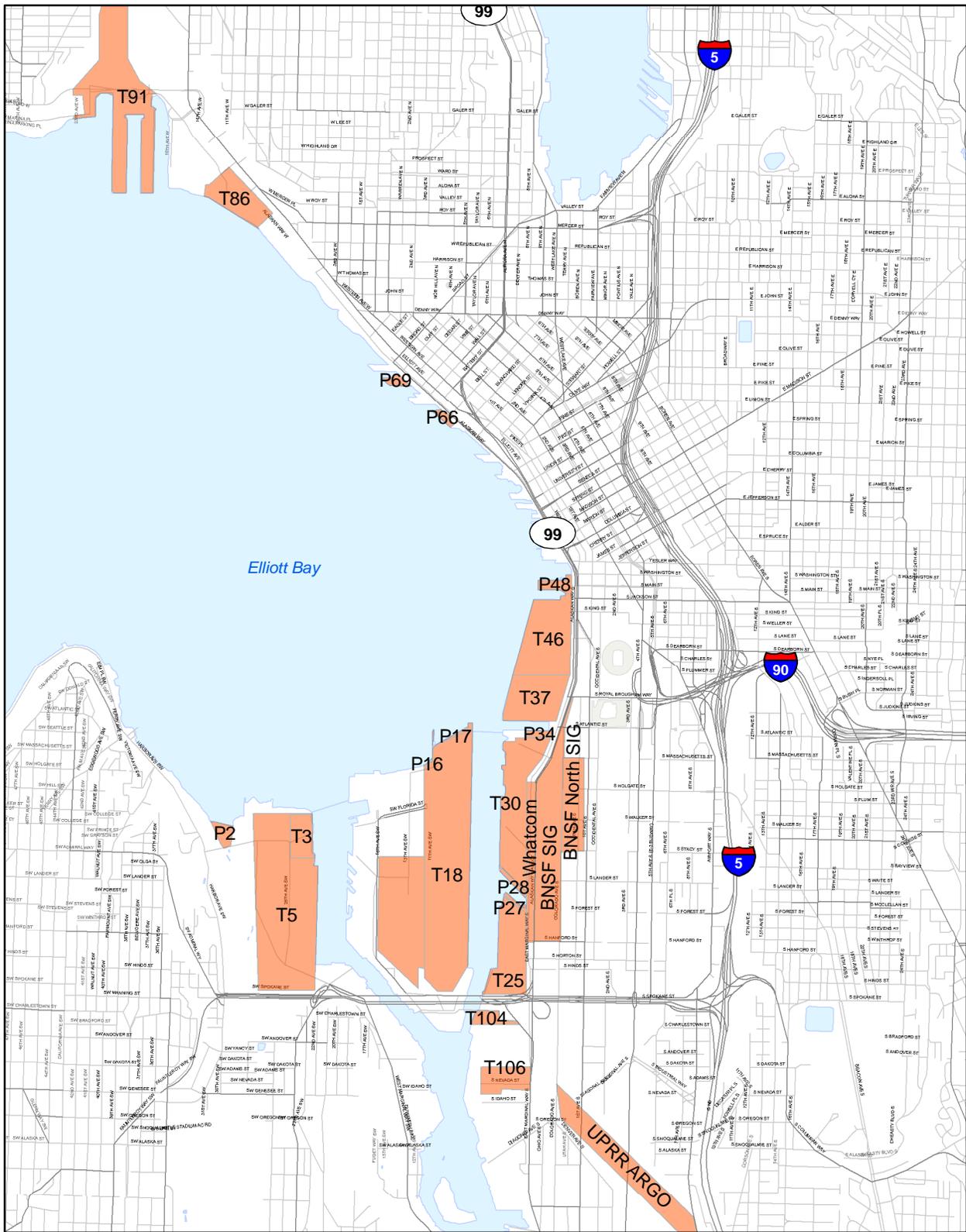
Most of the freight shipped through the port is in intermodal containers that are transferred to or from railroad cars or trucks on the dock. Terminals 5 and 18 were upgraded over the past decade to include on-dock rail facilities. However, some containers are shuttled (or “drayed”) by truck to or from the BNSF or UPRR intermodal railyards to be transferred to or from railroad cars remotely.

Terminals located along the SE Harbor do not have on-dock rail facilities. When ships are unloaded at these terminals, containers bound for inland locations by rail must be drayed between the terminal and the railyard. The primary dray route (i.e., the truck route between the container terminal and the railyard) is along E. Marginal Way S. to S. Hanford Street, under the Alaskan Way Viaduct to the SIG Railyard entrance. Other key truck arterials in the north Duwamish area include W. Marginal Way, Alaskan Way S., and S. Michigan and S. Hanford Streets.

BNSF has just recently opened the North SIG Railyard for operations. Based on information from the Port of Seattle, T-46 dray routes will be switching from the SIG Railyard to the North SIG Railyard to take advantage of the proximity of these two facilities. This will change the dray route from E. Marginal Way S. to S. Atlantic Street, Colorado Avenue S., and S. Massachusetts Street, directly across the tail track.

Truck arrivals at port gates are generally constant between 7:30 a.m. and about 3:30 p.m., with few arrivals during the noon hour when gate employees take lunch break. The Port’s gate operation determines when trucks can arrive and leave, including hours when the gates open and close and when employee breaks are observed. Recent information on truck traffic at T-46 from the Port of Seattle indicates a morning peak from 7:00 to 8:00 a.m. and an afternoon peak from 1:00 to 2:00 p.m. Truck traffic entering and exiting T-46 was recently counted by the Port of Seattle. Approximately 100 vehicles entered the terminal and 120 vehicles exited in the morning peak. T-46 is anticipated to provide approximately 50 percent of all truck traffic into and out of the North SIG Railyard.

FILE: \\stf\viaduct\GIS\3-Maps\EA\Ex 4-24 Port and Rail Facilities.mxd



0 0.5 1 Miles

Basemap Data Source: City of Seattle, 2006. Port of Seattle, 2007.

Exhibit 4-24 Railroad Yards and Port of Seattle Facilities

The North SIG Railyard is not yet fully operational, but is expected to process approximately 1,500 to 2,000 truck movements per day by 2015, with a large percentage arriving from T-46.

The tail track is estimated to be in operation approximately 8 hours out of a 24-hour period. With increased processing capabilities by both the railyard and the terminals, and the expectation of longer trains, the tail track is projected to be in use up to 16 hours per day, perhaps as early as 2015. As trains are built at any time during a 24-hour period, it is difficult to predict when the tail track may be in use or the duration of blockage, as it depends on the length of the train being built and the railyard operations.

Seattle Ferry Terminal Access

Passenger Connections

Loading and unloading takes place at the Seattle Ferry Terminal's upper level, from which a direct walkway crosses above Alaskan Way S. and below the viaduct, connecting to the sidewalk on the south side of Marion Street at First Avenue S. Passengers can also enter and exit at Alaskan Way S., where they can catch a bus or cross Alaskan Way S.

Automobile Access and Egress

Alaskan Way at Yesler Way is estimated to operate at an overall average of LOS B during both the AM and PM peak hours (Exhibit 4-25). Note, however, that the Yesler Way intersection experiences increased congestion while ferry vessels unload and load, and decreased congestion at other times. The data presented here represent the average for the entire AM and PM peak hours. This average represents conditions for traffic exiting and entering the terminal, and for through traffic on Alaskan Way.

Exhibit 4-25. Existing (2005) AM and PM Peak Hour Average Vehicle Delay (seconds) and LOS at the Seattle Ferry Terminal

Traffic Movement	Average AM Peak-Hour Conditions		Average PM Peak-Hour Conditions	
	Delay (sec)	LOS	Delay (sec)	LOS
Alaskan Way at Yesler Way	15	B	19	B

sec = seconds

Pedestrian and Bicycle Access

A widened sidewalk on the west side of Alaskan Way S., starting at about S. Washington Street and running along the central waterfront, fronts waterfront businesses and attractions and acts as a pedestrian promenade. South of S. Washington Street, a sidewalk is provided along the west side of Alaskan Way S.

An asphalt walkway is provided on the east side of Alaskan Way S. from S. Royal Brougham Way to the north. This path has a mix of users, including walkers and bicyclists.

Alaskan Way’s surface crossings are provided regularly at intersections. Intersections at S. Royal Brougham Way, Railroad Way S., S. Jackson Street, S. Main Street, S. Washington Street, and Yesler Way are signalized, allowing pedestrians to cross as Alaskan Way traffic is stopped (though pedestrians do have to contend with turning traffic from the side streets). Crosswalks are provided at S. King Street, but the intersection is not signalized.

Along Alaskan Way S. north of S. Royal Brougham Way, cyclists ride either in the street or on the parallel asphalt path. From S. Royal Brougham Way to the south, a bicycle lane is located on the east side of Alaskan Way S./E. Marginal Way S.

Pedestrians and bicycles on First Avenue S. may encounter heavy traffic and fast-moving vehicles at locations where traffic enters or exits SR 99.

Parking

As described in Section 4.2.6, the parking assessment is based on types of parking. Exhibit 4-26 summarizes the existing parking in the study area. By definition, the parking study area was delineated to quantify parking located near SR 99 and Alaskan Way S. that would be directly affected by the Project. This means, for example, that if a parking lot contained 20 spaces but only 5 spaces would be affected by the Project, only 5 spaces (not 20) are counted as existing parking in Exhibit 4-26.

Exhibit 4-26. Summary of Affected Existing Parking within the Study Area

On-Street Parking			Off-Street Parking	Total
Short-Term	Long-Term	Subtotal		
29	423	452	1,020	1,472

In the study area, on-street parking includes short-term parking (about 29 spaces) but predominantly consists of long-term parking (about 423 spaces). Off-street parking, which represents privately managed paid parking lots available for public use, represents about 1,020 stalls within the project area.

South of S. King Street, parking under the viaduct and along Alaskan Way S. is unmetered and available for use for up to 24 hours. These spots are primarily used for commuter parking and stadium events. Field observations suggest that waterfront workers who arrive early in the morning and leave in the midafternoon use many of these spaces.

To encourage the use of alternative transportation modes, City and regional policies discourage providing long-term free parking in urban activity centers. Conversely, providing sufficient short-term parking is considered vital, because businesses rely on short-term parking for their customers and suppliers. Short-term parking is available north, south, and east of the project area. Short-term parking in Pioneer Square and on sections of First Avenue S. requires payment at meters or pay stations. However, along most of First Avenue S. in the project area there is free parking with 1- and 2-hour limits. In addition, several blocks of free parking with no time limits are currently located near the Project on S. Massachusetts Street west of First Avenue S. and south of S. Massachusetts Street on Utah and Occidental Avenues S.

The PSRC 2006 Parking Inventory provides a breakdown of off-street pay parking utilization rates for the Seattle area (i.e., parking garages and lots). For the parking lots and garages within a quarter mile from the spaces affected by the Project, the average daily occupancy rate is approximately 37 percent. PSRC conducted the parking occupancy survey from March to June 2006, Monday through Thursday between 9:30 and 11:30 a.m. and 1:30 and 3:30 p.m. Each lot was surveyed during one morning and one afternoon, usually on the same day. Event days (e.g., days with Mariners games) would likely result in higher occupancy rates for the stadium area than the non-event occupancy rates.

Approximately 6,450 off-street parking stalls are located within a quarter mile from the parking spaces affected by the Project. With only about 37 percent of these being used on an average weekday, there are about 4,100 unused spaces in lots and garages within a quarter mile of the Project.

4.3.3 Safety

This safety discussion includes corridor design issues and collision history. Collision frequency, type, and severity were assessed for SR 99 between S. Spokane Street in the south and Valley Street in the north. The safety analysis was completed previously for the AWVSRP—this section is an excerpt of that work, which focuses on the project area. In addition, the data provided at the end of this section indicate the high-collision intersections on streets within the project area.

Corridor Design

SR 99 is a multi-lane, divided highway that travels through downtown Seattle within the study area. SR 99 is not a fully limited-access facility and does not meet access and other criteria normally associated with a freeway facility. As such, it most closely matches FHWA's "Principal Arterial – Other Freeways

and Expressways” category. The City of Seattle classifies SR 99 simply as a “Principal Arterial.”

SR 99 was opened to traffic in 1953 and designed to meet geometric standards that are less stringent than those typical for new highways today. Lane widths, shoulder widths, acceleration and deceleration lanes, and other geometric features on SR 99 generally conform to a lesser standard than those found on newer highway facilities.

Collision History

This section summarizes collision data for the Alaskan Way Viaduct, with an emphasis on SR 99 within the transportation study area. The analysis was conducted to describe the collision history on SR 99 in terms of rate of occurrence, crash types, and severity. Specific locations are identified where collisions occur with higher frequency or greater severity.

Collision Rates

Collision frequency, expressed as the number of collisions per million vehicle-miles traveled (MVMT), is a standardized measure that is useful for comparing collision rates between different segments of SR 99. It can also be used to compare collision rates on different highways.

Collision rates were calculated for five primary segments on SR 99 and are described in more detail in the *SR 99 Collision Analysis* report (Parsons Brinckerhoff 2005b). Two of these segments are wholly or partly located within the study area for this report: (1) S. Spokane Street to Stadiums and (2) Stadiums to Downtown. Generally, a segment was considered as beginning either 0.05 mile before an on-ramp or following an off-ramp, and ending 0.05 mile after the next off-ramp or before the next on-ramp. This definition typically results in uniform volumes and lane configurations within a segment.

The northbound (NB) segments are as follows:

- S. Spokane Street to Stadiums: From before the S. Spokane Street on-ramp, to before the First Avenue S. on-ramp.
- Stadiums to Downtown: From before the First Avenue S. on-ramp, to after the Seneca Street off-ramp.

The southbound (SB) segments are:

- Downtown to Stadiums: From before the Columbia Street on-ramp, to after the First Avenue S. off-ramp.
- Stadiums to S. Spokane Street: After the First Avenue S. off-ramp, to after the S. Spokane Street off-ramp.

Collision data supplied by WSDOT included crashes that occurred on the SR 99 mainline, as well as those on the first 250 feet of any adjacent ramps. Segment collision rates were calculated for the mainline only, and also for the mainline plus adjacent ramp sections (Exhibits 4-27 and 4-28).

In the NB direction, SR 99 was found to have an overall collision rate of 1.40 collisions per MVMT for the mainline only, and 1.62 for the mainline and connecting ramp segments. The collision rate for the S. Spokane Street to Stadiums segment is very low—less than half the corridor average. Many accidents that occur in this segment happen where the roadway climbs from at-grade to the top level of a stacked aerial structure. This location also has a slight reverse curve on the mainline as the roadway braids to the stacked structure.

Exhibit 4-27. Collision Rates for Northbound SR 99 Segments (2000–2003)

Segment	Collisions per MVMT	
	Mainline Only	Mainline and Ramps ¹
NB S. Spokane Street - Stadiums	0.69	0.70
NB Stadiums - Downtown	1.93	2.14
SR 99 Corridor Average	1.40	1.62

¹ Includes collisions on ramps that occur within 250 feet of the mainline.

Exhibit 4-28. Collision Rates for Southbound SR 99 Segments (2000–2003)

Segment	Collisions per MVMT	
	Mainline Only	Mainline and Ramps ¹
SB Downtown - Stadiums	3.27	3.71
SB Stadiums – S. Spokane Street	0.77	0.83
SR 99 Corridor Average	1.41	1.57

¹ Includes collisions on ramps that occur within 250 feet of the mainline.

The NB Stadiums to Downtown segment experiences a relatively high collision rate of 1.93 collisions per MVMT for the mainline only, and 2.14 for the mainline and connecting ramp segments. Weaving movements and back-ups from the Seneca Street off-ramp likely contribute to higher collision rates on this segment. This segment also carries the highest volume of traffic on the corridor, which could also be a contributing factor. Another possible contributing factor for some collisions on this segment may be driver distraction, as the aerial segment provides panoramic views of the downtown skyline, Elliott Bay, and the Olympic Mountains.

Southbound, the overall mainline collision rate is nearly identical to northbound: 1.41 collisions per MVMT. However, when both the mainline and connecting ramps are considered, the SB collision rate is slightly lower

than the NB rate (1.57 versus 1.62 collisions per MVMT). Overall, NB and SB segments show a similar pattern of collision occurrences.

The highest collision rates on the corridor for either direction of travel are on the SB Downtown to Stadiums segment, with 3.27 collisions per MVMT for the mainline only, and 3.71 for the mainline and connecting ramp segments. A number of factors could contribute to these high collision rates, including a high concentration of traffic, a left-side merge with a short acceleration lane, a major weaving movement between adjacent ramps, and a left-side off-ramp following in quick succession.

The SB Stadiums to S. Spokane Street segment exhibits lower collision rates than the corridor average. Ramp connections within these segments are exclusively add or drop lanes, and conflicts between traffic movements are minimal.

Overall, collision rates on SR 99—which range from 1.40 to 1.62 collisions per MVMT, depending on whether ramp crashes are included—are slightly higher but similar to the average systemwide collision rates historically reported for other urban, limited-access freeways in Washington. The statewide rate was 1.32 collisions per MVMT in 2003, and rates dating back to 1996 have been as high as 1.60 collisions per MVMT.

Collision Type

To help identify possible factors associated with collisions, the project team reviewed the proportion of collisions by type for the major corridor segments. Collision rates specific to each crash type were also calculated. Collisions are grouped into the following categories:

- Fixed-Object: Collisions with roadside barriers or objects (walls, guardrails, other roadside appurtenances).
- Rear-End: Collisions where one or more vehicles strike slower-moving or stopped vehicles from behind.
- Sideswipe: Side-to-side collisions between two vehicles traveling in the same direction, often involving a lane change or straying from the travel lane.
- Enter-at-Angle: Collisions with vehicles entering the roadway from side-street connections.
- Pedestrian: Collisions between vehicles and pedestrians or bicycles.
- Other/Unknown: All other collision types, including the wrong direction of travel, overturned vehicles, and other unknown or unclassified collision types.

Exhibit 4-29 summarizes the share of collisions by crash type for NB SR 99. Fixed-object (33 percent), rear-end (29 percent), and sideswipe (20 percent) collisions predominate on NB SR 99. Fixed-object collisions are most prevalent NB on the following segments:

- 46 percent of collisions are fixed-object on the NB S. Spokane Street to Stadiums segment.
- 41 percent of collisions are fixed-object on the NB Stadiums to Downtown segment.
- Rear-end collisions are next most prevalent at 27 percent on the NB S. Spokane Street to Stadiums segment and 28 percent on the NB Stadiums to Downtown segment.

Exhibit 4-29. Mainline Collision Types for Northbound SR 99 Segments

Segment	Collision Types					
	Fixed-Object	Rear-End	Sideswipe	Enter-at-Angle	Pedestrian	Unknown/Other ¹
NB S. Spokane Street - Stadiums	46%	27%	13%	2%	0%	12%
NB Stadiums - Downtown	41%	28%	22%	0%	0%	9%
SR 99 Corridor Average	33%	29%	20%	5%	2%	11%

¹ Roll over, wrong direction of travel, or unknown/unclassified.

Exhibit 4-30 summarizes the share of collisions by crash type for SB SR 99.

Sideswipe collisions tend to account for a greater share of collisions in locations where ramp locations and configurations lead to more lane changing activity. This is found SB between the Columbia Street on-ramp and the First Avenue S. off-ramp. However, fixed-object and rear-end collisions also account for 30 percent each of all accidents in this segment.

Exhibit 4-30. Mainline Collision Types for Southbound SR 99 Segments

Segment	Collision Types					
	Fixed-Object	Rear-End	Sideswipe	Enter-at-Angle	Pedestrian	Unknown/Other ¹
SB Downtown – Stadiums	30%	31%	31%	2%	0%	6%
SB Stadiums – S. Spokane Street	30%	50%	13%	0%	0%	7%
SR 99 Corridor Average	29%	34%	24%	4%	2%	7%

¹ Roll over, wrong direction of travel, or unknown/unclassified.

Rear-end collisions predominate on the SB Stadiums to S. Spokane Street segment at 50 percent, although the general frequency of collisions is low on this segment.

Collision Severity

Exhibits 4-31 and 4-32 summarize collision severity for the SR 99 corridor segments. Collisions are classified as either property-damage-only collisions or injury collisions.

Exhibit 4-31. Collision Severity for Northbound SR 99 Segments

Segment	Property Damage Only	Injury	Mainline Injury Collisions per MVMT
NB S. Spokane Street - Stadiums	60%	40%	0.28
NB Stadiums - Downtown	71%	29%	0.56
SR 99 Corridor Average	65%	35%	0.49

Exhibit 4-32. Collision Severity for Southbound SR 99 Segments

Segment	Property Damage Only	Injury	Mainline Injury Collisions per MVMT
SB Downtown - Stadiums	69%	31%	1.03
SB Stadiums – S. Spokane Street	50%	50%	0.39
SR 99 Corridor Average	61%	39%	0.54

The corridor-average injury collision rates are 0.49 injury collision per MVMT for NB SR 99 and 0.54 injury collision per MVMT for SB SR 99. These rates are close to the 2003 statewide average injury collision rate for urban limited-access freeways, which was 0.49 injury collision per MVMT.

Although the NB Stadiums to Downtown segment has a higher than average overall collision rate, the share of injury collisions is relatively low. Therefore, injury collisions on this segment occur at only a slightly higher than average rate compared to the overall corridor.

The SB Downtown to Stadiums segment (SB SR 99 between the Columbia Street on-ramp and First Avenue S. off-ramp) experiences the highest crash rate on the corridor, and also exhibits a high rate of injury collisions relative to the rest of the corridor. A combination of factors likely contributes to these elevated crash rates, including narrow lanes, little roadside clearance, a left-side merge from Columbia Street, a left-side diverge to First Avenue S., heavy weaving movements associated with left-side on- and off-ramp traffic, and high congestion levels.

Local Streets

Several high-collision intersections are located within the project area. The City of Seattle provided data on the signalized intersections with 10 or more collisions annually, and on unsignalized intersections with 5 or more collisions annually. In 2005 the unsignalized intersection at Alaskan Way S. and S. King Street experienced 9 collisions. In 2006, the number of collisions dropped to 5, and in 2007 it was less than 5 collisions. The signalized intersection at First Avenue S. and S. Atlantic Street had 10 collisions in 2007. Fewer than 10 collisions occurred at that intersection in 2005 and 2006.

Seattle trucking interests have expressed safety concerns with bicycle interface points. Within the study area, Alaskan Way S. and First Avenue S. are arterial streets commonly used by bicyclists and also are identified as major truck streets. S. Holgate Street and S. Royal Brougham Way are major truck streets that interface with First Avenue S. These locations where truck and bicycle routes intersect or are co-located could raise safety concerns.

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Chapter 5 OPERATIONAL EFFECTS AND BENEFITS

To gauge potential effects to the transportation system and assess transportation performance, SR 99 and related transportation systems were analyzed with and without the Project under 2030 forecasted conditions. As outlined in Section 2.3, these future transportation system conditions were established based on forecasts of regional population and employment, socioeconomic conditions, and transportation system pricing (parking, tolls, fares) developed by PSRC and reflected in its EMME/2 travel demand model. The 2030 Build Alternative reflects projected conditions, assuming the Project is in place.

The project team investigated a 2030 Baseline Scenario that presumes SR 99's current configuration against the backdrop of forecasted 2030 conditions. This scenario serves to establish baseline information for system performance, against which conditions for the Project may be compared.

These future conditions presume a limited number of new transportation facilities and services by 2030, under both the 2030 Build Alternative and the 2030 Baseline Scenario.

In addition to the 2030 Baseline and 2030 Build conditions, year-of-opening conditions are evaluated in Section 5.4.

5.1 Mobility

Mobility measures include travel demand and traffic patterns and AM and PM peak-hour traffic operations for the forecast year. Refer to Section 5.4 for year-of-opening mobility information. Effects and benefits for each measure are described in the following sections.

5.1.1 Travel Demand and Traffic Patterns

Key Findings

- Travel patterns on SR 99 and its ramps would be affected by the Project due to the addition of new access ramps south of S. King Street. Vehicles using these new ramps would be drawn from other ramps in the SR 99 corridor, in particular the Seneca Street/Columbia Street ramps. Some vehicles that currently use the surface street network south of S. King Street (E. Marginal Way S., First Avenue S.) may also switch to SR 99 due to the new access.

Alaskan Way Viaduct (SR 99) Users

The project team developed detailed AM and PM peak-hour traffic estimates for the 2030 Baseline Scenario and the Build Alternative for SR 99 through the study area. Traffic volumes are presented for each connection to SR 99 (ramps or side streets) and for each mainline segment (section of SR 99 between connections). The project team estimated year 2030 traffic volumes based on current volumes, which were adjusted to reflect the growth and traffic redistribution forecasted by the AWV model.

2030 Baseline Mainline and Ramp Volumes – AM Peak Hour

Traffic volumes on the SR 99 corridor are highest during commuting hours. In the morning, peak-hour traffic volumes on SR 99 are fairly directional, with heavier volumes entering the central downtown. AM and PM peak-hour mainline and ramp volumes forecasted for the 2030 Baseline Scenario are shown in Exhibit 5-1.

The downtown ramps that provide access to and from the south reflect this directionality: more vehicles exit NB at Seneca Street (1,050 vehicles) than enter SB at Columbia Street (355 vehicles). The First Avenue S. ramps also show directionality, with 1,500 vehicles exiting SB but only 845 vehicles entering NB. South of downtown and the stadium area, mainline volumes are considerably higher in the NB direction (4,915 vehicles) than in the SB direction (2,885 vehicles). At S. Spokane Street, volumes entering NB from West Seattle (1,765 vehicles) are more than double those exiting SB to West Seattle (750 vehicles).

2030 Baseline Mainline and Ramp Volumes – PM Peak Hour

Similar to the AM peak, PM peak-hour traffic volumes along SR 99 are directional, with heavier volumes leaving the central downtown area (see Exhibit 5-1).

The downtown ramps that provide access to and from the south show this directionality, with more vehicles entering SB at Columbia Street (1,230 vehicles) than those exiting NB at Seneca Street (680 vehicles). The First Avenue S. ramps also show directionality, with 1,310 vehicles entering NB but only 920 vehicles exiting SB. South of downtown and the stadium area, mainline volumes are higher in the SB direction (4,915 vehicles) than in the NB direction (4,120 vehicles). At S. Spokane Street, volumes exiting SB to West Seattle (1,955 vehicles) are almost double those entering NB from West Seattle (1,190 vehicles).

FILE: \\sif\viaduct\GIS\Ex-3\Maps\EA\Ex 5-1 2030 Baseline SR 99 Mainline and Ramp Volumes.mxd

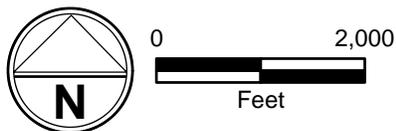
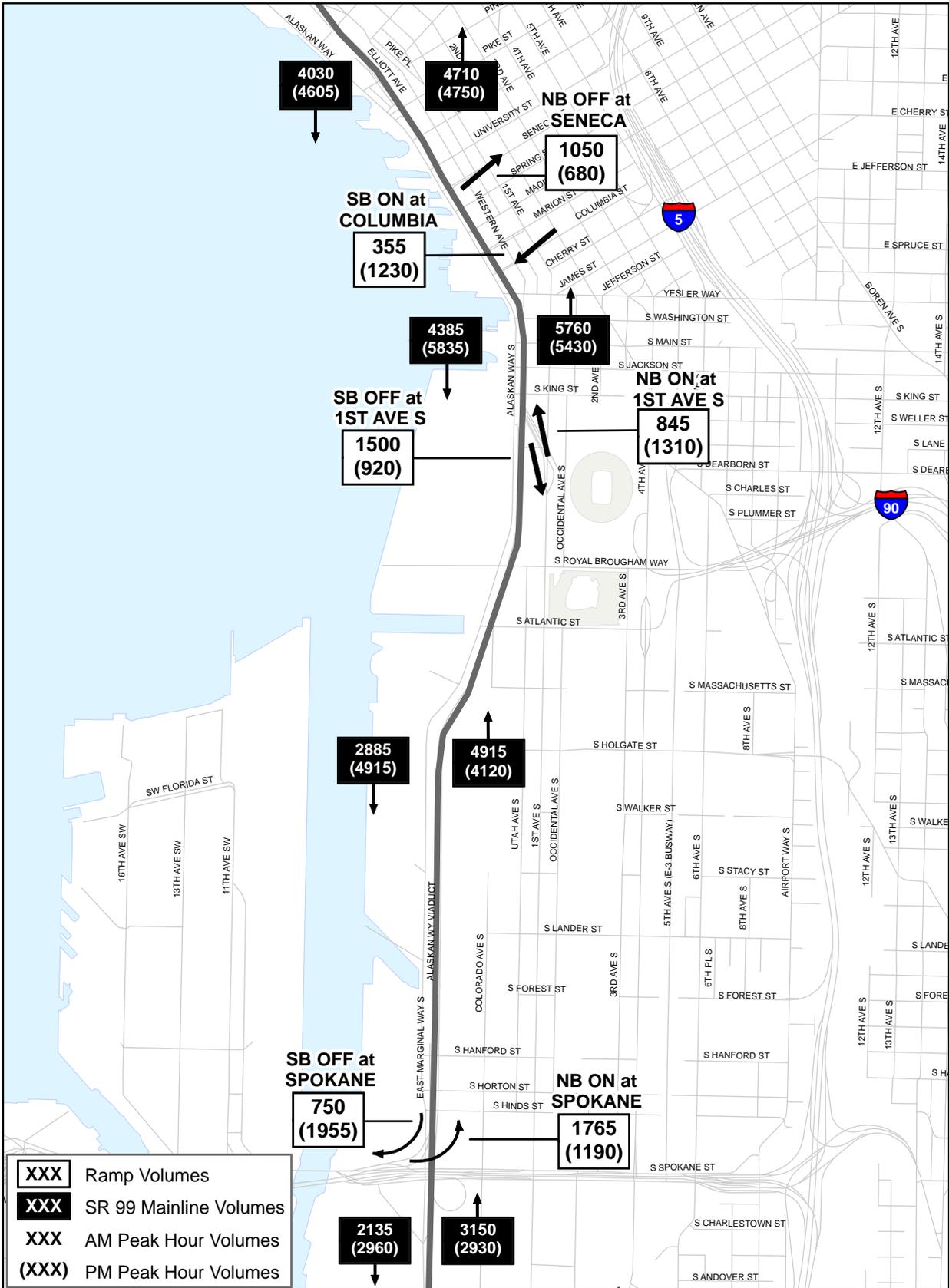


Exhibit 5-1
2030 Baseline
SR 99 Mainline and Ramp Volumes
AM and PM Peak Hour

2030 Build Alternative Mainline and Ramp Volumes – AM Peak Hour

The 2030 AM and PM peak-hour mainline and ramp volumes forecasted for the Build Alternative are shown in Exhibit 5-2.

The Build Alternative has a new SB on-ramp and a new NB off-ramp at S. King Street. At this location, 730 vehicles are projected to exit via the NB off-ramp during the AM peak hour, and 280 vehicles are projected to enter via the SB on-ramp. Compared to the 2030 Baseline Scenario, because of these new ramps, mainline SR 99 volumes for the Build Alternative north of S. King Street would be approximately 9 percent lower in the NB direction and approximately 13 percent lower SB.

At the Seneca Street off-ramp downtown, traffic exiting NB SR 99 is anticipated to decrease by approximately 11 percent (from 1,050 to 930 vehicles) with the Build Alternative. Traffic entering SB SR 99 from the Columbia Street on-ramp is anticipated to decrease by approximately 15 percent (from 355 to 300 vehicles).

The volumes at the First Avenue S. ramps are not anticipated to change substantially from 2030 Baseline volumes.

2030 Build Alternative Mainline and Ramp Volumes – PM Peak Hour

At the new S. King Street ramps, 475 vehicles are projected to exit via the NB off-ramp during the PM peak hour, and 965 vehicles are projected to enter via the SB on-ramp. Because of these new ramps, mainline SR 99 volumes for the Build Alternative in the vicinity of S. King Street would be approximately 5 percent lower in the NB direction and approximately 9 percent lower in the SB direction compared to 2030 Baseline conditions.

At the Seneca Street off-ramp downtown, traffic exiting NB SR 99 is anticipated to decrease by approximately 10 percent (from 680 to 610 vehicles) with the Build Alternative. Traffic entering SB SR 99 from the Columbia Street on-ramp is anticipated to decrease by approximately 15 percent (from 1,230 to 1,040 vehicles). Volumes at the First Avenue S. ramps are not anticipated to change substantially from the 2030 Baseline.

Arterial and Local Street Forecasts

To analyze traffic operations, the project team developed traffic estimates for selected links and intersections on arterials and local streets within the study area. The intersections selected for study are shown in Exhibit 2-2 (Chapter 2) and include all ramp termini and congested or high-volume intersections.

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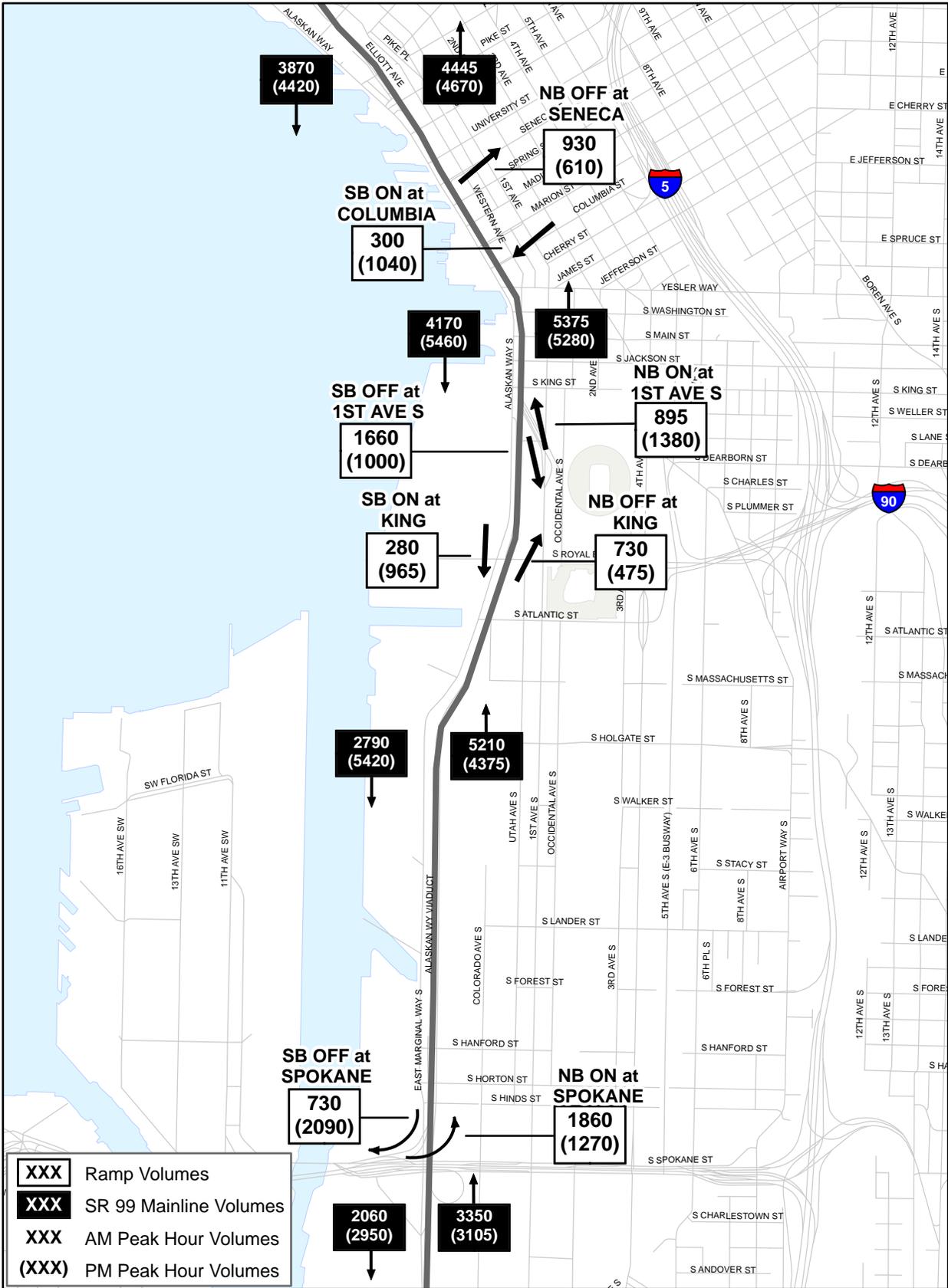


Exhibit 5-2
2030 Build Alternative
SR 99 Mainline and Ramp Volumes
AM and PM Peak Hour

5.1.2 Traffic Operations

Key Findings

- Additional trips drawn to SR 99 by the S. King Street ramps are not expected to substantially affect traffic flow along SR 99 south of the new ramps, and operations on SR 99 north of S. King Street may improve somewhat due to redistribution of traffic to the new ramp locations.
- Project elements would change travel patterns and operating conditions in the study area. The S. King Street/Alaskan Way S. and First Avenue S./S. Royal Brougham Way intersections are expected to particularly benefit from improved traffic operations as a result of the Project.
- While travel patterns would change to some degree, the project elements are not expected to substantially affect traffic conditions at the First Avenue S. and S. Atlantic Street intersection, which is expected to experience similar conditions (LOS E during the PM peak) under the 2030 Baseline as with the Project.
- Changes in surface street operations are not expected to affect SR 99 or ramp traffic conditions.
- The Project would provide a new, grade-separated connection under the BNSF tail track. This undercrossing would provide for continuous access across the tracks, which is not possible today or under the future baseline conditions. The new undercrossing would result in a complex set of intersections at the convergence of E. Marginal Way S., T-46, Alaskan Way S., Colorado Avenue S., and S. Atlantic Street. Especially long traffic signal cycle lengths would be needed to accommodate all movements at this location. As a result, average vehicle delays at this location are expected to be relatively high. However, overall conditions are expected to be improved relative to the 2030 Baseline given the uninterrupted availability of access across the tail track.

SR 99 Mainline Level of Service

This section presents the AM and PM peak-hour LOS for corridor segments under the 2030 Baseline Scenario and the Build Alternative. As described in Chapter 2, LOS is a standard measure of intersection performance that describes the degree of congestion forecasted. LOS is measured on a scale from A (best level of service, representing free-flow conditions), to F (very congested breakdown conditions).

Mainline traffic performance was modeled using VISSIM simulation software. LOS for mainline and ramp operations is calculated based on speed and density, as observed in the VISSIM model. Although LOS can indicate how a facility performs overall, it is not always a straightforward means of comparing scenarios, because ramp and segment arrangements vary among the scenarios.

2030 Baseline Level of Service

Exhibits 5-3 and Exhibit 5-4 show the SR 99 mainline LOS by segment for the existing facility for year 2030 travel demands during the AM and PM peak hours, respectively. These findings generally reflect the existing conditions described in Chapter 4, but with some increases in congestion due to growth in travel demand. Under most conditions, this corridor is expected to operate under LOS D or E conditions by 2030. The exception is during the AM peak hour in the SB direction south of the First Avenue S. ramps, where LOS B conditions are forecasted.

Exhibit 5-3. 2030 Baseline AM Peak Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	E	D	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	B	D	S. Spokane Street to First Avenue S.

Exhibit 5-4. 2030 Baseline PM Peak Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	E	D	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	D	D	S. Spokane Street to First Avenue S.

Build Alternative Level of Service

The Build Alternative includes a number of changes that are expected to affect traffic operations, including new access to/from the SR 99 mainline in the stadium area. As shown in Exhibits 5-5 and 5-6, LOS D, E, and F conditions are forecasted for peak travel directions under the Build Alternative: NB in the AM peak, SB in the PM peak. The other travel direction operates at LOS C or D during the AM peak and LOS D during the PM peak.

Exhibit 5-5. Build Alternative (2030) AM Peak Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	D	D	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	C	F	S. Spokane Street to S. King Street Off

Exhibit 5-6. Build Alternative (2030) PM Peak Hour SR 99 Segment LOS

	Southbound	Northbound	
Columbia On to First Avenue S. Off	E	D	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	E	D	S. Spokane Street to S. King Street Off

As a whole, mainline traffic operations for the Build Alternative would be comparable to the 2030 Baseline Scenario. The main exception is from S. Spokane Street to S. King Street, where higher volumes (attracted to SR 99 due to new access at S. King Street) would cause the LOS to deteriorate to LOS F. Although the LOS indicates congestion at this location, the speed would still be relatively high (40 mph). Therefore, although the density of vehicles on the roadway would be relatively high (contributing to the degraded LOS), traffic would still move at a reasonable speed, and breakdowns in flow are not expected.

SR 99 Mainline Speeds

This section presents the AM and PM peak-hour travel speeds for corridor segments for the 2030 Baseline Scenario and the Build Alternative. Mainline traffic speeds were modeled using VISSIM simulation software. Travel speed results for the corridor segments confirm the LOS findings for the 2030 Baseline Scenario: they show congested conditions causing slower speeds on the existing facility in 2030 NB during the AM peak (Exhibit 5-7), and in both directions during the PM peak (Exhibit 5-8).

Under the Build Alternative (Exhibits 5-9 and 5-10), peak-period travel speeds are generally expected to be the same, although some slowing is expected to occur on the southern segment (from S. King Street to S. Spokane Street) due to increased volumes and exiting movements to the NB off-ramp at S. King Street, which would provide improved access from the south. The additional traffic is expected to come from parallel arterial routes such as First Avenue S. Conversely, travel speeds are expected to improve on the northern segment (from Columbia Street to First Avenue S.), because fewer vehicles would be traveling this segment due to the new access at S. King Street. Therefore, these vehicles would travel in a more direct route to their destination.

Exhibit 5-7. 2030 Baseline AM Peak Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	40	40	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	50	50	S. Spokane Street to First Avenue S.

Exhibit 5-8. 2030 Baseline PM Peak Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	30	20	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	45	50	S. Spokane Street to First Avenue S.

Exhibit 5-9. Build Alternative (2030) AM Peak Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	40	40	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	45	40	S. Spokane Street to S. King Street Off

Exhibit 5-10. Build Alternative (2030) PM Peak Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	40	40	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	40	45	S. Spokane Street to S. King Street Off

Arterial Traffic Performance

To assess the effects of the 2030 Baseline Scenario and the 2030 Build Alternative on the surface street network, traffic operations at study area signalized intersections have been evaluated. Traffic operations at these locations can be affected by redistribution effects caused by (1) changes to street grid connections, (2) changes to the intersection configurations or traffic control (signals), or (3) relocation of access points to the SR 99 corridor, which affects how traffic distributes to and from the SR 99 corridor.

All intersections directly affected by, or created as a result of, implementation of the Build Alternative are analyzed. Other major, signalized intersections within the study area are assessed as well; these are concentrated along First Avenue S., Alaskan Way S., and S. Atlantic Street.

The traffic analysis software package Synchro was used to quantify the LOS and average vehicle delays at selected intersections in the project area for projected AM and PM peak hour conditions under anticipated 2030 traffic demand. Traffic routing would vary at the new undercrossing location, depending on whether a train is present in the railroad crossing. The Synchro results presented here reflect conditions during periods of time when the railroad tracks are not blocked. Effects of rail operations are assessed in the following section. Results of this analysis are shown in Exhibits 5-11 and 5-12.

Exhibit 5-11. Intersection Level of Service

Street	Cross Street	2005	2030	2030	2005	2030	2030
		Existing	Baseline	Build	Existing	Baseline	Build
		AM PEAK HOUR			PM PEAK HOUR		
Alaskan Way S.	S. King Street ¹	C	E	A	F	F	D
Alaskan Way S.	Ferry Holding	A	A	B	A	A	A
Alaskan Way S.	S. Royal Brougham Way	B	C	-	C	C	-
NB Alaskan Way S.	S. Royal Brougham Way ²	-	-	C	-	-	C
NB Alaskan Way S	S Atlantic Street	-	-	B	-	-	A
First Avenue S.	S. Royal Brougham Way	C	F	C	D	E	D
First Avenue S.	S. Atlantic Street	C	E	D	D	E	E
First Avenue S.	S. Massachusetts Street ³	E	A	A	E	A	A
First Avenue S.	S. Holgate Street	B	B	B	C	C	C
First Avenue S.	S. Lander Street	B	B	B	C	D	D
Colorado Avenue S.	SB Alaskan Way S./ S. Atlantic Street ⁴	-	-	F	-	-	E
E. Marginal Way S.	T-46 Driveway/ S. Atlantic Street ⁴	-	-	D	-	-	D

¹ This intersection is unsignalized for existing conditions and the 2030 Baseline Scenario, and signalized in the 2030 Build Alternative.

² This intersection is unsignalized in the 2030 Build Alternative.

³ This intersection is currently unsignalized but is assumed to be signalized in both the 2030 Baseline and 2030 Build Alternative.

⁴ These intersections are unsignalized for the existing condition, signalized for the Baseline and Build conditions, and have different configurations for the existing conditions, 2030 Baseline Scenario, and 2030 Build Alternative. Consistent comparison of LOS is therefore not possible.

Exhibit 5-12. Intersection Average Vehicle Delay (seconds)

Street	Cross Street	2005	2030	2030	2005	2030	2030
		Existing	Baseline	Build	Existing	Baseline	Build
		AM PEAK HOUR			PM PEAK HOUR		
Alaskan Way S.	S. King Street ¹	24	43	6	68	120	44
Alaskan Way S.	Ferry Holding	4	4	13	4	6	6
Alaskan Way S.	S. Royal Brougham Way	13	26	-	22	25	-
NB Alaskan Way S.	S. Royal Brougham Way ²	-	-	20	-	-	17
NB Alaskan Way S	S Atlantic Street	-	-	11	-	-	6
First Avenue S.	S. Royal Brougham Way	33	108	29	54	74	36
First Avenue S.	S. Atlantic Street	28	57	36	45	76	63
First Avenue S.	S. Massachusetts Street ³	48	7	6	38	6	7
First Avenue S.	S. Holgate Street	17	16	17	21	33	34
First Avenue S.	S. Lander Street	14	20	19	25	39	39
Colorado Avenue S.	SB Alaskan Way S. / S. Atlantic Street ⁴	-	-	90	-	-	59
E. Marginal Way S.	T-46 Driveway / S. Atlantic Street ⁴	-	-	47	-	-	39

¹ This intersection is unsignalized for existing conditions and the 2030 Baseline Scenario, and signalized in the 2030 Build Alternative.

² This intersection is unsignalized in the 2030 Build Alternative.

³ This intersection is currently unsignalized but is assumed to be signalized in both the 2030 Baseline and 2030 Build Alternative.

⁴ These intersections are unsignalized for the existing condition, signalized for the Baseline and Build conditions, and have different configurations for the existing conditions, 2030 Baseline Scenario, and 2030 Build Alternative. Consistent comparison of LOS is therefore not possible.

The project team made the following observations based on the results of the Synchro analysis:

- The proposed intersection of Colorado Avenue S./SB Alaskan Way S./ S. Atlantic Street would operate with a delay rating of LOS F during the AM peak hour and LOS E during the PM peak hour. This intersection is unsignalized and configured differently today, hence a direct LOS comparison to baseline conditions is not a useful comparison. However, the simulation model did indicate that the level of traffic volumes expected at this intersection under future baseline conditions would make truck movements from NB Colorado Avenue S. to WB S. Atlantic Street very difficult given that the intersection is unsignalized.

- During the PM peak hour, First Avenue S./S. Atlantic Street would continue to operate at LOS E conditions.
- The remaining study intersections would operate at LOS D or better conditions during the AM and PM peak hours. Operations at First Avenue S. and S. Royal Brougham Way are expected to improve compared to baseline conditions.

LOS E represents traffic operations that are at or near capacity. For this reason, a discussion of operations at these locations follows.

Colorado Avenue S./Alaskan Way S./S. Atlantic Street

During the AM peak hour, the new Colorado Avenue S./Alaskan Way S./S. Atlantic Street intersection is projected to operate at LOS F conditions, due in large part to high levels of anticipated truck use. During the PM peak hour, LOS E conditions are forecasted. These LOS results in part reflect the complexity of the proposed intersection configuration, which necessitates signalization using very long cycle lengths to accommodate all movements. The signal system for this location must provide not only for movements that occur specifically at this intersection, but also for those at the adjacent E. Marginal Way S./T-46 Driveway/S. Atlantic Street intersection as well. Furthermore, the signal system includes provisions to accommodate rail crossings on the BNSF tail track while diverting traffic to the new undercrossing. As a result, even under moderately congested conditions, travelers would face delays at this location as the traffic signal cycles through all necessary signal phases.

Given these constraints, additional lane geometry improvements or imposition of traffic restrictions would be necessary to reduce anticipated delays below those levels forecast.

First Avenue S./S. Atlantic Street

This intersection is projected to operate well (LOS D) during the AM peak hour, but it is expected to be more congested (LOS E) during the PM peak hour. PM peak conditions are slightly improved relative to the 2030 Baseline conditions. Further signal optimization could potentially reduce delay for lower-volume movements at the intersection, but the tested signal phasing at this intersection was designed to give priority to the heavy north-south flow of vehicles traveling through the intersection on First Avenue S, as well as eastbound flow from S. Atlantic Street. Congestion at this location does not appear to substantially affect operations at adjacent intersections given the tested signal timings.

Estimating Effects of the Tail Track Crossing

Intersection traffic operations were analyzed to estimate the associated delay, but this analysis did not specifically account for potential effects associated with train crossings on the BNSF tail track east of E. Marginal Way S. at S. Atlantic Street.

Under baseline conditions, many traffic movements on Alaskan Way S., E. Marginal Way S., and S. Atlantic Street would be blocked when trains occupy the BNSF tail track (used primarily to switch railroad cars to build trains in BNSF's SIG Railyard). In some cases, traffic can detour around the blocked crossings, but in most cases, traffic must simply wait out the crossing. With the Build Alternative, the new undercrossing at S. Atlantic Street would provide an uninterrupted route in most cases.

The following routes are affected:

Alaskan Way S. to E. Marginal Way S.

This route does not cross the tail track but can be affected by traffic queuing to turn at S. Royal Brougham Way or S. Atlantic Street when the rail crossings are blocked. These blocked turning movements can extend into the through travel lanes, blocking or slowing through traffic.

With the Build Alternative, southbound travelers would have to cross the tail track. When the track is blocked, they would not be allowed to wait and queue for the crossing, but would instead be instructed to continue traveling with the predominant flow toward First Avenue S. Drivers would be able to circle the block to access the new undercrossing indirectly from this direction. Northbound travelers would be able to use the undercrossing when the tail track is occupied.

T-46 to North SIG Railyard or SR 519/First Avenue S.

Under baseline conditions, trucks traveling between T-46 and points east would have to wait while trains occupy the tail track crossing. Only north/south access on Alaskan Way S. and E. Marginal Way S. would be available at these times.

The Build Alternative would provide a full-time bypass for these trips, allowing uninterrupted access.

Alaskan Way S./E. Marginal Way S. to Stadium Area

Access to First Avenue S. in the stadium area would be blocked at S. Royal Brougham Way and S. Atlantic Street during railroad crossings under the Baseline Scenario. Northbound trips could choose to continue to S. King Street, where they could cross to First Avenue S.

and circle back toward the stadium area. However, northbound flow on E. Marginal Way S. would typically be blocked once a few drivers chose to wait for the railroad crossing (rather than circle around), which would substantially disrupt northbound flow when rail activity was ongoing. Southbound drivers would typically be beyond S. King Street before becoming aware of a blocked crossing, hence most drivers would be unable to detour (unless they were to perform a U-turn or continue all the way south to S. Hanford Street).

The Build Alternative would provide a full-time bypass for these trips, allowing uninterrupted access.

The effects associated with rail crossings at this location are dependent on the frequency and duration of the blockages. Because the track is used for switching activities, train operations are unpredictable. Through discussions with the Port of Seattle and BNSF, the project team has learned that under worst-case conditions, the railroad crossing could be occupied as much as 30 minutes out of the hour at times under conditions in 2030. Less crossing activity is possible, and probably likely. To help understand how the Baseline Scenario and Build Alternative would operate given potential levels of train activity, a series of traffic simulation tests were conducted. These tests used the traffic simulation models SimTraffic and VISSIM to replicate blockages associated with various levels of train activity corresponding to (1) no train crossings during the peak hour, (2) a single 10-minute train crossing during the peak hour, and (3) three 10-minute crossings during the peak hour.

These simulations demonstrate that any train crossing activity would affect traffic operations on E. Marginal Way S., Alaskan Way S., and S. Atlantic Street under either the Baseline Scenario or Build Alternative. Because the Baseline network does not provide a detour route when the rail crossings are occupied, conditions deteriorate rapidly with any train activity. With just one 10-minute crossing during the PM peak hour, queuing would form on northbound E. Marginal Way S. and southbound Alaskan Way S., with LOS D to LOS E conditions likely along Alaskan Way S. and E. Marginal Way S. south of S. Royal Brougham Way. With three 10-minute train crossings, LOS F conditions are forecasted for these segments, with average vehicle delays reaching as high as 10 minutes per vehicle for some movements, and queuing extending for nearly one-third mile on NB E. Marginal Way S. Truck travel between T-46 and the North SIG Railyard is particularly affected under baseline conditions. Trucks traveling between these two locations often wait out rail crossings rather than detouring to alternative routes. Further, congestion in the area makes truck movements from northbound Colorado Avenue S. to westbound S. Atlantic Street very difficult given that the

intersection is unsignalized. During the AM peak hour, less than half of the vehicles attempting to make this particular movement are expected to get through the intersection, with the remainder spilling over into subsequent hours.

The Build Alternative would also experience degraded conditions as train activity increases, but to a lesser degree. Train activity would require the traffic signal system to adjust to direct traffic to the undercrossing, resulting in some loss of efficiency. Further, the undercrossing provides less traffic capacity than does the normal at-grade route across the tail track. A single 10-minute train crossing would increase delay at the new intersection complex at E. Marginal Way S./T-46/Alaskan Way S./Colorado Avenue S./S. Atlantic Street, dropping the level of service from LOS E to just beyond the LOS F threshold. Three 10-minute train crossings would result in a more pronounced LOS F condition, but the delay anticipated for trucks traveling between T-46 and the North SIG Railyard would significantly decrease from the Baseline Scenario. Most notably, traffic movements in the Build Alternative are able to continue moving during rail crossing via the undercrossing route, which is an improved condition for E. Marginal Way S. traffic as well as for freight traffic traveling between T-46 and the North SIG Railyard.

Effects to Specific Sensitive Areas

Fire Station No. 5 on Alaskan Way S. near the Seattle Ferry Terminal is an important emergency services facility. Although it is outside the study area, traffic operations on Alaskan Way S. and on connecting east-west arterials could affect response time and egress from this waterfront fire station. The Build Alternative would not degrade traffic conditions along the waterfront, and it is not expected to affect fire station operations compared to the 2030 Baseline Scenario.

Fire Stations No. 10 (located near Fifth Avenue S. and S. Washington Street) and No. 14 (at about S. Hanford Street and Fourth Avenue S.) also respond to incidents in the vicinity of the Project. Fire and emergency services are described in more detail in the Public Services and Utilities Technical Memorandum in Appendix G.

5.2 Accessibility

Accessibility measures include roadway connectivity and access, transit connectivity and coverage, freight access, Seattle Ferry Terminal access, access to adjacent land uses, pedestrian and bicycle access, and parking. This section describes the effects and benefits for each measure.

5.2.1 Roadway Connectivity and Access

Key Findings

- The Project would provide new access to SB SR 99 and from NB SR 99, providing a benefit by improving connections (compared to existing conditions or the 2030 Baseline Scenario) to SR 519 and local streets in the stadium area.

This section assesses the connections provided between the SR 99 corridor and other streets and highways in the study area. Exhibits 5-13 and 5-14 list connections to and from SR 99 for the existing facility and the Build Alternative in the project area.

To and From Stadium Area/SR 519

Access to and from the north would be maintained via the First Avenue S. ramps near Railroad Way S. New access to and from the south would be provided by the proposed S. King Street ramps.

Exhibit 5-13. Connections Provided to and from SR 99 – Existing Facility

Connection From/To	Good Access	Partial or Substandard Access	No Access
Stadium Area			
SB SR 99 to Stadium Area	First Avenue S. off-ramp		
Stadium Area to SB SR 99			None
NB SR 99 to Stadium Area			None
Stadium Area to NB SR 99	First Avenue S. on-ramp		

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

Exhibit 5-14. Connections Provided to and from SR 99 – Build Alternative

Connection From/To	Good Access	Partial or Substandard Access	No Access
Stadium Area			
SB SR 99 to Stadium Area	First Avenue S. off-ramp		
Stadium Area to SB SR 99	S. King Street on-ramp		
NB SR 99 to Stadium Area	S. King Street off-ramp		
Stadium Area to NB SR 99	First Avenue S. on-ramp		

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

With the Project, SR 99 would cross over S. Atlantic Street and the railroad tracks before returning to grade at S. Royal Brougham Way. S. Atlantic Street would remain at grade and connect to E. Marginal Way S. S. Royal Brougham Way would intersect with the new NB Alaskan Way S. E. Marginal Way S. and Alaskan Way S. would connect using S. Atlantic Street.

The project design changed after an initial traffic analysis was completed. The new design includes a reconfiguration of the SR 99 off-ramp, the remote holding area for the Seattle Ferry Terminal, and the frontage road (NB Alaskan Way S.). Although the traffic analysis performed for this report does not account for this new configuration, preliminary analysis indicates that the proposed design changes would not preclude acceptable traffic operations.

To and From Downtown Seattle

The Project would not change access to and from downtown Seattle; this access would remain at the Columbia and Seneca Street ramps. Minor shifts in traffic usage of the Columbia and Seneca ramps to the new S. King Street ramps is projected, with Alaskan Way S. carrying additional traffic. However, the Project is expected to reduce some out-of-direction travel between the Columbia and Seneca ramps and the stadium area. Some drivers would divert to the S. King Street ramps to access the waterfront, stadium, and SODO areas.

5.2.2 Transit Connectivity and Coverage

Key Findings

- The Project would provide additional access to both the south and central downtown area via the new S. King Street ramps. A benefit of the new access from the S. King Street ramps is that transit service coverage could be extended to a greater portion of the downtown area.
- Transit travel times for routes accessing downtown on SR 99 from the south are expected to be similar to the 2030 Baseline Scenario, with possible improvements if a transit lane is implemented on the NB S. King Street off-ramp (and King County Metro chooses to use the ramp). Specific travel times would vary by destination and routing.
- Use of the S. King Street ramps offers opportunities to expand transit coverage in the south downtown area.

Transit Vehicle Connections

Transit vehicles traveling on the Alaskan Way Viaduct to and from the south could access south downtown and the waterfront from the new ramps located at S. King Street by traveling north on Alaskan Way S. Buses could then turn on S. Main Street or other east-west streets, then onto one of the primary north-south corridors to access the downtown street grid. Alternatively, King County Metro could continue to use the Columbia and Seneca ramps based on the desired coverage for individual routes.

The new access from the S. King Street ramps could extend transit service coverage to a greater portion of the downtown area, in comparison to the 2030

Baseline Scenario. This could potentially increase ridership on routes that use SR 99 and provide increased transit service accessibility to the southern end of the downtown area. However, travel times to some areas (particularly in north downtown) could increase due to routing along surface arterials.

The Project's design would not preclude potential transit priority treatments along Alaskan Way S., between the new S. King Street on- and off-ramps and King County Metro's desired east/west distributor roadway (e.g., S. Main Street).

Access to the King County Metro transit bases south of downtown (Atlantic, Central, and Ryerson) is not expected to be negatively affected, because traffic conditions in the area around the bases are anticipated to be similar to the 2030 Baseline Scenario.

Peak-Hour Travel Times

Transit travel time effects are expected to be minimal for currently routed service. The S. King Street ramps would offer opportunities to expand transit coverage in the south downtown area for routes using SR 99. This expansion would need to be considered in conjunction with the additional time that currently routed coaches would spend traveling on arterial streets rather than on SR 99.

5.2.3 Freight Access

Key Findings

- The Project would improve freight connections between SR 99 and the waterfront, stadium, and SODO areas through the addition of the S. King Street ramps.
- Connections for freight traffic traveling between T-46 and SR 519/I-90/I-5 and the SIG and North SIG Railyards would become more reliable with the addition of the undercrossing, which would allow these connections even while the tail track is in use and blocking S. Atlantic Street.

Freight Connections

The S. King Street ramps would provide improved access to and from the south on SR 99 to the waterfront, stadium, and SODO areas. They would also improve connections to and from SR 519.

Ability of Design to Facilitate Freight Operations

Freight operations would benefit from construction of the undercrossing. The undercrossing would allow freight traffic to travel around the tail track when it is in use. This would be a considerable improvement over existing conditions. Currently, when BNSF uses the tail track, travel on S. Atlantic

Street between E. Marginal Way S. and First Avenue S. is blocked for east- and westbound traffic, creating delays to freight traffic in the area. The Project would provide an alternative route to S. Atlantic Street when the tail track is in use by BNSF.

Freight Rail Operations

The Project would reduce potential conflicts with rail operations by eliminating a crossing at S. Royal Brougham Way and providing for a coordinated train/traffic signal system that would provide safe operations for rail, heavy vehicle, and general purpose vehicular traffic. The coordinated train/traffic signal system would allow vehicles to cross S. Atlantic Street with greater predictability, rather than waiting an undetermined length of time. Coordination between the project team, BNSF, and the Port of Seattle will continue as the Project progresses.

5.2.4 Seattle Ferry Terminal Access

Key Findings

- Light to moderate congestion (LOS D or better) is expected along Alaskan Way S. between the remote holding area and the Seattle Ferry Terminal during peak periods.
- Pedestrian access, drop-off, transit, and taxicab access would not change from current conditions.

Access and Egress at the Seattle Ferry Terminal

Access to the Seattle Ferry Terminal would be provided from NB Alaskan Way at Yesler Way. The Project presumes a remote holding area for the Seattle Ferry Terminal east of SR 99 between First Avenue S. and Alaskan Way S. (see later discussion).

The S. King Street on-ramp was assumed to change some drivers' desired access point from the Columbia Street on-ramp to the S. King Street on-ramp. Therefore, a portion of these drivers would travel SB on Alaskan Way through the Yesler Way intersection.

Access Between the Seattle Ferry Terminal and the Remote Holding Area

Access to the remote holding area is assumed to be accommodated on the east side of SR 99 and south of S. King Street. Ferry traffic traveling to the Seattle Ferry Terminal would travel north on First Avenue S. or NB Alaskan Way S. from the stadium area to access the remote holding area.

Traffic would exit the remote holding area at a signalized intersection with NB Alaskan Way S., mixing with general purpose traffic as it does today. It would then travel NB to a signalized intersection with the S. King Street off-

ramp. The final roadway configuration between S. King Street and the Seattle Ferry Terminal, as well as the operational characteristics for the remote holding area and the arterial signal system, will be determined as part of a larger central waterfront plan, which is currently underway.

As such, this Project would only be providing the remote holding area and the connections to the proposed and existing street system at S. Royal Brougham Way and S. King Street. However, the project team, SDOT, and Washington State Ferries will work together to develop an operations and traffic management scenario that will balance both the arterial roadway and ferry operations needs under this scenario.

As currently designed, light to moderate congestion (LOS D or better) is expected along Alaskan Way S. between the remote holding area and the Seattle Ferry Terminal during peak periods (see Exhibit 5-11, Signalized Intersection Level of Service). Design of the intersections associated with and controlling the remote holding area is still flexible and is expected to be able to accommodate a range of acceptable operating conditions.

Traffic leaving the Seattle Ferry Terminal would travel south on Alaskan Way S. to access the S. King Street on-ramp to SB SR 99, or could continue south to S. Atlantic Street to access First Avenue S. or SR 519.

Traffic Forecasting Assumptions

Traffic forecasts for the Seattle Ferry Terminal are consistent with the Bainbridge and Bremerton routes' continued ferry service to the terminal. Although ferry routes may be added in the future, at the time of this analysis a plan for additional routes has not been adopted. The 2030 forecasts are based on 92nd-percentile estimates for weekdays during the PM peak hour. During the PM peak hour, 520 vehicles were forecasted to exit the terminal—270 vehicles at the Marion Street exit and 250 vehicles at the Yesler Way exit. During the same period, 600 vehicles were forecasted to arrive at the remote holding area and travel on to the terminal.

Pedestrian Access

With the Project, pedestrian access between the Seattle Ferry Terminal and downtown would not change from current conditions.

Drop-Off, Transit, and Taxicab Access

With the Project, taxicab access at the Seattle Ferry Terminal would not change from current conditions.

5.2.5 Pedestrian and Bicycle Access

Key Findings

- Pedestrian and bicycle facilities would be maintained and, in several locations, would improve over current conditions. Two greenway corridors, each with a 14-foot paved bicycle/pedestrian path, would be added. One would be along the west edge of the Project and the second would be added along the east side of SR 99.
- Due to the proposed roadway configuration, the connection between S. Atlantic Street and E. Marginal Way S. would become more complicated for bicyclists and pedestrians.

Bicycle and Pedestrian Facilities Provided

Pedestrian and bicycle access would be maintained and improved where feasible. Bicycle and pedestrian facilities that the Project would provide are shown in Exhibit 5-15. Surface streets would be widened to add bicycle lanes on Alaskan Way S., E. Marginal Way S., and S. Atlantic Street.

S. Holgate Street to S. Atlantic Street

From S. Holgate Street to S. Atlantic Street, 5-foot-wide bike lanes would be provided on either side of E. Marginal Way S. An 8-foot-wide sidewalk would be located west of the roadway and the bike lane. South of S. Holgate Street, these improvements would tie into the existing sidewalk and bike lane on the east side of E. Marginal Way S. The new SB bike lane would end at S. Holgate Street, and cyclists would share the road with vehicles as they do today.

A 10- to 12-foot-wide bicycle/pedestrian mixed-use path would be added along the north side of S. Atlantic Street, west of First Avenue S., as part of the Mountains to Sound Greenway Trail. This path would connect to the sidewalks and bike paths on the west side of SR 99. On the south side of S. Atlantic Street, the existing sidewalk would be increased to a width of 12 feet. Similarly, the sidewalk width on the east side of Colorado Avenue S., south of S. Atlantic Street, would be increased to 12 feet.



Exhibit 5-15
Bicycle and Pedestrian Facilities

The connection between S. Atlantic Street and E. Marginal Way S. would occur under the elevated SR 99 roadway. As currently designed, the intersection configuration would be complicated for bicyclists heading EB on S. Atlantic Street and for NB bicyclists. EB bicyclists would need to use the pedestrian/bicycle trail on the north side of S. Atlantic Street, or would share the road with vehicles. NB bicyclists approaching this intersection are proposed to have their own signal that would operate at the same time as the NB left turn, which would operate with no other movements allowed, reducing the potential conflicts between bikes and vehicles. However, cyclists would still need to use caution at this location due to the potential that drivers may still turn right on a red light, even though that movement is prohibited. One design modification currently under consideration is to have NB cyclists cross to a widened bike path on the west side of E. Marginal Way S. and use the proposed crosswalk system at the intersection.

S. Atlantic Street to S. Royal Brougham Way

North of S. Atlantic Street, on the west side of SR 99, a bicycle/pedestrian path would be provided on either side of the undercrossing. At about S. Royal Brougham Way, these two paths would join to form a 14-foot-wide bicycle/pedestrian path in the greenway corridor on the west side of Alaskan Way S., west of the relocated tail track (in accordance with the City of Seattle Bicycle Master Plan). A 14-foot-wide bicycle/pedestrian path also would be provided in the greenway corridor on the east side of SR 99 between the remote holding area and SR 99. Additionally, there would be a sidewalk on the east side of NB Alaskan Way S.

An 8-foot-wide sidewalk would be included on the inside of the undercrossing. This sidewalk would be used during emergencies (e.g., a stalled vehicle in the undercrossing, or for maintenance access) or could be used by pedestrians avoiding blockages caused by trains using the tail track. Bicyclists could use the sidewalk or, more likely, would ride in the street. This pedestrian detour would be about 1,100 feet long (equivalent to almost four city blocks). Using the undercrossing would take pedestrians approximately 4 to 5 minutes.

Between S. Atlantic Street and S. Royal Brougham Way, in addition to the shared path, a 5-foot-wide bike lane would be provided on the west side of SB Alaskan Way S., east of the relocated tail track. This would be west of the SR 99 roadway. This bike lane would allow connections with S. Atlantic Street and E. Marginal Way S.

To the east of SR 99, NB and SB 5-foot-wide bike lanes would be provided on the east and west sides, respectively, of Alaskan Way S.

On both sides of S. Royal Brougham Way, west of First Avenue S., 5-foot-wide bike lanes and 6-foot-wide sidewalks would be provided.

S. Royal Brougham Way to S. King Street

Between S. Royal Brougham Way and S. King Street, in addition to the 14-foot-wide bicycle/pedestrian path, a 5-foot-wide bike lane would be provided in the NB direction on the east side of NB Alaskan Way S. (west of the SR 99 roadway).

On the east side of SR 99, a 14-foot-wide bicycle/pedestrian path would be added west of the remote holding area for the Seattle Ferry Terminal. A 5-foot-wide NB bike lane would be provided on the east side of NB Alaskan Way S. (east of the SR 99 roadway). Additionally, a 10-foot-wide sidewalk would be provided on the east side of NB Alaskan Way S., to the east of the bike lane.

Just south of S. King Street, the bike lane and sidewalks on the east side of SR 99 would pass under the viaduct and merge into the existing shared-use path on the east side of Alaskan Way S. The shared-use path on the west side of Alaskan Way S. would connect with the existing sidewalk. The bike lane would end north of S. King Street, and bicycles would share the roadway with vehicles or use the shared-use path on the east side of Alaskan Way S., as they do today.

5.2.6 Parking Effects

Key Findings

- About 1,267 total parking spaces would be removed. Of these, approximately 29 on-street short-term parking spaces and 418 on-street long-term spaces would be eliminated with the Build Alternative. Approximately 820 off-street spaces would also be removed. Currently, on the average weekday, about 4,100 off-street parking spaces within several blocks of the project area are unused.
- Because parking lots are generally underutilized in the stadium area, parking spaces are not anticipated to be difficult to find during average days. During events at the stadiums, finding available parking may be slightly more challenging or may cost more than under current conditions.

This section estimates the parking effects that would result from construction of the Project. It is assumed that some affected on-street short-term and on-street long-term parking spaces would be replaced as feasible. These assumptions are meant to serve as a guide, because SDOT would ultimately determine how on-street parking spaces are managed.

If the Project no longer uses an off-street parking area after construction is complete, it is assumed that these off-street spaces would be replaced. However, for parking lots not controlled by the Project, private development may occur that includes a different number of spaces.

Exhibit 5-16 summarizes the potential parking effects for the Build Alternative. The Project would reduce parking spaces compared to existing conditions and the 2030 Baseline Scenario. The reduction in the number of parking spaces would be approximately 1,267 spaces.

Exhibit 5-16. Summary of Parking Effects

	On-Street Spaces			Off-Street Spaces	Total Spaces
	Short-Term	Long-Term	Subtotal		
Existing Conditions ¹	29	423	452	1,020	1,472
Build Alternative	0	5	5	200	205
Change	-29	-418	-447	-820	-1,267

¹ Baseline parking effects are assumed to be the same as those for existing conditions.

The Build Alternative would result in a net loss of 29 on-street short-term parking spaces compared to today. Approximately 423 spaces are currently designated as on-street long-term parking, primarily along Alaskan Way S. and under the viaduct. Given the configuration of the new roadway, only about 5 spaces would be replaced, resulting in a loss of about 418 spaces. SDOT would ultimately determine how on-street parking spaces are managed and may restrict the 5 replaced spaces to short-term parking instead of allowing long-term use.

South of S. Atlantic Street, there is free parking with 1- and 2-hour limits along First Avenue S. In addition, several blocks of free parking with no time limits are currently located near the Project on S. Massachusetts Street west of First Avenue S. and south of S. Massachusetts Street on Utah Avenue S. and Occidental Avenue S.

Approximately 1,020 off-street parking spaces would be removed in the area east of the viaduct, between about S. King Street and S. Atlantic Street. Of these, 200 would be replaced, resulting in a loss of 820 off-street spaces. WSDOT purchased the Washington-Oregon Shippers Cooperative Association (WOSCA) property and a property just east of the viaduct between S. Atlantic Street and S. Royal Brougham Way for use by the AWVSRP. The 820 off-street pay parking spaces on these properties are initially removed as a result of the electric line relocations. Permanently changing these areas from paid parking spaces to a transportation facility would reduce the total supply of parking in the area.

In the stadium area, most of the parking losses would be off-street (i.e., pay lots). Pay lots in the area are abundant and underutilized. Over 6,450 off-street parking stalls are located within a quarter mile of the project area, with even more stalls available in the greater stadium area. The off-street parking utilization rate for the stadium area is about 37 percent on an average non-event weekday (PSRC 2006). Please refer to Section 4.3.2 *Parking* for more detail. Currently, on the average weekday, about 4,100 off-street spaces within a quarter mile of the spaces affected by the Project are unused. A private development is also scheduled to occur near S. Atlantic Street and First Avenue S., with Home Plate Development adding about 790 parking spaces by 2010. The existing Home Plate lot has 300 spaces, and the planned Home Plate development at that location would include 300 parking stalls for use during events. The Home Plate spaces will increase the parking inventory in the area, but are not included in the parking counts for this Project because the development has yet to be built.

With about 400 on-street long-term spaces removed from under the viaduct and along Alaskan Way S., some drivers who currently park for free all day may need to look for on-street long-term parking several streets away or would need to pay to park. The closest on-street unrestricted parking is located just south of the project area, along S. Massachusetts Street west of First Avenue S. and on Utah Avenue S. south of S. Massachusetts Street. Considering the number of underutilized parking spaces near the stadiums, difficulty in finding parking during the average non-event day is not anticipated.

Event Parking

During events, such as Seahawks and Mariners games, parking is highly utilized today, with private lots charging a premium for event parking. With the removal of about 1,267 spaces total in the stadium area, it could become more difficult to find parking during an event, and private parking lot operators may increase prices to coincide with the reduction in parking supply. Many businesses near the stadiums and event center already offer their lots for paid parking during events. This is one example of how the private market would adjust to the demand.

A number of major parking facilities are near the stadiums, as shown in Exhibit 5-17. The six parking facilities listed in Exhibit 5-17 provide about 6,900 parking spaces for use during events. Event-goers will continue to be encouraged to use bus and rail service and to carpool to the stadiums. The Safeco Field Transportation Management Plan and the Qwest Field Transportation Management Program both include parking reduction and

transit-related goals and mitigation measures that aim to reduce the number of event attendees who require parking near the stadiums.

Exhibit 5-17. Major Parking Facilities Near the Stadiums

Facility Name	Location	Number of spaces
Safeco Field Garage	South of Safeco Field on Edgar Martinez Drive S. at First Avenue S.	2,000
Stadium Exhibition Center Garage	S. Royal Brougham Way west of Fourth Avenue S.	2,000
Union Station Garage	Fourth Avenue S. south of Airport Way S.	1,200
North Lot (old Kingdome)	S. King Street at Second Avenue S.	1,100
Impark Parking	S. Jackson Street	300
Home Plate Parking	First Avenue S. and S. Atlantic Street	300
	Total	6,900

Source: Seattle Mariners (2008).

5.3 Safety

Key Findings

- The Build Alternative is expected to improve safety due to increased shoulder widths and improved design standards.
- Additional bike lanes and improved pedestrian facilities on surface streets could potentially reduce conflicts between vehicles and bicycles and pedestrians.
- Due to the proposed roadway configuration, the connection between S. Atlantic Street and Alaskan Way S. would become more complicated for bicyclists.

Overall, geometric features for the new facility would be improved over the existing facility. The Project would substantially improve shoulder widths compared to the existing facility, with increased inside shoulders and full (approximately 10-foot-wide) outside shoulders. Outside shoulders on the existing facility are approximately 1 foot wide. For the SR 99 mainline, inside shoulders would increase from the existing 1-foot shoulders to 4- to 5.5-foot shoulders. It is expected that safety would improve due to increased shoulder widths. Grades would be similar to the existing facility, with maximum grades of 6 percent.

The addition of ramps has the potential to increase accident rates. However, the benefits of increased access, paired with increased shoulder widths, are considered to outweigh the potential for conflicts at ramp locations.

Pedestrians would remain separated from mainline SR 99. Pedestrian and bicycle facilities would be improved on surrounding surface streets, as described previously in Section 5.2.5, *Pedestrian and Bicycle Access*. The proposed pedestrian and bicycle facilities could contribute to fewer conflicts between vehicles and bicycles and pedestrians. However, the intersection at S. Atlantic Street and E. Marginal Way S. would be more complicated for bicyclists than the current configuration.

The unsignalized intersection at Alaskan Way S. and S. King Street was listed as a high-collision intersection in 2006. This intersection would be signalized in the Build Alternative, which is expected to contribute to improved safety of the intersection.

The high-collision intersection at First Avenue S. and S. Atlantic Street had 10 collisions in 2007. The Project includes redesigning this intersection, which would include channelization improvements that are expected to improve safety.

5.4 Year of Opening Conditions

According to the current conceptual project construction schedule, the opening year is assumed to be 2013. This section discusses mobility measures, including travel demand, traffic patterns, and traffic operations for the Year of Opening Baseline and Build Alternative. For a discussion of 2005 existing conditions, refer to Chapter 4.

5.4.1 Travel Demand and Traffic Patterns

Key Findings

- For the year of opening, SR 99 mainline and ramp volumes in the project area would change due to new access at S. King Street. Vehicles using these new ramps would be drawn from other ramps in the corridor, namely the Seneca Street/Columbia Street ramps.

Alaskan Way Viaduct (SR 99) Users

Detailed AM and PM peak-hour traffic estimates for the Year of Opening Baseline Scenario and Build Alternative were developed for SR 99 through the study area. Traffic volumes are presented for each connection to SR 99 (ramps or side streets) and for each mainline segment (section of SR 99 between connections). Traffic volumes are estimated based on current volumes, which were adjusted to reflect growth and traffic redistribution forecasted by the AWV model.

Year of Opening Baseline Mainline and Ramp Volumes – AM Peak Hour

Traffic volumes on the SR 99 corridor are highest during commuting hours. In the morning, peak-hour traffic volumes on SR 99 are fairly directional, with heavier volumes entering the central downtown.

Approximately 1,050 vehicles would exit NB at Seneca Street, and 350 vehicles would enter SB at Columbia Street. At the First Avenue S. ramps, 1,480 vehicles would exit SB but only 800 vehicles would enter NB. South of downtown and the stadium area, mainline volumes are considerably higher in the NB direction (4,490 vehicles) than the SB direction (2,400 vehicles), as would be expected.

Year of Opening Baseline Mainline and Ramp Volumes – PM Peak Hour

Similar to the AM peak, PM peak-hour traffic volumes along SR 99 are directional, with heavier volumes leaving the central downtown.

Approximately 1,230 vehicles would enter SB at Columbia Street, and 680 vehicles would exit NB at Seneca Street. At the First Avenue S. ramps, 1,260 vehicles would enter NB but only 850 vehicles would exit SB. South of downtown and the stadium area, mainline volumes are considerably higher in the SB direction (4,480 vehicles) than in the NB direction (3,640 vehicles).

The AM and PM peak-hour mainline and ramp volumes forecasted for the Year of Opening Baseline Scenario are shown in Exhibit 5-18.

Year of Opening Build Alternative Mainline and Ramp Volumes – AM Peak Hour

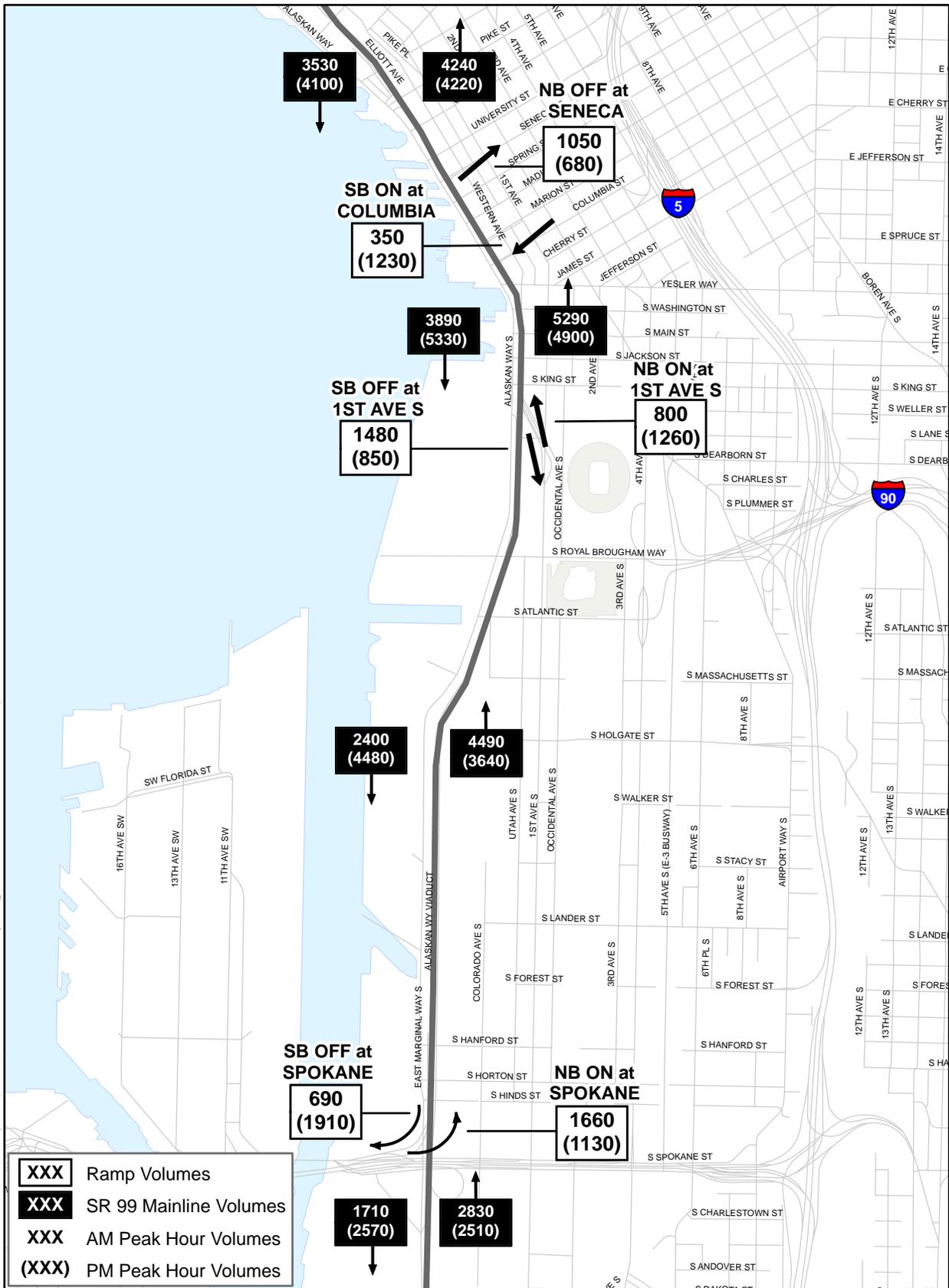
The Build Alternative would add a new SB on-ramp and a new NB off-ramp at S. King Street. At this location, 600 vehicles are projected to exit at the NB off-ramp during the AM peak hour and 260 vehicles would enter SB.

As such, the mainline and ramp volumes anticipated for the Build Alternative would vary from the existing facility near S. King Street. The volume exiting at the Seneca Street ramp in downtown is anticipated to decrease from 1,050 to 750 vehicles, and the volume entering at the Columbia Street on-ramp is expected to decrease from 350 to 240 vehicles. The volumes at the First Avenue S. ramps are not anticipated to change substantially from the Year of Opening Baseline Scenario.

Year of Opening Build Alternative Mainline and Ramp Volumes – PM Peak Hour

Approximately 440 vehicles are projected to exit at the new NB off-ramp at S. King Street during the PM peak hour, and 750 vehicles would enter at the new SB on-ramp.

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XXX Ramp Volumes
XXX SR 99 Mainline Volumes
XXX AM Peak Hour Volumes
(XXX) PM Peak Hour Volumes

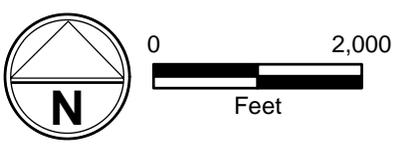


Exhibit 5-18
Year of Opening Baseline
SR 99 Mainline and Ramp Volumes
AM and PM Peak Hour

As with the AM peak hour, the mainline and ramp volumes anticipated for the Build Alternative are different from the Year of Opening Baseline Scenario near S. King Street. The volume exiting at the Seneca Street ramp downtown is anticipated to decrease from 680 to 465 vehicles, and the volume entering at the Columbia Street on-ramp is expected to decrease from 1,230 to 800 vehicles. The volumes at the First Avenue S. ramps are not anticipated to change substantially from the Year of Opening Baseline Scenario.

The year of opening AM and PM peak-hour mainline ramp volumes forecasted for the Build Alternative are shown in Exhibit 5-19.

Arterial and Local Street Forecasts

AM and PM peak-hour traffic estimates for arterial and local streets for the year of opening were derived from year 2030 estimates. They were adjusted to opening year demand levels by the negative application of growth rates and changes in traffic patterns forecasted by the AWW model.

5.4.2 Traffic Operations

Key Findings

- For the year of opening, findings are consistent with those described for conditions in 2030.
- Traffic conditions on First Avenue S. show some improvement under the Build Alternative, relative to the Baseline Scenario.
- Traffic analysis results are consistent with those described previously for conditions in 2030. In most cases, notably the First Avenue S. and S. Atlantic Street intersection, traffic operating conditions are uniformly (though moderately) better than reported for 2030 due to less projected growth in peak traffic volumes (continued regional and local increases in population and employment will result in higher traffic volumes in 2030 than in 2013).

SR 99 Mainline Level of Service

This section presents the AM and PM peak-hour LOS for corridor segments under the Year of Opening Baseline and Build Alternative. Mainline traffic performance was modeled using VISSIM simulation software. LOS for mainline and ramp operations was calculated based on speed and density, as observed in the VISSIM model. Although LOS can provide an indication of how a facility is performing overall, it is not always a straightforward means of comparing scenarios, because ramp and segment arrangements vary among the scenarios.

FILE: \\sif\viaduct\GIS\Ex-3\Maps\EA_South_End\Ex-5-19 Year of Opening Build SR 99 Mainline and Ramp Volumes.mxd

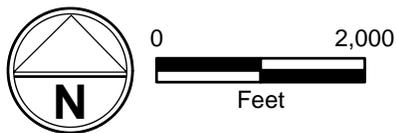
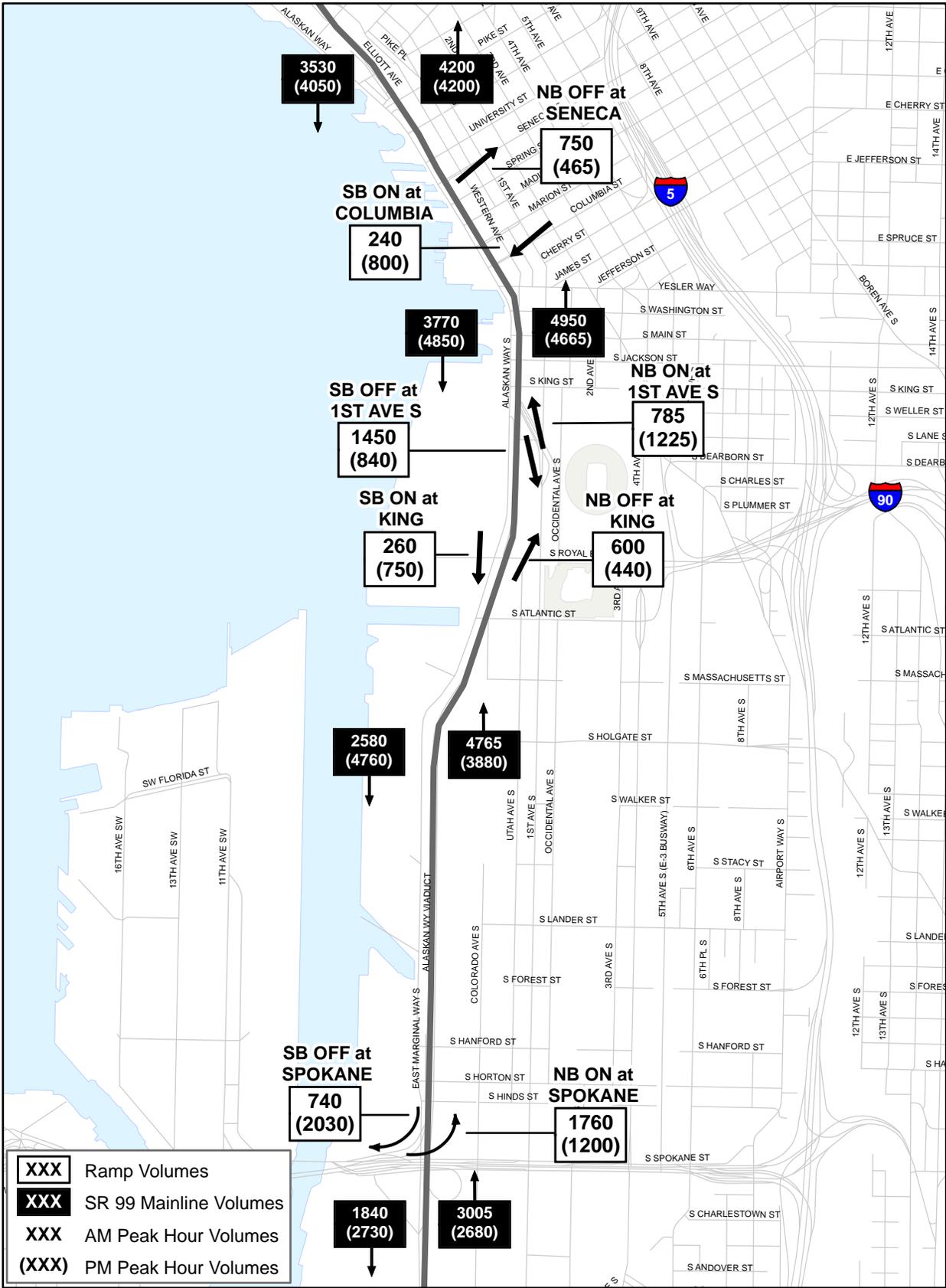


Exhibit 5-19
Year of Opening Build Alternative
SR 99 Mainline and Ramp Volumes
AM and PM Peak Hour

Year of Opening Baseline LOS

Exhibits 5-20 and Exhibit 5-21 show the SR 99 mainline LOS by segment for the existing facility, for Year of Opening Baseline travel demands during the AM and PM peak hours, respectively. These findings generally reflect the existing conditions described in Chapter 4, but with some increases in congestion due to growth in travel demand. Under most conditions, this corridor is expected to operate at LOS D or better during the year of opening.

Exhibit 5-20. Year of Opening Baseline AM Peak-Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	D	D	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	B	D	S. Spokane Street to First Avenue S.

Exhibit 5-21. Year of Opening Baseline PM Peak-Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	D	D	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	C	C	S. Spokane Street to First Avenue S.

Year of Opening Build Alternative LOS

The Build Alternative includes a number of changes expected to affect traffic operations. This includes new access to and from the SR 99 mainline in the stadium area, and enhanced freight mobility between the North SIG Railyard and Port of Seattle T-46.

Exhibits 5-22 and 5-23 represent LOS for SR 99 segments for AM and PM peak hours. The VISSIM simulation, unlike the Synchro model and SimTraffic simulation, provided one set of results that represent periodic tail track closures throughout the hour-long simulation. In other words, this simulation allowed analysts to assess how “normal conditions” are affected prior to, during, and after each period of tail track closure. As such, the results reported in these exhibits represent typical operating conditions.

Exhibit 5-22. Year of Opening Build Alternative AM Peak-Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	D	D	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	C	E	S. Spokane Street to S. King Street Off

Exhibit 5-23. Year of Opening Build Alternative PM Peak-Hour SR 99 Segment LOS

Southbound		Northbound	
Columbia On to First Avenue S. Off	D	D	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	E	D	S. Spokane Street to S. King Street Off

The most congested SR 99 mainline segments would be between the S. King Street ramps and S. Spokane Street, where LOS E conditions would occur in the SB travel direction during the PM peak hour and in the NB direction during the AM peak hour. Although the LOS indicates considerable congestion at these locations, the speeds are still relatively high. Therefore, although the density of vehicles on the roadway is relatively high (contributing to the degraded LOS), traffic would still move at a reasonable speed, and breakdowns in flow are not projected.

SR 99 Mainline Speeds

This section presents the AM and PM peak-hour travel speeds for corridor segments for the Year of Opening Baseline and Build Alternative. Mainline traffic speeds were modeled using VISSIM simulation software. Exhibits 5-24 and 5-25 list segment speeds for AM and PM peak hours for the Baseline Scenario. Exhibits 5-26 and 5-27 show segment speeds for the Build Alternative.

Exhibit 5-24. Year of Opening Baseline AM Peak-Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	45	40	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	55	50	S. Spokane Street to First Avenue S.

Exhibit 5-25. Year of Opening Baseline PM Peak-Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	40	25	First Avenue S. On to Seneca Off
First Avenue S. Off to S. Spokane Street	40	50	S. Spokane Street to First Avenue S.

Exhibit 5-26. Year of Opening Build Alternative AM Peak-Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	45	40	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	45	40	S. Spokane Street to S. King Street Off

Exhibit 5-27. Year of Opening Build Alternative PM Peak-Hour SR 99 Segment Speeds

	Southbound	Northbound	
Columbia On to First Avenue S. Off	45	40	First Avenue S. On to Seneca Off
S. King Street On to S. Spokane Street	40	45	S. Spokane Street to S. King Street Off

During the Year of Opening AM peak hour, SB mainline speeds are generally higher than NB speeds. Speeds for the SB direction on the mainline operate within 10 mph of the posted speed during the AM peak hour, but NB speeds are affected by congestion in the downtown area.

As would be expected, speeds during the PM peak are generally slower in the SB direction than in the NB direction. During the PM peak hour, speeds are expected to operate at 40 mph in the SB direction (10 mph below the posted speed), due to congestion caused by the ramps to the West Seattle Bridge near S. Spokane Street.

NB speeds are affected by congestion at the downtown ramps. Congestion resulting from high volumes on the NB mainline north of First Avenue S. and from ramp congestion at the Seneca Street and Western Avenue off-ramps affect the flow between First Avenue S. and Seneca Street, which results in slow speeds.

With the Build Alternative (Exhibits 5-26 and 5-27), the average travel speeds during peak periods would be approximately 40 to 45 mph—slower than the posted travel speed of 50 mph. During the AM peak hour, travel speeds on SR 99 between the First Avenue S. on-ramp and the Seneca Street off-ramp in the NB direction are expected to be higher than existing conditions, because of a decrease in the NB volumes between these ramps. This is due to the new NB off-ramp at S. King Street, which diverts traffic from SR 99. During peak periods, ramp congestion on the Seneca Street and Western Avenue off-ramps is also higher than existing conditions, affecting speeds on NB SR 99 between Seneca Street and First Avenue S. During the PM peak hour, the new SB on-ramp at S. King Street would result in decreased SB volumes, increasing speeds on SR 99 between the Columbia Street on-ramp and First Avenue S. off-ramp.

Arterial and Local Street Traffic Performance

This section reports the results of the Synchro analysis and traffic simulation observations for the Year of Opening Build Alternative.

Synchro Analysis

To assess the Year of Opening conditions for the surface street network, traffic operations at study area signalized intersections have been evaluated in the same manner as for the 2030 conditions presented previously. Results of this analysis are shown in Exhibits 5-28 and 5-29.

Exhibit 5-28. Year of Opening Intersection Level of Service

Street	Cross Street	2005 Existing	Year of Opening Baseline	Year of Opening Build	2005 Existing	Year of Opening Baseline	Year of Opening Build
		AM PEAK HOUR			PM PEAK HOUR		
Alaskan Way S.	S. King Street ¹	C	E	A	F	F	C
Alaskan Way S.	Ferry Holding	A	A	B	A	A	A
Alaskan Way S.	S. Royal Brougham Way	B	C	-	C	C	-
NB Alaskan Way S.	S. Royal Brougham Way ²	-	-	C	-	-	C
NB Alaskan Way S	S Atlantic Street	-	-	B	-	-	A
First Avenue S.	S. Royal Brougham Way	C	F	C	D	F	C
First Avenue S.	S. Atlantic St.	C	C	C	D	E	D
First Avenue S.	S. Massachusetts St ³	E	A	A	E	A	A
First Avenue S.	S. Holgate St.	B	C	B	C	C	C
First Avenue S.	S. Lander St.	B	B	C	C	C	C
Colorado Avenue S.	SB Alaskan Way S./ S. Atlantic St. ⁴	-	-	E	-	-	D
E. Marginal Way S.	T-46 Driveway/ S. Atlantic St. ⁴	-	-	D	-	-	C

¹ This intersection is unsignalized for existing conditions and the 2030 Baseline Scenario, and signalized in the 2030 Build Alternative.

² This intersection is unsignalized in the 2030 Build Alternative.

³ This intersection is currently unsignalized but is assumed to be signalized in both the Year of Opening Baseline Scenario and Build Alternative.

⁴ These intersections are unsignalized and have different configurations for the existing conditions and the Year of Opening Baseline Scenario as compared to the Build Alternative. Consistent comparison of LOS is therefore not possible.

Exhibit 5-29. Year of Opening Intersection Average Vehicle Delay (seconds)

Street	Cross Street	2005 Existing	Year of Opening Baseline	Year of Opening Build	2005 Existing	Year of Opening Baseline	Year of Opening Build
		AM PEAK HOUR			PM PEAK HOUR		
Alaskan Way S.	S. King Street ¹	24	38	5	68	95	34
Alaskan Way S.	Ferry Holding	4	4	12	4	5	6
Alaskan Way S.	S. Royal Brougham Way	13	25	-	22	27	-
NB Alaskan Way S.	S. Royal Brougham Way ²	-	-	18	-	-	16
NB Alaskan Way S.	S. Atlantic Street	-	-	10	-	-	7
First Avenue S.	S. Royal Brougham Way	33	138	25	54	284	27
First Avenue S.	S. Atlantic Street	28	29	33	45	56	52
First Avenue S.	S. Massachusetts St. ³	48	5	5	38	7	7
First Avenue S.	S. Holgate Street	17	20	17	21	29	24
First Avenue S.	S. Lander Street	14	18	20	25	31	32
Colorado Avenue S.	SB Alaskan Way S./ S. Atlantic St. ⁴	-	-	69	-	-	52
E. Marginal Way S.	T-46 Driveway/ S. Atlantic St. ⁴	-	-	43	-	-	35

¹ This intersection is unsignalized for existing conditions and the 2030 Baseline Scenario, and signalized in the 2030 Build Alternative.

² This intersection is unsignalized in the 2030 Build Alternative.

³ This intersection is currently unsignalized but is assumed to be signalized in both the Year of Opening Baseline Scenario and Build Alternative.

⁴ These intersections are unsignalized and have different configurations for the existing conditions and the Year of Opening Baseline Scenario as compared to the Build Alternative. Consistent comparison of LOS is therefore not possible.

Traffic analysis results are consistent with those described previously for conditions in 2030. In most cases, notably the First Avenue S. and S. Atlantic Street intersection, traffic operating conditions are uniformly (though moderately) better than reported for 2030 due to less projected growth in peak traffic volumes (continued regional and local increases in population and employment will result in higher traffic volumes in 2030 than in 2010).

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Chapter 6 TRANSPORTATION CONDITIONS DURING CONSTRUCTION

6.1 Construction Approach

Construction of the Project is expected to take about 4 years and 4 months beginning in June 2009. Prior to Traffic Stage 1, there would be 8 months of utility relocation work. Water, communication, and electrical lines would be moved during this time so that they are not in the path of the major construction activities. There would be lane closures and restrictions during this 8-month period at various locations on the surface streets. These locations would change as the utilities are relocated. Construction of Traffic Stages 1 through 5 is planned to begin in February 2010 and end by October 2013.

6.1.1 Traffic Stage 1

Traffic Stage 1 is estimated to occur over a period of 17 months. Construction activities planned during this stage are:

- Conducting initial utility relocations.
- Constructing the temporary Whatcom lead and tail track.
- Modifying the existing tail track at S. Atlantic Street.
- Constructing a temporary remote holding area for the Seattle Ferry Terminal west of the viaduct.
- Performing soil improvement for construction of SB SR 99.
- Constructing a transition ramp for SB SR 99.
- Constructing the west half of the undercrossing.
- Constructing the west half of SB retained fill.
- Building the SB WOSCA detour.

Corridor closures would be limited to nights and weekends. Other traffic disruptions associated with these construction activities are described in the following sections.

Traffic Stage 1 Traffic Revisions – SR 99

- For the first 11 months of Traffic Stage 1, NB and SB traffic would not change on the existing SR 99: three lanes would be open in each direction (four lanes NB between the First Avenue S. on-ramp and the Seneca Street off-ramp).

- For the last 6 months of Traffic Stage 1, SB traffic would be reduced to two lanes through the construction area. This lane reduction would begin north of the First Avenue S. off-ramp and end south of S. Atlantic Street.

Traffic Stage 1 Traffic Revisions – Surface Streets

- Various lane closures would be required for utility relocations.
- NB and SB traffic on Alaskan Way S. would be maintained between S. King Street and E. Marginal Way S. until construction of the undercrossing between E. Marginal Way S./T-46 and S. Atlantic Street/Colorado Avenue S. During construction of the undercrossing, Alaskan Way S. would be detoured on S. Royal Brougham Way, First Avenue S., and S. Atlantic Street.
- S. Atlantic Street would have one or more lanes open in each direction during this construction stage.

6.1.2 Traffic Stage 2

Over the expected 6-month duration of Traffic Stage 2, the following construction activities are planned:

- Removing the east half of existing SB SR 99 between S. Holgate Street and S. Massachusetts Street and completing construction of the proposed SB retained fill structure.
- Constructing the NB WOSCA detour.

Traffic Stage 2 Traffic Revisions – SR 99

- NB traffic on the existing SR 99 would not change, with the normal three to four lanes available to traffic.
- SB traffic would be diverted to a detour route through the WOSCA property, located west of First Avenue S. and north of S. Royal Brougham Way. Traffic would access the detour via the First Avenue S. off-ramp, which would be restriped to carry two lanes of SB traffic. The detour route would reconnect to the SR 99 mainline near S. Atlantic Street and would have limited access (i.e., no traffic signals, stop signs, or cross traffic).
- A new temporary access point for transit use only is proposed from Alaskan Way S. to the SB SR 99 detour route north of S. Royal Brougham Way.

Traffic Stage 2 Traffic Revisions – Surface Streets

- Alaskan Way S. traffic would be reduced to one lane in the NB direction. Two lanes in the SB direction would be maintained, with a connection to E. Marginal Way S.
- S. Royal Brougham Way would be closed between First Avenue S. and Alaskan Way S.
- A temporary remote holding area for the Seattle Ferry Terminal would be provided west of the viaduct and south of S. King Street.

6.1.3 Traffic Stage 3

Traffic Stage 3 is expected to have the largest effect on traffic operations in and through the project construction work zone. Construction activities planned during the approximately 8-month-long Traffic Stage 3 are:

- Removing the existing viaduct south of S. Dearborn Street.
- Constructing NB and SB transition structures between S. Dearborn Street and S. Royal Brougham Way.
- Improving soil to provide support for transition structures and NB SR 99.
- Beginning construction of the east half of the undercrossing.

Traffic Stage 3 Traffic Revisions – SR 99

- NB and SB traffic would be diverted to the WOSCA detours. Two lanes for SR 99 would be provided in each direction utilizing rebuilt connections to the First Avenue S. ramps.
- The SB and NB First Avenue S. ramps would be reconstructed to the WOSCA detour site to allow for a detour route that avoids physical effects to First Avenue S. SB traffic would be accommodated with two lanes on a limited-access detour similar to that described for Traffic Stage 2. NB traffic would use two lanes on the newly constructed bridge (which would carry SB traffic following construction), detour through WOSCA, and continue onto a new NB ramp to be constructed just west of the WOSCA building. The NB detour would require 2 months of weekend closures and a ramp retrofit.

Traffic Stage 3 Traffic Revisions – Surface Streets

- Alaskan Way S. traffic would be reduced to one lane in the NB direction. Two lanes would be available in the SB direction, with a connection to E. Marginal Way S. maintained by decking over the west half of the undercrossing.

- S. Royal Brougham Way would be permanently closed between First Avenue S. and Alaskan Way S.
- A temporary remote holding area for the Seattle Ferry Terminal would be provided to the west of the viaduct, south of S. King Street.

6.1.4 Traffic Stage 4

Construction activities planned during the expected 7 months of Traffic Stage 4 are:

- Constructing the final Whatcom lead track and making the final connection to the tail track.
- Completing construction of the NB overcrossing.
- Completing construction of the east half of the undercrossing.

Traffic Stage 4 Traffic Revisions – SR 99

- NB and SB traffic would be diverted to the new transition structures and the new SB SR 99 bridge, with two lanes available in each direction.

Traffic Stage 4 Traffic Revisions – Surface Streets

- Alaskan Way S. would be reduced to one lane in each direction, with a connection to E. Marginal Way S. maintained by decking over the undercrossing.
- The temporary remote holding area for the Seattle Ferry Terminal would be located west of the viaduct, south of S. King Street.

6.1.5 Traffic Stage 5

Construction activities planned during Traffic Stage 5 are expected to last 6 months. This stage would include completing paving, signing, striping, and other restoration activities on surface streets that are necessary for completing construction of the final surface roadway configurations. A permanent remote holding area for the Seattle Ferry Terminal would be added between S. Royal Brougham Way and S. King Street along the east side of SR 99.

Traffic Stage 5 Traffic Revisions – SR 99

- NB and SB SR 99 traffic would be carried on new structures from S. Holgate Street to Railroad Way S., with three lanes open in each direction.

Traffic Stage 5 Traffic Revisions – Surface Streets

- Localized lane closures and detours would be instituted as required for final paving and striping.

6.2 Transportation Disruptions During Construction

This section describes transportation conditions during the construction period. Given the dynamic nature of construction activities, transportation effects would vary depending on the construction period. Generally, the most severe travel effects would occur during Traffic Stage 3, when SR 99's capacity would be reduced to the greatest extent and construction activities would also affect nearby surface roadways. This section discusses peak effects during Traffic Stage 3 and summarizes how conditions may vary during other construction stages.

6.2.1 Mobility

This traffic analysis specifically assesses traffic revisions proposed for the Traffic Stage 3 construction detour, because traffic disruption would be greatest during this stage. Mainline SR 99 traffic would be detoured in the stadium area onto a temporary, limited-access surface roadway and aerial structure connections to SR 99 that would provide two lanes for each direction of travel throughout the detour. The detour route would travel west of and parallel to First Avenue S., roughly between S. Atlantic Street and Railroad Way S.

Travel Demand and Traffic Patterns

SR 99 Users

Due to increased congestion and travel times on SR 99 during the construction period, some SR 99 users are expected to make other travel choices. These changes may include switching to other routes, changing travel modes, making fewer trips, choosing other destinations, or changing travel times. Because of the complex and individually unique nature of how people make travel choices, estimating travel demand changes involves some level of uncertainty.

To estimate travel demand changes, analysts considered existing traffic volumes, modeled changes in travel demand, past studies conducted for the AWVSRP, and experiences elsewhere. Traffic Stage 3 traffic estimates for the AM and PM peak hours were developed, which generally reflected a 30- to 35-percent reduction in normal base year (2010) traffic on SR 99, as shown in Exhibit 6-1. These volumes served as input for the traffic operations analysis described in the following section.

Exhibit 6-2 shows how modeled peak-hour volumes during construction compare to normal traffic levels throughout the day for the Columbia/Seneca Street to S. Spokane Street segments. The level of demand modeled for the construction period is lower than the demand levels normally experienced for several hours during both the AM and PM peak hours. This illustrates that

the conditions reported for the peak hours during construction would also be expected throughout much of the day. Midday conditions may be somewhat better than those reported for the peak hour, because normal demand levels are lower than the projected volumes. Note, however, that changes in time of travel could result in higher than normal travel demand during the off-peak hours, so midday conditions on SR 99 could also mirror those experienced during the peaks.

Exhibit 6-1. Peak-Hour SR 99 Traffic Volumes During Construction

	2010	%	Traffic Stage 3	2010	%	Traffic Stage 3
	Baseline	Decrease	Volumes	Baseline	Decrease	Volumes
Northbound						
	AM Peak Hour Volumes			PM Peak Hour Volumes		
NB SR 99 (S. Spokane Street to Stadium Area)	4,540	35%	2,950	3,620	30%	2,560
ON from Stadium Area	800	35%	520	1,260	35%	820
NB SR 99 (Stadium Area to Seneca Street)	5,330	35%	3,470	4,880	31%	3,360
Southbound						
SB SR 99 (Columbia to Stadium Area)	3,900	30%	2,730	5,400	35%	3,510
OFF to Stadium Area	1,480	30%	1,040	850	35%	560
SB SR 99 (Stadium Area to S. Spokane Street)	2,420	30%	1,690	4,550	35%	3,000

Note: Numbers rounded to the nearest ten.

Arterial and Local Street Forecasts

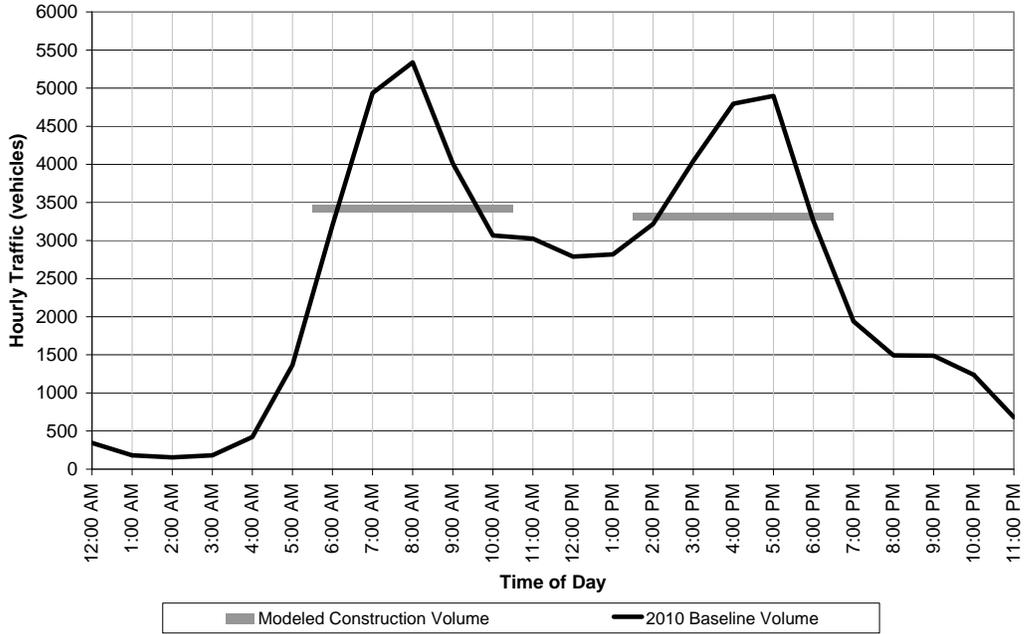
Traffic disruption caused by construction would also affect traffic conditions on nearby local streets and alternate routes. Some drivers would choose to divert to alternate routes. In particular, First Avenue S. and Fourth Avenue S. offer direct, alternate routes to SR 99 in the stadium area. Traffic forecasts that reflect trips displaced from SR 99 to parallel routes, and changes in travel patterns associated with local street closures during the construction period and relocation of SR 99 ramp connections are described below.

First Avenue S.

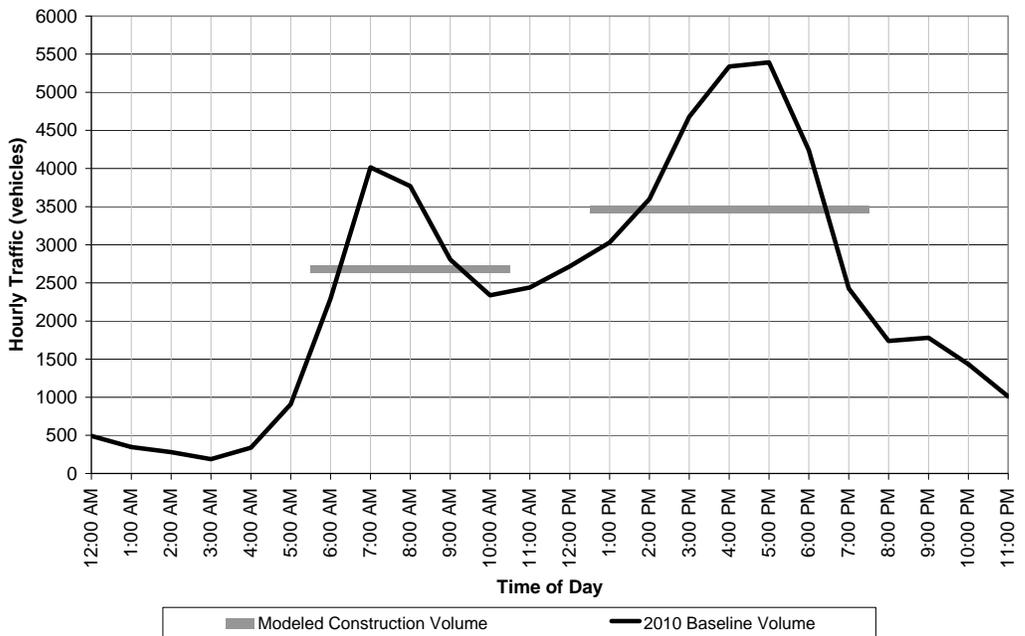
In Pioneer Square (north of the SR 99 First Avenue S. ramps), First Avenue S. carries a relatively light volume of traffic. During both the AM and PM peak, typical volumes range from 400 to 550 vehicles per hour in each direction. During SR 99 construction, traffic in this area is projected to increase to 600 to 900 vehicles per hour in each direction.

Exhibit 6-2. Modeled Peak-Hour Traffic Volumes Compared to 24-Hour Baseline Traffic Volumes

Northbound SR 99



Southbound SR 99



Between the SR 99 First Avenue S. ramps and S. Royal Brougham Way, First Avenue S. normally carries high traffic loads associated with the SR 99 ramps. Typical volumes (pre-construction) range from 1,600 to 2,000 vehicles per hour in each direction during the AM and PM peak hours. Traffic using these ramps is expected to decrease during the construction period due to the local effects associated with construction. In addition, these ramps would be temporarily relocated to Alaskan Way S. (SB off-ramp) and S. Royal Brougham Way (NB on-ramp) during construction, which would sharply decrease traffic loads on this segment. Traffic volumes are expected to range from 600 to 1,000 vehicles per hour during the construction period on this segment.

South of the stadiums (near S. Atlantic Street), normal traffic volumes are on the order of 1,100 to 1,500 vehicles per hour in each direction during peak conditions. While some diverted traffic is expected on First Avenue S., the forecasted amount is more than offset by traffic reductions associated with the temporary relocation and expected reduction in use of the SR 99 First Avenue S. ramps, as described above. Traffic volumes in the range of 1,050 to 1,350 vehicles per hour in each direction are expected during SR 99 construction.

Fourth Avenue S.

Fourth Avenue S. is expected to also attract diverted trips during SR 99 construction, but would not see the volume increase offset by other construction zone changes to the same degree as First Avenue S.

In the south downtown area (north of Airport Way S.), Fourth Avenue S. carries approximately 650 vehicles in the SB direction, but 2,000 vehicles in the NB direction during the morning commute. During the afternoon peak, volumes are more balanced, with 1,150 vehicles per hour traveling SB and 1,400 vehicles per hour NB. During SR 99 construction, demand is expected to increase by 400 to 700 vehicles per hour in each direction, though roadway capacity is constrained on this segment, particularly NB during the AM peak.

Between the I-90 ramps and S. Royal Brougham Way, the predominant traffic flow is SB as vehicles travel from the I-90 off-ramp to SR 519. About 1,800 vehicles travel this segment SB during the AM peak, and 2,300 during the PM peak. An additional 300 to 400 vehicles per hour are forecast during the construction period. In the NB direction, traffic is expected to increase from about 650 vehicles during both peaks under normal conditions to around 900 to 1,000 vehicles per hour during the construction period.

South of S. Atlantic Street, peak hour volumes range from 1,100 to 1,350 vehicles per hour normally, except for SB during the morning peak, which carries a relatively light 500 vehicles per hour. During construction, an additional 400 to 600 vehicles per hour are expected.

Truck Forecasts

Truck forecasts were updated to reflect recent input (September 2007) from the Port of Seattle, with regard to planned service levels for Terminal 46 and expanded operations in and out of the North SIG Railyard. Based on this input, the analysis presumed that during the AM peak hour, 170 vehicles would enter and exit T-46 (in each direction), and most are destined to either the North SIG Railyard or points east on S. Atlantic Street. A total of 205 vehicles per hour would enter and exit the North SIG Railyard via Colorado Avenue S. During the PM peak hour, 75 trucks would enter and exit T-46, and 80 trucks are projected to enter and exit the North SIG Railyard.

Traffic Operations

Arterial traffic operations for the AM and PM peak hours were assessed using Trafficware's SimTraffic (version 7) software. The study area network consists of the SR 99 mainline and detours (S. Spokane Street to Battery Street Tunnel), as well as arterials and local streets in the stadium area (waterfront to First Avenue S., S. King Street to S. Holgate Street). A separate network was used to quickly assess traffic conditions on Fourth Avenue S.

Reported results are averages for three distinct 60-minute-long simulations. Ten-minute seeding periods were initiated prior to the hour-long simulations to pre-load the network with traffic. Each simulation run was reviewed to identify whether any anomalies or simulation errors were present. If so, those runs were resimulated using a different seed number.

SR 99 Mainline

Traffic simulations for the AM and PM peak hours were conducted to help estimate maximum throughput and typical travel conditions during Traffic Stage 3. As noted previously, these conditions would likely be prevalent throughout the daytime hours, though a period of improved conditions may occur in the midday (approximately 10 a.m. to 2 p.m.).

A two-lane SB configuration for Alaskan Way S. was modeled with signalization emphasizing the movement of ramp traffic. Occasional ramp queuing was observed under this configuration, but traffic flow and throughput on the ramp and SR 99 greatly improved compared to the initial model runs, which included only a single SB lane on Alaskan Way S. The resulting conclusion is that the proposed detour configuration would require

a two-lane section on SB Alaskan Way S. This change was studied and incorporated into the detour plans and proposed roadway configuration. Subsequent modeling included a two-lane SB configuration for Alaskan Way S. and is reported as such in this document.

Vehicle Throughput

Traffic simulation indicates that the proposed detour can operate reasonably and accommodate most of the projected demand (roughly 65 to 70 percent of normal peak traffic) during both the AM and PM peak hours. Exhibits 6-3 and 6-4 summarize the measured vehicle throughput (rounded to the nearest 10), relative to traffic volume input and baseline conditions. For the AM peak hour, the SR 99 detour was able to accommodate over 90 percent of projected traffic for all movements. This translates to 61 to 65 percent of normal baseline traffic. Similarly, for the PM peak hour, 90 to 98 percent of input traffic volumes was accommodated depending on the movement—equivalent to 58 to 68 percent of baseline traffic. The results substantiate that roughly one-third of normal peak-hour SR 99 traffic would need to be accommodated in other ways during the construction period. This could include shifting to other routes, changing modes, changing the time of travel, or reducing the number of trips made.

Exhibit 6-3. AM Peak-Hour SR 99 Vehicle Throughput During Construction

Northbound	Baseline Volume	Traffic Stage 3 Input Volume	Simulated Throughput	Percentage of Input Volume Served	Percentage of Baseline Traffic Served
NB SR 99 (S. Spokane Street to Stadium Area)	4,540	2,950	2,760	94%	61%
ON from Stadium Area	800	520	510	99%	64%
NB SR 99 (Stadium Area to Seneca Street)	5,330	3,470	3,270	94%	61%
Southbound					
SB SR 99 (Columbia Street to Stadium Area)	3,900	2,730	2,520	92%	65%
OFF to Stadium Area	1,480	1,040	960	93%	65%
SB SR 99 (Stadium Area to S. Spokane Street)	2,420	1,690	1,560	92%	65%

Note: Numbers rounded to the nearest ten.

Exhibit 6-4. PM Peak-Hour SR 99 Vehicle Throughput During Construction

Northbound	Baseline Volume	Traffic Stage 3 Input Volume	Simulated Throughput	Percentage of Input Volume Served	Percentage of Baseline Traffic Served
NB SR 99 (S. Spokane Street to Stadium Area)	3,620	2,530	2,480	98%	68%
ON from Stadium Area	1,260	820	770	94%	61%
NB SR 99 (Stadium Area to Seneca Street)	4,880	3,360	3,250	97%	67%
Southbound					
SB SR 99 (Columbia Street to Stadium Area)	5,400	3,510	3,190	91%	59%
OFF to Stadium Area	850	560	500	90%	58%
SB SR 99 (Stadium Area to S. Spokane Street)	4,550	3,000	2,700	91%	59%

Note: Numbers rounded to the nearest ten.

SR 99 Mainline Speeds

As expected, traffic simulation indicates that congested conditions would be prevalent during the construction period. Northbound, congestion is expected on the detour and would extend south toward S. Spokane Street during the AM peak hour, but would not extend as far back as S. Spokane Street for the assumed vehicle demand. Modeled AM travel speeds ranged as follows:

- 40 mph near S. Spokane Street.
- 12 to 20 mph from approximately S. Lander Street through the detour.
- Free-flow north of the detour.

During the PM peak hour, heavy congestion was observed NB only in the immediate vicinity of the detour. Travel speeds during the PM simulation were:

- 40+ mph between S. Spokane Street and S. Holgate Street.
- Slowing approaching S. Atlantic Street, with 10 to 20 mph through the detour.
- Free-flow north of the detour.

Southbound, congestion formed on the detour route and extended back to the vicinity of the Elliott Avenue on-ramp during the AM peak. In all three runs, the congested conditions never extended beyond this location. Modeled travel speeds were:

- 28 mph near the Elliott Avenue on-ramp.
- 12 to 20 mph on the viaduct structure and through the detour.

- Free-flow south of the detour.

During the PM peak, similar results were observed, though some slowing near the south portal of the Battery Street Tunnel was also present. Modeled travel speeds were:

- 27 mph near the Elliott Avenue on-ramp, extending to the Battery Street Tunnel south portal.
- 8 to 20 mph on the viaduct and through the detour.
- Free-flow south of the detour.

Arterial Traffic Performance

Construction activities would close S. Royal Brougham Way between Alaskan Way S. and First Avenue S., and the proposed detour would redirect traffic exiting SR 99 in the stadium area to Alaskan Way S. These two factors would intensify demand on SB Alaskan Way S. and EB S. Atlantic Street, increasing the importance of maintaining stable traffic flow on these routes. As described earlier, initial analysis demonstrated the need for a minimum of two travel lanes for SB traffic on Alaskan Way S.

A critical intersection is the revised configuration for Alaskan Way S./Colorado Avenue S. at S. Atlantic Street, which operates in tandem with the adjacent E. Marginal Way S./T-46/S. Atlantic Street intersection. A number of different conflicting movements must be accommodated at this location, while at the same time sufficiently prioritizing SB Alaskan Way S. to EB S. Atlantic Street traffic flow to avoid back-ups onto SR 99. Analysis of the proposed configuration shows that the intersection can accommodate the demand levels projected, but would be congested and at near-breakdown conditions. During the AM peak hour, the Alaskan Way S./S. Atlantic Street/Colorado Avenue S. intersection is projected to operate at LOS F conditions, with resulting congestion forming along SB Alaskan Way S., NB E. Marginal Way S., and NB Colorado Avenue S. The neighboring T-46 intersection is projected to operate at LOS D during the AM peak hour. These intersections would operate somewhat better during the PM peak hour (LOS E and D), and resulting congestion would be lighter.

The First Avenue S./S. Atlantic Street intersection is forecast to operate acceptably during both peak hours (LOS D). Clearing the EB movement is especially critical to avoid effects to upstream intersections on S. Atlantic Street and Alaskan Way S. The intersection appears to clear acceptably at the modeled demand levels.

First Avenue S.

Traffic simulation shows stable flow along First Avenue S. under conditions expected during the construction period. All intersections are forecast to operate at LOS D or better conditions, except for First Avenue S./S. Royal Brougham Way (LOS E during the PM peak hour) and First Avenue S./S. Main Street (LOS F during the PM peak hour). Note that this analysis assumed that parking would be prohibited on First Avenue S. in Pioneer Square during both peak periods, to create an additional travel lane north of S. King Street.

Given these results, it is possible that First Avenue S. may attract even greater traffic diversions during construction than presumed in this analysis, particularly in the AM peak period.

Fourth Avenue S.

Traffic simulations were only conducted for the PM peak hour, as a test of whether Fourth Avenue S. can accommodate additional traffic. Traffic flow is heavy in both directions during this time, whereas only select movements are heavy during the AM peak.

During the PM peak, SB Fourth Avenue S. would be heavily congested north of S. Royal Brougham Way under the tested conditions. This finding is not unexpected, given that this corridor segment is currently heavily congested during peak periods under normal conditions. Capacity constraints on Second Avenue S. (which becomes Fourth Avenue S. in the stadium area) at S. Main and S. Jackson Streets would limit PM peak hour SB throughput to 78 percent of projected demand levels. Each intersection is projected to operate at LOS F. The intersections of Fourth Avenue S./Airport Way S. and the Fourth Avenue S./I-90 off-ramp are also projected to operate at LOS F. These results confirm that Fourth Avenue S. cannot be expected to carry a substantial amount of additional traffic during the peak period in the peak commute direction. Despite operational problems on Fourth Avenue S., EB traffic flow on Edgar Martinez Drive S. (also called S. Atlantic Street) is not expected to be substantially affected.

Transportation Disruptions During Traffic Stages 1, 2, 4, and 5

During the first 11 months of Traffic Stage 1, NB and SB traffic on SR 99 would not experience any change. A reduction from three to two lanes of SB SR 99 traffic during the next 6 months is expected to affect travel times and choices to some extent. During construction of the undercrossing, Alaskan Way S. traffic would interact with traffic on S. Royal Brougham Way, First Avenue S., and S. Atlantic Street. Signal timing adjustments may be needed at

the S. Royal Brougham Way/First Avenue S. and S. Atlantic Street/First Avenue S. intersections.

During Traffic Stage 2 when SB SR 99 traffic is diverted to the WOSCA detour, a reduction of 30 to 35 percent in the SB SR 99 baseline traffic in 2010 can be expected, which is similar to Traffic Stage 3. Congestion is expected on the detour route, and additional traffic is expected on Alaskan Way S. and First and Fourth Avenues S. in the SB direction. Because S. Royal Brougham Way would be closed between First Avenue S. and Alaskan Way S., a higher volume of traffic would be observed on the S. Atlantic Street section between these two streets. The capacity for the NB traffic would not be affected during this stage.

During Traffic Stage 4, two lanes would be available for traffic flowing in each direction. Capacity would continue to be low compared to the existing structure, influencing travel times to some extent. However, congestion effects on local arterial traffic are unlikely to be as severe as during Traffic Stage 3.

Traffic Stage 5 would make the three lanes in each direction on the new SR 99 structure available for traffic. However, restoration activities on surface streets would affect local traffic due to lane closures and detours.

6.2.2 Accessibility

Construction activities would result in roadway disruption that affects accessibility near the Project. Connections to/from SR 99 would be affected, as would local streets in the construction area. This section considers how automobile, transit, bicycle, and pedestrian access would be affected during the construction period. Potential effects to freight haulers and access to the Seattle Ferry Terminal are also considered.

Roadway Connectivity and Access

SR 99 Access to and from Stadium Area/SR 519

Access between SR 99 and the stadium area would be maintained throughout the construction period. Today, the First Avenue S. ramps provide an exit from SB SR 99 and an entrance to NB SR 99. These access points would remain open during the beginning and end of construction (Traffic Stages 1 and 5), but would be relocated during Traffic Stages 2 through 4.

During Traffic Stages 2 through 4, the SB First Avenue S. off-ramp would be replaced by a temporary off-ramp to Alaskan Way S. north of S. Royal Brougham Way. Access back to First Avenue S. would be via Alaskan Way S. and S. Atlantic Street. This access route is more circuitous than the existing route for those traveling to destinations north of S. Atlantic Street, but

comparable to existing access for those traveling south of S. Atlantic Street or east of First Avenue S.

The First Avenue S. on-ramp to NB SR 99 would remain open during Traffic Stage 2, but would be replaced by a temporary on-ramp from S. Royal Brougham Way west of First Avenue S. The temporary ramp would provide similar access as the current on-ramp.

Access to SB SR 99 and from NB SR 99 is not currently provided in the project area, but would be provided late in the Project (by Traffic Stage 5) with the addition of the S. King Street ramps. These ramps would provide new access into the south downtown area.

Local Street Access

Construction activities would result in disruptions to several streets within the project area, most notably S. Royal Brougham Way, S. Atlantic Street, Alaskan Way S., and E. Marginal Way S.

S. Royal Brougham Way would be closed east of Alaskan Way S. throughout the construction period and remain closed thereafter. A portion of the roadway west of First Avenue S. would remain open to provide access to adjacent businesses and the temporary on-ramp to NB SR 99. In this way, business access would not be directly affected. Users who normally use S. Royal Brougham Way to travel east-west between Alaskan Way S. and the stadium area, SR 519, or First Avenue S. would instead use S. King Street to the north or S. Atlantic Street one block to the south.

Given the closure of S. Royal Brougham Way, maintaining access on S. Atlantic Street is of critical importance. This roadway would remain open throughout the construction period. A minimum of four lanes would be provided east of Colorado Avenue S., with two or more lanes connecting to E. Marginal Way S.

Construction activities would relocate Alaskan Way S. east of its current alignment and would modify connections between S. Atlantic Street and E. Marginal Way S. Temporary connections would be provided as necessary to maintain these routes throughout the construction period.

The relocated SB off-ramp from SR 99 would direct traffic to SB Alaskan Way S. and S. Atlantic Street. A minimum of two SB/EB lanes would be maintained on these streets to accommodate these trips.

Local access to businesses within the project area would be maintained throughout the construction period.

Transit Connectivity and Coverage

Transit Vehicle Connections

King County Metro bus services using SR 99 would be affected by lane reductions on SR 99 during the construction period. As described in Section 6.2.1 *Mobility*, congestion is expected to increase and result in slower travel speeds on SR 99. Therefore, the buses that use SR 99 (primarily those that travel between West Seattle and downtown) would experience longer travel times.

Although transit access routes would be maintained (SR 99 would remain open, as would all ramps used by buses), King County Metro may decide to make some routing changes to help lessen the expected congestion effects. Additionally, during corridor closures on nights and weekends during construction, buses would need to use alternate routes. Potential alternate transit routes were identified in coordination with WSDOT, SDOT, and King County Metro staff. Options include SR 99, First Avenue S., and Fourth Avenue S., with various possible transit priority treatments along each alignment. These options are in the process of being refined. Please see Section 6.3.2, *Transit Priority Routes and Strategies* for a discussion of the possible alternative routes and transit priority treatments under consideration for the construction period.

Freight Access

Freight access is a key concern given the importance of E. Marginal Way S., S. Atlantic Street, First Avenue S., and SR 519 as freight routes and the proximity of several important freight handling sites to the project area. The Port of Seattle's T-46 relies on the E. Marginal Way S. and S. Atlantic Street corridors for access, as does the North SIG Railyard. BNSF's tail track for the SIG Railyard, which is used to switch railroad cars and build trains, also runs through the middle of the project construction zone.

Freight Connections

S. Atlantic Street would remain open between E. Marginal Way S. and First Avenue S. throughout the construction period, maintaining a vital freight link. There would be instances when construction activities would affect freight traffic, but the maintenance of freight operations is a priority, and the Project will strive to minimize effects. During rail switching operations, S. Atlantic Street would be blocked by train activity, as is the case today. Alternate connections are to the south at S. Horton Street and S. Hanford Street, although these routes are circuitous for trips between T-46 and either the North SIG Railyard or SR 519 and other points east.

S. Royal Brougham Way would close between Alaskan Way S. and First Avenue S. during the construction period. Trucks that use this segment would instead use S. Atlantic Street one block to the south, which is a more direct connection to freight-related sites on E. Marginal Way S.

Other primary freight routes—First Avenue S., E. Marginal Way S., and SR 519—would remain open during the construction period. More detail on specific detour routes, if needed, including routes for trucks carrying hazardous materials, will be included in the construction traffic management plan, which will be developed as the Project progresses.

Freight Train Operations

The BNSF tail track from the SIG Railyard can remain open and in operation for a majority of the construction period, but there would be instances when rail operations would be affected due to temporary track relocations and construction of the final track configuration. However, as with freight operations, maintenance of rail operations is also a priority, and the Project will strive to expedite track construction and minimize effects to rail operations.

Seattle Ferry Terminal Access

Although the Seattle Ferry Terminal is located north of the project area, access to and from the dock passes through the construction zone for many trips. The closure of S. Royal Brougham Way during construction would necessitate changes in access for vehicles traveling to the Seattle Ferry Terminal. The primary access route would use S. Atlantic Street and Alaskan Way S. with a temporary remote holding area provided west of Alaskan Way S., south of S. King Street.

Vehicles exiting the Seattle Ferry Terminal would also experience some changes due to construction. With S. Royal Brougham Way closed, exiting traffic on SB Alaskan Way S. would instead use S. Atlantic Street and S. King Street to access SR 99 or First Avenue S. The tail track would be relocated to the west of its current location to prevent train blockages from affecting the predominant movement from SB Alaskan Way S. to EB S. Atlantic Street.

As planning and design of the Project and construction staging progresses, coordination with Washington State Ferries staff will continue to take place to ensure that service disruptions or degradations are minimized or avoided at the Seattle Ferry Terminal.

Pedestrian and Bicycle Access

During Traffic Stage 1 of construction, the sidewalk on the west side of Alaskan Way S. would be rerouted to a combined bike/pedestrian path on the east side of the street. This path would detour around construction activities

between S. Atlantic Street and S. Royal Brougham Way. The reroute would cross under the existing viaduct and run along a temporary path east of the viaduct between S. Royal Brougham Way and S. Atlantic Street. During construction of the undercrossing in Traffic Stage 1, Alaskan Way S. would be detoured, which would also necessitate changes to the bicycle lane. Alaskan Way S. would be detoured to S. Royal Brougham Way, First Avenue S., and S. Atlantic Street. Bicyclists would have the option of sharing the roadway with vehicles or using the combined bike/pedestrian path.

During Traffic Stages 2 through 4, a combined bike/pedestrian path would be provided on the west side of Alaskan Way S., close to the location of the existing sidewalk. The path currently located on the east side of Alaskan Way S. would be closed south of S. King Street and combined with the bike/pedestrian path on the west side of Alaskan Way S. A bike/pedestrian connection to S. Atlantic Street would be provided. As in Traffic Stage 1, bicyclists would need to use the combined bike/pedestrian path or share the roadway with vehicles.

Traffic Stage 5 would include localized lane closures for final paving and striping. Detours of short duration and distance for bicycles and pedestrians may be necessary before the final facilities are open for use.

Traffic diverting to arterial and local streets during construction could make it more difficult for pedestrians and bicyclists to cross the streets. In particular, First and Fourth Avenues S. are anticipated to carry increased volumes of traffic during construction. Bicyclists riding in the street may face increased potential for conflicts with vehicles given the higher volume of traffic.

Parking Effects

Traffic Stages 1, 2, 3, 4, and 5

Exhibit 6-5 summarizes potential parking effects during construction for the Project and includes spaces that would be permanently affected. The number of spaces affected varies by traffic stage, as shown in the exhibit.

Exhibit 6-5. Parking Spaces Removed During Construction

	On-Street Spaces			Off-Street Spaces	Total Spaces
	Short-Term	Long-Term	Subtotal		
Traffic Stage 1 Affected Spaces	146	423	569	1,064	1,633
Traffic Stage 2 Affected Spaces	146	423	569	1,020	1,589
Traffic Stage 3 Affected Spaces	146	423	569	1,020	1,589
Traffic Stage 4 Affected Spaces	146	423	569	1,020	1,589
Traffic Stage 5 Affected Spaces	29	423	452	1,020	1,472

Note: The spaces that would be permanently affected are included in these counts.

Traffic Stage 1 would experience the largest number of parking space removals during construction. A total of about 569 on-street spaces and 1,633 off-street spaces would be affected.

Some spaces may be affected for only part of a construction stage, so the effects shown in the table are relatively conservative. There are 32 spaces along First Avenue S. that may be considered for removal during the last 6 months of Traffic Stage 1, when SB SR 99 traffic is reduced to two lanes. These 32 spaces are included in the total Traffic Stage 1 effects of 146 on-street short-term spaces. Additionally, 44 of the 1,064 off-street spaces shown as affected during Traffic Stage 1 would be removed only during the first half of Traffic Stage 1.

For Traffic Stages 2, 3, and 4, about 569 on-street spaces could be affected at a time. Some on-street short-term spaces would be restored by Traffic Stage 5, resulting in about 452 total on-street spaces affected during that final stage. In addition to the spaces shown in Exhibit 6-5, during Traffic Stage 3 parking restrictions may be needed during the PM peak period along First Avenue S. from S. Royal Brougham Way to Yesler Way. These spaces are currently restricted for AM peak periods. Some additional parking spaces may need to be restricted along surrounding streets if necessitated by traffic conditions during construction. For example, if transit priority is provided on First Avenue S. (described in Section 6.3.2), parking restrictions may be needed along First Avenue S. between S. Spokane Street and Yesler Way. More detail on construction conditions will be developed as the Project progresses.

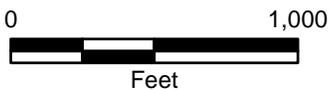
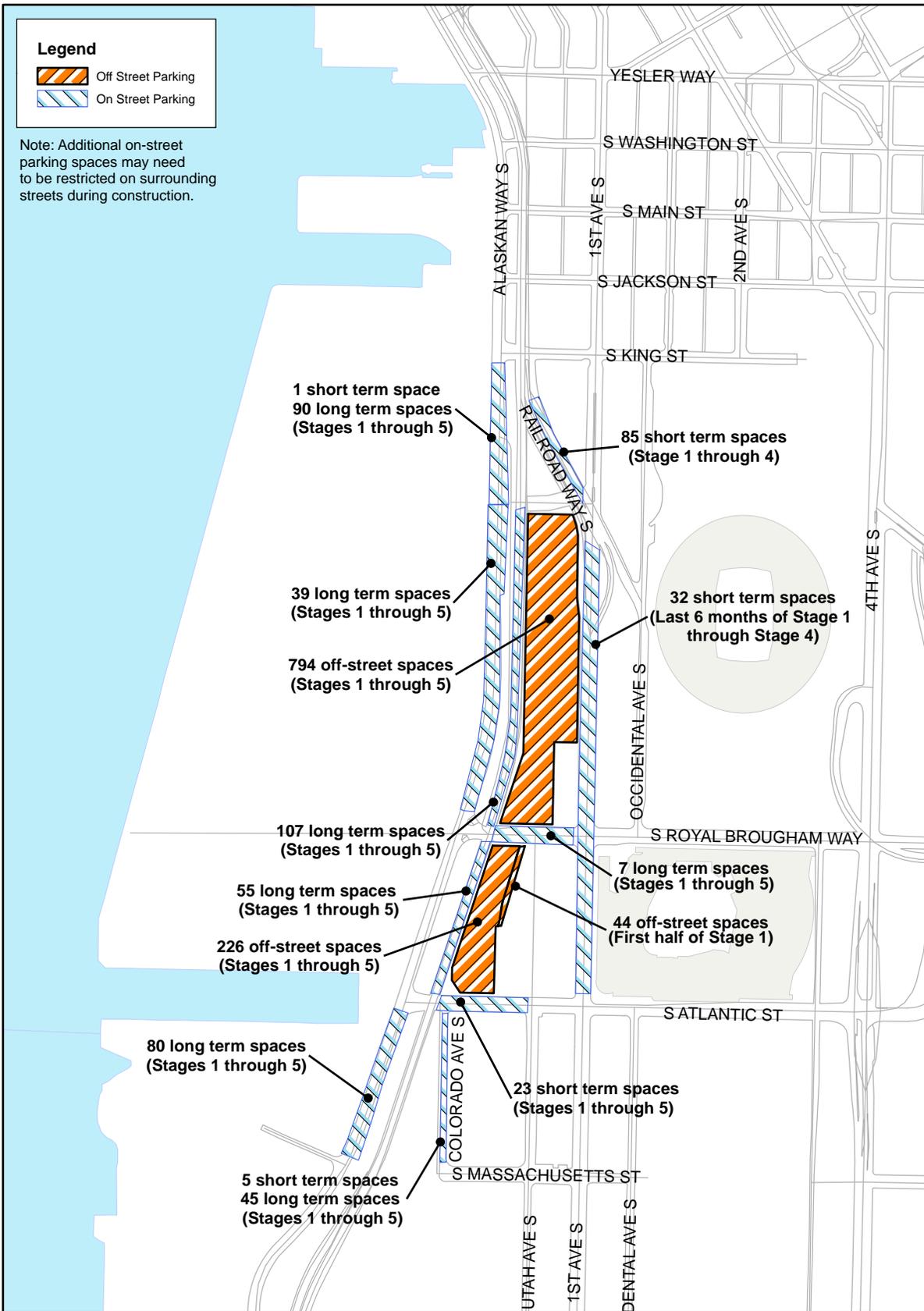
About 1,020 off-street parking spaces would be affected from Traffic Stages 2 through 5.

Overall Effect of Construction Parking Effects

The locations of parking removals are shown in Exhibit 6-6. Parking effects would occur in a relatively focused area of SODO—from S. Massachusetts Street to S. King Street and First Avenue S. to Alaskan Way S., west of the stadiums.

As discussed in Chapter 5, pay lots in the stadium area are abundant and underutilized. Although parking would be reduced compared to today's conditions, ample parking is expected to be available in pay lots near the stadiums. Most surface streets in the SODO area allow on-street parking, and much of it is long-term, so free parking is also anticipated to be available.

For the duration of project construction, the average workforce would be about 350 construction workers. Considering overlapping work schedules, parking demand could average 250 vehicles per day, Monday through Friday. Construction workers who are not able to park within the construction zone would likely seek available long-term parking in the area, first pursuing on-street spaces, then pay lots.



**Exhibit 6-6
Locations of Parking Removed
During Construction**

During events such as Seahawks and Mariners games, parking is currently highly utilized, and private lots charge a premium for event parking. During construction, it could become slightly more difficult to find parking during an event, and private parking lot operators may increase prices to coincide with the reduced parking supply. Between about 1,020 and 1,064 off-street parking spaces would be removed during project construction, depending on the construction stage. As listed previously in Exhibit 5-17, approximately 6,900 off-street parking spaces are available in the major parking facilities near the stadiums. The spaces in both the North Lot and Home Plate Parking may be temporarily unavailable during the construction of new developments planned at these locations in the next several years. Both new developments plan to replace the event parking spaces. Even if the parking at these two lots were unavailable at the same time, 5,500 spaces would still be available in the other lots listed in Exhibit 5-17.

The Project would affect on-street parking spaces along First Avenue S. during Traffic Stages 1 through 4. However, these spaces already tend to be restricted during events. Currently during major stadium events, several on-street curb locations adjacent to the stadiums, including along First Avenue S., are not available for parking before, during, or after the event. On-street parking is restricted, depending on the event, to better accommodate traffic, transit, and passenger drop-off and pick-up.

As they are today, event-goers will be encouraged to use bus and rail service and to carpool to the stadiums. The SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements (described in Section 6.3, *Mitigation*) would provide transit enhancements that further encourage transit use.

6.2.3 Safety

Driving in a work zone is more dangerous than on other parts of the road. Drivers can become confused by unfamiliar traffic patterns, signage, and cones/barricades in roadway work zones.

FHWA published the Work Zone Safety and Mobility Rule on September 9, 2004, in the Federal Register (69 FR 54562). In accordance with this rule, the Project would develop a temporary traffic control plan. This plan would address traffic safety and control throughout the work zone. Work zone management strategies may include using Intelligent Transportation Systems (ITS), traveler information, real-time work zone monitoring, traffic incident management, and enforcement components.

During construction, the bicycle lane on Alaskan Way S. south of S. Royal Brougham Way would be removed. Bicycles would use the shared bike/pedestrian path, although some may opt to share the roadway with vehicles.

This would increase the potential for vehicle-bicycle conflicts. The combined bicycle/pedestrian path is unlikely to be highly used by pedestrians through the construction area, so bicycle-pedestrian conflicts are not expected to be frequent. The path may experience increased use by pedestrians before and after stadium events, but if there are a high number of pedestrians, bicyclists may choose to use the roadway instead of competing with pedestrians for space on the path.

6.3 Mitigation

6.3.1 SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements

Goals

The goal of the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements is to provide investment funding to develop and deliver projects and strategies within areas potentially affected by construction of the Moving Forward projects. These enhancements and improvements are independent projects that benefit all pending improvements under the AWVSRP. As such, they are not part of the S. Holgate Street to S. King Street Viaduct Replacement Project and will each be evaluated separately.

The SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements will help maintain overall travel mobility and keep the system moving during construction of the Moving Forward projects. Up to \$125 million has been set aside for funding the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements. These projects and strategies include additional transit service hours, facilities to monitor transit reliability, traveler information systems, improvements to arterial and street traffic operations, and supporting demand management efforts and other projects.

Enhancements and Mitigation Advisory Team

A multi-agency team was formed to oversee the development of the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements. This team, called the Enhancements and Mitigation Advisory Team (EMAT), has recommended a list of projects for implementation.

Downtown Transportation Operations Committee

WSDOT, the City of Seattle, and King County have identified the need for ongoing coordination of the various construction activities. A new committee, the Downtown Transportation Operations Committee, may be created to support construction activities in the greater downtown Seattle area. It would likely be charged with the monitoring and coordination of transportation

construction activities, as well as multimodal operational responses to address the effects of that construction.

This Downtown Transportation Operations Committee would lead the coordination efforts to ensure multimodal transportation operations are as effective as possible during downtown project construction activities. This committee would provide for real-time communications and information linkages to better manage the multimodal transportation network.

Initial Transit Enhancements and Other Improvements

Candidate projects have been identified for initial funding and implementation. These projects require some development lead time to be operational by the time SR 99 traffic revisions begin. Exhibit 6-7 lists the projects, which are described in more detail following the table. The approximate locations of potential improvements are shown in Exhibit 6-8.

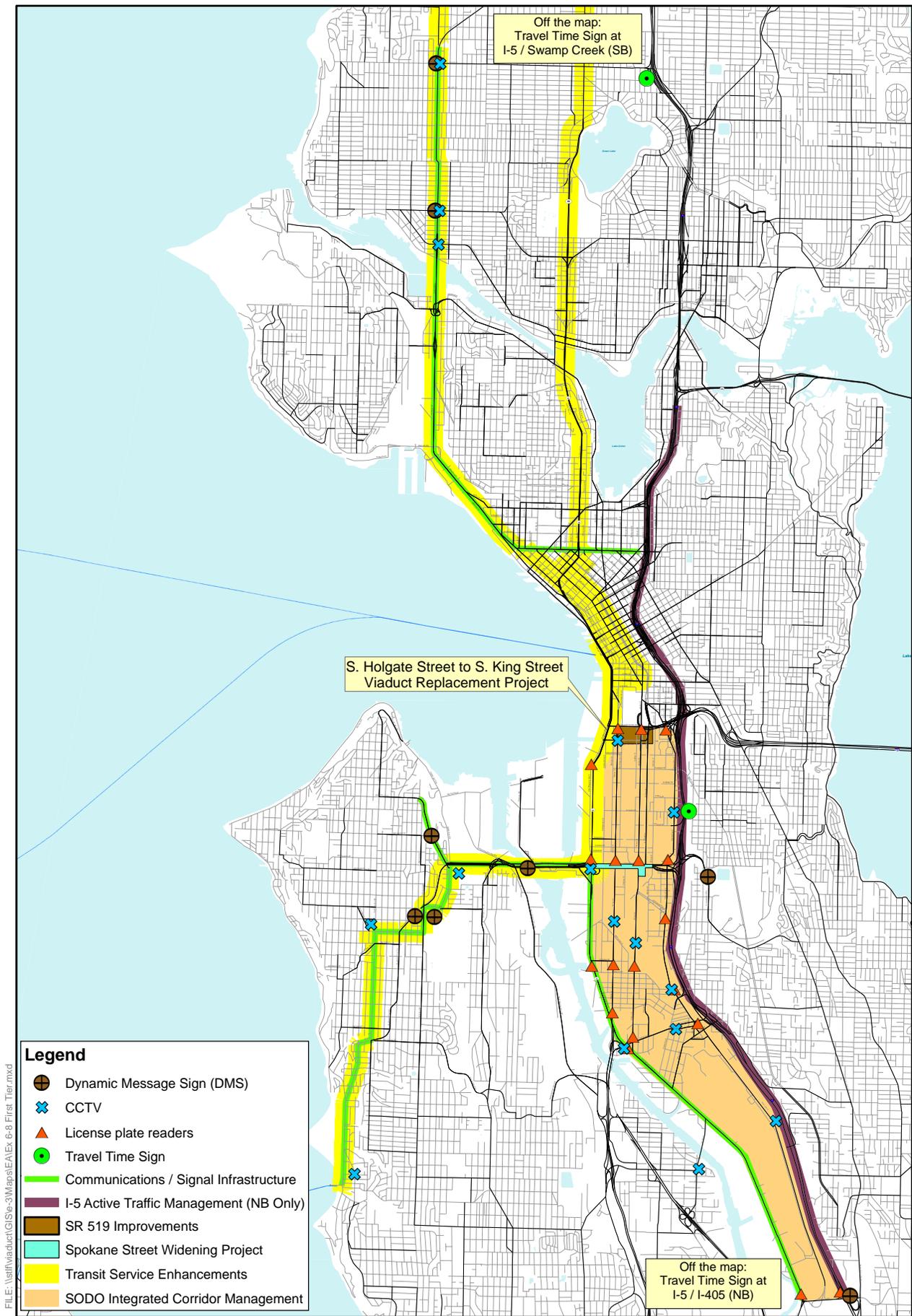
Exhibit 6-7. Summary of SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements

No.	Project Name	Travel Market	Functional Goals
1	SR 519 Intermodal Access Project, Phase 2	<ul style="list-style-type: none"> • Freight to/from Port • SODO 	<ul style="list-style-type: none"> • Highway and street system reliability • Freight connectivity
2	Spokane Street Viaduct Widening Project	<ul style="list-style-type: none"> • West Seattle • SODO • Duwamish 	<ul style="list-style-type: none"> • Highway and street system reliability • Freight connectivity • Traffic redistribution
3	Elliott Avenue W./ 15th Avenue W. Corridor Improvements (ITS and transit support)	<ul style="list-style-type: none"> • Ballard • Magnolia/Interbay 	<ul style="list-style-type: none"> • Highway and street system reliability • Traveler information • ITS infrastructure to support transit signal priority and real-time transit information
4	West Seattle Corridor Improvements (ITS and transit support)	<ul style="list-style-type: none"> • West Seattle 	<ul style="list-style-type: none"> • Highway and street system reliability • Traveler information • ITS infrastructure to support transit signal priority and real-time transit information
5	SODO/Integrated Corridor Management Improvements (ITS and transit support)	<ul style="list-style-type: none"> • SODO • Georgetown • I-5 	<ul style="list-style-type: none"> • Highway and street system reliability • Traveler information • ITS infrastructure to support transit signal priority and real-time transit information
6	I-5 Travel Time Signs	<ul style="list-style-type: none"> • Regional through trips on I-5 	<ul style="list-style-type: none"> • Traveler information

Exhibit 6-7. Summary of SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements (continued)

No.	Project Name	Travel Market	Functional Goals
7	Secure Use of New Buses and Transit Service Hours	<ul style="list-style-type: none"> • West Seattle • Burien • White Center • Ballard • Aurora • I-5 Corridor 	<ul style="list-style-type: none"> • Increased transit capacity • Increased transit frequency • Increased transit system reliability
8	Bus Travel Time Monitoring System	<ul style="list-style-type: none"> • Transit system 	<ul style="list-style-type: none"> • Transit system reliability
9	I-5 Active Traffic Management	<ul style="list-style-type: none"> • I-5 Corridor 	<ul style="list-style-type: none"> • Freeway system reliability • Incident reduction • Severity reduction
10	Ballard and SODO Arterial Travel Time System	<ul style="list-style-type: none"> • Ballard/Magnolia/ Interbay • SODO 	<ul style="list-style-type: none"> • Traveler information • Street system reliability
11	Denny Way Corridor Improvements (ITS)	<ul style="list-style-type: none"> • Ballard/South Lake Union/Queen Anne 	<ul style="list-style-type: none"> • Street system reliability • Traveler information
12	South End Transportation Demand Management (TDM)	<ul style="list-style-type: none"> • West Seattle • South Seattle • Burien • Tukwila 	<ul style="list-style-type: none"> • Traveler information • SOV trip reduction
13	Downtown Transportation Demand Management	<ul style="list-style-type: none"> • Downtown Seattle retail/commercial 	<ul style="list-style-type: none"> • Traveler information • SOV trip reduction • Parking management
14	In-Construction Adaptation Project	<ul style="list-style-type: none"> • All 	<ul style="list-style-type: none"> • System modifications to adapt program to ongoing construction activities (project flexibility)

SOV = single-occupancy vehicle



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Note: Improvement locations are approximate and are subject to change.



Exhibit 6-8
Potential Locations of SR 99/Viaduct
Project Initial Transit Enhancements
and Other Improvements

SR 519 Intermodal Access Project, Phase 2

This project will receive partial funding from the AWVSRP. The project design calls for constructing a new WB off-ramp from I-5 and I-90 via the current S. Atlantic Street overpass. Surface street improvements will be made at the First Avenue S./S. Atlantic Street and Occidental Avenue S./S. Atlantic Street intersections. The project design also calls for a grade-separated crossing at S. Royal Brougham Way, which will eliminate vehicle, freight, and pedestrian conflicts with trains at S. Royal Brougham Way and Third Avenue S.

Early implementation of the SR 519 Phase 2 Project will provide needed traffic relief for major construction of the S. Holgate Street to S. King Street Viaduct Replacement Project. SR 519 Phase 2 Project improvements are intended to provide additional traffic capacity and further eliminate the delays and traffic safety issues related to the surface-level rail crossing on S. Royal Brougham Way. The project will enhance highway and street system reliability and freight connectivity to and from I-5 and I-90 and waterfront locations. By reducing railroad and freight conflicts, the project will enable the Port of Seattle to move product from the Port to market more quickly.

Spokane Street Viaduct Widening Project

The S. Holgate Street to S. King Street Viaduct Replacement Project would provide partial funding to complete design and construction of a widened Spokane Street Viaduct between SR 99 and I-5, as well as an EB off-ramp from the Spokane Street Viaduct to Fourth Avenue S.

The project will enhance highway and street system reliability by providing more opportunities for traffic to redistribute itself on more travel corridors, improving connections and access for West Seattle trips to downtown. This will help reduce demand on the First Avenue S. off-ramp and street, which is expected to draw additional traffic during the S. Holgate Street to S. King Street Viaduct Replacement Project.

Elliott Avenue W./15th Avenue W. Corridor Improvements (ITS and Transit Support)

This project will implement Dynamic Message Signs (DMS), closed-circuit television (CCTV), and traffic signal upgrades in the Elliott Avenue W./15th Avenue W. corridor (from Denny Way to N. 85th Street). The project will also provide the communications and traffic signal infrastructure needed to support transit signal priority for future Ballard-to-Downtown RapidRide service. The project will include installing fiber-optic cable and traffic signal upgrades to facilitate transit signal priority functionality.

This project will provide real-time traveler information to help divert traffic off the SR 99 corridor during major construction and improve transportation system operations. It will also provide improvements to the traffic signal system in key corridors, which will help improve transit speeds and schedule reliability, especially for new RapidRide services and general purpose traffic operations on affected city streets.

West Seattle Corridor Improvements (ITS and Transit Support)

This project will implement DMS along three West Seattle corridors and improve communications capabilities by extending fiber-optic cable across the West Seattle Bridge. It will provide the communications and traffic signal infrastructure needed to support transit signal priority for the West Seattle-to-downtown RapidRide service.

The project will provide real-time traveler information to help divert traffic off the SR 99 corridor during major construction and improve transportation system operations. This will help improve highway and street system reliability. The project will also help facilitate the swift and reliable movement of future RapidRide buses, which will help encourage mode shift and reduce auto demand in the West Seattle-to-downtown travel corridor.

SODO/Integrated Corridor Management Improvements (ITS and Transit Support)

These improvements involve implementing DMS, CCTV, a Highway Advisory Radio system, and traffic signal controller and communications upgrades on major arterials in the SODO/Duwamish Valley area. Center-to-center communications software development and integration of ramp terminal signals will also be included. License plate reader technology will be provided to gather arterial street travel time data on First Avenue S., Airport Way S., and Fourth Avenue S. from the Boeing Access Road to S. Royal Brougham Way (SR 519).

This project will provide real-time traveler information to help divert traffic off the SR 99 corridor during major construction and improve transportation system operations. It will also provide improvements to the traffic signal system in key corridors to help improve transit speeds, schedule reliability, and general purpose traffic operations on affected city streets.

I-5 Travel Time Signs

The I-5 Travel Time Signs project involves static message signs that provide real-time travel time information. Signs will be placed at key decision points on I-5. These locations could include south of the I-405 interchanges at Tukwila and approaching the I-5/I-90 interchange area for NB traffic, and the

I-5/Northgate area and north of the I-405 interchange at Swamp Creek for SB traffic.

The system will help relieve traffic congestion by allowing drivers to change routes to less congested facilities. This will save travel time and free up congested corridors downstream from the sign.

Secure New Transit Service Hours

This project will provide funding to King County Metro to increase transit services in affected travel corridors (e.g., West Seattle, Burien, White Center, Ballard/Uptown, and Aurora Avenue) and support schedule maintenance requirements. The service hours and funding provided by the AWVSRP would cease after project completion.

Additional buses and service hours will help King County Metro maintain service schedules and provide additional seat capacity. This will help encourage mode shift (single-occupancy vehicles to transit) and reduce vehicle demand in the SR 99 corridor.

Bus Travel Time Monitoring System

This project will redeploy and augment the existing travel time monitoring equipment with limited new detection locations to cover key entry/exit points along downtown corridors. It will provide a means for monitoring bus performance to adjust to changes to street levels of service during project construction. This project will also provide the valuable data needed for before-and-after studies to help maximize transit investments and will help transit agencies adapt service to meet customer needs.

I-5 Active Traffic Management

This project will deploy the Active Traffic Management techniques of speed harmonization and queue warning to northbound I-5 from Boeing Access Road to I-90 and perhaps SR 520. Speed harmonization and queue warning systems help dynamically and automatically reduce speed limits approaching areas of congestion, accidents, or special events. This helps reduce the number and/or severity of incidents.

Ballard and SODO Arterial Travel Time System

This project will generate arterial travel time information in the SODO and Ballard/Magnolia/Interbay areas by deploying license plate reader technology on key roadway segments. Traffic engineers will also use this information to optimize traffic signal operations to maximize traffic flow on congested streets. Travel time information will enable people and businesses to make informed decisions about their trip-making.

License plate reader technology to gather arterial street travel time data will likely be deployed in the 15th Avenue W. corridor serving the Ballard/Interbay corridor. In the SODO area, readers will likely be deployed on First Avenue S., Airport Way S., and Fourth Avenue S. from Boeing Access Road to S. Royal Brougham Way (SR 519).

Denny Way Corridor Improvements (ITS)

This project will optimize the traffic flow on Denny Way by restricting left turns at selected intersections, adjusting signal timing, and adding a new transit-activated signal at Third Avenue and Denny Way.

South End Transportation Demand Management (TDM)

This project will deploy transportation demand management programs targeted toward serving commuter markets in the south end (primarily West Seattle, Burien, and Tukwila) and trips destined to the SODO/Duwamish industrial area. Although final detailed project descriptions are being developed, these programs would likely focus on providing improved access to multimodal traveler information, and marketing to encourage the use of transit and carpool and vanpool programs.

Downtown Transportation Demand Management

This project will deploy transportation demand management programs targeted toward reducing single-occupancy vehicle demand to and from downtown Seattle. Although final detailed project descriptions are being developed, these programs will likely target downtown retail and commercial travel markets, stadium and special events, and the integration of transit services with the Seattle Ferry Terminal.

In-Construction Adaptation Project

To meet an unforeseen mitigation need, this project will provide funding to target implementation of a project (or program), or supplement funding for one of the existing SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements.

6.3.2 Transit Priority Routes and Strategies

Providing priority conditions and facilities for transit and HOVs during the construction period is a priority for the project partners. WSDOT, SDOT, and King County are currently considering a range of potential transit enhancements (capital projects) and routing options along SR 99, First Avenue S., and Fourth Avenue S. during construction activities. At this time, projects and routings along SR 99 and First Avenue S. appear to be the most viable. The projects and routings under consideration for transit and HOV

priority are discussed in greater detail below and are shown in Exhibit 6-9, Transit Priority Routes and Strategies.

SR 99

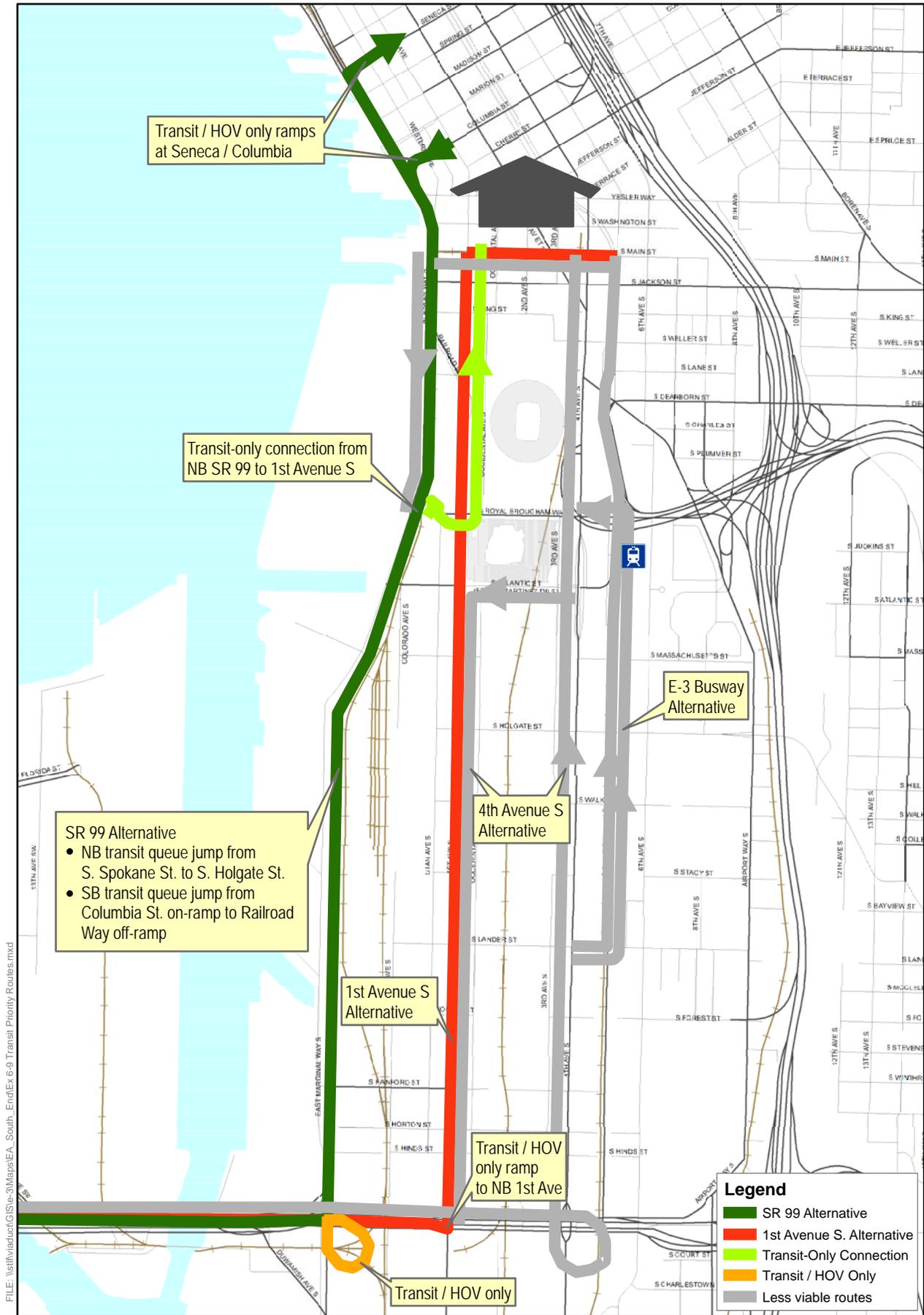
Potential transit enhancements on SR 99 include a directional queue bypass lane for both NB and SB SR 99. In the NB direction, the queue bypass lane would extend from the Spokane Street Viaduct to the approximate start of the construction zone at S. Holgate Street. The SB transit queue bypass would begin at the Columbia Street on-ramp and end near the First Avenue S. off-ramp. By providing a bypass of any back-ups that may occur as a result of the construction zone detour, the transit queue bypass lanes would provide transit with a higher level of reliability and improved speed over the general purpose travel lanes. The higher level of reliability and improved speeds may provide SR 99 users an incentive to use transit during construction.

The SB transit queue bypass lane would likely only be feasible if the Columbia Street on-ramp were designated as transit and HOV only (likely peak-period only). This would reduce the overall volume of traffic entering SR 99 in the SB direction, providing available capacity for transit and HOV drivers. Conversely, the NB transit queue bypass lane is anticipated to have a relatively small additional effect (beyond those already experienced due to construction) on general purpose traffic, as up to 35 percent of peak-period SR 99 users are expected to change either routes or modes.

A variation on the transit queue bypass strategy would be to provide a continuous transit/HOV lane through the construction zone detour, using one of the two available travel lanes (two lanes available in each direction). This strategy will continue to be assessed as the construction staging and phasing progresses.

The second possible transit-related project on SR 99 is the possible peak-period conversion of the Seneca and Columbia Street ramps to transit/HOV only during construction. This modification would improve the relative attractiveness of transit travel to downtown, which may serve as an incentive to SR 99 travelers to use transit. This conversion would also allow transit to better accommodate trips into and out of downtown during the peak periods when the viaduct is most heavily used, and would retain more capacity for through trips on SR 99 through downtown. As noted earlier, the implementation of this strategy also needs to be considered in conjunction with the HOV or transit-only queue bypass lanes.

Conversion of the Seneca and Columbia Street ramps would be expected to displace a relatively high amount of traffic onto the downtown street grid,



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**Exhibit 6-9
Transit Priority Routes
and Strategies**

particularly those trips from West Seattle. These effects would also need to be identified and assessed. The conversion of these ramps from general purpose to transit and HOV only would require a policy decision from WSDOT, as well as coordination with and agreement from the project partners (SDOT, King County, and FHWA).

Another transit priority strategy under consideration is the implementation of a transit-only off-ramp to First Avenue S. at approximately S. Royal Brougham Way. This off-ramp could allow transit to bypass some of the congestion resulting from the construction zone detour through the WOSCA property and back onto SR 99 via the First Avenue S. on-ramp. A SB transit-only on-ramp from Alaskan Way S. is also under consideration, but it appears to be a less viable strategy due to the challenging roadway geometrics expected at this location (relatively steep grade and minimal merge distance onto SB SR 99).

First Avenue S.

First Avenue S., immediately parallel to SR 99, is also being considered for transit enhancements during the construction period. Transit priority would be provided through parking restrictions in the existing parking lane and/or use of the two-way, center turn lane between S. Spokane Street and S. Atlantic Street to provide NB and SB transit lanes.

The transit lanes could either be adjacent to the curb or run down the center of the roadway. Due to the proximity of utility poles to the parking lanes, if the transit lane is located adjacent to the curb, First Avenue S. would need to be regraded to reduce the crown and side slope to avoid damage to both buses and utility poles. An alternative to regrading the roadway would be to eliminate the two-way, center turn lane and restripe the roadway for wider curb lanes, allowing buses to travel farther away from the curb. The transit lanes could also be located in the center of the roadway to avoid regrading, but passenger platforms would need to be located in the center of the roadway and a system of safe crossings would need to be devised.

Regardless of the transit lane placement (curb or center), transit would still be required to use the general purpose lanes through the most congested segment on First Avenue S. (between S. Holgate Street and S. Royal Brougham Way), as all available roadway space is expected to be needed for travel lanes and safety measures through the construction zone. Another element for consideration prior to final selection of First Avenue S. is the underground areaways. The structural stability and ability of the areaways to withstand continual transit usage would need to be assessed.

The second element of using First Avenue S. to provide transit priority would include changing the designation of the EB ramp from the Spokane Street Viaduct to First Avenue S. from general purpose to transit and HOV only. This designation change would provide transit with a designated path to the transit lanes on First Avenue S. and therefore would support a higher level of reliability and improved speed over auto travel. As noted in the Seneca and Columbia ramp discussion, the conversion of the ramp from general purpose to transit and HOV only would require a policy decision from SDOT and agreement from the project partners (WSDOT and King County).

The implementation of this concept assumes that the added EB lane on the Spokane Street Viaduct to the Fourth Avenue S. loop ramp (SDOT's Spokane Street Viaduct Widening Project) would be designated as general purpose to facilitate auto traffic's use of the Fourth Avenue S. loop ramp.

Routes Considered as Less Viable

Fourth Avenue S. to and from the Spokane Street Viaduct, using the Fourth Avenue S. loop ramp from the Spokane Street Viaduct, was considered a less viable route due to the lack of a corresponding SB path and access to the Spokane Street Viaduct. In addition, Fourth Avenue S. experiences considerable congestion between S. Royal Brougham Way and S. Jackson Street, which is largely unavoidable. It should be noted, however, that the Spokane Street Viaduct widening and Fourth Avenue S. loop ramp improvements would provide meaningful transportation benefits by allowing general purpose traffic to better access the street grid in the SODO area.

Use of the E-3 Busway also was considered and determined to be a less viable option because there is insufficient capacity for additional buses in the tunnel (under joint operations). In addition, the existing E-3 Busway ends at S. Royal Brougham Way, which is prior to the bottleneck noted above that is north of S. Royal Brougham Way. And, as found with the Fourth Avenue S. routing, there is no corresponding SB path and access to the Spokane Street Viaduct.

Selection of Transit Priority Strategies for Implementation

The transit priority alternatives discussed above will be further developed and assessed as the Project's construction staging and phasing work progresses. Additional quantitative and qualitative analysis will need to be completed to compare the SR 99 and First Avenue S. strategies for the following criteria:

- Number of trips served
- Travel time (express, local, reverse peak)
- Reliability
- Competitiveness with driving

- Transit costs
- Effects on other users
- Compatibility with future transit scenarios

6.3.3 Other Potential Mitigation

In addition to the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements and the transit-related projects, more localized mitigation measures will be developed as construction details are refined. Additional detail on mitigation will be included in the Traffic Management Plan (TMP), and mitigation commitments will be included in the Finding of No Significant Impact (FONSI). Some localized construction mitigation measures specific to this Project might include:

- Temporary widening of the proposed Alaskan Way S. from S. Atlantic Street to S. King Street, to accommodate three lanes of traffic during Traffic Stages 2 through 4 for ferry traffic (two lanes) as well as northbound traffic.
- Construction of temporary signals.
- Providing flaggers at certain intersections to facilitate both freight and general purpose traffic movements.

In addition, the contractor selected to construct the Project will be required to prepare a TMP to be approved by the City of Seattle to ensure that construction effects on local streets, property owners, and businesses are minimized. The TMP will include as a minimum the following measures:

- Details on required street and lane closures (duration and timing).
- Proposed detours and signing plans (for vehicles, pedestrians, freight and bicycles).
- Measures to minimize impacts on transit operations and access to/from transit facilities (in coordination with transit service providers).
- Traffic enforcement measures, including deployment of police officers.
- Coordination with emergency service providers.
- Measures to minimize traffic and parking impacts from construction employees.
- Measures to minimize effects of truck traffic for equipment and material delivery.
- Measures to minimize disruption of access to businesses and properties.

- Measures to minimize conflicts between construction activities and traffic during events (this may or may not include stopping construction activities during certain hours).
- Public outreach communication plan.

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Chapter 7 INDIRECT AND CUMULATIVE EFFECTS

Indirect effects are effects that are caused by the Project but occur later in time or are farther removed in distance. Cumulative effects are effects that could result when relatively minor independent effects from multiple projects become collectively substantial over time if not properly mitigated. This chapter discusses both types of effects.

7.1 Operational Effects

This indirect and cumulative effects evaluation includes those transportation improvements expected to be operational by the Project's completion. The new transportation system components anticipated to be in operation include:

- Sound Transit Link Light Rail – Central Link is expected to be operational from Sea-Tac Airport to Westlake Station (in downtown Seattle) by 2010, with joint bus operations in the Downtown Seattle Transit Tunnel.
- Downtown Seattle Transit Corridor – This includes Third Avenue transit exclusivity (Stewart Street to Yesler Way), Prefontaine Place S. Reconfiguration, and a Fourth Avenue S. Bus Island north of S. Jackson Street.
- PSRC Four-County Assumptions – These travel demand model assumptions include PSRC growth/land use assumptions and regional transit and highway/roadway improvements. This information is based on the current Metropolitan Transportation Plan (*Destination 2030*) (as adopted).
- Transit Agency Six-Year Plans – Other regional capital projects include park-and-ride expansions, direct access facilities, in-line stop facilities, HOV lane construction, and other operational roadway improvements.
- King County Metro Transit Now Service Changes and RapidRide Corridors – King County Metro has proposed Transit Now, a transit funding plan for service improvements that will substantially improve transit's ability to accommodate increased ridership. This plan includes RapidRide services that provide high-frequency service and bus priority improvements to highly traveled routes within King County Metro's service area. It also includes improved service on high-ridership routes and new peak and midday service in newly developing residential areas, and creates service partnerships with

major employers throughout the region. Transit Now has been included in the operating assumptions for the baseline conditions.

- SR 519 Intermodal Access Project Phase 2 – This project will connect a WB off-ramp from I-5 and I-90 to the current S. Atlantic Street Overpass (S. Atlantic Street’s current EB lanes would remain intact). Improvements at the intersections of First Avenue S./S. Atlantic Street and Occidental Avenue S./S. Atlantic Street will also be made. Additionally, a grade-separated crossing at S. Royal Brougham Way will be built to eliminate conflicts between cars, nonmotorized traffic, and trains.
- S. Lander Street Overcrossing Project – A bridge structure would be built over the BNSF railroad tracks to touch down at First Avenue S. and Fourth Avenue S., ultimately providing a roadway that is no longer affected by railroad operations.
- Spokane Street Viaduct Phase 1, Widening from SR 99 to First Avenue S. – Widening of the S. Spokane Street upper roadway.
- Spokane Street Viaduct Phase 3, Fourth Avenue S. Loop Ramp – A new EB loop ramp would touch down on Fourth Avenue S. south of S. Spokane Street.
- Home Plate Development – This project site is located west of First Avenue S. between S. Atlantic Street and S. Massachusetts Street. The proposed project would redevelop the entire site to include a mix of office, retail, and restaurant uses. The development would include approximately 300 event parking spaces and 500 accessory parking spaces.
- Port of Seattle Terminal 46 – The Port of Seattle projects an increased volume of container processing over the next 7 years.
- Port of Seattle Terminal 91 Cruise Ship Terminal Construction Project (2008–2009) – The Port is moving the cruise ship terminal from Terminal 30 and constructing a new cruise ship facility at Terminal 91.
- Port of Seattle Terminal 30 Container Terminal – This project will convert Terminal 30’s current use as a cruise terminal back to its original use for container operations.
- Mountains to Sound Greenway Pro-Parks Project – The SR 519 Intermodal Access Project Phase 2 includes a Greenway trail connection. The missing link from SR 519 downtown to the beginning of the Mountains to Sound/I-90 Trail on Beacon Hill would also be completed.

The Project's long-term cumulative effects on transportation are limited. The Project would not generate traffic and would improve operating conditions compared with leaving the existing facility in place. Improved connections near the stadiums could support revitalization in surrounding areas. However, the stadium area has been experiencing an increase in development over the previous several years, regardless. Over the past several years, the SODO area north of S. Atlantic Street has experienced several redevelopment projects due in part to the construction of Safeco and Qwest Fields and the Qwest Field Event Center. Specific planned projects in the area include redeveloping a portion of Qwest Field's north parking lot, a planned mixed-use development on the WOSCA site west of Qwest Field, and the planned Home Plate mixed-use project and parking. Even without the Project, redevelopment in the SODO area is expected to continue.

7.2 Construction Effects

During the Project's construction phase, several other projects are expected to be under construction in the downtown and SODO areas. WSDOT and SDOT have been monitoring these projects' construction schedules and coordinating to avoid major construction conflicts and to minimize effects to traffic to the extent practicable. Construction dates are subject to change, but notable projects that are likely to have construction schedules that coincide with or are close to the Project's construction schedule include:

- Bridging the Gap (2007–2013) – In November 2006, Seattle voters passed a \$365 million levy for transportation maintenance and improvements. Bridging the Gap will fund infrastructure maintenance and provide investment for major transportation projects. Considerable road and bridge repair work will take place throughout Seattle for a number of years. Key Bridging the Gap south end projects include the East Duwamish Waterway Bridge, bridge rehabilitation of Airport Way S. over the Argo Railyard, and the First Avenue S. pavement repair. Several of these projects would be complete before the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project begins.
- E. Marginal Way Overpass (mid-2007 to fall 2010) – The Port of Seattle will construct a grade-separated crossing of the BNSF rail lines (used by both BNSF and UPRR) and an improved intersection between E. Marginal Way and S.W. Spokane Street (to Harbor Island and West Seattle).
- Port of Seattle Terminal 25 (mid-2009 to mid-2010) – The south portion of Terminal 25 is going to be converted from cold storage warehouse use to container terminal operations.

- SR 519 Intermodal Access Project, Phase 2 (Fall 2008–2011)
- I-5 Pavement Repair (2009) – This will involve 22 lane miles of grinding and 58 panel replacements from Boeing Access Road to the King/Snohomish County line. Work will be done during evening and weekend closures of I-5.
- Electric Line Relocation for the AWVSRP (May 2009 to January 2010) – Utility relocations would take place along the east side of SR 99.
- SR 99 Battery Street Tunnel Fire and Safety Improvements (September 2009 to December 2010) – This project is one of the AWVSRP Moving Forward projects. Closures of SR 99 through the Battery Street Tunnel are expected to take place during weeknights and on up to two weekends per month.
- Spokane Street Viaduct Phase 3, Fourth Avenue S. Loop Ramp (October 2008 to September 2010) – A new EB loop ramp would touch down on Fourth Avenue S. south of S. Spokane Street.
- Spokane Street Viaduct Phase 1 (June 2009 to June 2011) – Widening of the S. Spokane Street upper roadway from SR 99 to First Avenue S.
- S. Lander Street Overcrossing Project – Construction would take place on S. Lander Street between First Avenue S. and Fourth Avenue S. The construction schedule of this project is currently unknown, since it is not fully funded.

In addition, the SR 520 Bridge Replacement and HOV Project may begin construction as early as 2010 and run through 2014. Construction on the central waterfront portion of the AWVSRP may begin in 2012. However, construction along the central waterfront is not specifically addressed below because coincident construction schedules would require different construction staging and traffic stages than are assumed for the Project.

Overlapping construction schedules could have a cumulative effect on the project area. Together, these projects could intensify traffic congestion through downtown. This would cause problems for all drivers, including transit and freight.

In 2009 and early 2010, prior to major construction of the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project, the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements (described in Section 6.3, *Mitigation*) would be underway, as would the SR 519 Intermodal Access Project Phase 2. The early utility relocations for this Project would be complete in early 2010. Construction of the Fourth Avenue S. loop ramp would also be underway, and widening of the Spokane Street Viaduct would

begin in June 2009. Bridge work on Airport Way S. over the Argo Railyard would occur between mid-2009 and mid-2010. E. Marginal Way Overpass construction would be complete in early 2010.

Throughout 2009, evening and/or weekend closures of sections of I-5 could be expected for I-5 pavement repair. SR 99 Battery Street Tunnel Fire and Safety Improvements would be ongoing from June 2009 until February 2011, with evening and weekend closures of SR 99 through the Battery Street Tunnel. In early 2010, the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project construction would start.

Traffic Stage 1 (February 2010 through July 2011)

During Traffic Stage 1, several projects would be underway. Traffic on SR 99 would be disrupted starting in January 2011, with lane reductions in the SB direction.

SR 99 Battery Street Tunnel Fire and Safety Improvements would be ongoing until December 2010. Weeknight and some weekend closures of SR 99 are anticipated, with SB traffic detoured off of SR 99 at the Denny Way ramp and back onto SR 99 at the Elliott Avenue on-ramp and NB SR 99 traffic exiting at the Western Avenue off-ramp and re-entering SR 99 using the Denny Way on-ramp. The Battery Street Tunnel project is scheduled to be complete in December 2010, which would be before SB lane reductions begin on SR 99 associated with the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project. As such, drivers on SB SR 99 would not experience disruptions on both the viaduct (south of S. King Street) and through the Battery Street Tunnel at the same time.

The SR 519 Intermodal Access Project Phase 2 construction would affect S. Royal Brougham Way during Traffic Stage 1. Fourth Avenue S. north of S. Royal Brougham Way would experience partial closures for resurfacing work from March through September 2010. The resurfacing work on Fourth Avenue S. could encourage some traffic to divert to First Avenue S. This may coincide, for several months, with the closure of Alaskan Way S. between S. King Street and E. Marginal Way S. due to the construction of the undercrossing. Traffic detoured from Alaskan Way S. would likely also use First Avenue S.

Construction of the Fourth Avenue S. loop ramp would be finished in September 2010, and widening of the Spokane Street Viaduct would be complete in June 2011. Pavement repair work would occur on downtown streets between March and September 2011. This would include Pine, Pike, Union, University, Seneca, Spring, Madison, Marion, Columbia, Cherry, and James Streets, and Yesler Way, Airport Way S., and S. Dearborn Street. Bridge

work on Airport Way S. over the Argo Railyard would occur between mid-2009 and mid-2010, overlapping with Traffic Stage 1. E. Marginal Way Overpass construction would be complete in the fall of 2010. The Port of Seattle Terminal 25 conversion project would end in mid-2010.

Traffic Stage 2 (July 2011 through January 2012)

During Traffic Stage 2, NB traffic on SR 99 would be unchanged, but SB traffic would be reduced to two lanes through the WOSCA detour.

Construction of the SR 519 Intermodal Access Project may be ongoing through the end of 2011. The pavement repair work occurring on downtown streets would continue until about September 2011.

Traffic Stage 3 (January through September 2012)

Both NB and SB traffic on SR 99 would be reduced to two lanes on the WOSCA detour during Traffic Stage 3. As described in Chapter 6, the most severe traffic effects would occur during this stage, when SR 99's capacity would be reduced and construction activities would also affect nearby surface streets. Although project construction schedules may change, given the current information, no major conflict in construction activities is foreseen in the vicinity of the Project. The nearest Bridging the Gap pavement repair project would involve Sixth Avenue through downtown from James Street to Denny Way (March through September 2012).

The construction schedule for the S. Lander Street Overcrossing project is currently unknown, since the project is not fully funded. However, it is possible that the project may be constructed within the same period as the SR 99: S. Holgate to S. King Street Viaduct Replacement Project.

If the S. Lander Street Overcrossing project is underway during Traffic Stage 3, coordination would be needed to minimize or avoid potential disruptions to traffic on First or Fourth Avenues S. due to the S. Lander Street Overcrossing project. The AWVSRP will continue to coordinate construction projects in the SODO area with the City of Seattle.

Traffic Stage 4 (September 2012 through April 2013)

During Traffic Stage 4, NB and SB traffic on SR 99 would be diverted to the new transition structures and the new SB SR 99 bridge, with two lanes available in each direction.

Traffic Stage 5 (April through October 2013)

Three lanes in both directions would be open to SR 99 traffic during Traffic Stage 5.

Other Construction Effects

Additional work in the stadium area could involve construction related to potential future rezoning. Rezoning would be in accordance with “Livable South Downtown” study findings, the Qwest Field North Lot’s redevelopment, and King Street Station Renovation.

As the Project’s design and construction planning move forward, project partners and other agencies will continue to work together to minimize possible cumulative effects and coordinate construction schedules. Much of the roadway work in the downtown and SODO areas would likely be completed with partial lane closures and/or evening and weekend work.

Although coordination among agencies will continue and effective mitigation plans will be in place, the Project’s cumulative effects relate to a larger area of effects (both beneficial or negative) than if it were the only major project under construction. The SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements described in Section 6.3 would help improve conditions caused by cumulative effects.

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