Draft
Environmental Impact Statement

LIVABLE SOUTH DOWNTOWN TRANSPORTATION DISCIPLINE REPORT

Prepared for:

City of Seattle
Department of Planning
and Development

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 STUDY BACKGROUND

The Transportation Discipline Report is an integral part of the Livable South Downtown Draft EIS and describes the transportation related impacts of the growth alternatives for the South Downtown area. It identifies and compares the transportation impacts associated with each alternative and outlines suggested mitigation strategies to consider.

The Livable South Downtown planning process was initiated in 2005 by the City's Department of Planning and Development (DPD). Preliminary recommendations were released by the DPD in March 2006. Land use and zoning alternatives are required to undergo environmental review prior to legislative decision-making. Consequently, the DPD has published this programmatic environmental impact statement (EIS) to provide information to decision-makers, agencies and interested citizens. The programmatic EIS evaluates the impacts of the proposed land use alternatives at a broad level, versus very specific impacts that a project EIS would identify.

The EIS studies the environmental impact implications of three "Action" Alternatives that include land use and zoning changes associated with Livable South Downtown planning, and one "No-Action" Alternative. These changes, if adopted, would influence future patterns of land use and growth in South Downtown, including the maximum heights and sizes of future buildings that may be built in the area. The EIS analysis also considers the implications of the full range of recommendations covered within the Livable South Downtown planning process, covering such topics as urban design, economic development, utilities and environmental sustainability.

1.2 REPORT OVERVIEW

The Transportation Discipline Report comprises the following chapters:

- **Chapter 2: Methodology** - Describes the methods and underlying assumptions used to assess the different Alternatives.
- **Chapter 3: Consistency with Other Studies** - References and summarizes the relevant policies, plans, and projects, while also describing how they were used or incorporated into the study.
- **Chapter 4: Affected Environment** - Describes existing transportation conditions for each of the major transportation modes.
- **Chapter 5: Impacts and Alternatives Comparison** - Describes the future impacts of each Alternative on the different components of the transportation system.
- **Chapter 6: Mitigation Strategies** – Describes suggested mitigation strategies to help address the identified impacts, and also highlights the significant and unavoidable adverse impacts.

1.3 STUDY AREA

The South Downtown area enjoys an important and strategic location locally and regionally. From a local perspective, the area lies south of Downtown Seattle which in turn is the Pacific Northwest's major metropolitan area and center of several major commercial, retail, and business activities. The South Downtown area is also a center for Asian culture and a significant tourist destination.

The Livable South Downtown planning area is described according to five neighborhoods which include Pioneer Square, Chinatown/Japantown, Little Saigon, South of Dearborn, and the Stadium Area. Also included in the study area at the periphery of Little Saigon are properties east of Rainier Avenue S, outside of the Downtown Urban Center, within the Jackson Place neighborhood. As illustrated in Figure 1-1, the study

area in this programmatic EIS is irregular in shape and is bordered from the north by Columbia Street and Yesler Way, from the east by I-5 and Rainier Avenue S, from the south by S Holgate Street, and from the west by Alaskan Way S.

Two major stadiums exist in the study area: Safeco Field and Qwest Field. These are home to the Seattle Mariners baseball team and the Seattle Seahawks football team, respectively. The stadiums also host numerous other events year-round, and are major traffic generators during those times.

From a regional perspective, part of the study area includes the Greater Duwamish Manufacturing and Industrial Center (MIC) and borders major freight areas such as the Port of Seattle Terminals (T46) and the Burlington Northern/Seattle International Gateway Intermodal Rail Yard (SIG Yard). The area is a major origin and destination for truck and rail movements and facilitates trade across the Pacific Ocean.

In addition to the several state routes passing through the area, such as SR 99 and SR 519, two interstates bisect the area which include I-5 (going north-south) and I-90 (going east-west and terminating in the study area). All of the state routes serve significant regional traffic and are major freight routes.

A ferry terminal, Colman Dock, is also located northwest of the study area. The signed route from the freeways to the Colman ferry dock bisects the study area and is a source of additional traffic on the study area roadways.

1.4 ALTERNATIVES EVALUATED

The EIS Alternatives address a range of possible land use regulatory choices, with different implications for the amount and distribution of future growth. The No-Action Alternative analyzes the potential impacts of what may happen with future growth and development if no changes are made in zoning. Alternative 1's zoning choices would likely result in greater commercial development toward the west of the study area - along the 1st Avenue S corridor, including the Washington Oregon Shippers Cooperative Association (WOSCA) property. Alternative 2's zoning choices would likely result in greater concentration of commercial development toward the east and central portion of the study area (along the 4th Avenue S and Airport Way S corridors, including the "over-tracks" and Frye properties sites). Alternative 3 assumes a more balanced distribution of future growth across the study area.

1.4.1 No-Action Alternative

Under the No-Action Alternative, no changes would be made to the City's existing zoning and Land Use Code regulations. The residential and employment growth targets established in the Comprehensive Plan for 2024 (in this study projected further to 2030) would continue to be the benchmarks for expected growth.

The current zoning system would continue into the foreseeable future, including the existing zoning tailored to the Pioneer Square and Chinatown/International District neighborhoods (west of I-5), industrial zoning with a Stadium Area Overlay in the 1st Avenue S and stadium vicinity, general industrial zoning in the vicinity near Airport Way S south of S Charles Street, and a mixture of commercial, neighborhood commercial and industrial zoning in the Little Saigon vicinity.

Over time, the trend of gradual infill development in and around the neighborhood cores would likely continue. The northern half of Qwest Field's north parking lot has been identified to be developed with several hundred residential units. There are several other redevelopment projects planned and in the permitting process within the study area. These projects are assumed in all Alternatives, including the No-Action Alternative, but at various intensities of development.

Major transportation projects, including SR 99 construction, the second phase of SR 519, Link Light Rail and the extension to Bellevue (East Link), HOV lanes on I-90, and the S Lander Street Grade Separation are

assumed to be in place by 2030 and included under all Alternatives. The effective closure of S Holgate Street between 3rd Avenue S and Occidental Avenue S as a result of increased rail operations is also assumed, but the City is not committed to this project and is still evaluating its feasibility.

1.4.2 Alternative 1: Neighborhood Infill with Commercial Growth toward the West

Alternative 1's planning concept is broadly summarized as encouraging growth that will reinforce the neighborhood cores and areas near those cores, with modest expansion of development capacity in other peripheral vicinities. Recommendations would incentivize infill development within the Pioneer Square and Chinatown cores in locations where historic resources would not be directly impacted, and additional zoned development capacity would be provided in three areas at the edges of these neighborhood cores—the Japantown and Qwest Field north lot vicinities and the northern portion of the WOSCA property. This is intended to result in the central neighborhoods experiencing the benefits of increased residential occupation, and a more complete and denser urban fabric that will assist in improving the vitality of businesses and streetscapes. The defining element of Alternative 1's commercial growth emphasis "toward the west" would occur through increases in commercial development capacity along the 1st Avenue S corridor south of Pioneer Square.

1.4.3 Alternative 2: Neighborhood Infill with Commercial Growth toward the East

Similar to Alternative 1, Alternative 2 encourages infill development within the Pioneer Square and Chinatown core areas and additional residential-oriented development capacity at the underused periphery of the cores. The primary difference is that Alternative 2 assumes an increased concentration of commercial development within the eastern portion of the study area. This includes significant commercial growth along the 4th Avenue S corridor, south of S Dearborn Street, and in Little Saigon. The South of Dearborn vicinity would remain industrially-zoned, allowing more intensive commercial development while maintaining a transition to the more intensive industrial zone (IG2) further south. No changes to Downtown Urban Center boundaries would be needed for this Alternative.

1.4.4 Alternative 3: Balanced Growth

Alternative 3 defines a more balanced distribution of future employment growth capacity throughout the study area than the other Alternatives. This includes lesser increases in zoned height limits in several areas, moderate changes in commercial capacity across several large properties throughout the study area, and consistent Neighborhood Commercial (NC3-85') zoning throughout the Little Saigon vicinity. Alternative 3 also includes a 20-foot increase in height limits north of S Atlantic Street and the permission of hotel uses within the Stadium Transition Area Overlay. No zoning changes are proposed within the Chinatown/International District core, but in the South of Dearborn vicinity a new South Downtown mixed zone is proposed to allow for a more diverse mix of uses, including residential uses. Alternative 3 includes a proposal to move the WOSCA property and South of Dearborn area into the Downtown Urban Center and out of the Greater Duwamish Manufacturing and Industrial Center.

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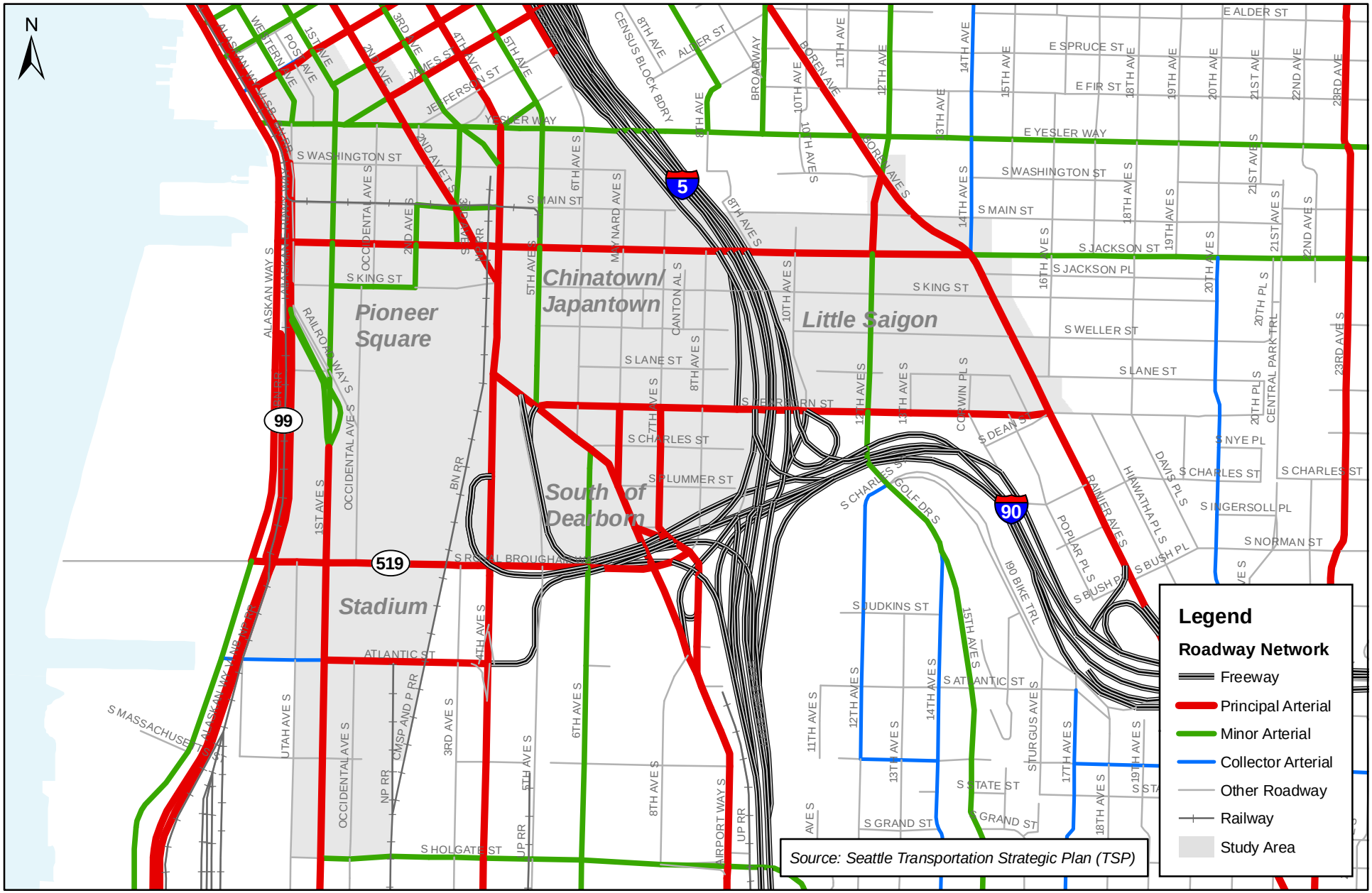

Figure 1-1

Study Area

Livable South Downtown EIS

The Transpo Group

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2. STUDY METHODOLOGY

This chapter summarizes the overall approach to evaluating the transportation system, and describes the transportation data that was collected and the measures used to assess the performance of each of the major transportation system components under each Alternative.

2.1 APPROACH TO THE ALTERNATIVES EVALUATION

The evaluation of the transportation system and the identification of transportation impacts generally followed typical transportation methodologies that include an evaluation of traffic volumes, operations, pedestrians, bicycles and parking. In addition, this analysis includes a relatively more detailed evaluation of the transit and freight components than what has been generally observed in similar programmatic EIS evaluations. Freight was addressed in more detail because of the location of the study area next to the Port of Seattle and adjacent industrial areas. Transit was evaluated at a more detailed level because of its importance to the transportation needs for the study area and the potential effects on transit service to/from Downtown Seattle. This study included the collection of transportation data, evaluation of the existing transportation system conditions, development of travel forecasts, and an assessment of projected future conditions. The performance of the arterial street system, and the transit, freight, parking, and non-motorized elements were evaluated, including an assessment of the event management measures.

The evaluation of the transportation system included a number of transportation-related performance measures grouped by area of focus (arterials, transit, freight, parking, non-motorized, and event management). Each of these specific elements is described in detail below.

Year 2030 travel forecasts were estimated and evaluated to gauge the performance and functionality of the study area transportation system. The 2030 No-Action Alternative was developed to represent the future transportation system operations assuming no zoning changes and completion of several regional and local transportation improvement projects that are expected to be in place by 2030. This Alternative serves as a future baseline against which each of the three Action Alternatives can be compared. The same performance measures evaluated for existing conditions were again assessed for each of the 2030 Alternatives.

2.2 DATA COLLECTION SUMMARY

The evaluation included the collection and assimilation of data for each of the major transportation elements. The data were provided by several different agencies including the City of Seattle, WSDOT, King County Metro, and Port of Seattle. The existing data were supplemented by data collected in the field such as traffic counts, vehicle classification counts, parking utilization and supply surveys, and general windshield surveys. A summary of the data collection activities is provided below.

2.2.1 Arterial Street System

Traffic data were collected for major intersections and arterials in the study area. The turning movement counts (TMC) were collected during both the AM and PM peak hours. Many of the TMCs also included pedestrian and heavy vehicle counts as well. Data were collected for two hours in each of the AM and PM peaks over 15 minute intervals in order to capture the peak hour traffic period. Counts were conducted on a Tuesday, Wednesday, or Thursday. Mondays, Fridays, and weekends were excluded since traffic volumes are typically reduced immediately prior to, or following, weekends. No counts were conducted on holidays or immediately prior to or following holidays. Counts were also not conducted during events at the stadiums. The AM counts were conducted between 7:00 am and 9:00 am while the PM counts were conducted between 4:00 pm and 6:00 pm. The hour with the greatest number of vehicles within the two hour peak period was used to evaluate the traffic operations. The existing intersection turning movements are provided in Appendix A.

Most of the traffic data collection occurred during January and February 2007. However, some intersection counts were obtained from the Seattle Department of Transportation (SDOT) and other recent studies, and were typically conducted at some time over the past two years. These counts were factored to 2007 volumes assuming a one percent annual growth rate, based on historical traffic counts.

Signal timing and phasing data were obtained from SDOT in the form of intersection time cards, while intersection geometry was derived from aerial images and channelization was verified during the windshield surveys.

Mid-block daily counts were also conducted along S Dearborn Street, Airport Way S, 1st Avenue S, and 4th Avenue S. For 1st and 4th Avenues S, the tube counts were performed at two locations: north of S Royal Brougham Way and south of S Atlantic Street. These were performed on similar days as the turning movement counts.

2.2.2 Transit

Transit information related to service coverage and frequency for bus routes within the study area was identified through published schedules provided by King County Metro and Sound Transit. Transit ridership data for 2006 were provided by King County Metro and included boarding and alighting data for each bus stop within the study area for the average weekday AM and PM peak hours.

GIS data included bus stop locations and other transit facilities within the study area. Records related to the transit performance measures detailed in the Urban Village Transportation Network (UVTN) Monitoring Report (2006) included frequencies, span of service, operating speed, and passenger loading for the study area UVTN corridors.

2.2.3 Freight

Vehicle classification counts were conducted along S Dearborn Street, Airport Way S, 1st Avenue S, and 4th Avenue S. For 1st and 4th Avenues S, the counts were performed at two locations: north of S Royal Brougham Way and south of S Atlantic Street. The counts were collected between January and March 2007 using tube counters. A supplementary heavy vehicle count was made in April 2007 between 7:00 am and 9:00 pm using video cameras to verify the type and volume of truck activity along the Airport Way S and 6th Avenue S corridors in the South of Dearborn neighborhood. Other vehicle classification data were assimilated for the S Royal Brougham Way and S Atlantic Street corridors from the SR 519 Phase 2 feasibility analysis.

Daily counts of rail traffic at S Royal Brougham Way and S Holgate Street between 1st Avenue S and 4th Avenue S were assimilated from the S Holgate Street Closure Study.[1] Additional data were collected in May from field surveys to identify the number of trains during the PM peak hour.

2.2.4 Parking

Parking supply and demand was obtained from several different sources. The majority of on-street parking information was obtained from the City of Seattle. Other data sources for parking included the S Dearborn Street Mixed Use Development EIS and the SR 99: Alaskan Way Viaduct & Seawall Replacement Project EIS. The data were supplemented via a field review, which verified the supply and noted approximate mid-day utilization of lots. This review was conducted in March 2007 for the on-street and off-street parking locations. Off-street parking data were collected only for public lots identified for potential redevelopment so as to identify the number of spaces that would likely be displaced.

[1] *S Holgate Street Railway Crossing Closure Traffic Impact Analysis*, WSDOT, December 2003

2.3 DEVELOPMENT OF THE TRAVEL FORECASTS

The SDOT travel demand model, which is a refined version of the Puget Sound Regional Council (PSRC) Regional Travel Demand Model, was used for this study. The SDOT model retains the PSRC model level of detail for areas outside Seattle boundaries while using a more detailed network and zonal structure for Seattle itself, along with enhancements to parking costs and transit.

The most current version (April 2007) of the City's model, representing progress made in the model update process, was used for this study. The updated model reflects changes in residential and employment land uses, as well as approved future transportation projects, developed by the PSRC for this purpose. The model represents a reasonable platform for comparing the travel impacts of the study alternatives. The model has a 2005 base year and a 2030 future horizon year. The 2030 horizon year land use data within the model were updated for each Alternative to assist in evaluating changes in travel behavior resulting from the proposed land use modifications.

The SDOT model is a rather sophisticated model running on an EMME/2 software platform and uses the four-step model process that includes trip generation, trip distribution, mode choice, and trip assignment. Documentation of the model and model updates were obtained along with each of the model databanks from SDOT.

The model was used to evaluate the different Alternatives by comparing the Alternatives to the No-Action Alternative. It also was used to develop 2030 forecast traffic volumes along the major roadways within the study area. Future daily person trips were also output from the model to identify changes to mode share and the number of future transit trips.

2.4 IDENTIFICATION OF THE PERFORMANCE MEASURES

Performance measures were identified and evaluated for existing conditions, 2030 No-Action Alternative, and under each of the Action Alternatives. The measures characterize the relative differences in performance between each of the Alternatives and establish transportation impacts that could be expected. They were developed based on input from the City of Seattle and are meant to be used as broad level comparisons consistent with a programmatic EIS evaluation. The measures address each of the modes of travel.

2.4.1 Arterial Street System

The performance measures used for analyzing and assessing the arterial street system are focused on a travel time based level of service (LOS) for the major corridors within the study area. Arterial LOS is a useful measurement to depict traffic conditions on urban street corridors. The *Highway Capacity Manual* (HCM) Transportation Research Board 2000 presents clear guidelines on quantifying travel-time-based LOS for urban streets. Table 2-1 summarizes the HCM travel time LOS definitions based on travel speeds.

Table 2-1. Urban Street Level of Service

LOS	Description
A	Describes primarily free-flow operations at average travel speeds, usually about 90 percent of the free flow speed (FFS) for the given street class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.
B	Describes reasonably unimpeded operations at average travel speeds, usually about 70 percent of the FFS for the street class. The ability to maneuver within the traffic stream in only slightly restricted, and control delays at signalized intersections are not significant.
C	Describes stable operations, however, ability to maneuver and change lanes in mid-block locations may be more restricted than LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the FFS for the street class.
D	Borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40 percent of FFS.
E	Characterized by significant delays and average travel speeds of 33 percent or less of the FFS. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.
F	Characterized by urban street flow at extremely low speeds, typically one-third to one-fourth of the FFS. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

Source: *Highway Capacity Manual,* Transportation Research Board, 2000

The average travel speed for through-vehicles along an urban arterial is measured against the free flow speed and used to determine the operating arterial LOS. The travel speed along an arterial is dependent on running speed between signalized intersections and the amount of control delay incurred at signalized intersections. Table 2-2 summarizes descriptions that characterize travel time based LOS on urban streets.

The study area corridors were assigned an Urban Street Class designation (see Table 4-1). The Urban Street Class designation is used to develop an LOS value for the corridor based on the average travel time. Urban Street Class is a classification system used by the *Highway Capacity Manual* 2000 to reflect the unique combinations of street function and design. The functional component is separated into two categories: principal arterials and minor arterials. The design component is separated into four categories: high-speed, suburban, intermediate, or urban (see Chapters 10 and 15 of the *Highway Capacity Manual* 2000 for a complete discussion on urban street concepts and travel time LOS methodology). For the purposes of this analysis the Urban Street Class was assigned based on the average posted speed. All corridors were assigned an Urban Street Class III designation, with the exception of 3rd Avenue which was assigned a Class IV designation.

Table 2-2. Level of Service for Urban Streets

Urban Street Class	**I**	**II**	**III**	**IV**
Range of Free Flow Speed[1] (mph)	**55 - 45**	**45 - 35**	**35 - 30**	**35 - 25**
Typical Free Flow Speed (mph)	**50**	**40**	**35**	**30**
LOS	**Average Travel Speed**			
A	>42	> 35	> 30	> 25
B	> 34 – 42	> 28 – 35	> 24 – 30	> 19 – 25
C	> 27 – 34	> 22 – 28	> 18 – 24	> 13 – 19
D	> 21 – 27	> 17 – 22	> 14 – 18	> 9 – 13
E	> 16 – 21	> 13 – 17	> 10 – 14	> 7 – 9
F	<= 16	<= 13	<= 10	<= 7

Source: *Highway Capacity Manual,* Transportation Research Board, 2000 Exhibit 15-2

1. The free flow speed is the average speed of the traffic stream when traffic volumes are sufficiently low that drivers are not influenced by the presence of other vehicles and when intersection traffic controls are not present or is sufficiently distant as to have no effect on speed choice.

The process that is used to evaluate arterial level of service requires that individual intersection operations be included in the analyses to estimate delays and average travel speeds along the corridors. While individual intersection LOS is not the primary performance measure for the arterial street system, trends in the total number of intersections operating below LOS D conditions were summarized and are presented for each alternative. A description of the intersection LOS methodology and a summary of the intersection LOS results are presented in Appendix A.

2.4.2 Transit

Performance measures reflect the quality of the transit service by evaluating its operational aspects. The Transportation Research Board's (TRB) Transit Cooperative Research Program (TCRP) Report 100 *The Transit Capacity and Quality of Service Manual* identified a wide range of factors that would affect the quality of service. However, the Seattle Transit Plan and the Urban Village Transit Network (UVTN) Monitoring Report (City of Seattle, 2006) define several transit service performance measures for characteristics or features considered as the most important to the City. For consistency, this study applies four of the five identified performance measures described in the Seattle Transit Plan, but refined in the UVTN Monitoring Report. The measures include:

- **Frequency:** The duration of the maximum scheduled gap between consecutive buses on the route. This concept is used as an indicator to reflect the intensity of the service, and the availability for mobility along a corridor. The acceptable threshold set by Seattle Transit Plan is 15 minutes. It should be noted that service frequency is determined by destination from a given transit stop, as several routes may serve a given stop, but not all may serve a particular destination[2].
- **Span of Service:** The number of hours in the day that a service runs at minimum acceptable frequencies identified in the previous performance measure (15 minutes or less). The purpose of this indicator is to show how many hours of acceptable frequency service are available along a street segment. The scoring threshold for the Span of Service measure required by the Seattle Transit Plan is 16 hours of service. Based on this strict threshold, the UVTN Monitoring Report 2006 found that the large majority of the system is failing. Therefore, the UVTN Monitoring Report adopted a reduced passing score of 12 hours that will be increased in the future by the City. For consistency with the UVTN Monitoring Report, this lower threshold was used as the standard in the analysis of the affected environment. However, the 16-hour threshold was set as the future goal to achieve by 2030 and was used as the standard for the alternatives analysis.
- **Travel Speed:** Measures the average operating speed along a transit corridor. It is expressed as a Percentage of Posted Speed Limit (%PSL). The measurement reflects how long the service takes (including all types of delay) to traverse one mile compared to the posted speed limit. Previous studies showed that on key Downtown Seattle streets, average operating speeds have never exceeded 10 mph and could reach as low as 5 mph on some streets during the PM peak hour. Delay along transit routes generally consist of recurring traffic congestion, traffic signal delay, dwell time at stops and sometimes occasional delays caused by a mechanical fault or an accident. The minimum threshold adopted as a percent of posted speed limit is 30 percent. UVTN street segments where transit operating speed drops below 30 percent of PSL are considered deficient.
- **Passenger Loading:** An indicator of the utilization of a transit corridor based on an identified service capacity. Its value is expressed as the ratio of passengers to seated capacity. This parameter is an important measure that provides insight into passenger comfort, both in terms of finding a seat and crowding levels on the transit vehicle.

The fifth performance measure that is identified in the Seattle Transit Plan is Reliability and measures the degree to which the transit schedules are achieved (i.e. on time). Reliability is based on field measurements

[2] *Comprehensive Street Classification, Performance and Design Standard System: final working paper,* City of Seattle, April 2004, p.4-6.

rather than prediction because of the many site specific and stochastic factors that could affect having buses on schedule, which makes it difficult to forecast. Therefore the Reliability performance measure was not included in the evaluation of transit.

2.4.3 Freight

In the absence of nationally or locally adopted performance standards for freight, the *Comprehensive Street Classification, Performance and Design Standard System* report (Nelson/Nygard Consulting Associates, April 2004) recommended types of freight performance indicators. The indicators included a set of qualitative and quantitative assessments such as:

- **Truck Connections:** Ability of current facilities to provide proper connections and circulation options for trucks. It reflects the accessibility level provided by the road network in the study area to allow trucks to safely access their destinations within and around the study area.
- **Major Truck Street Travel Speed:** This indicator assesses the operating conditions of street segments and intersections along the designated Major Truck Streets. It is similar to the general traffic travel speeds, except that increased congestion affects trucks disproportionately more than vehicles due to longer acceleration and wider turning radii. The travel speeds provide a good indicator of the relative differences between the Alternatives even though they may not fully account for additional operational delays that trucks may encounter (which are addressed by the other freight performance measures). Increased travel speed arises from less delay encountered at intersections.
- **Design Standards:** Assessment of design standards that would facilitate or inhibit truck operations. It includes items such as clearances at bridges and other structures, turning radii, lane width and absence of weight limits or other restrictions.

Each of these identified performance measures were used to evaluate the impacts along the Major Truck Streets and compare between Alternatives.

2.4.4 Parking

The parking analysis focused on existing parking lots that are expected to be redeveloped under the various Alternatives. These locations are most likely to impact the parking supply in the study area. The performance measures included a review of the total amount of displaced off-street public parking by neighborhood to be displaced by each of the Alternatives. The impacts focus less on the supply of lost parking spaces and more on the loss of utilized parking spaces that currently provide parking to the public (either hourly or by permit). In addition, the supply and utilization of on-street parking supply was also inventoried and evaluated to understand whether it might be able to accommodate any displaced parking.

The City's parking based goals, as included in the Comprehensive Plan and TSP, are not to provide sufficient parking for commuters, so as to encourage alternative mode use. The policies do, however, recognize the need to provide adequate short-term parking to support commercial clientele.

2.4.5 Pedestrians and Bicycles

Performance measures used for pedestrians and bicycles were primarily qualitatively assessed, though included pedestrian counts at some locations. They were evaluated to give a general overview of the impacts the Alternatives may have on the pedestrian and bicycle facilities throughout the study area. The performance measures are as follows:

- **Facilities:** How well the current facilities would serve the new pedestrian and bicycle population.
- **Major Attractors:** How accessible major pedestrian attractors are to new and existing pedestrian and bicycle users.

- **Neighborhood Attractors:** How accessible new and future neighborhood attractors, such as mixed-use developments, are to pedestrians and bicycles.
- **Conflicts:** How pedestrians and bicyclists would be affected by growth in traffic volumes from new development.

2.4.6 Event Management

Event management impacts were evaluated at a programmatic level using both Qwest Field and Safeco Field Transportation Management Plans (TMP) as a guide to assess potential impacts of each Alternative within the study area, as opposed to a detailed analysis of each intersection or specific access and/or parking location. The analysis focuses on how, in general, the objectives and specific measures necessary to achieve the goals of each TMP for Safeco and Qwest would be affected and what strategies should be employed to mitigate the impacts of the Alternatives on event management and the level of additional resources needed to accommodate the land uses.

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3. CONSISTENCY WITH OTHER STUDIES

This section provides a summary of the studies and adopted plans that have been completed recently and which have been used to assist in the development of future assumptions, identification of performance measures, and evaluation of the proposed Alternatives on Seattle's transportation system. The South Downtown transportation discipline report is consistent with and supportive of each of the plan documents described below.

3.1 SEATTLE'S COMPREHENSIVE PLAN: TOWARD A SUSTAINABLE FUTURE

(Chapter 3: Transportation Element) City of Seattle, January 2005

The Comprehensive Plan defines transportation goals and policies that serve the growth objectives of the City. The policies focus on the Urban Village (UV) development pattern and highlight the desire to connect these areas with high quality transit service. The plan recognizes the City has a limited amount of street space and instead focuses on non-single occupant vehicle transportation facilities to support future development. The plan highlights the desire to make non-auto modes such as transit, bike, and walk real choices for residents. The Livable South Downtown project is consistent with the Comprehensive Plan in that it promotes transportation modes such as walking and biking, while taking advantage of the existing and planned transit facilities within the South Downtown area. The transportation policies of the Comprehensive Plan were used to guide the level and focus of the transportation analysis and assist in identifying appropriate mitigation strategies. Recent passage of Seattle's Complete Street ordinance (#122386) in April of 2007 reinforces the policies of the Comprehensive Plan by requiring the City to consider all users of the transportation system when designing roadway improvements.

3.2 TRANSPORTATION STRATEGIC PLAN (TSP)

Seattle Department of Transportation, August 2005

The Transportation Strategic Plan (TSP) is the functional plan developed to implement the policies adopted by the Comprehensive Plan. It establishes the Seattle Department of Transportation's (SDOT) near- and long-term strategies, projects and programs to improve safety, preserve and maintain the transportation infrastructure, support the Urban Village land use strategy, and provide mobility and access through transportation choices. The TSP was used to evaluate roadway classifications and operational measures and identify future projects within the study area.

3.3 SEATTLE TRANSIT PLAN

Seattle Department of Transportation, September 2005

The Transit Plan sets the Comprehensive Plan transit goals and policies, in addition to the transit vision based on the Urban Village land use concept. The key element of this plan is to make transit a real transportation choice. It provides good direction on how Seattle can achieve this goal by focusing on the Urban Village transit corridors and multimodal hubs. The plan also defines the transit quality of service measures and transit priority treatment toolbox. The Transit Plan was used to identify key transit corridors, performance measures, and future transit projects.

3.4 UVTN MONITORING REPORT

Seattle Department of Transportation, Draft Final Report, June 2006

This document reports on the performance of the Urban Village Transit Network (UVTN), or "Seattle Transit Connections." It is the first of a series of annual reports that measure the performance of the UVTN corridors and make recommendations on required improvements. The report includes a description of the transit quality of service measures and identifies how they have been revised since the adoption of the Seattle Transit Plan. Information used to develop the report was obtained and used to evaluate the UVTN transit corridors within the study area. The revised service standards identified in this study were the basis of the transit evaluation.

3.5 FREIGHT MOBILITY STRATEGIC ACTION PLAN

Seattle Department of Transportation, June 2005

The plan identifies strategies, projects, and programs to protect and grow the industrial job base. It includes twenty-two specific actions that will help get freight moving. The action items vary from updating street design guidelines for easy truck turning to long-term strategic investment programs such as railroad crossing overpasses. The plan focuses on projects to improve freight movement such as SR 519 Phase 2, the Spokane Street Viaduct widening, and the S Lander Street grade separation. The plan was used to identify future freight improvements, establish freight performance measures, and evaluate impacts along the Major Truck Streets.

3.6 GREATER DUWAMISH MANUFACTURING AND INDUSTRIAL CENTER PLAN

Seattle Department of Planning and Development, June 1999

This plan recommends specific goals and policies intended to ensure the viability and expansion of manufacturing and industrial activity in the Greater Duwamish Manufacturing and Industrial Center (M&I Center). The plan discusses the conflict between the various transportation modes, the increasing traffic congestion by non-industrial uses in the area, and increased commuter through-traffic. The plan recommends a prioritized set of proposals designed to improve transportation and freight mobility throughout the M&I Center. The plan was used to assist in identifying and evaluating the freight performance measures and understanding the issues identified by the industrial community.

3.7 CENTER CITY CIRCULATION REPORT

Nelson/Nygard Consulting Associates, Seattle Department of Transportation, December 2003

The report helps define the relationships among the major capital projects and the City's economic development and quality of life goals. It provides a set of localized recommendations by area on what else must be done once the major transit and roadway projects are completed such as Link Light Rail and the Alaskan Way Viaduct. The areas of focus within the study area include Pioneer Square Station, King Street/International District Station, Alaskan Way S, and other north-south streets such as 1st Avenue S and 3rd Avenue. The study was used to assist in identifying mitigation strategies and areas to evaluate further as part of the transportation analysis.

3.8 CONTAINER TERMINAL ACCESS STUDY

Heffron Transportation, Inc., Port of Seattle, October 2003

The updated study summarizes the current state of the South Downtown area roadway network and what additional improvements are needed to serve continued growth at the Port through the year 2015. The goals of the study include the review of currently planned improvements, understanding how different development scenarios could affect infrastructure needs, and recommending policies that the Port can choose to implement regarding infrastructure improvements. Information within the report was used to update the City travel demand model to be consistent with future truck activity from the Port's terminals surrounding the study area, such as T-46, while also noting truck travel patterns and time of day impacts.

3.9 MAYOR'S MANUFACTURING AND MARITIME ACTION PLAN

Office of Economic Development of the City of Seattle, Berk and Associates and University of Washington, 2004

Under the Mayor's Action agenda, two studies have been conducted: The "Basic Industries Cluster Analysis Study" and "Seattle's Maritime Cluster: Characteristics, Trend and Policy issues." The Plan aims at protecting industrial land base, retaining and expanding the City's Manufacturing and Maritime sectors, and improving transportation to keep Freight moving.

3.10 DEARBORN STREET EIS TRANSPORTATION IMPACT ANALYSIS

Heffron Transportation, Inc., Seattle Department of Planning and Development, August 2006

The report presents the transportation impact analysis for the proposed S Dearborn Street Mixed-Use Development. The development is located where the existing Goodwill Industries is located today. It documents and compares the likely impacts of each land use alternative and highlights recommended mitigation strategies. Information regarding the size of the development and potential displaced parking spaces were used and incorporated into the Livable South Downtown transportation analyses.

3.11 SEATTLE PARKING MANAGEMENT STUDY

Heffron Transportation, Inc., Seattle Department of Transportation, September 2002

This study reviewed on-street parking management and regulations for providing off-street parking in several Seattle urban and suburban neighborhoods. While none of the neighborhoods included in the Parking Management study are specifically the same as those in this study, the observations and recommendations included in the study are consistent with those identified as part of the Livable South Downtown transportation analyses.

3.12 SEATTLE COMPREHENSIVE NEIGHBORHOOD PARKING STUDY

KJS Associates, 2000

This study was sponsored by the City of Seattle Strategic Planning Office. The goal of the study was to recommend parking management strategies that would support transit use as well as commercial and residential parking needs. It also reviewed the City's parking requirements to determine if changes were recommended to support the City's land use goals. Bicycle parking requirements and the financing of public

parking facilities were reviewed. The study was used to assist in identifying possible mitigation strategies as part of the transportation analysis.

3.13 SAFECO FIELD TRANSPORTATION MANAGEMENT PLAN (MARCH 1, 2007 TO MARCH 1, 2008)

Baseball Club of Seattle, LLP., The Seattle Mariners, 2007

Each year the Seattle Mariners submit a Transportation Management Plan (TMP) as required by their Master Use Permit (MUP) for the ballpark. The plan covers all the games at Safeco and other special events. The plan was prepared by Susan K. Ranf, Director of Transportation for the Seattle Mariners. The plan outlines the measures implemented and evaluation techniques used to assure that the TMP achieves the goals as directed in the MUP related to number of vehicles per 1,000 attendees are achieved. The plan was used to identify the TMP measures currently implemented.

3.14 QWEST FIELD EVENT CENTER TRANSPORTATION MANAGEMENT PROGRAM (PLAN YEAR 2006 TO 2007)

Washington State Public Stadium Authority, First & Goal, Inc., Seattle Seahawks, May 2006

This document prepared for the City of Seattle and the Parking and Access Review Committee (PARC) summarizes the Transportation Management Program (TMP) and implementation responsibility for the activities at the Qwest Field and Event Center for the years 2006 and 2007. The document outlines the performance goals related to the number of cars per 1000 attendees for the type of event and timing of the event. The document provides an overview of the specifics of the TMP and the responsibilities for implementation and monitoring. It was used to identify the TMP measures currently implemented.

4. AFFECTED ENVIRONMENT

This chapter describes existing 2007 conditions for the transportation systems within the study area. Information regarding current transportation facilities, their use, and their performance is presented. This information establishes an understanding of current conditions and serves as a basis against which projected future conditions for the 2030 Alternatives are compared. Major transportation facilities that could potentially be affected by the Alternatives were inventoried and evaluated. The analysis focused on existing corridor traffic volumes and levels of service, transit routes, freight roadways, on- and off-street parking supply, pedestrian and bicycle facilities, and traffic management measures for events.

4.1 ARTERIAL STREET SYSTEM

This section summarizes the street facilities in the project study area and includes an inventory of the major arterial corridors and existing AM and PM peak hour traffic volumes. The performance measures related to the arterial street system focus on the evaluation of existing corridor levels of service and travel speeds. Other transportation facilities and modes are described in later sections.

4.1.1 Major Corridors

Major corridors within the study area were identified based upon their importance in supporting vehicle, transit, freight, and pedestrian and bicycle movements. Each corridor was identified in coordination with SDOT and DPD staff. The selected corridors generally serve the highest volume of traffic in the study area while supporting several different types of travel modes. Evaluation of these corridors provides a good indication of the Alternatives' potential impacts on the arterial street system. The corridors are as follows:

- **1st Avenue S:** A major north-south corridor carrying traffic to and from the study area as well as serving through-traffic. Ramps exist along 1st Avenue S connecting it to the Alaskan Way and Spokane Street Viaducts. It is a major truck route and transit corridor. 1st Avenue S was analyzed between Yesler Way and S Spokane Street.
- **2nd Avenue Extension S:** Operates in the southbound direction through Downtown and ends at 4th Avenue S just south of S Jackson Street. It is a major transit corridor. The 2nd Avenue Extension S was analyzed between James Street to the north and 4th Avenue S to the south.
- **3rd Avenue:** A minor arterial in the Downtown core that has been converted to a bus-only transit way north of Yesler Way during peak hours while the bus tunnel is retrofitted for Light Rail. 3rd Avenue was analyzed between James Street and the 2nd Avenue Extension S.
- **4th Avenue S:** Provides important connections to and from I-90, SR 519, Airport Way S and from the Spokane Street Viaduct. 4th Avenue S carries traffic in both directions south of the 2nd Avenue Extension S, while only serving northbound traffic into Downtown north of S Jackson Street. 4th Avenue S was analyzed between S Washington Street and S Spokane Street. It is a major truck route south of Airport Way S.
- **Rainier Avenue S:** A north-south corridor connecting to I-90 and the Rainier Valley south of the study area. It borders the eastern part of the study area and is a major transit corridor and truck route south of S Dearborn Street. Rainier Avenue S was analyzed between S Jackson Street and S Dearborn Street.
- **S Jackson Street:** An important east-west corridor that extends from Alaskan Way S to Rainier Avenue S. S Jackson Street is used by local traffic as well as through-traffic mainly between 4th Avenue S and Rainier Avenue S. It is a major transit corridor.
- **S Dearborn Street:** A major truck route that provides a connection between 4th Avenue S and Rainier Avenue S. It has ramps for general purpose vehicles connecting to I-5 and express lane ramps connecting to I-90.
- **S Royal Brougham Way:** A major connection to the waterfront from 4th Avenue S and 1st Avenue S. In addition, it serves as primary access to Qwest Field and Safeco Field. It is a critical

connection especially during events. There is an at-grade railroad crossing located west of 4th Avenue S which closes the road quite often at all times of the day.

- **S Atlantic Street:** Also known as Edgar Martinez Drive S and SR 519. It provides an important connection to I-90 and is envisioned to be a major connection from I-90 when the second phase of SR 519, linking I-90 westbound to S Atlantic Street, is completed.

The major characteristics of each corridor are listed in Table 4-1. The table includes information on the arterial classification, number of lanes, average weekday daily traffic, speed limits, and a sidewalk inventory.

Table 4-1. Major Corridor Characteristics

Corridor	Classification	Direction	Lanes [1]	2007 AWDT [2]	Speed Limit	Sidewalks
North-South Corridors						
1st Avenue S	Principal Arterial /	NB	2	25,000	35	Both Sides
(Yesler Way to S Spokane St)	Minor Arterial [3]	SB	2			
2nd Avenue Extension S	Principal Arterial	NB	-	13,000	30	Both Sides
(James St to 4th Ave S)		SB	3			
3rd Avenue S	Minor Arterial	NB [4]	2	7,500	30	Both Sides
(James St to S Jackson St)		SB	2			
4th Avenue S[5]	Principal Arterial	NB	3	29,000	30	Both Sides
(S Washington St to S Spokane St)		SB	2			
Rainier Avenue S	Principal Arterial	NB	2	31,000	30	Both Sides
(S Jackson St to S Dearborn St)		SB	2			
East-West Corridors						
S Jackson St	Principal Arterial	EB	2	16,500	30	Both Sides
(Alaskan Way S to Rainier Ave S)		WB	2			
S Dearborn St	Principal Arterial	EB	2	21,500	30	One Side
(Airport Way S to Rainier Ave S)		WB	2			
S Royal Brougham Way	Principal Arterial	EB	2	12,000	30	Both Sides
(Alaskan Way S to 4th Ave S)		WB	3			
S Atlantic Street	Principal Arterial	EB	2	19,000	30	Both Sides
(Alaskan Way S to 4th Ave S)		WB	2			

Source: *The Transportation Strategic Plan, 2005 Update* (SDOT, August 2005), field survey (March 2007), The Transpo Group (July 2007)
1. The number of lanes varies especially at intersection approaches. Reported is the mid block number of lanes excluding parking lanes.
2. Average Weekday Daily Traffic Volumes. Displays the highest measured daily traffic volumes along the corridor segment.
3. 1st Avenue S is classified as Principal Arterial south of Alaskan Way Viaduct Ramps and Minor Arterial North of AWV Ramps.
4. 3rd Avenue S is SB only between Yesler Way and S Washington St and between 2nd Avenue Ext S and S Jackson St.
5. 4th Avenue is NB only between 2nd Avenue Ext S and S Washington St.

4.1.2 Peak Hour Traffic Volumes

Traffic volume data were collected for the study area to evaluate existing weekday traffic conditions during both the AM and PM peak hours. The weekday AM and PM peak hours were included in the review and analysis to document traffic conditions during the time periods that typically have the highest traffic volumes and levels of congestion in the study area. Year 2007 AM and PM peak hour traffic volumes are shown on Figure 4-1.

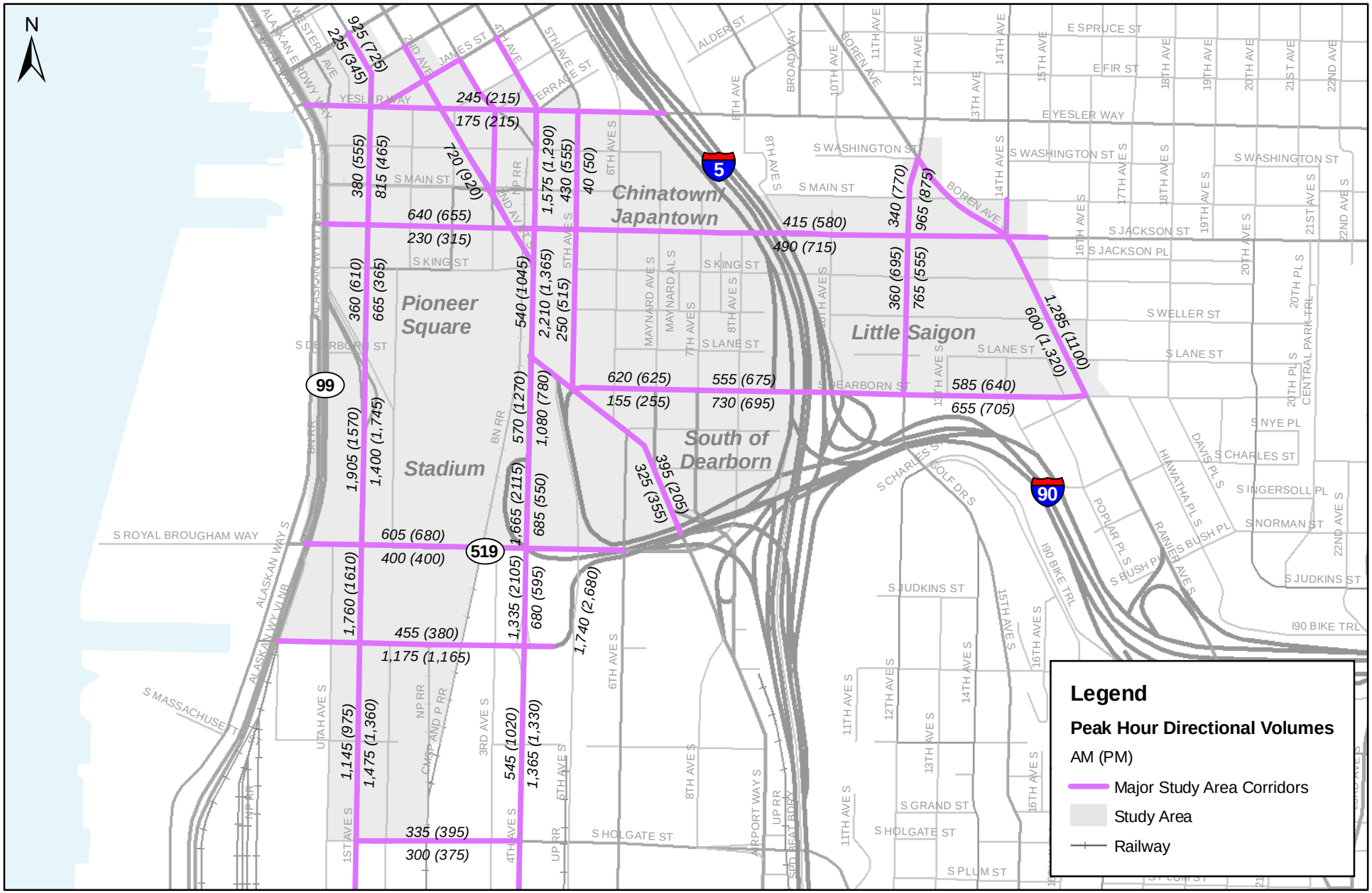

Figure 4-1
2007 Weekday AM & PM Peak Hour Traffic Volumes

Livable South Downtown EIS

The Transpo Group

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AM Peak Hour

During the AM peak hour, traffic volumes are highest going toward Downtown along corridors such as 1st Avenue S, 4th Avenue S, and Rainier Avenue S. The inbound traffic volumes in the AM peak hour are more than 50 percent greater than inbound volumes during the PM peak hour. This trend is mostly observed in the northern part of the study area. This is due to the high number of vehicles heading to the Downtown employment centers from communities south and east of the study area. Other corridors throughout the study area generally carry more vehicles during the PM peak hour.

PM Peak Hour

During the PM peak hour, a reverse traffic flow is observed with higher volumes of traffic leaving the Downtown area. The reverse traffic pattern is also observed on east-west corridors such as S Dearborn Street and S Jackson Street. These traffic flow patterns are also found on the ramps from I-90 at 4th Avenue S, SR 519 at S Atlantic Street, and from/to I-5 at S Dearborn Street. However, the corridor segments in the southern part of the study area generally have the same number of vehicles in each direction during the PM peak hour as they do during the AM peak hour, unlike those locations observed in the northern areas. The land uses along these corridors are industrial and commercial in nature with inbound and outbound vehicles generated by these land uses going both northbound and southbound to access the major freeways.

4.1.3 Travel Characteristics

Travel patterns within the study area are estimated based on the 2005 version of the SDOT EMME/2 travel demand model. Analysis of travel patterns show that during the AM and PM peak hours the majority of traffic in South Downtown is through-traffic having both origins and destinations outside the study area. Traffic commuting to the employment centers in the Downtown area from east and south communities constitute the majority of through-traffic. In addition, traffic going from I-90 to the Alaskan Way Viaduct and the Alaskan Way S surface street contribute additional through-traffic.

The modeling estimates that under existing conditions, through-traffic during both the AM and PM peak hours accounts for more than 90 percent of the traffic on the South Downtown road network. This is discussed below in more detail for both AM and PM peaks and illustrated in Figure 4-2.

AM Peak Hour

In the AM peak hour, the average number of trips having their origins or destinations within the study area is about 6,800 person trips or 3,400 vehicle trips. The non-auto mode capture (which includes transit, walk, and bike) was estimated from the model at 37 percent of total person trips. The average auto occupancy during the AM peak was about 1.26 persons per vehicle based on information summarized for the SOV, HOV, and vanpool modes.

As listed in Table 4-2 and illustrated in Figure 4-2, of the traffic entering the study area from the north during the AM peak hour, approximately 89 percent are vehicle trips through South Downtown. Of the total vehicle traffic entering from the south, about 92 percent are through trips. Similar results are observed for vehicle traffic entering the study area from the east and west during the AM peak. Overall, of all of the total vehicle trips entering South Downtown in the AM peak hour, about 90 percent are through trips and only about 10 percent are destined to South Downtown.

Of the total person trips generated by uses within the study area (or originating within the study area), the model estimates about 50 percent of trips during the AM peak hour have destinations to the north, 26 percent to the south, 8 percent to the east, and 1 percent to the west. The remaining 15 percent are estimated to be internal person trips having both their origins and destinations within the study area.

Table 4-2. Study Area Vehicle Travel Patterns (2007 AM Peak Hour)

	Destination[1]					
Entering Location	**Study Area**	**North**	**South**	**East**	**West[2]**	**Through Trip Percentage**
North	11%	-	65%	24%	0%	89%
South	8%	87%	-	5%	0%	92%
East	10%	65%	25%	-	0%	90%
West	6%	59%	24%	11%	-	94%
		Total Average				**90%**

Source: City of Seattle Travel Demand Model, vehicle trips only
1. State Highways such as I-90, I-5, and SR 99 were included in this analysis.
2. The traffic from north, south, and east heading west is not zero in absolute terms but rounds to 0% when reported as a percentage.

PM Peak Hour

During the PM peak hour, it is estimated that about 10,600 person trips or 5,600 vehicle trips have an origin or destination within the study area. The auto occupancy during the PM peak hour is higher than during the AM peak hour at 1.42 persons per vehicle whereas the non-auto mode capture (including transit, bike and walk modes) is estimated at 26 percent of the total person trips.

The travel patterns under PM peak conditions are illustrated in Table 4-3 and Figure 4-2. The PM peak travel patterns are similar to the AM peak with an even smaller share of traffic having its origin or destination within South Downtown, estimated at 7 percent out of the total traffic on the network within the study area boundaries.

Of the total person trips generated in the study area during the PM peak hour, approximately 42 percent are oriented to the north, 36 percent to the south, 10 percent to the east, and 1 percent to the west. It is estimated that the remaining 11 percent are internal trips within the study area.

Table 4-3. Study Area Vehicle Travel Patterns (2007 PM Peak Hour)

	Destination[1]					
Entering Location	**Study Area**	**North**	**South**	**East**	**West[2]**	**Through Trip Percentage**
North	8%	-	61%	30%	1%	92%
South	6%	86%	-	8%	0%	95%
East	8%	75%	17%	-	0%	92%
West	4%	67%	20%	9%	-	96%
		Total Average				**93%**

Source: City of Seattle Travel Demand Model
1. State Highways such as I-90, I-5, and SR 99 were included in this analysis.
2. The traffic from south and east heading west is not zero in absolute terms but rounds to 0% when reported as a percentage.

4.1.4 Corridor Operations and Travel Speeds

As identified in Chapter 2, arterial LOS and average speeds are used as the primary criteria to measure the performance along major corridors. The corridor levels of service are based upon the classification and the amount of time it takes a vehicle to navigate the length of the identified corridor. Corridor speeds, on the other hand, are a good quantitative measure to describe the general operational characteristics of each study area corridor. Corridor speeds and levels of service are also evaluated for each Alternative in the subsequent chapter. Table 4-4 lists the results of the arterial analysis for study area corridors for both AM and PM peak hours.