SR 519 INTERMODAL ACCESS PROJECT PHASE 2: SOUTH ATLANTIC CORRIDOR

Transportation Discipline Report

Prepared for

U.S. Department of Transportation
Federal Highway Administration

Washington State Department of Transportation

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Appendix A: Traffic Analysis

Acronyms and Abbreviations

	A
AVO	average vehicle occupancy
AWV	Alaskan Way Viaduct
	B
BNSF	Burlington Northern Santa Fe Railway Company
	C
CBD	Central Business District
CD	collector-distributor
	E
EB	eastbound
EIS	environmental impact statement
	F
FHWA	Federal Highway Administration
	H
HAC	High Accident Corridor
HAL	High Accident Location
HCM	Highway Capacity Manual
HCT	high-capacity transit
HOV	high-occupancy vehicle
	I
ICU	intersection capacity utilization
IDT	Interdisciplinary Team
IJR	Interchange Justification Report
	K
KC	King County
	L
LOS	level of service
	M
MOE	measure of effectiveness
mph	miles per hour

N

NB	northbound
NEPA	National Environmental Policy Act

O

ODOT	Oregon Department of Transportation

P

PAL	Pedestrian Accident Location
pcphpl	passenger car equivalents per hour per lane
pcpmpl	passenger car equivalents per mile per lane
PSRC	Puget Sound Regional Council

S

SB	southbound
SDOT	Seattle Department of Transportation
SEPA	State Environmental Policy Act
SIG	Seattle International Gateway
SODO	South of Downtown
SOV	single-occupancy vehicle
SR	State Route
ST	Sound Transit

T

TAZ	Transportation Analysis Zone
TDM	Transportation Demand Management
TMP	Transportation Management Plan

U

UDC	Urban Design Concept
UPRR	Union Pacific Railroad

V

V/C	volume to capacity ratio
vph	vehicles per hour

W

WSDOT	Washington State Department of Transportation
WSF	Washington State Ferries
WB	westbound

Glossary of Technical Terms

arterial streets – Major thoroughfares that serve as a traffic way for travel between and through a municipality.

Highway Capacity Manual (HCM) – A publication that contains concepts, guidelines, and computational procedures for computing the capacity and quality of service of various highway facilities, including freeways, signalized and unsignalized intersections, rural highways, and the effects of transit, pedestrians, and bicycles on the performance of these systems.

level of service (LOS) – A measure of roadway or intersection performance in terms of average delay per vehicle. LOS values range from LOS A, indicating good operating conditions with little or no delay, to LOS F, indicating extreme congestion and long vehicle delays. For signalized intersections, LOS is reported for the intersection as a whole. For unsignalized intersections, it is reported in terms of average delay for the worst movement.

Major Truck Streets – Major Truck Streets are defined by the City of Seattle as primary routes serving both local and regional freight traffic. The intent is to encourage trucks, especially larger ones, to use these arterials and discourage them from using other streets that are not ideal for accommodating truck movements.

Principal Arterials – Transportation arteries which connect the focal points of traffic interest within a city; arteries which provide communications with other communities and the outlying areas; or arteries which have relatively high traffic volume compared with other streets within the city.

Synchro – Traffic analysis software used to get a measure of delays, queues and intersection levels of service, and to optimize signal timings in order to minimize delays and stops at signalized intersections.

tail track – A tail track is a track extension beyond the end of a rail line.

Vissim – Traffic simulation program used in transportation planning and traffic engineering projects to analyze and visualize complex technical systems.

Summary

1 What is the Proposed Action and why is it needed?

The Federal Highway Administration (FHWA) and Washington State Department of Transportation (WSDOT) propose to construct improvements to State Route (SR) 519 in Seattle as Phase 2 of the SR 519 Intermodal Access Project. The project would include three components:

- A proposed new Interstate 90 (I-90) off-ramp to South Atlantic Street (I-90 off-ramp)
- A proposed new South Royal Brougham Way railroad overpass (BNSF Railway overpass)
- Roadway widening along the existing South Atlantic Street east of First Avenue South and improvements to the intersection of First Avenue South and South Atlantic Street

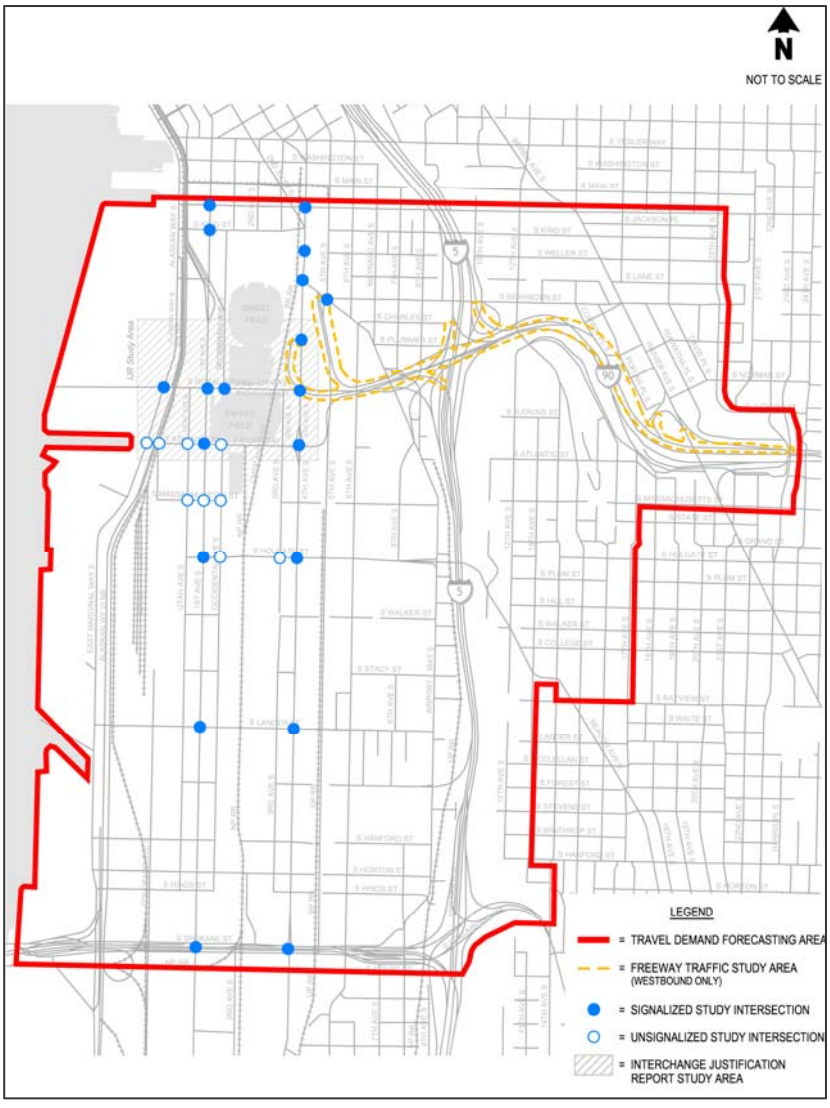
SR 519 is an important thoroughfare for cars, trucks, and pedestrians in Seattle's South of Downtown (SODO) district. In 2004, WSDOT opened Phase 1 of the SR 519 project, consisting of a new South Atlantic Street on-ramp to I-5 and I-90 and the South Atlantic Street overpass. The Proposed Action (SR 519 Intermodal Access Project – Phase 2: South Atlantic Corridor) would complete the SR 519 project by providing a direct westbound connection from the I-5/I-90 freeway system to the Seattle waterfront and Port of Seattle. Currently, westbound traffic from the freeway exits at Fourth Avenue South and has a circuitous route to South Atlantic Street to safely cross over the BNSF Railway tracks located just east of Safeco Field and Qwest Field. Vehicular and pedestrian traffic

on South Royal Brougham Way must use an at-grade railroad crossing. New roadway structures are needed to allow vehicles and pedestrians to reach their destinations safely, quickly, and directly.

The Proposed Action would connect the existing westbound off-ramp from I-5 and I-90 to the current South Atlantic Street overpass, and would construct improvements at the intersection of First Avenue South and South Atlantic Street to accommodate traffic along this new route. The Proposed Action would also build a grade-separated crossing over the railroad tracks at South Royal Brougham Way. Phase 2 of the Proposed Action would channel regional vehicle and freight traffic through South Atlantic Street. Local traffic, including pedestrians and bicycles, would be routed onto South Royal Brougham Way. Separating these travel modes is expected to increase pedestrian and bicycle safety.

This project would increase traffic mobility and safety by improving connections between Interstates 5 and 90 and Port of Seattle terminals, the Washington State Ferries terminal at Colman Dock, waterfront commercial interests, and the stadium area. The project would also allow people to walk more safely to and from the stadium area.

MAP OF STUDY AREA



2 What is the affected environment?

The affected environment for transportation extends north to south from Jackson Street to the Spokane Viaduct and east to

west from the Mount Baker Ridge tunnel to the waterfront. The I-90 freeway analysis focuses on the westbound direction which is affected by the Proposed Action.

The analysis of existing conditions for transportation identifies mobility issues for people and freight movements between Interstates 5 and 90 and the Seattle Waterfront, especially the Port of Seattle terminals and the Washington State Ferries terminal at Colman Dock.

In addition, there are safety issues related to surface-level rail crossings by vehicular traffic, bicyclists and pedestrians. Pedestrian safety issues are particularly critical during events at Safeco Field and Qwest Field. Pedestrian traffic is expected to increase when the new light rail Stadium station opens in 2009.

3 How were the effects of the project on transportation analyzed?

The traffic-related impacts are studied using three main criteria: traffic volumes, level of service and travel times. Three horizon years are being considered in this analysis: 2007 (existing conditions) provides a point of reference to compare with future scenarios, 2011 is the proposed year of opening, and 2030 is the design year. Traffic conditions are analyzed for the morning and afternoon peak hours on a typical day. The analysis also considers daily volumes to capture the off-peak conditions. Event traffic conditions are analyzed separately, considering different types of events that occur within the study area.

Effects on transportation also covered freight operations, transit, parking, pedestrian and bicycle circulation as well as traffic management during events. In addition, the project team analyzed impacts on safety, including elimination of freight and pedestrian crossings on mainline rail tracks and reduction of regional travel through the intersection of South Royal Brougham Way and Fourth Avenue South.

4 What transportation effects could occur during construction of the project, and what mitigation is proposed?

Construction activities would take approximately 3 years—from 2009 to 2012—to complete. The construction schedule for the Proposed Action will have to be carefully coordinated with other construction activities that could affect the area, including the south end of the Alaskan Way Viaduct and Seawall Replacement Project, the Central Link Light Rail, the Spokane Street Viaduct Project, the South Lander Street and East Marginal Way Grade Separation Projects, the expansion of the Rail Maintenance Facility across Holgate, and the I-90 Two-way Transit Lanes and HOV Project.

Proposed Construction Schedule

Temporary lane and street closures would be needed to accommodate construction equipment, vehicles and workers. Construction activities will affect vehicle circulation, parking, pedestrian circulation and access to adjacent businesses, services and residences.

Public outreach and agency communication will play a key role in construction management. WSDOT and the City of Seattle will work with the Port of Seattle, the freight community, transit agencies, and stadium authorities to ensure that construction activities are coordinated with the various services provided within the service area.

Conflicts between construction activities and traffic will be managed during events. This may or may not include stopping construction activities; a more detailed plan will be developed as project design progresses.

Operations at the King County Metro Ryerson transit base will be disrupted during construction, requiring that some buses be transferred to another base.

5 What transportation effects could occur during operation of the project, and what mitigation is proposed?

The project borders a local preservation district and affects one of the nation's largest ports, growing rail and transit services, two sports stadiums, and the busiest terminal of Washington State Ferries. Operation of the project over the long term would have a number of benefits related to freight, ferry, and event traffic by improving the connections from the Port of Seattle, waterfront, and stadium areas to the freeway system. These effects would occur after the completion of construction and during the operational life of the facility.

The main benefits of the project for transportation operations include:

- Creation of a more direct route between I-5/I-90 and the waterfront, especially the Port of Seattle terminals and the Colman Dock ferry terminal;
- Reduced congestion at the Fourth Avenue South terminus of I-90, which in 2030 is projected to extend east of the I-5 ramps, causing congestion on the northbound and southbound I-5 collector distributor in addition to westbound I-90;
- Improved travel times between I-5/I-90 and the waterfront, especially the Port of Seattle terminals and the Colman Dock ferry terminal;
- Improved operations at the intersection of First Avenue South and South Atlantic Street and improved travel times along First Avenue South;

- Reduced truck and rail traffic conflicts between the POS terminals and local, regional and national markets;
- Elimination of conflicts between trains and other modes of transportation at the railroad crossing on South Royal Brougham Way near Third Avenue South;
- Reduced truck traffic and regional traffic along South Royal Brougham Way and improved pedestrian and bicycle experience;
- Improved access to Safeco and Qwest Field garages from I-5 and I-90;
- Increased pedestrian and bicycle safety due to separation of travel modes. Regional vehicle and freight traffic would be channeled through South Atlantic Street. Local traffic, including pedestrians and bicycles, would be routed onto the new South Royal Brougham Way elevated structure.

A few potential adverse impacts are expected on transportation operations. The intersection traffic operations at First Avenue South and Royal Brougham Way are expected to degrade in the opening year 2011 as a result of the project. However, northbound and southbound travel times along First Avenue South would not be seriously affected.

The project would slightly reduce on-street parking supply on Third Avenue South and First Avenue South. This could result in increased use of the off-street public parking, and possibly parking in adjacent neighborhoods. This effect could be mitigated by general transportation demand management (TDM) techniques to reduce parking demand by encouraging more people to use alternative modes of transportation.

The number of bus parking spaces permanently lost on the Ryerson Base as a result of the project will depend on the final location of the support columns. Preliminary design analysis indicates that approximately two spaces could be permanently lost.

While the Proposed Action eliminates pedestrian conflicts with trains at South Royal Brougham Way, pedestrian access and

circulation has been raised as an issue at certain locations. These places are the north side of South Atlantic Street where the new Atlantic ramp I-90 connects, the Royal Brougham Way elevated structure touchdown at Occidental Avenue South, the crossing of the elevated structure near the garage access, the East Marginal Way Grade Separation, the Lander Street Overpass, the expansion of the Rail Maintenance Facility across Holgate, and the intersection of First Avenue South and South Atlantic Street. These safety concerns will be addressed using different techniques to better protect pedestrian crossings or to restrict pedestrian crossings when necessary.

These potential adverse impacts are not considered significant as the area is expected to incur overall improved operations with the Proposed Action.

6 What would be the cumulative effects related to transportation?

The City of Seattle is in the process of developing a comprehensive neighborhood plan known as the Livable South Downtown project which could have cumulative effects with the Proposed Action.

If implemented, this plan may contribute to changes in travel patterns in the SR 519 area including increased pedestrian and bicycle activity. However, most of the vehicular traffic in the area does not have an origin or destination within the study area (except during events), and that will not change under any of the potential land use scenarios considered in the Livable South Downtown project. The Proposed Action contributes to better distribute east-west traffic, with South Atlantic Street becoming the primary route for through traffic and trucks whereas South Royal Brougham Way becomes mostly a local street with improved bicycle and pedestrian facilities. Therefore, the Proposed Action would not be adversely affected by cumulative effects resulting from the Livable South Downtown project such as increased local vehicular and non-motorized traffic.

7 Are any of the identified effects considered substantial?

Examples of substantial effects could include the deterioration of intersection performance, safety hazards, or impeding key movements. However, the Proposed Action would not have any substantial effects on transportation in the study area.

8 What effects associated with transportation would occur if the Proposed Action is not built?

If the Proposed Action is not constructed, other projects are still anticipated to be built in the project area including the replacement of a southern portion of the Alaskan Way Viaduct, completion of the BNSF tracks, completion of the South Lander Street viaduct and closure of the South Holgate Street railroad crossing. General traffic, truck traffic, rail traffic, and pedestrian volumes are all expected to increase in the future.

Increasingly larger volumes of traffic, including trucks, would be constrained to the circuitous routing via Fourth Avenue South and South Atlantic Street or via the at-grade railroad crossing at South Royal Brougham Way to reach the waterfront from I-90. Congestion on the I-90 terminus ramp to Fourth Avenue South would increase with potential safety issues. Delays at the railroad crossing, and potential risks of collision with trains would increase significantly. Truck delays would result in increased vehicle emissions and higher costs for carriers translating to higher costs for consumers.

Higher pedestrian volume crossings are expected when the Sound Transit light rail operation starts in 2009, resulting in safety concerns and travel delays. Increasing pedestrian use of South Royal Brougham Way associated with the sports stadiums, event center, new developments planned in the area, and the new light rail station will create more potential conflicts between pedestrians and rail. There are approximately 70 train movements on the mainline tracks per day across the east-west arterial streets in the area. These train volumes and associated traffic delays and safety issues are expected to increase in the future if no grade separation is provided.

Without the proposed project improvements at the intersection of First Avenue South and South Atlantic Streets, the congestion would significantly increase by 2030, affecting east-west and north-south traffic. Bus operations along First Avenue South would be negatively affected.

Chapter 1 Introduction

1 Why is transportation considered in the Environmental Assessment?

The purpose of this Transportation Discipline Report is to evaluate the SR 519 Intermodal Access Project – Phase 2 for effects on transportation. Understanding the effects of a proposed public project on the transportation system is an important part of any environmental review and is required by law. Analysis of transportation effects is required under the National Environmental Policy Act (NEPA) for actions sponsored, funded, permitted, or approved by federal agencies. The State Environmental Policy Act (SEPA) requires analysis of a project's impact on the natural and built environment.

The Transportation Discipline Report addresses key questions such as: How would the Proposed Action affect traffic volumes and operations on the freeways and local surface streets? How would the project affect truck, transit and rail operations? Would the project affect parking and access to businesses and residences? How would pedestrians and bicyclists be affected by the Proposed Action? Would the project change parking, access and circulation conditions during events at the stadiums or exhibition center?

2 What is in this report?

Chapter 2 of this report introduces the purpose and need for this project and describes the various alternatives. Chapter 3 presents the approach followed in the transportation analysis. Chapter 4 describes the existing transportation conditions. Chapter 5 presents the analysis of the project impacts on the transportation system and suggests a range of mitigation measures to relieve negative effects on transportation during

project construction and operations. Chapter 6 describes potential cumulative effects on transportation from other projects.

3 What are the key points of this report?

The project borders a historic district and affects one of the nation's largest ports, growing rail and transit services, two sports stadiums, and the busiest terminal of Washington State Ferries. Operation of the project over the long term would have a number of benefits related to freight, ferry, and event traffic by improving the connections from the Port of Seattle, waterfront, and stadium areas to the freeway system. These effects would occur after the completion of construction and during the operational life of the facility.

The main benefits of the project for transportation operations include:

- Creation of a more direct route between I-5/I-90 and the waterfront, especially the Port of Seattle terminals and the Colman Dock ferry terminal;
- Reduced congestion at the Fourth Avenue South terminus of I-90, which in 2030 is projected to extend east of the I-5 ramps, causing congestion on the northbound and southbound I-5 collector distributor in addition to westbound I-90;
- Improved travel times between I-5/I-90 and the waterfront, especially the Port of Seattle terminals and the Colman Dock ferry terminal;
- Improved operations at the intersection of First Avenue South and South Atlantic Street and improved travel times along First Avenue South;
- Reduced truck and rail traffic conflicts between the POS terminals and local, regional and national markets;
- Elimination of conflicts between trains and other modes of transportation at the railroad crossing on Royal Brougham Way near Third Avenue South;

- Reduced truck traffic and regional traffic along South Royal Brougham Way and improved pedestrian and bicycle experience;
- Improved access to Safeco and Qwest Field garages from I-5 and I-90;
- Increased pedestrian and bicycle safety due to separation of travel modes. Regional vehicle and freight traffic would be channeled through South Atlantic Street. Local traffic, including pedestrians and bicycles, would be routed onto South Royal Brougham Way.

Construction activities would take approximately 3 years—from 2009 to 2012—to complete. The construction schedule for the Proposed Action will have to be carefully coordinated with other construction activities that could affect the area including the south end of the Alaskan Way Viaduct and Seawall Replacement Project, the Central Link Light Rail, the Spokane Street Viaduct Project, the East Marginal Way and South Lander Street Grade Separation Projects, the expansion of the Rail Maintenance Facility across Holgate, and the I-90 Two-way Transit Lanes and HOV Project.

Temporary lane and street closures would be needed to accommodate construction equipment, vehicles, and workers. These temporary closures would need to accommodate emergency response vehicles and allow access to buildings for fire, medical, rescue, and hazardous material responses. Construction activities will affect vehicle circulation, parking, pedestrian circulation and access to adjacent businesses, services and residences.

Public outreach and agency communication will play a key role in construction management. WSDOT and the City of Seattle will work with the Port of Seattle, the freight community, transit agencies, and stadium authorities to ensure that construction activities are coordinated with the various services provided within the service area.

Conflicts between construction activities and traffic will be managed during events. This may or may not include stopping

construction activities; a more detailed plan will be developed as project design progresses. The City will maintain ultimate permit authority to control construction activities impacting local streets.

A few potential adverse impacts are expected on transportation operations. The intersection traffic operations at First Avenue South and Royal Brougham Way are expected to degrade in the opening year 2011 as a result of the project. However, northbound and southbound travel times along First Avenue South would not be seriously affected.

The project would slightly reduce on-street parking supply on Third Avenue South and First Avenue South. This could result in increased use of the off-street public parking, and possibly parking in adjacent neighborhoods. This effect could be mitigated by general transportation demand management (TDM) techniques to reduce parking demand by encouraging more people to use alternative modes of transportation.

The number of bus parking spaces permanently lost on the Ryerson Base as a result of the project will depend on the final location of the support columns. Preliminary design analysis indicates that approximately two spaces could be permanently lost.

There are several locations where safety for pedestrian crossings is a potential concern with the Proposed Action. These locations are the north side of South Atlantic Street where the new Atlantic ramp I-90 connects, the Royal Brougham Way elevated structure touchdown at South Occidental Avenue, the mid-block crossing of the new Royal Brougham Way elevated structure near the garage access, and the intersection of First Avenue South and South Atlantic Street. These safety concerns will be addressed using different techniques to better protect pedestrian crossings or to restrict pedestrian crossings when necessary.

These potential adverse impacts are not considered significant as the area is expected to incur overall improved operations with the Proposed Action.

Chapter 2 Description of Alternatives

SR 519 is an important thoroughfare for cars, trucks, and pedestrians in Seattle's South Downtown (SODO) district (Exhibit 2-1). In 2004, WSDOT opened Phase 1 of the SR 519 project, consisting of the South Atlantic Street railroad overpass (Edgar Martinez Drive South) and a new eastbound on-ramp from South Atlantic Street to I-5 and I-90. The overpass separates road and railway traffic at Third and Fourth Avenues South and improves access to the freeway system from important waterfront facilities such as the Port of Seattle terminals, railroad freight yards, and the Washington State Ferries terminal at Colman Dock.

New South Atlantic Street overpass built in SR 519 Phase 1

The Phase 1 project had four main components which:

Provided the eastbound connection from the waterfront to I-5 and I-90 via South Atlantic Street

Removed the old eastbound I-90 ramp on Fourth Avenue South

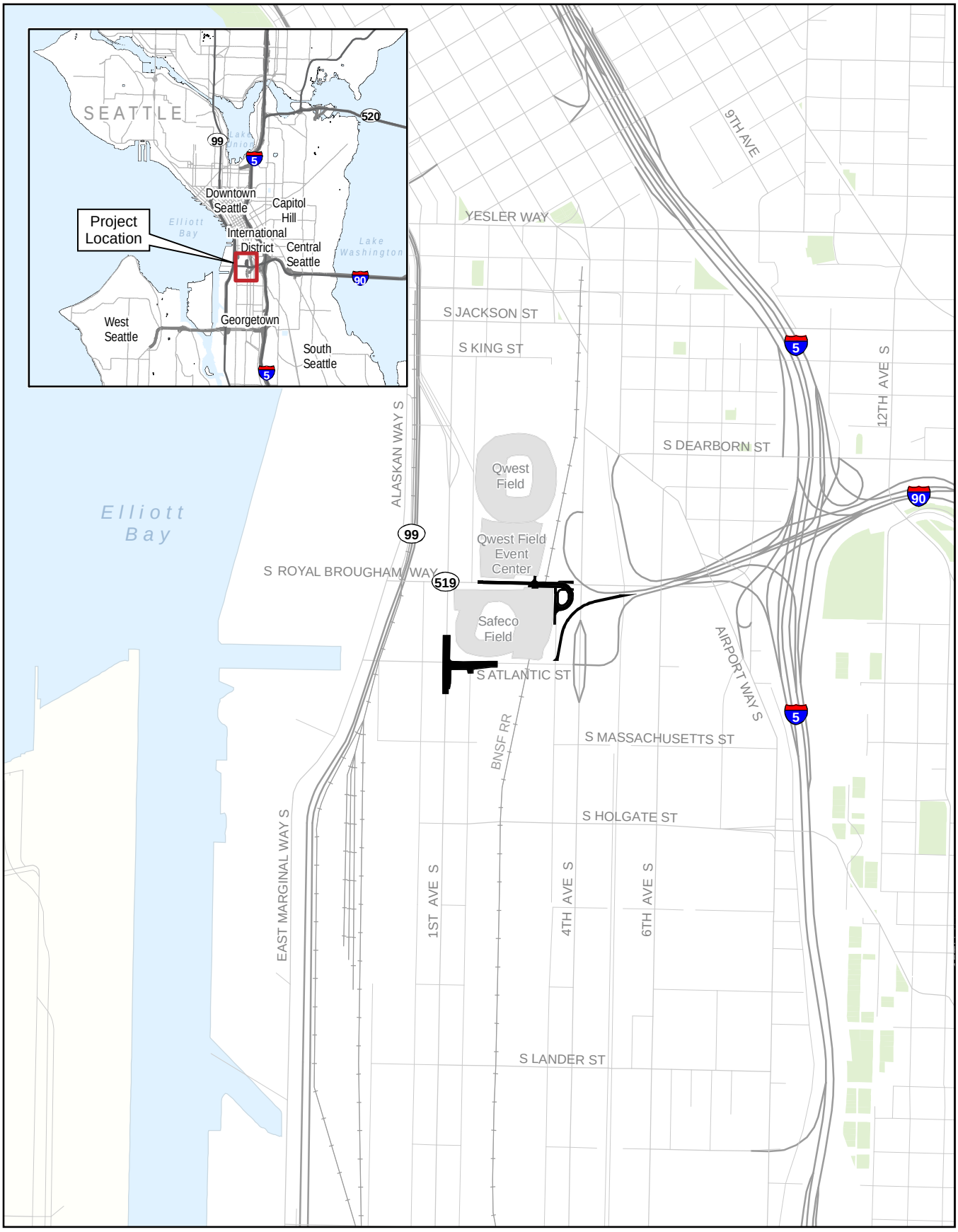
Made improvements to South Atlantic Street between First Avenue South and the Alaskan Way South/East Marginal Way intersection

Constructed the South Weller Street Pedestrian Bridge

When Phase 1 opened, eastbound freight, ferry, and event traffic immediately moved more freely, because connections from the Port of Seattle, waterfront, and stadium area to the freeway system were improved.

1 Why is the Phase 2 project needed?

SR 519 provides a vital roadway system for east-west traffic through Seattle, but it currently does not assist in the efficient westbound movement of cars, trucks, trains, and pedestrians through Seattle’s SODO district. The route passes through an area that has changed so much in recent years that the roadway arrangement is not well suited to present conditions.



Source: City of Seattle (2007) and King County (2006)

Stadiums
Project

N
0 1,000 Feet

Exhibit 2-1
Vicinity Map

A new design and new roadway structures are needed to allow vehicles and pedestrians to reach their destinations safely, quickly, and more directly.

This project would help to resolve several issues:

- Safety concerns from traffic and people crossing surface-level railroad tracks in the stadium area
- The expected increase in rail traffic and pedestrian crossings at South Royal Brougham Way when Sound Transit Central link light rail service begins in 2009, resulting in safety concerns and travel delays
- Poor westbound access between I-5/I-90 and the Seattle waterfront, especially the Port of Seattle terminals and the Washington State Ferries terminal at Colman Dock
- Delays in moving products between Port of Seattle terminals and local, regional, and national markets

2 What is the purpose of the project?

This project would improve traffic mobility and safety by improving westbound connections between I-5/I-90 and the Port of Seattle terminals, the Washington State Ferries terminal at Colman Dock, waterfront commercial interests, and the stadium area. The project would allow people to walk more safely to and from the stadium area.

The purpose of the project is to:

- Provide a more direct route between I-5/I-90 and the Seattle waterfront, so that westbound freight, commuters, and local traffic can move more safely and efficiently through the stadium area
- Improve safety and reduce railroad and vehicle delays at the surface-level rail crossing on South Royal Brougham Way west of Fourth Avenue South
- Improve safety for people walking to events, work, and neighborhood destinations

- Reduce truck and rail traffic conflicts so that freight operators can move products more efficiently between Port of Seattle terminals and markets

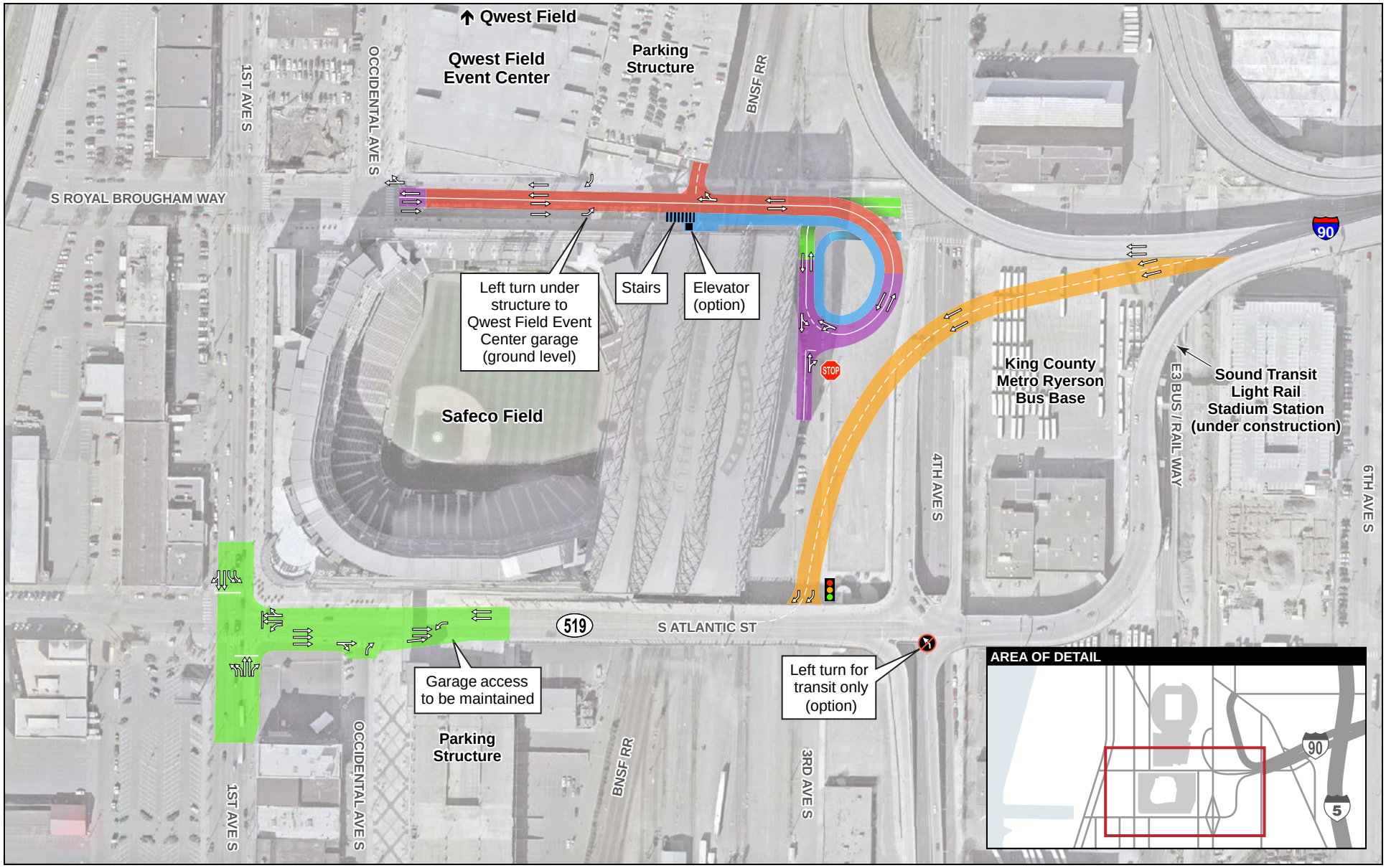
3 What are the project alternatives?

Two alternatives were analyzed for this report: the Proposed Action and the No Build Alternative. The Proposed Action, which has been designed to meet current and projected future traffic conditions, was developed following the completion of an earlier NEPA Environmental Assessment and associated Finding of No Significant Impact (FONSI) (USDOT et al., 1997) and builds on the more recent screening and evaluation of 21 preliminary Phase 2 options by WSDOT in a feasibility study (KPFF et al., 2006).

Proposed Action

The Proposed Action (SR 519 Intermodal Access Project Phase 2: Atlantic Corridor) would connect the existing westbound off-ramp from I-5 and I-90 to the existing South Atlantic Street overpass. It would also provide improvements at the intersection of First Avenue South and South Atlantic Street to accommodate traffic more efficiently along the route. In addition, it would build a grade-separated crossing over the railroad tracks at South Royal Brougham Way. These proposed improvements are described in more detail below and are illustrated on Exhibit 2-2. Traffic flow with the proposed improvements in place is shown in Exhibit 2-3. All proposed improvements would comply with the Americans with Disabilities Act of 1990 (ADA).

I-90 Off-Ramp to South Atlantic Street. A new two-lane elevated ramp connection would be built from westbound I-90 to terminate at a signalized T-intersection on the South Atlantic Street railroad overpass. The new South Atlantic Street connection would serve westbound freeway traffic exiting I-90 and I-5. The new ramp would be entirely elevated, passing over Fourth Avenue South and Third Avenue South and connecting to the South Atlantic Street overpass southeast of Safeco Field.

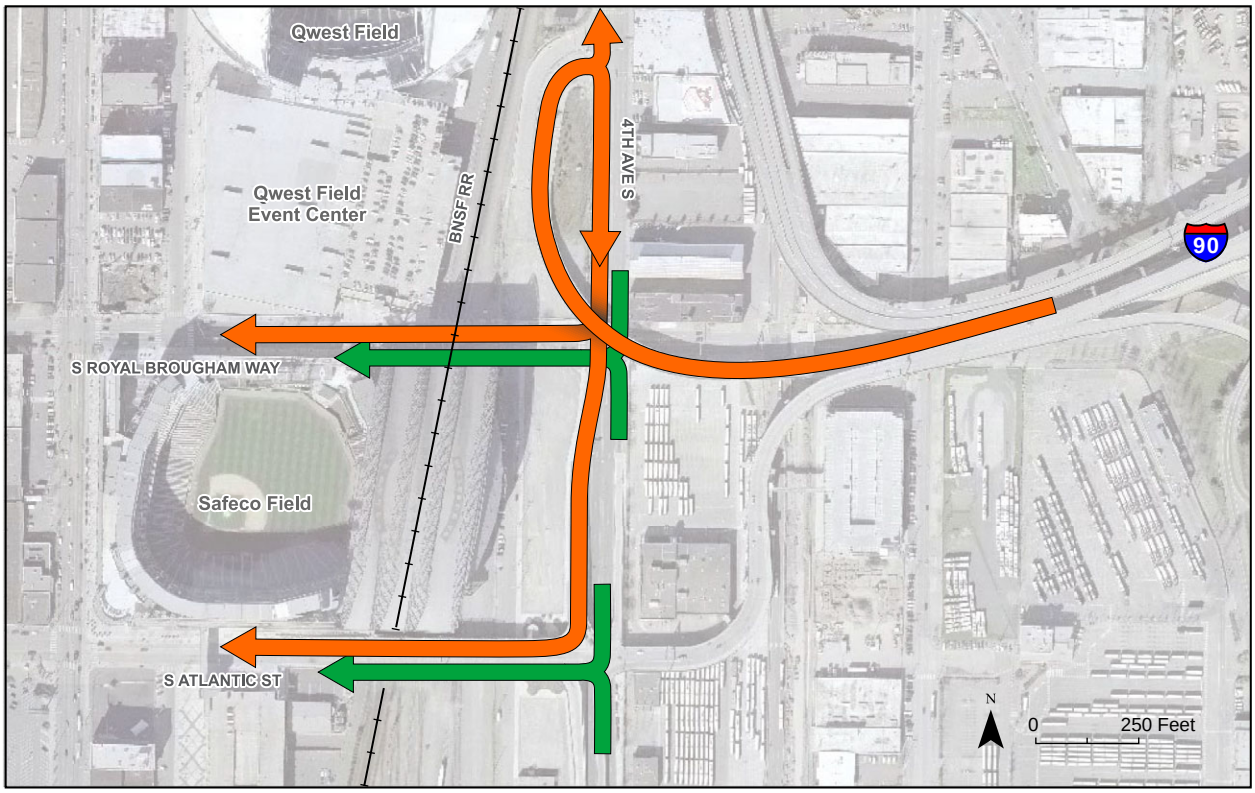


Arterial Bridge
Elevated Ramp
Pedestrian Bridge
Surface Improvements
Fill Embankment

N
0
250 Feet

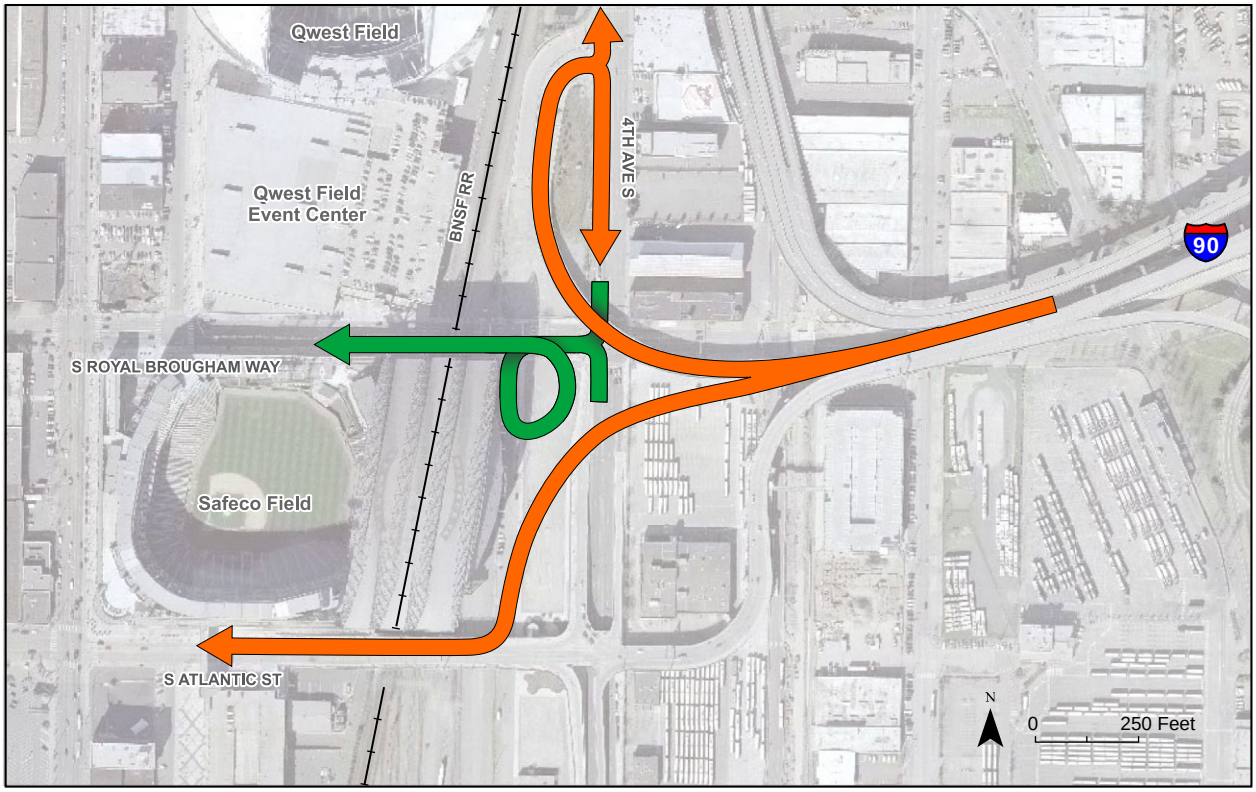
Exhibit 2-2
Project Elements

SR 519 Intermodal Access Project - Phase 2
February 2008



Existing Westbound Regional Routes
Existing Westbound Local Routes

Existing Westbound Travel Routes



Proposed Westbound Regional Routes
Proposed Westbound Local Routes

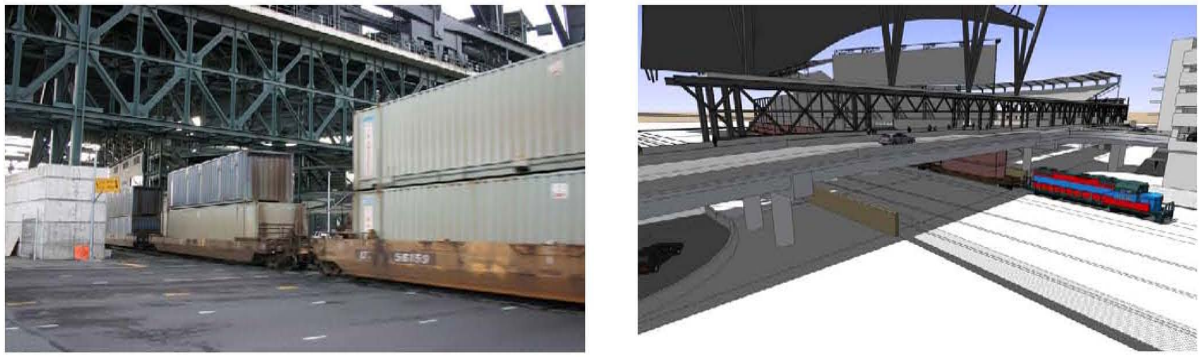
Proposed Westbound Travel Routes

Exhibit 2-3
Existing and Proposed Westbound Travel Routes

Exiting northbound I-5 traffic would be routed to South Atlantic Street, while exiting southbound I-5 traffic would have the option of using either the new off-ramp to South Atlantic Street or the existing I-90 off-ramp to Fourth Avenue South.

South Royal Brougham Way Railroad Overpass. The South Royal Brougham Way at-grade railroad crossing would be closed, but it could possibly be opened to public services in the event of a major emergency in the vicinity. A new two-lane elevated structure would be built, connecting Occidental Avenue South to Third Avenue South. The new overpass would transport vehicular, pedestrian, and bicycle traffic over the railroad tracks and provide a new connection and entrance from South Royal Brougham Way to the second level of the Qwest Field Event Center parking garage. The new ramp would accommodate local two-way traffic and provide ADA-compliant access.

Proposed ramp at east end of South Royal Brougham Way railroad overpass



South Royal Brougham Way existing at-grade railroad crossing (left) and proposed overpass (right)

Improvements to the Intersection of First Avenue South and South Atlantic Street. The project would widen the intersection by adding additional turn lanes to each approach. Existing parking lanes along First Avenue South would be converted into travel lanes, with a new eastbound lane added to South Atlantic Street. Sidewalks along the southern edge of South Atlantic Street east of First Avenue South would be relocated to the south to accommodate the added eastbound lane.

Construction Components

Construction of the SR 519 Phase 2 project could take about 3 years, and WSDOT is exploring ways to accelerate this schedule. Construction would involve three project components:

- Improvements to the intersection of First Avenue South and South Atlantic Street could begin first, with construction starting in 2009 and lasting 6 to 9 months.
- Construction of the new I-90 ramp connection to the South Atlantic Street overpass could last 15 to 18 months and could begin as improvements to the intersection of First Avenue South and South Atlantic Street are underway.
- Construction of the new South Royal Brougham Way railroad overpass, most likely beginning in 2010, could overlap with construction of the new I-90 off-ramp and last 18 to 21 months.

Proposed Construction Schedule

Access for emergency service vehicles would be maintained at all times. A construction management plan (CMP) would be developed to optimize the sequencing of the SR 519 Phase 2 project elements. The CMP would identify approaches that best coordinate with and minimize unwanted effects on the following:

- Stadiums and Event Center activities
- Port of Seattle container operations

- Washington State Ferries
- BNSF Railway mainline and yard operations, AMTRAK mainline operations, and Sound Transit commuter rail operations
- Sound Transit Link light rail operations, Sounder commuter rail service, and Regional Express bus operations
- King County Metro Ryerson Bus Base operations and Metro bus service throughout the affected area, including through-routes operating within the area, and access to the bases and downtown Seattle transit tunnel
- Greater Duwamish Manufacturing and Industrial Center freight operations

Temporary construction staging areas would be required to store equipment and materials during construction. A gravel lot owned by WSDOT, bounded by South Atlantic Street and South Royal Brougham Way, and Third Avenue South and Fourth Avenue South, would serve as the primary construction staging area for the SR 519 Phase 2 project. This lot is vacant, and no adverse environmental effects are expected from staging at this location. Other temporary staging areas would be determined through consultation with King County and the City of Seattle during project design.

No Build Alternative

Under the No Build Alternative, the three proposed Phase 2 components discussed above would not be built. Westbound traffic exiting from I-5 and I-90 would continue to flow as shown in Exhibit 2-3.

4 What permits would be required to build the project?

The SR 519 Phase 2 project would be built under close regulatory scrutiny. WSDOT would apply to the State of Washington, King County, and the City of Seattle for a number of permits and approvals. They would most likely include, but not necessarily be limited to:

- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (Washington State Department of Ecology)
- Wastewater Discharge Approval (King County)
- Street Use Permit (City of Seattle)
- Side Sewer Permit (City of Seattle)
- Noise Variance (City of Seattle)

WSDOT will confirm the requirement for these and other permits as engineering design and construction planning proceed in coordination with the permitting authorities.

Chapter 3 Methodology

This report identifies and analyzes transportation impacts associated with the proposed SR 519 Phase 2 project. It follows general guidelines for analyzing transportation impacts as part of the environmental review process. The analysis includes an evaluation of existing transportation conditions, an assessment of projected future conditions with and without the construction of the Proposed Action, and an identification of mitigation measures to avoid or minimize potential adverse effects of the proposed action.

The transportation analysis covers all modes of transportation including general traffic, trucks, transit, rail, bicycles and pedestrians. Three scenarios were analyzed in detail: existing conditions, the No Build Alternative, and the Proposed Action.

1 What is the transportation study area?

The study area for traffic analysis extends north to south from S Jackson Street to the Spokane Viaduct and east to west from the Mount Baker Ridge tunnel to the waterfront. The I-90 freeway analysis focuses on the westbound direction, which is affected by the Proposed Action.

The study area is illustrated on Exhibit 3-1.

N

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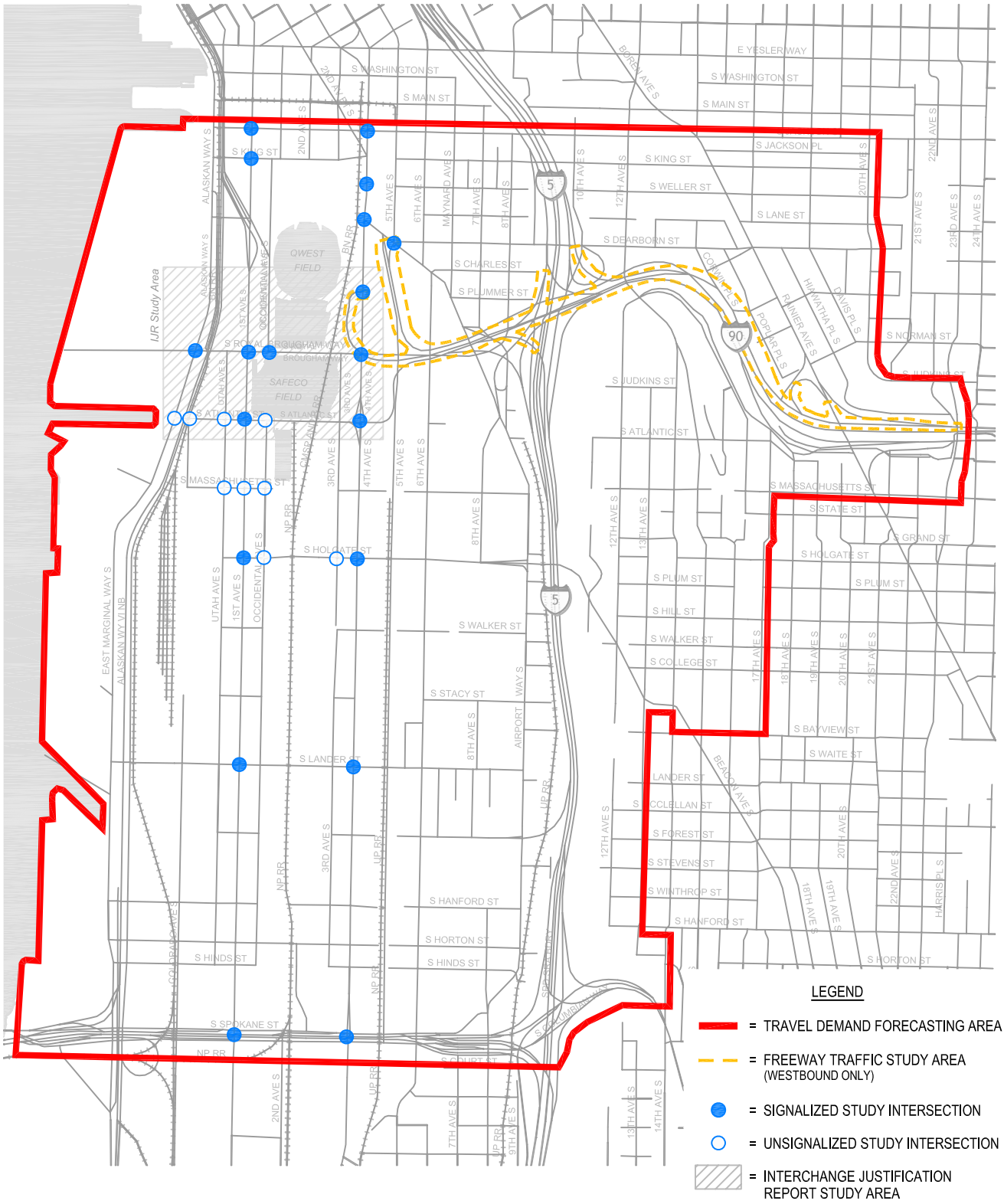

Exhibit 3-1

Project Study Area

SR 519 Intermodal Access Project, Phase 2

The Transpo Group

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2 What horizon years are being considered and why?

Three horizon years are considered in this analysis: 2007 (existing conditions) provides a point of reference to compare with future scenarios, 2011 is the proposed year of opening, and 2030 is the design year.

3 What time periods were evaluated and why?

Traffic conditions were analyzed for the morning and afternoon peak hours on a typical day. Daily volumes were also considered in the analysis to capture the off-peak conditions. Event traffic conditions were analyzed separately, considering representative types of events that occur within the study area.

4 What type of data was collected?

The analysis relied on existing data or additional data collected for the purpose of this study. The data that was assembled covers all modes of transportation (cars, trucks, buses, trains, pedestrians, bicycles) and consists of counts, delays, travel times (see Appendix C for further detail), and collision statistics. In addition, an origin-destination study was conducted and used to help establish travel patterns; this study is included as Appendix B.

5 What other studies and reports were used?

There are a number of relevant studies and reports that were used for developing this analysis. The most relevant documents are listed in Exhibit 3-2.

EXHIBIT 3-2. LIST OF RELEVANT STUDIES

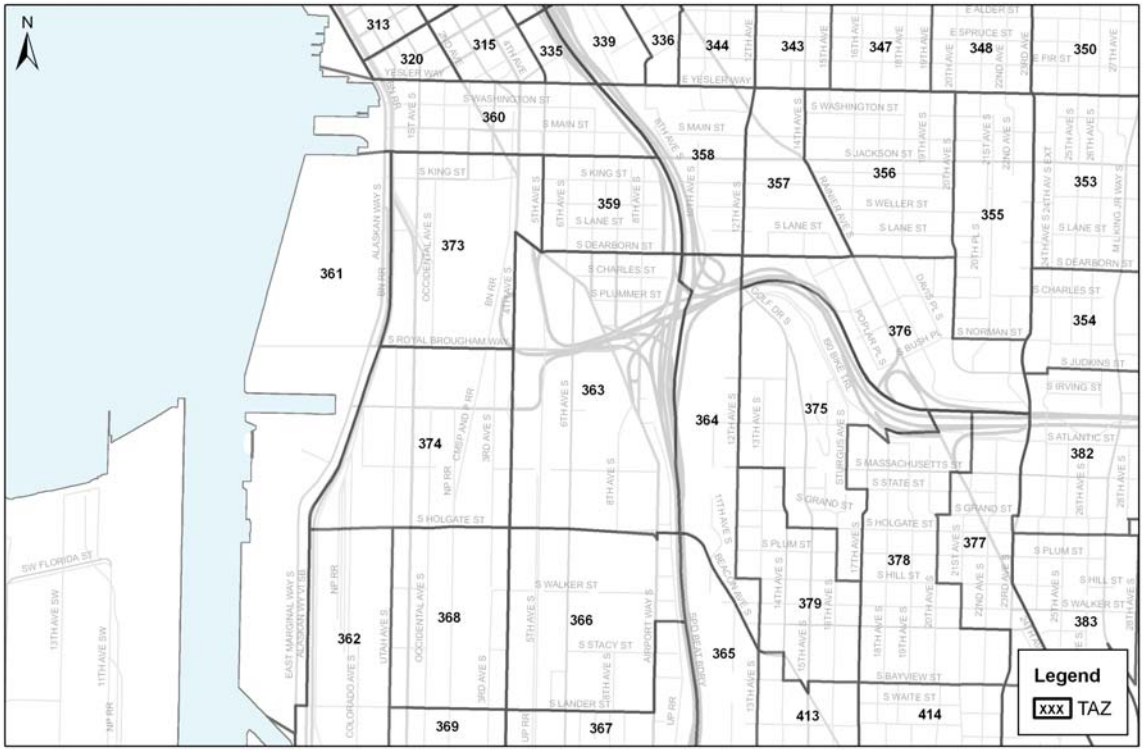
Agency	Document or Study	Year	Author
WSDOT	Original SR 519 Intermodal Access Project - Transportation Report	1996	WSDOT
WSDOT	Original SR 519 Intermodal Access Project – Access Point Decision Report	2001	WSDOT
WSDOT	S Holgate Street Railway Crossing Closure Study	2003	Garry Struthers Associates
WSDOT	WSDOT Comment to the SR 519 Surface Street Traffic Report	2004	The Transpo Group
WSDOT	Alaskan Way Viaduct DEIS – Transportation Discipline Report	2004	PB
WSDOT	Freight and Goods Transportation System (FGTS) 2005 Update	2005	WSDOT
WSDOT	Alaskan Way Viaduct SDEIS – Transportation Discipline Report	2006	PB
WSDOT	SR 519 Phase 2 Alternatives Feasibility Assessment	2006	KPFF
WSDOT	I-90 Center Roadway Study	2006	DKS
WSDOT / Sound Transit	I-90 Two-way Transit and HOV Operations FEIS	2004	HNTB
City of Seattle	Lander Street Grade Separation Project – Transportation Technical Report	2002	Heffron Transportation
POS	Container Terminal Access Study Update	2003	Heffron Transportation
City of Seattle	South Downtown Railroad Corridor Transportation Study	2005	Mirai
City of Seattle	Freight Mobility Strategic Action Plan Update	2005	SDOT
City of Seattle	Livable South Downtown: Phase 1 Staff Report	2006	City of Seattle
King County	Atlantic/Central Base Expansion Project EIS Scoping Document	1999	King County DOT
Amtrak	Analysis of Train Operations across S. Holgate Street	2005	HDR
First and Goal Inc. Washington State Public Stadium Authority	Seattle Stadium and Exhibition Center EIS – Transportation Review	1998	The Transpo Group
Qwest Field	Qwest Field Event Center Transportation Management Program	2006	PSA
Safeco Field	Transportation Management Plan	2007	Baseball Club

6 How were traffic volume forecasts developed?

How was the City of Seattle travel demand model used to predict traffic growth in 2030?

The traffic forecasts for this study were based on the most recent version (April 2007) of the City of Seattle travel demand model. The City model was developed to be consistent with the Puget Sound Regional Council (PSRC) travel demand model. The City of Seattle model provided forecasts for 2030 using transportation analysis zones (TAZs). The model TAZ structure in and around the study area is shown in Exhibit 3-3. The model projects person trips, mode share (auto, transit, walk and bike) and traffic volumes on freeways and surface streets.

EXHIBIT 3-3. CITY OF SEATTLE MODEL TAZ STRUCTURE



What land use assumptions were made in the 2030 travel demand model?

The model was updated to reflect the latest information on programmed transportation improvements and land use changes in the study area. The land use projections for 2030 (population and employment) are consistent with regional

projections by PSRC and the City of Seattle Comprehensive Plan.

Although the City of Seattle is currently studying potential changes in the zoning and land use code regulations as part of the Livable South Downtown planning process, none of these changes were assumed in the development of the 2030 traffic volume forecasts for the SR 519 project. This reflects the current status of the Livable South Downtown planning process, with a range of possible land use regulatory choices being considered but no decisions on the preferred alternative.

The expected changes in population and employment in the study area that were assumed in the model based on adopted plans are summarized in Exhibit 3-4. These figures are derived primarily from information found in the Livable South Downtown study.

EXHIBIT 3-4. EXPECTED CHANGES IN POPULATION AND EMPLOYMENT

	2005	2030	Growth
Population	2,751	6,146	+ 123%
Employment	25,199	32,762	+ 30%

The forecasting model also includes special generators that are coded to reflect the unique trip volumes and patterns of specific businesses. Within the study area there are two special generators: the Port of Seattle and WSF Colman Dock ferry terminal. The April 2007 version of the 2030 SDOT Travel Demand Model assumes that expansion of the Colman Dock Ferry Terminal and remote holding area are in place; these options are currently being re-evaluated.

What transportation improvements are included in the travel demand model?

A number of transportation improvements were assumed to be in place in 2030, independent of the proposed SR 519 project. These include:

- Spokane Street Viaduct improvements: widening of the structure between Sixth Avenue South and East Marginal Way, construction of a new eastbound ramp at Fourth Avenue South, and addition of new westbound on- and off-ramps at First Avenue South

- Grade separation at South Lander Street: grade separation of South Lander Street between First Avenue South and Fourth Avenue South
- Sound Transit Light Rail Airport Line: completion of Link Light Rail between the Airport and Downtown Seattle
- Alaskan Way Viaduct South End concept as of July 2007: replacement of the existing limited-access Alaskan Way Viaduct, including First Avenue South frontage roads
- South Holgate Street closed to through traffic between Third Avenue South and Occidental Avenue South
- New I-90 reconfiguration with one HOV lane added in each direction on the outside roadway, with the center roadway reserved for light rail (option R8A).

The 2011 volume forecasts assumed that only the first three of these projects (Spokane Street Viaduct, Lander Street grade separation and Link light rail) will be completed by 2011.

How were the traffic forecasts developed?

The estimation of the future volumes used in the detailed operational analysis did not rely directly on the model outputs for specific links, but instead involved the determination of growth rates to be applied to existing volumes. The growth rates were determined at a number of screenline locations. A screenline is an imaginary boundary through which all of the entering and exiting vehicles are collectively counted. Within the study area, screenlines were established at the following locations: First Avenue South, Fourth Avenue South, Sixth Avenue South, and Twelfth Avenue South in the north-south direction; South Lander Street, South Holgate Street, South Atlantic Street, South Royal Brougham Way, South Dearborn Street, South Jackson Street, and Yesler Way in the east-west direction.

The 2030 baseline and existing year models were compared to determine a net difference—or growth—in the AM and PM peak hour volumes. The travel demand model produces forecasts for a 3-hour peak period. These 3-hour forecasts were converted to peak-hour forecasts by applying a factor of 0.37

which is based on field observations and commonly used in similar studies.

The 25-year traffic growth rates (2005 to 2030) for the Stadium area ranged from 25 to 30 percent.

For the 2011 analysis, existing counts were grown by an annual 1 percent growth rate. The 1 percent growth rate is based on historical rates (1990 to 2005) at four locations: First Avenue South north of King Street; First Avenue South north of South Spokane Street; Fourth Avenue South north of Airport Way; and Fourth Avenue South near South Holgate Street. The ramp volumes at the interchange of I-5 and I-90 were derived from an origin-destination study conducted as part of this study (see Appendix B).

How were truck volume forecasts developed?

Vehicle classification data collected between 2005 and 2007 provided information on total truck volumes and percentages during peak commute and off-peak hours. A recent study conducted by the Port of Seattle (*Container Terminal Access Study Update*, Heffron Transportation, 2003) provided an estimation of the average daily truck trips generated by the Port container terminals. This study also provided a distribution of the POS truck trips in the study area, including freeway sections and surface streets.

In order to generate truck volume forecasts for 2030, it was assumed that the POS truck trips would grow at 3 percent per year until 2015 and then at 2 percent per year until 2030. These growth rates were based on long-range forecasts provided by the Port of Seattle. The other truck traffic was assumed to grow at the same rate as the overall traffic through the area.

7 What methods and criteria were used to evaluate potential effects of the Proposed Action and the No-Build Alternative?

The traffic-related impacts were studied using three main criteria: traffic volumes, level of service and travel times. Various analytical tools were used to perform the detailed operational analysis.

Intersection Operations Analysis

Surface street impacts were evaluated using the Synchro model at signalized intersections including interchange ramp intersections, as shown in Exhibit 3-1. Existing signal timings were used to analyze existing conditions. The most recent traffic counts available (under non-event conditions) were used for weekday AM and PM peak conditions. No turning movement counts dated prior to 2003 were used.

Opening year and design year conditions have been analyzed with optimized signal timings based on the forecasted volumes.

Intersection performances were evaluated and documented based on *Highway Capacity Manual* (Transportation Research Board, 2000 Edition) procedures.

Freeway Operations Analysis

The VISSIM microsimulation model was used to analyze freeway mainline and ramps operations. Merging, weaving, diverging, and ramp terminus were considered in this analysis.

The VISSIM freeway network built for this study included the westbound section of I-90 starting at the Mount Baker tunnel and extending to the terminus of the Fourth Avenue ramp, the I-90 Express lanes at Airport Way, and the new Atlantic Street ramp.

Freeway VISSIM models were built to analyze weekday AM and PM peak two-hour operations for existing conditions, 2011, and 2030. The following scenarios were included in the analysis:

- 2007 Base Year
- 2011 No Build
- 2011 Proposed Action
- 2030 No Build
- 2030 Proposed Action

The existing conditions model was based on existing counts (freeway ramps and mainline) and an origin-destination study between the I-90/I-5 interchange and the stadium area specifically conducted as part of this study.

Freeway operation results from the model were measured and reported in terms of density, volume throughput, speeds and queue lengths.

Corridor Operations Analysis

The VISSIM freeway models previously described were extended to include the surface streets covered in the Synchro network. VISSIM corridor models were built for 2007, 2011, and 2030 AM and PM peak conditions. The 2011 and 2030 models considered the No Build and the Proposed Action alternatives.

The VISSIM corridor models were used to analyze corridor travel times (including key freight routes) on selected east-west and north-south routes.

Six representative paths were chosen to quantify east-west and north-south travel time differences through the study area. Travel time runs were driven to determine existing travel times for the paths listed in Exhibit 3-5. Exhibit 3-6 identifies each of the travel time paths with the starting and ending locations.

EXHIBIT 3-5. TRAVEL TIME PATHS

East-West Paths	From	To
Westbound I-90 to Waterfront	I-90 Mount Baker Tunnel	Port Terminal 46 entrance
Eastbound Waterfront to I-90	Port Terminal 46 entrance	I-90 Eastbound freeway start at 4th Avenue South
North-South Paths	**From**	**To**
Northbound 4th Avenue South	South Holgate Street	South Jackson Street
Southbound 4th Avenue South	South Jackson Street	South Holgate Street
Northbound 1st Avenue South	South Holgate Street	South King Street
Southbound 1st Avenue South	South King Street	South Holgate Street

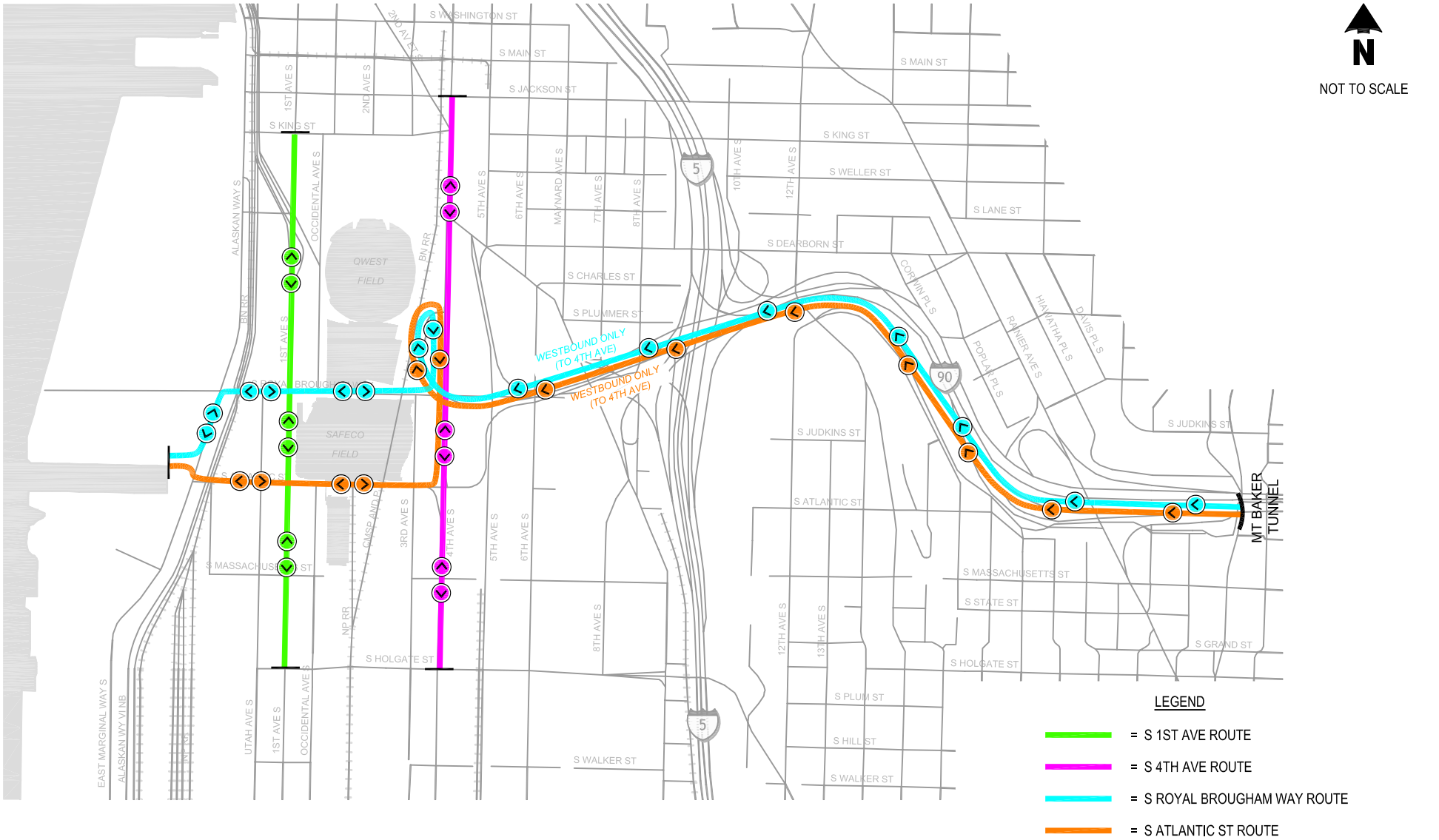


Exhibit 3-6

Travel Time Run Limits

SR 519 Intermodal Access Project, Phase 2

The Transpo Group

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Chapter 4 Affected Environment

1 What is currently happening with motor vehicle traffic?

Morning and afternoon peak-hour traffic volumes were collected throughout the study area including I-90 westbound, South Atlantic Street, South Royal Brougham Way, South Holgate Street, South Lander Street, First Avenue South and Fourth Avenue South. Exhibits 4-1, 4-2, and 4-3 illustrate respectively the average daily, morning peak hour, and afternoon peak hour volumes under existing conditions.

The 2007 daily distribution of traffic volumes for the I-90 westbound terminus off-ramp provides an indication of the travel demand pattern in the study area. Traffic volumes from the I-90 westbound off-ramp are significantly higher in the morning peak than in the evening peak. On typical weekdays in January 2007, the morning peak hour volumes were about 1,500 vehicles and the afternoon peak hour volumes were about 1,000 vehicles.

Volumes on I-90 westbound are much higher east of the I-5 interchange (about 60,000 vehicles daily) than west of the interchange (about 15,000 vehicles). At the I-5 interchange, about twice as many vehicles are destined to northbound I-5 (32,000) compared to southbound I-5 (18,000). Volumes entering I-90 from I-5 are much lower than exiting volumes. There is slightly more traffic coming from I-5 southbound (2,300 vehicles) than coming from I-5 northbound (2,000 vehicles).

The traffic volume patterns along South Atlantic Street and South Royal Brougham Way between First Avenue and Fourth Avenue show that the eastbound traffic volumes are consistently higher throughout the day than the westbound traffic volumes (35 percent higher).

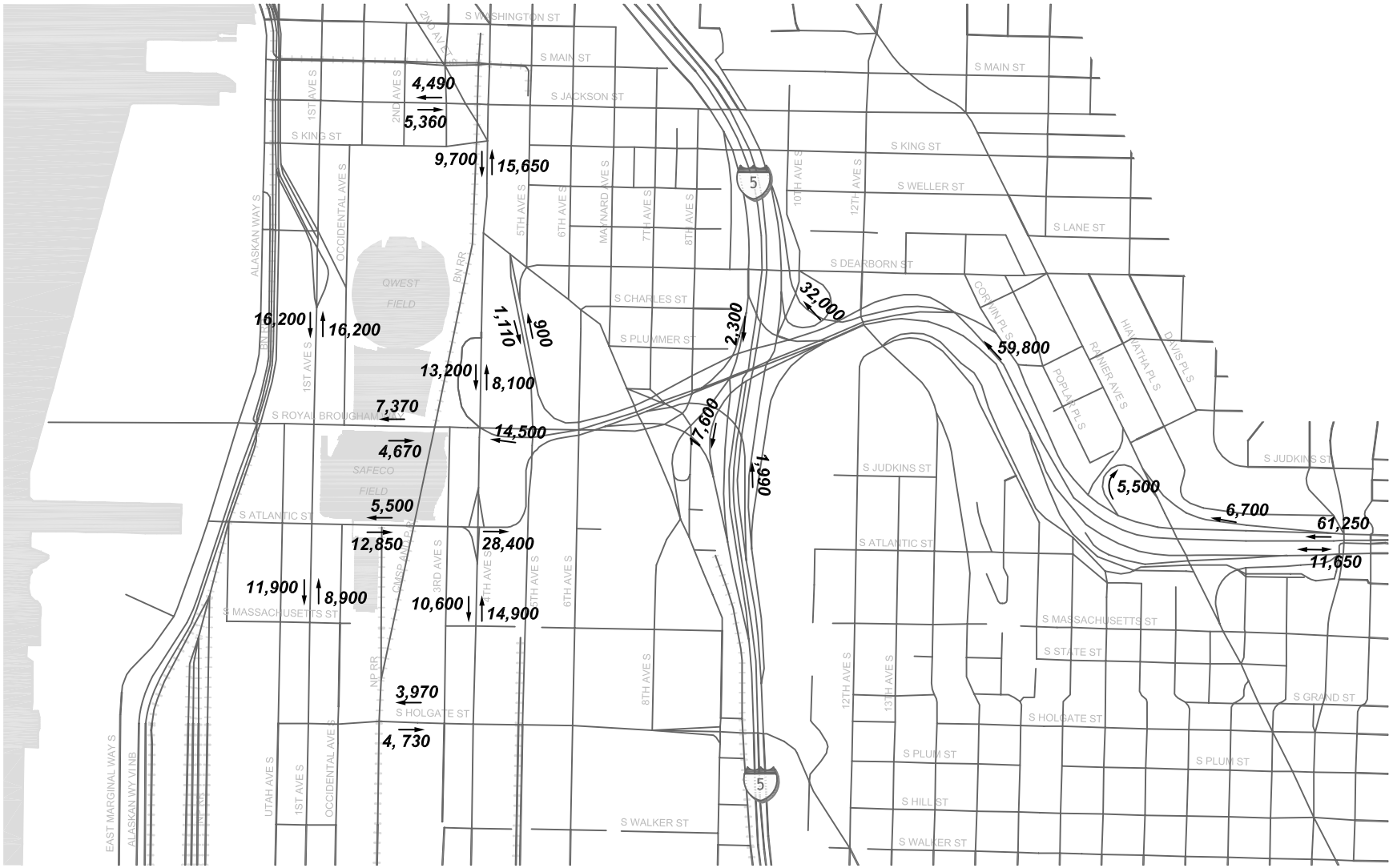

Exhibit 4-1

Existing Weekday Average Daily Traffic Volumes

SR 519 Intermodal Access Project, Phase 2

The Transpo Group

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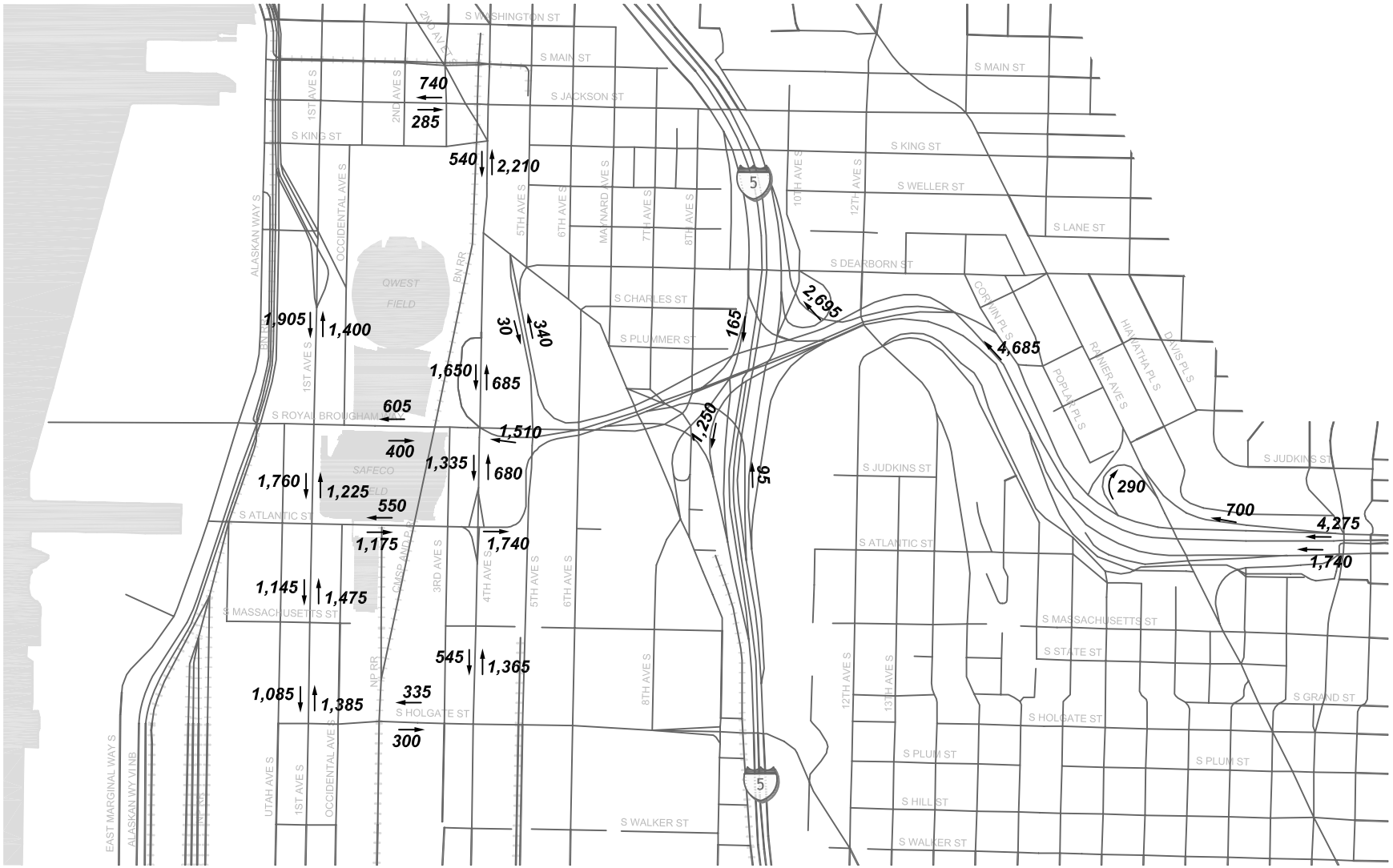

Exhibit 4-2

Existing AM Peak Hour Traffic Volumes

SR 519 Intermodal Access Project, Phase 2

The Transpo Group

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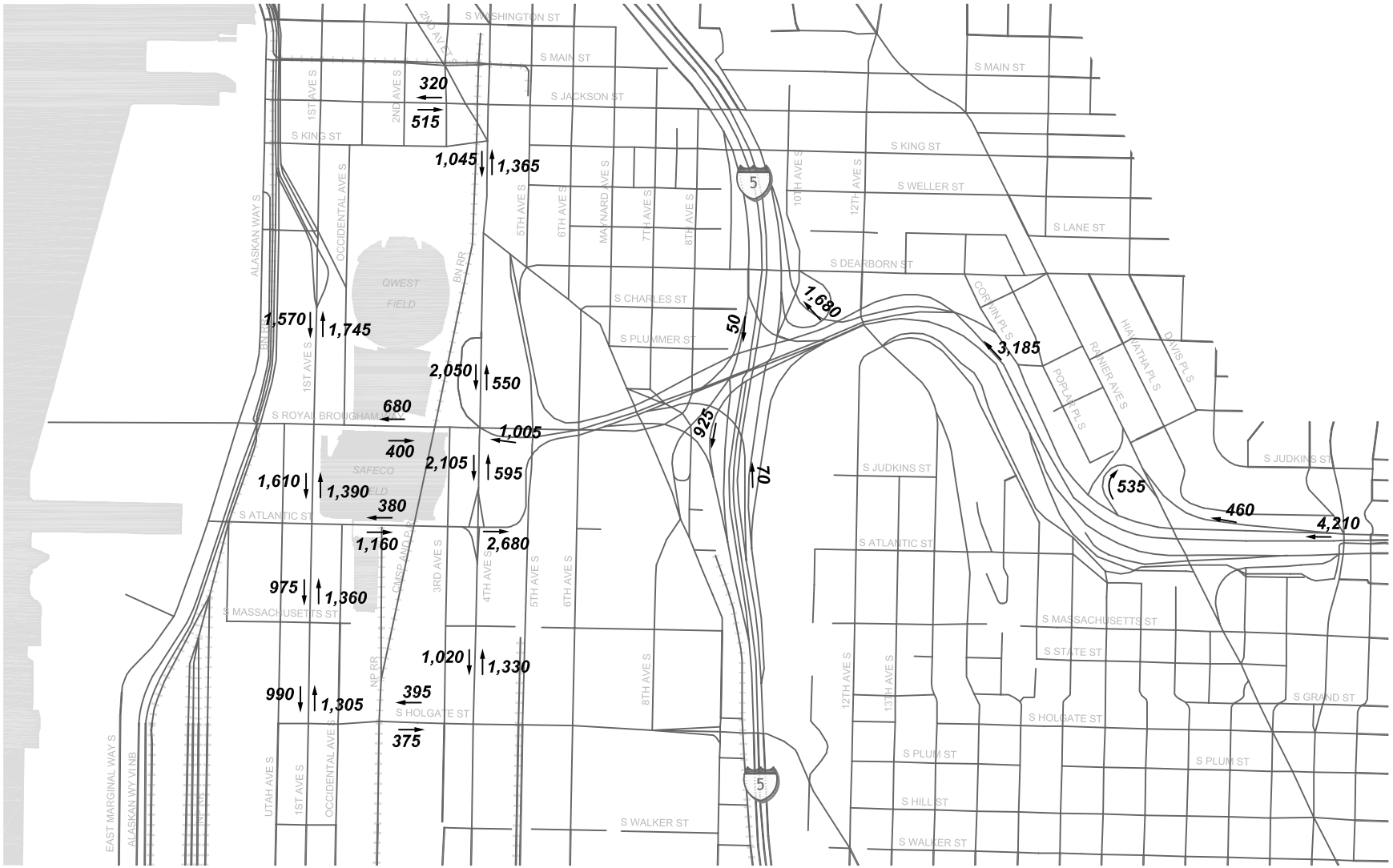

Exhibit 4-3

Existing PM Peak Hour Traffic Volumes

SR 519 Intermodal Access Project, Phase 2

The Transpo Group

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Atlantic Street captures a much higher proportion of the eastbound traffic than Royal Brougham Way (about 73 percent for Atlantic and 27 percent for Royal Brougham Way). In the westbound direction, Royal Brougham Way currently attracts more traffic than Atlantic Street (57 percent on Royal Brougham Way and 43 percent on Atlantic Street). About 30,000 vehicles travel on Atlantic Street and Royal Brougham Way on an average weekday.

2 What is currently happening with traffic operations?

How much traffic congestion occurs within the study area?

A level of service (LOS) analysis was conducted at each study area intersection using Synchro 6.0. This software program is based on methodologies presented in the *Highway Capacity Manual*. LOS values range from LOS A, indicating good operating conditions with little or no delay, to LOS F, indicating extreme congestion and long vehicle delays. LOS is measured in terms of average delay per vehicle. For signalized intersections, LOS is reported for the intersection as a whole. For unsignalized intersections, it is reported in terms of average delay for the worst movement.

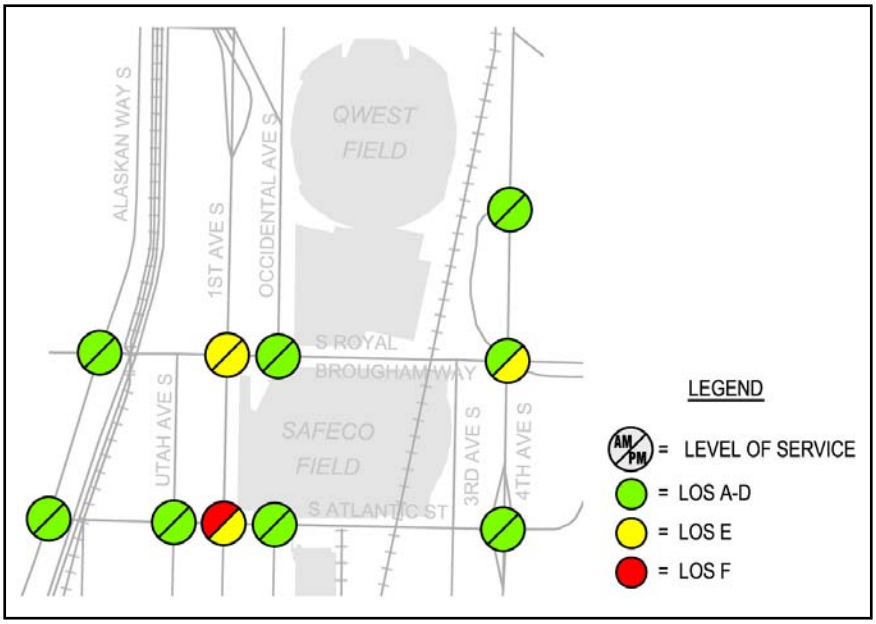
The analysis of existing intersection operations focused on both the weekday morning and afternoon peak hours. At the vast majority of study intersections, two-hour turning movement counts were conducted to capture the actual peak-hour at an intersection. These two-hour counts were based on peak hour at surface street intersections in the City of Seattle typically occurring between 7-9 am and 4-6 pm. Morning and afternoon peak weekday traffic volumes were counted between July 2003 and April 2007. Count data collected prior to 2007 was grown at a rate of 1.0 percent per year to increase the recent count data to current levels. The growth rate was based on the average historical growth rate for several locations within the study area.

Intersection control was coded as part of the Synchro analysis for both signalized and unsignalized intersections. At signalized study intersections, signal timing data provided by the City of Seattle was used as the basis for the analysis. Data provided in

the signal timing cards included signal phasing for vehicle and pedestrian movements; time of day information including cycle length, split and offset; and minimum and maximum green times for each phase. At a number of study intersections, the collection of the traffic volume data used in the analysis also included pedestrian count data. Where this data was available, it was incorporated into the Synchro analysis.

Exhibit 4-4 shows the intersection level of service within the stadium area. Appendices A-1 and A-2 provide more detailed information including AM and PM peak hour turning movement volumes and LOS results at all studied intersections.

EXHIBIT 4-4. EXISTING PEAK HOUR LEVELS OF SERVICE IN STADIUM FOCUS AREA



During both the weekday morning and afternoon peak hours, the majority of study intersections operate at LOS D or better. However, the following currently operate at LOS E or F during one or both of the weekday peak hours (*Note: some of the following intersections are not shown in Exhibit 4-4; see Appendices A-1 and A-2 for full study area LOS graphic)*:

- First Avenue South / South Royal Brougham Way (AM and PM)
- First Avenue South / South Atlantic Street (AM and PM)

- First Avenue South / South Massachusetts Street (AM and PM)
- First Avenue South / South Holgate Street (AM only)
- Fourth Avenue South / South Royal Brougham Way (PM only)
- Fourth Avenue South/ South Jackson Street / (AM only)

These intersections generally represent gateways to and from I-90 that carry high traffic volumes and have historically been congested during the peak hours. A more detailed description of operations at these intersections is provided below.

First Avenue South / South Royal Brougham Way. This signalized intersection currently operates at LOS E during both the morning and afternoon peak hours. This is primarily the result of delays on the westbound approach. During both peak hours, the westbound left-turn, and westbound right-turn movements operate at LOS F. Also, during the morning peak hour, the westbound through movement also operates at LOS F. The poor operations on the westbound approach are a result of limited green time available for these movements after the high through and left-turn traffic volumes on First Avenue South have been served.

First Avenue South / South Atlantic Street. This signalized intersection currently operates at LOS F during the morning peak hour and LOS E during the afternoon peak hour. The southbound left-turn movement on First Avenue South experiences 770 vehicles per hour (vph) during the morning peak hour and 675 vph during the afternoon peak hour, in a single left-turn lane. This results in exceptionally high vehicle delays for this movement, which in turn degrades overall intersection operations. The westbound thru/left lane (with permitted left turns) also operates at LOS F during the morning peak hour.

First Avenue South / South Massachusetts Street. The poor intersection operations at this stop-controlled intersection during both the morning and afternoon peak hours can be attributed to high traffic volumes on northbound and southbound First Avenue

South. This results in the availability of few suitable gaps for traffic crossing First Avenue South or turning left to proceed south on First Avenue South from the stop-controlled South Massachusetts Street.

First Avenue South / South Holgate Street. The LOS E at this signalized intersection during the morning peak hour can be attributed to high northbound through traffic volumes on First Avenue South (1,220 vph in two lanes) and the existing signal timing result in LOS F for the northbound through movement and LOS E for the overall intersection.

Fourth Avenue South / South Royal Brougham Way. The LOS E at this signalized intersection during the afternoon peak hour can be attributed to high southbound through and right-turn volumes (2,210 vph) on Fourth Avenue South that require approximately half of the available green time for the intersection, resulting in limited green time to serve the northbound/southbound left-turn movements and South Royal Brougham Way intersection approaches. These factors result in the eastbound left-turn, eastbound right-turn, westbound left-turn, and northbound left-turn movements operating at LOS F. The long east-west pedestrian crossing times, combined with left turn green times also contribute to the long cycle length and minimal green time for the heavy north-south traffic.

Fourth Avenue South / South Jackson Street. The LOS E at this signalized intersection during the morning peak hour can be attributed to the high northbound through traffic volume on Fourth Avenue South and existing signal timing. The intersection configuration and the need for coordination between closely spaced signals is also a major reason for intersection delays.

Where are the bottlenecks in the study area?

The I-90 westbound off-ramp terminus is controlled by a traffic signal at Fourth Avenue South. The queue length on the off-ramp resulting from the signal is typically about 0.25 mile in the morning peak and 0.1 mile in the afternoon peak. Delays to travel across the intersection are higher for vehicles heading north on Fourth Avenue South (about 50 seconds on average)

than for vehicles heading south on Fourth Avenue South (about 20 seconds on average).

Congestion on westbound I-90 is primarily due to the I-5 off-ramps backing up, late lane changing maneuvers to get into the exit lanes, and vehicles weaving from the center roadway express lanes to exit onto northbound I-5. Congestion on I-90 westbound occurs primarily on the northbound I-5 off-ramp in the morning peak hours and on the southbound ramp in the afternoon peak hours.

How long does it take to travel through the study area?

Exhibit 4-5 presents existing travel times on key routes through the study area during weekday morning and afternoon peak hours; see Appendix C for further detail.

EXHIBIT 4-5. TRAVEL TIMES (IN MINUTES) DURING WEEKDAY AM AND PM PEAK TIMES

East-West Paths	**AM**	**PM**
WB I-90 to Waterfront via South Royal Brougham Way	6.1	6.6
WB I-90 to Waterfront via South Atlantic Street	6.0	7.1
EB Waterfront to I-90 EB start via South Atlantic Street[1]	*2.0*	*2.0*
North-South Paths	**AM**	**PM**
NB 4th Avenue from S Holgate Street to S Jackson Street	3.0	3.0
SB 4th Avenue from S Jackson Street to S Holgate Street	3.7	3.2
NB 1st Avenue from S Holgate Street to S King Street	2.9	4.0
SB 1st Avenue from S King Street to S Holgate Street[1]	*2.6*	2.7

1. Italicized and underlined times taken from the Synchro network. These times may not be as reliable as the other travel times, which were from GPS field collection.

3 How do events affect traffic conditions through the study area?

Within the project vicinity there are three large event facilities: Safeco Field, Qwest Field, and the Qwest Field Event Center (QFEC). The main types of events put on in these facilities are sporting events, held in either Safeco Field or Qwest Field, and consumer trade, or flat shows. Major parking areas for all three facilities are the Safeco parking garage (south of Safeco Field), the QFEC parking garage (south of Qwest Field), the large surface lot north of Qwest Field, and Union Station Garage

(northeast of Qwest Field across Fourth Avenue). In addition there are several roadways with on-street parking available, including sections of First Avenue South, Third Avenue South, and Occidental Avenue South, though much of the on-street parking is removed during large events. King Street Station is northeast of Qwest Field, providing easy access to passenger trains, and there are numerous bus stops in the immediate area to facilitate transit use to and from events. Exhibit 4-25 shows the current bus staging locations for stadium events.

Sporting Events

There are two principal sporting events which occur in the facilities mentioned: baseball games in Safeco Field and football games in Qwest Field. Baseball games are most often scheduled for 7:05 pm on weekdays, while football games are typically held on Sundays, though there are a growing number of football games on weekdays that impact evening peak hours of travel.

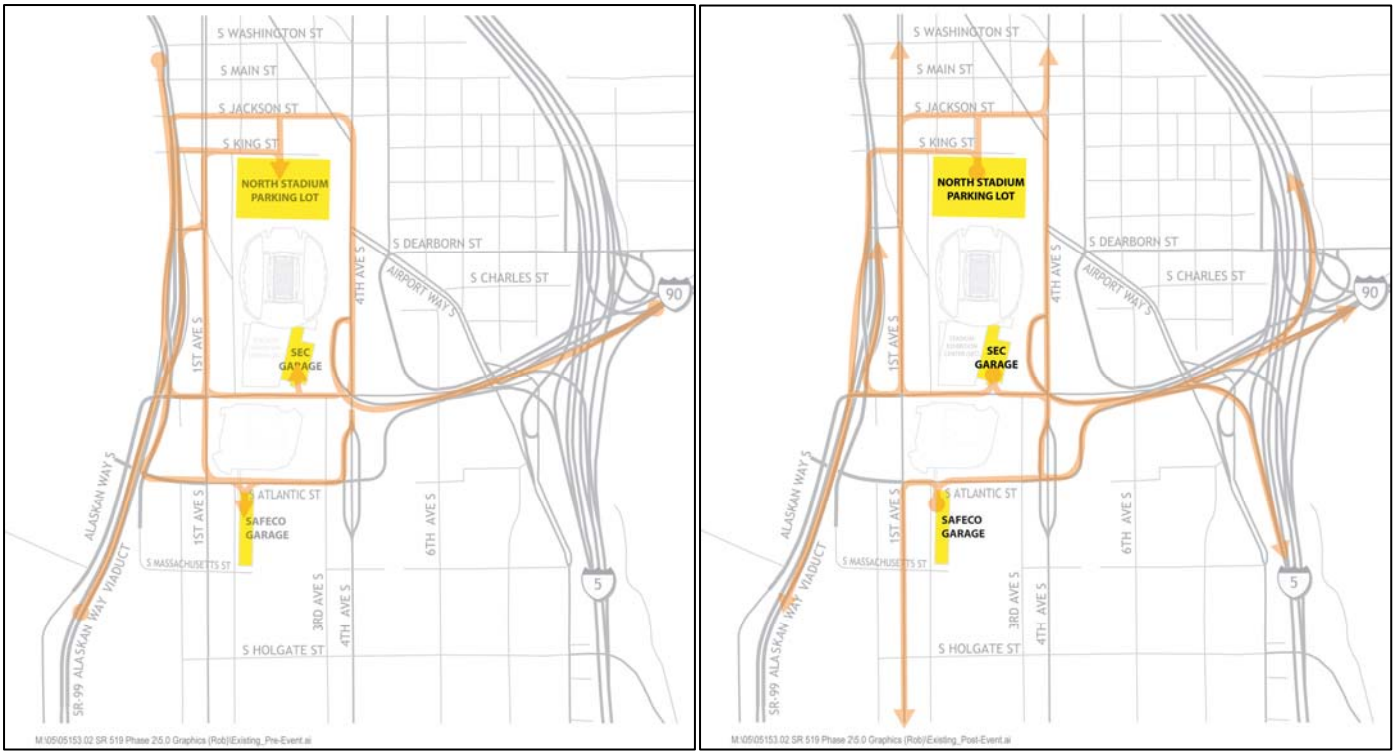
Average attendance for a baseball game during the 2006 season was 33,000 people (according to data provided by Safeco Field in their 2007-2008 Transportation Management Plan [TMP]), and for a football game it was approximately 58,000 people (according to data provided by Qwest Field in their 2006-2007 Transportation Management Plan [TMP]). On average there are between 250 and 300 cars per thousand attendees for both types of games, with arrivals beginning roughly 3 hours prior to game time and ending roughly 30 minutes after the game begins. Other arrivals include charter buses (between 15 and 40 for either type of game) and Metro special service buses (between 15 and 25 for baseball and roughly 100 for football), all of which arrive in the same time frame as mentioned previously.

Both football and baseball games run an average of 3 hours, although that can range between 2 hours and 5 hours for baseball games. Exiting from surrounding garages can take 1 to 2 hours for both sporting events.

The typical routing of traffic for each sporting event facility is shown in Figures 4-6 (ingress) and 4-7 (egress). It includes the use of the following highways and streets for primary inbound and outbound travel movements:

- I-90
- I-5
- Highway 99
- First Avenue South
- Second Avenue South
- Fourth Avenue South
- Sixth Avenue South
- South Jackson Street
- Airport Way South
- South Royal Brougham Way
- South Atlantic Street

EXHIBITS 4-6 AND 4-7. EXISTING EVENT INGRESS & EGRESS ROUTES



As a result of this primary routing, traffic control occurs at up to 37 locations in the Qwest TMP and up to 16 locations in the Safeco TMP. This traffic control includes police officers

directing vehicular and pedestrian traffic as well as turn restrictions and/or lane closures. Due to the location of each stadium, the Qwest traffic control extends as far north as S Washington Street, south to South Holgate Street, and east of Fifth Avenue South. The Safeco traffic control extends as far north as South King Street, south to South Holgate Street, and east to Fourth Avenue South. Much of the traffic exiting from parking garages is directed toward the east and I-90/I-5, with some directed north toward SR 99 or south along surface streets.

Flat Shows

Flat shows refer to events usually held for the public that cater to a specific area of interest. Some of the larger flat shows include the Seattle Home Show, the Seattle Roadster Show, the Northwest Women's Show, the Seattle International Auto Show, and the Seattle Boat Show. These events typically run a couple days to a week in length, from 8 am to 9 pm. They can attract anywhere between 20,000 to 65,000 people, with attendee arrival at a fairly steady flow throughout the day. Attendee departure is also fairly steady throughout the day, though it does get heavier as the show closes at the end of the day.

There are several smaller flat shows as well, including the Seattle RV and Outdoor Recreation Show, the International Gem and Jewelry Show, and the Seattle Ski Fever and Snowboard Show. These events usually run for a couple days or over a weekend, from 8 am to 9 pm. Attendance at the shows ranges from 5,000 to 20,000 people, with arrival and departure patterns the same as larger flat shows.

As arrivals and departures for flat shows do not conflict as greatly with traffic as arrivals and departures for sporting events, fewer mitigation measures are necessary. For all types of flat shows, there are typically no restricted movements or police-controlled intersections, though there are some brief road closures during the setup and takedown of events.

4 What is currently happening with railroad crossings at Third Avenue South and at the Tail Tracks?

What are the railroad facilities in the study area?

Burlington Northern Santa Fe (BNSF) currently has two continuous north-south railroad tracks traveling through Downtown Seattle. Within the study area the mainline tracks are located between Occidental Avenue South and Fourth Avenue South.

Several tail tracks exist between Alaskan Way South and Utah Avenue South, including, but not limited to the south SIG lead, the South Whatcom lead, and the SIG tail track to the North. A tail track is a track extension beyond the end of a rail line. Tail tracks are used exclusively by freight rail operations and are not used by passenger rail operations. This very active switching yard tail track, paralleling the Alaskan Way Viaduct, crosses South Royal Brougham Way and South Atlantic Street.

In addition to the mainline and tail tracks, numerous sidings associated with both rail lines exist within the study area.

Within the study area, at-grade rail crossings associated with the mainline tracks exist across the following east-west roadways:

- South Royal Brougham Way
- South Holgate Street
- South Lander Street
- South Horton Street
- South Spokane Street

At each of these at-grade rail crossings, traffic control consists of gate arms with flashing lights, which close the crossing to vehicular traffic when a train approaches.

In addition, at-grade crossings to the west of First Avenue South exist at the following locations:

- South Royal Brougham Way
- South Atlantic Street

- South Hanford Street
- South Horton Street
- South Hinds Street

Except for the tail track crossings at South Royal Brougham Way and South Atlantic Street which are unprotected, traffic control at the grade crossings consists of gate arms with flashing lights, which close the crossing to vehicular traffic when a train approaches.

What is the level of train activity in the study area?

An inventory of train activity was conducted for existing conditions. This step identified the degree of potential impact and delay introduced at each grade crossing as a result of existing train activity. This effort was coordinated with the City of Seattle and representatives from BNSF to identify train activity by time of day and duration of crossing. Rail service currently using the tracks includes BNSF freight operations, Amtrak passenger service, and Sound Transit Sounder Commuter Rail service.

Passenger Rail

Both Sound Transit Sounder Commuter Rail service and Amtrak passenger service currently operate within the study area. Current passenger rail speeds in the vicinity of the Royal Brougham Way crossing are 20 mph.

Sound Transit Commuter Rail service connects between King Street Station to the north and Tacoma to the south. Service is currently provided during the weekday AM and PM peak periods only. Currently five northbound trips and one southbound trip are scheduled to occur during the AM peak period. The northbound trips arrive at King Street Station between 6:00 am and 8:20 am. The southbound trip during the AM peak period leaves King Street Station at 6:10 am. During the PM peak period, five southbound trips and one northbound trip are scheduled. The southbound trips leave King Street Station between 3:35 pm and 5:55 pm. The southbound trip during the PM peak period arrives at King Street Station at 5:45 pm. The six trips currently scheduled during each of the AM and PM peak periods, result in the Sound Transit trains crossing the Royal Brougham Way at-

grade crossing a total of up to 24 times including yard movements.

Effective September 24, 2007, there are five morning trips leaving Tacoma traveling northbound to Seattle and three morning trips leaving Everett traveling southbound to Seattle. In the afternoon, there are five trips departing Seattle heading to Tacoma and three trips departing Seattle heading to Everett. There is also one "reverse commute" trip on the Sounder south line, departing Seattle for Tacoma at 6:10 am and departing Tacoma for Seattle at 4:45 pm.

Sound Transit operates a second commuter rail route, between King Street Station and Everett to the north. While this route does not directly pass through the Royal Brougham Street crossing, the trains operating on this route pass through this crossing up to six times a day from the Seattle International Gateway (SIG) yard to King Street Station.

Additional Sound Transit services are provided to coincide with Seattle Mariner and Seattle Seahawk games at Safeco Field and Qwest Field respectively.

Amtrak passenger rail service currently operates two routes through the study area: Cascades and Coast Starlight. The Cascades route connects Vancouver, BC with Eugene-Springfield, OR. The Coast Starlight operates between Seattle and Los Angeles, CA. To the south of Seattle, through the study area, these two routes operate a total of five southbound trains per day and five northbound trains per day. During the weekday AM peak period, one southbound train travels through the study area. During the weekday PM peak period, one southbound and one northbound trains travel through the study area. Each of these departing or arriving Amtrak trains, as well as the Seattle-Chicago Empire Builder, makes additional crossings of South Royal Brougham Way when moving between King Street Station and the servicing yard.

Freight Rail

Unlike the passenger rail operations documented above, freight rail trains do not keep to a specific schedule, either in number of trains per day or time of day. Information provided by BNSF

indicates that on average, approximately 40 freight trains cross South Royal Brougham Way during a typical weekday.

Weekday AM and PM peak period observations at the South Royal Brougham Way crossings were made to document typical freight activity during these critical time periods. These observations showed that during both the AM and PM peak periods, one BNSF freight train was observed crossing South Royal Brougham Way. In addition, during the AM peak period two additional freight closures of this crossing were observed, for the movement of locomotives.

Current freight rail speeds in the vicinity of the South Royal Brougham Way crossing are 20 mph.

While specific data for the tail tracks adjacent to Alaskan Way is not available, the facility is used to build freight trains and its use is limited relative to the main line. The speed limit on the tail tracks is 10 mph.

How long are the railroad crossing closures?

Based on information provided by BNSF during July 2007, the at-grade mainline rail crossing at South Royal Brougham Way is closed for an average of 110 minutes (1.8 hours) per day or about 7.5 percent of the time. This equates to an average of 770 minutes (12.8 hours) per week.

In addition, observations were made during May 2007 of crossings closures during the weekday AM and PM peak hours (please refer to Appendix D). These observations showed that for a typical weekday, the mainline crossing is closed approximately 12 times during the AM peak two hour period (7 am to 9 am). These closures resulted in a total closure time of approximately 20 minutes (17 percent). The closures ranged from less than one minute to four minutes, with an average closure time of approximately 100 seconds.

During the PM peak two hour period (4 pm to 6 pm) the mainline crossing is closed 11 times. These closures resulted in a total closure time of 15 minutes (12 percent). The closures ranged between less than one minute and three minutes, with an average closure time of approximately 80 seconds.

Closures of the tail track crossings are not as frequent as closures of the mainline crossings. However, due to the use of the tail tracks to build trains, it is possible that these crossings may be blocked for extended periods of time, with closures of up to 20 minutes possible. The closer to the yard (farther south), the longer the delays are. Farther north, there are fewer delays from the train building activity.

How do the crossing closures affect vehicle traffic?

The methodology developed to estimate vehicle delay associated with the closure of the railroad crossing was developed as part of the Access Duwamish project (*Access Duwamish Grade Crossing Delay Analysis,* Heffron Transportation, 1997). The methodology is based in traffic flow theory, and treats the railroad as a simple two-phase traffic signal. The following equation was derived from the Webster delay equation and accounts for both the delay associated with waiting while the crossing is closed, and the delay associated with the dissipation of vehicle queues which have accumulated during the closure:

$$D = \lambda n \mu r^2 / 2(\mu-\lambda)$$

Where: D is the Total delay in vehicle-hours

λ is the Arrival rate of vehicle (vehicles per hour)

μ is the Queue dissipation rate (vehicles per hour)

r is the Average blockage time at crossings (hrs)

n is the number of blockages per hour

The total delay for vehicles waiting at a closed crossing is a function of the number and duration of closures, and the directional traffic on the roadway. Hence, the total delay for a closure must include the delay incurred in both directions of travel. Also, the crossing delays are related to the specific durations of crossing closure and are not comparable to calculations based on the average closure duration. Therefore, the delay for specific closure durations must be calculated separately and then summed. The crossing delays for the AM and PM peak periods based on the May 2007 crossing closure observations are summarized in Exhibit 4-8.

EXHIBIT 4-8. SOUTH ROYAL BROUGHAM WAY – PEAK HOUR CROSSING DELAYS

	Eastbound	Westbound	Total
AM Peak Hour			
Total Delay	1.6 vehicle-hours	2.3 vehicle-hours	3.9 vehicle-hours
Average Delay per Vehicle	13 seconds	13 seconds	13 seconds
PM Peak Hour			
Total Delay	1.1 vehicle-hours	1.9 vehicle-hours	3.0 vehicle-hours
Average Delay per Vehicle	9 seconds	9 seconds	9 seconds

As shown in Exhibit 4-8, during the weekday AM peak period, vehicles experience an average of 13 seconds of delay associated with the closure of South Royal Brougham Way due to mainline train crossings. This equates to a total system delay of approximately four vehicle-hours during the weekday AM peak hour.

During the weekday PM peak hour, average vehicle delays associated with the South Royal Brougham Way mainline rail crossing are approximately 9 seconds per vehicle in both directions. Total system delay for all vehicles is approximately three vehicle-hours during the weekday PM peak hour.

As a result of the delays experienced due to the closure of the South Royal Brougham Way at-grade mainline rail crossing, vehicles have been observed making u-turns to avoid this crossing and utilize the grade separated crossing at Atlantic Street.

What are the safety concerns associated with railroad crossings?

The Federal Railroad Administration provided safety records at the three at-grade railroad crossings within the study area. Accidents reported between 1976 and 2006 are presented in Exhibit 4-9.

EXHIBIT 4-9. RAILROAD CROSSING ACCIDENTS (1976-2006)

Railroad Crossing	Total Accidents	Fatality	Pedes-trian	Auto	Truck	School Bus
Royal Brougham Way/ Third Avenue South	19	1	3[1]	4	11	1
Royal Brougham Way/ Alaskan Way	4	0	0	1	3	0
South Atlantic Street/ Alaskan Way	17	0	0	8	9	0

1. A fourth pedestrian/train accident occurred on September 30, 2007.

At the crossing of Royal Brougham Way near Third Avenue South, a total of 19 collisions have been reported since 1976 between trains and other vehicles or pedestrians; 11 of those collisions involved a truck and occurred mostly before 2000. The use of barriers to prevent vehicles from crossing the tracks when a train passage is imminent has helped reduce the number of train/vehicle collisions.

The construction of Safeco Field and Qwest Field increased the amount of pedestrian traffic near the railroad crossing. Safeco Field opened in July 1999, followed by Qwest Field in 2003. Statistics show that 5 collisions involving a train occurred between 2000 and 2006 at the South Royal Brougham Way crossing. There was one pedestrian/train collision reported each year between 2003 and 2005, the 2005 accident resulting in a fatality. A fourth person was struck by a train while crossing the tracks near Safeco Field on September 30, 2007.

At the railroad crossing of South Atlantic Street near Alaskan Way, a total of 17 train accidents were reported between 1976 and 2006. None of those involved pedestrians.

5 What is currently happening with truck traffic?

The project area contains a large amount of industrial lands, including Port of Seattle properties and container ship yards, railroad intermodal yards, and other businesses that rely upon the movement of trucks and freight. The freeway and arterials within the study area provide an important connection for freight transportation and are heavily used by trucks.

Where does commercial traffic go to and from?

The study area is adjacent to a major truck generator—the Port of Seattle. The Port of Seattle accommodates five container terminals. One of the terminals, T-46, is located along Alaskan Way South at the western boundary of the study area.

Freight is shipped mostly through the port by intermodal containers that are transferred to or from railcars or trucks on the dock. The trucks dray the containers to the rail intermodal yards, where they are transferred to trains. At the intermodal yards, containers are transferred to and from railcars. Trucks transport the cargo to and from Port terminals and the warehousing and distribution centers. In 2002, Terminal-46 produced an average of 1,250 daily truck trips with approximately 30 percent of those trips having a regional destination (*Container Terminal Access Study, Year 2003 Update*, Heffron Transportation, Inc., October 2003). Regional access to the terminals is provided by SR 519 and South Spokane Street from both the viaduct level and the surface roadway, then along surface streets.

There are two major intermodal rail yards near the Port of Seattle: the Seattle International Gateway (SIG) Yard owned by the Burlington Northern Santa Fe (BNSF) Railroad and the Argo Yard owned by the Union Pacific (UP) Railroad south of the study area. The rail yard lines cross South Horton Street and South Hanford Street. The SIG Yard utilizes two truck gates: the main gate on South Hanford Street and the north gate at South Massachusetts Street.

Another major truck generator adjacent to the study area is one of Seattle's two designated manufacturing and industrial centers—the Duwamish Manufacturing Industrial Center. This center is expected to accommodate at least 10 percent of Seattle's new employment over the next 20 years—nearly 15,000 new jobs (City of Seattle, 2005).

Two mainline railroad tracks run through the study area, paralleling I-5 between First and Fourth Avenue South, crossing South Holgate Street, South Atlantic Street and South Royal Brougham Way (SR 519) at-grade.

The Colman Dock terminal of Washington State Ferries is located northwest of the study area and serves commercial trucks within the Puget Sound area. WSF reports that 80,000 commercial vehicles each year use the Bainbridge Island and Bremerton ferries at Colman Dock to carry goods to west Puget Sound communities and the Olympic Peninsula. The signed route from I-90 to the ferry terminal is via Fourth Avenue South, South Atlantic Street and Alaskan Way South.

What are the main truck routes?

The City of Seattle and WSDOT have defined several of the major corridors within the study area as major truck routes. These designated truck routes provide access between the industrial lands within the study area and the state highway system, while also facilitating travel between the industrial lands and the Port terminals.

WSDOT Truck Route Designation

The Washington State Freight and Goods Transportation System (FGTS) is a classification system adopted by WSDOT and is used to classify state highways, county roads, and city streets according to the average annual gross truck tonnage they carry. The FGTS classifies roadways using five freight tonnage classifications, T-1 through T-5, as follows:

- T-1: more than 10 million tons per year
- T-2: 4 million to 10 million tons per year
- T-3: 300,000 to 4 million tons per year
- T-4: 100,000 to 300,000 tons per year
- T-5: at least 20,000 tons in 60 days

Among these five classes, the system identifies the "Washington's Strategic Freight Corridors" that carry four million or more gross tons of freight annually (i.e. T-1 and T-2 classes). Tonnage values are estimated from truck traffic count data, converted into average weights by truck type. The FGTS 2005 Update Report designated 43 Strategic Freight corridors in Seattle, some of them located in or near the study area. These are presented in Exhibit 4-10.

EXHIBIT 4-10. WSDOT DESIGNATED "STRATEGIC FREIGHT CORRIDORS" IN THE STUDY AREA

Route Name	Begin	End	2005 FGTS Class
SR 519	I-90	SR 99 Viaduct	T-2
4th Avenue South	E Marginal Way South	South Royal Brougham	T-1
Airport Way	4th Avenue South	South City Limit	T-1
East Marginal Way South	Alaskan Way South	South Michigan Street	T-1
Alaskan Way South	E Marginal Way South	Yesler Way	T-1
South Dearborn Street	Airport Way South	Rainier Avenue South	T-1
South Royal Brougham Way	4th Avenue South	Airport Way South	T-1

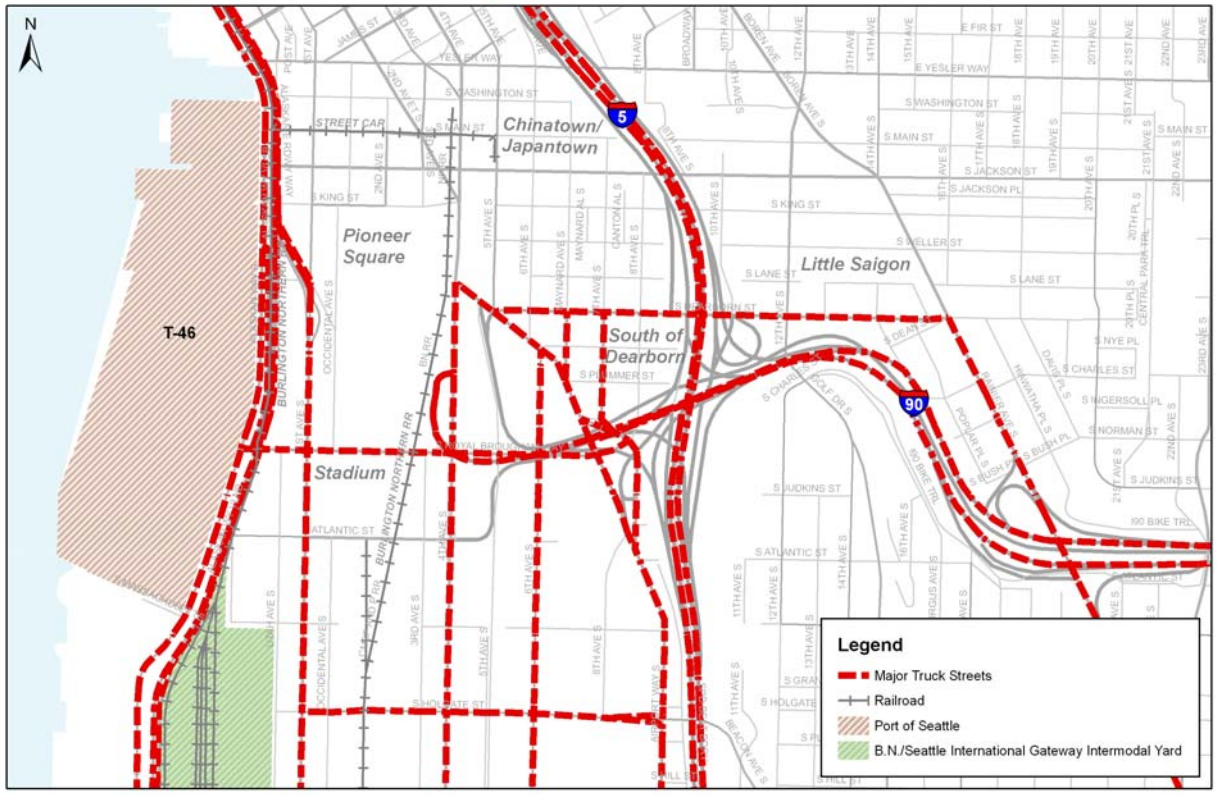
The estimated annual tonnage on SR 519 was 9.94 million tons, very close to the T-1 classification.

City of Seattle Designated Truck Routes

The City of Seattle designates all arterial streets as truck streets. It has also classified certain streets as Major Truck Streets. The Major Truck Streets are defined as primary routes serving both local and regional freight traffic. The intent is to encourage trucks, especially larger ones, to use these arterials and discourage them from using other streets that are not ideal for accommodating truck movements.

The Major Truck Streets across the study area are shown in Exhibit 4-11. Almost all north-south arterial streets including East Marginal Way South, South Spokane Street and its viaduct, First Avenue South, Fourth Avenue South, Sixth Avenue South and Airport Way South have been designated as Major Truck Streets. In the east-west direction, South Dearborn Street, South Royal Brougham Way, South Atlantic Street and South Holgate Street have been designated as Major Truck Streets. These routes support and facilitate travel to I-90, I-5 and the Alaskan Way Viaduct.

EXHIBIT 4-11. CITY OF SEATTLE DESIGNATED MAJOR TRUCK STREETS



Source: adapted from Freight Mobility Strategic Action Plan, SDOT, June 2005

What are the existing truck traffic volumes in the study area?

Recent vehicle classification count surveys were assembled and new counts were conducted in early 2007 for several of the major truck routes throughout the study area. Exhibit 4-12 summarizes the total truck volumes for each corridor.

EXHIBIT 4-12. DAILY TRUCK VOLUMES AND PERCENT OF TOTAL TRAFFIC

Corridor	Daily One-way Truck Volume		Daily Two-way truck Volume	Percent of Total Traffic
North-South Corridors	**NB**	**SB**		
1st Avenue South (north of South Royal Brougham Way)	800	540	1,340	4.1%
1st Avenue South (south of South Atlantic Street)	525	955	1,480	7.1%
4th Avenue South (north of South Royal Brougham Way)	490	560	1,050	4.9%
4th Avenue South (south of South Atlantic Street)	875	480	1,355	5.3%
East-West Corridors	**EB**	**WB**		
South Royal Brougham Way (between 1st and 4th Avenue South)	295	555	850	7.2%
South Atlantic Street (between 1st and 4th Avenue South)	1,000	500	1,500	8.0%
South Lander Street (between 1st and 4th Avenue South)	550	685	1,235	9.5%

Source: Based mainly on field traffic counts (year 2005 and 2007)

In general, trucks represent between 5 and 10 percent of all vehicles over a 24-hour weekday. The largest number of trucks is observed along South Atlantic Street, First Avenue South and Fourth Avenue South. These corridors provide access to I-5, I-90 and SR 99 and therefore serve more trucks throughout the day.

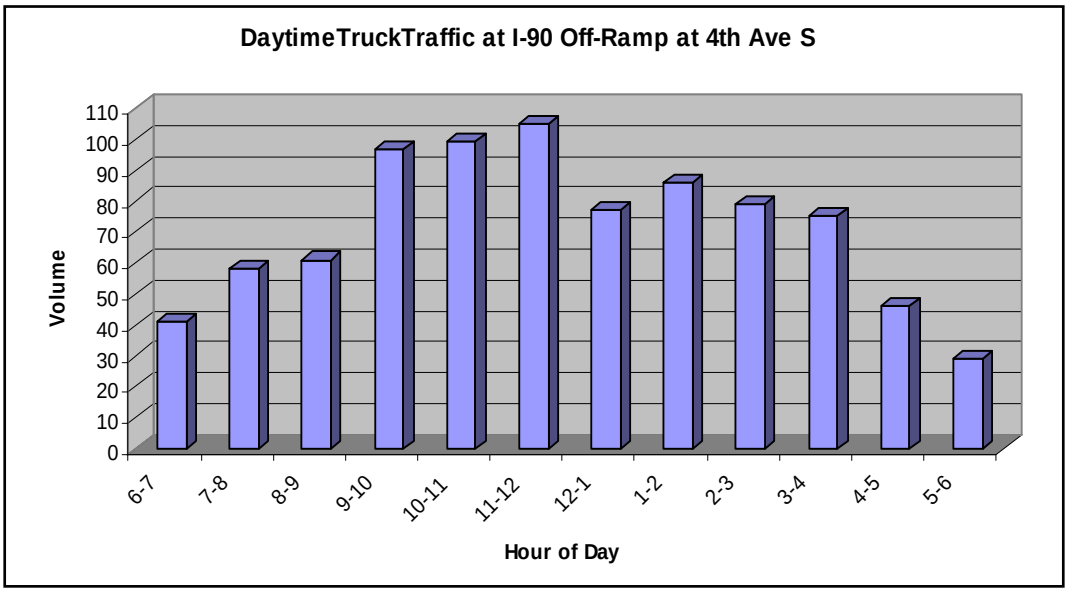
In the east-west direction, South Royal Brougham Way and South Atlantic Street serve a total of about 2,350 trucks per day. In the westbound direction, the truck volumes are similar on both streets (about 500 daily trucks); in the eastbound direction, truck traffic is predominantly using South Atlantic Street which provides direct access to I-90 and I-5.

A more detailed analysis of the classification data reveals that more than two-thirds of the counted trucks are either light or medium trucks (single-unit trucks). These types of trucks are typically used for local or regional delivery rather than interstate travel. Heavy trucks (single- and multi-trailers) make up less than one-third of the total number of trucks counted within the study area.

What is the daily distribution of truck traffic in the study area?

Exhibit 4-13 illustrates the daily (12-hour) distribution of truck traffic on the westbound I-90 off-ramp to Fourth Avenue South.

EXHIBIT 4-13. DAYTIME TRUCK TRAFFIC AT I-9 OFF-RAMP TO FOURTH AVENUE SOUTH

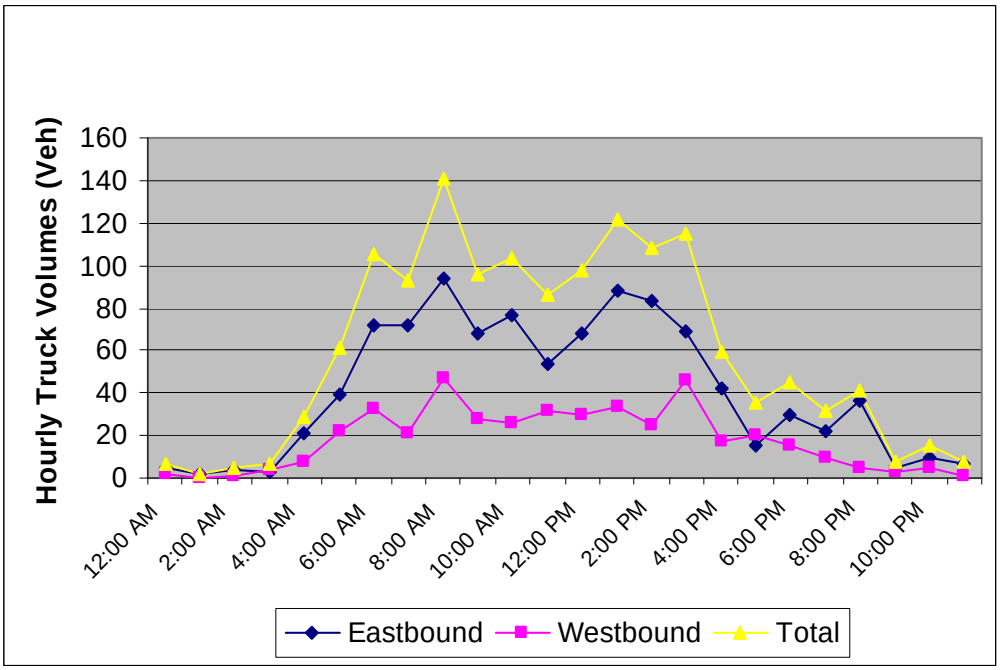


Source: February 2007 WSDOT counts

Truck traffic at this location tends to peak in the middle of the day, after the morning peak commute hours for general traffic. The period from 9:00 AM to 12:00 PM has the highest truck volumes.

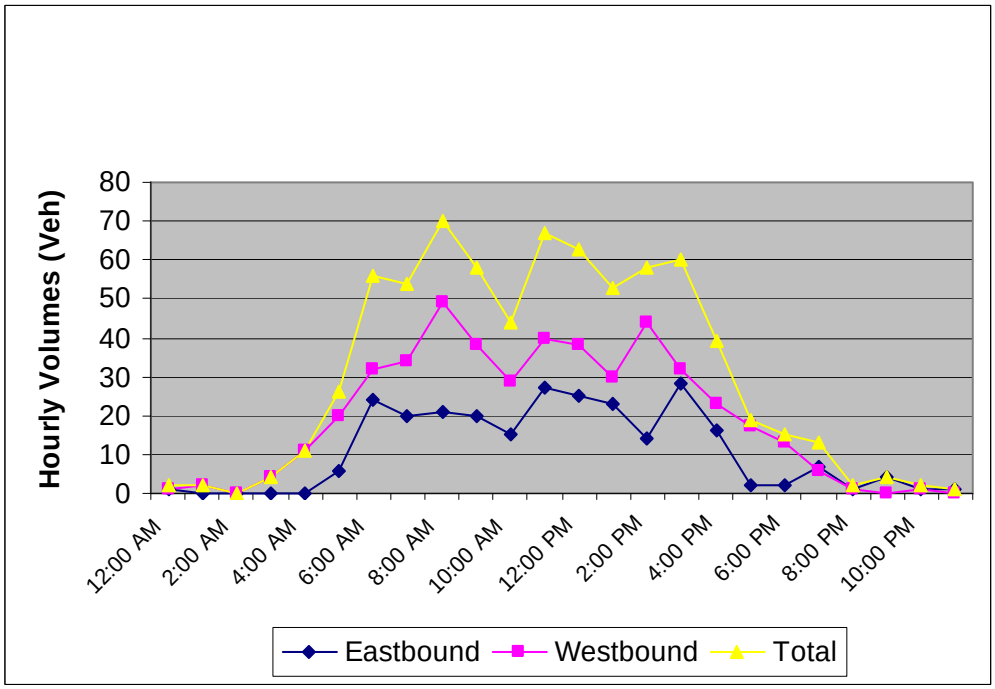
Similar patterns are observed along South Atlantic Street and South Royal Brougham Way, as illustrated on Exhibits 4-14 and 4-15. The highest truck volumes are observed between 8:00 and 9:00 am and early in the afternoon.

EXHIBIT 4-14. HOURLY TRUCK TRAFFIC ON SOUTH ATLANTIC STREET



Source: June 2005 counts for SDOT

EXHIBIT 4-15. HOURLY TRUCK TRAFFIC ON SOUTH ROYAL BROUGHAM WAY



Source: June 2005 counts for SDOT

What are the issues associated with current truck operations?

Under existing conditions, truck traffic exiting from I-5 and I-90 travels as shown in Exhibit 2-3. Westbound traffic from the freeway exits at Fourth Avenue South and has a circuitous route to South Atlantic Street to safely cross over the BNSF Railway tracks located just east of Safeco Field and Qwest Field.

Rail crossings on heavily used truck routes are obstacles for truck movement, especially in the South Downtown area where the BNSF mainline railroad, Amtrak and Sounder Commuter Rail are located.

There are approximately 70 train movements on the mainline tracks per day across the east-west arterial streets in the Duwamish area. These train volumes and associated traffic delays are expected to increase in the future.

The railroad grade separation project recently completed at South Atlantic Street (SR 519 Phase 1) provides an efficient two-way facility between First Avenue South and Fourth Avenue South. The Phase 1 project which was opened in November 2003 provides an improved eastbound on-ramp connection to I-90. However, trucks traveling westbound do not directly benefit from the Phase 1 improvements as there is currently no efficient connection from the freeway to the grade separation facility.

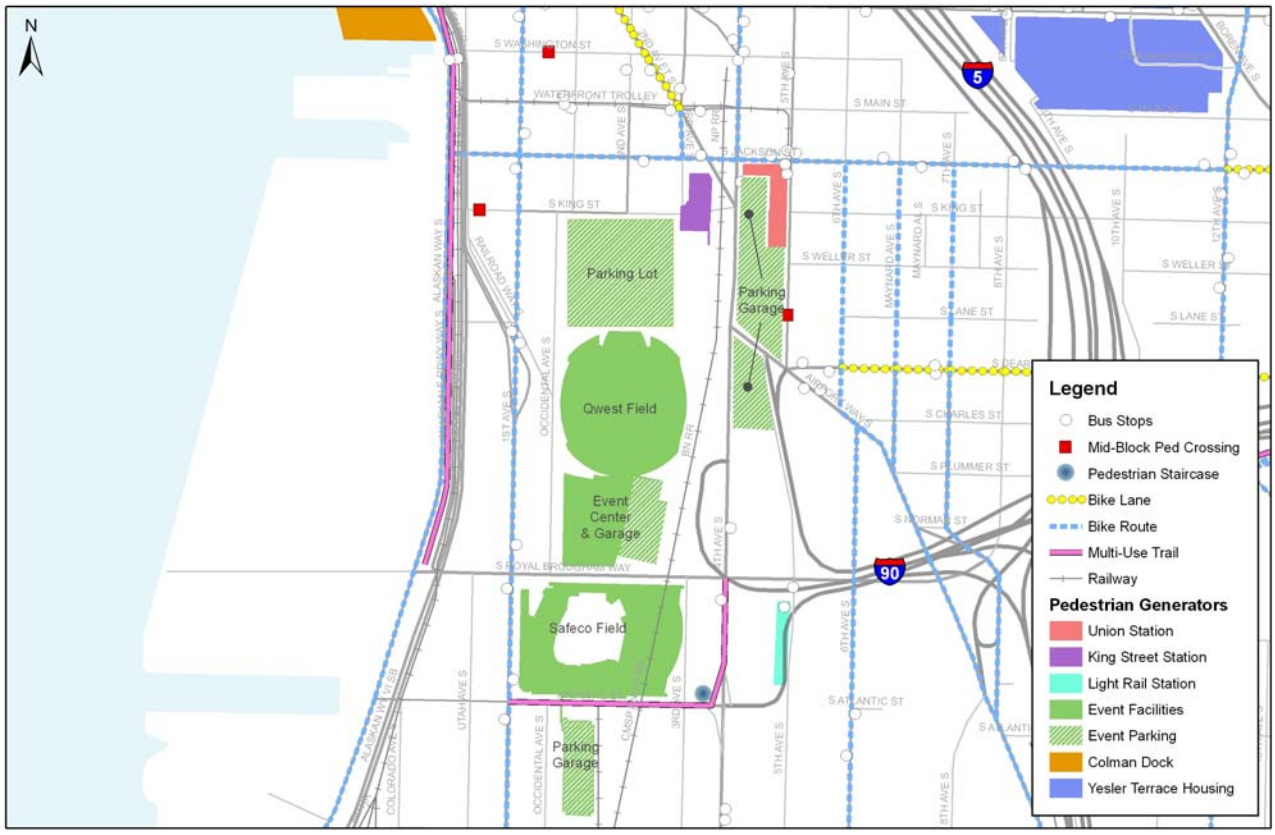
6 What is currently happening with pedestrian and bicycle facilities?

How do pedestrians and bicyclists get around?

It is easiest for pedestrians and bicyclists to travel on facilities that are designed specifically for them. Within the study area there are several of these types of facilities. Pedestrian pathways exist along Alaskan Way South, from South Royal Brougham Way to the north, along South Atlantic Street from First Avenue South to Fourth Avenue South, and along Fourth Avenue South from South Royal Brougham Way to South Atlantic Street. Bicycles are also permitted along these pathways. Two designated bicycle lanes are in the vicinity; one along Alaskan Way South, from South Royal Brougham Way to south of the study area, and the other along Dearborn Street, extending from

just west of Rainier Avenue South to Sixth Avenue South. The Mountains to Sound Greenway also runs through the area, starting on the north side of South Atlantic Street at Alaskan Way South and traveling eastbound to Fourth Avenue South, then turning north and ending at South Royal Brougham Way. It then picks up again at the Jose Rizal bridge and continues on as the I-90 trail. In addition, there is a multi-use trail in the area along Fifth Avenue, starting at South Royal Brougham Way and extending south out of the study area. Exhibit 4-16 shows the existing designated pedestrian and bicycle facilities.

EXHIBIT 4-16 EXISTING DESIGNATED PEDESTRIAN AND BICYCLE FACILITIES



In addition to the above pathways and lanes, sidewalks exist throughout the study area. The main north-south corridors of First Avenue South and Fourth Avenue South have sidewalks lining both sides of the street, with the exception of a segment on the west side of Fourth Avenue South near the I-90 off-ramp. The sidewalks along First Avenue South have a planting strip on the portion of the sidewalk nearest the curb, with trees and other

shrubbery planted in them to create space between pedestrians and vehicles traveling in the roadway. Fourth Avenue South has planting strips along parts north of SR 519, but not south of SR 519. South of South Royal Brougham Way, the sidewalks are wider and in parts separated from vehicular traffic, mainly near South Atlantic Street. In addition, there is a pedestrian staircase leading from the west side of Fourth Avenue South up to the elevated South Atlantic Street.

Of the east-west corridors in the area, both South Royal Brougham Way and South Atlantic Street have sidewalks on either side of the roadway. The sidewalks are fairly wide, to help accommodate pedestrian traffic during events, and for the most part have a planting strip or intermittent trees between the main part of the sidewalk and the roadway.

Where do pedestrians and bicyclists travel to and from?

While some pedestrians and bicyclists are just passing through the study area, others are trying to reach a destination within the study area. The most common places pedestrians and bicyclists travel to and/or from in the immediate area are the event facilities near South Royal Brougham Way and First Avenue South (Safeco Field, the Exhibition Center, and Qwest Field) and transit stops dispersed along major roadways, mainly First Avenue South and Fourth Avenue South. In an online bicycle survey conducted by SDOT, approximately 30% of bicyclists also rode a ferry, bus or train[1]. All three of these types of facilities are located near the project site. The closest facilities are:

- The Colman Dock ferry terminal, where the Washington State Ferries arrive and depart
- King Street Station along Fourth Avenue South
- Bus tunnel entrances and exits near Fourth Avenue South and South Jackson Street.

Previous Exhibit 4-16 shows these major attractors and Exhibit 4-17 shows counts of pedestrians at two major intersections.

[1] http://www.seattle.gov/transportation/docs/bmp/AppendixA.pdf

EXHIBIT 4-17. EXISTING PEAK HOUR PEDESTRIAN COUNTS (NON-EVENT)

Intersection[1]	Year	North Leg	East Leg	South Leg	West Leg
Weekday AM Peak Hour					
4th Avenue South/ South Royal Brougham Way	2005	38	16	42	7
1st Avenue South/ South Atlantic Street	2006	26	12	7	15
Weekday PM Peak Hour					
4th Avenue South/ South Royal Brougham Way	2005	26	13	40	4
1st Avenue South/ South Atlantic Street	2006	24	21	10	40

1. All intersections are signalized.

As shown in Exhibit 4-17, the majority of pedestrian movement is east-west. The exception to this is in the PM peak hour at First Avenue South and South Atlantic Street, where the heaviest movement is north-south along the west side of the street. While these counts do not show which direction pedestrians are moving (east to west or west to east), they do show that there is not as much pedestrian movement between areas north and south of SR 519 as areas east and west of SR 519.

What happens to pedestrians and bicyclists when there are major events going on?

Typical major events in the study area are held at Qwest Field, Safeco Field, or the Exhibition Center. The two major types of events are trade and consumer shows and sporting events. For events which generate a large amount of interest, police officers are called in to facilitate movement of both motorized and non-motorized traffic.

The intersections surrounding SR 519 receive a high amount of non-motorized traffic during game days as the majority of people attending events park in the vicinity of the facilities and walk to get inside the facility. Exhibit 4-18 shows pedestrian flows and bicycle routes for events at Safeco Field, Qwest Field, and the Exhibition Center.

EXHIBIT 4-18. PEDESTRIAN FLOWS AND BICYCLE ROUTES FOR EVENTS

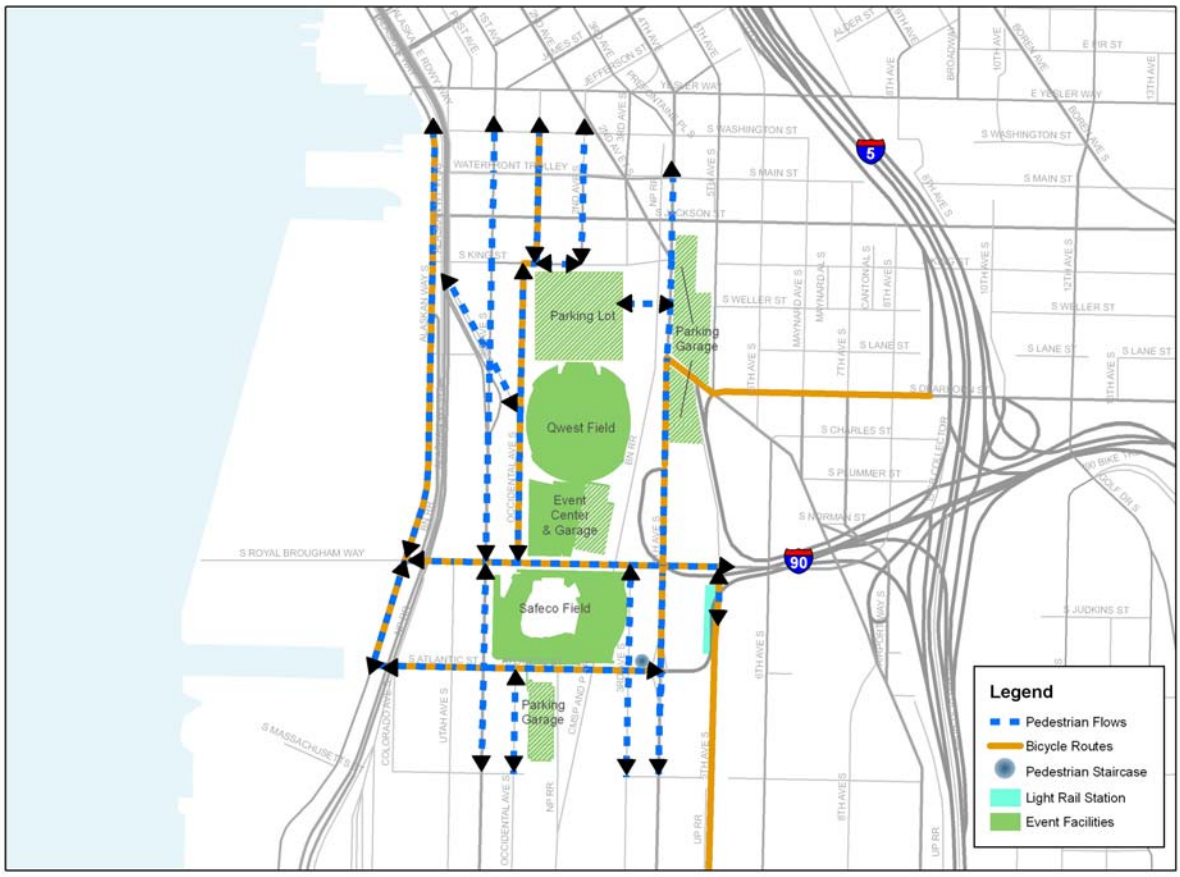


Exhibit 4-19 shows pedestrian counts at intersections in the immediate area during events.

EXHIBIT 4-19. SAFECO FIELD BASEBALL GAME WEEKDAY EVENING PEDESTRIAN COUNTS (AVERAGE ATTENDANCE)[1]

Intersection	Percentage of Attendance[2]	# of Pedestrians
1st Avenue South/ South Royal Brougham Way	16%	5,300
1st Avenue South/ South Atlantic Street	31%	10,200
4th Avenue South/ South Royal Brougham Way	14%	4,600
4th Avenue South/ South Atlantic Street	13%	4,300
Occidental Avenue South/ South Royal Brougham Way	10%	3,300
Occidental Avenue South/ South Atlantic Street	5%	1,700
Skybridges[3] & Miscellaneous Area Intersections	11%	3,600
Total	100%	33,000

1. Baseball games at Safeco Field typically being at 7pm. Average attendance for the 2007 season is estimated to be 33,000 fans (Safeco Field Transportation Management Plan, March 1, 2007 to March 1, 2008)
2. Intersection percentages based on attendance estimated by Susan Ranf, Direction of Transportation for Safeco.
3. "Skybridges" refer to structures from Safeco Field Parking Garage leading directly to Safeco Field.

As shown in Exhibit 4-19, the number of pedestrians in the area is massively increased during events. Comparing event and non-event counts at the intersection of First Avenue South and South Atlantic Street, the non-event count is approximately 1/100th of the volume of the event count.

For bicyclists, bike racks are provided for both facilities: just outside of Qwest Field, inside the Safeco Parking Garage, and outside of the Safeco Parking Garage to the west. The indoor Safeco Parking Garage rack accommodates roughly 150 bicycles for event patrons and ballpark employees.

How safe are the roadways for pedestrians and bicyclists?

In the past three years there have been a limited number of collisions involving motorized vehicles (including trains) and non-motorized users. Exhibit 4-20 shows pedestrian and bicycle collisions in the vicinity.

EXHIBIT 4-20 PEDESTRIAN/BICYCLE COLLISION SUMMARY (2004 - 2006)

Collision Locations	2004	2005	2006	Total	Average per year
Intersections					
1st Avenue S/ S Royal Brougham Way	1	1[1]	1	3	1.0
1st Avenue S/ S Atlantic Street	0	1	1	2	0.67
4th Avenue S/ I-90 Off-Ramp	0	0	1	1	0.33
4th Avenue S/ S Royal Brougham Way	0	1	0	1	0.33
Alaskan Way/ S Royal Brougham Way	0	0	0	0	0.00
Alaskan Way/ S Atlantic Street	1[1]	0	0	1	0.33
Railroad Crossing					
S Royal Brougham Way/ Thrid Avenue	1	1[2]	0	2[3]	0.67
Roadway Segments					
S Royal Brougham Way (1st Avenue S to 4th Avenue S)	0	0	0	0	0.00
S Atlantic St (1st Avenue S to 4th Avenue S)	0	1	0	1	0.33

1, These collisions are motorized vehicles colliding with bicyclists – all others involved motorized vehicles and pedestrians.

2. This collision was the only fatality for all of the intersections and roadway segments.

3. A fourth pedestrian/train collision occurred on September 30, 2007

As Exhibit 4-20 shows, the highest average collision rate occurred at First Avenue South and South Royal Brougham Way, with an average of 1 collision per year. Based on this three-year

period, there is no notable pattern for pedestrian or bicycle collisions. However, there was one fatality in the vicinity, occurring in 2005 at the railroad crossing along Royal Brougham Way.

What are the key points regarding pedestrians and bicyclists?

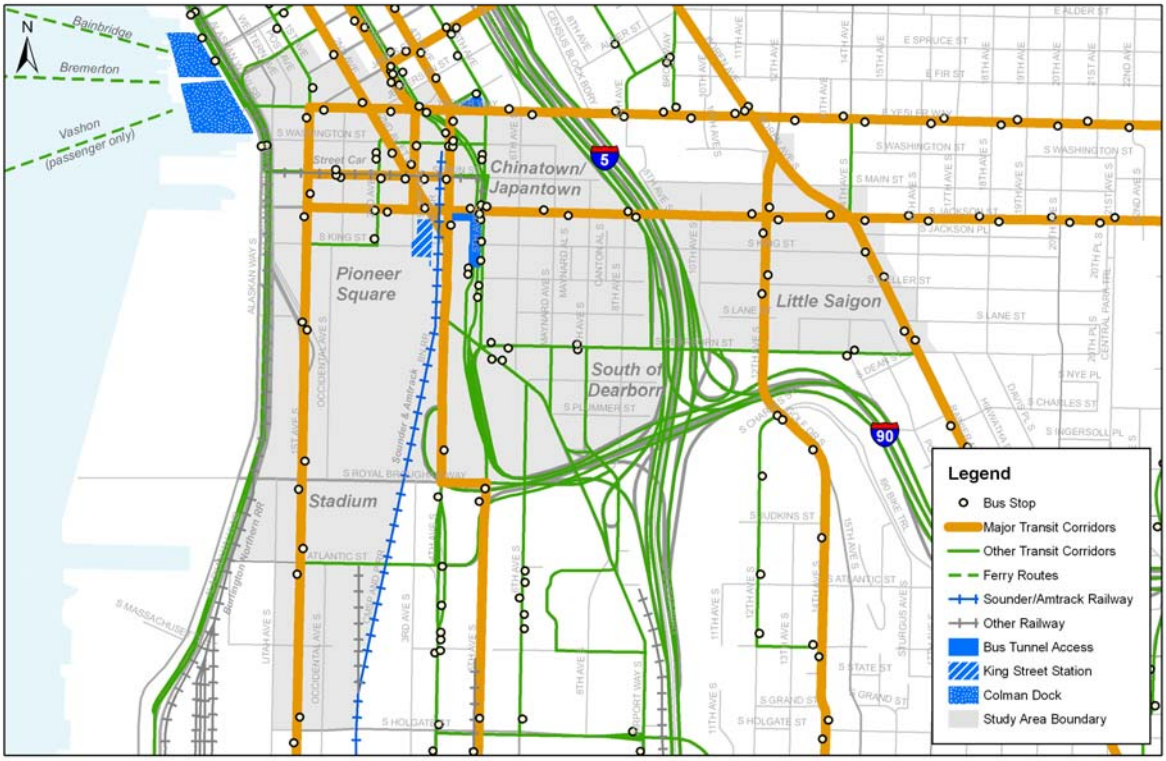
Pedestrians and bicyclists travel through the study area via a network of trails, bike lanes, and sidewalks. The main movements of pedestrians appear to be from east to west, with some variance in the PM peak hour. Major pedestrian and bicycle attractors in the surrounding area include Qwest Field, Safeco Field, Colman Dock, and King Street Station, as well as several bus stops located throughout the vicinity. During events, the number of pedestrians and bicyclists in the area greatly increases and pedestrian movements are guided by police officers stationed at major intersections. The area is fairly safe for non-motorized activity, except for the railroad crossing at South Royal Brougham Way where a fatality collision has occurred within the past three years.

7 What is currently happening with public transit and ferry?

What public transit and ferry services are available in the study area today?

Four regional and local transit entities provide five types of transit services in the study area. These entities are King County Metro, Sound Transit, Amtrak, and Washington State Ferries. These providers and their service characteristics are described below. Exhibit 4-21 shows the transit services in the study area.

EXHIBIT 4-21 MAJOR TRANSIT CORRIDORS AND FACILITIES IN STUDY AREA



King County Metro

King County Metro Transit (KC Metro) provides most of the local (and local express) transit service in Seattle and the surrounding area. All buses operating in Downtown Seattle are free to riders from 6:00 am to 7:00 pm. This ride-free area is located just north of the study area and its boundaries are defined to the south by Jackson Street, to the north by Battery Street, to the east by Sixth Avenue South (by I-5 toward the south end), and to the west by the waterfront.

In the study area, most of KC Metro's buses travel along First Avenue South and Fourth Avenue South. Bus volumes on First Avenue South and Fourth Avenue South are significant: there are 313 daily trips on First Avenue South and 1,436 daily trips on Fourth Avenue South (both directions, just north of South Royal Brougham, including deadhead trips).

Only one KC Metro route crosses through South Atlantic Street between First Avenue South and Fourth Avenue South. No transit routes pass through South Royal Brougham Way. There is one

deadheading route (Route 11), which comes from the SODO Busway and crosses South Royal Brougham to get to First Avenue South when the transit tunnel is closed.

Sound Transit

Sound Transit (ST) is the regional transit authority for the Puget Sound area, covering portions of King, Snohomish, and Pierce Counties. ST runs two types of regional transit services: Sound Transit Regional Express bus service and Sounder commuter rail service.

Sound Transit's Regional Express. Sound Transit's bus fleet is operated by local transit authorities Community Transit (Snohomish County), Metro Transit (King County), and Pierce Transit (Pierce County). It provides express bus service connecting major urban centers throughout Sound Transit's service area, namely Seattle, Redmond, Issaquah, Lakewood, Bellevue, Auburn, Federal Way, Gig Harbor, Everett, and Tacoma. For Seattle, the regional express buses connect the suburban areas in the three-county service area to Downtown Seattle, West Seattle, and the University District. In Seattle, there are a total of 20 bus routes that provide this all-day, two-way express service with limited stops. Transit stops near the project site are mainly located along Fourth Avenue South and the E-3 busway, both near South Royal Brougham Way.

Sounder Commuter Rail. "The Sounder," as it is often called, is a weekday peak period commuter rail service that started operating between Tacoma and Seattle in 2000, then between Everett and Seattle in 2003. It stops at King Street Station, located in the north end of the study area. There are currently six daily round trips between Tacoma and Seattle and three between Everett and Seattle.

Effective September 24, 2007, there are five morning trips leaving Tacoma traveling northbound to Seattle and three morning trips leaving Everett traveling southbound to Seattle. In the afternoon, there are five trips departing Seattle heading to Tacoma and three trips departing Seattle heading to Everett. There is also one "reverse commute" trip on the Sounder south

line, departing Seattle for Tacoma at 6:10 am and departing Tacoma for Seattle at 4:45 pm.

Sound Transit will eventually run up to eighteen daily round trips from Tacoma to Seattle and four from Everett to Seattle once all the track work is completed by BNSF Railway. Sound Transit also plans on extending service to South Tacoma and Lakewood by the end of 2008. The Sounder is capable of moving 6,000 people per hour (by peak direction during peak hour periods).

Amtrak Cascades

Amtrak Cascades is a partnership between WSDOT, Amtrak, and the Oregon Department of Transportation (ODOT). It provides intercity passenger rail service for long-distance travel between cities located along the Cascades. The corridor runs 156 miles from Vancouver, British Columbia south to Seattle, Washington, continuing 310 miles south via Portland, Oregon to Eugene, Oregon. In 2007, there was one daily round trip between Seattle and Vancouver B.C., one daily round trip between Seattle and Bellingham, four daily round trips between Seattle and Portland, and two daily round trips between Portland and Eugene, Oregon. King County Station is the busiest station along the Cascade line.

Amtrak Coast Starlight

Amtrak Coast Starlight provides rail service along the west coast, stretching from Seattle through Portland, Oregon and Oakland, California, ending in Los Angeles, California. The corridor runs 1,377 miles long, with connections to San Diego, California in the south and Vancouver, B.C. in the north. In 2007, there was one daily departure from Seattle and one daily departure from Los Angeles.

Washington State Ferries

The Washington State Ferries (WSF) maintains the largest fleet of passenger and auto ferries in the US and the third largest in the world. The system serves communities on Puget Sound and in the San Juan Islands. WSF operates part of its fleet from the Colman Dock Ferry Terminal in Downtown Seattle, just northwest of the study area. The following three routes serve the Colman Dock: Bainbridge Island to/from Seattle, Bremerton to/from Seattle, and Vashon Island to/from Seattle. The Vashon

route is a passenger-only route, not a passenger/auto route. It is planned that a new King County Ferry District would take over the Vashon passenger-only route but it would continue to operate from Colman Dock.

Vehicular traffic associated with the ferries crosses the study area in order to access the Colman Dock terminal off of Alaskan Way South. The signed route from I-90 to the terminal is via Fourth Avenue South, South Atlantic Street and Alaskan Way South. Exhibit 4-21 shows the location of the Colman Dock ferry terminal in relation with the study area. Vehicle queuing also occurs under the Alaskan Way Viaduct when the terminal holding area is full.

The ferry terminal is served by two Metro bus routes (16 and 66) and the Waterfront Streetcar.

What public transit and ferry facilities are located in the study area?

Transit facilities located within the study area consist of the bus stops, the E-3 Bus/Rail Way, King Street Station, and King County Metro's bus bases. The ferry facility is the Colman Dock ferry terminal.

Bus Stops

Metro routes serve approximately 30 bus stops in the study area. The stop locations are shown in previous Exhibit 4-21.

Bus/Rail Way

The E-3 Bus/Rail Way (and Downtown Seattle Transit Tunnel) provides Metro and Sound Transit exclusive right-of-way for their bus operations. In the mid-1990s, the State built the transit-only roadway along Fifth Avenue South between Royal Brougham Way and South Spokane Street to help move buses more quickly between Downtown Seattle and I-5. The tunnel is owned and operated by King County Metro. The bus tunnel recently reopened after a two-year closure to allow installation of new tracks for Sound Transit's light-rail system, which is scheduled to begin running through the tunnel in 2009. The light rail will share the tunnel with buses. The tunnel helps alleviate congestion by keeping some buses (and eventually light rail vehicles) off crowded downtown surface streets.

Sound Transit and Amtrak share a maintenance facility next to Safeco Field.

King Street Station

The King Street Station is a historic train station built in 1906. The station is located between South King Street and South Jackson Street and Second and Fourth Avenues in the Pioneer Square neighborhood of Seattle.

The Station is the hub of The Sounder service, where trains depart from the center platform of the station. An elevated walkway connects passengers to the street level above and to the International District Metro Bus Tunnel station.

The station already serves Amtrak passengers as well as Sounder commuter rail passengers. In the future, it will continue to be an important facility for linking Amtrak and Sounder services. It can also be an important transfer facility for users of regional and local transit buses, the George Benson Waterfront Streetcar, Link light rail, roads, ferries, pedestrians, and cyclists.

Metro Bus Bases

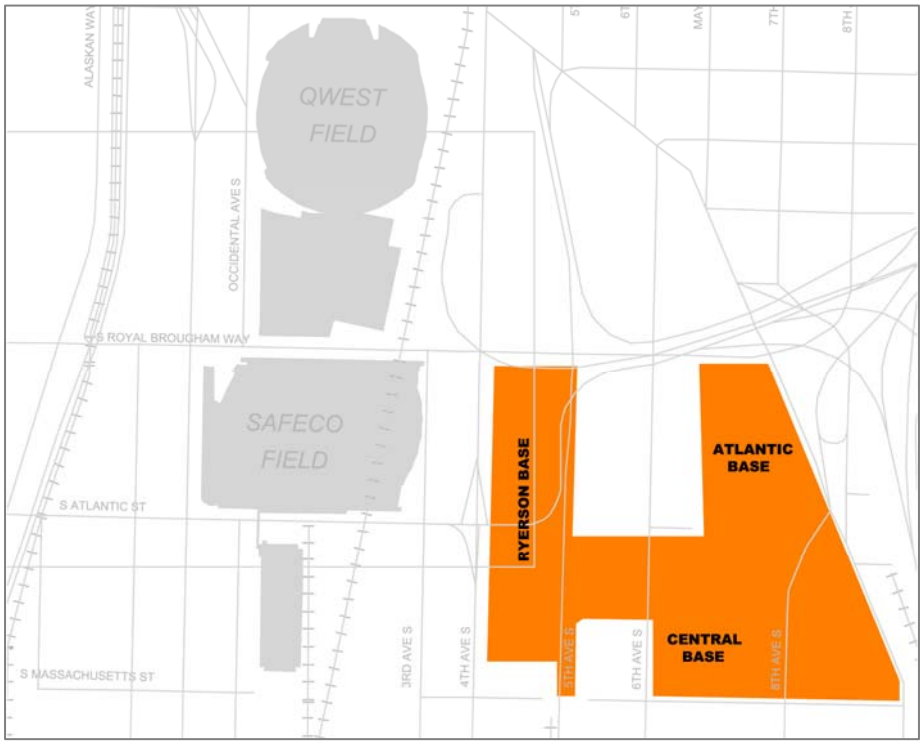
King County Metro owns and operates a bus base complex that provides parking, maintenance, and operation services. The complex is located southeast of Safeco Field and occupies most of the land area between Fourth Avenue South (west), Airport Way South (east), South Royal Brougham Way (north), and South Massachusetts Street (south). Functionally, the complex is composed of three bases: Ryerson Base, Atlantic Base, and Central Base, as shown in Exhibit 4-22. The latter two bases are referred to as the Atlantic/Central Base, in which King County Metro is planning to expand the bus parking area to house more than 550 buses, a 50 percent increase over its present capacity.[2] After completion of the Atlantic/Central base expansion, the total bus parking capacity for the three central bases will be approximately 800.

The three bases can be accessed from Fifth Avenue South, South Royal Brougham Way, Airport Way South and South

[2] Source: http://www.metrokc.gov/kcdot/transit/atlantic/

Massachusetts Street. Metro Transit also utilizes Sixth Avenue South as a bus layover. Base driveways accommodate frequent in and out bus movements. On a regular weekday in June 2007, approximately 1,500 bus trips to and from the bus base complex were reported. About 43 percent of total trips either originated from or were destined to Ryerson Base. In addition, numerous trips are generated by more than 200 maintenance employees, 1,160 bus operators, and 70 administrative/supervisory personnel. Base employees and transit operators access the newly constructed parking garage on the base via Sixth Avenue South.

EXHIBIT 4-22 METRO BUS BASES IN STUDY AREA



WSF Colman Dock Ferry Terminal

The Seattle Ferry Terminal at Colman Dock is Washington State Ferries' busiest terminal and is used by over nine million riders per year. The terminal serves the Bainbridge Island and Bremerton passenger-vehicle routes and the Vashon Island passenger-only ferry route. In coming years, the number of daily commuters and visitors is expected to grow, with the majority of the growth coming from walk-on passengers. These ferries are a

critical part of the state highway system and the terminals serve as the transportation hub between the east and west sides of Puget Sound.

What is the current level of transit and ferry ridership in the study area?

Exhibit 4-23 presents average daily (and annual) ridership for King County Metro transit services within the study area. The bus stops located within the study area served on average in 2006 approximately 4,300 passengers in the AM peak period and 5,000 passengers in the PM peak period.

EXHIBIT 4-23. BUS TRIPS AND RIDERSHIP (2007)

Segment	Daily Transit Trips (in-service and deadhead)	Daily Riders	Annualized Ridership
North-South Corridors			
1st Avenue South (north of South Royal Brougham Way)	313	4,577	1,373,100
4th Avenue South (north of South Royal Brougham Way	1,436	26,699	8,009,700
E-3 Busway (south of South Royal Brougham Way)	927	16,214	4,864,200
East-West Corridors			
South Royal Brougham Way (east of 4th Avenue South)	1,002	17,732	5,319,600

Source: King County Metro Service Planning (2007)

Systemwide, Sound Transit express buses had about 9.678 million boards in 2006[3] and the Sounder ridership for 2006 was about 1.693 million. Total Amtrak Cascades ridership for 2006 was approximately 630,000, with about 418,000 of those riders coming from or going to Seattle via King Street Station.

More than 9 million people travel through the Colman Dock ferry terminal on an annual basis. Of those, 7.2 million people

[3] Sound Transit 4th Quarter Performance Report: http://www.soundtransit.org/Documents/pdf/newsroom/Ridership_Q4_2006.pdf

walk onto the ferries or are passengers in cars. Ferry ridership information for 2006 is shown in Exhibit 4-24.

EXHIBIT 4-24. COLMAN DOCK FERRY RIDERSHIP (2006)

Ferry Route	Total Vehicles	Total Passengers	Total Riders
Bainbridge Island-Seattle	2,127,117	4,332,685	6,459,802
Bremerton-Seattle	722,745	1,692,693	2,415,438
Vashon Island-Seattle		129,839	129,839
Total Colman Dock	2,849,862	6,155,217	9,005,079
Average Daily Ridership	*7,808*	*16,864*	*24,671*

Source: WSF Annual Traffic Statistics

How is transit affected by events?

Most of the sports events attendees come by car. A survey carried out for a football game on a weekend day in December 2005 showed that auto riders represent about two-thirds of the total number of attendees, with an average of 367 cars per 1000 attendees *(Transportation Management Program, Plan Year 2006 to 2007*, Qwest Field Event Center).

Usually, the regular bus routes that travel into or out of Downtown Seattle via First Avenue South, Fourth Avenue South, the Metro Bus/ Rail Way, Sixth Avenue South, or South Jackson Street serve the area during game periods and drop people within walking distance of both fields. However, the scenario is different during weekday games that start after 5:00 pm, and during all Saturday and Sunday games. In these cases, regular Metro and Sound Transit Regional Express bus service that is normally scheduled to operate via First Avenue South and Fourth Avenue South is rerouted 90 minutes before the start of the game to operate instead via the E-3 Bus/Rail Way and Airport Way South in both directions between the Safeco Field area and Downtown Seattle.[4]

Both Qwest and Safeco Fields prepare annual Transportation Management Plans (TMPs) to deal with the traffic issues during events. The parties have entered into agreements to coordinate

[4] Source: http://transit.metrokc.gov/up/spclevent/mariners-service.html#1aveshuttle

game schedules and avoid dual major events taking place at the same time of day. Transit is a major component emphasized by the Qwest and Safeco TMPs. Qwest Field has developed charter bus packages and established on-site charter bus parking on the east side of the north parking lot. Charter buses enter the lot from Royal Brougham and travel along the east access road to the north lot and exit out the northwest gate of the north parking lot. Qwest Field is also promoting several transit programs: Charter Boat Service, Event Day Rail Service (to serve people coming from Portland and the south), and a special rail program with Sound Transit (to serve the Green River Valley and Tacoma to the south as well as Everett to the north). In addition, Metro Transit is providing non-stop shuttle service for Seahawks home games from five area park-and-ride lots to Qwest Field for $3.00 each way.[5]

In turn, Safeco established its TMP which includes an agreement with King County Metro to lease game bus service. Under this agreement, Metro provides transit service between Safeco Field and park-and-ride facilities around Puget Sound and credits the cost for leased buses by collecting a fare of $3.00 per trip. This is the same program for Qwest Field.

Staging locations for Metro buses to Mariners and Seahawks games are shown in Exhibit 4-25.

[5] http://transit.metrokc.gov/up/spclevent/seahawks-service.html

EXHIBIT 4-25: BUS STAGING FOR MARINERS AND SEAHAWKS GAMES

Source: http://transit.metrokc.gov/up/spclevent/mariners-service.html#1aveshuttle

New for the 2007 Mariners season, Metro operates a First Avenue South shuttle during the times near and after the end of games when the roadway is closed by Seattle police. The First Avenue shuttle operates approximately every 15 minutes in both directions between South Spokane Street in SODO and Seneca Street in downtown Seattle at times when regular First Avenue bus service is rerouted.

As part of Safeco's TMP, Sound Transit Commuter rail will provide weekend service to games with a 12:35 - 1:35 start time, and Sound Transit's regular route service will provide inter- and

intra-county bus service from King, Pierce and Snohomish counties.

8 What are the current safety concerns?

What is the traffic safety history record in the study area?

A review of current transportation safety conditions was conducted within the study area. The City of Seattle provided collision data for the surface streets and WSDOT provided collision data for the freeway mainline and ramps. Data for both City of Seattle and WSDOT locations are for the most recent three years of available data: between January 2004 and December 2006. The review of collision data covered intersections, street segments, freeway sections, and freeway ramps.

Detailed current collision data are presented in Appendix E. Appendix E-1 shows the number of collisions at the intersections and their severity. Appendix E-2 shows the number and severity of collisions on the surface street segments. Appendices E-3 and E-4 present respectively the freeway mainline and freeway ramp collision data.

What are the High Accident Locations?

Intersections

The City of Seattle defines a high accident intersection as a signalized intersection with more than 10 collisions per year on average, or an unsignalized intersection with 5 collisions per year on average.

Within the study area, two intersections were found to be high accident intersections based on the three-year period. The intersection of First Avenue South and South Spokane Street had more than 15 collisions per year on average, and the intersection of Fourth Avenue South and South Royal Brougham Way had 10 collisions per year on average. At the intersection of First Avenue South and South Spokane Street, the majority of the collisions were angle type collisions. None of the collisions reported at this intersection involved a pedestrian or bicyclist, and none of the reported collisions resulted in a fatality. At the intersection of

Fourth Avenue South and South Royal Brougham Way, the collisions varied between rear-end and sideswipe.

In addition to these two high accident intersections, the intersection of First Avenue South and South Royal Brougham Way had 9 collisions per year on average, which is close to the high accident intersection criteria.

None of the study intersections experienced more than two pedestrian/bicycle collisions in a single year, and none experienced more than three during the three-year period for which data was reviewed.

Street Segments

The analysis of various east-west street segments within the study area indicated that the sections of South Royal Brougham Way, South Atlantic Street and South Lander Street between First Avenue South and Fourth Avenue South all had more than 4 collisions per year on average. South Royal Brougham Way had the highest number of collisions of the four studied segments. This is likely the result of relatively high traffic volumes, closely spaced intersections, and rail crossings.

No fatal collisions occurred on the surface street roadway segments included in this analysis between 2004 and 2006. Both South Royal Brougham Way and South Atlantic Street had four accidents resulting in injuries between 2004 and 2006.

Freeway Mainline

WSDOT collision data shows that urban interstate facilities in the northwest region of the state have, on average, 1.5 collisions per million vehicle miles. Based on data collected between 2004 and 2006, both analyzed sections along I-90 westbound within the study area have collision rates higher than the average. From the end of the Mount Baker Tunnel to northbound I-5 off-ramp, there were on average 1.6 annual collisions per million vehicle miles traveled (MVMT); from the northbound I-5 off-ramp to the Fourth Avenue intersection, the annual collision rate per MVMT was 2.

On both sections of I-90, a similar percentage of accidents (1/3) resulted in injuries. Exceeding the speed limit is the most

contributing factor and rear-end collisions are the predominant accident type.

Between 2004 and 2006, one fatality was reported along I-90 westbound between southbound Rainier Avenue off-ramp and the northbound I-5 off-ramp. The fatality occurred in 2006 as a result of a vehicle traveling at excess speed colliding with a concrete barrier.

Freeway Ramps

Off-ramps from westbound I-90 to I-5 have average annual collisions of 8 for the northbound I-5 exit and 5 for the southbound I-5 exit. The predominant collision type on this ramp is rear-end collision, likely resulting from congestion conditions on southbound I-5 and on the ramp.

9 What is the current parking situation?

How was parking supply information collected?

A field survey was conducted in March 2007 to gauge approximate parking supply and demand in the immediate area for both off-street and on-street parking. Additional information regarding off-street garage parking came from the Safeco Field and Qwest Field Transportation Management Plans.

Where can people park during events and non-events?

Near the project site there are two types of parking available: on-street parking and off-street parking. The descriptions of the different types of parking are as follows:

- Off-Street – parking which is provided in a lot.
- On-Street – parking provided on the side of the roadway
- Pay Parking – spaces which are paid for using.
- Unrestricted Parking – spaces which the public does not have to pay for and are unrestricted by time.
- Unrestricted Hourly Parking – spaces which the public does not have to pay for, but are restricted by time (30 minutes, 1 hour, 2 hours).

Exhibit 4-26 shows both the off-street and on-street parking in the project vicinity.

EXHIBIT 4-26: ON-STREET AND OFF-STREET PARKING IN STUDY AREA

On-Street Parking

Many of the roadways in the area do not allow on-street parking, particularly Fourth Avenue S, Royal Brougham Way, and Edgar Martinez Drive. Where on-street parking is allowed, the two dominant types are unrestricted parking and unrestricted hourly parking. Exhibit 4-27 shows the estimated on-street parking supply for roadways in the project site vicinity.

EXHIBIT 4-27. ON-STREET ESTIMATED PARKING SUPPLY[1]

Street	Street Side	Limits	Supply (spaces)[2]
East-West Streets			
S Massachusetts Street	North	Utah Ave S to Occidental Ave S	5
S Massachusetts Street	South	Utah Ave S to Occidental Ave S	20
S Atlantic Street	North	BNSF Mainline RR Crossing to 1st Avenue S	30
S Atlantic Street	South	BNSF Mainline RR Crossing to 1st Avenue S	20
Edgar Martinez Drive S	North/South	1st Avenue S to 4th Avenue S	0
S Royal Brougham Way	North/South	BNSF Mainline RR Crossing to 4th Avenue S	0
S King Street	North	1st Avenue S to 3rd Avenue S	35
S King Street	South	1st Avenue S to 3rd Avenue S	30
North-South Streets			
1st Avenue S	East	S King St to S Royal Brougham Way	50
1st Avenue S	West	S King St to S Royal Brougham Way	50
1st Avenue S	East	S Royal Brougham Way to S Mass. St	50
1st Avenue S	West	S Royal Brougham Way to S Mass. St	40
Occidental Ave S	East	S King St to S Royal Brougham Way	15
Occidental Ave S	West	S King St to S Royal Brougham Way	75
Occidental Ave S	East/West	Edgar Martinez Dr S to S Mass. St	0
3rd Avenue S	East	S Royal Brougham Way to S Mass. St	70
3rd Avenue S	East	S Royal Brougham Way to S Mass. St	120
4th Avenue S	East/West	S King St to S Massachusetts St	0
Total			610

1, Parking Supply was estimated using previous studies and aerial images.

2. Supply is in number of parking spaces and is rounded to the nearest five.

As Exhibit 4-27 demonstrates, there are slightly over 600 spaces for on-street parking near SR 519. The roadways running north-south have the majority of parking available—a little over 75 percent. Of these, Third Avenue South provides the most on-street parking.

Off-Street Parking

The off-street parking in the area is a mix of surface lots and parking garages. There are a number of surface lots north of South Royal Brougham Way, and a large lot south of South Atlantic Street and west of First Avenue South. Two main

parking garages are in the area; one is next to the Exhibition Center and the other south of Safeco Field. Exhibit 4-28 shows the supply for these lots and garages.

EXHIBIT 4-28. OFF-STREET ESTIMATED PARKING SUPPLY[1]

ID (see Exhibit 4-26)	Location	Supply (spaces)[2]
Surface Lots		
A	North of Qwest Field	1,080
B	Between BNSF Railroad and 1st Avenue S	550
C	Between 1st Avenue S and Occidental Ave S (north)	30
D	Between 1st Avenue S and Occidental Ave S (south)	70
E	Between Utah Avenue S and 1st Avenue S	300
Garages		
1	Exhibition Center Garage	2,000
2	Safeco Field Garage	2,000
Total		6,030

1, Parking Supply was estimated using previous studies and aerial images.

2. Supply is in number of parking spaces and is rounded to the nearest ten.

As Exhibit 4-28 demonstrates, there are approximately 6,000 off-street parking spaces available in the surrounding area. About two-thirds of these spaces are in the parking garages, and the rest are dispersed throughout the surface lots.

Event Parking

Event parking refers to parking conditions which occur when major events are hosted at Safeco Field or Qwest Field. The number of cars in the area greatly increases during events when compared to typical weekday conditions. To help mitigate this increase, both Safeco Field and Qwest Field have Transportation Management Plans (TMPs). These plans define actions to reduce parking demand, including increased transit service, HOV incentives, and bicycle accommodations, and efficiently manage the increase in traffic in the area.

The following table shows the results of a parking survey done at Qwest Field on a weekend football game. Though the data was collected on a weekend, football games do occur on weekdays where similar results are likely.

EXHIBIT 4-29. QWEST FIELD EVENT ATTENDANCE AND PARKING FIGURES[1]

Game Attendance	Mode Split	Average Automobile Occupancy	Cars Parked
62,860	67%	2.67	15,774

1. Numbers based on a survey conducted by Qwest Field during a Seahawks Football Game on December 11, 2005.

As shown in Exhibit 4-29, the number of cars parked in the area during the football game is nearly 16,000. This exceeds available parking in the immediate vicinity, which is approximately 6,600 spaces. A majority of the remaining vehicles spill into adjacent neighborhoods with both on- and off-street parking.

Summary

Within the project area, there are two main types of parking: on-street and off-street. The two main types of on-street parking are unrestricted and unrestricted hourly parking. Off-street parking is supplied via various surface lots and two main parking garages near event facilities. Event parking in the area greatly exceeds the available parking in the immediate vicinity; however, action steps are planned to reduce the demand and ease over-crowding.

Chapter 5 Environmental Consequences and Mitigation Measures

1 How would the project permanently affect freeway operations and safety in the study area?

How would travel patterns change on the freeway?

The following summarizes traffic demand forecasts on westbound I-90 for the No Build and Proposed Action Alternatives. The analysis includes 2011 and 2030 horizons for morning and afternoon peak periods, as well as average daily conditions. Appendices A-5 through A-8 show the predicted directional volumes for the different scenarios, years and periods.

Traffic demand on mainline I-90 west of the Mount Baker tunnel and on the off-ramps to I-5 would not be substantially affected by the project because traffic volumes on the mainline and the ramps would remain essentially the same as under the No Build Alternative.

However, there are some differences in travel patterns between the Proposed Action and No Build Alternatives, which include:

- With the creation of a new I-90 off-ramp to South Atlantic Street, some of the westbound freeway traffic from I-90 and I-5 would divert from the Fourth Avenue South off-ramp. Traffic volumes on the existing I-90 off-ramp to Fourth Avenue South would be lower in the Proposed Action Alternative.
- In the Proposed Action Alternative, all traffic coming from the northbound I-5 on-ramp to I-90 westbound would be directed toward the new off-ramp to South Atlantic Street. Traffic volumes on the I-5 northbound on-ramp would be

lower in the Proposed Action Alternative as vehicles heading to Fourth Avenue South would use other freeway exits.

Exhibits 5-1 and 5-2 summarize the growth forecasts for 2011 and 2030 during the AM and PM peak hours. When comparing traffic volumes, existing conditions are compared with the No Build Alternative in the year the project is completed (2011) and for the project design year (2030). This provides a point of reference for comparing current conditions to the future. The Proposed Action Alternative is then compared with the No Build Alternative to show changes associated with the project.

EXHIBIT 5-1. CHANGES IN AM PEAK HOUR FREEWAY VOLUMES

AM Peak Hour Percent Change				
Route	No Build Alternative Compared to Today		Proposed Action Alternative Compared to No Build	
	2011	2030	2011	2030
I-90 off-ramp to 4th Avenue	12%	40%	-45%	-47%
I-90 westbound mainline	2%	27%	3%	5%
I-90 westbound on-ramp from NB I-5	63%	100%	-26%	-39%
I-90 westbound on-ramp from SB I-5	64%	103%	0%	0%

For the Proposed Action Alternative, AM peak hour traffic volumes on the I-90 off ramp to Fourth Avenue South are projected to decrease by about 45 percent. Vehicles will use the new connector to South Atlantic Street to cross over the railroad tracks. Proposed Action volumes on the northbound I-5 exit ramp to I-90 westbound are reduced by about 25 percent in 2011 and 40 percent in 2030.

EXHIBIT 5-2. CHANGES IN PM PEAK HOUR FREEWAY VOLUMES

PM Peak Hour Percent Change				
Route	No Build Alternative Compared to Today		Proposed Action Alternative Compared to No Build	
	2011	2030	2011	2030
I-90 off-ramp to 4th Avenue	1%	30%	-49%	-44%
I-90 westbound mainline	-5%	23%	2%	4%
I-90 westbound on-ramp from NB I-5	36%	71%	-21%	-33%
I-90 westbound on-ramp from SB I-5	60%	110%	0%	0%

Changes predicted during the PM peak hour are similar to those described for the AM peak hour. Volumes on the I-90 off-ramp to Fourth Avenue are expected to decrease by about 50 percent in 2011 and 45 percent in 2030 when the project is implemented. Volumes on the I-5 northbound exit ramp to I-90 westbound are expected to decrease by about 20 percent in 2011 and 35 percent in 2030.

What are the freeway traffic operation results?

Freeway operation analysis was performed on westbound I-90 between the Mount Baker Tunnel and the end of I-90 for the AM and PM peak-hour conditions in 2011 and 2030. The freeway simulation models for 2011 and 2030 assumed that the I-5 off-ramps would not create congestion on the mainline section of I-90. This ensured that the traffic volumes to be handled by SR 519 and other facilities under the various project alternatives would not be constrained by upstream bottlenecks during the AM and PM peak periods.

The Proposed Action alternative is compared to the No Build alternative.

What are the predicted freeway performances in 2011?

Figures showing 2011 freeway level of service for the No Build and Proposed Action alternatives are presented in Appendices A-3a and A-3b.

In general, the project does not affect freeway operations on I-90 east of the I-5 interchange. The main differences between the Proposed Action and No Build alternatives occur in the last section of westbound I-90 west of the I-5 on-ramps.

In the Proposed Action, the level of service (LOS) on the I-90 off ramp to Fourth Avenue South improves from LOS D to LOS B in the AM peak hour and from LOS C to LOS A in the PM peak hour. This is due to the shift of traffic onto the new South Atlantic Street connector, with volumes on the Fourth Avenue South ramp decreasing by about 800 vehicles per hour in the AM peak and about 500 vehicles per hour in the PM peak.

The new South Atlantic connector is shown to operate at LOS B during the AM peak and LOS A during the PM peak hour.

Exhibit 5-3 shows the predicted average and maximum queue lengths for the last sections of I-90 in 2011.

The Proposed Action contributes to fewer vehicles using the Fourth Avenue South off-ramp. The queue length predicted for I-90 traffic at the signalized intersection with Fourth Avenue South is expected to also be reduced.

Short queue lengths and minimal delays for I-90 traffic are expected on the new South Atlantic Street connector, as shown in Exhibit 5-3.

EXHIBIT 5-3. 2011 QUEUE LENGTHS (IN FEET) ON I-90 OFF RAMPS

2011		No Build		Proposed Action	
		AM	PM	AM	PM
Queue length at 4th Avenue intersection	Average	135	220	130	105
	Maximum	635	695	555	390
Queue length at South Atlantic Street	Average	NA	NA	30	15
	Maximum	NA	NA	275	170

What are the predicted freeway performances in 2030?

Graphics showing 2030 freeway level of service results for the No Build and Proposed Action alternatives are presented in Appendices A-4a and A-4b.

In general, the Proposed Action does not affect freeway operations on I-90 east of the I-5 interchange. East of the northbound I-5 off-ramp the LOS does not change in the AM

or PM peak hour between the Proposed Action and No Build alternatives. The main differences between the two alternatives occur in the final section of I-90 past the I-5 exit ramps during the AM peak hour.

During the AM peak hour in the No Build scenario, the increased volumes on the I-90 off-ramp at Fourth Avenue South and along Fourth Avenue South produce long delays and queues on the off-ramp. The congestion affects freeway operations starting immediately after the off-ramp to southbound I-5. With the redistribution of traffic on the new South Atlantic connector, freeway performance west of the southbound I-5 off-ramp is significantly improved, from LOS F to LOS C and D (depending on the particular segment).

The new South Atlantic connector is shown to operate at LOS B during the AM and PM peak hours.

Exhibit 5-4 shows the predicted average and maximum queue lengths for the last sections of I-90 in 2030.

The proposed action contributes to fewer vehicles using the Fourth Avenue South off-ramp, which reduces the average and maximum queue lengths for I-90 traffic at the signalized intersection with Fourth Avenue South.

Short queue lengths and minimal delays for I-90 traffic are expected on the new South Atlantic Street connector as shown in Exhibit 5-4.

EXHIBIT 5-4. 2030 QUEUE LENGTHS (IN FEET) ON I-90 OFF RAMPS

2030		No Build		Proposed Action	
		AM	PM	AM	PM
Queue length at 4th Avenue intersection	Average	1,970	680	410	580
	Maximum	2,570	1,190	1,120	985
Queue length at South Atlantic Street	Average	NA	NA	25	45
	Maximum	NA	NA	210	305

In the Proposed Action scenario, the average queue length on the I-90 off ramp at Fourth Avenue South is predicted to be slightly higher in the PM peak than in the AM peak, even though the I-90 volumes are lower. This is due to the signal

timings at the intersection of Fourth Avenue South that provide more green time for the north-south movements in the PM peak.

What effects will the project alternatives have on freeway safety?

With the No Build alternative, the potential for traffic collisions within the study area is anticipated to increase in the future with the expected increase in traffic volumes. Therefore, it is possible that traffic collisions increase at the following locations within the study area where safety hazards have been identified under existing conditions:

- Westbound I-90 Mainline between Mount Baker Tunnel and Rainier Avenue South
- Westbound I-90 Mainline between the Northbound I-5 on-ramp and 4th Avenue South

The Proposed Action introduces a number of roadway and intersection improvements that would eliminate some of the existing design and operation deficiencies within the study area. The proposed improvements are also anticipated to modify existing travel patterns. These factors could result in changes to traffic safety.

The Proposed Action would eliminate the existing merge between the northbound I-5 off-ramp to westbound I-90. Currently, vehicles exiting I-5 using this ramp are required to merge into the westbound through traffic on I-90. The Proposed Action would prohibit this merge, forcing vehicles exiting I-5 in the northbound direction to use the new South Atlantic Street connector. This could improve safety through this section of westbound I-90.

The proposed ramp connecting westbound I-90 to South Atlantic Street would result in a reduction in traffic volumes using the existing ramp connection to 4th Avenue South. The shift in traffic to the proposed ramp is anticipated to reduce traffic volumes on the existing ramp relative to baseline conditions. This reduction in traffic could result in an

improvement in safety both on the existing ramp, and at the intersection with 4th Avenue South.

The proposed direct ramp connection between westbound I-90 and South Atlantic Street will be designed in a manner to facilitate the safe and efficient movement of traffic. The intersection at the ramp terminus with South Atlantic Street is forecast to operate with minimal delays and queuing. As a result, it is not anticipated that the new ramp connection will create a new safety hazard. This includes pedestrians crossing the ramp terminus on the north side of South Atlantic Street, where a signalized crosswalk will be provided as part of the proposed intersection control.

2 How would the project permanently affect surface street operations and safety in the study area?

How would travel patterns change on the surface streets?

The following summarizes traffic demand forecasts on surface streets for the No Build and Proposed Action Alternatives. The analysis includes 2011 and 2030 horizons for both AM and PM peak periods, as well as daily traffic patterns. Appendices A-5 through A-8 show, the predicted directional volumes for the different scenarios, years and periods.

Traffic demand on local streets in the study area, primarily First Avenue South, Fourth Avenue South, South Royal Brougham Way and South Atlantic Street, would be affected by the Proposed Action. There are also a number of traffic pattern changes that would happen independently of the Proposed Action due to land use changes or other transportation projects planned in the area.

Exhibits 5-5 and 5-6 summarize the growth forecasts for 2011 and 2030, respectively, during the AM and PM peak hours. When comparing traffic volumes, existing conditions are compared with the No Build Alternative to provide a point of reference for comparing current conditions to the future. The Proposed Action Alternative is then compared with the No Build Alternative to show changes associated with the project.

EXHIBIT 5-5. CHANGES IN AM PEAK HOUR SURFACE STREET VOLUMES

AM Peak Hour Percent Change					
		No Build Alternative Compared to Today		Proposed Action Compared to No Build	
		2011	2030	2011	2030
4th Avenue S north of S Royal Brougham Way	NB	18%	36%	4%	0%
4th Avenue S north of S Royal Brougham Way	SB	3%	29%	-41%	-38%
4th Avenue S south of S Royal Brougham Way	NB	4%	25%	8%	22%
4th Avenue S south of S Royal Brougham Way	SB	10%	36%	-21%	-12%
1st Avenue S between S Atlantic Street and S Royal Brougham Way	NB	2%	10%	29%	11%
1st Avenue S between S Atlantic Street and S Royal Brougham Way	SB	7%	-34%	0%	0%
S Royal Brougham Way	EB	21%	8%	-54%	0%
S Royal Brougham Way	WB	4%	-17%	-17%	-5%
S Atlantic Street	EB	4%	54%	0%	0%
S Atlantic Street	WB	-5%	89%	62%	12%

The main changes in travel patterns that are expected independently of the SR 519 project include:

- In 2030, the south end Alaskan Way configuration assumed in the No Build alternative (known as the Alaskan Way Viaduct South End concept as of July 2007) produces a shift of traffic from First Avenue South to a new SR 99 frontage road. As a result, the anticipated traffic volumes on First Avenue South between South Atlantic Street and South Royal Brougham Way are generally lower in 2030 than today.

EXHIBIT 5-6. CHANGES IN PM PEAK HOUR SURFACE STREET VOLUMES

PM Peak Hour Percent Change					
		No Build Alternative Compared to Today		Proposed Action Compared to No Build	
		2011	2030	2011	2030
4th Avenue S north of S Royal Brougham Way	NB	14%	35%	16%	0%
4th Avenue S north of S Royal Brougham Way	SB	1%	22%	-22%	-20%
4th Avenue S south of S Royal Brougham Way	NB	3%	19%	15%	27%
4th Avenue S south of S Royal Brougham Way	SB	-3%	32%	-4%	-11%
1st Avenue S between S Atlantic Street and S Royal Brougham Way	NB	4%	-8%	17%	9%
1st Avenue S between S Atlantic Street and S Royal Brougham Way	SB	13%	-18%	0%	0%
S Royal Brougham Way	EB	6%	19%	6%	-1%
S Royal Brougham Way	WB	10%	-10%	-36%	5%
S Atlantic Street	EB	5%	51%	0%	4%
S Atlantic Street	WB	5%	141%	50%	-5%

- In the No Build alternative, the railroad crossing at South Royal Brougham Way and Third Avenue South would remain at-grade. The increased rail traffic by 2030 would produce more frequent and longer gate closures along South Royal Brougham Way. This would result in limited growth or reduction of east-west traffic along South Royal Brougham Way, and a shift of traffic to South Atlantic Street.
- The closure of South Holgate Street assumed in the 2030 scenario contributes to additional east-west traffic in the stadium area. These vehicles are expected to use South Royal Brougham Way and South Atlantic Street.

The expected changes in travel patterns due to the Proposed Action include the following:

- Traffic volumes along southbound Fourth Avenue South between the I-90 off-ramp and South Atlantic Street would

decrease with the Proposed Action. The new Atlantic connector would serve I-90 traffic heading west, which would not use Fourth Avenue South anymore.

- Traffic volumes along northbound Fourth Avenue South between South Atlantic Street and South Royal Brougham Way would increase with the Proposed Action. This results from the northbound Fourth Avenue traffic being prohibited from making a left turn on South Atlantic Street.
- The Proposed Action results in a shift of eastbound and westbound traffic from South Royal Brougham Way to South Atlantic Street, particularly in 2011.
- The Proposed Action eliminates the northbound left-turn movement from Fourth Avenue South to South Atlantic Street, which is diverted to South Lander Street (40%) and South Royal Brougham Way (60%). Some of the vehicles using South Royal Brougham Way approach the new loop ramp from the south along Third Avenue South instead of turning left at Fourth Avenue South.
- The northbound volumes on First Avenue South between South Atlantic Street and South Royal Brougham Way are expected to increase with the Proposed Action. This is a result of vehicles coming from I-90 and I-5 using South Atlantic Street instead of Royal Brougham Way to head west across the area, before continuing north on First Avenue South.

What are the surface street traffic operation results?

Intersection operation analyses were performed for the AM and PM peak-hour conditions in 2011 and 2030.

What are the predicted intersection performances in 2011?

Exhibits 5-7 and 5-8 show the 2011 intersection levels of service within the stadium area for the No Build and Proposed Action alternatives during the AM and PM peak hours.

Appendices A-9 and A-10 provide more detailed information, including AM and PM peak hour turning movement volumes and LOS results at all studied intersections.

EXHIBIT 5-7. 2011 NO BUILD AM AND PM PEAK HOUR INTERSECTION LOS IN STADIUM FOCUS AREA

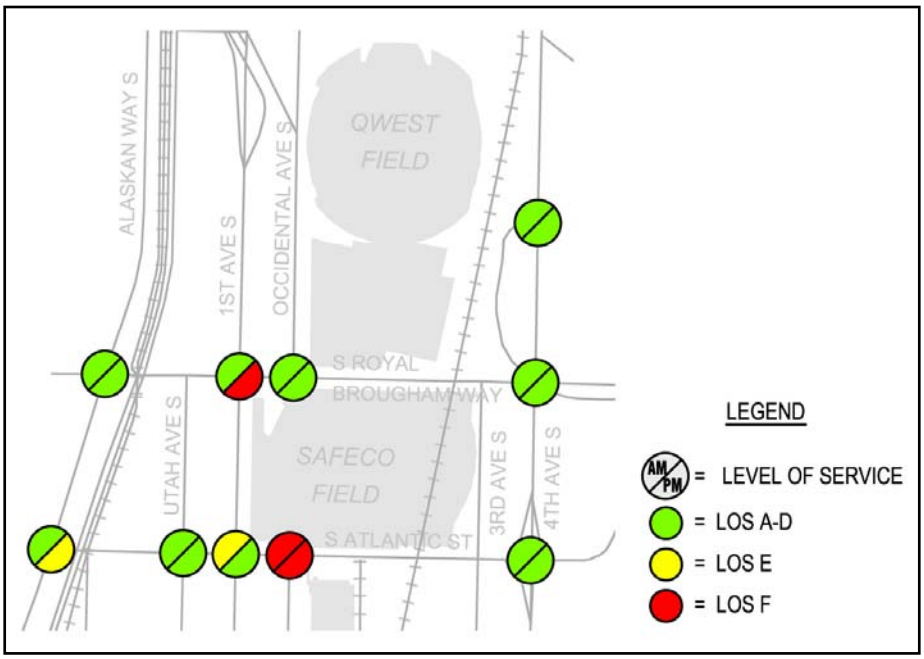
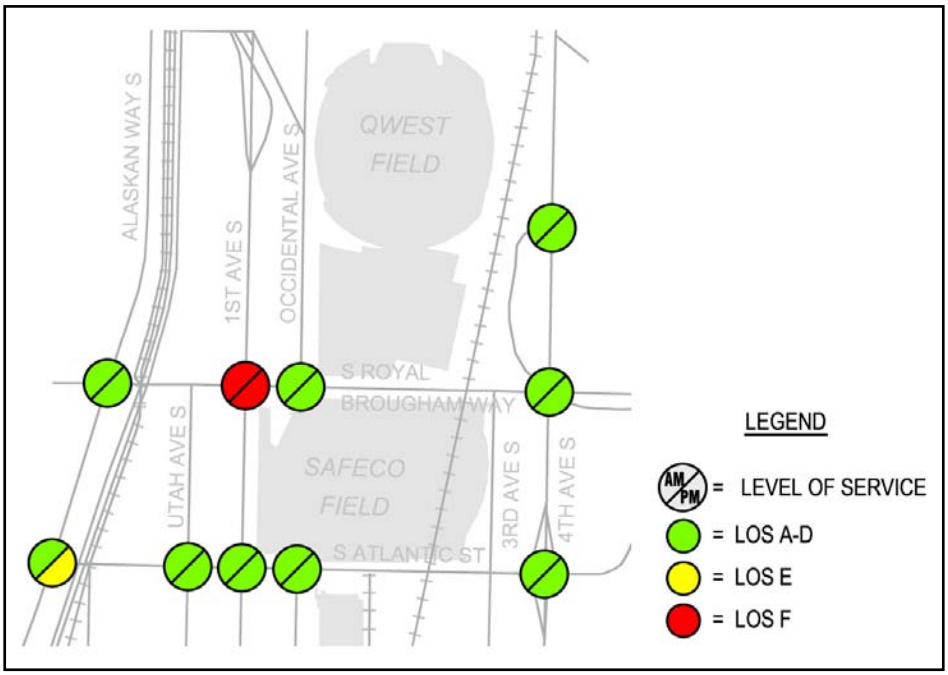


EXHIBIT 5-8. 2011 PROPOSED ACTION AM AND PM PEAK HOUR INTERSECTION LOS IN STADIUM FOCUS AREA



2011 AM Intersection

The new intersection between the proposed I-90 connector and South Atlantic Street is forecasted to operate at LOS B during

the AM peak hour in 2011. The existing off-ramp intersection at Fourth Avenue South would continue to operate at LOS C.

During the 2011 AM peak hour, intersection delays at a number of intersections are shown to improve between the No Build and Proposed Action scenarios.

The intersection of First Avenue South and South Atlantic Street improves from LOS E to LOS D. This result is due to proposed intersection improvements to be constructed as part of the project, changes in travel patterns as a result of the proposed changes to the street system and the re-optimization of signal timing.

The intersection of South Atlantic Street and Occidental Avenue improves from LOS F to LOS C. The improvement can be attributed to the restriction of the stop-controlled northbound to westbound left-turn movement.

During the 2011 AM peak hour, the signalized intersection of First Avenue South and South Royal Brougham Way is anticipated to degrade from LOS D to LOS F under the Proposed Action scenario. This is a result of approximately 325 additional northbound through vehicles on First Avenue South at this location, mainly resulting from the increased use of South Atlantic Street rather than South Royal Brougham Way to travel westbound through the area.

The First Avenue South and South Massachusetts Avenue intersection is anticipated to continue to operate at LOS F without or with the Proposed Action. High delays are expected for stop-controlled approaches off of South Massachusetts onto First Avenue South.

2011 PM Intersection

The new intersection between the proposed I-90 connector and South Atlantic Street is forecasted to operate at LOS A during the PM peak hour in 2011. The existing off-ramp intersection at Fourth Avenue South would continue to operate at LOS D with the Proposed Action.

During the 2011 PM peak hour, intersection delays at the intersection of South Atlantic Street and Occidental Avenue are

shown to improve between the No Build and Proposed Action scenarios. The reasons are similar to those described in the AM peak-hour conditions.

The other study intersection where the LOS is anticipated to improve as a result of the Proposed Action is First Avenue South and South Massachusetts Street (LOS F to LOS E).

At the Alaskan Way/South Atlantic Street intersection, the Proposed Action would increase average delays on the westbound approach to 49 seconds per vehicle; this represents a borderline LOS E/F condition.

During the PM peak hour, the signalized intersection of First Avenue South and South Royal Brougham Way is anticipated to continue to operate at LOS F under the Proposed Action, with an average of approximately 30 seconds of additional delay per vehicle compared to the No Build scenario.

What are the predicted local travel times in 2011?

Exhibit 5-9 shows the 2011 predicted travel times for the No Build and Proposed Action alternatives during the AM and PM peak hours.

EXHIBIT 5-9. PREDICTED 2011 TRAVEL TIMES (IN MIN)

Path	AM		PM	
	No Build	Proposed Action	No Build	Proposed Action
WB I-90 to Waterfront via S Atlantic Street	6.8	4.4	6.1	4.3
EB Waterfront to I-90 EB start via S Atlantic Street	2.6	2.3	2.4	2.7
NB 4th Avenue from S Holgate Street to S Jackson St	3.8	3.5	3.4	3.4
SB 4th Avenue from S Jackson St to S Holgate Street	3.6	3.8	4.1	4.2
NB 1st Avenue from S Holgate Street to S King Street	3.8	3.8	3.6	3.8
SB 1st Avenue from S King Street to S Holgate Street	2.7	2.7	2.7	2.7

The main improvement in travel times resulting from the Proposed Action is the westbound path from the Mount Baker tunnel to the waterfront. The benefits on this path are expected both during the AM and PM peak hours. Reductions of travel times would also be expected during off-peak hours. This path

is especially important for truck traffic coming from the freeways and heading towards the waterfront destinations.

The other paths would not experience any significant changes in travel times between the No Build and Proposed Action alternatives in 2011.

What are the predicted intersection performances in 2030?

Exhibits 5-10 and 5-11 show the 2030 intersection level of service within the stadium area for the No Build and Proposed Action alternatives, respectively for AM and PM peak-hour.

Appendices A-11 and A-12 provide more detailed information, including AM and PM peak hour turning movement volumes and LOS results at all study intersections.

EXHIBIT 5-10. 2030 NO BUILD AM AND PM PEAK HOUR INTERSECTION LOS IN STADIUM FOCUS AREA

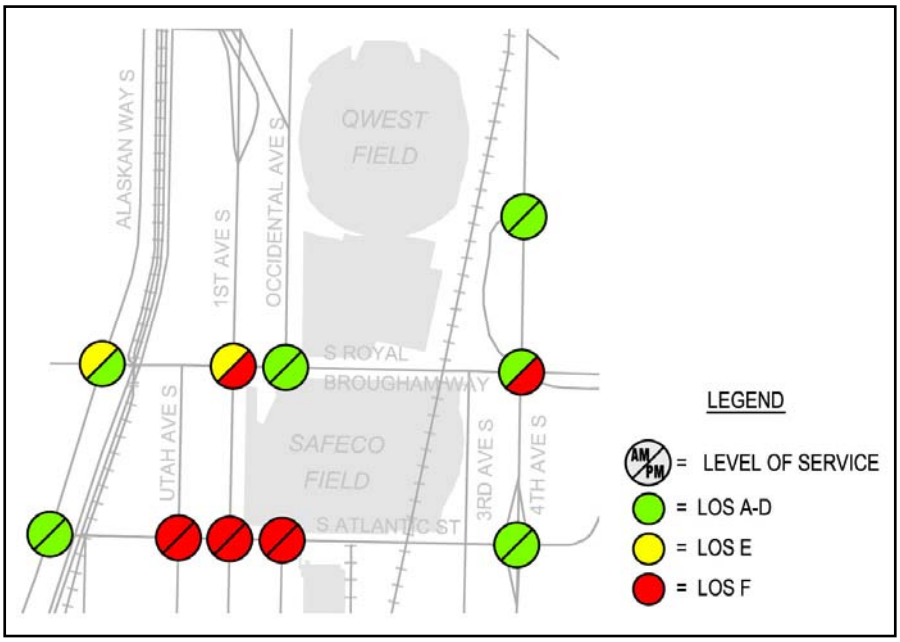
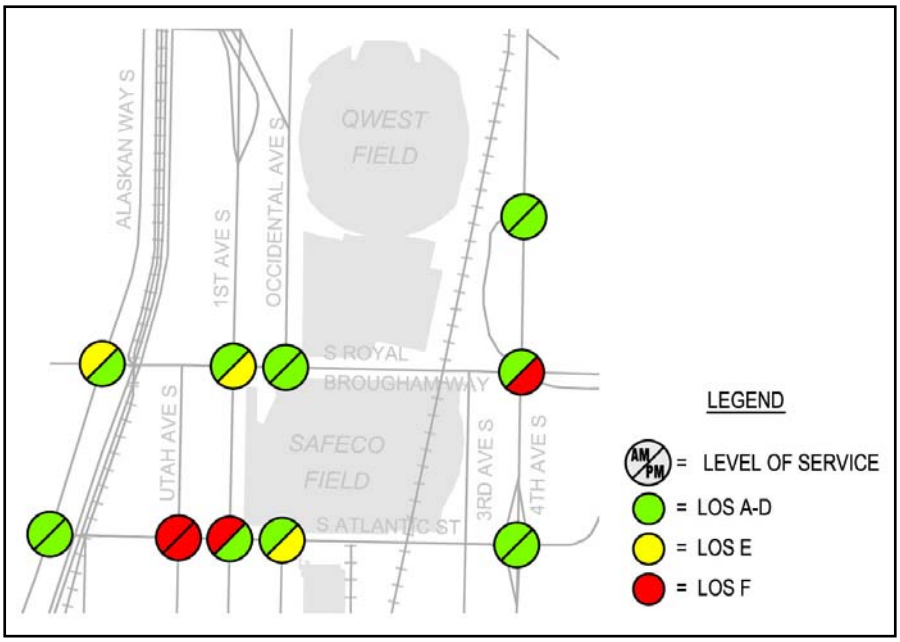


EXHIBIT 5-11. 2030 PROPOSED ACTION AM AND PM PEAK HOUR INTERSECTION LOS IN STADIUM FOCUS AREA



2030 AM Intersection

The new intersection between the proposed I-90 connector and South Atlantic Street is forecasted to operate at LOS B during the AM peak hour in 2030. The existing off-ramp intersection at Fourth Avenue South would improve from LOS D to LOS C with the Proposed Action, reflecting a decrease of traffic volumes through the intersection.

During the 2030 AM peak hour, intersection delays at a number of other intersections are also shown to improve between the No Build and Proposed Action scenarios. The reductions in delay are sufficient to improve the LOS at the following intersections:

- First Avenue South / South Royal Brougham Way (LOS E to LOS D)
- Occidental Avenue South / South Atlantic Street (LOS F to LOS C)
- Fourth Avenue South / South Atlantic Street (LOS C to LOS B)

These improvements can be attributed to a combination of changes in travel patterns as a result of the proposed changes to the street system, intersection improvements proposed to be constructed as part of the Proposed Action, and the re-optimization of signal timing to account for these changes.

The following intersections are anticipated to continue to operate at LOS F during the AM peak hour without or with the Proposed Action:

- First Avenue South / South Atlantic Street
- First Avenue South / South Spokane Street
- Airport Way South / Fourth Avenue South
- Fourth Avenue South / South Spokane Street

With the exception of the First Avenue South / South Atlantic Street intersection, where average intersection delays are reduced from over 300 seconds per vehicle to approximately 95 seconds per vehicle as a result of the Proposed Action, delays at these LOS F locations would not be reduced by the Proposed Action.

2030 PM Intersection

The new intersection between the proposed I-90 connector and South Atlantic Street is forecast to operate at LOS A during the PM peak hour in 2030. The existing off-ramp intersection at Fourth Avenue South would continue to operate at LOS D with the Proposed Action.

During the 2030 PM peak hour, intersection delays at a number of intersections are shown to improve between the No Build and Proposed Action scenarios. The reductions in delay are sufficient to improve the LOS at the following intersections:

- First Avenue South / South Atlantic Street intersection (LOS F to LOS D)
- Occidental Avenue South / South Atlantic Street (LOS F to LOS E)
- First Avenue South / South Royal Brougham Way (LOS F to LOS E)

These improvements can be attributed to a combination of changes in travel patterns as a result of the proposed changes to the street system, intersection improvements proposed to be constructed as part of the Proposed Action, and the re-optimization of signal timing to account for these changes.

At the First Avenue South/South Massachusetts Street intersection, the Proposed Action would increase average delays on the westbound approach to approximately 575 seconds per vehicle; this represents a significant LOS F condition. This intersection is anticipated to operate at LOS F without the Proposed Action, but with significantly shorter delays.

During the PM peak hour, the Fourth Avenue South/South Royal Brougham Way, First Avenue South/South Lander Street, and Fourth Avenue South/South Spokane Street intersections are anticipated to continue to operate at LOS F under the Proposed Action. The Fourth Avenue South/South Lander Street intersection is anticipated to degrade from LOS D to LOS E as a result of the Proposed Action.

What are the predicted local travel times in 2030?

Exhibit 5-12 shows the 2030 predicted travel times for the No Build and Proposed Action alternatives during the AM and PM peak hours.

EXHIBIT 5-12. PREDICTED 2030 TRAVEL TIMES (IN MIN)

Path	AM		PM	
	No Build	Proposed Action	No Build	Proposed Action
WB I-90 to Waterfront via S Atlantic Street	15.3	4.4	7.8	5.3
EB Waterfront to I-90 EB start via S Atlantic Street	2.0	2.3	2.3	3.2
NB 4th Avenue from S Holgate Street to S Jackson St	4.5	4.4	4.2	3.6
SB 4th Avenue from S Jackson St to S Holgate Street	4.2	4.1	7.8	7.7
NB 1st Avenue from S Holgate Street to S King Street	6.2	4.0	4.7	4.0
SB 1st Avenue from S King Street to S Holgate Street	13.5	3.5	10.0	4.5

Travel times in the westbound direction between the freeways and the waterfront are significantly improved with the Proposed Action, especially during the morning peak hour.

Travel times along this path are also expected to be reduced during off-peak periods as a result of the Proposed Action.

The southbound movement along First Avenue South would also be significantly improved as a result of the Proposed Action. Travel times in 2030 from South King Street to South Holgate Street would be reduced from 13.5 minutes to 3.5 minutes in the AM peak hour, and from 10 minutes to 4.5 minutes in the PM peak hour. The northbound movement along First Avenue South would also be improved with the Proposed Action.

Travel times along Fourth Avenue South between South Jackson Street and South Holgate Street would be similar or slightly improved with the Proposed Action.

Eastbound travel times along South Atlantic Street would be slightly increased with the Proposed Action; however, this is not considered a significant impact as the predicted travel times remain close to free-flowing conditions even during commute peak periods.

What effects will the project alternatives have on surface street safety?

With the No Build alternative, the potential for traffic collisions on surface streets is anticipated to increase in the future with the expected increase in traffic volumes. Therefore, it is possible that traffic collisions increase at the following locations where safety hazards have been identified under existing conditions:

- South Royal Brougham Way between First Avenue South and Fourth Avenue South
- South Atlantic Street between First Avenue South and Fourth Avenue South
- South Lander Street between First Avenue South and Fourth Avenue South
- First Avenue South / South Spokane Street intersection
- Fourth Avenue South / South Royal Brougham Way intersection.

Changes in traffic volumes on study area roadways and at study intersection due to the proposed improvement project may result in a change in the occurrence of traffic collisions. There are no formulas that can be applied to forecast where collisions may occur based on changes in traffic volumes. The number, or rate of collisions, could change, especially at congested intersections or roadways, and at those locations where existing safety hazards have been identified.

The Proposed Action introduces a number of roadway and intersection improvements that would eliminate some of the existing design and operation deficiencies within the study area. The proposed improvements are also anticipated to modify existing travel patterns. These factors could result in changes to traffic safety.

Traffic volumes along Fourth Avenue South and at the intersections with South Royal Brougham Way and South Atlantic Street would be reduced as a result of the new ramp connection to South Atlantic Street. This could result in improved safety at these locations as a result of lower traffic volumes and reduced congestion relative to No Build conditions.

In addition, the intersection of Fourth Avenue South and South Atlantic Street would be modified to prohibit the northbound left-turn movement in the Proposed Action. This would reduce the number of potential conflicts at the intersection and reduce traffic volumes and congestion. As a result, it is anticipated that safety at this intersection could be improved relative to No Build conditions.

Traffic volumes at the intersection of South Atlantic Street and First Avenue South are expected to be slightly higher with the Proposed Action. However, the westbound approach is not expected to increase significantly due to the restriction of the northbound left-turn movement at the intersection of Fourth Avenue South and South Atlantic Street. The Proposed Action intersection improvements are forecast to greatly facilitate intersection operations, resulting in a significant reduction in vehicle delays and queuing relative to No Build conditions.

Intersection safety, relative to No Build conditions, could be improved as a result.

Another component of the Proposed Action, the grade separation of South Royal Brougham Way over the BNSF mainline rail tracks (between South Occidental Street and Third Avenue South) would also improve safety relative to No Build conditions.

This connection would enable the at-grade crossing to be closed to both vehicles and pedestrians. This would remove the existing conflicts at this location and result in improved safety associated with the rail crossing. The loop connector would also likely improve safety along South Royal Brougham Way between First Avenue South and Fourth Avenue South as a result of reduced traffic volumes on the surface street, the closure of the rail crossing, and separation of through traffic from pedestrian activity.

One location where safety could potentially be impacted as a result of the Proposed Action is the intersection of South Royal Brougham Way and Occidental Avenue South. The ramps to the new loop ramp are proposed to begin immediately to the east of this intersection. This could result in additional vehicle weaving between First Avenue South and Occidental Avenue South between vehicles using the new ramps and those continuing on the South Royal Brougham Way surface street. It is anticipated that these potential safety impacts could be offset through the implementation of appropriate signage on the approaches to the First Avenue South and Occidental Avenue South intersections with South Royal Brougham Way.

Overall, the improvements identified to be constructed as part of the Proposed Action could have a beneficial effect on safety, especially at the following locations:

- Fourth Avenue South / South Royal Brougham Way intersection
- South Royal Brougham Way between First Avenue South and Fourth Avenue South

- South Atlantic Street between First Avenue South and Fourth Avenue South
- Westbound I-90 Mainline between the Northbound I-5 on-ramp and Fourth Avenue South.

3 How would the project affect traffic and parking management during events?

To understand future event traffic and parking conditions, a meeting was held with interested parties, including representatives from Safeco Field, Qwest Field, the Port of Seattle, the Seattle Police Department, WSDOT, and the City of Seattle.

To determine how the project would affect traffic and parking during events, two different types of events were considered: major sporting events and flat trade shows. It was assumed that event characteristics would remain the same in the future as existing, with the majority of baseball games occurring during the weekday PM peak hour of traffic and most of the football games occurring on a Sunday, with some affecting weekday PM peak hour traffic. Flat trade show characteristics were also assumed to remain the same as existing, with the shows being open all day on weekdays and/or weekends, depending on the timing of the show.

How would the project affect parking availability during events?

Under event conditions, the parking supply will be similar to what it is currently, with the exception of some eliminated parking on First Avenue South and Third Avenue South. For sporting events, Occidental Avenue South is anticipated to be closed from South King Street to South Royal Brougham Way and from South Atlantic Street to South Massachusetts Street. Railroad Avenue South is anticipated to be closed from Occidental Avenue South to First Avenue South. All of these street closures are consistent with existing street closures for sporting events. For flat shows, no street closures are anticipated; therefore, no additional parking supply would be removed. In addition, all of the parking garages in the area

would be operational and are anticipated to have the same supply as under existing conditions.

Under future non-event conditions, parking which is currently available along both sides of Third Avenue South would be removed from just north of the South Atlantic Street overpass to South Royal Brougham Way. This equates to roughly 40 spaces. Parking along a portion of First Avenue South, north of South Atlantic Street, would also be removed, a total of approximately 10 spaces. This is a total of approximately 50 spaces of parking which will be removed by the project. Section 5-8 and Exhibit 5-20 provide more detail on future non-event parking conditions.

How would the project affect garage access and egress during events?

The three major parking facilities in the area are the Safeco Field garage, the Qwest Field Event Center garage, and the North Stadium parking lot. Exhibits 5-13 and 5-14 show potential ingress and egress routes for the main parking facilities.

Under the Proposed Action event conditions, the Safeco Field garage would have improved safer access from the westbound direction off South Atlantic Street, with the addition of a left turn pocket. Eastbound access remains unchanged. The new I-90 off-ramp will help facilitate the ingress movements from the freeways. The addition of a left-turn lane along South Atlantic Street for westbound vehicles to turn into the Safeco Field garage will assist the vehicles coming from I-90. Egress will also be very similar to the current conditions, with vehicles exiting the garage onto South Atlantic Street and South Massachusetts Street and directed southbound on First Avenue South, north- or southbound on the Alaskan Way Viaduct, and east toward the freeways.

EXHIBIT 5-13. 2030 PROPOSED ACTION EVENT INGRESS ROUTES

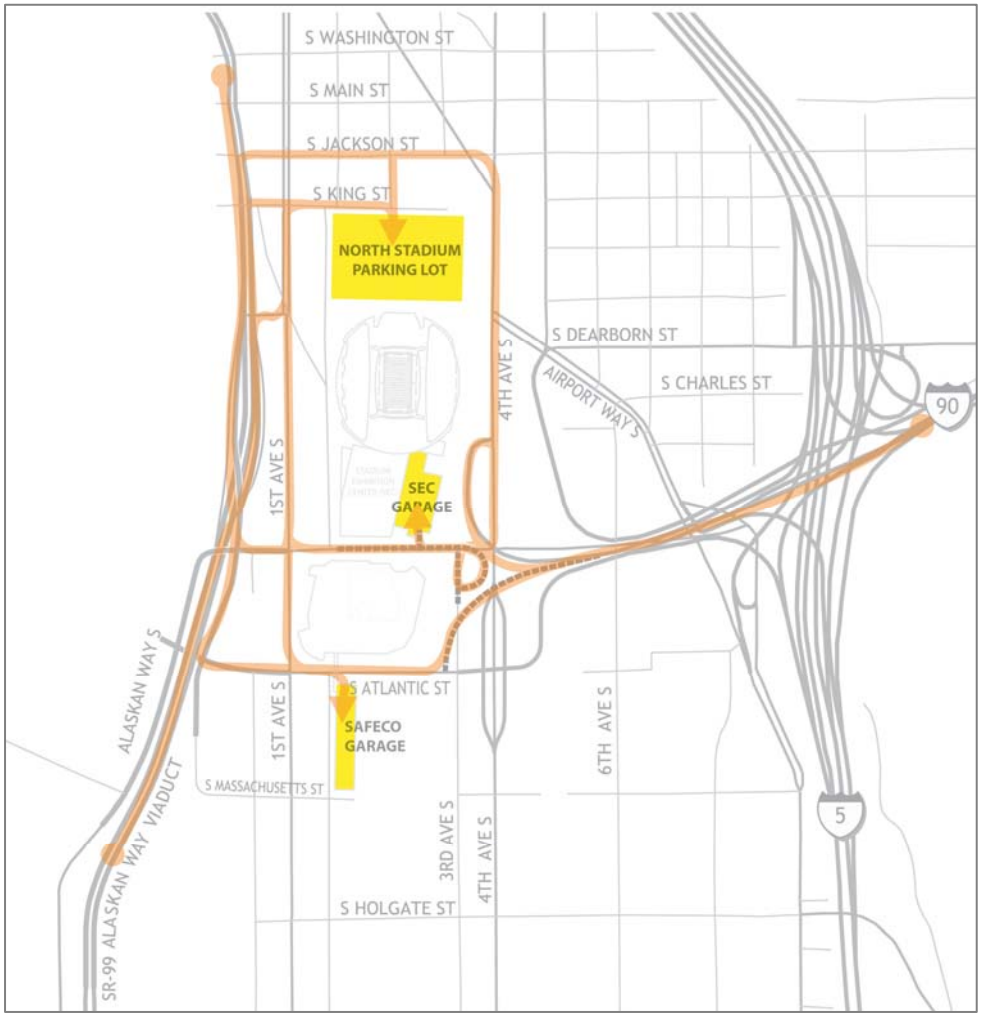
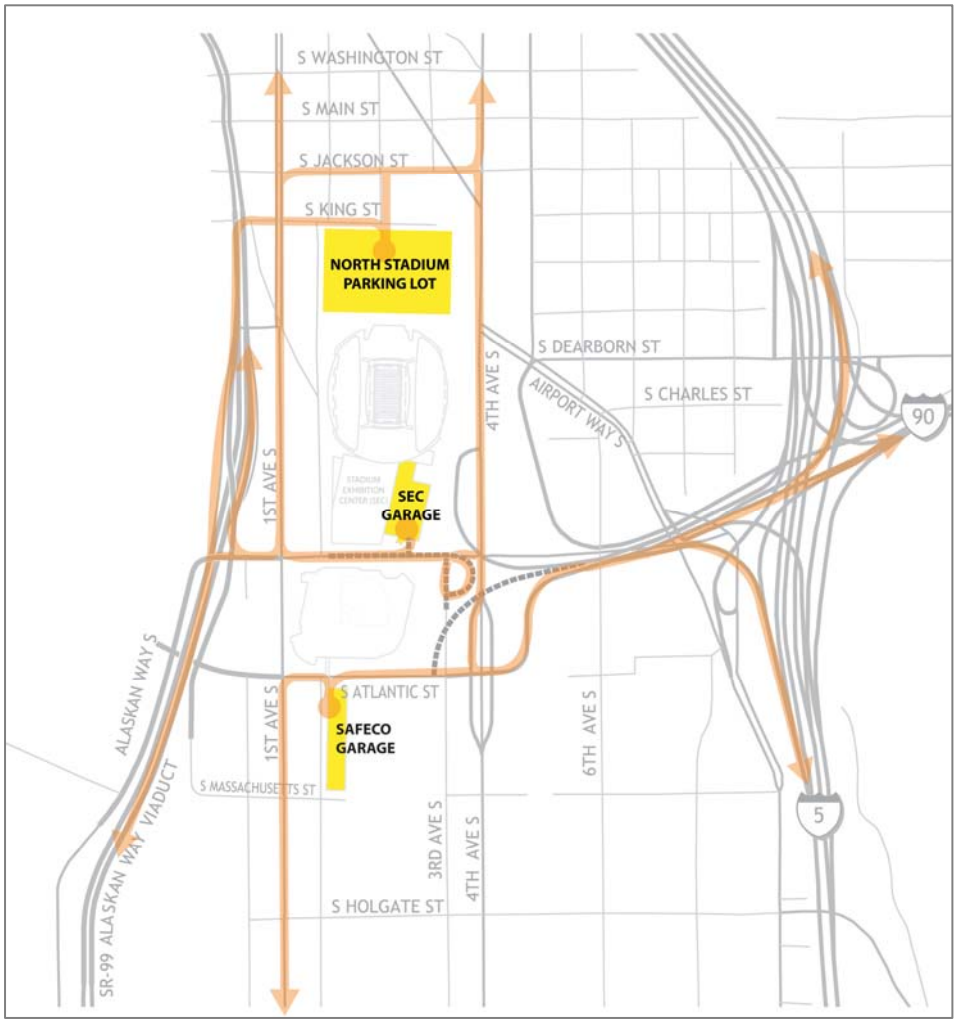


EXHIBIT 5-14. 2030 PROPOSED ACTION EVENT EGRESS ROUTES



For the Qwest Field parking garage, access would continue to be provided off of South Royal Brougham Way, with the main access point shifting to an elevated garage entrance on the second level. Vehicles would use the new ramp structure on Third Avenue South to access the main entrance, while vehicles coming from the Alaskan Way Viaduct or First Avenue South could still access the garage via the ground level entrance along South Royal Brougham Way. Egress would be similar to ingress, with the main exit point off of the second level onto the elevated structure. Vehicles exiting from the ground-level entrance would be required to travel westbound on South

Royal Brougham Way, then directed northbound onto First Avenue South or onto the Alaskan Way Viaduct. Vehicles exiting from the 2nd level would most likely be required to travel eastbound on the ramp and then onto Fourth Avenue South toward the freeways or westbound onto South Royal Brougham Way

The North Stadium Lot's main access point is along South King Street, and it is assumed to remain there in the future. Event traffic would most likely use First and Fourth Avenues to travel both to and from an event. Past these streets, vehicles would likely come from or merge onto the Alaskan Way Viaduct, I-5, or I-90.

Garage access routing will vary due to event attendance and start times. Potential ingress and egress routes and traffic control measures during events are discussed under the mitigation section.

4 How would the project permanently affect truck operations?

What is the expected growth of truck traffic through the area?

Future truck volumes in the study area were estimated separately for truck traffic generated by the Port of Seattle and other trucks. For the Port of Seattle truck traffic, the forecast was based on a memorandum prepared for the POS in 2005 (Heffron Transportation, 2005). The POS long range forecast assumes that regional truck traffic generated by the Port of Seattle would grow at about 2.0 percent per year between 2015 and 2030. This is lower than the rate of growth expected between 2002 and 2015 (3.0 percent). These growth rates were applied to estimates of existing truck traffic volumes generated by the POS. A recent study conducted by the Port of Seattle (Heffron Transportation, 2003) provided an estimation of the average daily truck trips generated by the Port container terminals. This study also provided a distribution of the POS truck trips in the study area, including freeway sections and surface streets.

Truck traffic not generated by the Port of Seattle was assumed to grow at the same rate as the general traffic through the area.

How would the project affect truck routes?

The Proposed Action (SR 519 Intermodal Access Project – Phase 2: South Atlantic Corridor) would complete the SR 519 project by providing a direct westbound connection from the I-5/I-90 freeway system to the Seattle waterfront and Port of Seattle. Currently, westbound traffic from the freeway exits at Fourth Avenue South and has a circuitous route to South Atlantic Street to safely cross over the BNSF Railway tracks located just east of Safeco Field and Qwest Field.

Previous Exhibit 2-3 illustrates the westbound route options between I-90 and First Avenue South with the Proposed Action.

With the Proposed Action, the primary westbound truck route to the waterfront would be through the new South Atlantic Street connector and along South Atlantic Street via the improved intersection at First Avenue South. This provides a direct and efficient connection from I-90 to the waterfront and Terminal 46.

A secondary route via the new loop ramp and elevated structure on South Royal Brougham Way is also available to travel westbound from the freeway to the waterfront. This route would also be grade separated at the railroad crossing and offers an alternative to the primary route via South Atlantic Street. However, it is a circuitous route with a series of tight turns and the uphill loop ramp.

The eastbound travel route between the waterfront and I-90 is not modified by the Proposed Action and remains primarily via South Atlantic Street.

How would the project affect truck operations, travel times and truck queuing?

The Proposed Action primarily affects truck movements in the westbound direction between I-90 and the waterfront. Other truck routes are also affected, including the eastbound direction across the study area, as well as the First Avenue South and Fourth Avenue South corridors.

The primary route via the new South Atlantic connector would make it faster to reach the waterfront from I-90 during peak commute hours, as well as during the rest of the day. The Proposed Action creates a shorter and more direct connection, and also reduces the amount of queuing and delays at intersections.

In the No Build scenario, queues in 2030 on the I-90 off-ramp at Fourth Avenue South are expected to reach 2,600 feet in the AM peak hour and 1,200 feet in the PM peak hour. With the Proposed Action, expected queues at the new intersection with South Atlantic Street are not expected to exceed 300 feet. The predicted truck percentage anticipated on the new South Atlantic Corridor ranges from 6% to 9% in the AM and PM peak hours, respectively.

Improvements at the intersection of First Avenue South and South Atlantic Street are also contributing to better truck performances in the westbound direction in 2030. In the No Build alternative, the westbound through movement would be expected to fail (LOS F) with average vehicle delays of 1,350 seconds in the AM peak hour, and 360 seconds in the PM peak hour. With the Proposed Action, the westbound through movement is expected to perform at an acceptable level of service, during peak and off-peak hours.

These improvements would result in reduced travel times for truck traffic traveling westbound between I-90 and Terminal 46. In 2030, the travel time from the Mount Baker tunnel to Terminal 46 is expected to improve with the Proposed Action from 14 minutes to 4.4 minutes during the AM peak hour, and from 7.4 minutes to 5.3 minutes during the PM peak hour.

In the eastbound direction, the 2030 travel times from the waterfront to the I-90 on-ramp at South Atlantic Street are shown to slightly increase with the Proposed Action: 2.3 minutes compared to 2.0 minutes during the AM peak hour, and 3.2 minutes compared to 2.3 minutes during the PM peak. This result is due to the optimization of signal timings which adversely affect the eastbound direction. However, this is not considered a significant adverse impact as the expected travel

times remain close to those experienced under free-flowing conditions.

The southbound movement along First Avenue South would be significantly improved as a result of the Proposed Action. Travel times in 2030 from South King Street to South Holgate Street would be reduced from 13.5 minutes to 3.5 minutes in the AM peak hour, and from 10 minutes to 4.5 minutes in the PM peak hour. The northbound movement along First Avenue South would also be improved with the Proposed Action.

Travel times along Fourth Avenue South between South Jackson Street and South Holgate Street would be similar or slightly improved with the Proposed Action.

How would the project affect the ability to handle large size vehicles?

The proposed I-90 connector to South Atlantic Street is designed to accommodate the largest Interstate Semitrailer WB-67 vehicles.

For the loop ramp and elevated structure on South Royal Brougham Way, the Intermediate Semitrailer WB-50 is used for preliminary design. Single unit (or delivery) trucks, medium trailers and buses could maneuver the loop ramp of South Royal Brougham. The majority of freight movements is expected to use South Atlantic Street to access the Port of Seattle facilities. Semi-trailer trucks could use the ramp and elevated structure; however, they may interfere with the bicycle lane.

The most commonly used vehicle by the Port of Seattle is a Semitrailer WB-62, which is slightly shorter than the WB-67 and has a smaller offtracking and swept path when making a turn. The bridge structure has been designed for a WB-50 design vehicle but would accommodate a WB-62 and therefore restrictions would not be required or could be evaluated based on expected travel patterns.

How would the project affect the ability to handle hazardous material cargo?

The Proposed Action would not require any restrictions regarding transportation of hazardous material.

5 How would the project permanently affect rail operations?

What is the expected growth of rail passenger and freight traffic?

Several important changes to the railroad system are anticipated independently of the proposed SR 519 project:

- Grade separation of the existing at-grade crossing on South Lander Street between First Avenue South and Fourth Avenue South
- It is assumed that closure of the existing at-grade railroad crossing will occur on South Holgate Street between Occidental Avenue South and Fourth Avenue South.

The transportation analysis for 2011 assumes that the grade separation at South Lander Street is completed. The 2030 analysis assumes that both projects are completed.

The area is anticipated to experience a significant growth of passenger rail operations. By the end of 2008, Sound Transit Commuter Rail between King Street and Tacoma will be expanded to provide nine northbound trips and nine southbound trips. It is anticipated that approximately 20 Sound Transit trains will cross South Royal Brougham Way during the weekday AM peak period. During the weekday PM peak period, approximately 18 crossings are anticipated.

Amtrak passenger rail service through the study area is also anticipated to increase by 2011. The service is expected to increase to seven southbound and six northbound trains per day in 2011.

Passenger rail speeds in the vicinity of the South Royal Brougham Way crossing will be increased to 25 mph by 2011. While the number of crossing closures is anticipated to

increase, assuming that average train length does not increase, each crossing closure will be of shorter duration than in existing conditions due to increased train speed. No additional increases to passenger rail speed are anticipated between 2011 and 2030.

BNSF predicts annual growth in freight rail service or traffic through the study area of between five and ten percent per year. This equates to an annual increase of two to three trains. By 2030, approximately 100 freight trains are anticipated to cross South Royal Brougham Way during a typical weekday. A proportional increase in peak period freight activity is expected to occur, with up to eight trains crossing South Royal Brougham Way during the morning and afternoon peak hours.

What is the expected number of railroad crossing closures in 2011 and 2030?

With the Proposed Action, the South Royal Brougham Way mainline crossing would be grade separated. Therefore, there would not be any crossing closures at this location. Closures of the tail track grade-crossing will be the same in the Proposed Action and No Build alternatives.

In the No Build alternative, the number of railroad crossing closures would increase in the future at the South Royal Brougham Way and at the tail track crossings. Exhibit 5-15 shows the number and duration of closures expected at the South Royal Brougham Way crossing on a typical weekday and during the morning (7 am to 9 am) and afternoon (4 pm to 6 pm) peak periods. The table also indicates the percentage of blockage time for each time period.

EXHIBIT 5-15. 2011 AND 2030 SOUTH ROYAL BROUGHAM WAY CROSSING CLOSURES

Year	Daily	AM Peak (7–9)	PM Peak (4-6)
2011	160 minutes total (11% of time)	21 times 33 minutes total (28% of time)	19 times 24 minutes (20% of time)
2030	300 minutes total (21% of time)	25 times 40 minutes total (33% of time)	21 times 30 minutes total (25% of time)

Closures of the tail track crossings, while not as frequent as closures of the mainline crossings, are also anticipated to increase in proportion to freight rail using the mainline. As such, an increase in tail track crossing closures of approximately 25 percent is anticipated by 2011. By 2030, the expected increase in tail track crossing closures is approximately 150 percent, relative to existing conditions. However, the duration of the crossing closures is not anticipated to change as a result of the increased activity, with closures of up to 20 minutes.

What are the expected railroad crossing delays in 2011 and 2030?

Under the Proposed Action, the South Royal Brougham Way mainline crossing will be grade separated. Therefore, no vehicle delay will be incurred at this location as a result of mainline rail activity. Delays at the tail track grade-crossing will be the same as reported for the No Build conditions.

The methodology used to estimate existing vehicle delays at railroad crossings was applied to future conditions to analyze the impact of the No Build alternative.

Exhibit 5-16 summarizes the expected delays at the South Royal Brougham Way at-grade railroad crossings in the AM and PM peak hours under the No Build Alternative. Indicated delays represent the average delay per vehicle for both directions and the total delay during each peak hour.

EXHIBIT 5-16. 2011 AND 2030 SOUTH ROYAL BROUGHAM WAY CROSSNG DELAYS

Year	AM Peak Hour	PM Peak Hour
2011	32 seconds per vehicle 7.2 vehicle - hours	22 seconds per vehicle 4.9 vehicle - hours
2030	35 seconds per vehicle 8.0 vehicle - hours	27 seconds per vehicle 6.2 vehicle - hours

How would the project affect safety of railroad crossings?

The Proposed Action introduces a grade separation at the South Royal Brougham Way mainline crossing. It removes the

conflicts between trains and vehicles or pedestrians at the mainline crossing.

Safety associated with the tail track grade-crossing would be the same for the Proposed Action and the No Build alternative.

In the No Build scenario, safety conditions at the South Royal Brougham Way at-grade rail crossing are expected to degrade relative to existing conditions, due to the following factors:

- Increased vehicular traffic on South Royal Brougham Way
- Increased pedestrian volumes on South Royal Brougham Way
- Increased number of crossing closures
- Increased train speed.

Increased congestion on the surface street system as a result of increased traffic volumes throughout the study area, combined with more crossing closures and higher train speeds, would likely result in an increase in rail-related collisions at this location.

6 How would the project permanently affect pedestrian and bicycle circulation?

In the future, pedestrian and bicycle circulation is expected to increase, per the improvements suggested in the *Seattle Bicycle Master Plan* (Toole Design Group, 2007). One of the major improvements affecting the project area will be the connecting of segments of the Mountains to Sound Greenway. The project will not cause many changes to pedestrian and bicycle circulation. Both pedestrians and bicyclists will still be able to move east-west along South Royal Brougham Way using the new facilities described below.

What are the new proposed bike and pedestrian facilities?

The proposed bike and pedestrian facilities consist mainly of new elevated ramp structures along South Royal Brougham Way, (shown in Exhibit 5-17a), crossing over Third Avenue South and the railroad tracks. One of the ramps will be used for

vehicular traffic, with designated bike lanes next to motorized travel lanes (shown in Exhibit 5-17b); the other ramp will be adjacent to the first, and used only by pedestrians. A staircase will be located on the south side of the ramps and west of the railroad tracks, leading from the ground level up to the pedestrian structure. There will also be an elevator just south of the staircase which will provide pedestrian access to the ramp. The pedestrian ramp will touch down on the southwest corner of the Fourth Avenue South/South Royal Brougham Way intersection, as well as having a small ramp leading south to the vehicular ramp touchdown along Third Avenue South. At this touchdown there is a crosswalk for pedestrians to travel south across travel lanes leading up to the vehicular structure. The bicycle lanes follow vehicular travel lanes leading north on the surface of Third Avenue South. There will be a large area at the southwest corner of Fourth Avenue South/South Royal Brougham Way to help accommodate non-motorized traffic associated with events and/or traveling to the Stadium Light Rail station.

There will also be pedestrian improvements at the intersection of First Avenue South/South Atlantic Street. New sidewalks will be added to the east side of the intersection.

What are the expected project impacts on pedestrian safety?

Improved railroad crossing safety

The ramp structure will eliminate potential conflicts between pedestrians/bicycles and the trains using the railroad by grade-separating the two. This is a dramatic increase in safety as the only pedestrian collision resulting in a fatality in the immediate area over the past three years was with a train. Grade-separating the two modes of travel will be particularly valuable for events, as the number of pedestrians significantly increases during those times.

EXHIBIT 5-17A. PROPOSED ACTION PEDESTRIAN LOOP RAMP

EXHIBIT 5-17B. PROPOSED ACTION BICYCLE LANES

What would be the affect at the intersections of South Royal Brougham Way with Occidental Avenue South and First Avenue South?

The intersection of South Royal Brougham Way and First Avenue South will not be changed by this project. Pedestrians and bicyclists will continue to use this intersection as they currently use it. At the intersection of South Royal Brougham Way and Occidental Avenue South, two of the travel lanes that are currently at ground level will travel up the new elevated structure. Crosswalks are planned to remain on all legs of the intersection, enabling pedestrians to cross the intersection when allowed to do so by the traffic signal. Keeping the crosswalk on

the east side of the intersection at the ramp touchdown may present sight issues, and in turn safety issues, for pedestrians crossing South Royal Brougham Way; mitigation measures to address this concern are discussed in section 5-10.

What would be the affect at the loop ramp touch down?
Pedestrians using the elevated structure will be able to come off the ramp at two locations: near the southwest corner of South Royal Brougham Way and Fourth Avenue South and along Third Avenue South where the vehicular ramp structure touches down. When on the elevated structure they will still be separated from vehicles coming off the ramp, so there will be no conflicts with motorized users. Pedestrians can then use the existing crosswalks or sidewalks to travel as they would normally.

Bicyclists will travel along dedicated bicycle lanes and come off the ramp where the vehicular ramp structure touches down, bisecting Third Avenue South. They can then travel north or south in the travel lanes as done currently along roadways surrounding the project site (South Royal Brougham Way, Third Avenue South, and Fourth Avenue South).

What would be the affect at the crossing of the expanded roadway (5-lane) along South Atlantic Street?
The width of South Atlantic Street on the east side of First Avenue South will increase in the Proposed Action by one travel lane, making a total of five lanes for pedestrians to cross. The crossing of this street is normally regulated by the signal and will continue to be with the project. During events, the intersection will be regulated by police control.

Looking at other roadway widths in the area, both First Avenue South and South Royal Brougham Way are seven lanes wide (including parking lanes). Currently, pedestrians and bicyclists are able to safely cross those roadways (at intersections and along crosswalks) both during event and non-event conditions. However, the new configuration of South Atlantic Street and First Avenue South will allow for dual southbound left turns onto South Atlantic Street. This means a higher amount of vehicles will be passing through the intersection, and in turn a

higher amount of potential pedestrian conflicts with the vehicles. This is a potential safety issue.

Another location of concern is along South Atlantic Street at the new I-90 ramp connection. The new I-90 ramp will create a gap in the sidewalk along the north side of South Atlantic Street, which is part of the Mountains to Sound Greenway. This issue with this location revolves around potentially high pedestrian volumes due to the staircase located east of Third Avenue South connecting the elevated South Atlantic Street to the ground-level Fourth Avenue South and the vehicles using the ramp, which will be decelerating from high freeway speeds. A crosswalk is planned to enable pedestrian crossings and keep the Mountains to Sound Greenway connected, however there are still potential conflicts.

7 How would the project permanently affect transit and ferry operations?

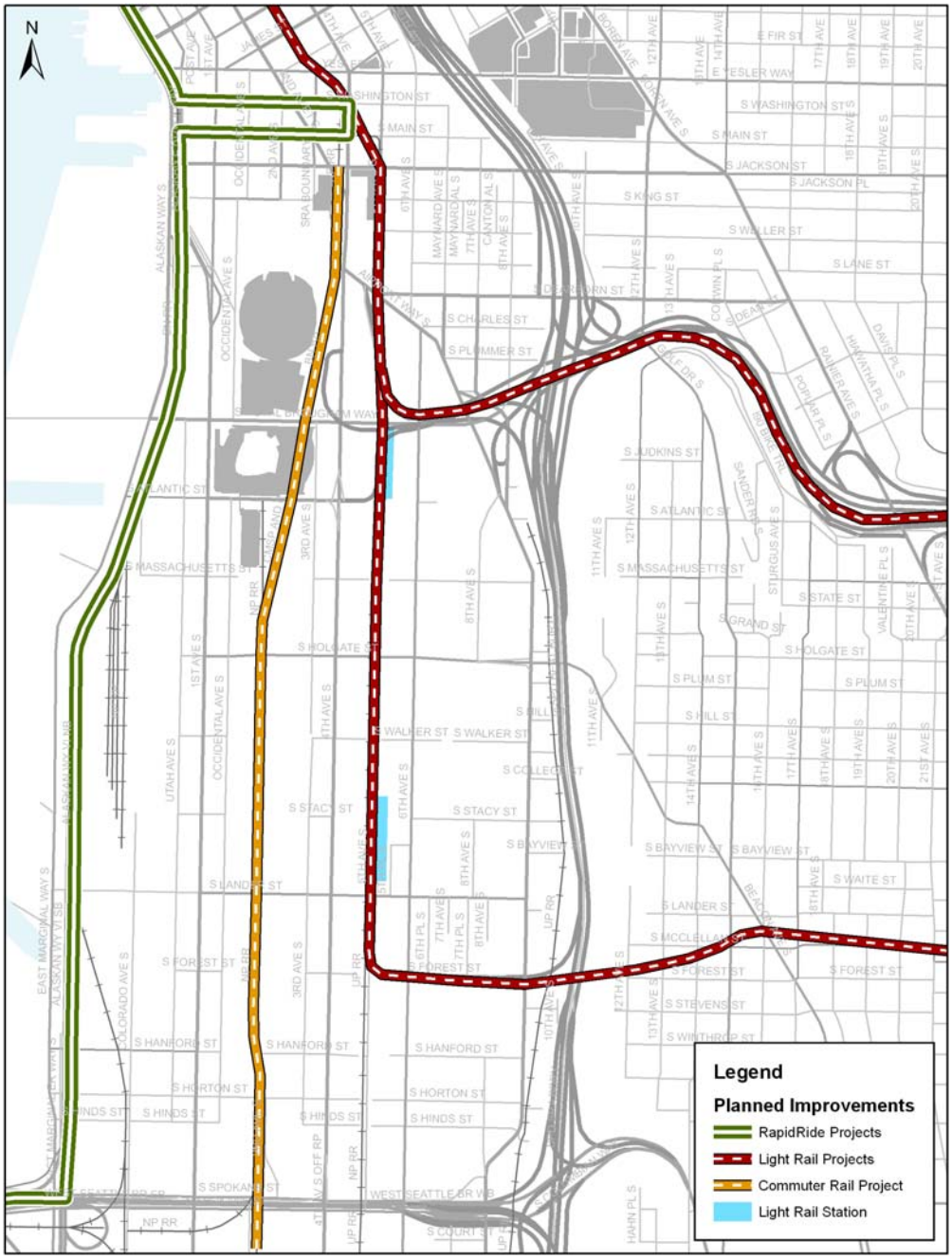
What transit services are assumed in the future?

Major transit projects affecting the area are scheduled to begin operations in 2009. These include the Light Rail, RapidRide, and "Sound Transit 2" projects. When completed, these planned improvements will create a multi-modal transit hub in the study area where local and regional, wheeled and tracked transit modes and bus lines meet to provide greatly improved transit services supported by a strong and reliable transit infrastructure. Exhibit 5-18 shows some of these planned transit improvements.

Light rail

Light rail projects will provide strong transit connections between Seattle (and its downtown) to the regional cities. The Central Link, running from the Sea-Tac airport to Downtown Seattle is expected to begin operations in 2009. It will have two railway stations in the study area: the Stadium station and the SODO station. Proposed extensions to the Central Link include the University Link, (extending from Downtown to the University of Washington), the North Link, (from the University of Washington to Northgate), and the East Link (from Downtown Seattle and downtown Bellevue via I-90).

EXHIBIT 5-18. PLANNED TRANSIT IMPROVEMENTS



Sound Transit 2

If funding is approved, the Sound Transit 2 plan would improve the services of Sound Transit express and transit rail. This plan includes building a new streetcar in Downtown

Seattle, connecting the International District, First Hill and Capitol Hill areas.

How would the project affect transit operations?

Most transit lines operating in the study area use the north-south corridors of First Avenue South and Fourth Avenue South. Only one route (Metro Route 132) uses South Atlantic Street and no transit route uses South Royal Brougham Way. While bus stops are located within the vicinity of the project, no bus stops would require relocation.

The reliability of bus operations is sensitive to delays, especially at intersections. Movements at intersections utilized by buses should be operating at an acceptable level of service (D or better) to avoid buses running behind schedules. The analysis of the project impact on bus operations focused on through movements along the First Avenue South and Fourth Avenue South main transit corridors. Intersection delays for these critical movements were compared between the No Build and Proposed Action alternatives for AM and PM peak periods.

Exhibit 5-19 shows the delay and LOS comparisons by movement for 2030 conditions.

Exhibit 5-19 shows that most of the critical movements which affect buses will experience a reduction in average delay or no difference between the No Build alternative and the Proposed Action.

The only exceptions are the northbound through along First Avenue South near South Royal Brougham Way (for both AM and PM) and the southbound through along Fourth Avenue South (in the AM). In all three cases, the intersections still operate at an acceptable level of service (D or above). In addition, the general travel times along those two corridors either stay the same or improve with the Proposed Action when compared to the No Build (see Exhibit 5-12 for 2030 travel times). While buses may be slightly delayed at certain movements when approaching certain intersections, the overall corridor travel times will not be diminished and in most cases will be improved. The provision of transit priority measures at these intersections should be considered to improve transit operations.

EXHIBIT 5-19. DELAY AND LOS COMPARISON OF CRITICAL BUS MOVEMENTS AT KEY INTERSECTION (NO BUILD VS. PROPOSED ACTION)

Intersection	Critical movement for buses	AM - Average Delay in seconds & (LOS)		PM - Average Delay in seconds & (LOS)		Difference in Delay (P.A. – No Build, in seconds)[1]	
		No Build	P.A.	No Build	P.A	AM	PM
1st Ave /Royal Brougham W	NB through	26 (C)	33 (C)	16 (B)	30 (C)	7	14
	SB through	39 (D)	39 (D)	118 (F)	98 (F)	0	-20
1st/Atlantic	NB through	223 (F)	145 (F)	78 (E)	49 (D)	-78	-29
	SB through	51 (D)	39 (D)	124 (F)	51 (D)	-12	-73
4th Ave/Royal Brougham W	NB through	18 (B)	15 (B)	21 (C)	21 (C)	-3	0
	SB through	33 (C)	43 (D)	144 (F)	116 (F)	10	-28
4th Ave/ I-90 off ramp	NB through	43 (D)	33 (C)	24 (C)	20 (C)	-10	-4
	SB through	35 (C)	20 (C)	49 (D)	48 (D)	-15	-1

1. Negative number indicates lower delay in Proposed Action. Positive number indicates lower delay in No Build alternative.

How would the project affect access to transit facilities?

Several Metro and Sound Transit buses have route layovers (where buses wait until their next route run begins) at the Central Base, Atlantic Base, or on Sixth Avenue South. All of these buses use South Royal Brougham Way to get to these layover locations. South Royal Brougham Way provides employee access to the Metro employee parking garage and is used for some bus road relief trips. The elevated South Royal Brougham Way will continue serving those trips to and from the bases and Sixth Avenue South, especially in the absence of an alternative route (South Lander and South Jackson Streets are the closest east-west corridors with the future closure of South Holgate Street). It is important that bus access to South Royal Brougham between First and Fourth Avenue be maintained.

The grade separation over the railroad tracks contributes to eliminating delays associated by train conflicts. However, the

design of the new roadway with its increased grade and loop ramp is less conducive to bus travel, and may offset some of the travel time benefits. The decline of intersection performances at the intersection of First Avenue and South Royal Brougham Way (in the 2011 scenario) may also affect travel times on this roadway segment.

The Proposed Action will also impact the parking area of Ryerson Base, within which one off-ramp column will be located in the parking area. As a result, there will be a permanent reduction in parking capacity of two to four parking spaces. The Proposed Action is not anticipated to impact circulation within any of the bus bases.

Also, access to the bases from northbound I-5 will require a more circuitous routing or getting off at a different exit since traffic is forced to use the new connector to South Atlantic Street.

How would the project affect transit services and operations during events?

The project will have some impact on the staging plan of buses during sporting events. The current staging plan of the transit buses for Qwest Field events will be less sensitive to changes from the Proposed Action than the staging plan for Safeco Field events, as most of the Qwest Field boarding locations are positioned along Fifth Avenue South and First Avenue South. These boarding locations serve the Eastside and Northgate directions and are relatively far from the project site. The boarding locations at Third Avenue South that serve remote areas toward the south (Kent and Federal Way), will not be affected by the at-grade closure of South Royal Brougham Way, and buses will remain able to access the South Royal Brougham Way and Fourth Avenue South intersection.

The transit staging plan for Safeco events will be partially affected by the project, namely the boarding locations at South Royal Brougham Way that serve park-and-ride lots toward the south (Kent, Renton, Tukwila, Federal Way, Star Lake and Des Moines). Buses at this location will no longer be able to access

Fourth Avenue South and will need to be relocated to Third Avenue South or possibly onto the new ramp structure.

The other boarding locations at First Avenue South and Occidental Avenue South that serve the Eastside, Downtown Seattle, and Northgate areas will not be affected by the project and therefore need no relocation.

King County Metro currently uses Third Avenue South as a layover facility for special event buses. Loss of any of this special event bus staging area would be a very significant impact. If any layover spaces are lost, coordination with Metro will be required to identify other sites for temporary layover staging, either along Third Avenue South or elsewhere.

Event-day Sounder service will be positively impacted by the Proposed Action as trains will not be crossing an active roadway. The light rail service will not be permanently impacted by the Proposed Action.

Immediately following a major event, transit movements will continue to be impacted at the intersection of Fourth Avenue South and South Royal Brougham Way, due to the conflicts between pedestrian crossings on the south side of the intersection and the flow of traffic exiting from the Qwest Field Event Center Garage.

How would the project affect access to the Colman Dock ferry terminal?

The signed route from I-90 to the ferry terminal is currently via Fourth Avenue South, South Atlantic Street and Alaskan Way South. In the No Build alternative, access route would remain unchanged, and the westbound travel time between I-90 and the waterfront is expected to increase significantly during the morning peak hour.

With the Proposed Action, the signed westbound route from I-90 to the ferry terminal will be via the new Atlantic ramp connector providing a shorter and more direct access to South Atlantic Street. As a result, the travel time between I-90 and the waterfront (including Colman Dock) will be reduced as a direct effect of the project. Exhibit 5-12 indicates that travel times

from I-90 to the waterfront are reduced during the AM and PM peak hours. Travel times during off-peak hours are also expected to be reduced as the travel distance is reduced.

During events, access to South Atlantic Street westbound may be restricted to better manage traffic getting in and out of the parking facilities. Specific traffic management plans have not been developed at this stage. If needed, event traffic control may be implemented before or after events at the intersection of the new I-90 connector with South Atlantic Street: non-event traffic (including ferry terminal traffic) may be allowed on South Atlantic Street or redirected to proceed north or south along Fourth Avenue South and use South Jackson Street or South Lander Street to travel westbound.

8 How would the project permanently affect parking?

The No Build Alternative in this project assumes several areas currently occupied by parking would have a different land use in the future. These areas include the northern half of the large parking lot north of Qwest Field, the parking lot located on the southwest corner of First Avenue South and South Atlantic Street, and the WOSCA site west of Qwest Field, north of South Royal Brougham Way and east of SR 99. The effect of developing these sites and the amount of parking impacted is not known at this time.

How would the project affect parking supply?

The on-street parking permanently affected by the project is along the west side of First Avenue South near South Atlantic Street and along Third Avenue South from South Royal Brougham Way to just north of South Atlantic Street. Exhibit 5-20 shows the estimated reduction in parking supply between No Build and Proposed Action conditions.

As Exhibit 5-20 shows, the on-street parking supply is reduced by approximately 50 spaces, for a total of roughly 560 spaces available for use with the Proposed Action. This calculation assumes that the perpendicular parking along the west side of Third Avenue South will become parallel parking along the

portions of the roadway. By switching from perpendicular to parallel parking, enough roadway should be available to enable two travel lanes on Third Avenue South.

EXHIBIT 5-20. 2030 PROPOSED ACTION - ESTIMATED REDUCTION IN ON-STREET PARKING SUPPLY[1]

Street	Street Side	Limits	Supply (spaces)[2]
No Build Total			**610**
1st Avenue S	West	S Royal Brougham Way to S Massachusetts St	-10
3rd Avenue S	East	S Royal Brougham Way to S Massachusetts St	-20
3rd Avenue S	West	S Royal Brougham Way to S Massachusetts St	-20
Proposed Action Total			**560**

1. Parking supply was estimated using previous studies and aerial images.
2. Supply is in number of parking spaces and is rounded to the nearest five.

Off-street parking supply is not permanently affected by the Proposed Action, however access to major off-street parking facilities is affected. As discussed under event conditions, the main entrance to the Qwest Field parking garage will be on the second level, along the new elevated structure over South Royal Brougham Way. Access to South Royal Brougham Way at ground level will still exist from the garage, though vehicles will be directed westbound toward First Avenue South and Alaskan Way South. The Safeco Field garage will have the same access, with the addition of a westbound left turn lane along South Atlantic Street to reduce delay due to vehicles turning into the garage. Finally, access to the North Stadium parking lot is not expected to change with the Proposed Action.

9 How would project construction temporarily affect transportation in the study area?

This section provides a qualitative discussion on what the major issues pertaining to construction activities are, and what actions should be taken in order to manage those issues and minimize their impact on commuters.

The Proposed Action was subject to an analysis evaluating the potential effects of construction work on the freeway system and local streets. The analysis includes a qualitative assessment of the impact of construction on the general traffic operations, including potential road closures. The following issues are addressed for the Proposed Action:

- Construction phasing plan
- Operational needs of different parties during construction
- Construction duration and work hours
- Identification of potential temporary or permanent road and lane closures
- Potential hauling routes for construction traffic
- Estimates of the potential effects on local and regional transportation operations.

The potential effects of construction on traffic are qualitatively assessed for the critical travel period considered in the traffic analysis (the AM and PM peak hour of typical weekday traffic). The City of Seattle would expect to manage and control project traffic closures through its regulatory permit authority. It is anticipated that certain provisional partial or full road closures might occur at night when traffic is light. However, the effects of these closures on traffic are considered secondary and managed by standard detour measures and, therefore, are not evaluated in this section.

Since under the No Build Alternative there would be no construction, the following sections describe the construction-related impacts of the Proposed Action only.

Construction Phasing

The project construction is currently planned to proceed as follows:

- Stage 1: Improvements to the intersection of First Avenue South and South Atlantic Street would be completed first, with construction starting in the third quarter of 2009 and lasting approximately 9 months.

- Stage 2: Construction of the new I-90 ramp connection to South Atlantic Street would last approximately 15 months, and begin as improvements to the intersection of First Avenue South and South Atlantic Street are underway.
- Stage 3: Construction of the new South Royal Brougham Way elevated ramp structure would last approximately 20 months, and may begin at the conclusion of construction activities at First Avenue South and South Atlantic Street. It is possible that South Royal Brougham Way will remain partially open throughout most of the construction activities.

Construction Duration and Work hours

Construction of the SR 519 Phase 2 project would last approximately 30 months starting summer 2009. The major project preparation and implementation milestones are:

- April 2008: Completion of environmental documentation.
- April 2008: Begin preparation of construction plans.
- Summer 2009: Construction begins.
- Year 2012: Constructional project elements are operationally complete and open to traffic.

Construction activities on roads could occur regularly between 7:00 am to 7:00 pm on weekdays based on a coordinated decision between WSDOT and the City of Seattle. Since the project area is dominantly a non-residential zone, site work could continue at night when tasks need to be accelerated. However, there are still some noise-sensitive receptors in the area (e.g. Silver Cloud) that could pose an issue for nighttime construction. Off-site and other ancillary works that do not result in any inconvenience could be performed on weekends.

What routes would be affected by the construction of the Proposed Action?

During the 30 months of construction work, construction trucks will be continuously delivering construction materials and removing construction waste, thereby increasing truck

movement on the surrounding street network, as well as safety concerns.

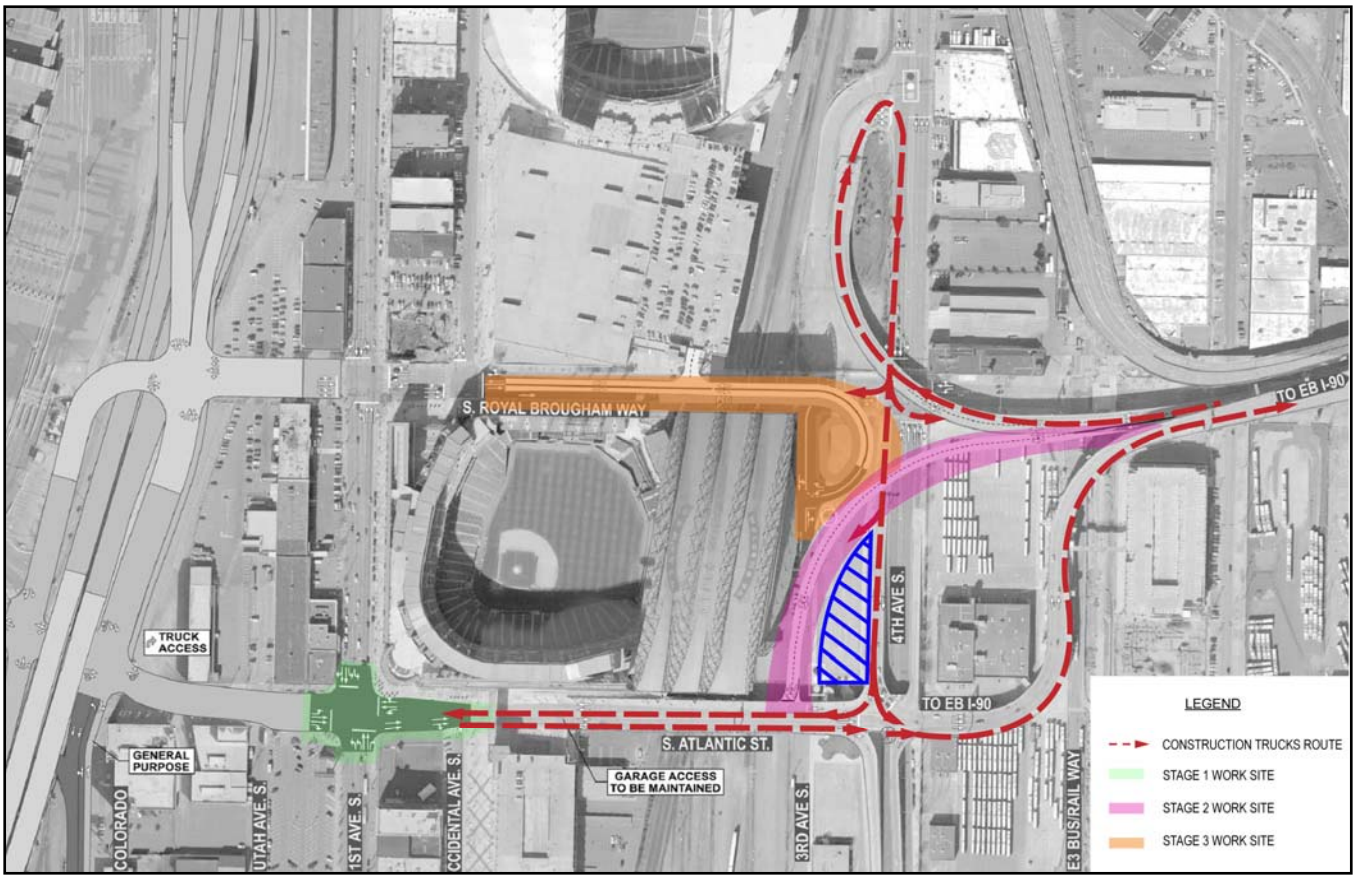
Depending on the type, size, and sequence of construction activities, truck traffic will have variable arrival and departure patterns to and from the project site. The most significant activities that require frequent truck movement include: hauling of excavated and fill material, concrete pours, structural framing, and crane deliveries. It is important to establish routes for construction trucks to take while delivering or removing construction materials to help define and control the effects of these activities.

The source of construction materials and the destination of waste materials are located at remote areas far from the project site. Therefore, potential hauling vehicle routes are directed away from the construction site (north, east and south) via the freeway system (I-90 and I-5). Exhibit 5-21 shows a potential site access plan to and from the freeway system. In addition to the on and off ramps of I-90, the surface streets likely to be affected by construction routes are mainly First and Fourth Avenue South, South Atlantic Street, and South Royal Brougham Way.

What would be the anticipated traffic impacts during construction?

The safety precautions during construction would make temporary partial or full closure of some roadways inevitable. The construction phasing plan would require a temporary partial closure at the First Avenue South and South Atlantic Street intersection during the widening work in Stage 1, and at Third and Fourth Avenue South during the construction of the I-90 off ramp in Stage 2. During construction of Stage 3, South Royal Brougham Way may remain partially open with construction activities being restricted to the center of the roadway.

EXHIBIT 5-21. CONSTRUCTION SITES AND ROUTES



Two other roadway facilities which are very important to traffic and transit mobility will also be affected by the construction work. These roadways, South Atlantic Street and E-3 Bus/Rail Way, will be impacted by the construction of the I-90 off-ramp. In order to reduce conflicts with traffic and ensure the safety of riders, a temporary closure of one lane westbound on South Atlantic Street in the vicinity of the new I-90 ramp connection might be required. During construction of the new I-90 ramp tie-in with the existing I-90 structure, temporary closure of the E-3 Bus/Rail Way may be required.

When it is not closed, the capacity of the First Avenue South and South Atlantic Street intersection would be reduced due to material deliveries and maneuvering for stockpiling and installation. The capacity of Fourth Avenue South would most likely be affected by heavy vehicle volumes supporting

material deliveries, and construction of the South Royal Brougham Way elevated ramp.

Sizable delay and long queues may spill over to adjacent intersections throughout the 30-month construction period; however, this can be combated with effective mitigation. The intersections most likely to be impacted are South Atlantic Street, First Avenue South and Fourth Avenue South. Potential mitigation strategies are discussed under the mitigation section of this chapter.

How would construction impact traffic and parking during events?

When events occur while construction is taking place, traffic will be affected the most by the possible partial closure of South Royal Brougham Way, and to a lesser extent by the partial closure of the First Avenue South and South Atlantic Street intersection.

Pedestrian accessibility to gates on the north side of Safeco Field, as well as the stairway of the Exhibition Center at South Royal Brougham Way, may be affected during construction of the South Royal Brougham Way elevated ramp. Temporary closure of some gates and partial closure of the stairway might be necessary for the safety of event visitors. Construction activities must maintain public safety and allow event participants to exit facilities in case of emergencies. It will be necessary to coordinate closely with the Seattle Fire Department and Seattle Police Department.

On-street parking may be prohibited at sections of Fourth Avenue South, South Royal Brougham Way, and South Atlantic Street located within the project influence area. However, on-street parking is currently permitted at Third Avenue South and First Avenue South between South Royal Brougham Way and South Atlantic Street. The project will permanently eliminate the curb parking at Third Avenue South. Parking prohibition could be made effective upon the initiation of Stage 2 construction. The estimated total number of parking spaces eliminated is 50.

Curb parking at First Avenue South will be affected by widening work at the intersection with South Atlantic Street. During construction, 10 to15 parking stalls will be prohibited on the west side of the street north of the intersection, of which 5 to 10 stalls will be permanently removed because of the construction of an additional southbound left turn lane.

The project area could also experience an additional temporary demand on parking created by construction workers if no on-site parking or a vanpool program is provided.

The staging plans for Metro Transit buses during events need to be revised for the construction phase. The boarding location at Third Avenue South for Qwest Field events will be affected by the construction of elevated structures in the second and third stages of the project. In turn, the transit staging plan for Safeco Field events will also be affected by the construction, namely the boarding locations at First Avenue South near South Atlantic Street (in the first stage of construction), and near South Royal Brougham Way (in the third construction stage). These two locations will become part of the construction site and buses will need to be relocated.

How would construction impact truck circulation?

Major truck routes in the area which will be impacted by construction are South Atlantic Street, South Royal Brougham Way, First Avenue South, and Fourth Avenue South. Truck circulation will be affected similarly to regular (non-truck) traffic: lane closures and reductions in capacity along the major routes. Close coordination with the Port of Seattle, their terminal operators, and independent truck drivers will help keep trucks moving efficiently through the area during construction.

How would construction impact bicycle and pedestrian circulation?

Dedicated bicycle lanes are not provided along the construction truck routes. Along South Atlantic Street and Fourth Avenue South, cyclists typically use the wide sidewalks, therefore bicycle interaction with construction vehicles will be limited to intersection crossings near the construction site. The same is

true for pedestrians. Construction work at the First Avenue South and South Atlantic Street and South Royal Brougham Way and Occidental Avenue South intersections are the most likely location where pedestrians and cyclists will be exposed to safety vulnerabilities because of the widening work.

Another area of concern is the overhead construction work for the elevated structures over Fourth Avenue South and along South Royal Brougham Way that might affect the mobility and safety of non-motorized travelers.

Construction of the tie-in for the off-ramp at South Atlantic Street may require a temporary closure of the stairway at the South Atlantic Street and Third Avenue South intersection. Sidewalks along the north side of South Atlantic Street at the south end connection, which is also the pathway for the Mountains to Sound Greenway, will be temporarily interrupted and a protected path for pedestrians may be provided.

As the project is located in an area with heavy pedestrians and bicycle activity, efforts will be made to ensure the safety of non-motorized travelers during construction. These efforts may include protected pathways, signage, maintaining existing sidewalk or pathway connections.

How would construction impact bus circulation?

Transit revenue service routes and deadhead routes will be affected by lane closures and reroutes during construction. Fourth Avenue South and First Avenue South are major bus service routes with respectively 1,436 and 313 daily trips., including deadhead trips. Access routes to or from the bases are critical to transit operations.

The King County Metro Ryerson base is accessed from the E-3 Bus/Rail Way. Base operations would be affected by the construction work at the east end section of the I-90 off-ramp. The base will permanently accommodate two supporting columns in the north part of the bus parking lot to support the I-90 off-ramp. The placement of construction equipment and the circulation of construction vehicles at the site would require a temporary separation of the northern portion of the parking lot, so that construction could occur relatively unimpeded. A

temporary fence would be placed south of its existing location, eliminating up to 4 bus stalls in each of two rows of bus parking (8 stalls total). This could require limited modification of the flow plan within the base. King County Metro engineers have estimated as many as 50 buses may need to be relocated.

Operations at the King County Metro Ryerson transit base will be disrupted during construction, requiring that some buses be transferred to another base. Access to the transit facilities that operate all day will be impacted during construction. The impact will be most noticeable after 10:00 pm when buses return to the parking garage for layover. The post-construction impact will be limited to reducing the parking capacity by 2 bus stalls only. The construction work within the base would last 3 to 6 months and require day-to-day coordination between Metro Transit and WSDOT to ensure safe and efficient transit and construction operations.

The Metro employee parking garage is located just south of South Royal Brougham Way between the E-3 Bus/Rail Way and Sixth Avenue South, at which garage entries and exits are located. Employees parking in the garage can access Ryerson Base via a sky bridge over the E-3 Bus/Rail Way. Accessibility to the garage will not be directly affected by the construction work. However, the route to the parking garage via South Royal Brougham Way will experience higher delay due to the additional traffic created by construction activities.

The access points of the Atlantic/Central Base are located at Airport Way South and South Massachusetts Street. An exit gate is also located at South Royal Brougham Way east of Sixth Avenue South. The accessibility and circulation of buses to/from the base will not likely be affected during the construction phase. Additional congestion in the area, due to construction truck traffic, lane closures and construction activity is likely to increase coach travel times for coaches moving in and out of the bases. With 1,500 trips in and out of the central bases each day, even minor delays can have significant cumulative impacts.

The impacts of construction on King County Metro operations could be more significant if the project is undertaken at same time that the South End of the Alaskan Way Viaduct is closed. Streets that do not currently have high bus volumes could be required to absorb the buses displaced from the Viaduct. Displaced traffic from the Viaduct would increase pressure on key intersections, decreasing levels of performance and adding delay to transit operations. Many bus routes from the Viaduct would be moved onto City streets such as First Avenue South and Fourth Avenue South. There would also likely be increased bus traffic on east-west streets connecting to the E-3 busway such as South Lander Street, South Holgate Street (until closed) and South Atlantic Street.

How would construction impact rail operations?

The construction of the I-90 off-ramp section over the light rail track is probably the most challenging phase, which consists of building two piers at both ends of the new I-90 ramp section over the E3 Bus/Rail Way, followed by the installation of steel girders (3-5 girders). The construction work at this location includes false work forming and casting concrete columns. Rail operation, which will span over twenty hours daily, could be affected occasionally by crane movements and girder placement that would impede rail activities. This critical phase will receive special attention and intensive coordination between WSDOT and Sound Transit to schedule and expedite construction tasks before construction starts adjacent to and over the E3 Bus/Rail Way.

10 How could the project mitigate potential effects of the Proposed Action on transportation?

Construction Mitigation

A number of strategies and measures will be explored to mitigate the potential adverse effects of the project construction on general traffic and transportation conditions in the area.

The construction schedule for the SR 519 Proposed Action needs to be carefully coordinated with other construction activities that could affect the area. These projects include:

South End Alaskan Way Viaduct and Seawall Replacement Project. The early safety and mobility project for SR99's South End would include the removal of the existing Alaskan Way Viaduct between Holgate Street and King Street, and the construction of a new SR99 including grade separation at Atlantic Street and South Royal Brougham Way, detour routes and temporary connections. Design is expected to be completed in 2008, with construction from 2009 to 2012.

Central Link Light Rail. Construction is well under way on a new 14-mile Central Link light rail line that is a critical piece in this region's transportation future. The trains will begin carrying passengers in 2009, stopping at 12 stations running between downtown and SeaTac Airport including two stations in the study area: the Stadium station just south of Royal Brougham Way, adjacent to the King County Metro Transit busway and Metro bus base; and the SODO station located on east side of the King County Metro Transit Busway about 160 feet north of Lander Street. To support the line, Sound Transit retrofitted the Downtown Seattle Transit Tunnel for joint use by both light rail trains and buses. The transit tunnel reopened for bus use in September 2007.

Spokane Street Viaduct Project. The South Spokane Street Viaduct is a critical connection linking I-5 to the Port of Seattle terminal, businesses along the Duwamish River and West Seattle to I-5, I-90 and SR99. This project creates direct eastbound access to Fourth Avenue South allowing freight to avoid train tracks, and facilitates direct bus access to the E-3 Busway. If completed prior to Alaskan Way construction, the project helps ease congestion by creating an alternate route from West Seattle to downtown. Funding to widen the Spokane Viaduct to five lanes with shoulders and add a Fourth Avenue off-

ramp is included in the 2007 Regional Transportation Improvement District ballot measure.

East Marginal Way Grade Separation Project. The East Marginal Way Grade Separation Project will route trucks and general vehicle traffic up and over railroad tracks just south of the Spokane Street corridor. When completed in late 2009, the project will eliminate traffic delays on East Marginal Way caused by trains crossing at grade level.

South Lander Street Grade Separation Project. Design is underway on the South Lander Street Grade Separation project between First Avenue South and Fourth Avenue South. The 30% design milestone for the project was completed in September 2007 and work has begun on the next stage of design. Construction is expected to kick-off around mid-2009 and will take about two years to complete.

City of Seattle Bridging the Gap Project. Over the next nine years, the City of Seattle will pave and repair streets, make seismic upgrades to bridges, improve pedestrian and bicycle safety, and increase transit speed and reliability. Specific tasks include resurfacing, restoring, or replacing approximately 300 lane-miles of arterial streets; building approximately 117 blocks of new sidewalks; and restoring approximately 144 blocks of existing sidewalks. South Holgate Street and South Royal Brougham Way are scheduled for pavement reconstruction in 2009.

I-90 Two-way Transit Lanes and HOV Project. This project adds High Occupancy Vehicle lanes to the outer sections of I-90 between Seattle and Bellevue. It also constructs HOV on- and off-ramps on Mercer Island and improves HOV access at Bellevue Way. In 2007, WSDOT is constructing the westbound HOV lane from E. Mercer Way to 80th Avenue SE. The project accommodates future plans to use the center road for high capacity transit, such as Light Rail.

Construction schedule management and agency coordination are required to avoid potential cumulative effects due to multiple project construction occurring simultaneously in the same area.

Public outreach and agency communication will play a key role in construction management. WSDOT will work with the City of Seattle, the Port of Seattle, the freight community, transit agencies, and stadium authorities to ensure that construction activities are coordinated with the various services provided within the project area. To inform the general public, various media will be used including informational signs, radio announcements and website postings. GIS maps on the Web could be used to illustrate construction phases and update information with timely notification of activities and schedules.

The use of Intelligent Transportation Systems (ITS) could provide benefits to trucks, transit, and general traffic by making better use of the existing transportation system during construction. Techniques such as traffic surveillance cameras, improved signal timings, transit priority, electronic message signs, real-time traveler information and guidance systems are all intended to reduce travel times and improve safety.

The contractor selected to construct the Proposed Action will be required to prepare a Traffic Management Plan (TMP) to be approved by the City of Seattle in order to ensure that effects on local streets, property owners and businesses are minimized. The TMP will include as a minimum the following:

- 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 SPD 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)
- Public outreach communication plan.

In addition to the general TMP, specific measures should be identified and agreed upon between the contractor, the project owner and individual agencies. These agreements will cover how and when contractors can work, and what measures will be implemented in order to minimize adverse impacts during construction. Such agreements should be developed as a minimum with the following agencies: City of Seattle, Sound Transit, King County Metro, Port of Seattle, BNSF, Amtrak, Public Stadium Authority, Public Facilities District, Baseball Club of Seattle. Consultations with all involved agencies will take place to ensure that services and activities provided in the area are properly protected during construction.

As construction will take place on Ryerson Base, King County Metro should be consulted to discuss relocation of bus parking and bus layover during construction. Possible options include temporary storage on nearby parcels, surrounding roadways, or other bus bases. Coordination will also be necessary for all temporary relocation of bus stops.

Even though closures at night have negligible impacts on general purpose traffic, there might be significant impacts to transit operations. Transit construction coordination needs to be notified at least three days in advance to reroute regular diesel bus service and at least ten days in advance to coordinate possible reroutes of trolley bus service. There are fewer options

for trolley buses operating out of Central Base and therefore coordination for reroutes or street closures affecting trolley service should be done well in advance.

A program of incentives will most likely be developed to get contractors in and out of the right-of-way as fast as possible. Sound Transit is using incentives with the contractors constructing the Central Link Light Rail. The City of Seattle's street-use fee structure was designed with the objective of accelerating construction schedules.

Operational Mitigation

How could effects on intersection operations be mitigated?

The intersection LOS analysis showed that the vast majority of the intersections within the study area would either benefit from the Proposed Action, or would remain unchanged. There are a few exceptions.

During the 2011 AM peak hour, the signalized intersection of First Avenue South and South Royal Brougham Way is anticipated to degrade from LOS D to LOS F under the Proposed Action scenario. During the 2011 PM peak hour, the signalized intersection of First Avenue South and South Royal Brougham Way is anticipated to continue to operate at LOS F under the Proposed Action scenario, with an average of approximately 30 seconds of additional delay per vehicle compared to the No Build scenario. The reasons for this problem are a combination of changes in travel patterns (increased use of South Atlantic Street rather than South Royal Brougham Way to travel westbound through the area) and the elimination of the dual left-turn lanes from southbound First Avenue onto eastbound South Royal Brougham Way. This is a temporary situation as the 2011 transportation network assumes no changes in the Alaskan Way Viaduct on and off-ramps at First Avenue South.

In 2030, almost all intersections are shown to perform better or the same in the Proposed Action compared to the No Build scenario. The exception is the intersection of First Avenue South and South Massachusetts Street which is shown to experience higher delays on the westbound approach with the

Proposed Action due to higher volumes expected along northbound First Avenue South. This is a stop-controlled intersection. Two improvement options are available: signalization of the intersection or restrictions of minor-street turning options. Based on the projected traffic volumes on South Massachusetts Street, it is not anticipated that signal warrants will be met at this location. Restricting the side-street approaches to allow only right-turns onto First Avenue South will improve side-street operations to LOS B during the AM peak hour and LOS C during the PM peak hour.

Although there is an improvement compared to the No Build option, the intersection of Fourth Avenue South and South Royal Brougham Way is still expected to operate at level of service F during the PM peak hour with an average delay of 100 seconds per vehicle with the Proposed Action. Several traffic control improvement options exist for this intersection. The first option would be to provide an overlap phase for the eastbound right-turn lane that would reduce delays at the intersection, but would not improve the level of service. The second option would be to lengthen the cycle length to 150 seconds (from 120 seconds) and add an eastbound overlap phase. The increased cycle length would improve the efficiency of the intersection, reducing average vehicle delays to 77 seconds, and improving the level of service to E. The third option would modify the eastbound/westbound left-turn phasing to be protected/permitted. This improvement, combined with the overlap for the eastbound right-turn and a 130 second cycle length (optimal) would improve operations to level of service D.

How could the effects on parking be mitigated?

Access to the Safeco Field garage and Qwest Field Event Center garage is generally similar with the Proposed Action and the No Build alternative. The Proposed Action creates an additional access point on the second level through the new elevated structure on South Royal Brougham Way. Preliminary design analysis indicates that there may be issues related to sight distances for traffic exiting the garage onto the new elevated structure. However, traffic on both directions on the

elevated structure will be traveling at low speeds and will have good visibility of vehicles exiting the garage.

The on-street parking supply is reduced by about 50 parking spaces with the Proposed Action. Most of the eliminated parking spaces are along Third Avenue South. Nearly all of Third Avenue South between South Royal Brougham Way and South Holgate Street is currently free on-street parking, and would remain so in the No Build alternative. The slight reduction of on-street parking will likely result in increased use of the off-street public parking, and possibly parking in adjacent neighborhoods. This could be mitigated by general transportation demand management (TDM) techniques to reduce parking demand by encouraging more people to use alternative modes of transportation.

How could the effects on Metro bus bases and bus operations be mitigated?

The number of bus parking spaces permanently lost on the Ryerson Base as a result of the project will depend on the final location of the support columns. The design will be closely coordinated with King County Metro to minimize adverse impacts on existing bus spaces and internal circulation. Preliminary design analysis indicates that approximately two spaces could be permanently lost, but this is subject to reviewing the final column layout superimposed on the current bus parking striping plan.

King County Metro currently uses Third Avenue South as a layover facility for special event buses. Loss of any of this special event bus staging area would be a very significant impact. If any layover spaces are lost, coordination with Metro will be required to identify other sites for temporary layover staging, either along Third Avenue South or elsewhere.

How could the effects on pedestrians and bicycles be mitigated?

To help mitigate the impact of the Proposed Action on pedestrians and bicyclists several measures can be taken. These measures include:

Potential Elevated Pedestrian Crossing. While the Proposed Action provides a great benefit to pedestrians with the elevated structure, access could be improved. Currently pedestrians are not able to cross the ramp to the Qwest Field parking garage due to potential conflict with vehicular traffic. In the future, this could be modified to put in a pedestrian crossing from the staircase to the garage. This crossing could be a simple crosswalk or flashing pedestrian signal.

Safer Pedestrian Crossings. There are several locations where safety at pedestrian crossings is a potential issue. These locations are the north side of South Atlantic Street where the I-90 ramp connects, the west ramp touchdown along South Royal Brougham Way, and the intersection of First Avenue South and South Atlantic Street. Possible mitigation measures to increase safety at these locations include:

- Restricting right turns when the signal is red to ensure pedestrians have a clear path to cross the intersection.
- Countdown Pedestrian Signals: Alerts pedestrians of the amount of time they have to cross a street safely. They can also inform pedestrians how long they must wait before crossing a street safely.
- Pedestrian Signs: Alerts drivers coming off the freeway that a pedestrian crossing is ahead.
- Informational Signs: Inform pedestrians what to do during each phase of a pedestrian signal.

Continuation of Bicycle Lanes. The Proposed Action provides a safe route for bicyclists to travel along the corridor, however once off of the elevated structure bicyclists must use vehicular travel lanes. Bicycle lanes could be placed along Third Avenue South and South Royal Brougham Way to connect to existing bicycle facilities. It should be noted that in the City of Seattle Bicycle Master Plan bicycle lanes are planned along South Royal Brougham Way between Alaskan Way South and the E-3 Busway/Proposed I-90 Multi-Use Trail extension.

Safer Bicycle Paths. Similar to the pedestrian crossings mentioned above, the west ramp touchdown along South Royal Brougham Way presents a safety concern for bicyclists. Currently vehicles traveling along the ramp and the ground level roadway will be allowed to take a left or a right at the South Royal Brougham Way and First Avenue South intersection. This presents weaving issues with bicyclists traveling in the roadway. Restricting turns at South Royal Brougham Way and First Avenue South for vehicles traveling along the structure could help minimize weaving and reduce potential conflicts between bicyclists and motorists.

How could the effects on events be mitigated?

The effects of the Proposed Action on events could be mitigated several different ways. Potential mitigation strategies were discussed at the previously mentioned workshop with representatives from area stakeholders. To help keep both event and non-event traffic moving when events are taking place, the following mitigation strategies could be employed in addition to those strategies which are already utilized. These strategies are primarily for large sporting events and are broken into Pre-Event and Post-Event conditions.

Pre-Event

- Keep the elevated loop ramp structure open in both directions for vehicles not wanting to access Qwest Field garage. This should not inhibit event-related traffic much as the volume would most likely be low.
- Consider placing a ticket taker at the bottom of the elevated loop ramp to help keep the queue to Qwest Field parking garage at a minimum. There is potential for the queue to back onto Third Avenue South or even Fourth Avenue South, so this strategy would need further development by interested parties.
- Put Variable Messages Signs (VMS) along I-5 to direct traffic exiting from I-5 northbound along the new off-ramp. The left lane could direct vehicles east onto South Atlantic Street, then to Fourth Avenue South, either northbound or southbound. The right lane would direct traffic west onto

South Atlantic Street, for Safeco Field garage parking only. VMS signage would also include event routing of Ferry traffic.

Post-Event

- Vehicles exiting from the Qwest Field garage would have a restricted right turn, meaning they would only be able to travel east onto the ramp structure. Both lanes of the loop ramp would be used for egress movements only, and directed to the East.
- The peak of non-motorized activity is approximately 20 minutes after the end of an event, which presents potential conflicts with traffic. To help mitigate these conflicts, traffic from I-5 northbound using the new freeway ramp could be restricted to take a left heading eastbound on South Atlantic Street and then onto northbound or southbound Fourth Avenue South. The use of VMS (as in pre-event conditions) could help with this mitigation strategy.
- For fire truck access, a lane would need to be kept open on the surface street of South Royal Brougham Way, which may prevent buses from lining up there. Instead, buses may be able to line up along Third Avenue South or on the elevated ramp between the Occidental Avenue South intersection and the access to Qwest Field garage. Buses could then travel east or west, depending on which direction they are facing.

11 Would the Proposed Action have any significant unavoidable adverse effects on traffic?

The Proposed Action would have no significant unavoidable adverse effects on transportation.

Chapter 6 Cumulative Effects

1 Would the Proposed Action have any cumulative effects on transportation?

Cumulative effects are important because they help us to understand the project in terms of a "bigger picture." They can reveal possible unintended consequences of the Proposed Action or No Build Alternative that might not be apparent when we look at the project by itself. Because of this, cumulative effects help us to evaluate how sustainable the project is likely to be in future years, and how it might interact with other projects that are planned but have not been built yet.

2 How did the project team identify expected cumulative effects on transportation?

The project team identified expected cumulative effects of the Proposed Action and No Build Alternative by following a process recommended by the President's Council on Environmental Quality (CEQ, 1997) and as identified in Chapter 412 of the WSDOT *Environmental Procedures Manual* (WSDOT, 2007).

First, the team considered other past and present projects that are affecting transportation in the study area. These past and present actions have changed transportation conditions in and around the SR 519 study area from their original condition and continue to influence current trends.

Next, the expected direct and indirect effects of the project on transportation, discussed in Chapter 5, were added. A number of reasonably foreseeable future actions in or near the study area were already accounted for in Chapter 5 because they

were included in the baseline models used to develop the traffic volume forecasts.

The purpose of the cumulative effect analysis is to study the Proposed Action and the No Build alternatives in combination with other reasonably foreseeable planning efforts that were not accounted for as part of project's direct and indirect effects discussed in Chapter 5.

The transportation project team combined these past, present, and reasonably foreseeable future actions to produce a comprehensive view. This allowed the project team to visualize the future condition of transportation in the study area and to understand how the effects of past, present, and future projects might add to, and interact with, the expected effects of the Proposed Action or the No Build Alternative in coming years.

Past and Present Actions

Past actions have produced lasting effects that still influence traffic and transportation conditions in the study area. The area serves a variety of transportation needs. Some of the most relevant actions that have helped to shape the present conditions include:

The growth of POS container traffic. SR 519 is the primary connection between the Port of Seattle Terminal 46 and I-5/I-90. The POS handled 2.1 million containers in 2005, which are estimated to generate 8,300 truck trips on an average weekday; 40 percent of the trucks are headed to and from the SIG and Argo rail yards. About 500 daily trucks on SR 519 are generated by the Port of Seattle Terminal 46. Two routes are available for container trucks from I-5 and I-90 to Terminal 46: via South Atlantic Street or via South Royal Brougham Way.

Rail traffic increase. Trains crossing South Royal Brougham Way create safety concerns and vehicle delays at the Third Avenue South at-grade rail crossing. Sound Transit has expanded its commuter service between Seattle and Tacoma; Amtrak has added passenger trains on the Cascades service between Seattle and Portland, and BNSF has increased the number of freight trains.

Stadium and event center. Safeco and Qwest fields, combined, host events on 121 days per year. The number of large events and their interaction with typical daily traffic in the vicinity create large traffic volumes that can result in severe traffic congestion in the area.

Seattle ferry terminal. The WSF ferry terminal at Colman Dock carries about 25,000 daily passengers. The signed route from I-5 and I-90 to the terminal is via Fourth Avenue South, South Atlantic Street and Alaskan Way South.

SR 519 Phase 1. A significant past action was the completion of the SR 519 Phase 1 in 2004, when WSDOT opened the new SR 519 South Atlantic Street on-ramp to I-5 and I-90. This overpass separates road and railway traffic and improves access between waterfront locations and I-90 such as the Port of Seattle and Seattle Ferry Terminal.

Renovation of King Street Station. Amtrak and WSDOT are working in partnership with BNSF Railway to transform the busy and historic King Street Station. On December 11, 2006, the Seattle City Council approved the purchase of King Street Station for $1.00. The City of Seattle is currently negotiating agreements with BNSF Railway, Amtrak, and WSDOT. The renovation includes new restrooms, a bigger lobby and waiting area, improved ticketing and baggage facilities, new train arrival and departure display, new way-finding signage to the surrounding neighborhoods, new roof, exterior cleaning and safety and security improvements.

Downtown Redevelopment. Urban development is increasing in portions of the South Downtown area immediately north of the study area. This area, which includes Seattle's International District/Chinatown/Little Saigon neighborhood, is currently the subject of Livable South Downtown, a major planning effort by the City of Seattle's Department of Planning and Development. In November 2007, the City of Seattle released the *Draft EIS for Livable South Downtown Planning* (City of Seattle, 2007a), a SEPA programmatic EIS which evaluates options for a comprehensive neighborhood plan for the South Downtown area.

The study examines growth and planning issues specific to Pioneer Square, the Chinatown/International District (including the Little Saigon area east of I-5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center. Preliminary recommendations were released by the City's Department of Planning and Development in March 2006. Land use and zoning changes considered as part of this process will require conducting an environmental review prior to legislative decision-making.

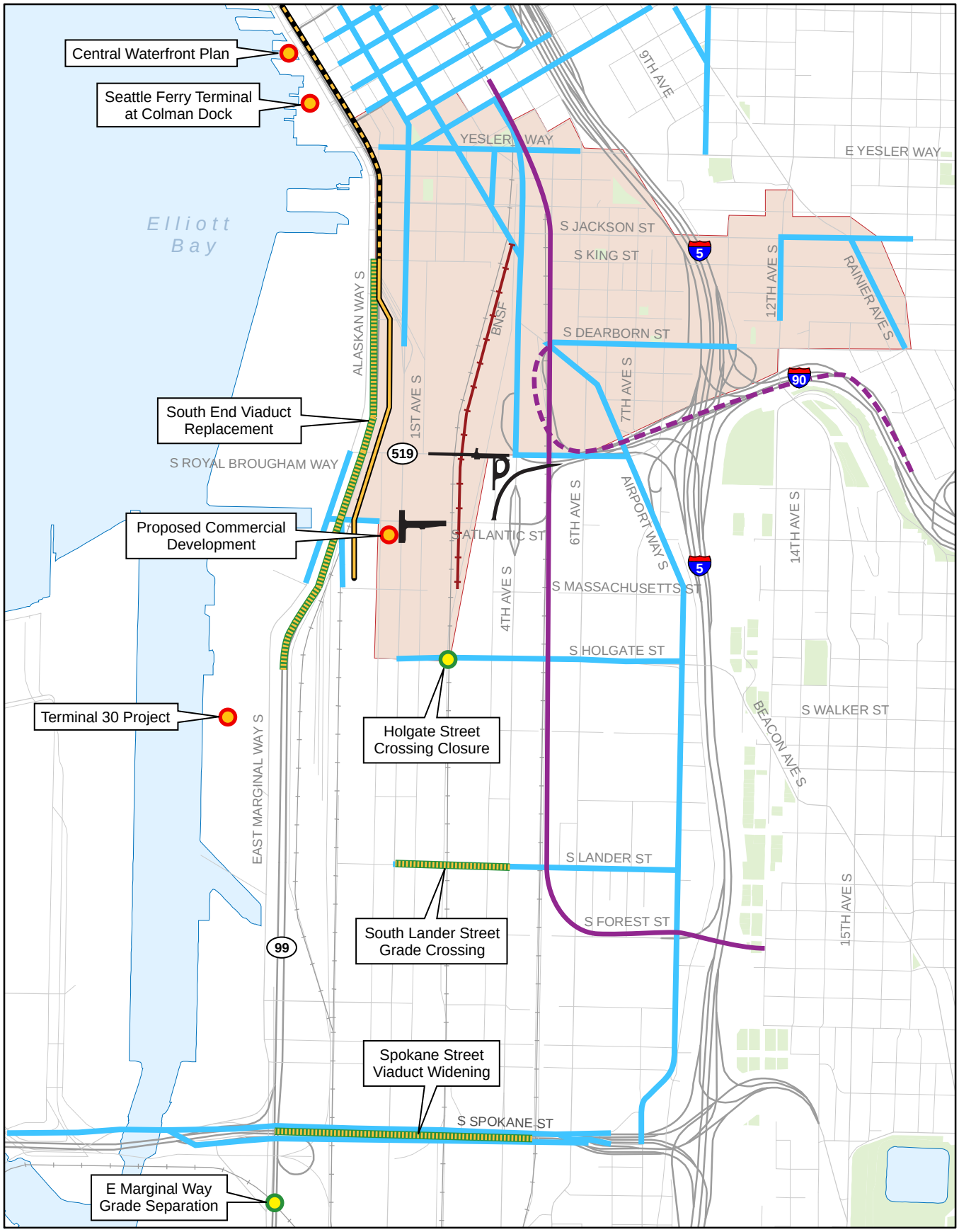
Direct and Indirect Effects of the No Build and Proposed Action Alternatives

The analysis of the SR 519 project impacts on transportation reported in Chapter 5 relied on the application of the City of Seattle 2030 travel demand model to estimate future traffic volumes for the different modes. The City of Seattle transportation model is based on forecasts and assumptions regarding the future changes in land use and transportation infrastructure.

Both the No Build and Proposed Action alternatives were analyzed using a consistent set of land use and transportation assumptions. The 2030 land use is based on the existing City of Seattle Comprehensive Plan, and therefore does not include any of the zoning changes currently being considered a part of the Livable South Downtown planning process.

Some of the reasonably foreseeable future actions in or near the study area are shown on Exhibit 6-1 and described in Exhibit 6-2.

The 2030 traffic forecasts (No Build and Proposed Action) also assumed a consistent set of transportation capital and service improvements. Projects that were identified in local or regional plans and had a likely source of funding were incorporated in the forecasts and analysis. The major planned transportation projects included in the 2030 forecasts are described in Exhibit 6-3.



Source: City of Seattle (2007) and King County (2006)

- Project
- Livable South Downtown Study Area (Approx.)
- BNSF Railway Completion
- Electrical Line Relocation Phase 1 and Phase 2
- Sound Transit Central Link
- Proposed Sound Transit East Link
- Bridging the Gap Paving Project
- Road Project
- Development Project

N

0 1,000 Feet

Exhibit 6-1
Reasonably Foreseeable Future Actions

SR 519 Intermodal Access Project - Phase 2
February 2008

EXHIBIT 6-2. REASONABLY FORESEEABLE FUTURE ACTIONS IN OR NEAR THE STUDY AREA

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
South Holgate Street to South King Street Viaduct Replacement Project	SR 99 from South Holgate Street to South King Street	Build new SR 99 between South Holgate Street and South King Street. Includes South Atlantic Street and South Royal Brougham Way grade separation, detour routes, and temporary connections	Washington State Department of Transportation	2009-2012
Electrical Line Relocation	Phase 1: South Massachusetts Street to South King Street Phase 2: South King Street to Union Street	Remove network distribution lines and transmission lines that are located under the existing Viaduct before it is demolished	Washington State Department of Transportation	Phase 1: Construction scheduled for 2008-2009. Phase 2: To be determined.
Completion of BNSF Railway Improvements	King Street Station to South Royal Brougham Way	Reduce rail transportation conflicts along the BNSF right-of-way; increase safety at the BNSF crossing of South Royal Brougham Way	BNSF Railway	Improvements at South Royal Brougham Way have been completed; with additional improvements along the BNSF right-of-way currently in progress.
Central Link Light Rail	Downtown Seattle to Sea-Tac Airport	Provide light rail service between downtown Seattle and Sea-Tac Airport	Sound Transit	2008-2009
East Link Light Rail	Downtown Seattle to Redmond	Provide light rail service between downtown Seattle, Mercer Island, Bellevue, and Redmond	Sound Transit	Construction not scheduled. Environmental impact statement scheduled for release in fall 2009.
Proposed Commercial Development	South side of South Atlantic Street between First Avenue South and Utah Avenue South	Provide office and retail uses	Gull Industries	2010-2012
Livable South Downtown Planning Study	The study examines growth and planning issues specific to Pioneer Square, the Chinatown/ International District (including the Little Saigon area east of I-5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center.	Stimulate housing and related development consistent with the Mayor's Center City Seattle strategy	City of Seattle, Department of Planning and Development	Environmental impact statement and legislative proposals in 2008

EXHIBIT 6-2. REASONABLY FORESEEABLE FUTURE ACTIONS IN OR NEAR THE STUDY AREA

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
Closure of South Holgate Street at BNSF Railway Crossing	South Holgate Street at the BNSF Railway crossing	Eliminate conflicts between rail and vehicle traffic.	City of Seattle, Department of Transportation	Construction not scheduled
South Lander Street Grade Separation	South Lander Street between First Avenue South and Fourth Avenue South	Improve safety and traffic flow by constructing a roadway bridge for vehicles, bicycles, and pedestrians over the BNSF Railway tracks.	City of Seattle, Department of Transportation	2009-2011
South Spokane Street Viaduct Widening	South Spokane Street from Sixth Avenue South to West Seattle Bridge	Improve traffic safety and upgrade the structural and seismic performance of the viaduct that connects I-5 to the West Seattle High Level Bridge. Construct a new eastbound loop ramp to Fourth Avenue South, to the south of South Spokane Street.	City of Seattle, Department of Transportation	Seismic retrofit, median barrier installation, and street-level utility relocations have been completed. Viaduct widening and ramp construction is scheduled to start in 2008 and would be constructed in phases as funds become available, so exact construction range not known.
Bridging the Gap Paving Projects	Seattle arterial streets	As part of a larger program, the paving projects will resurface, restore, or replace approximately 300 lane-miles of arterial streets; rehabilitate or replace 3-5 bridges and seismically retrofit 5 additional bridges; repair or restore approximately 144 blocks of existing sidewalks; build approximately 117 blocks of new sidewalks; rehabilitate approximately 50 stairways; and restripe about 5,000 crosswalks.	City of Seattle, Department of Transportation	2006-2013

EXHIBIT 6-2. REASONABLY FORESEEABLE FUTURE ACTIONS IN OR NEAR THE STUDY AREA

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
Central Waterfront Plan	South Atlantic Street to West Thomas Street along the shoreline edge of the Center City	Following replacement of the existing Alaskan Way Viaduct, construct new parks and open spaces, shoreline and habitat improvements, improved linkages to the downtown core, *and* transit connections, *and implement* land use and regulatory changes.	City of Seattle	Presently in planning process. Construction will begin with the removal of the viaduct and will be ongoing for several years.
Terminal 30 Conversion	East Marginal Way South between approximately South Holgate Street and South Lander Street	Terminal 30 had been used for cruise operations but will be converted back to its original use as a container terminal. This and the adjacent Terminal 25 will provide 70 acres for container use.	Port of Seattle	2007-2009
East Marginal Way Grade Separation Project	East Marginal Way South just south of South Spokane Street	Provide a north- and southbound grade separation on Duwamish Avenue South, relocating East Marginal Way through this corridor to improve access among Port of Seattle terminals, rail yards, and industrial warehouses.	Port of Seattle	2006-2008
Washington State Ferries Terminal Improvements at Colman Dock	Pier 54 at Seattle Waterfront on Alaskan Way South	Upgrade structures and facilities and increase capacity.	Washington State Department of Transportation	Construction not scheduled. For 2008-2009, focus will be on system-wide planning and coordination with nearby projects, including the proposed SR 519 Phase 2.

[a]Only major planned projects are listed. Many other projects that could be implemented in the reasonably foreseeable future are not shown.
[b]Dates are approximate.
Sources: General information from the WSDOT, City of Seattle, Port of Seattle, and Sound Transit websites**.**

EXHIBIT 6-3. PLANNED TRANSPORTATION PROJECTS ASSUMED TO BE COMPLETE BY 2030

Project	Description
Alaskan Way Viaduct	Replacement of the existing limited-access Alaskan Way Viaduct structure, including 1st Avenue South frontage roads (consistent with the Alaskan Way Viaduct South End concept as of July 2007)
I-90 HOV Lanes	Installation of High Occupancy Vehicle (HOV) lanes in each direction along I-90 between Rainier Avenue South and Bellevue Way, otherwise known as reconfiguration Option 8A
South Lander Street	Grade separation of South Lander Street between 1st Avenue South and 4th Avenue South
South Holgate Street	Closure of at-grade crossing between Occidental Avenue and 3rd Avenue South
Spokane Street Viaduct Improvements	Construction of a new ramp at 4th Avenue S and addition of HOV lanes between I-5 and 1st Avenue S
Sound Transit Phase I	Completion of Sounder Commuter Rail, Express Bus, and Link Light Rail between the Airport and University of Washington
East Link LRT Connection	Extension of Light Rail to Bellevue/Redmond across I-90
Colman Dock Ferry Terminal	Expansion of Colman Dock and remote holding area (options currently being re-evaluated)

3 What would be the cumulative effects on transportation of other reasonably foreseeable future actions?

Other projects or actions not accounted for in the direct and indirect impact analysis might have a cumulative effect on transportation in the SR 519 study area.

Reasonably Foreseeable Future Actions

Exhibit 6-1 shows approximate locations of some of the reasonably foreseeable future actions (RFFAs) that could add to or interact with the Proposed Action to contribute to cumulative effects on transportation. Exhibit 6-2 briefly summarizes information about these projects. They include, but are not limited to:

- The South Holgate Street to South King Street Viaduct Replacement Project and the two-phase Electrical Line Relocation Project, which are Moving Forward projects

within the Alaskan Way Viaduct and Seawall Replacement Program

- The South Spokane Street Viaduct project
- Completion of the BNSF Railway tracks
- Sound Transit light rail projects
- Closure of the South Holgate Street rail crossing
- Conversion of the Port of Seattle's Terminal 30 to a container terminal
- The East Marginal Way Grade Separation Project
- The City of Seattle's Central Waterfront Plan
- The City of Seattle's Bridging the Gap paving projects
- Several utility pipeline projects.
- Washington State Ferries Terminal Improvements at Colman Dock

South End Alaskan Way Viaduct Replacement

The project most likely to interact with the Proposed Action in the near future is the South Holgate Street to South King Street Viaduct Replacement Project, which will replace the south end of the viaduct (Exhibit 6-1). That project, a Moving Forward project within the Alaskan Way Viaduct and Seawall Replacement Program, is scheduled for construction from 2009 to 2012, the same time frame as the Proposed Action, and it would will be located immediately west of the proposed SR 519 improvements.

This project is still in the planning and design phase. The goal is to improve access between the south and west to downtown and I-5 near the sports stadiums.

The work that will be completed as part of the South End project includes:

- Replace the viaduct from South Holgate Street to South King Street with a new roadway that connects to the existing viaduct;

- Create a crossing for freight coming to and from the Port of Seattle;
- Install new connections to SR 99 in the stadium area.

The South End configuration now being considered is different from the July 2007 concept that was used for the SR 519 traffic analysis reported in Chapter 5 of this document. The main difference is that the July 2007 concept included access to Northbound SR 99 at Colorado Avenue South while the new South End concept keeps Northbound SR 99 access at Railroad Way South. With the new South End concept, South Royal Brougham Way does not connect with SR 99 but would end at the frontage road east of SR 99.

The traffic volume forecasts associated with the new South End concept are therefore different from those obtained with the July 2007 concept, reflecting the changes in traffic distribution patterns in the stadium area. However, comparisons of traffic volume forecasts at the intersection of First Avenue South and South Atlantic Street show that the total number of vehicles expected to travel through the intersection during the peak hours is similar under both scenarios.

Independently of the South End configuration, the same approach width on every leg of the First Avenue South and South Atlantic Street intersection can be used. Detailed channelization decisions and associated traffic signal operation strategies can be defined later depending on how the volumes actually transpire in the future.

Livable South Downtown Project

Land use and zoning changes considered as part of the Livable South Downtown process require conducting an environmental review prior to legislative decision-making; a programmatic EIS (Environmental Impact Statement) is underway.

The Livable South Downtown EIS alternatives address a range of possible land use regulatory choices with different implications for the amount and distribution of future residential and commercial growth. Alternative 1 would result

in greater commercial development towards the west of the study area; Alternative 2 would result in greater commercial development towards the east and central portions of the study area; Alternative 3 assumes a more balanced distribution of future growth across the study area.

If implemented, the Livable South Downtown project may contribute to changes in travel patterns in the SR 519 area including increased pedestrian and bicycle activity. However, most of the vehicular traffic in the area does not have an origin or destination within the study area (except during events), and that will not change under any of the potential land use scenarios. The Proposed Action contributes to better distribute east-west traffic, with South Atlantic Street becoming the primary route for through traffic and trucks whereas South Royal Brougham Way becomes mostly a local street with improved bicycle and pedestrian facilities. Therefore, the Proposed Action would not be adversely affected by cumulative effects resulting from the Livable South Downtown project such as increased local vehicular and non-motorized traffic.

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APPENDICES

Appendix A: Traffic Analysis

A-1. Existing Intersection LOS Summary (AM & PM)

A-2a. Existing Peak Hour Traffic Volumes and Intersection LOS (North)

A-2b. Existing Peak Hour Traffic Volumes and Intersection LOS (South)

A-3a. 2011 No Build Freeway LOS

A-3b. 2011 Proposed Action Freeway LOS

A-4a. 2030 No Build Freeway LOS

A-4b. 2030 Proposed Action Freeway LOS

A-5a. 2011 No Build Average Daily Traffic Volumes

A-5b. 2011 No Build AM Peak Hour Traffic Volumes

A-5c. 2011 No Build PM Peak Hour Traffic Volumes

A-6a. 2011 Proposed Action Average Daily Traffic Volumes

A-6b. 2011 Proposed Action AM Peak Hour Traffic Volumes

A-6c. 2011 Proposed Action PM Peak Hour Traffic Volumes

A-7a. 2030 No Build Average Daily Traffic Volumes

A-7b. 2030 No Build AM Peak Hour Traffic Volumes

A-7c. 2030 No Build PM Peak Hour Traffic Volumes

A-8a. 2030 Proposed Action Average Daily Traffic Volumes

A-8b. 2030 Proposed Action AM Peak Hour Traffic Volumes

A-8c. 2030 Proposed Action PM Peak Hour Traffic Volumes

A-9a. 2011 AM Intersection LOS Summary

A-9b. 2011 PM Intersection LOS Summary

A-10a. 2011 No Build Peak Hour Traffic Volumes and Intersection LOS (North)

A-10b. 2011 No Build Peak Hour Traffic Volumes and Intersection LOS (South)

A-10c. 2011 Proposed Action Peak Hour Traffic Volumes and Intersection LOS (North)

A-10d. 2011 Proposed Action Peak Hour Traffic Volumes and Intersection LOS (South)

A-11a. 2030 AM Intersection LOS Summary

A-11b. 2030 PM Intersection LOS Summary

A-12a. 2030 No Build Peak Hour Traffic Volumes and Intersection LOS (North)

A-12b. 2030 No Build Peak Hour Traffic Volumes and Intersection LOS (South)

A-12c. 2030 Proposed Action Peak Hour Traffic Volumes and Intersection LOS (North)

A-12d. 2030 Proposed Action Peak Hour Traffic Volumes and Intersection LOS (South)

Appendix B: Origin-Destination Study

B. Origin-Destination Study

Appendix C: Travel Time Plots

C-1a. I-90 Westbound Travel Times – AM Peak Hour

C-1b. I-90 Westbound Travel Times – PM Peak Hour

C-2a. I-90 WB Off-Ramp to Terminal 46 via Royal Brougham Way Travel Times – AM Peak Hour