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Fact Sheet

Transportation in the Center City Today

Introduction

Downtown Seattle is the heart of the Puget Sound's regional economy and a center of Pacific Northwest culture. Workers and residents, shoppers and tourists, freight and services make their way into and out of Seattle's center every day. Already the largest and densest employment center in the State, the Seattle Central Business District is expected to add approximately 30,000 jobs by 2030. During the same period, the downtown residential population is expected to more than double.

Figure 1 Seattle CBD Growth Forecasts

Year	Employment Growth Total	Employment Growth (from 2000)	Employment Growth Change (%)	Population Growth Total	Population Growth (from 2000)	Population Growth Change (%)
2000	137,038	-	-	11,269	-	-
2010	149,776	12,738	9%	16,078	4,809	43%
2020	164,680	27,642	20%	18,561	7,292	65%
2030	176,903	39,865	29%	23,242	11,973	106%
2040	185,262	48,224	35%	29,851	18,582	165%

Data Source: Puget Sound Regional Council, "2006 Sub-County (Small Area) Forecasts of Population and Employment, Central Puget Sound Region (Released Oct 26th, 2006)." PSRC. http://psrc.org/data/forecasts/index.htm (accessed November 18, 2007)

As it continues to grow, this thriving downtown and adjacent Center City neighborhoods will face unique transportation challenges and opportunities due to distinctive internal geometry and surrounding geography. Careful planning will be necessary for Seattle to support this level of growth by moving people and goods in and out of downtown and the Center City.

What are the Center City's geographic constraints?

Seattle's center resembles an hourglass in both shape and function. People and goods funnel through heavily-trafficked north-south corridors into a narrow downtown core. Bounded on the west and east by Puget Sound and Lake Washington, and further tapered by I-5 to the east, downtown Seattle has no room for horizontal spread and little opportunity to expand road or parking capacity. Abrupt bluffs and steep slopes, man-made railroad and highway structures, and water bodies such as the Ship Canal and Duwamish River erect additional barriers in all directions between downtown and surrounding neighborhoods. Within this narrow north-south dominated structure, pedestrians, cyclists, drivers, transit riders, and freight must all share existing rights of way.

New construction heralds growth in the CBD and creates challenges for surface street users
Source: Nelson\Nygaard

Many modes share downtown streets.
Source: Center City Circulation Report

Seattle's downtown streets offer a relatively good level of service for traffic. Though traffic collisions, weather delays, or sporting events can suddenly gridlock the core, cars, transit, and trucks consistently flow at steady rates downtown even during major long-term capacity changes such as the 2005-2007 Transit Tunnel closure. Indeed, the Center City Circulation Report finds that bottlenecks surrounding the downtown core efficiently meter vehicle entry, causing congestion on entry roadways, but allowing downtown streets to flow more freely. The worst congestion within downtown is caused by entry and exit ramps to the two north-south highways – I-5 and the Alaskan Way Viaduct (SR 99).

The above-mentioned water bodies bounding downtown create the outer ring of bottlenecks. Freight, transit vehicles, general purpose vehicles, pedestrians and cyclists must cross and enter the center at limited bridge and ferry terminal access points. The second, inner ring stems from the interface between the regional highway system and the downtown streets. SR 99 and I-5 are the major regional routes into Seattle, with SR 520 and I-90 providing links eastward from I-5. Slowdowns arise when vehicles abruptly change setting and speed where freeway ramps join city streets. Additionally within downtown, separate street grids collide at awkward angles at Denny, Olive Way/ Stewart Street, and Yesler Way. The resulting interchanges combined with freeway ramp choke points limit vehicle entry to downtown, which maintains a comparatively steady flow on downtown surface streets.[1]

Signage provides transit customers with directions on how to access the system.
Source: Nelson\Nygaard

Highway ramps slow traffic and pedstrians alike.
Source: Nelson\Nygaard

How does downtown Seattle currently support different modes?

Physical barriers present unique challenges but also suggest creative solutions for future transportation excellence in Seattle. In order to accommodate additional trips on a grid that has little room to expand, Seattle policies and projects must support a rich mix of high-capacity modes. Bus transit will continue to be crucial to keep Seattle moving and meet the city's economic, social justice, and environmental quality goals. Today Seattle is one of the largest major cities in the nation with a primarily bus-based transit system. Close to 650 buses per hour travel through downtown at rush

1 City of Seattle, 2003, "Center City Circulation Report"

Seattle's topography creates challenges for pedestrians and cyclists.
Source: Nelson\Nygaard

hour; this includes in-service and out-of-service transit vehicles operating on downtown surface streets and transit facilities. Keeping this number of buses moving reliably requires significant dedicated rights-of-way. Accommodating all the transit vehicles traveling through downtown creates a physical challenge and the sheer number of bus routes can make it difficult for customers to easily understand the system. Current and developing infrastructure, including the upgraded Transit Tunnel, transit-priority 3rd Avenue, Link Light Rail, streetcars, and expanded express bus service will all help to enhance transportation choices and make transit a viable option for growing numbers of residents.

Cyclists and pedestrians confront steep hills and man-made barriers entering downtown from many directions, whether crossing water, cliffs, highways, or railroads. However, access from some neighborhoods to the north and south is mostly flat, offering opportunities to increase non-motorized travel. The new Seattle Bicycle Master Plan and upcoming Seattle Pedestrian Master Plan seek to fill gaps in the non-motorized transportation network. As more people and jobs move downtown, biking and walking will become increasingly important for travel to and within the Center City. Still, large distances, steep slopes, and weather will limit these modes' capacity to absorb trips.

Travelers crossing Seattle's water bodies face lengthening ferry queues, difficult terminal-to-downtown connections, and congested bridges. Freight and general traffic compete for road capacity especially near port terminals and along regional highways. Restructuring Colman Dock, revamping ferry service, and deciding the best future for the Alaskan Way Viaduct all offer great opportunity for improvement. Expanded passenger-only ferry service also offers an opportunity to move people into downtown Seattle from around the region without introducing additional vehicular traffic on downtown streets.

The following sections in "Transportation in the City Center Today" will cover in more depth the current Center City experience for transit riders, cyclists, pedestrians, freight, and general-purpose vehicle traffic. Seattle faces difficult challenges in maintaining mobility to and through downtown and must proactively work to integrate plans, projects and services to achieve its goals.

Travel in the City Center Today

Thousands of people flow in and out of Seattle's Center City each day, commuting from nearby Seattle neighborhoods, traveling through the region, and arriving from other parts of the nation and the world. Though the vast number and variety of these trips make exact quantification difficult, this section begins to answer broad questions regarding who comes to the Center City, how they travel, and what are common trip origins and destinations.

What is the total weekday daily travel in and out of the CBD?

Demand for travel has a direct correlation with economic health. In a strong economy, employees must travel to work, the goods and services they produce require delivery, and travel for recreation and shopping increases. On an average weekday, approximately 240,000 vehicles and 85,000 transit passengers enter downtown Seattle; additionally, up to 2,500 bicyclists and thousands of pedestrians travel into and around downtown each day.

Figure 2 shows the number of vehicles entering downtown each weekday from three landside approaches based on 2005 data. Some trips crossing into downtown travel through to adjacent Center City neighborhoods, such as First Hill, Capitol Hill, South Lake Union, Uptown and South Downtown. The screenline tallies in Figure 2 include all vehicles and transit passengers entering downtown surface streets and transit facilities.[2] Vehicles bypassing downtown on SR 99 are not counted in the screenline totals.

Approximately 7% of the vehicles and 21% of transit passengers entering downtown on weekdays do so during a single hour during the morning peak (Figure 3). Totaling all visitors to downtown over the course of a day, 27% arrive on transit. By comparison, during this peak morning hour, 51% of those entering downtown are transit passengers. This suggests a stronger reliance on transit to make fixed commute trips; it is also reflective of the higher level of transit service available at this time.

What are the weekday traffic volumes on downtown streets and highways?

Weekday vehicle volumes in downtown Seattle vary from street to street. Multiple factors affect a street's vehicle-carrying capacity, including:

- Number of lanes
- Lane width
- On-street parking
- Access control
- Signal progression
- Heavy vehicles, such as trucks and buses
- Crossing pedestrians
- Driveways

The Seattle Department of Transportation (SDOT) uses automatic devices placed throughout the city to systematically count vehicles. Figure 4 documents the average weekday traffic volumes recorded by SDOT counters in 2006.

- I-5 weekday traffic volumes range between 235,000 and 241,000 vehicles per day, including traffic on the reversible express lanes.
- The segment of the Alaskan Way Viaduct (AWV) north of Seneca carries 92,500 vehicles per day.
- Aurora Avenue (SR 99) north of Denny Way, and the AWV south of the First Avenue ramps, each carry under 90,000 vehicles per day.
- Excluding 3rd Avenue, each of the city's north-south avenues from First to Sixth carries about 15,000 to 20,000 vehicles per day in the downtown core.
- North-south streets in the Denny Regrade area carry traffic volumes roughly half of those seen in the core.
- West of the I-5 ramps, Mercer Street carries about 39,000 eastbound vehicles per day, and westbound Valley Street carries about 36,000 vehicles. Here, Mercer and Valley act as a one-way couplet, though Valley Street is two-way.
- Denny Street is a 4/5 lane arterial and carries between 30,000 and 35,000 vehicles per day between Elliott Avenue and I-5.

What is the total north-south vehicle demand on downtown streets?

Downtown Seattle is characterized by steep topography on east-west streets and very limited total right-of-way on its avenues, which are aligned north-south. The downtown road and signal systems are designed to facilitate travel on north-south roadways where demand is highest and grades and geometric challenges are least severe. Figure 5 illustrates daily volumes of vehicles and persons crossing a Madison Street screenline on each north-south street and through underground transit facilities.

The height of the pink bars represents vehicle volumes, including the total number of both single occupant (SOV) and high occupancy (HOV) vehicles crossing Madison. The combined height of the blue bars illustrates how many people the facility moves in a day, totaling all passengers in SOV, HOV, and transit vehicles.

While each surface street individually carries a far lower volume of vehicles and persons compared to the AWV and I-5, the north-south surface streets combined carry significant volumes of traffic (Figure 6). Together, all north-south streets carry slightly fewer daily vehicles than the AWV but transport far more people. This is because more of the vehicles on city streets are transit buses rather than private cars.

2 Screenline is a generic term for an imaginary line that bisects one or more roadways or transit facilities allowing planners to quantify different aspects (temporal, mode, etc.) of travel.

Figure 2 2005 Daily Inbound Vehicles and Transit Riders Entering Downtown Surface Streets

Figure 3 2005 AM Peak Hour Inbound Vehicles and Transit Riders Entering Downtown Surface Streets

Figure 4 2006 Average Weekday Traffic Volumes

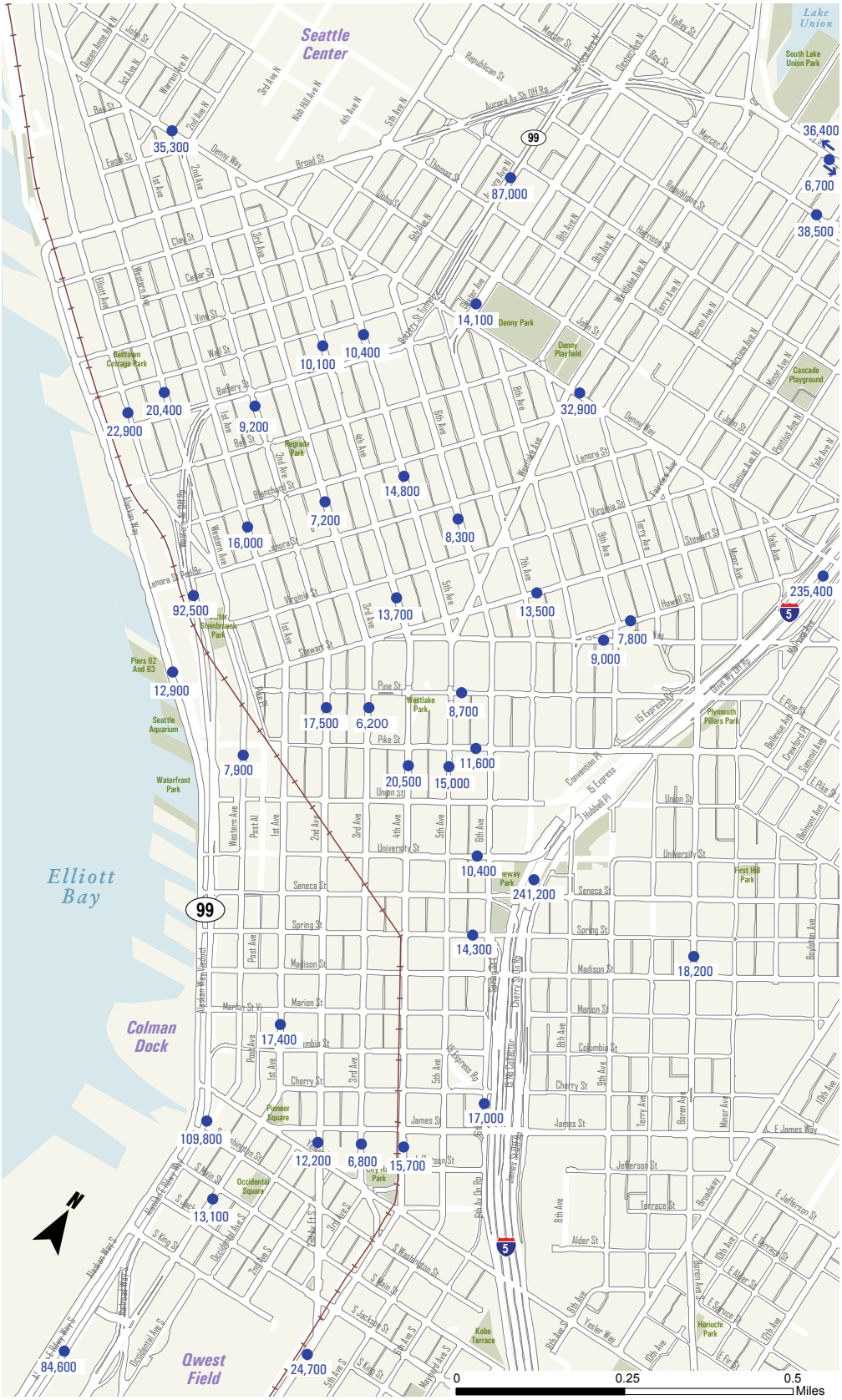
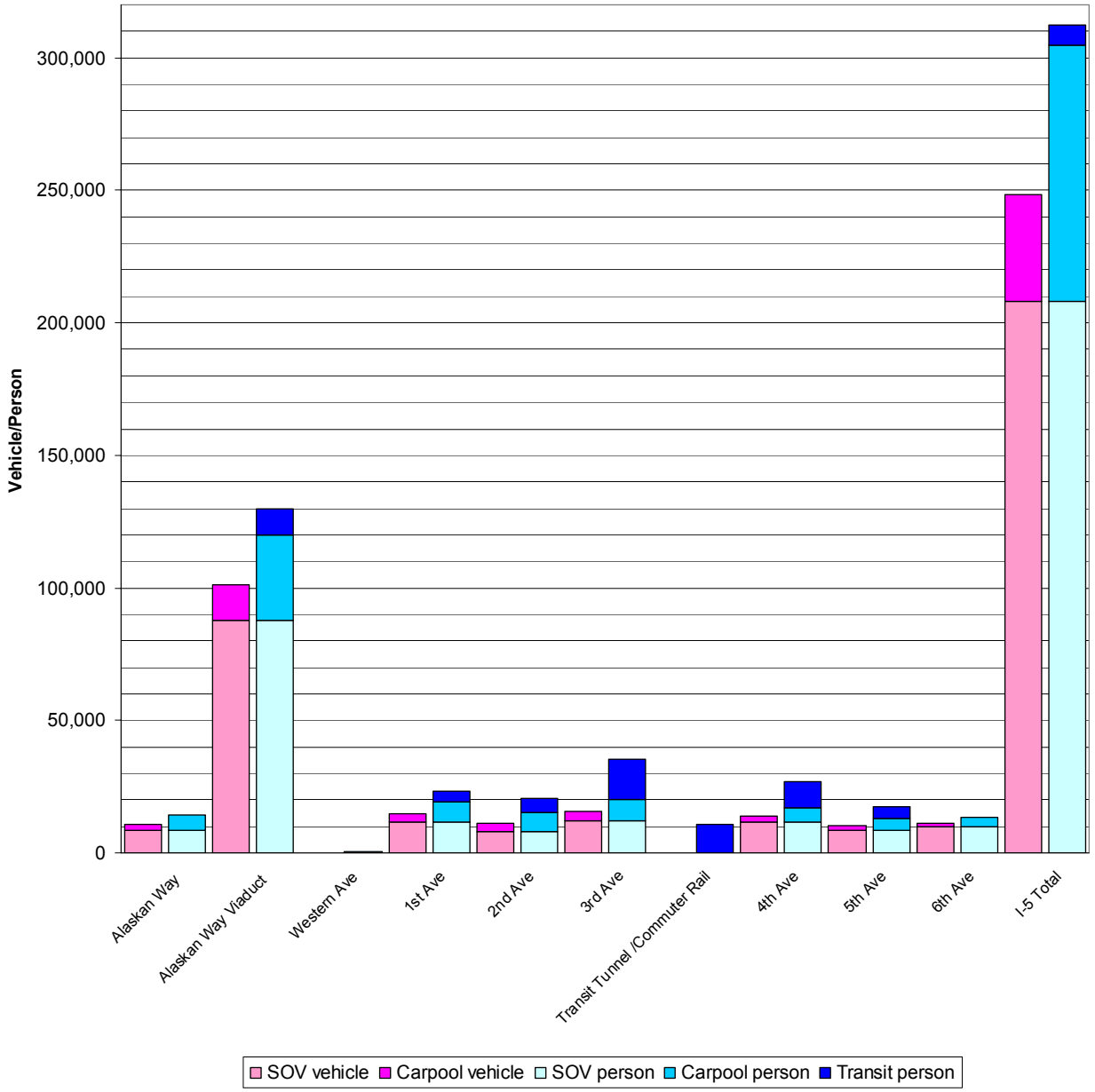
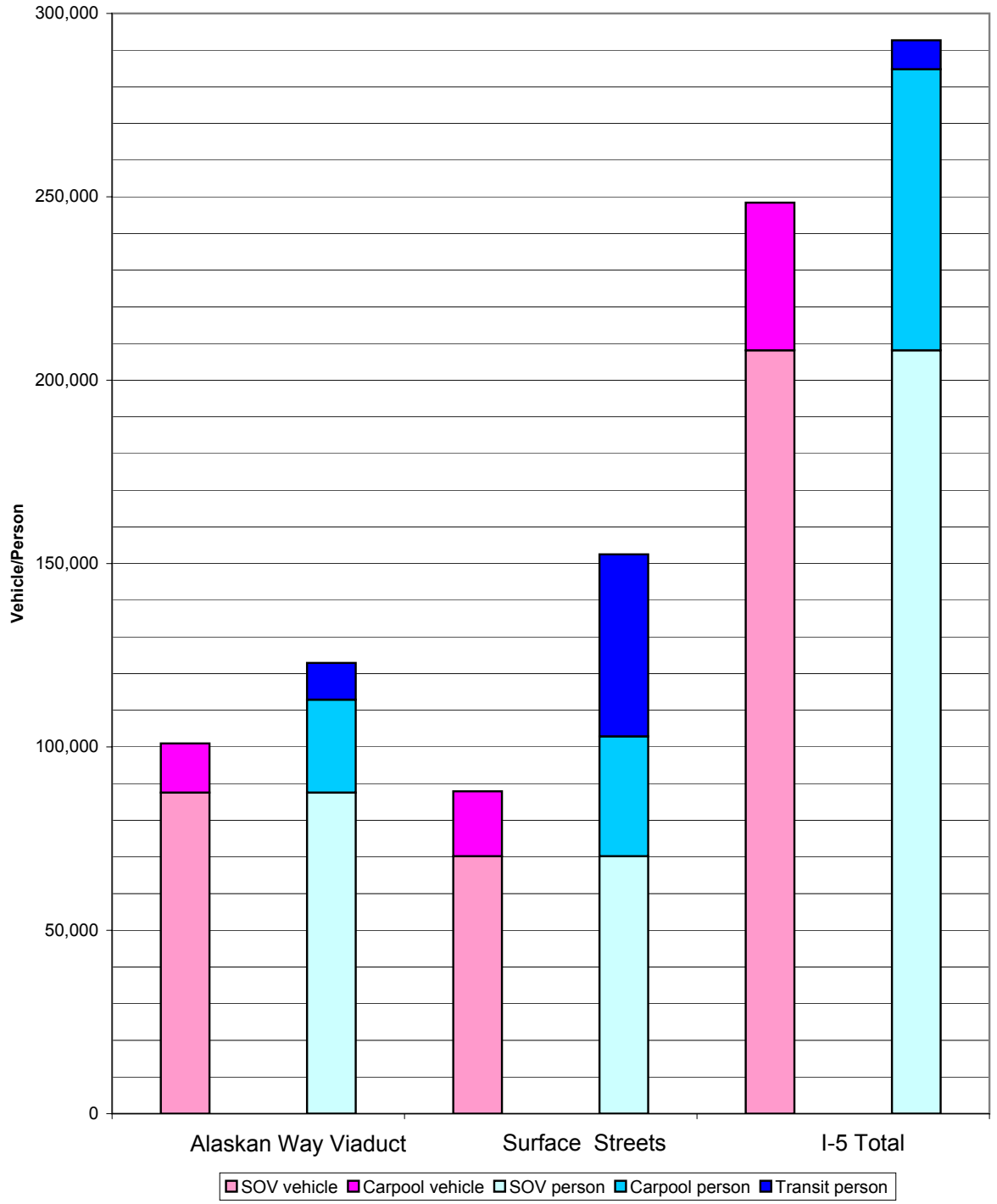


Figure 5 2005 Total Daily Vehicles and Persons Crossing Madison Street Screenline



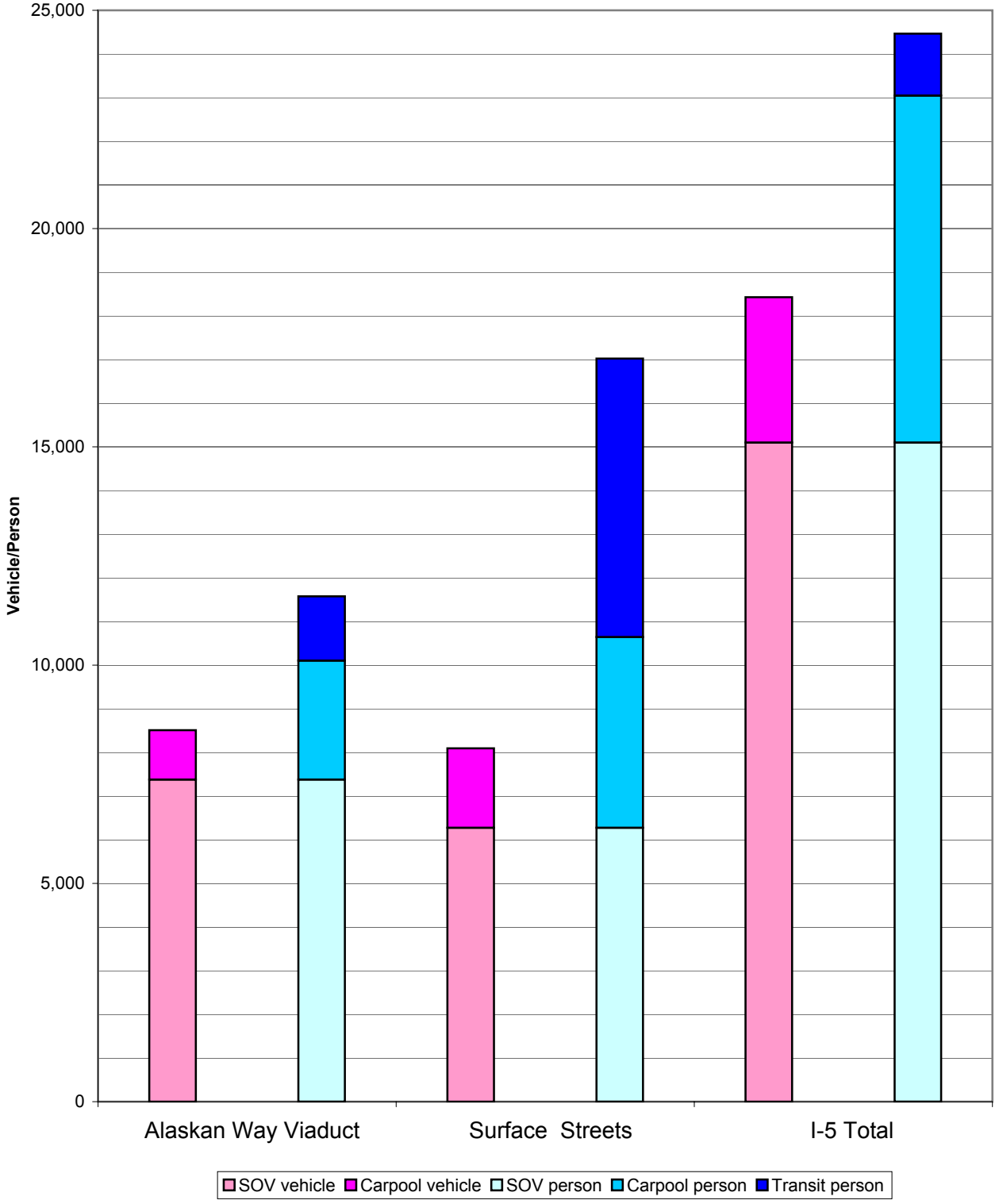
Source: City of Seattle Travel Demand Model (2005)

Figure 6 2005 Total Daily Vehicles and Persons Crossing Madison Street Screenline (Surface Streets Combined)



Source: City of Seattle Travel Demand Model (2005)

Figure 7 2005 PM Peak Hour Vehicles and Persons Crossing Madison Street Screenline (Surface Streets Combined)



Source: City of Seattle Travel Demand Model (2005)

Comparing the number of persons moved over an entire day on downtown streets (Figure 6) to the number of persons moved solely during peak hours (Figure 7) further emphasizes the greater efficiency of moving people via high occupancy modes, such as transit. During peak times, general-purpose auto movement is limited and curb parking is restricted on certain downtown surface streets to ensure more buses can move reliably through the CBD. As a result of the increased transit movement, surface streets carry a substantially higher proportion of the total people moving through downtown during peak periods compared to throughout the day. During one hour in the PM peak, north-south surface streets carry approximately 40,000 persons; three-quarters of these are transit riders.

How many vehicles traveling on the AWV, downtown streets, and I-5 bypass downtown Seattle?

Figures 8 and 9 show the percent of vehicle trips crossing screenlines north and south of downtown during AM and PM peak hours that have a final destination in downtown. This calculation is done separately for SR 99, all downtown surface streets combined, and I-5. Data is from the City of Seattle Travel Demand Model (2005).

The vast majority of AM peak hour trips (80%) that cross King Street on I-5 are not going to destinations in downtown, South Lake Union or Uptown. About 70% of I-5 southbound traffic crossing Denny Way in the AM peak hour bypasses downtown and SoDo. Approximately 35% of southbound vehicle trips on SR 99 at a point north of Denny Way exit to a destination in the CBD or South Downtown (this includes vehicles exiting at the Aurora/Denny ramps to enter downtown). In the northbound direction, about 45% of SR 99 traffic crossing a King Street screenline exits the freeway for destinations in downtown, uptown or South Lake Union. Vehicles entering on surface streets are more likely to be destined for downtown or near downtown neighborhoods. However, depending on the time of day and direction, 20% to 45% of vehicles crossing the screenlines on surface streets are bound for destinations outside downtown and the other near downtown neighborhoods included in this analysis. Some of these trips may be crossing screenlines bound for highway on-ramps or traveling to neighborhoods just east of I-5.

How do people travel to downtown ?

Figures 10 and 11 show the modes of travel used by people coming to downtown from various parts of the city and region. The data is based on 2005 travel pattern estimates from the Seattle Travel Demand Model. This model was calibrated against other sources such as the U.S. Census and the Puget Sound Regional Council's Household Travel Survey.

Figure 10 illustrates that a large number of residents in neighborhoods within one-half mile of downtown walk or bike to jobs. In most Seattle neighborhoods more than a mile from downtown there is a relative balance of people that drive and use transit to reach jobs downtown. Figure 11 shows clearly that transit is a less attractive option for non-work trips, as the number of people using transit to reach downtown drops dramatically in most zones when all trips are accounted for rather than just work trips. Combined transit and non-motorized mode share is lowest for people traveling from east of Lake Washington, Snohomish County and South King County.

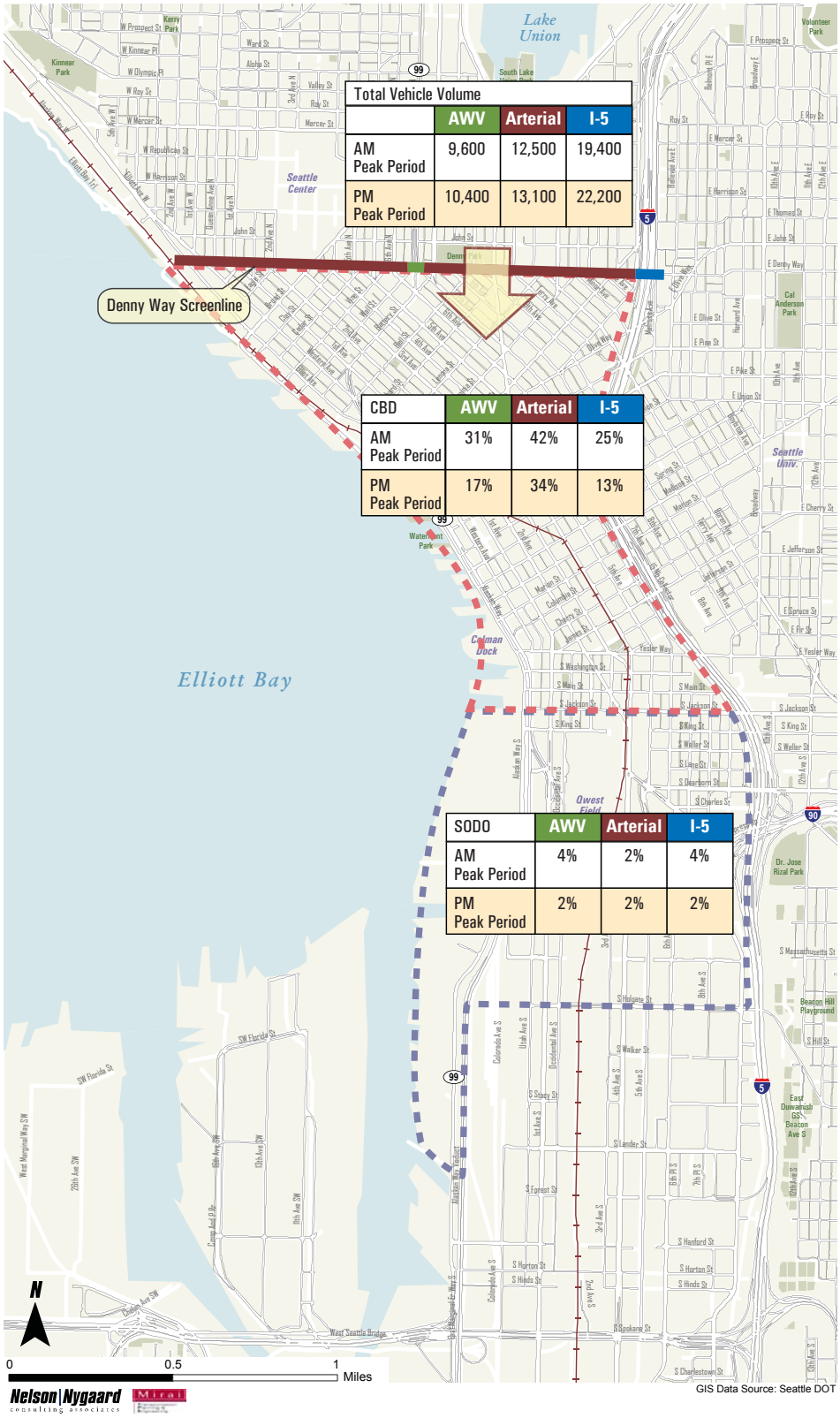
In the version of the Seattle Travel Demand Model used to produce this data, carpool trips are exaggerated due to model calibration issues (this is being corrected for future evaluation).

Mode share from Kitsap County is not illustrated in Figures 10 and 11 because the Seattle travel demand model has not been calibrated for projecting cross-sound travel. The 2000 U.S. Census home to work data shows the following mode share from Kitsap County to downtown Seattle:

- Single occupant driving: 23%
- Carpools and vanpools: 8%
- Transit: 10%
- Walk/Bike: 59%

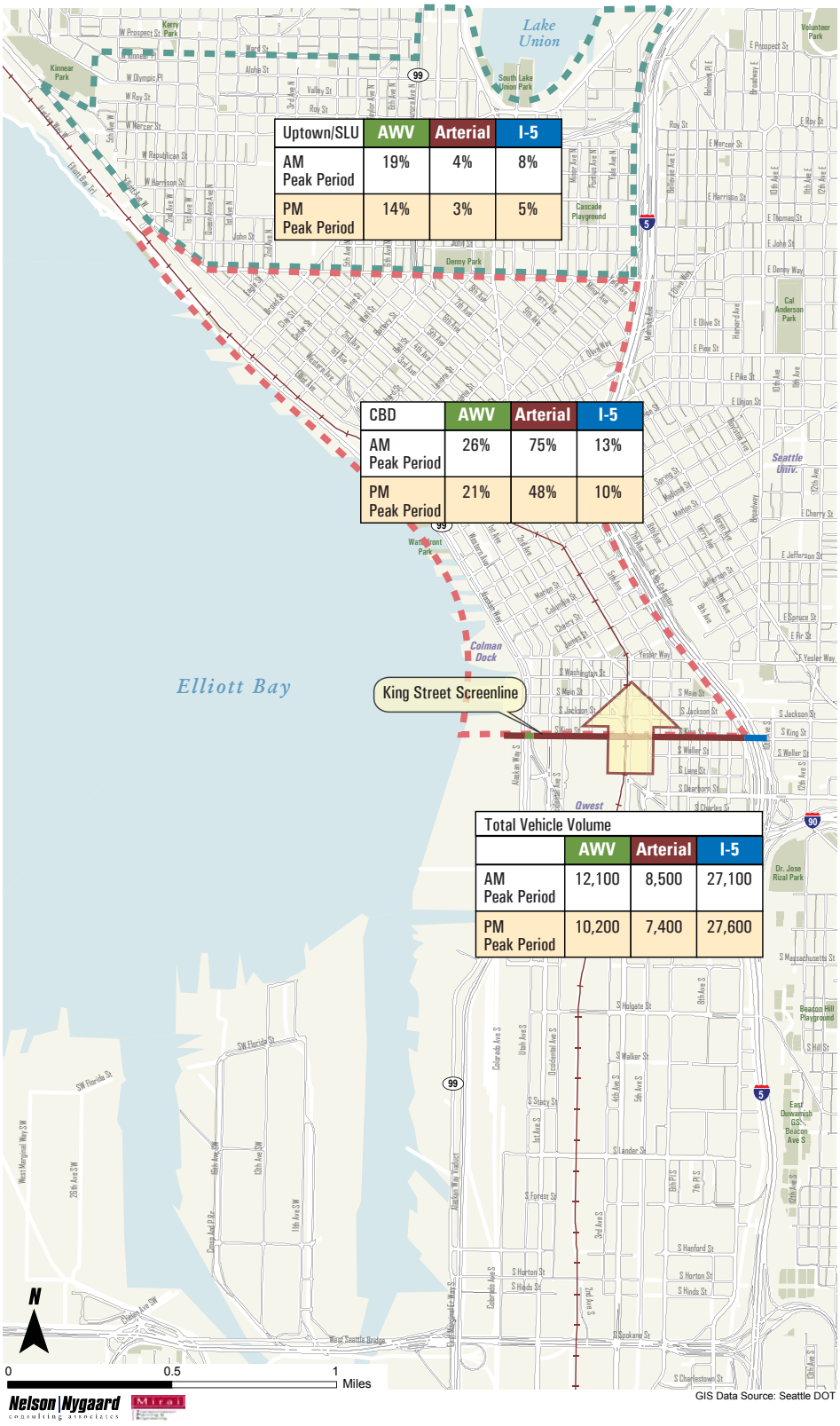
This data is based on a U.S. Census question that asks respondent to indicate their primary mode of travel to work. People who drive onto the ferry can choose either mode (SOV or ferry). Those who indicate they drive are counted as SOV or carpool trips and those who say they use the ferry are counted as transit trips. People who indicated that they walk or bicycle clearly use the ferry system to cross the Puget Sound. Due to this reporting, it is difficult to assess the actual share of access modes to the ferry system and how many drive trips use Washington State ferries versus driving around the Sound. Section 3C provides more specific data about ferry access at Colman Dock in Seattle.

Figure 8 Percent of Trips on SR 99, City Streets, and I-5 Traveling to CBD and SoDo (2005) at Screenline North of Denny Way



Source: City of Seattle Travel Demand Model (2005)

Figure 9 Percent of Trips on AWV, City Streets, and I-5 Traveling to CBD and South Lake Union/Uptown (2005) at Screenline South of King Street



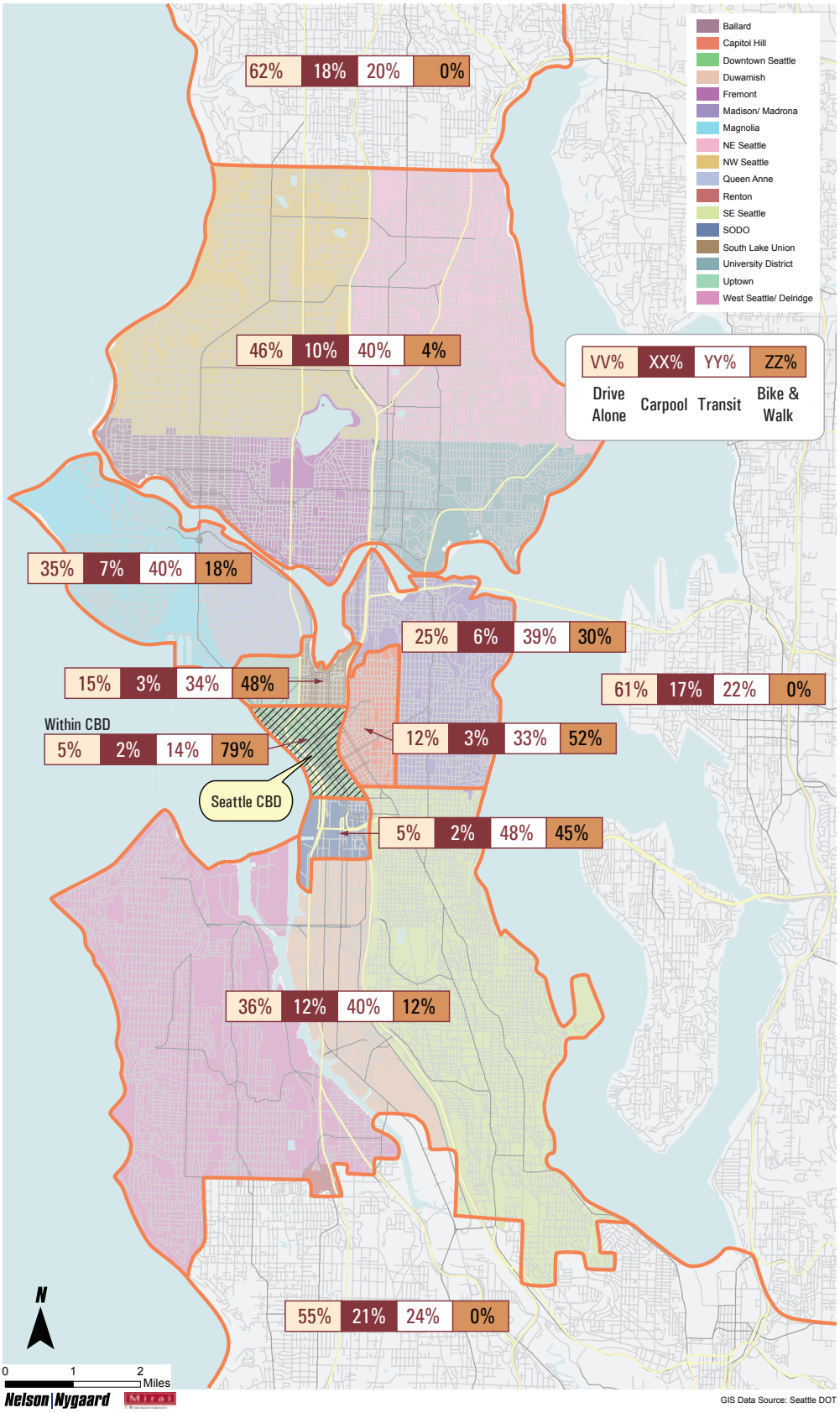
Uptown/SLU	AWV	Arterial	I-5
AM Peak Period	19%	4%	8%
PM Peak Period	14%	3%	5%

CBD	AWV	Arterial	I-5
AM Peak Period	26%	75%	13%
PM Peak Period	21%	48%	10%

Total Vehicle Volume	AWV	Arterial	I-5
AM Peak Period	12,100	8,500	27,100
PM Peak Period	10,200	7,400	27,600

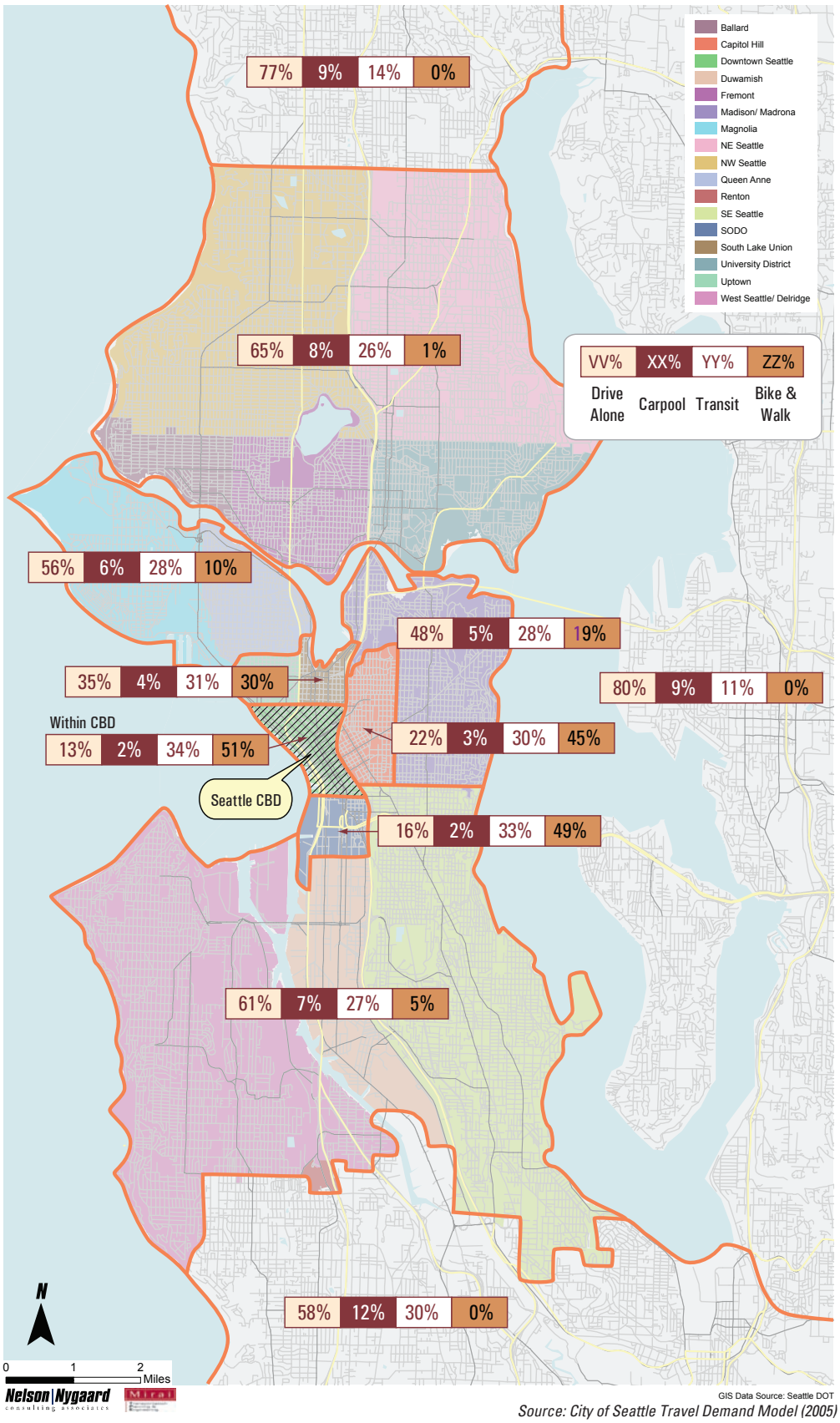
Source: City of Seattle Travel Demand Model (2005)

Figure 10 Mode Share for Work Trips to Seattle CBD (Daily, 2005)



Source: City of Seattle Travel Demand Model (2005)

Figure 11 Mode Share for All Trips to Seattle CBD (Daily, 2005)



Source: City of Seattle Travel Demand Model (2005)

How has mode share changed over time?

The United States Census "Journey-to-Work" data offer a source of commute mode share information. Figure 12 provides a summary of this data for Census years 1980, 1990 and 2000 for downtown Seattle (CBD) and the Denny Regrade. The percent of overall work trips to the CBD made by transit dropped by over 8% between 1980 and 1990. The percent increased slightly between 1990 and 2000. Correspondingly, drive alone commuting increased 10% between 1980 and 1990 and dropped 5% in the next decade. Overall, a higher percentage of commuters were driving in 2000 than in 1980. During the same period, Denny Regrade, a neighborhood abutting downtown, saw the opposite trend: its transit commute mode share increased by 5%, with a similar drop in drive alone work trips to the area. The number of walk and bike commute trips rose significantly in both the CBD and Denny Regrade.Relatively stagnant downtown mode shares for transit do not mean absolute transit ridership is not growing. Rather, transit system enhancements are simply keeping up with regional population growth.

Figure 12 Work Trip Travel Mode Shares (from Home to Seattle CBD and Denny Regrade Areas)

Home to Seattle CBD for Work						
	Drive Alone	Carpool	Transit	Bike/ Walk	Ferry	Other
1980	35.7%	16.6%	43.7%	3.2%	N/A	0.8%
1990	45.5%	13.7%	34.3%	3.7%	1.9%	0.9%
2000	40.9%	13.3%	36.9%	4.9%	3.1%	0.9%
Home to Denny Regrade for Work						
1980	55.6%	19.1%	20.0%	3.6%	N/A	1.7%
1990	56.2%	15.6%	20.5%	5.1%	1.0%	1.6%
2000	50.4%	14.1%	24.8%	6.8%	2.1%	1.8%

Source: Puget Sound Regional Council, Puget Sound Tends, No. T22, March 2004.

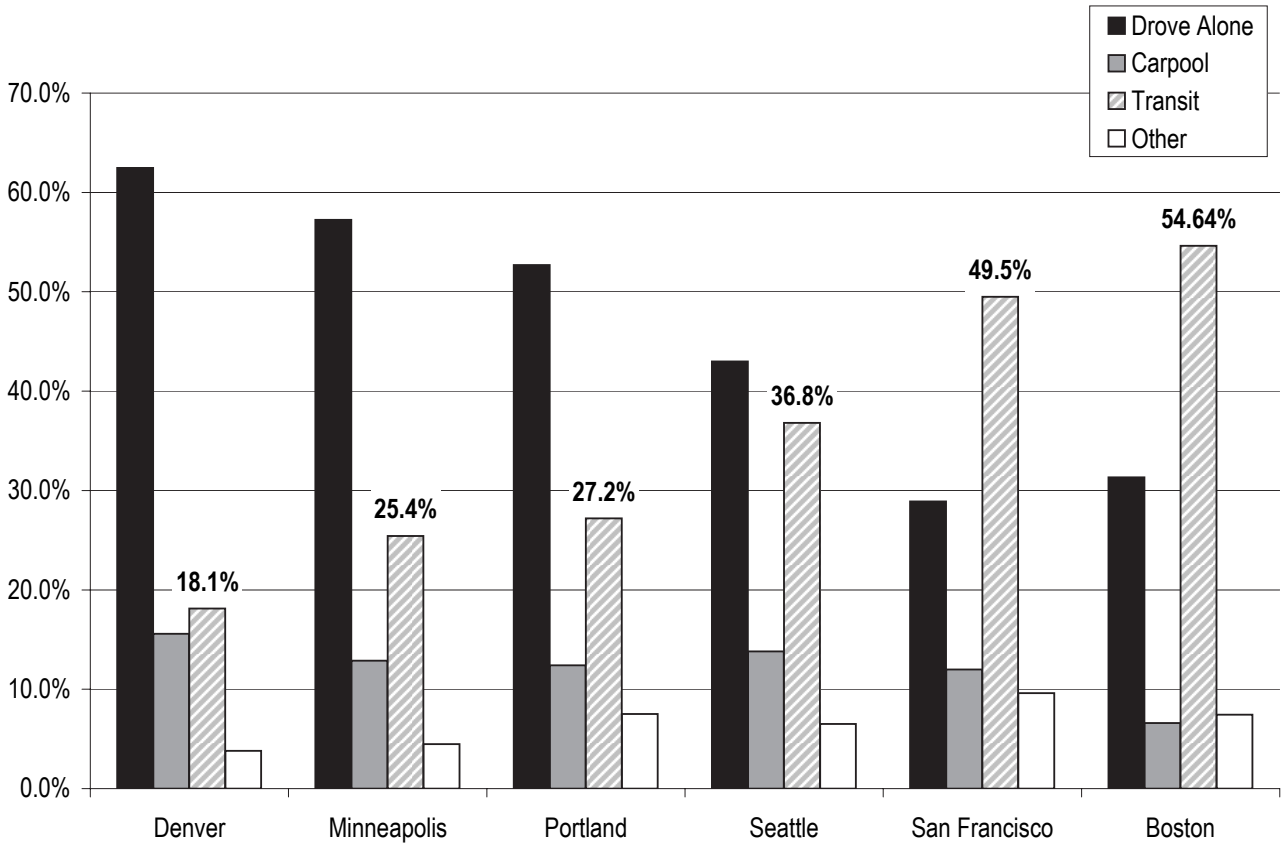
How do Seattle's commute mode shares compare to peer cities?

Figure 13 provides a comparison of Journey-to-Work mode share to the Central Business District in Seattle and five U.S. peer cities: Portland, San Francisco, Denver, Minneapolis and Boston. Peer comparisons are a common way to benchmark transportation system performance, but must be used cautiously as no two urban areas have directly comparable conditions.

A greater percentage of journey-to-work trips are made in non-SOV modes in Seattle than in Portland, Seattle's most comparable northwest peer. Seattle also has a higher non-SOV commute mode split than Denver or Minneapolis, which have similar population levels. Among the five peer cities, only San Francisco and Boston have higher downtown parking prices than Seattle and comparable levels of highway congestion. Seattle's transit mode share is relatively high, given it is the only peer city with no all-day rail service. Cities such as San Francisco and Boston have multiple rail systems, including light rail or subway service in urban neighborhoods and heavy rail serving more distant commuter markets. Seattle has the highest transit mode share of any U.S. city that does not have a heavy rail subway (New York, Chicago, San Francisco, Boston, Washington D.C. and Philadelphia all have higher transit mode shares than Seattle).

Intersection in Westlake Center, Seattle's downtown shopping district.
Source: Nelson\Nygaard

Figure 13 Journey to Work Mode Share (CBD) in Seattle and Peer Cities



Source: 2000 U.S. Census

Figure 14 2005 Daily Person Trips to Seattle and Downtown by Trip Purpose

	Work Trips	Non-Work Trips	Total Trips
To City of Seattle	798,500 (31%)	1,795,100 (69%)	2,593,600 (100%)
To Downtown Seattle	215,100 (45%)	267,300 (55%)	482,400 (100%)

Source: Seattle Travel Demand Model (2005)

Why are people traveling to the Center City?

Figure 14 shows trip purpose, simplified to work or non-work trips, for all daily trips from throughout the region to the city of Seattle (including internal trips) and all trips to downtown Seattle (including internal trips). Data is from the Seattle travel demand model for 2005. The large majority of trips made on city streets are for non-work purposes.

What is the quality of travel in the Center City?

All travelers have favorite transportation routes and modes. In Seattle, these might include catching a view of Elliott Bay from the Viaduct, reading a book on a Sound Transit Express Bus, or enjoying mountain vistas from a Washington State Ferry. Transportation analyses focus most often on measures of mobility that include travel time, intersection and roadway delay, and available capacity. These are important metrics, but they neglect travel quality in terms of both personal experience and the ability to access specific destinations or types of destinations. However, quantitative data do illuminate certain aspects of the system user's experience. This section discusses arterial roadway Level of Service and subsequent sections discuss measures of transit user and non-motorized traveler quality of service.

Level of service (LOS) is an indicator of the quality or comfort of travel. For vehicular traffic on arterial streets, it is associated with the average delay per vehicle at an intersection. This measure does not place any value on the number of people in a vehicle, and thus counts the aggregate delay that 30 passengers on a transit vehicle experience the same as the delay to a single occupant vehicle waiting at the same traffic light. Figure 15 shows the simple A to F grading system based on seconds of delay that traffic engineers use to calculate LOS.

Figure 15 Level of Service Definitions

LOS	Signalized Control Delay per Vehicle (sec/veh)
A	0-10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

Source: Highway Capacity Manual (HCM 2000, Transportation Research Board)

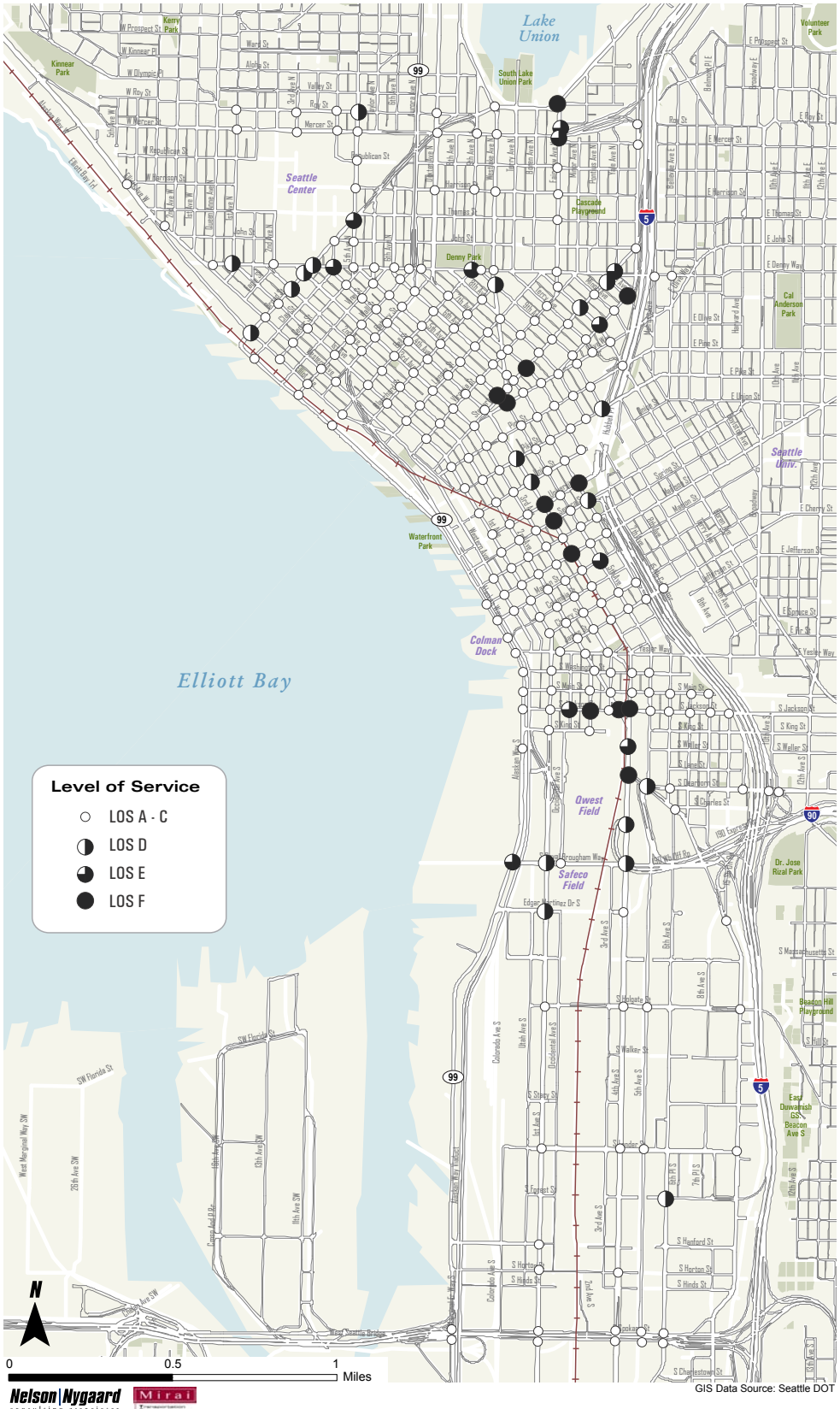
Figures 16 shows the average in-direction[3] LOS for key travel corridors in downtown and adjacent Center City neighborhoods during the PM peak hour. Figures 17 and 18 show the average AM and PM peak hour LOS for key intersections (all movements) in the Center City in 2006. Most downtown streets experience relatively minimal levels of intersection delay for a major urban CBD. Increasingly, thriving urban centers around the United States are relaxing LOS standards, realizing that congested urban arterials are the reality in any city with a healthy economy, and that building more travel lanes to lessen delay simply attracts more vehicles. Drivers traveling on downtown Seattle surface streets experience relatively little delay compared to many large U.S. cities, because highway ramps, intersecting street grids, natural grades, and water features meter traffic flow onto downtown streets.

3 Intersection LOS commonly measures all through movements at an intersection. In this case, Figure 16 only shows the delay in the main travel direction on the illustrated corridor. This provides a more accurate representation of quality of travel for vehicles traveling along the identified corridor.

Figure 16 PM Peak Hour Average Intersection Delay for Movements in Corridor Direction Only (2006)

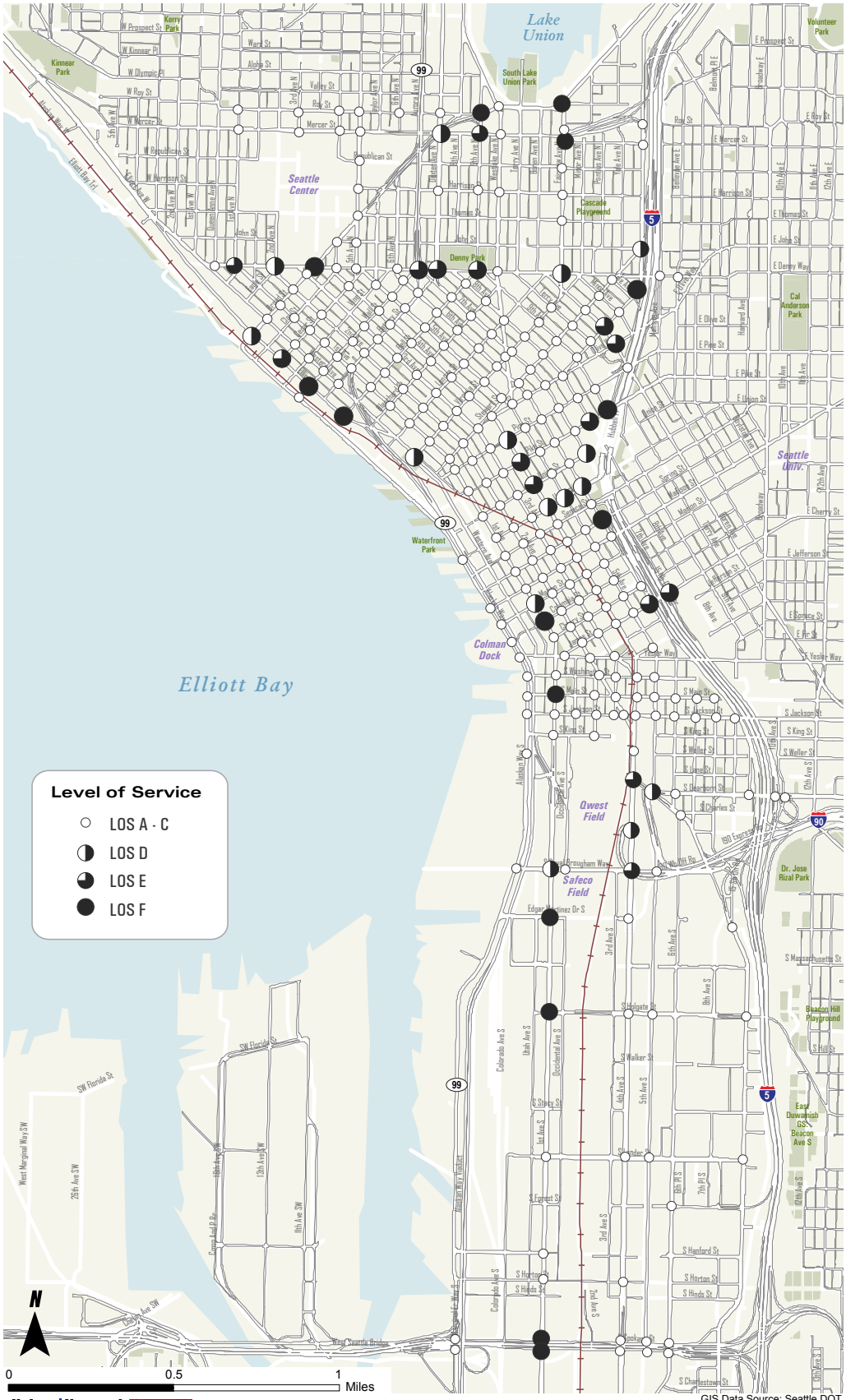
Source: City of Seattle Travel Demand Model (2005)

Figure 17 AM Peak Hour Intersection Levels of Service (2006)



City of Seattle Travel Demand Model (2005) and City of Seattle Syncho Traffic Operations Model

Figure 18 PM Peak Hour Intersection Levels of Service (2006)



Nelson|Nygaard consulting associates Mirai

City of Seattle Travel Demand Model (2005) and City of Seattle Syncho Traffic Operations Model

State Route 99 and Interstate-5

What is the history of Seattle's downtown freeways?

Originally part of the national highway system, US 99 was routed through downtown Seattle streets. When the Alaskan Way Viaduct (AWV) was completed on April 4, 1953, the routing was transferred to this new limited access highway (State Route 99) that runs along the Elliott Bay waterfront in Seattle's Industrial District and downtown. The AWV follows previously existing railroad lines, running above the Alaskan Way surface street from the entrance of Belltown's Battery Street Tunnel in the north to S. Nevada Street in the south. North of the Battery Street Tunnel, the SR 99 route continues on Aurora Avenue, a limited access surface street.

SR 99 is the smaller of the two major north-south traffic corridors traveling through Seattle Center City. I-5 is the primary north-south highway serving the West Coast of the United States, stretching from San Diego to the Canadian border with British Columbia. The central segment of Interstate-5 in Seattle was developed in the alignment of the planned Eastside Expressway – a project conceived in the 1950s to be funded by road tolls. It is notable that the alignment was developed with the idea that all users of the road would use it to reach downtown. Road planners cut the route through heavily populated areas and downtown in order to ensure tolls would be sufficient to support the project. Today I-5 in Seattle is a complex series of roadways and ramps, including a mainline highway, a collector distributor (CD) roadway that connects on- and off-ramps in the Center City to the mainline and a reversible direction express lane system that allows traffic flowing to and from the north to bypass congestion caused by on- and off-ramps on the mainline and CD roadways.

Do the central sections of I-5 and SR 99 serve the same function?

The Alaskan Way Viaduct (SR 99) was constructed largely as a downtown bypass roadway. A limited number of ramps serve the downtown between the Battery Street Tunnel and Royal Brougham. While it provides excellent direct access to downtown for a few neighborhoods, such as West Seattle, the AWV is perhaps valued most by people making relatively short-distance trips bypassing downtown. Access to downtown from the AWV was not optimized at the time it was built. For example, southbound vehicles exiting the Battery Street Tunnel onto the Viaduct must travel completely past the downtown business core before exiting the highway. In contrast, I-5 is designed to provide regional access to the Center City and has numerous ramps that feed the downtown business core, retail district, and neighborhoods just north and south of downtown. This explains in part why congestion on I-5 is much more severe and long lasting, since many vehicles use the facility to travel through the region, and a large amount of local access traffic exits and merges onto the facility from downtown ramps.

How has traffic on the Alaskan Way Viaduct segment of SR 99 changed over time?

Figure 19 shows historic traffic volumes on SR 99 at a point south of Columbia Street. Traffic volumes increased steadily on the Alaskan Way Viaduct from the time of the first counts in 1961 through the mid-1990s. The period following the opening of I-5 was an exception to this trend. Since 1995, traffic volumes have been very stable, rising or falling only a few percent each year. In 2001, lane closures on the Alaskan Way Viaduct due to the Nisqually Earthquake caused a temporary drop in SR 99 traffic to and through downtown.

How does this compare to traffic growth on I-5?

Similar to trends on SR 99, traffic growth on I-5 increased steadily from the 1970s through the mid-1990s. I-5 traffic volumes have stabilized between 280,000 and 290,000 average weekday daily vehicles (South of Columbia Street). Figure 20 compares 30 years of growth on I-5 and SR 99, showing the mid-1990s peaks on both roadways.

Figure 19 Historic Weekday Traffic Volumes on the Alaskan Way Viaduct South (South of Columbia Street)

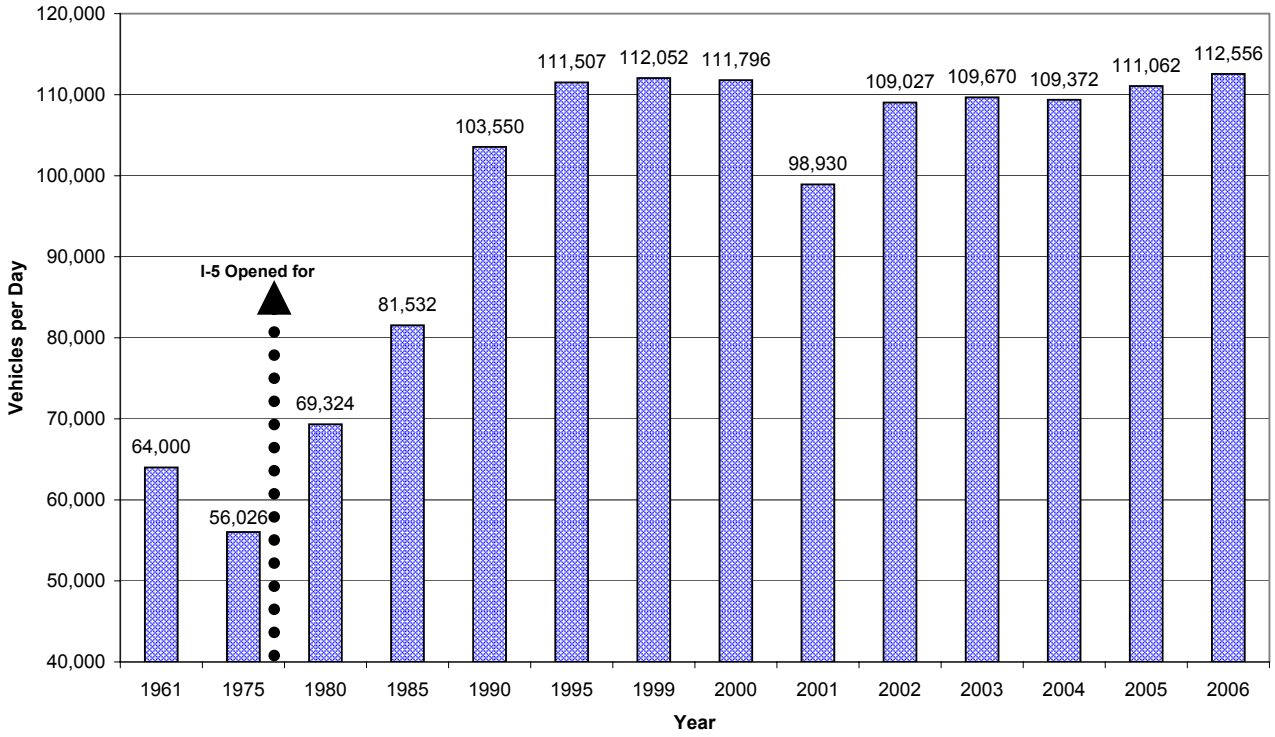
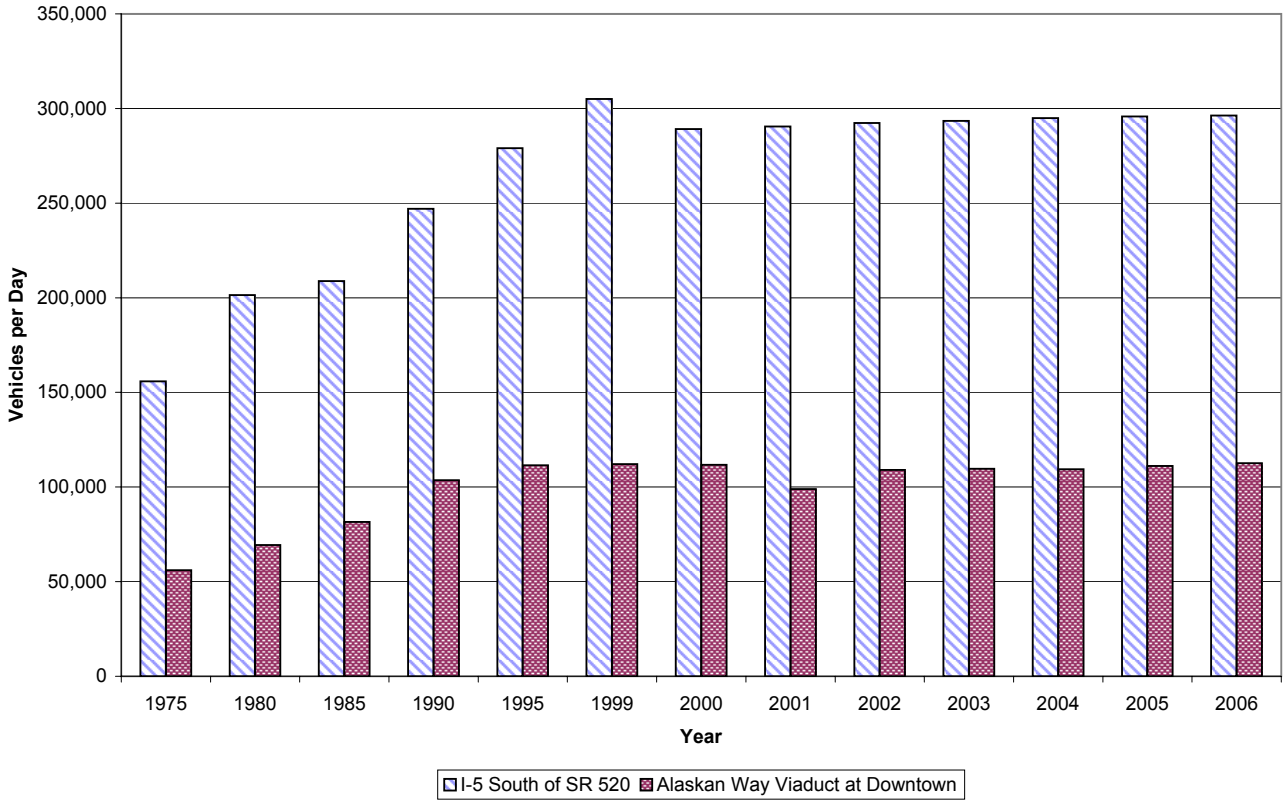


Figure 20 Historic Weekday Traffic Volumes on Interstate-5 and Alaskan Way Viaduct (South of Columbia Street)



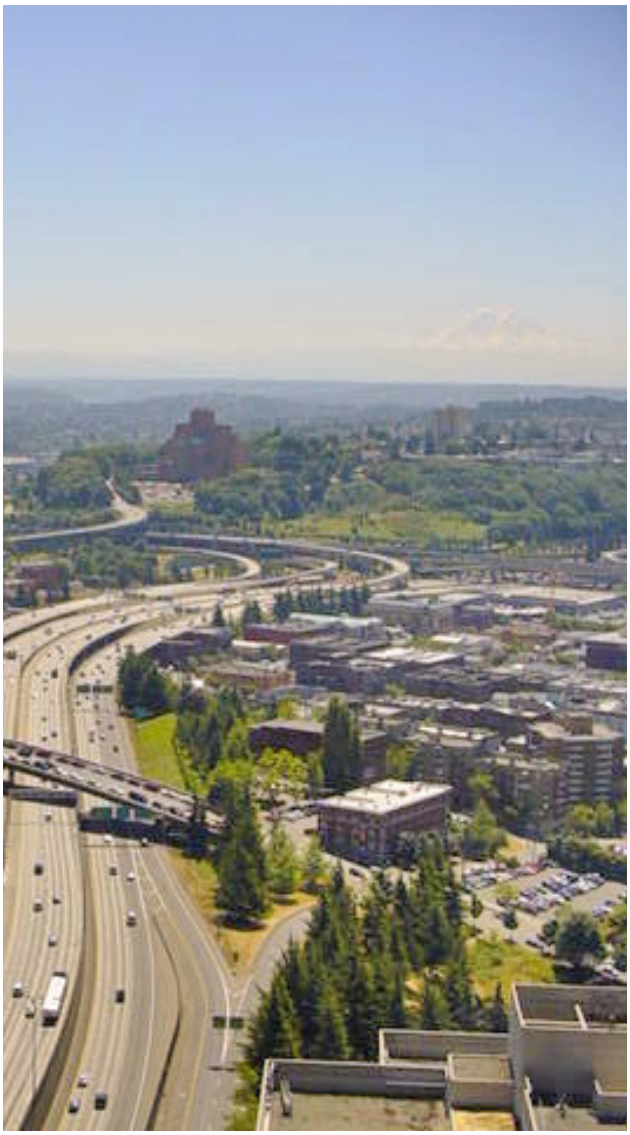
How do traffic volumes fluctuate over the course of the day on SR 99 and I-5?

Figures 21 and 22 show the traffic volumes on SR 99 at Holgate Street by hour over the course of a typical weekday in both directions. Traffic volumes on SR 99 peak at traditional commute peak times, between 7:00 AM and 8:00 AM and between 4:30 PM and 5:30 PM. In both the northbound and southbound directions, hourly traffic volumes during the midday (between 10:00 AM and 2:30 PM) are less than half those of the peak hour.

Figures 23 and 24 show similar data for I-5 at Marion Street. Unlike SR 99, volumes on I-5 northbound peak in the AM (7:00 AM) and remain relative high in both directions until the end of the PM peak hour (5:30 PM). On I-5 southbound volumes hit a morning high, drop slightly in the late morning, then climb steadily from noon to the end of the PM peak period.

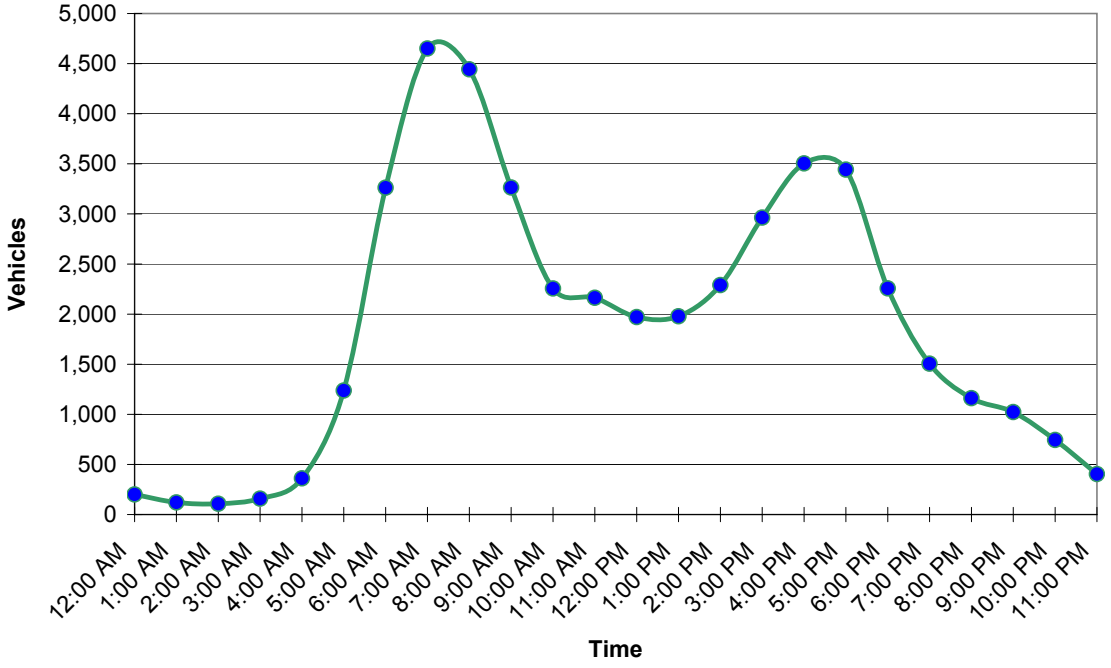
Figure 25 shows traffic volumes by hour for the I-5 express lanes at Marion Street. The express lanes switch direction midday (southbound in AM, northbound in PM) and are closed between midnight and 4:00 AM. The express lane system of I-5 has a more traditional peaking pattern with high volumes at the peak hours dropping off quickly toward the midday and into the evening.

The trend lines for SR 99 and I-5 hourly traffic volumes illustrate that the much better level of downtown access provided by I-5 combined with its importance as a regional through facility creates much stronger demand throughout the day.



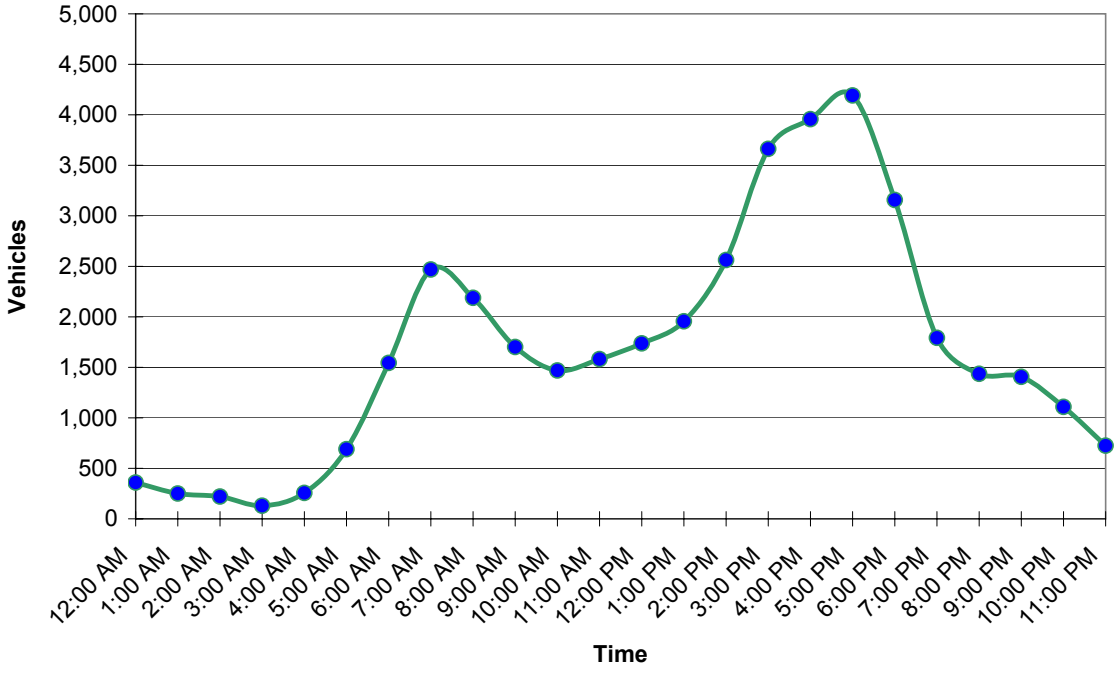
Aerial view of I-5.
Source: Nelson\Nygaard

Figure 21 SR 99 Northbound Hourly Volumes for a Typical Weekday at Holgate Street (2007)



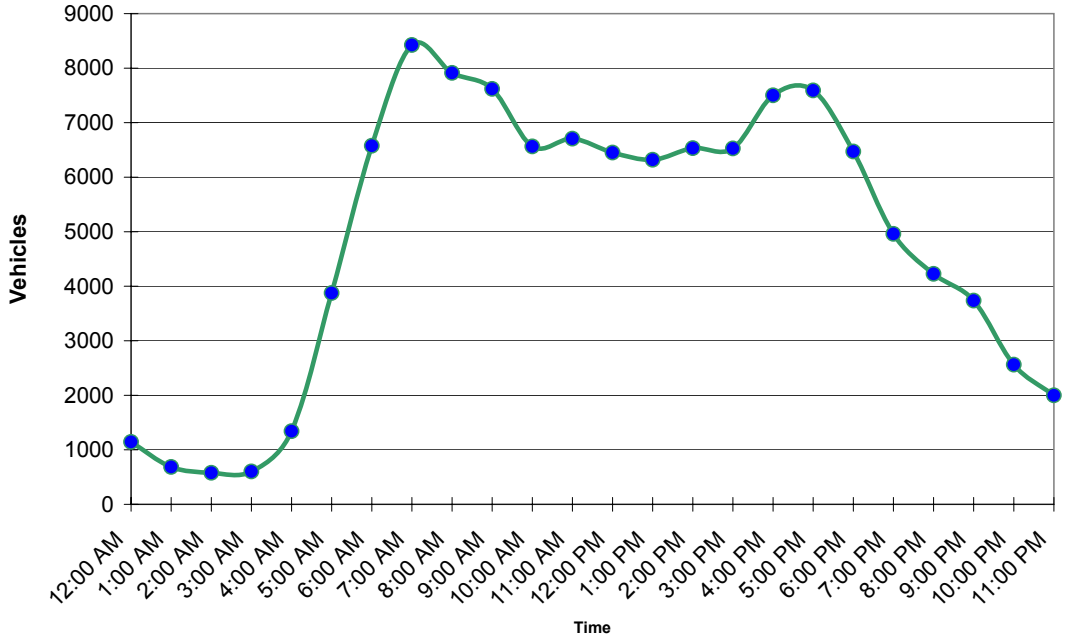
Source: Washington State Department of Transportation (2007)

Figure 22 SR 99 Southbound Hourly Volumes for a Typical Weekday at Holgate Street (2007)



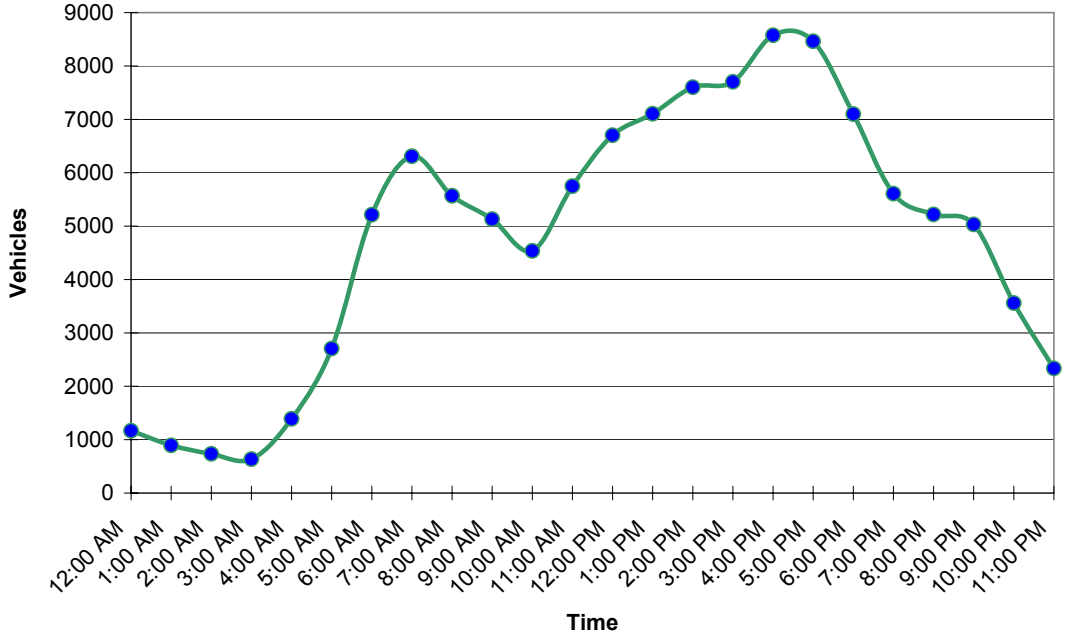
Source: Washington State Department of Transportation (2007)

Figure 23 Interstate-5 Northbound Mainline/Collector Distributor Roadway Hourly Volumes for a Typical Weekday at Madison Street (2007)



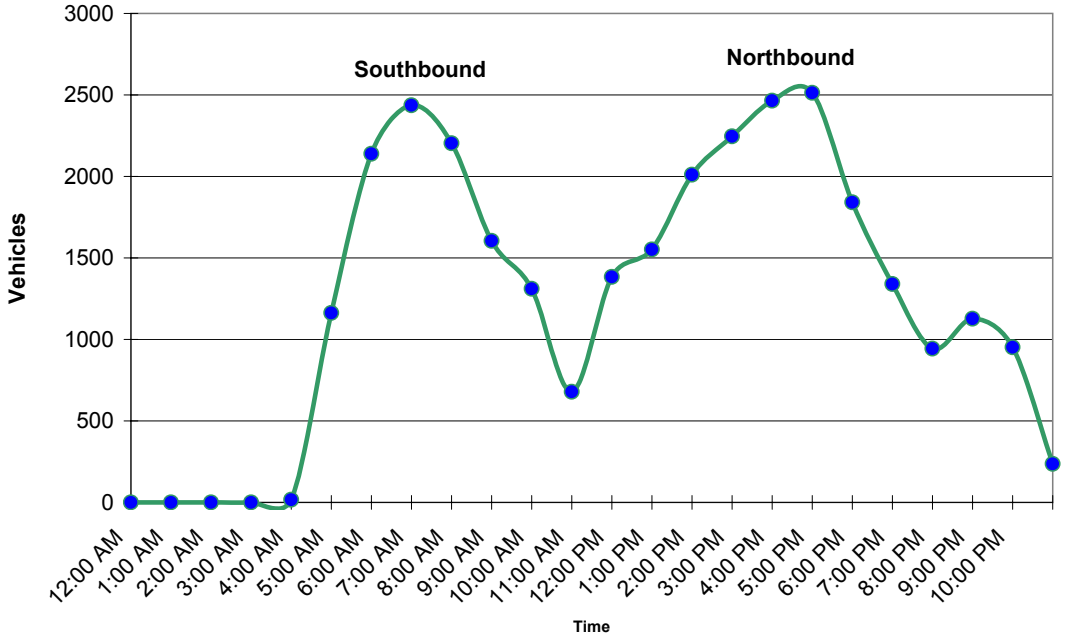
Source: Washington State Department of Transportation (2007)

Figure 24 Interstate-5 Southbound Mainline/Collector Distributor Roadway Hourly Volumes for a Typical Weekday at Madison Street (2007)



Source: Washington State Department of Transportation (2007)

Figure 25 Interstate-5 Express Lanes (Reversible) Hourly Volumes for a Typical Weekday at Madison Street (2007)



Source: Washington State Department of Transportation (2007)

What are the origin and destination points for vehicles traveling on SR 99 and I-5 in Center City?

No detailed survey of SR 99 or I-5 travelers in Seattle Center City has been completed in recent years, making it difficult to pinpoint specifically who is using each facility and where they are going. The graphics in this section use data from the Seattle travel demand model (2005) to illustrate the origins and destinations of vehicles using Center City segments of the two highways during the AM and PM peak hours. This analysis does not connect specific origins and destinations, but uses model outputs to evaluate the percent of total vehicle trips at a point or on an identified segment of the highway that starts or ends in a specific neighborhood or area outside Seattle.

Figures 26 through 29 show origins and destinations (by percent) of all vehicles traveling on the Alaskan Way Viaduct (SR 99) at its peak volume point between the Columbia Street and the First Avenue South ramps. This is the peak load point for the AWV and captures all vehicles traveling north on the Central Viaduct (first northbound off-ramp is at Seneca) and most of the vehicles that enter the Battery Street Tunnel. This data is shown separately for the AM three-hour and the PM three-hour peak periods. Each graphic shows origins and destinations for vehicles traveling in a single direction (either northbound or southbound). All data is generated by the Seattle travel demand model and is for the year 2005.

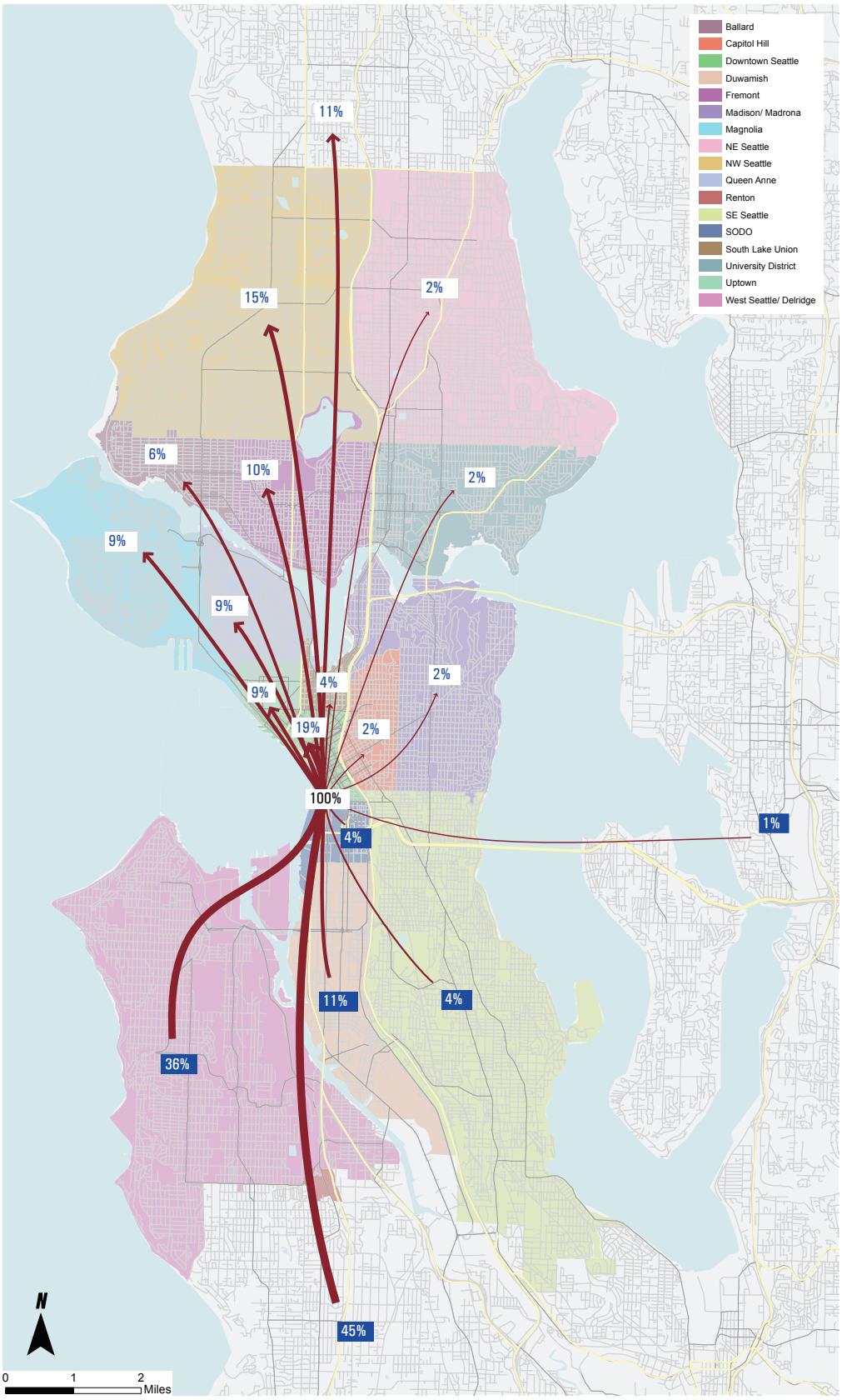
Figures 30 through 33 show origins and destinations (by percent) of vehicles traveling on the segment of I-5 between a point south of the I-90 interchange to a point north of the Mercer ramps, during the AM three-hour or PM three-hour peak period. Due to the number of I-5 ramps in the Center City, it is difficult to accurately portray vehicle origins and destinations at a select point in the roadway. Each graphic shows origins and destinations for vehicles traveling in a single direction (either northbound or southbound). The graphics also show the total number of vehicles that enter the identified segment of I-5 (from the mainline, express lanes and all ramps) during that peak hour. All data is generated by the Seattle travel demand model and is for year 2005.

How many vehicles use SR 99 and I-5 on- and off-ramps in the Center City?

A separate analysis completed as part of the Alaskan Way Viaduct and Seawall Replacement Project (AWVSRP) Draft Environmental Impact Statement (DEIS) analyzed weekday afternoon peak hour traffic volumes on the AWV and Center City ramps. The graphic from Exhibit 4-9 of the DEIS Appendix C, March 2004 is reproduced here as Figure 34. This figure is based on somewhat-dated 2002 data but trend information indicates that travel patterns on the Viaduct have changed little in recent years.

Graphics similar to Figure 34 (SR 99) were developed for I-5 as part of this study using data provided by the Washington State Department of Transportation. Due to the complexity of I-5 roadways and ramps, three separate graphics were developed. Figure 35 shows the mainline and collector distributor ramp volumes. Figure 36 shows the express lane ramp volumes.

Figure 26 PM Peak Period (3 Hour) Origins and Destinations for Northbound Vehicles on SR 99 (2005, Between Columbia and First Ave South Ramps)



Source: City of Seattle Travel Demand Model (2005)

Figure 27 PM Peak Period (3 Hour) Origins and Destinations for Southbound Vehicles on SR 99 (2005, Between Columbia and First Ave South Ramps)

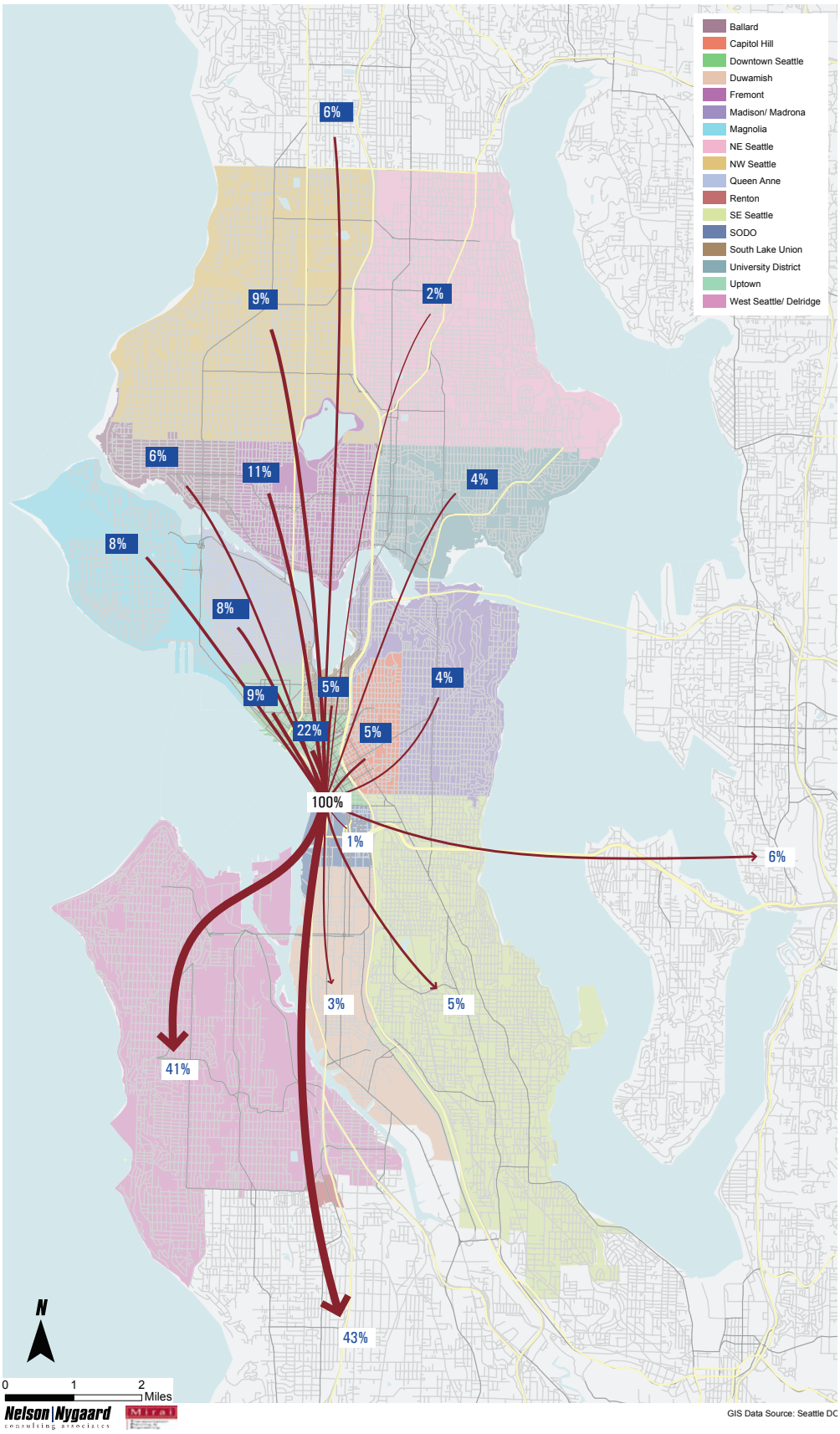


Figure 28 AM Peak Period (3 Hour) Origins and Destinations for Northbound Vehicles on SR 99 (2005, Between Columbia and First Ave South Ramps)

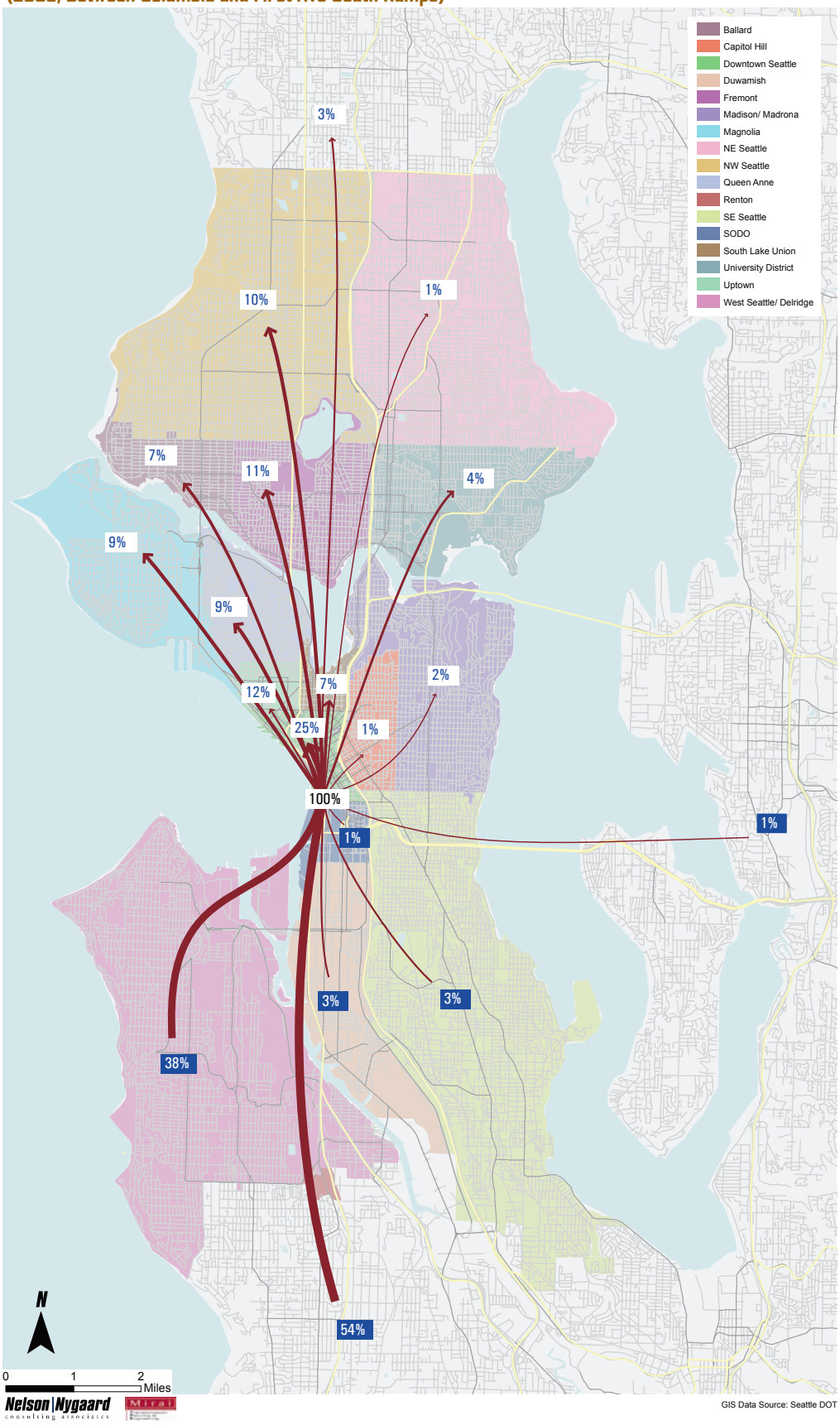


Figure 29 AM Peak Period (3 Hour) Origins and Destinations for Southbound Vehicles on SR 99 (2005, Between Columbia and First Ave South Ramps)

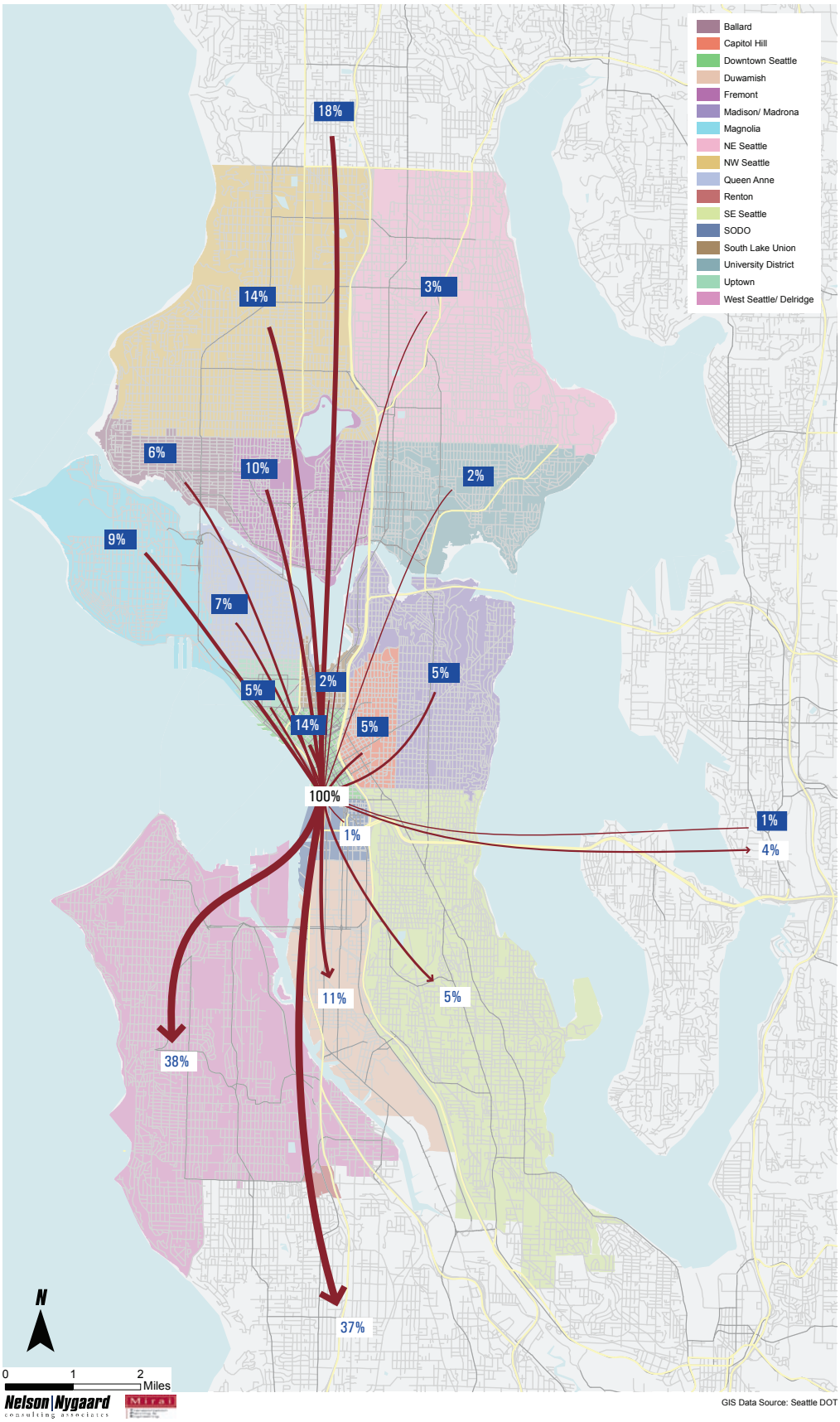


Figure 30 PM Peak Period (3 Hour) Origins and Destinations for Northbound Vehicles on Interstate-5 (2005, south of I-90 interchange to north of Mercer ramps)

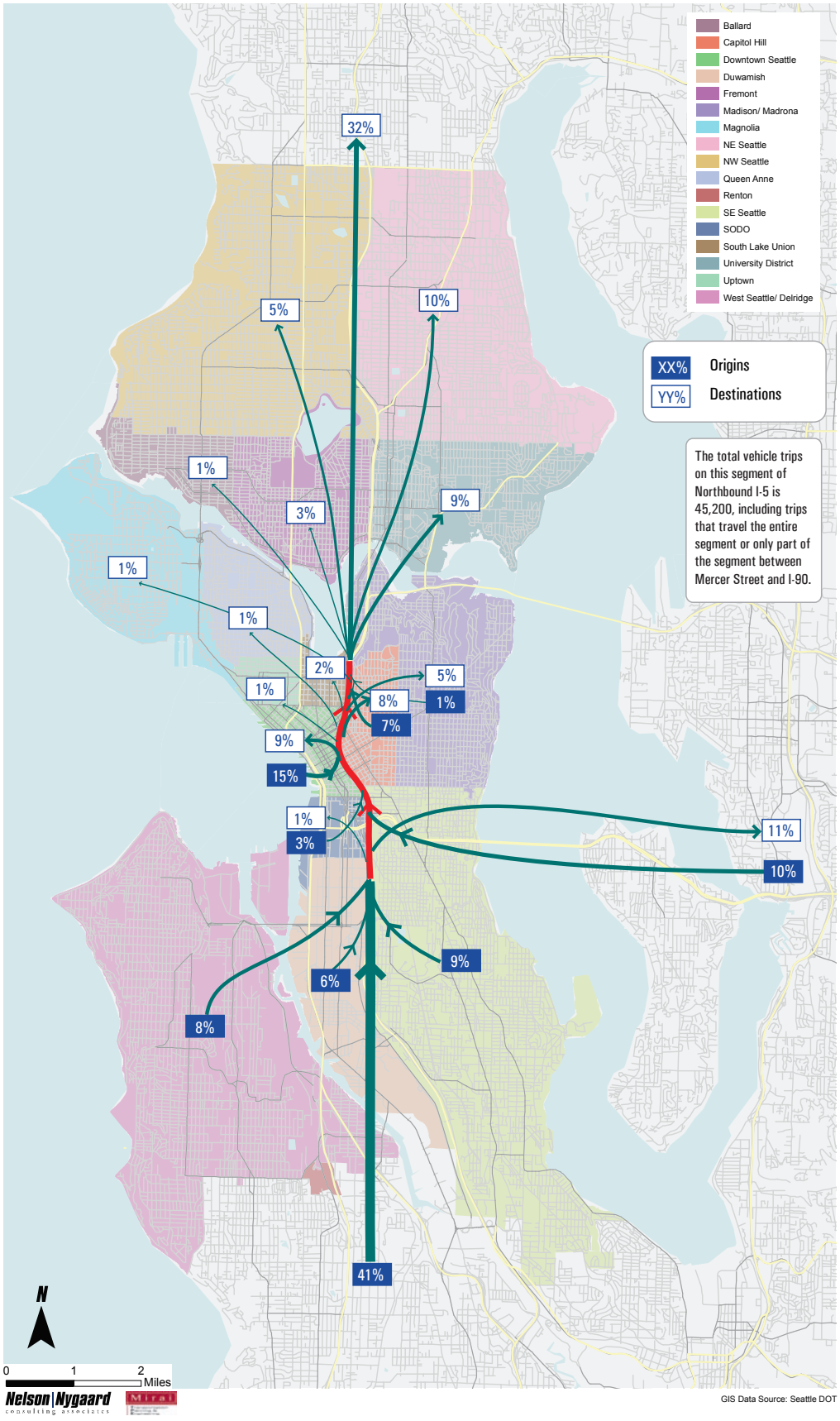


Figure 31 PM Peak Period (3 Hour) Origins and Destinations for Southbound Vehicles on Interstate-5 (2005, north of Mercer ramps to south of I-90 interchange)

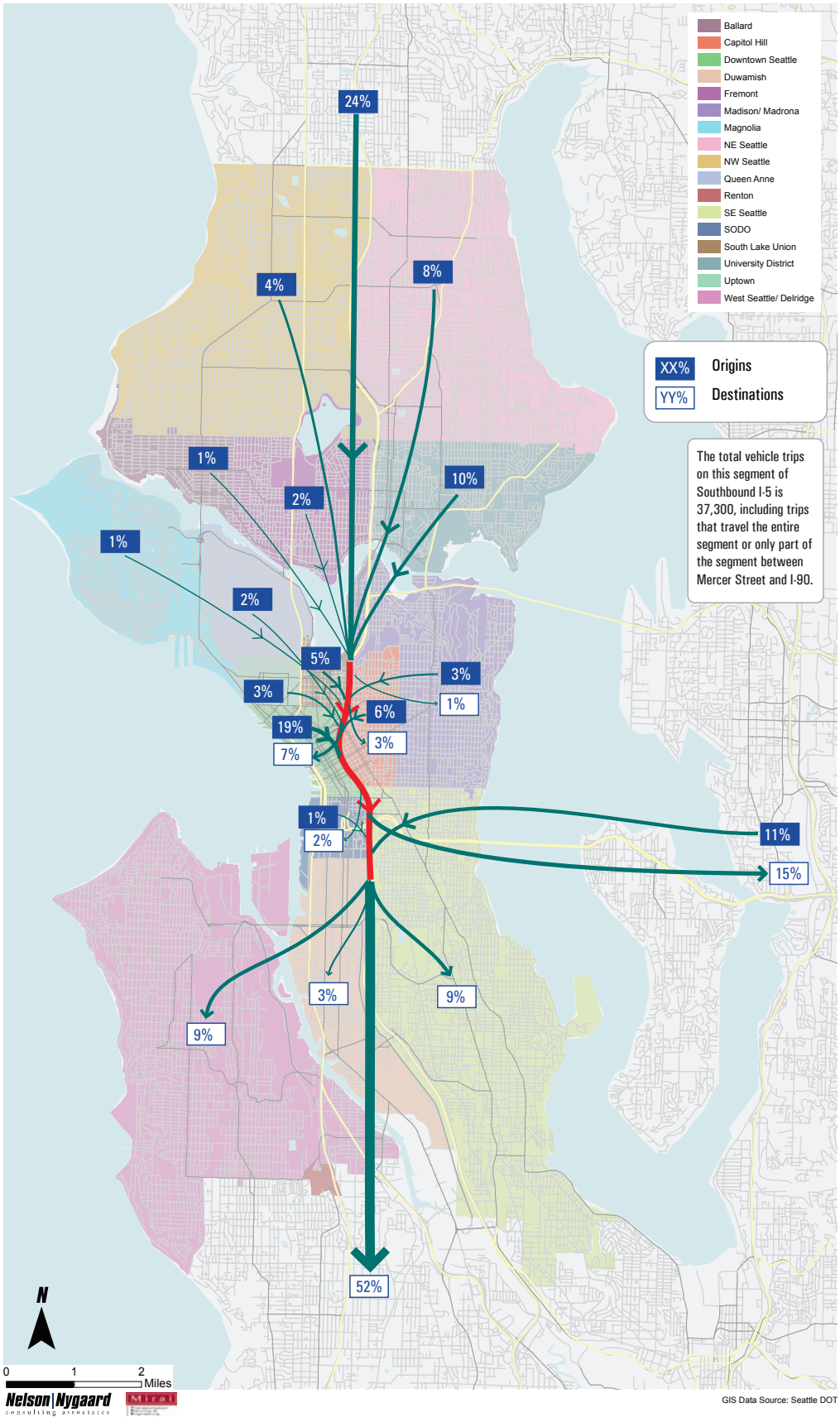


Figure 32 AM Peak Period (3 Hour) Origins and Destinations for Northbound Vehicles on Interstate-5 (2005, south of I-90 interchange to north of Mercer ramps)

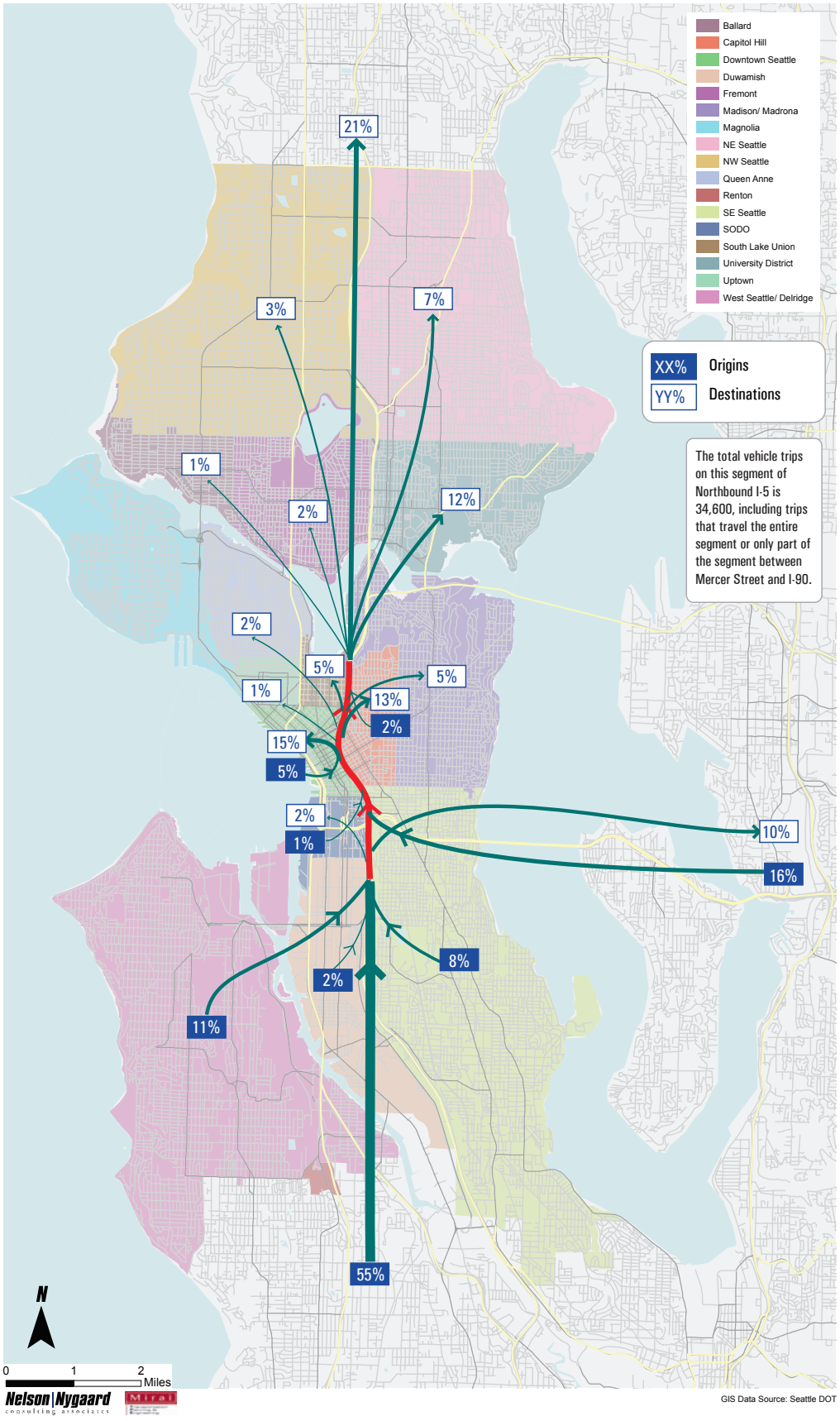


Figure 33 AM Peak Period (3 Hour) Origins and Destinations for Southbound Vehicles on Interstate-5 (2005, north of Mercer ramps to south of I-90 interchange)

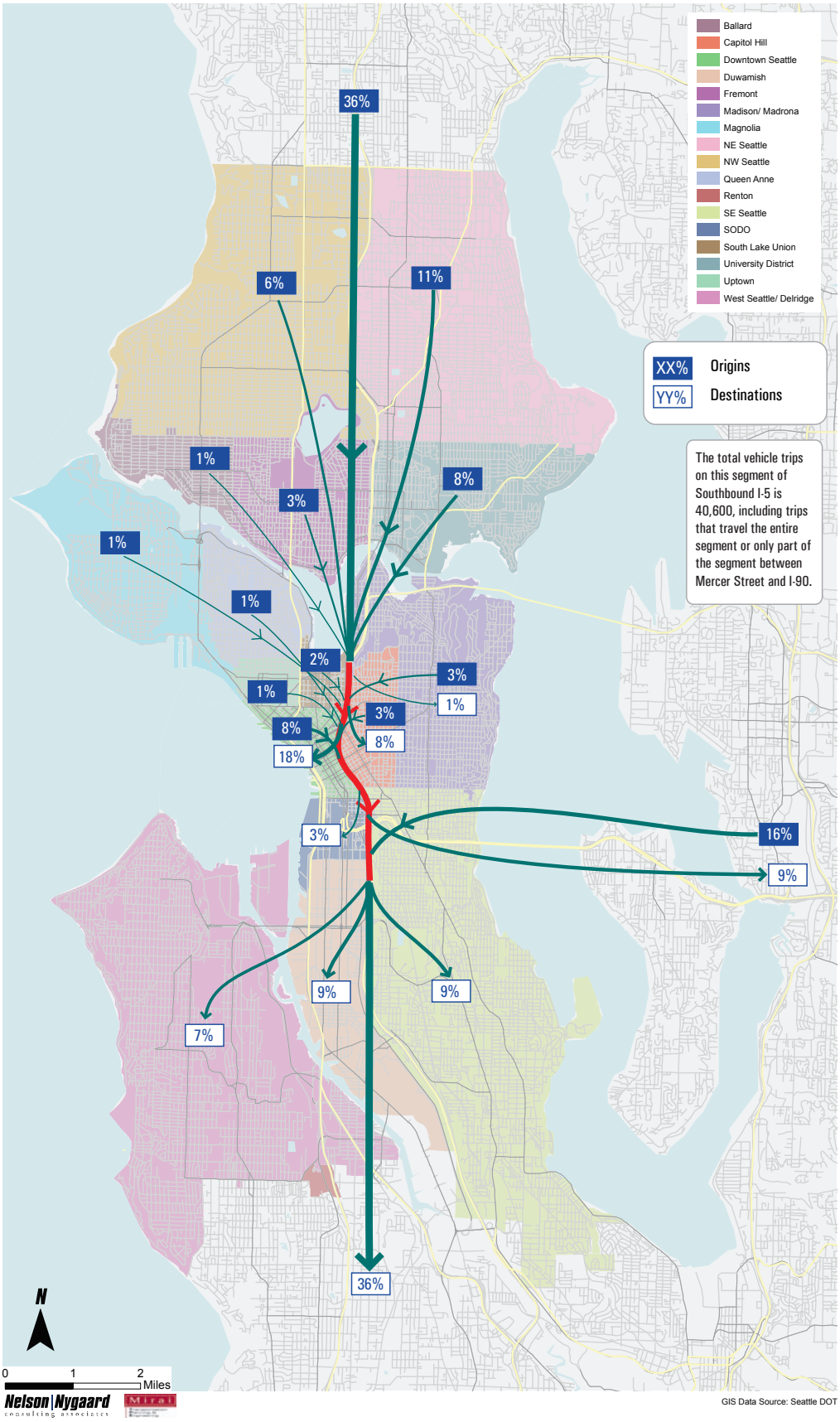
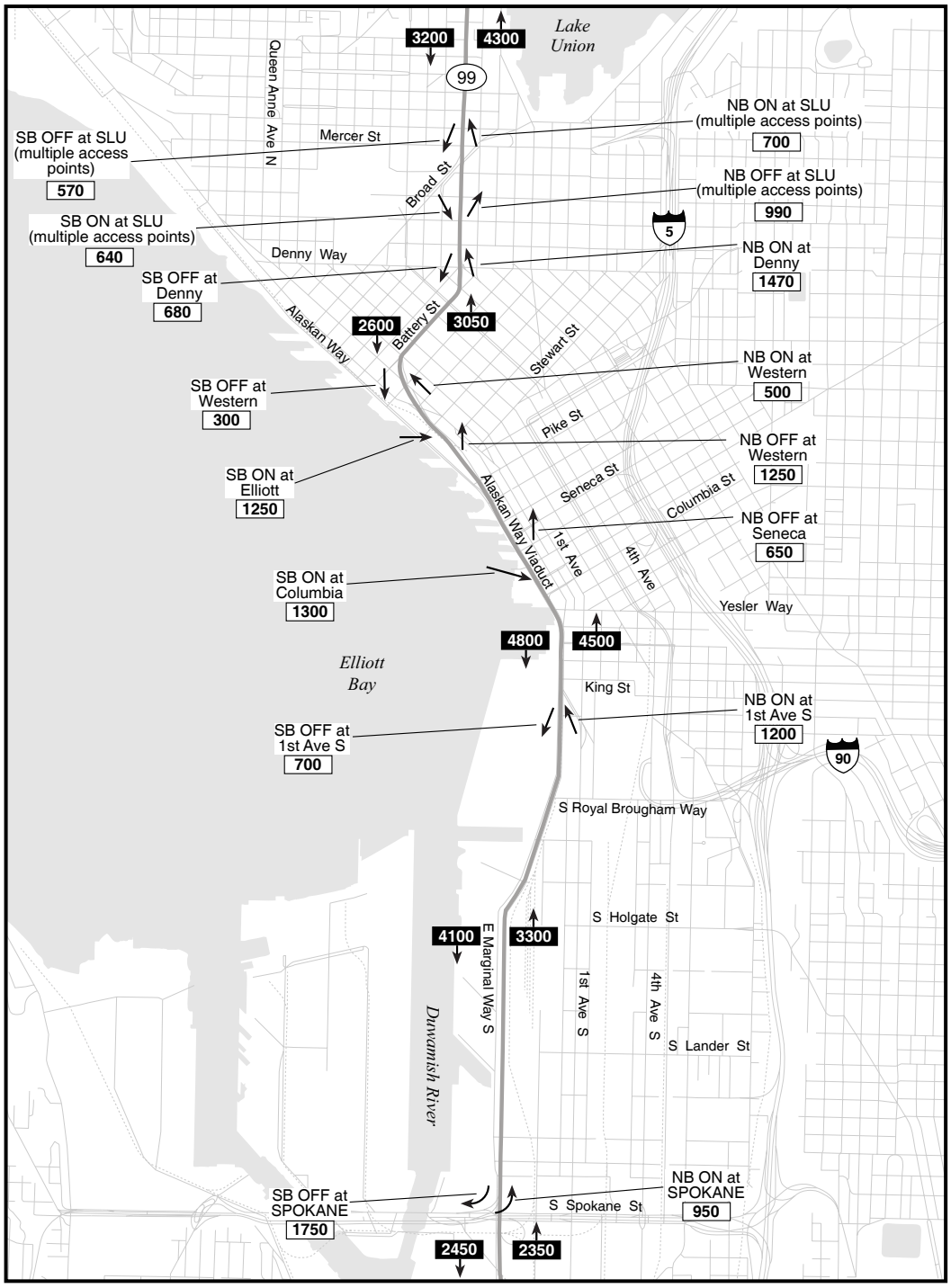
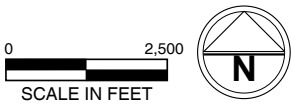


Figure 34 Weekday PM Peak Hour Traffic Volumes on the Alaskan Way Viaduct Mainline and Ramps (2002)



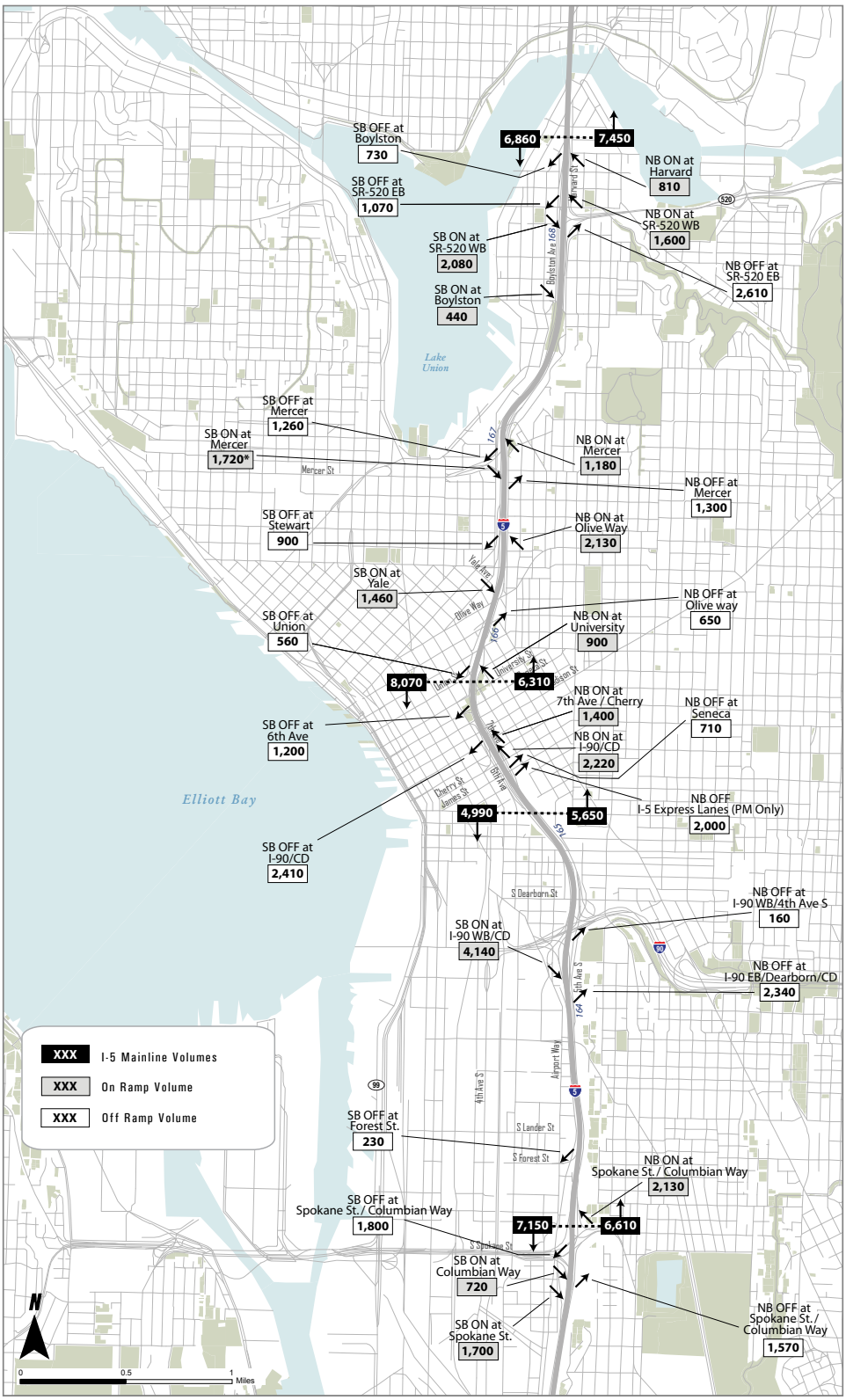
Source: Seattle DOT



XXX Ramp Volumes

XXX SR-99 Mainline Volumes

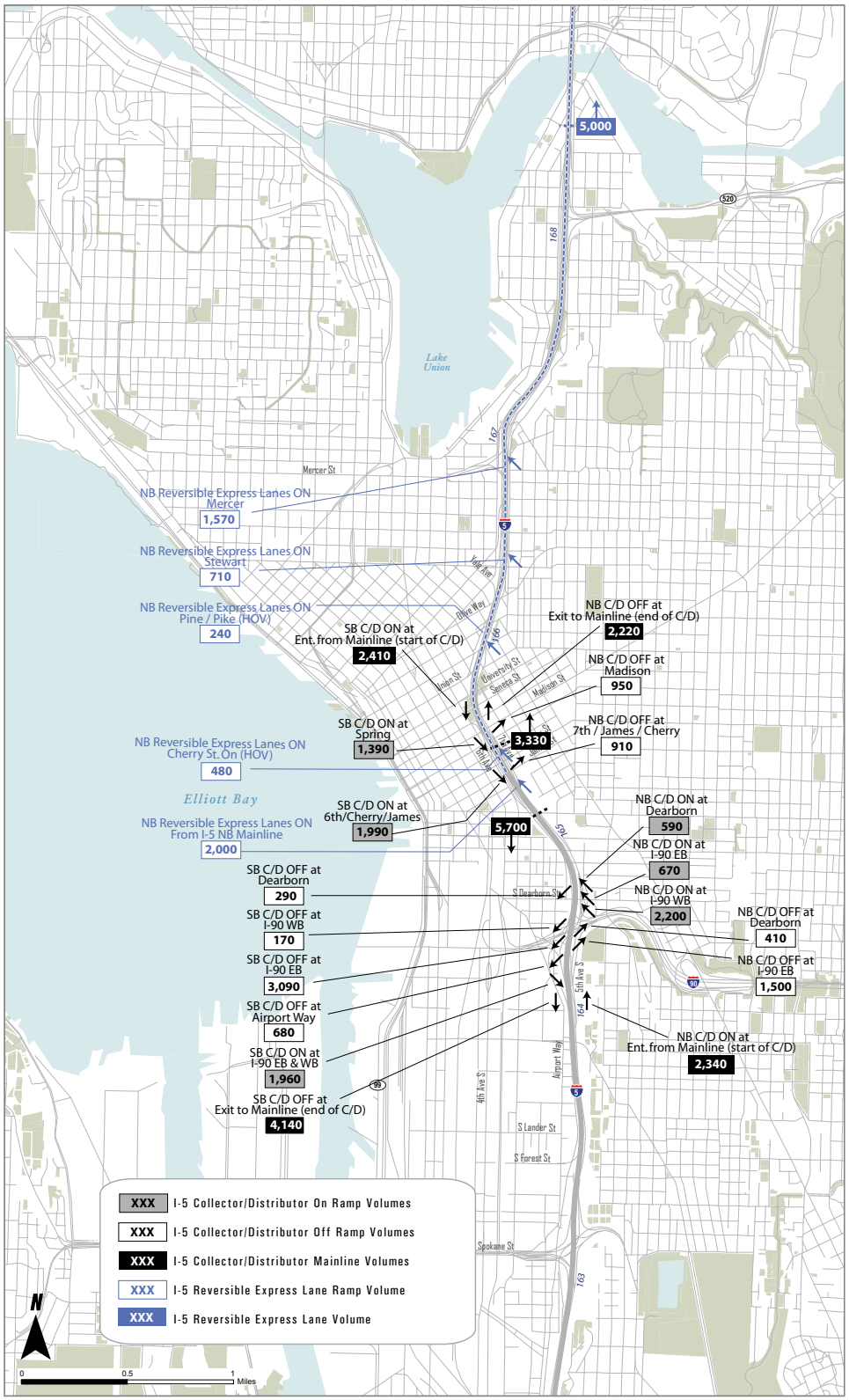
Figure 35 Weekday PM Peak Hour Traffic Volumes on Interstate-5 Mainline Roadways and Ramps (2006)



Nelson | Nygaard consulting associates

Data Source: WSDOT 2006 Ramp and Roadway Traffic Volume Report
* WSDOT 2004 Ramp and Roadway Traffic Volume Report

Figure 36 Weekday PM Peak Hour Traffic Volumes on Interstate-5 Reversable Express Lanes and Collector/Distributor Lanes (2006)



Nelson|Nygaard consulting associates

Data Source: WSDOT 2006 Ramp and Roadway Traffic Volume Report

How important is SR 99 for transit?

A number of King County Metro transit routes use the Alaskan Way Viaduct segments of SR 99 to access downtown from the south. The AWV serves as key route for services entering downtown from West Seattle, Burien, White Center and points south. These include both express service and local buses that operate as express into downtown via the Viaduct, such as routes 21 Express, 37 Express, 54, 55, 56 Express, 113, 120, and 125. These routes are bound for downtown and operate on surface streets within the downtown core; therefore, they benefit only from the limited access segments of SR 99 south of downtown. No transit routes use the AWV to bypass downtown Seattle. All transit routes that enter SR 99 north of Denny do so via the Denny ramps or streets in the South Lake Union/Uptown area.

At King Street, approximately 16% of the total person trips on SR 99 during the PM peak hour were on transit vehicles in 2005. Looking at SR 99 just north of Denny Way, roughly 21% of northbound peak hour person travel on SR 99 was on transit.

SR 99 creates an important benefit to transit by carrying traffic that might otherwise cause congestion on the downtown street grid, where most buses operate. Today, over 650 buses uses Seattle Center City surface streets and transit facilities at the PM peak hour; this includes both in-service and out-of-service vehicles. Growth and mode shift will create ever-increasing transit demand that will require more vehicles and lane capacity allocation to ensure that speed and reliability are maintained into the future.

Section 3B on "Transit Service, Characteristics and Use" in this Briefing Book provides more information on transit services, ridership and vehicle volumes.

How much freight and delivery traffic uses SR 99?

SR 99 is an important route for local and some regional freight traffic. While it does not carry as many large, multi-axle trucks as I-5, SR 99 is an important route for local freight movement, delivery trucks and construction vehicles. Counts conducted in 2007 at Holgate show that about 4,200 trucks per day use SR 99: 2,200 in the northbound direction and 2,000 in the southbound direction. Of these, about 65% were light trucks with two axles, 13% were medium-sized trucks with three to four axles, and 23% were heavy trucks with five or more axles.

Section 3E on "Freight Routes and Volumes" in this Briefing Book provides more information on freight segmentation, volumes, and vehicle types.

Sources

City of Seattle, 2003, "Center City Circulation Report," SDOT, http://www.ci.seattle.wa.us/transportation/ppmpcentercity.htm (accessed November 14, 2007)

Puget Sound Regional Council, 2006, "2006 Sub-County (Small Area) Forecasts of Population and Employment, Central Puget Sound Region (Released Oct 26th, 2006)," PSRC. http://psrc.org/data/forecasts/index.htm (accessed November 18, 2007)

HistoryLink.org, "First part of Seattle Freeway (Interstate 5) route receives federal funding on October 1, 1957" HistoryLink.org Essay 4166, http://www.historylink.org/essays/output.cfm?file_id=4166 (accessed December 27, 2007)

Fact Sheet

Transit Service, Characteristics and Use

Overview of Existing Transit Service

Seattle is one of the nation's largest cities that operates an almost entirely bus-based transit system. New rail services will come on line in the next few years, but the bus will continue to be the workhorse of the local and regional transit system for years to come. Figure 1 compares total annual passenger trips in the Seattle region to other regions in North America.

Several transit operators use downtown Seattle streets and transit facilities to deliver, circulate and collect passengers.

King County Metro articulated trolley bus in operation downtown.

Source: Nelson\Nygaard

King County Department of Transportation

King County Metro Transit (KCM) is a division of King County Department of Transportation and operates one of the largest bus systems in the U.S. King County Metro Transit routes in the City of Seattle are numbered from 1 to 79 and are supplemented by special late-night "Owl" routes. Figure 2 shows King County Metro's map of frequent service transit routes that serve downtown Seattle. This map also shows bus routes that operate in the Downtown Seattle Transit Tunnel.

Many of KCM's core transit routes (those services that operate higher frequency with long service spans throughout the day) use trolley bus technology. Trolley buses climb well on steep hills, are quiet and are environmentally friendly. This is important given the number of buses that operate on downtown Seattle streets. A map of these key routes is shown in Figure 6. KCM also operates a number of routes that connect other King County cities to Seattle Center City. These are not detailed due to the large number.

Within downtown, KCM offers a "Ride Free Zone" where all trips are free between 6 AM and 7 PM. The ride free zone extends from Jackson Street on the south, Battery Street to the north, and from the waterfront to Sixth Avenue. Passengers traveling within downtown using services in the Downtown Seattle Bus Tunnel are also eligible for free rides. In addition to encouraging short local trips in downtown, the Ride Free Zone reduces boarding time, which improves transit operating speeds in downtown and allows transit to operate more efficiently on downtown streets.

Figure 1 Annual Passenger Trips

City	Agency/Agencies	Service Area Population	Bus Ridership	Rail Ridership	Total Annual Ridership	% Rail Transit
Vancouver	Translink	2,100,000	205,832,000	69,457,000	275,289,000	25.2%
Portland	Tri-Met; C-Tran	1,657,002	68,336,018	34,000,000	102,336,018	33.2%
Minneapolis	Metro Transit; Regional Opt-Out Services	1,707,328	67,419,065	7,901,668	75,320,733	10.5%
Denver	RTD	2,619,000	67,721,307	11,277,855	78,999,162	14.3%
Seattle	King County Metro; Sound Transit; Community Transit; Pierce Transit	2,600,000	141,897,423	3,585,000	145,482,423	2.5%

Figure 2 King County Metro Frequent Service Routes in Downtown Seattle

Source: King County Metro http://transit.metrokc.gov/tops/bus/area_images/CBDMap_907.pdf

Sound Transit

Sound Transit, formally known as the Central Puget Sound Regional Transit Authority, provides regional transit connections between cities in King, Pierce, and Snohomish Counties. While the majority of Sound Transit's service is on the express bus system, they also operate the Sounder Commuter Rail lines between Everett and Seattle, and between Tacoma and Seattle. Sound Transit funds the one-mile Tacoma Link Light Rail line and is constructing Central Link Light Rail between Seattle and SeaTac Airport due to open in 2009.

Sound Transit offers 24 regional express routes connecting commuters to destinations throughout the Puget Sound region. Rather than being operated directly by Sound Transit, the agency contracts out to the local transit authorities in the region. One of Sound Transit's most important roles in the region is the development of transit infrastructure, including major park-and-ride facilities that are used by several agencies to collect and deliver passengers to Seattle's Center City. Sound Transit's ability to fund these facilities provides more leeway for agencies such as King County Metro Transit to spend valuable tax revenue on service provision.

Figure 3 presents the Sound Transit routes that operate in downtown Seattle. The table also shows the primary streets the route operates on through downtown, as well as the major entry/exit streets. It should be noted that all Sound Transit services are operated by the three major transit providers in the region: King County Metro (KCM), Community Transit (CT) or Pierce Transit (PT).

Sounder Commuter Rail

Sound Transit operates two commuter rail (heavy rail) lines that provide passenger service to King Street Station in downtown Seattle. The north line begins operation at Everett Station in Everett, Washington, and makes just one stop at Edmonds Station inbound to Seattle's King Street Station. A second interim stop is planned for Mukilteo. This line operates three peak trips each weekday. Sound Transit expects to initiate a forth run by 2010. The south line runs between Tacoma's Freighthouse Square Station and King Street Station in Seattle. The line makes stops in Puyallup, Auburn, Sumner, Kent, and Tukwila. In 2007 two additional peak trips were added to the south line, bringing the service level to six peak period trips each weekday. Sound Transit expects to have a total of nine trains operating on the south line by the end of 2008.

As measured in the third quarter of 2007, Sounder carries approximately 8,300 passengers per day. Planned expansions to both lines will allow for

Figure 3 Sound Transit Routes Serving Downtown Seattle

Route	Route Description	Operator	Weekday Frequency (Peak/Midday/Evening)	Core Street through Downtown	Entry/Exit Street into Downtown
510	Everett – Seattle	CT	15-30/30/60	4th/5th	Howell / Olive / Stewart
511	Lynwood – Seattle	CT	30/30/60	4th/5th	Howell / Olive / Stewart
513	Everett – Seattle	CT	4 trips	4th/5th	Howell / Olive / Stewart
522	Woodinville – Seattle	KCM	15-30/30/30-60	2nd/3rd	Pike / Union
545	Redmond – Seattle	KCM	8-10/15/30-60	4th/5th	Howell / Olive / Stewart
550	Bellevue – Seattle	KCM	6/15/30	Transit Tunnel	I-90 Express Lanes
554	Issaquah – Seattle	KCM	30/15/30-60	2nd/4th	5th Ave S
577	Federal Way – Seattle	KCM	15-30 peak	2nd/4th	Seneca (AM), 4th Ave S (PM)
590	Tacoma – Seattle	PT	6 min peak	2nd/4th	E-3 Busway
591	Lakewood – Tacoma Dome – Seattle	PT	9 AM trips, 10 PM trips	2nd/4th	E-3 Busway
592	DuPont – Lakewood – Seattle	PT	10-20 peak	2nd/4th	E-3 Busway
594	Lakewood – Tacoma – Tacoma Dome – Seattle	PT	30/30/30	2nd/4th	E-3 Busway
595	Purdy – Gig Harbor – West Tacoma – Seattle	PT	5 AM trips, 4 PM trips	2nd/4th	E-3 Busway

Source: Sound Transit

Sound Transit to carry more passengers. These extensions are dependent on track and signal upgrades that BNSF is contractually obligated to complete.

Community Transit

Community Transit bus entering downtown during the morning commute.

Source: Nelson\Nygaard

Community Transit provides local transit service in Snohomish County, with commute service to downtown Seattle, the University District, and other King County communities (Bellevue and Redmond). Commute service to downtown Seattle is provided on 20 routes, most of which are focused on service during peak periods only. Community Transit also operates three Sound Transit Express Bus routes (510, 511 and 513), as described in Figure 3.

South Lake Union Streetcar

Officially opened on December 12, 2007, the Seattle Streetcar route operates from the Westlake hub (Westlake and Olive) to Fairview and Campus Drive with five interim stops. The route operates every 15 minutes from 6:00 AM to 9:00 PM, Monday through Thursday, 6:00 AM to 11:00 PM on Friday and Saturday, and from 10:00 AM to 7:00 PM on Sunday. Fares on the streetcar are $1.50, with a reduced fare of $0.50 for seniors and youth. The PugetPass, Metro passes and Metro transfers are also honored on the streetcar.

Figure 4 Community Transit Routes Serving Downtown Seattle

Route	Route Description	Weekday Frequency (Peak/Midday/Evening)	Core Street through Downtown	Entry/Exit Street into Downtown
401 / 402	Lynnwood to Downtown Seattle	6 min peak	2nd/4th	Stewart / Olive / Howell
404 / 405	Edmonds to Downtown Seattle	6 trips AM; 10 trips PM	2nd/4th	Stewart / Olive / Howell
406	Seaview to Downtown Seattle	5 trips AM; 6 trips PM	2nd/4th/5th	Cherry
408	Mountlake Terrace to Downtown Seattle	9 trips AM; 7 trips PM	2nd/4th	Stewart / Olive / Howell
410 / 411	Mariner District To Downtown Seattle	12 trips AM; 14 trips PM	2nd/4th	Stewart / Olive / Howell
412	Silver Firs to Downtown Seattle	10 trips AM; 9 trips PM	2nd/4th/5th	Cherry
413	Swamp Creek P&R and Ash Way P&R to Downtown Seattle	9 trips AM; 10 trips PM	2nd/4th/5th	Cherry
414	McCollum Park Park & Ride to Downtown Seattle	30/60/60	2nd/4th	Stewart / Olive / Howell
415	Lincoln Way & Admiralty Way to Downtown Seattle	7 trips AM; 7 trips PM	2nd/4th	Stewart / Olive / Howell
416	Edmonds to Downtown Seattle	8 trips AM; 8 trips PM	2nd/4th/5th	Cherry
417	Mulkilteo to Downtown Seattle	5 trips AM; 7 trips PM	2nd/4th	Stewart / Olive / Howell
421	Marysville to Downtown Seattle	8 trips AM; 9 trips PM	2nd/4th/5th	Cherry
422	Stanwood to Downtown Seattle	3 trips AM; 3 trips PM	2nd/4th	Stewart / Olive / Howell
424	Snohomish P&R to Downtown Seattle	3 trips AM; 4 trips PM	2nd/4th	Stewart / Olive / Howell
425	Lake Stevens to Downtown Seattle	4 trips AM; 5 trips PM	2nd/4th/5th	Cherry
435	Mays Pond to Downtown Seattle	7 trips AM; 7 trips PM	2nd/4th/5th	Cherry
477	Brier to Downtown Seattle	7 trips AM; 7 trips PM	2nd/4th/5th	Cherry

Source: Community Transit

George Benson Waterfront Streetcar Line

The George Benson Streetcar line operates from Broad and Alaskan Way to Eighth and Jackson in the International District. The streetcar line is temporarily being operated by a bus, Metro Route 99, due to the removal of the historic maintenance facility to make way for the Olympic Sculpture Park. Rail service is not likely to reopen until after the replacement of the Central Waterfront segment of the Alaskan Way Viaduct is complete. Currently, bus service is provided approximately every 20 minutes from 6:30 AM to 7:15 PM, Monday through Friday, and from 10:30 AM to 7:00 PM on the weekends. Service is free on the Waterfront Streetcar alignment.

Elliott Bay Water Taxi

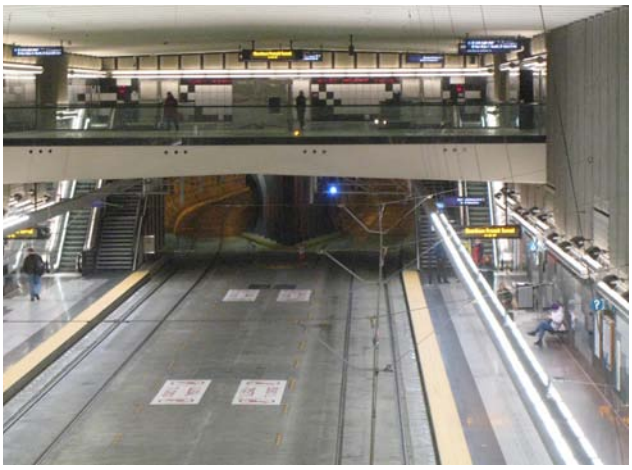
The Elliott Bay Water Taxi (also known as the West Seattle Water Taxi) is a passenger-only ferry that crosses Elliott Bay from Pier 55 on the Seattle waterfront to the Seacrest dock in West Seattle. The water taxi operates seven days a week from late April to mid-September each year. The ferry's crossing time is approximately twelve minutes and adults pay $3.00 per crossing. The water taxi attracts both commuters as well as a number of tourists who use the service to visit Seacrest Park, Alki Beach and other attractions in West Seattle.

In November 2007, a newly formed King County Ferry District passed a property tax measure that will allow it to take over operation of the West Seattle Water Taxi. Tax revenues will allow King County to operate the water taxi year round starting by 2010. The King County Ferry District is also developing a business plan for a demonstration passenger-only ferry to begin operating between Kirkland and the University of Washington by 2009 and also plans to pursue several other potential passenger-only ferry demonstration routes on Lake Washington and Puget Sound.

Transit Pathways

Transit operations use a north-south linear spine to serve downtown Seattle. With few exceptions, downtown bound transit services use one or more of the following corridors:

- Third Avenue: Most north-south transit is pulled together in the center of downtown along a Third Avenue Transit Spine, on which auto traffic is restricted during the AM and PM peaks. This street is the primary organizing element of the system. Third Avenue is within a quarter-mile walk of almost all of downtown and it is roughly at downtown's median elevation. Third Avenue between S Washington Street and Stewart Street is restricted to general traffic Monday through Friday from 6 to 9 AM and from 3 to 6:30 PM. Non-transit vehicles may turn onto Third Avenue from east/west streets, but they must turn right at the next block.
- Downtown Seattle Transit Tunnel: This 2.3 mile dual mode tunnel connects the E3 Busway with I-5 and surface streets north of the CBD. The tunnel starts at the International District/Chinatown Station on the south end of downtown and ends at the Convention Place Station. The five-station tunnel runs roughly under Third Avenue and Pine Street. In 2009 the Tunnel will begin to carry light rail trains; however, the 18 routes that now operate in the tunnel will remain. Metro has an agreement to continue to operate up to 60 buses per hour in tandem with Central Link light rail.
- Second and Fourth Avenues: The two Avenues parallel to Third operate as a couplet, with Second traveling south and Fourth northbound. These streets have peak hour bus-only facilities and carry a large number of buses, particularly regional service that cannot be



The Seattle Transit Tunnel carries buses today and will carry light rail trains beginning in 2009.

Source: Nelson\Nygaard

accommodated on Third Avenue during peak hours.

- First and Fifth Avenues: These two streets also carry bus transit. First is a local service routing and Fifth primarily carries regional express service.

Service into and out of downtown Seattle operates on several major corridors. Figure 5 provides the primary entry and exit streets to neighborhoods throughout Seattle and to other areas in the region.

To better understand how people travel to and from downtown Seattle as a whole, Figure 7 shows transit person trips and total person trips crossing three "screenlines" surrounding downtown Seattle during the peak hour of the AM commute period. Based on this data from the Seattle Travel Demand Model (2005), the overall transit mode share to downtown Seattle is about 38% during the morning commute. The transit mode share from the south (43%) is slightly higher than from the north (40%). The transit mode split from the east is somewhat lower than from the north or south (28%) primarily because of higher mode splits for walking and biking.

Seattle's Current Transit Policy Direction

The Urban Village Transit Network

Seattle Connections, the city's transit plan and the accompanying Urban Village Transit Network (UVTN) provide Seattle's vision for a network of high quality, reliable transit corridors that support and connect Seattle's urban villages, as set forth in the Seattle Comprehensive Plan. The UVTN network represents the backbone of transit service in Seattle today and as the system expands in the future. The goal for the UVTN is service at least every 15 minutes (in both directions), 18 hours a day, seven days a week. In order to ensure service quality is meeting expectations, the existing segments of the UVTN network are monitored annually using five independent quality-of-service (QOS) measures: frequency, service span, speed, reliability and loading. Minimum goals for each quality of service measure have been established and are described from the passenger's perspective. A map of the most recent UVTN network is shown in Figure 8, which illustrates transit travel speeds on the UVTN network as a percent of posted speed limit. Transit travel speed is an important quality-of-service measure, as transit's competitiveness with driving is judged in part on the comparative door-to-door travel time. The minimum standard established for travel speed on the UVTN network is 30% of speed limit. Transit travel speeds less than 30% of the posted speed limit are generally considered too slow to adequately compete with driving as a mode of travel.

For more information on the UVTN project, refer to the Seattle Transit Plan (http://www.seattle.gov/transportation/transitnetwork.htm).

Figure 5 Key Entry/Exit Transit Streets

Primary Entry/Exit Street(s)	To/From Neighborhood or Corridor
Western Ave or Mercer St	Ballard / Magnolia
Fifth Ave or Aurora Ave	North Seattle
Virginia Ave, Eastlake Ave, Fairview Ave	Northeast Seattle
Stewart St, Howell St, Fifth Avenue	SR 520 or I-5 North
Pike St/Pine St, Madison St/Marion St	Capital Hill and First Hill
Jackson St	Rainier Valley
Dearborn St	I-90 West
Seneca, E-3 Busway to Spokane	I-5 South
Fourth Ave S	South King County (Burien, Des Moines, Kent, Auburn, etc)
First Ave S, Fourth Ave S to E-3 Busway	West Seattle
Columbia and Seneca St. AWV ramps	West Seattle Express

This table provides a general summary of primary route paths from key corridors. Many areas are served by multiple routes, which may operate on different pathways entering downtown.

Figure 6 King County Metro Trolley Bus Routes

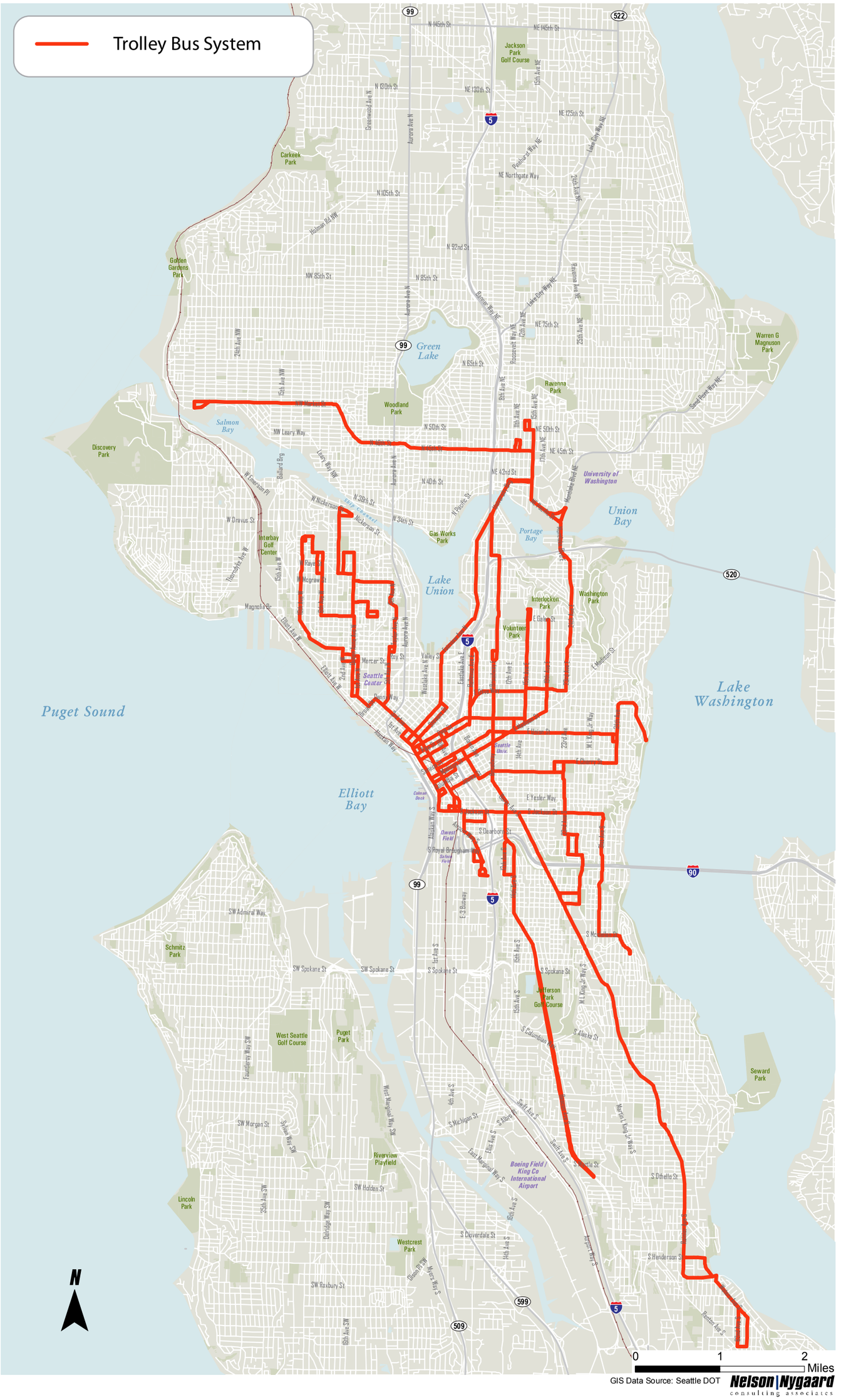


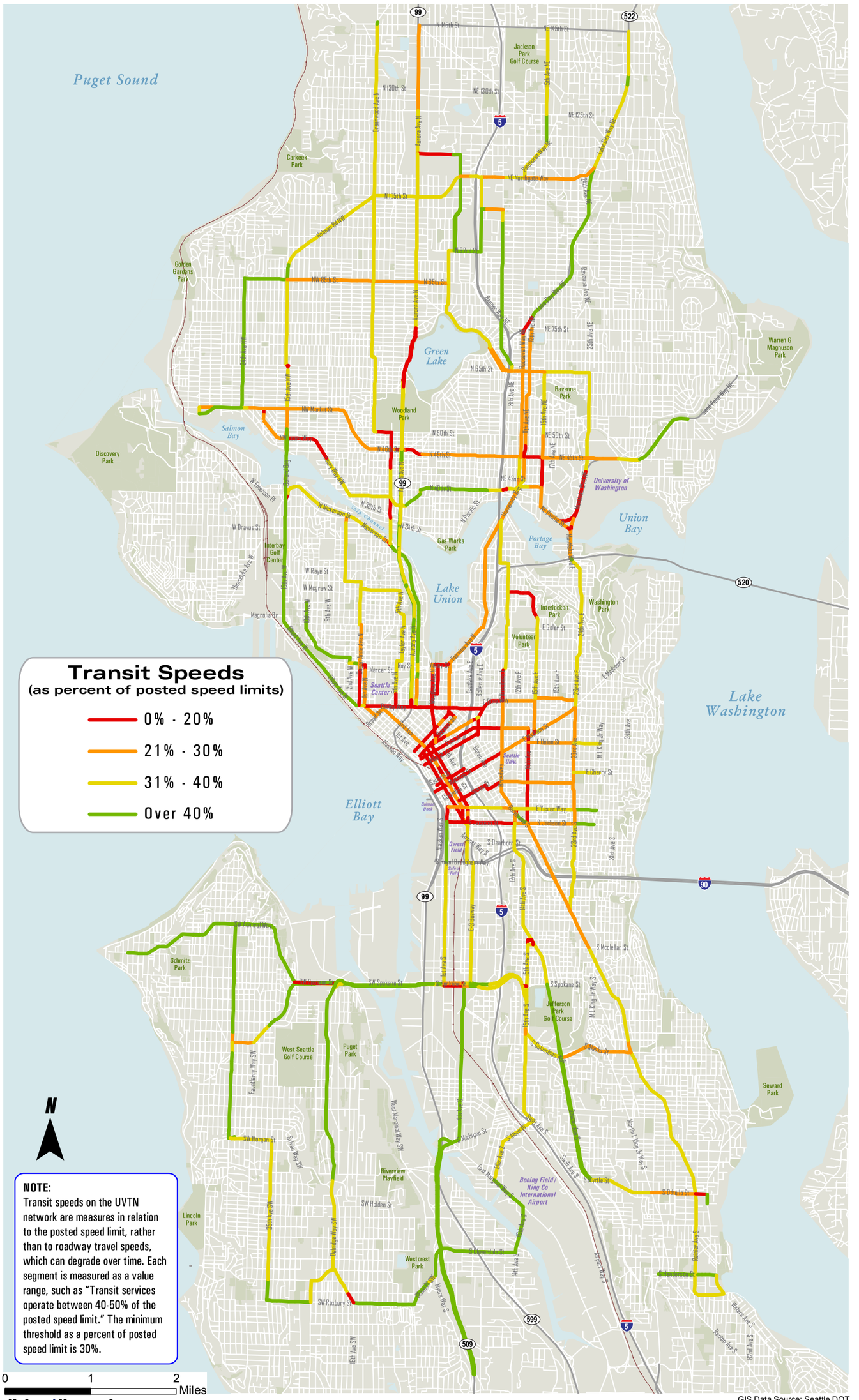
Figure 7 Inbound AM Peak Hour Transit Trips and Transit Vehicle Volumes at Key Screenlines

Nelson|Nygaard consulting associates

GIS Data Source: Seattle DOT

0 0.25 0.5 Miles

Figure 8: Urban Village Transit Network and 2006 Transit Speeds



GIS Data Source: Seattle DOT

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consulting associates

Fact Sheet

Colman Dock & Ferries

Seattle's development is directly influenced by its relationship to Elliott Bay and other surrounding bodies of water. Seattle's waterfront is the region's historic center of commerce and trade; it provided connections to other parts of the region and the world long before overland routes were available. The waterfront is also the oldest hub for intermodal transportation and has a long history and spectrum of ferry operations. For over 100 years ferry vessels of all descriptions have provided services in and out of Seattle, particularly at the western edge of Center City. Even today, the Central Waterfront is one of the three major multimodal hubs within the downtown area, Westlake and King Street being the other two. This distinction raises a number of issues and opportunities for Seattle. In general, ferry activity is located in one major and one minor location on the Central Waterfront. Colman Dock is the terminus for Washington State Ferries and accounts for the vast majority of multimodal transit activity on the waterfront. Colman Dock and Washington State Ferry lines that serve it are part of the state highway system, which provides connections to communities on the west banks of Puget Sound. This implies that Colman Dock is not only a major transit hub, but also a generator of vehicle traffic in the CBD. The Elliot Bay Water Taxi connects Seacrest Marina in West Seattle to Pier 55, located about ¼ mile north of Colman Dock. Together, these two terminals serve as the Central Waterfront Multimodal Hub.

Colman Dock

The Washington State Ferry (WSF) System is the largest system of its kind in the United States, and the Colman Dock ferry terminal in Seattle is the busiest ferry terminal with 9 million passengers and nearly 3 million vehicles annually entering Seattle through Colman Dock. Each weekday, the terminal accommodates passage of nearly 25,000 people including walk-on passengers, car-drivers, car passengers, vanpool riders, bicycle riders and motorcyclists.

Coman Dock is a major multimodal hub.

The terminal serves the Bainbridge Island and Bremerton passenger-vehicle ferry routes and the Vashon Island passenger-only ferry route (see Figure 1). In coming years, the number of daily commuters and visitors is expected to grow. The Seattle-Bainbridge and Seattle-Bremerton routes are part of Washington State highway system while the Seattle-Vashon passenger ferry makes a critical connection between the CBD and Vashon Island (note: July 2008 King County will assume financial responsibility for this route and in July 2009 will take on full operating responsibility from Washington State Ferries). Ridership statistics from the WSF Rider Segment Report for 2006 are shown in Figure 2 (Note: technical difficulties in WSF's reporting systems cause 2006 to be the most available information).

Over the past five years, walk-on passenger volumes at Colman Dock have been dropping steadily, while vehicle volumes have remained fairly constant and have begun to climb slightly in the past two years. Much of the drop in walk-on passenger volume is directly attributable to WSF's decision to de-emphasize passenger only opera-

tions. In 2002 (Figure 3), there was a passenger-only operation between Seattle and Bremerton and the Vashon-Seattle passenger-only route operated at a higher level of service. By 2006, the Bremerton passenger-only operation had been discontinued and the Vashon service reduced to about half of its former level.

Passenger Characteristics

Washington State Ferries conducts passenger surveys to assess the travel behavior of Washington State Ferry system riders. Origin and destination surveys were conducted in 2006, 1999 and 1993. The most recent survey indicates that the relative percentage of work trips passing through Colman Dock bound for either side of Puget Sound has declined steadily over the past 13 years. However, work trips remain the dominant trip purpose for ferry riders, comprising nearly 64% of all ferry trips. The total number of employment-based trips through Colman Dock has declined while trips for personal business, shopping and recreation have remained constant or grown slightly. Thus work trips now comprise a smaller percentage of the total trips than observed in previous surveys. It is postulated the reasons for the declining work trip market share are greater employment opportunities in the West Puget Sound region, a rise in telecommuting, and more people working full-time from their homes.

Figure 1 Seattle-Bainbridge, -Bremerton, and –Vashon Ferry Service Descriptions

Route	Operating Hours	Daily Sailings (one direction)	Approx. Peak Hour Headways
Seattle – Bainbridge Vehicle and passenger service	4:45 AM –1:35 AM Monday – Friday 5:20 AM – 2:10 AM Weekends and Holidays`	23 (Monday –Friday) 22 (Weekends and Holidays)	50 minutes
Seattle – Bremerton Vehicle and passenger service	4:50 AM – 12:50 AM Daily	14	70 minutes
Seattle –Vashon Passenger only service	7:00 AM – 6:10 PM	3	85 minutes

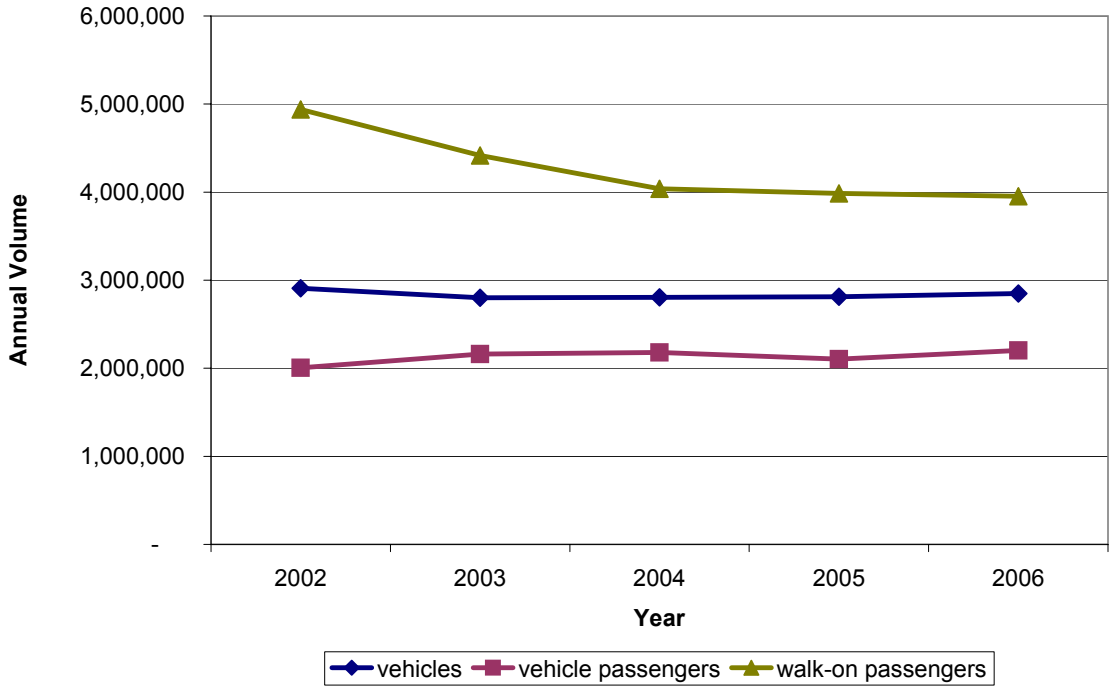
Source: www.wsdot.wa.gov/ferries

Figure 2 2006 Annual Ridership Statistics for Seattle-Bainbridge, -Bremerton, and –Vashon Ferries

Route	Vehicles	Vehicle Passengers	Foot Passengers	Total Riders
Seattle –Bremerton	722,745	513,000	1,179,693	2,415,438
Seattle – Bainbridge	2,127,117	1,689,952	2,642,733	6,459,802
Seattle –Vashon (P-O)			129,839	129,839
Totals	2,849,862	2,202,952	3,952,265	9,005,079

Source: www.wsdot.wa.gov/ferries

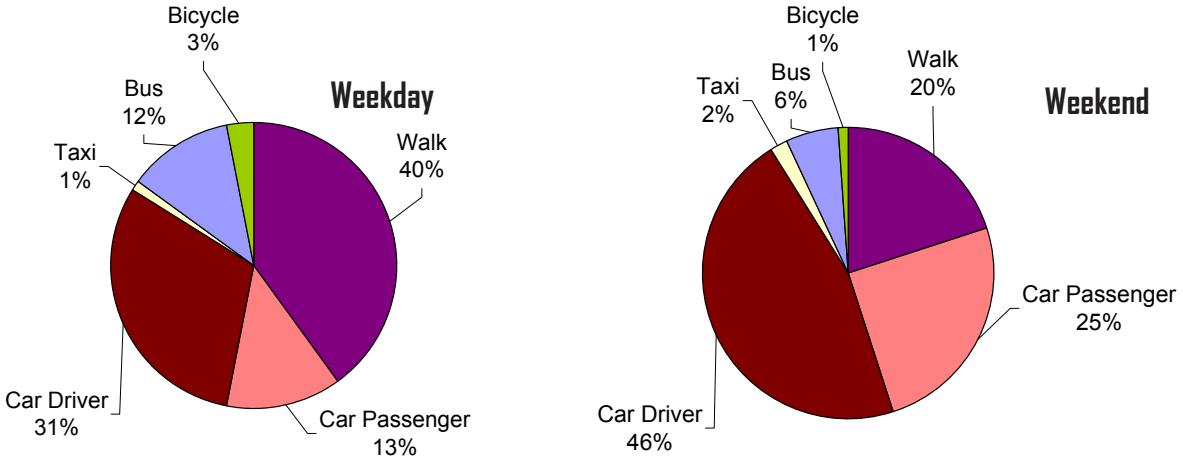
Figure 3 Historical Trends in Colman Dock Traffic (2002 – 2006)



Source: www.wsdot.wa.gov/ferries

Mode of access to Washington State Ferries at Colman Dock varies by day of the week. On weekdays, more people access ferries in Seattle using non-motorized modes - 56% of trips are made without an auto. On weekends the market is considerably different with just below 30% of trips accessing ferries without a car. The mode of access is displayed in Figure 4.

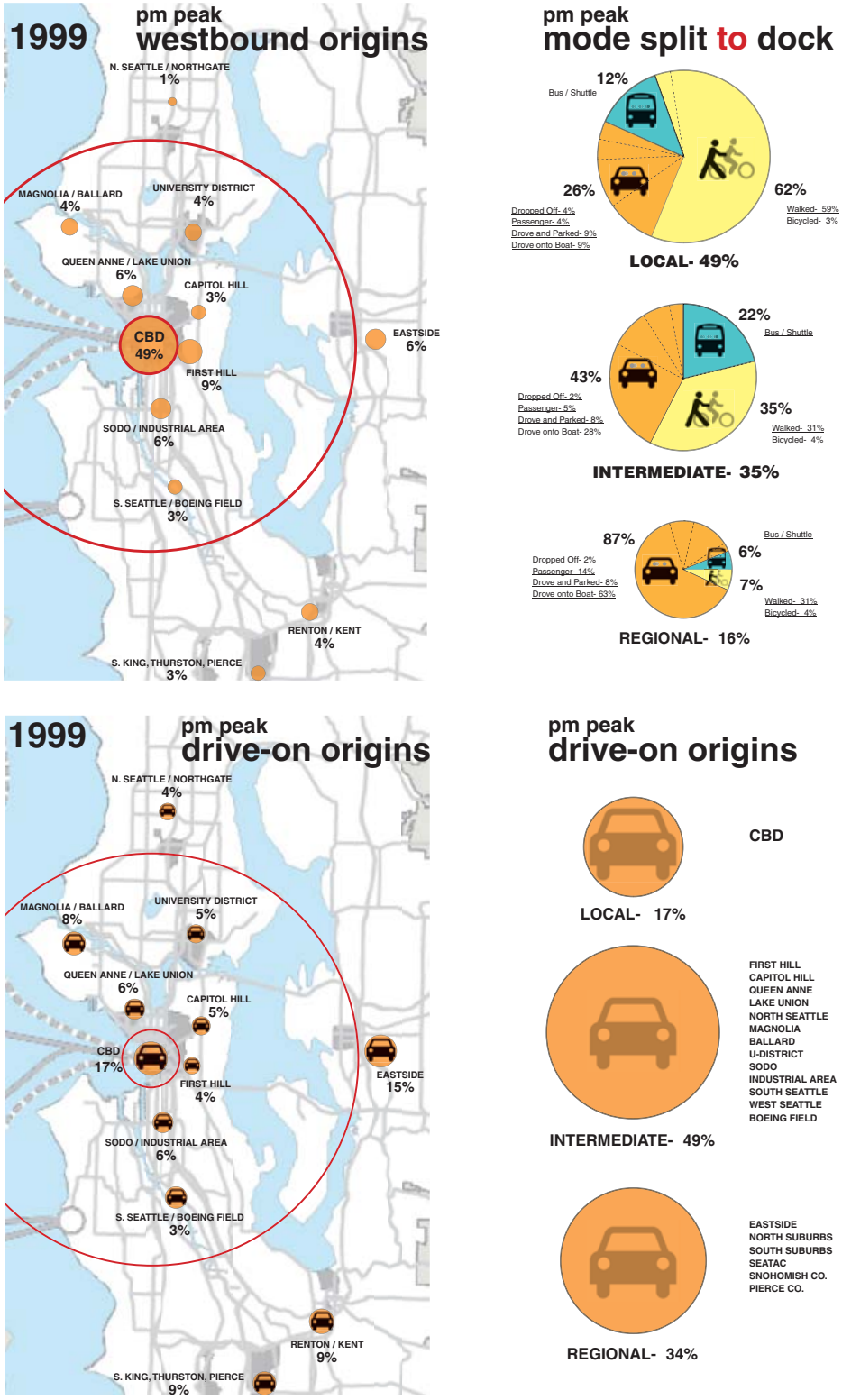
Figure 4 WSF Access Mode



Source: Washington State Ferries 2006 Origin Destination On Board Survey - Seattle Supplement

The mode of access also varies depending on where people's trips originate and their final destination. Not surprisingly, distance from Colman Dock plays a significant role in how people access the ferries. A fully segmented analysis of the 1999 WSF Origin and Destination Survey provides the following picture, see figure 5, of how mode of access and trip origins in the PM peak correspond.

Figure 5 Colman Dock Mode of Access and Trip Origins

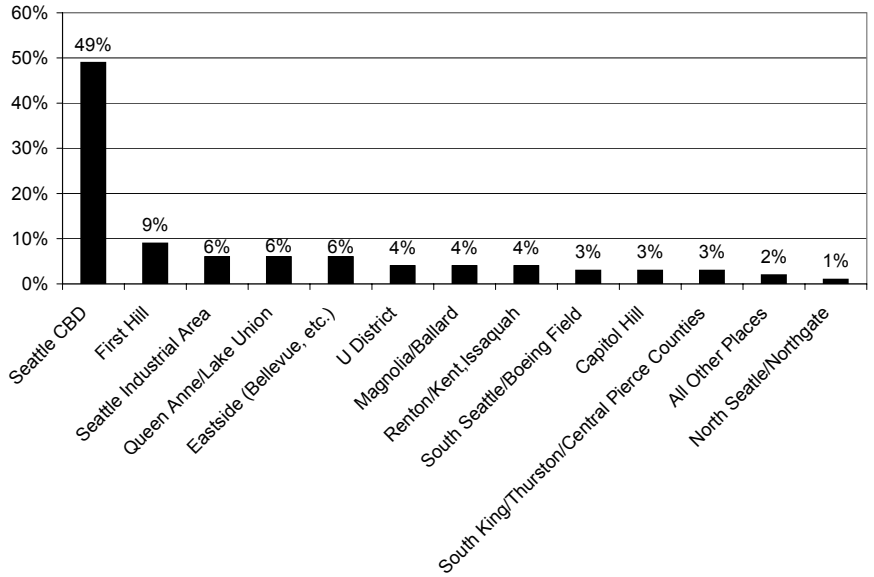


"Source: WSF – 1999 Origin and Destination Survey

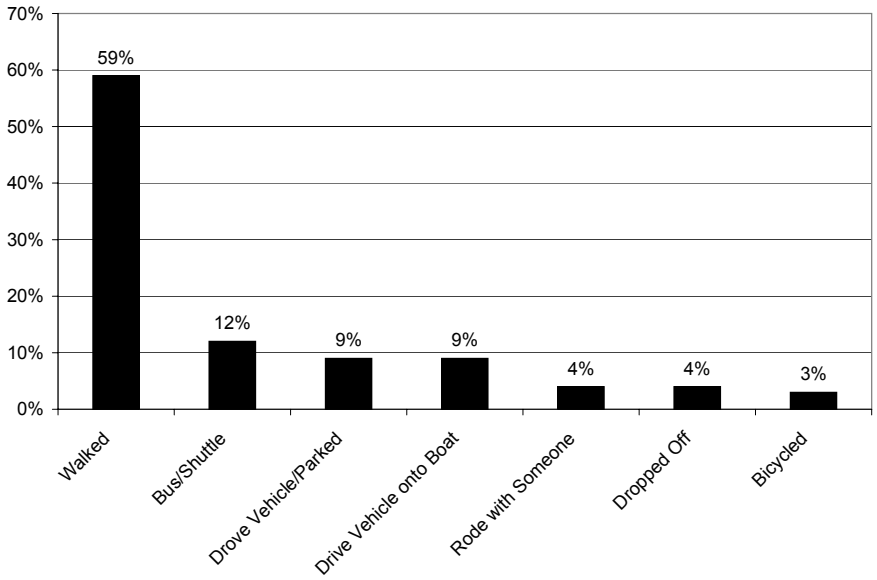
During the PM peak, nearly half of the passengers heading to Colman Dock are coming from the adjacent CBD, and an additional 18% are coming from the nearby First Hill, Capitol Hill, Queen Anne and South Lake Union neighborhoods, see Figure 6. Only 15% of PM peak passengers are coming from outside of Seattle – accounting for 38% of total vehicles. Of those coming from the CBD, only 9% are driving their own vehicle onto the dock – the same share who park and leave a car overnight near the waterfront. While these shares are low, the traffic implications are significant – assuming comparable mode splits throughout the day, 18% drive-share of the 25,000 daily trips oriented to the CBD results in 2,200 daily vehicle trips on Seattle's congested waterfront. Figure 7 displays the origins of other Center City trips which add about another 800 daily vehicle trips, for a total of 3,000 short-distance drives to and from Colman Dock each day. These trips should be highly susceptible to mode shift if better park-and-ride and transit options were available on the west side and if better pedestrian and transit connections were available in Center City Seattle.

Figure 6 PM Peak Trip Origins for Westbound trips through Colman Dock

Distribution of Origins (PM Peak - Where Do People Start Their Trips to Get to Colman Dock?)

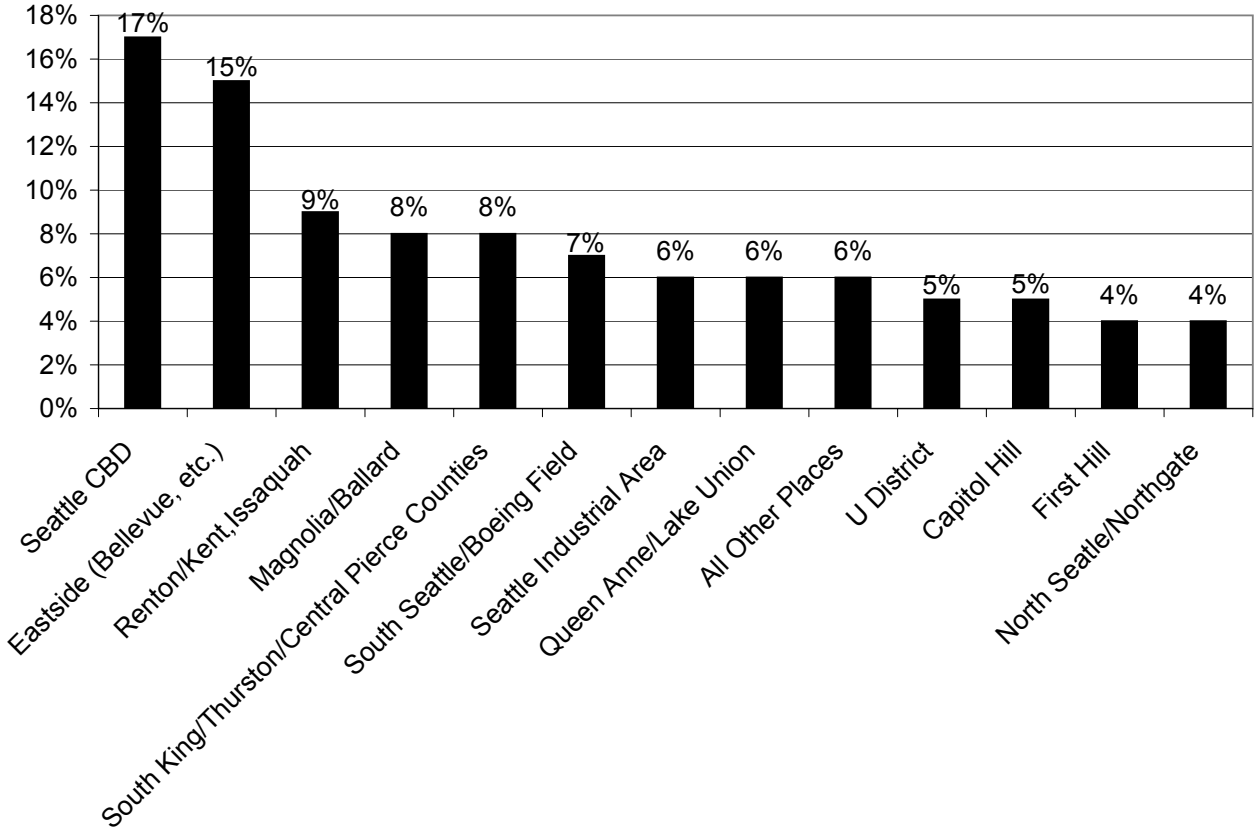


CBD Mode Choice (PM Peak - How Do People Get from CBD to Colman Dock?)



Source: WSF – 1999 Origin and Destination Survey

Figure 7 PM Peak Drive-on Trip Origins for Westbound Trips Through Colman Dock

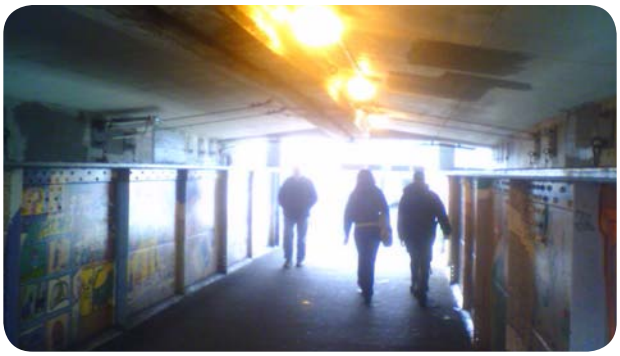


Source: WSF – 1999 Origin and Destination Survey

Multimodal Linkages

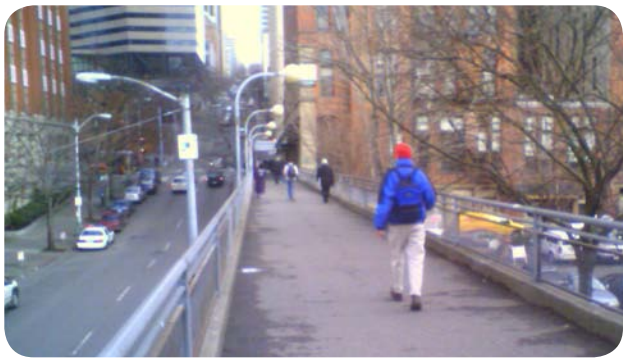
Walking and transit access are very important to Colman Dock, not just because of the high passenger volume, but because of its location at the western edge of the CBD. The WSF 2006 Origin/Destination survey indicates that about 55% of all trips into Seattle involve a walking segment with a median walk distance of six blocks. This implies that many passengers walk directly from ferries to their workplace, or they walk some distance to their bus connection. From Colman Dock, there is a steep incline to the Third Avenue Transit Spine and jobs cluster east of Third Avenue and on First Hill. The Marion Street pedestrian walkway is the primary pedestrian connection between Colman Dock, the CBD and other transit connections. At a typical peak, 1,500 pedestrians cross it in an eight minute period, well beyond its capacity. In the off-peak, its design presents significant CPTED (Crime Prevention Through Environmental Design) concerns, with entrapment points, a lack of

Photos on this page and facing page document the walk from ferry to bus.



general surveillance, high noise levels and other problems.

Colman Dock, while accommodating pedestrians and bicycles, is designed and functions primarily as a facility to accommodate vehicles. This basic character does little to encourage patrons to walk or use non-auto modes. Exacerbating this situation is the fact that there are two full blocks of auto-oriented highway infrastructure between the terminal and the city itself, particularly at street level.



Nearly 75% of ferry passengers who connect with land-based transit do so at locations on First, Second and Third Avenues with 31%, 14% and 30%, respectively, for each street. Just 23% of those making a transit connection board a bus on Alaskan Way. It is a full 0.6 miles from where passengers disembark from the ferries to either University Street or Pioneer Square stations, the future connections to regional light rail, and a quarter mile from the nearest buses of any frequency, along First Avenue.

Just two routes stop alongside the terminal providing direct transit access: Metro bus route 16 (service at 20 minute frequency to Third Avenue, Seattle Center and Wallingford) and Route 66 (service at 30 minute frequency to Third Avenue, South Lake Union, Eastlake, University District and Northgate). These transit routes are generally not well timed to ferry arrivals or departures, nor are they dedicated to that purpose. This means that on the occasions that ferry arrivals are delayed, connections are missed for people who depend on transferring to transit on Alaskan Way. Buses arriving at Colman Dock can face significant delays due to traffic queued to enter the dock, or surges of vehicles exiting the dock.

Various efforts are currently underway to redesign and modernize Colman Dock, but no design alternative has yet emerged that will allow buses to connect directly to ferries, free of interference from queued and exiting vehicles, as has been accomplished at ferry terminals like Bremerton. Accommodating growth in Colman Dock passenger demand while reducing its vehicle congestion impact on Seattle streets will require a stronger connection between the ferries and buses.

The Waterfront Streetcar is currently being operated as a bus route (Route 99, with 20 minute peak and 30 minute off peak frequency) pending construction of a new car barn (estimated in 2008). This historic streetcar line provides service along Seattle's Central Waterfront, linking the International District with Broad Street via Alaskan Way. It provides access to Colman Dock with a station (currently bus stops) at Spring Street. The city is currently exploring options to extend and integrate the Waterfront line with the balance of its emerging streetcar system.

Bicyclists comprise 3% of all trips into and out of Seattle, see Figure 4 – Mode of Access. During commuter hours as many as 50 bicyclists currently disembark from a single ferry arrival. There are no dedicated bicycle facilities in the vicinity of Colman Dock, though the city has noted that some streets such as Western and Alaskan Way are "commonly used by bicyclists," and allows bicyclists on the pedestrian path running along the east side of Alaskan Way near the dock. Bicyclists must mix with auto traffic on all surrounding streets or share the narrow waterfront path with pedestrians. Bicycle routes to and from destinations to the east, as well as access to Colman Dock, are not well marked. An inexperienced cyclist would have difficulty knowing if there is an intended or correct path to access Colman Dock or to make their way into the CBD.

Bicyclists leaving the ferry.

Car ferries create auto surges that can challenge the transportation system.

Vehicle Linkages

One of the most challenging issues created by Colman Dock is the management of vehicle surges from the dock. Particularly in the morning, ferries discharge over 200 cars in a period of just 5 to 10 minutes into the downtown street system. Intersections within one-quarter mile of the terminal quickly reach capacity with saturation traffic flow, then slowly return to normal. Fortunately, the primary inbound flow of vehicle traffic is in the morning commute when surface street traffic volume is not as high as the afternoon peak period. Vessel off-loads in the PM peak tend to be between 100 and 150 cars and so the discharge into city streets should have less impact. However, during afternoon peak traffic conditions, due to the higher volumes of background traffic on the surface streets, traffic exiting the ferries will cause greater congestion than in the morning periods.

Vehicle destinations into Seattle are also varied, Figure 5 displays trip origins in Seattle for vehicles going to the ferries in the PM peak. Figure 8 below illustrates what general routes vehicle drivers use to access Colman Dock.

Figure 8 General Access Routes to and From Colman Dock

Route	Percent of Vehicle drivers heading to/from Colman Dock
South along First Ave S or Alaskan Way S	38%
Marion/Madison through the CBD	21%
To and through Pioneer Square	17%
North Along Alaskan Way or Western	24%

Source: WSF 2006 Origin Destination Survey Seattle Supplement

In the afternoon peak period problems are created by cars queuing to pass through tollgates onto the dock. The vehicular approach to Colman Dock is designed to be from the south, or northbound on Alaskan Way. Motorcycles and certified HOVs are permitted to approach from the north, as are non-HOVs at times when all vehicles are able to be processed into the holding area. Whether to permit non-HOVs a right turn into the toll plaza from southbound Alaskan Way is left to the judgment of Washington State Patrol traffic officers on duty at the dock. Frequently, even during commuting hours at off-peak times of year, single occupant autos are allowed to turn right into Colman Dock. A vehicle driver cannot know whether or not the right turn will be allowed on any given day during the PM peak. If the turn is not permitted, the driver must make a circuitous trip south on Alaskan Way and other local streets to get turned around for the permitted approach to the terminal. Even at moderate traffic periods, this movement causes additional congestion on city streets.

Colman Dock currently holds approximately 650 vehicles. On a summer weekday evening or Saturday morning this capacity can be overtaxed, with vehicles queuing onto city streets. To an extent, the approaches to the terminal are designed and signed to accommodate this situation, with an extensive on-street storage and holding facility that stretches from Colman Dock in a single left hand turn lane in the center of Alaskan Way to its intersection with South Dearborn, where the turn lane crosses the northbound traffic lane on Alaskan Way and is tucked underneath the Alaskan Way Viaduct for an additional four blocks to Royal Brougham. The capacity of this off-terminal queuing lane is approximately 100 cars. Occasionally, this lane will overflow with arriving traffic leaving

Cars waiting for a ferry loading.

cars stacked on Royal Brougham Way. Another significant issue is the conflict between vehicles arriving and departing from Colman Dock. At peak traffic, congestion caused by various traffic movements often results in vehicles not reaching the vehicle holding area in time for a particular ferry sailing. In these instances ferry vessels sometimes leave with less than a full load even though demand exists.

For people who do drive onto the vessels with more regional destinations (about a third of all drive-on ferry passengers) connections to major regional thoroughfares, I-5 and I-90, are not direct. Auto drivers with regional destinations are forced to travel on congested city streets to reach the terminal, adding to the local congestion problem.

Taking advantage of the capacity of both ferries and terminals, it is most cost effective to combine walk-on and drive-on passengers in the same services, with each boat filling its person and vehicle capacity on every run. Separating auto ferries from passenger-only ferries may result in higher fares and worse service for all users. Excess passenger capacity on ferries at all times and excess vehicle queuing at peak represent both significant economic waste and inefficiency. As noted below, WSF is currently exploring new operations to make its services more efficient. Both WSF and the City of Seattle are working together to enhance the role of the ferries in moving people and goods, while minimizing negative transportation and environmental impacts on Seattle's waterfront.

Future Plans for Colman Dock

In addition to the issues above, there is a need to replace aging portions of the dock. In spring 2007, legislation was passed that requires analysis of and changes to the way WSF plans, operates, funds, and delivers its programs. The ferry financing legislation (ESHB 2358) is intended to address the lack of long-term, sustainable funding for Washington State Ferries, and directs the ferry system to "maximize the ferry system's current capacity and make the most efficient use of citizens' tax dollars."

As a result of the Legislature's direction most work on WSF's major preservation and improvement projects will slow significantly over the next two years to allow further study and development of recommendations on how to carry out the legislative intent. These actions will need to be integrated with the ferry system's long range plan, policies and financing. This system-wide work will include:

- Conducting a market survey to gather data on ferry users
- Revisiting ridership demand forecasts
- Developing terminal design standards that find the most efficient balance between capital and operating investments
- Evaluating operational and pricing strategies, such as reservations or peak-period pricing to accommodate peak period demand

With these studies currently underway it is difficult to predict how Colman Dock will function in the future and to what extent decisions reached on traffic management in Center City will impact these functions.

Pier 55 – Elliot Bay Water Taxi

Pier 55 currently serves as the eastern terminus for the Elliott Bay Water Taxi. It is a King County funded passenger only ferry that crosses Elliott Bay from Seacrest Marina in West Seattle. The ferry's crossing time is approximately 12 minutes, and the fare is $3 for adults. Historically, the water taxi has operated seven days a week from late April to late September, attracting about 1,000 daily riders. It has become popular with daily commuters and tourists, alike. In 2007 this popu-

larity caused the operating period to stretch into early November.

King County Ferry District

In mid-November, 2007 the King County Council elected to create a passenger-only ferry district and passed an incremental property tax to fund capital and operations. The Ferry District is governed by its own Board of Directors, who are currently the same officials elected to the King County Council. The property tax is 5.5 cents per thousand of assessed valuation and is projected to accumulate $18.3 million per year to fund ferry district capital and operating expenses. A top priority for the new ferry district is to establish the Elliot Bay Water Taxi as a year-round operation. It is expected that the ferry will continue seasonal operation in 2008 and 2009 and begin year around operations in spring 2010. First priority for the Ferry District is the assumption of Vashon to Seattle passenger-only ferry operations from Washington State Ferries. Other possible routes that could serve the Central Waterfront in the future include service to Shilshole Marina and Des Moines Marina. The Ferry District Board of Directors has not established any firm commitments to these potential routes. They are to be explored as experimental routes at some future date as funding is available and as other priorities are explored.

Other Ferry Operations

Several attempts have been made to provide passenger-only ferry operations from the Kitsap Peninsula to downtown Seattle. Routes have been tried from Bremerton and Kingston and discussed for Port Orchard and Southworth. Presently, there are no firm plans, or funding, to begin any of these passenger ferry operations. The Puget Sound Regional Council is currently conducting a passenger-only ferry feasibility study which may shed more light on the future potential of these additional ferry connections.

Photo Sources

All photos from Nelson\Nygaard Colman Dock Study.

Fact Sheet

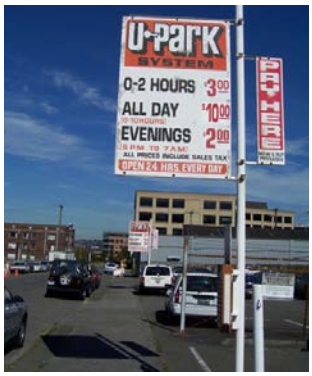
Parking

Downtown Seattle is the densest concentration of jobs and retail business in the state of Washington. Customers and employees traveling downtown demand a balanced supply of automobile parking and other modes. While the Seattle Comprehensive Plan calls for the reduction of car travel over time, it also recognizes that the city must "provide enough parking to sustain the economic viability and vitality of commercial areas." In short, city policies call for the provision of a reasonable amount of short-term parking to support customer access while discouraging commuting by single-occupant vehicles. These policies relate both to the management of existing parking and the development of new supply.

Off-Street Parking Management

Off-street parking in Seattle is owned and managed primarily by private companies and commercial operators. In the CBD only a small fraction of off-street parking stock that is open to the general public is publicly owned and/or managed. Many of the largest parking facilities in downtown serve building tenants, with additional spaces allocated for short- or long-term use by the general public. Others sell their full supply to the general public, but are often priced to encourage commuter parking. While there is a significant supply of off-street parking available, access to parking can be confusing for visitors and occasional drivers, rate signs can be deceptive and wayfinding is very limited.

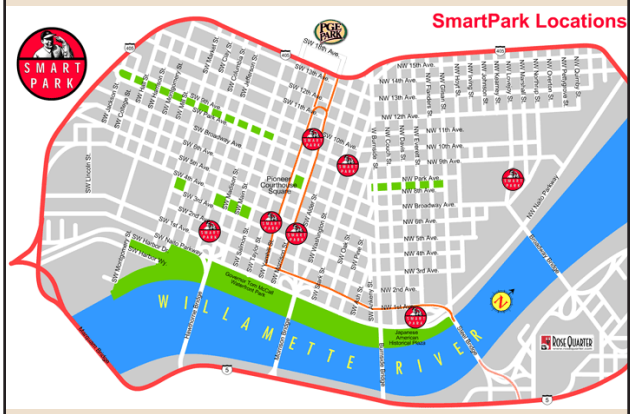
Due to the fact that the city of Seattle has very little control over the pricing and management of the downtown parking stock, the city encourages neighborhood businesses and community organizations to collaborate in order to address emerging parking, mobility, and access issues affecting each neighborhood. The city of Seattle works closely with the Downtown Seattle Association (DSA) , the Building Owners and Managers Association of Seattle (BOMA) and other private business owners and building managers throughout Center City to ensure customer parking needs are met.



Surface parking such as this lot in South Lake Union is rapidly disappearing in Center City.
Source: Nelson\Nygaard

Smart Park Portland

A number of downtowns in the northwest, including Portland and Vancouver, WA, have developed a unifying brand or logo for visitor parking facilities. A parking brand such as SmartPark in Portland helps to establish a recognizable and attractive identifier at parking locations that can marketed and become the universal symbol for affordable customer parking. In addition to being affordable and conveniently located, the success of these systems can be attributed to ubiquitous recognition by the public. The SmartPark logo tells customers they can expect a specific low hourly rate and high level of service.

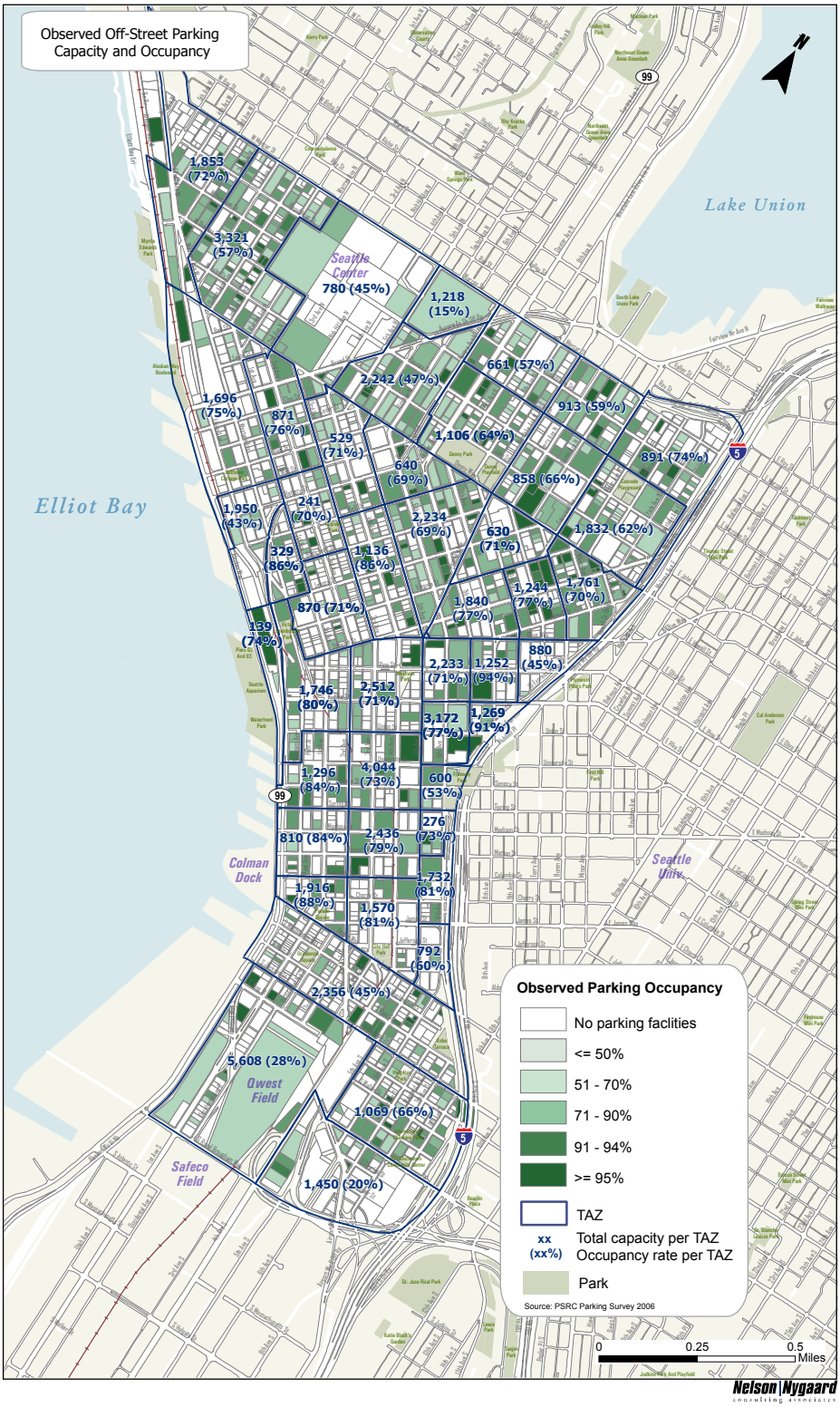


In Portland SmartPark facilities provide well-branded, low-cost customer parking throughout the downtown. Facilities are located on public transit infrastructure to provide a convenient "park-once" experience.

Off-Street Parking Supply and Use

Figure 1 (Off-street Parking Capacity) shows the number of off-street parking stalls located in Center City analysis zones along with the surveyed occupancy (2006). A total of 817 off-street parking facilities with over 67,400 parking spaces exist in the mapped area, based on the 2006 PSRC Regional Parking Inventory. These parking facilities operate at an average of 67% occupancy rate.

Figure 1 Off-street Parking Capacity

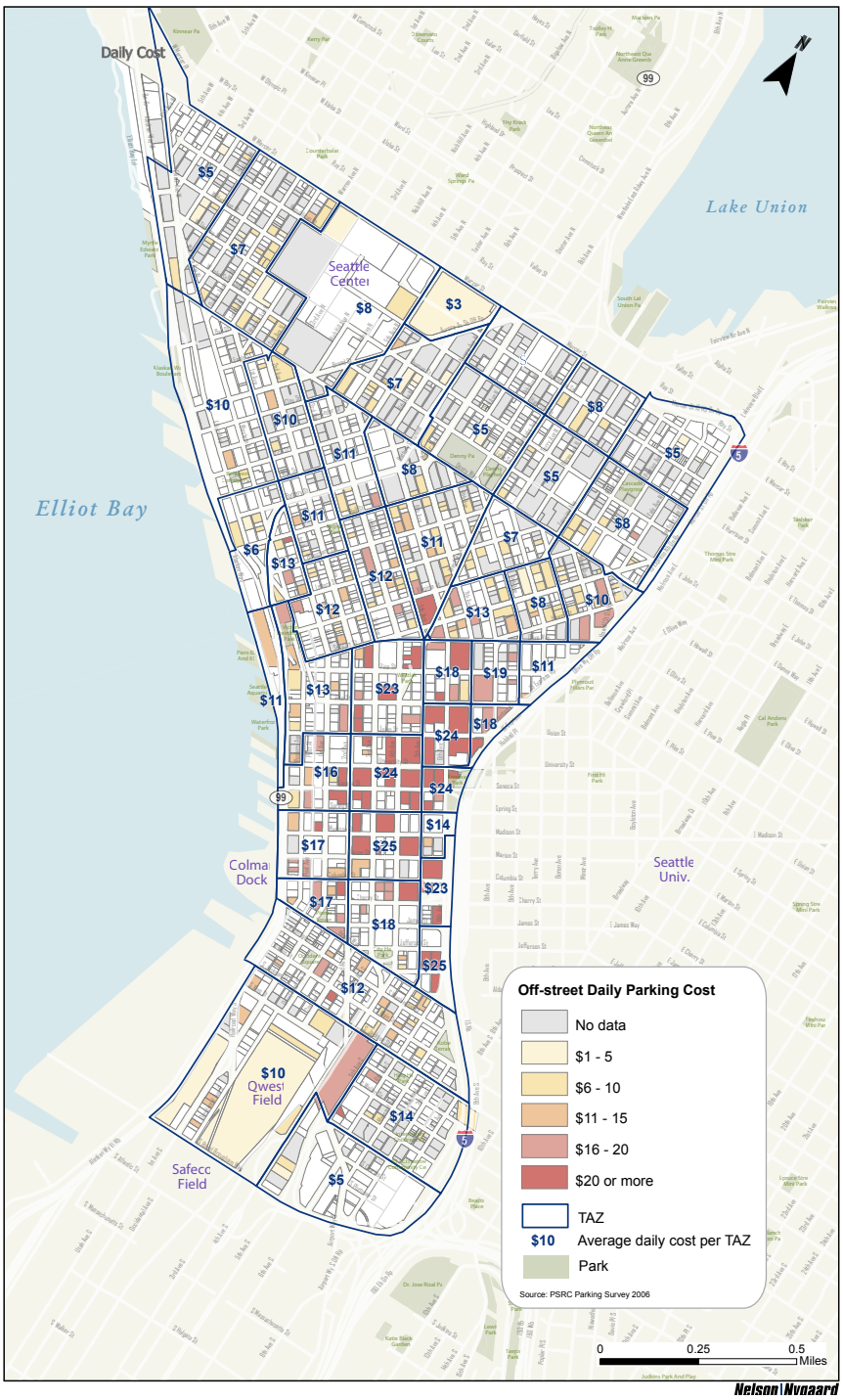


Off-Street Parking Supply and Rates

Figure 2 (Observed Off-street Parking Daily Cost map) shows the daily cost of the off-street parking facilities in 2006 based on a survey conducted by the Puget Sound Regional Council. Of the 817 off-street parking facilities surveyed in the area shown on the map, daily parking cost data is available for only 294 parking facilities. The average parking cost for the 294 parking facilities is $12 a day, ranging from $3 to $39. There is a clear relationship between the intensity of land use and the price of parking. As shown in Figure 2, the most expensive parking is in the heart of the Central Business District, while daily off-street parking costs in neighborhoods with lower density land uses, such as South Lake Union, are lower.

There are about 51,000 off-street parking spaces in downtown Seattle between Denny Way and Jackson Street and I-5 and the Elliott Bay.

Figure 2 Observed Off-street Parking Daily Cost



On-Street Parking Supply and Cost

On-street parking in most Center City neighborhoods is metered and managed for short-term usages. Most on-street metered parking spaces are restricted to two-hour parking and are charged at a rate of $1.25 per hour. Some metered stalls in South Lake Union have 10-hour maximum time stays. These stalls are currently priced at $0.75 per hour and the City plans to adjust prices periodically to ensure that at least 15% of stalls in the area are available at all times. Over 8,000 on-street parking spaces are available in the mapped area, which includes downtown, South Lake Union and Uptown.

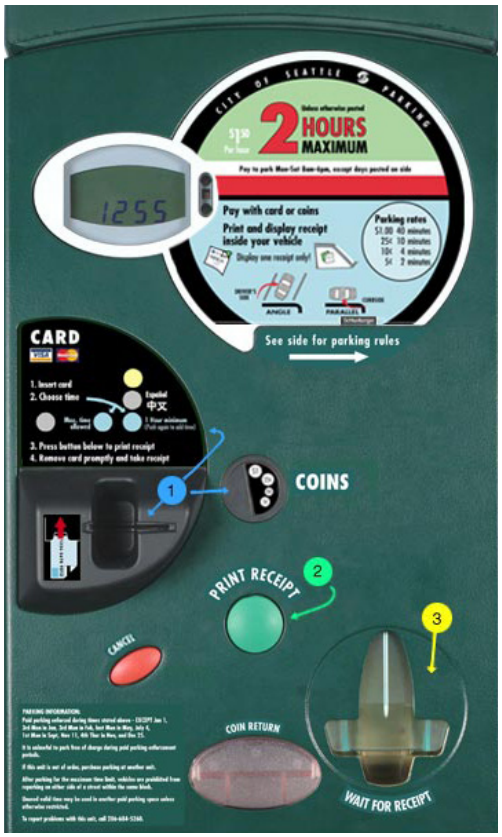
Peak-hour restrictions are applied to some on-street parking to provide additional lane capacity to transit vehicles or to manage heavy traffic flows during peak-hour periods. Most on-street parking in downtown operates all day, with fees charged from 8 AM to 6 PM. However, parking in certain on-street parking spaces is not allowed to provide additional lane capacity for transit. For example, vehicles are not allowed to park on 1st Avenue and 2nd Avenue between Virginia Street and Yesler Way during AM and PM peak periods. Approximately 10% of downtown parking spaces have peak hour restrictions, and over 5,000 parking spaces are paid parking. Figure 3 provides a more detailed map of peak hour parking restrictions.

Figure 3 Peak Hour Parking Restrictions on Center City Streets

Source: Washington State Department of Transportation. Draft Congestion Mitigation Transportation Plan, Exhibit 2-14. January 2007

Parking Requirements for New Development

As of January 2007 the City of Seattle eliminated off-street minimum parking requirements for uses on lots in downtown zones.[1] Seattle also has parking maximums for commercial uses in downtown. Further, the city does not require off-street parking in commercial zones in urban centers and for some uses within pedestrian-designated zones. Outside of downtown, residential parking requirements can vary depending on location criteria, though the City of Seattle has not implemented parking maximums for residential units in any neighborhoods. Multi-family units in commercial zones are required to provide one space per unit; multi-family units in commercial zones within urban centers do not have minimum parking requirements.



Paystations are now used on most downtown curbs to collect parking fees.
Source: Nelson\Nygaard

1 Exceptions exist for uses in the International District Mixed and International District Residential zones, parking requirements for restaurants, motion picture theaters, and other entertainment uses.

Fact Sheet

Freight Routes and Volumes

The Urban Mobility Plan focuses on a core area of Seattle from about South Spokane Street to N. 85th Street and from Elliott Bay to First Hill. Truck movements to and through this core area can be divided into six market segments, each with its own characteristics and each resulting from the regional economy.

Following the identification of truck markets, this section presents the volume of trucks in each market segment, followed by charts that show characteristics of truck movement by time of day.

Forklift loading containers on a freight truck.

Source: istockphoto.com

What are the major truck market segments?

Six principal truck markets use roads and highways in Seattle's Center City:

- **Through trips on Interstate-5** – Most of the trucks on I-5 are longer-range regional trips. Some of these may originate or are destined to businesses inside Seattle.
- **Through trips on the Alaskan Way Viaduct** – Many of these trucks trips originate or are destined to businesses located in Seattle, but outside the downtown core (for example, trips to or from the Ballard/Interbay Manufacturing and Industrial Center). Some trucks also use the Alaskan Way Viaduct (AWV) to reach locations further north on Aurora Avenue N (State Route 99).
- **Port trips** – These trips originate in or are destined for the Port of Seattle's container terminals. There are two components to these trips: intermodal dray trips between the container terminals and the nearby rail yards, and local/regional trips.
- **Downtown deliveries** – These trips are the local deliveries that serve downtown businesses. This also includes supply trips to the Port of Seattle's cruise ship terminal at Pier 66.
- **Construction trips** – These trips are associated with short-term construction in the downtown core and can include dump trucks used for excavation, concrete trucks, flatbed trucks with construction materials, and oversize trucks with crane parts and other materials.
- **Over-dimension trucks** – These trips move through Seattle with special permits. Those that use local streets (instead of I-5) are typically directed to surface Alaskan Way.

What is the relative volume in each market segment?

Available truck count information was compiled to show the relative volume of trucks in each of these market segments. The truck volumes include light trucks (two axles), medium trucks (three to four axles), and tractor-trailer combination units (five or more axles). Truck volume data for each market segment are summarized in Figure 1.

Figure 1 Truck Trips To and Through Seattle

Truck Market	Count Location	Trucks per Day (Average Weekday)	% of Daily Traffic
Through Trucks on I-5	I-5 at Olive Way [a]	15,800	7.2%
	I-5 at N 185th Street [b]	12,700	6.7%
Through Trucks on AWV	AWV mainline south of Seneca Street [c]	5,200	5.0%
	Elliott Ave & Western Ave Ramps [c]	2,600	7.8%
	Battery Street Tunnel [c]	1,900	3.2%
	Columbia & Seneca Street Ramps [c]	700	4.1%
Port Truck Trips	Terminal trip estimates [d]		
Total Port Trips		5,950	n/a
Dray Trips to Rail Yards		1,950	n/a
Trips to/from Region		4,000	n/a
Deliveries to Downtown Businesses	Sample of downtown access points		
	Stewart Street south of Denny Way [e]	810	6.1%
	4th Avenue north of James Street [e]	1,630	11.1%
	Seneca Street off-ramp from AWV [e]	500	5.6%
	Boren Avenue north of 12th Ave [e]	1,570	13.6%
Construction Trucks	Volume depends on location and quantity of construction projects.	Up to 170 trucks per day per downtown highrise site	n/a
Over-dimension Trucks	Volume varies daily. The City issues annual permits to some companies, and cannot track the number of times the permit may be used.		

a. Source: AM and PM peak period manual classification counts performed in September 2003 by Parametrix, Inc. The six hours of peak period data were expanded to a 24-hour volume using detailed count information on I-5 at NE 185th (see reference b.).

b. Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P-3 (I-5 at NE 185th Street), October 2003. These counts were compiled for the "I-5 Pavement Reconstruction Projects Final Existing Transportation Conditions Technical Report," Washington State Department of Transportation (WSDOT) and Parametrix, March 2005.

c. Source: SR 99: Alaskan Way Viaduct & Seawall Replacement Project. "Memorandum: Updated SR 99 Truck Volumes, September 6, 2006." Counts were performed in June 2006 using video and visual survey. Vans and "similarly sized small delivery trucks" are not included in the counts because it was unknown whether such vehicles were in commercial use.

d. Source: "Port of Seattle Container Sustainable Growth Plan, Draft Transportation Analysis," Heffron Transportation, Inc. May 17, 2006. The truck volumes reflect an annual average condition for 2002.

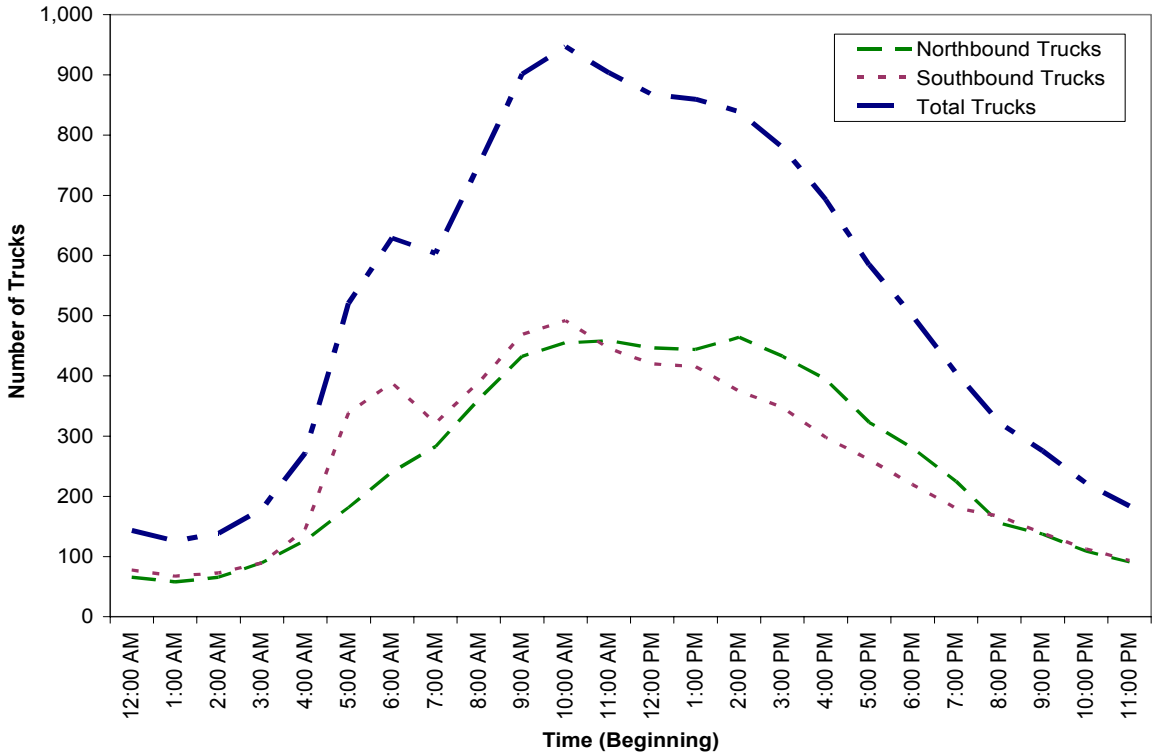
e. Source: Truck Needs Assessment for City of Seattle, Truck Volume and Classification Data Base, Heffron Transportation, Inc., September 20, 2007. All counts performed in May 2007.

When do trucks travel?

Through Trucks on I-5

Figure 2 displays average weekday truck volumes by time of day, and by direction, on I-5 at NE 185th Street. No daily data were available for the Olive Way count location. This figure shows that trucks are moving on I-5 primarily during regular business hours, with approximately 75% of all truck movements occurring between 6:00 AM and 6:00 PM. Truck volumes on I-5 begin to build around 5:00 AM, peak between about 9:00 and 11:00 AM, and then gradually diminish over the rest of the day. Southbound truck traffic surges between 5:00 and 7:00 AM, peaks between 10:00 and 11:00 AM, and then decreases over the rest of the day. Northbound truck volumes increase and then plateau between about 9:00 AM and 5:00 PM.

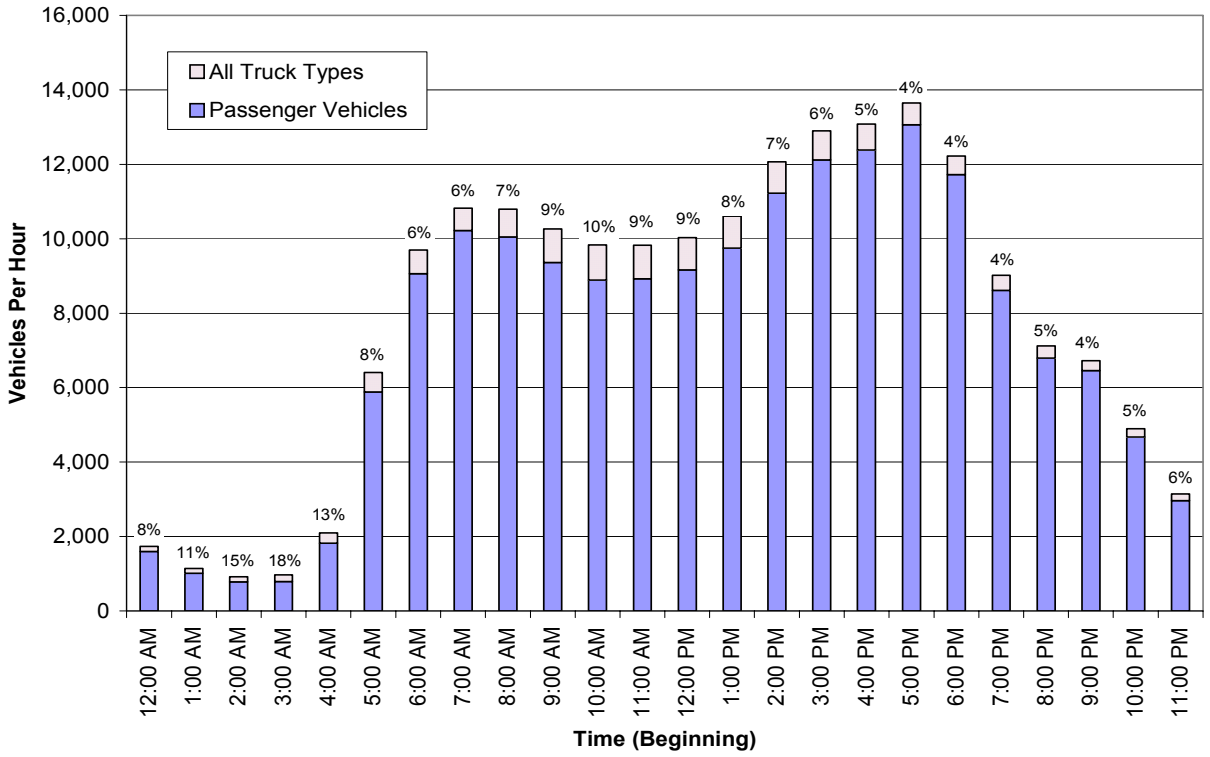
Figure 2 Trucks by Time of Day - I-5 at N 185th Street



Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P3 (I-5 at NE 185th Street for weekdays (Tuesday, Wednesday, Thursday) in October 2003.

Figure 3 shows how all traffic fluctuates over the course of an average weekday on I-5 at NE 185th Street. The figure also shows the truck volumes and percentage of trucks compared to the total traffic volume. During the AM peak period (6:00 to 9:00 AM), trucks account for 6 to 7% of the total traffic volume; during the PM peak period (3:00 to 6:00 PM), trucks range from 4 to 6% of the total volume. During the middle of the day, trucks on the study area highways represent up to 10% of total traffic. These trends are similar closer to Center City. Counts taken on I-5 at Olive Way show higher through truck counts than the 185th location.

Figure 3 Trucks as a Percent of All Traffic - Interstate 5 at N 185th Street

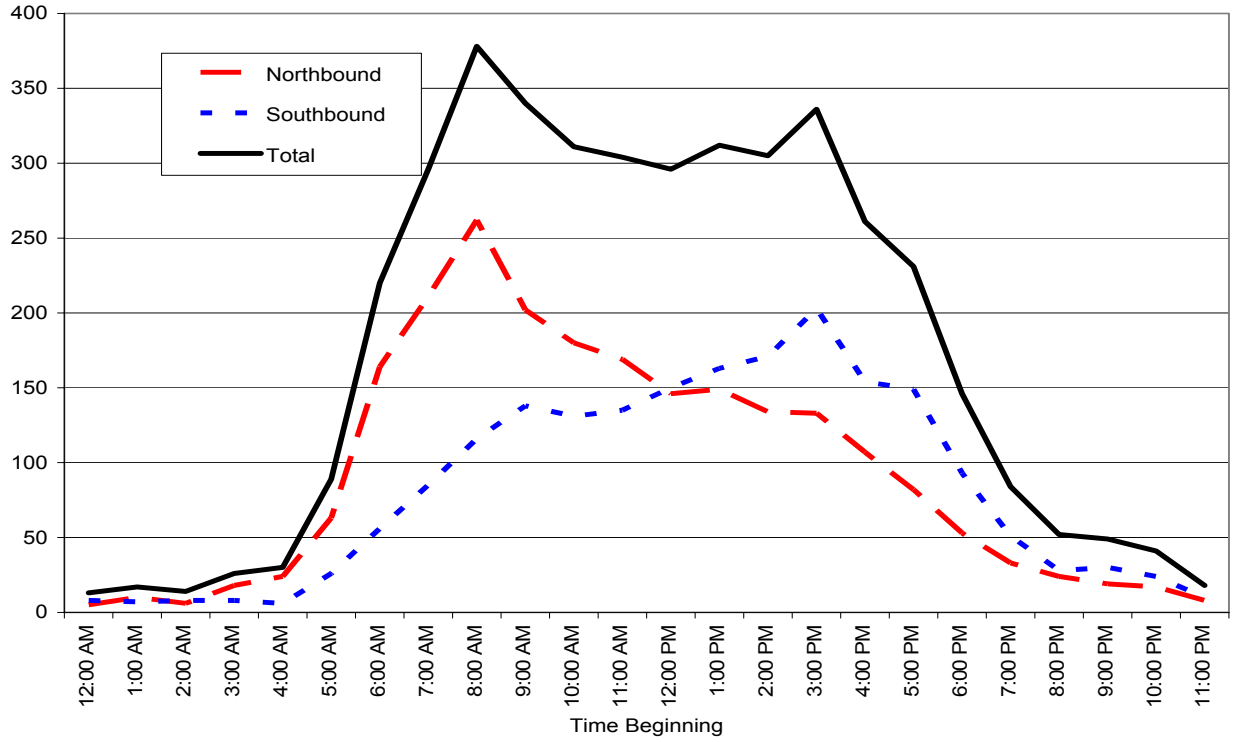


Source: Truck classification counts performed by WSDOT Permanent Traffic Recording Station P3 (I-5 at NE 185th Street for weekdays (Tuesday, Wednesday, Thursday) in October 2003.

Truck Trips on Alaskan Way Viaduct

Figure 1 counts of "Through Trucks on the AWV" reflect a June 2006 visual survey conducted as part of the SR 99: AWV & Seawall Replacement Project. These 2006 data did not include vans or "similarly sized light trucks," as the visual survey could not confirm whether these vehicles were being used commercially. In 2007, truck volumes on the Alaskan Way Viaduct (SR 99) were compiled from a permanent traffic recorder located near South Holgate Street. Average weekday counts for September 18 through 20, 2007 were compiled to show how truck volumes fluctuate by time of day and their relationship to other traffic on SR 99. About 4,200 trucks per day were counted using SR 99: 2,200 in the northbound direction and 2,000 in the southbound direction. Of these, about 65% were light trucks with two axles, 13% were medium-sized trucks with three to four axles, and 23% were heavy trucks with five or more axles. Figure 4 shows the trucks by time of day from September 2007. Northbound trucks peak in the morning at about 8:00 AM and southbound trucks peak at about 3:00 PM. The morning northbound peak is related to the concentration of industrial activities south of downtown, from which trucks are released in the morning to make deliveries to points north.

Figure 4 Trucks on SR 99 at S Holgate Street



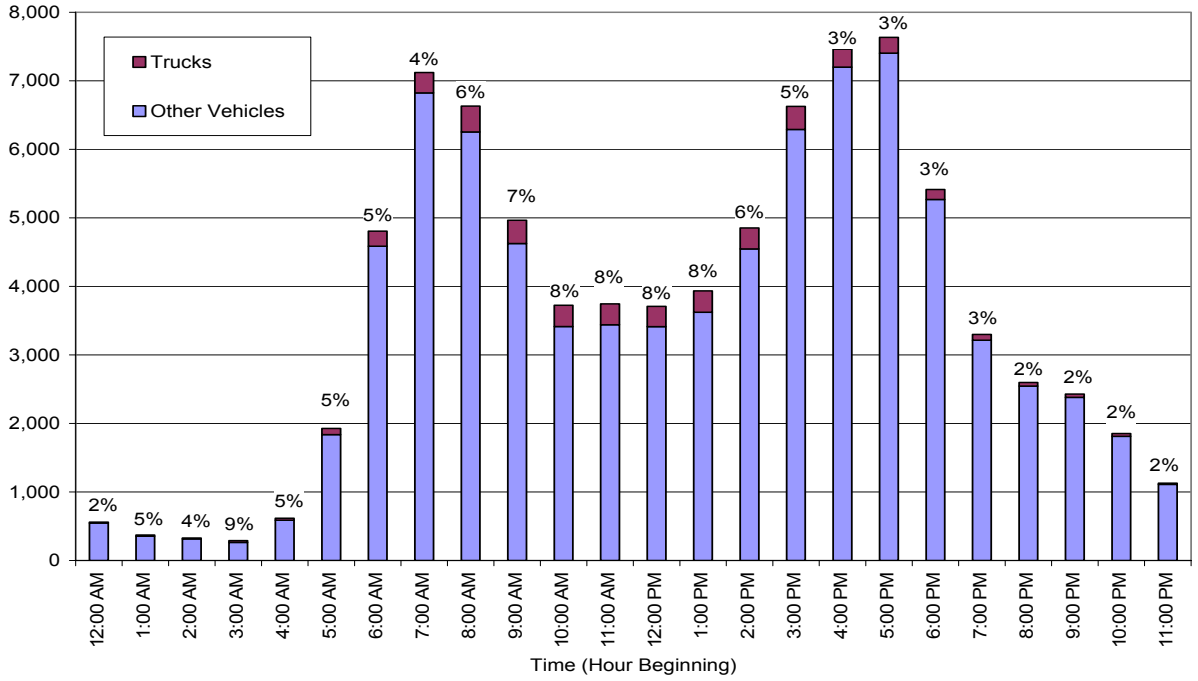
Source: WSDOT Permanent Traffic Recording Station on SR 99 at MP 29.37. Average of truck volumes for September 18, 19, and 20, 2007.

Figure 5 shows the percentage of trucks by hour of the day at this same count location. Overall, trucks at this location on SR 99 represent 4.8% of all traffic.

Port Truck Trips

The typical truck gate at the Port of Seattle operates from 7:00 AM through 5:00 PM on weekdays. The larger terminals also operate occasional night or Saturday gates when needed to move intermodal traffic. Occasionally, trucks queue beyond the terminal gates onto city streets, which can interfere with general-purpose traffic. This is especially evident at Terminal 18 – the Port's largest container terminal, located off of S Spokane Street on Harbor Island – and Terminal 46, located off of Alaskan Way just south of the downtown core. The on-street truck queues occur most often early in the morning and at the end of the lunch break during which the terminal gates are closed to trucks.

Figure 5 Truck Percentages on SR 99 at S Holgate Street

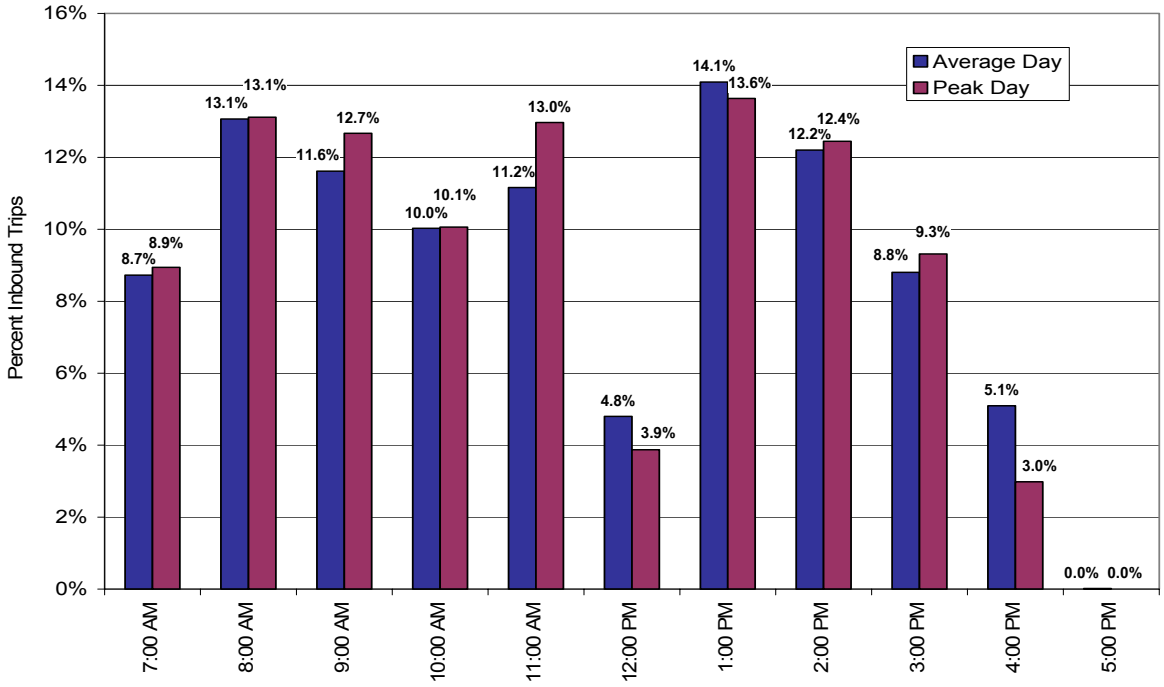


Source: WSDOT Permanent Traffic Recording Station on SR 99 at MP 29.37. Average of truck volumes for September 18, 19, and 20, 2007.

Truck moves by time of day at a typical port terminal were derived from existing data collected at Terminal 18 as part of a city-requested study of the Terminal 18 South Gate.[1] This study compiled truck entry times at the gate for each day between Monday, October 10 and Friday, October 28, 2005. The data were compiled to show the total entering volumes by hour of the day (Figure 6). The hourly summary is provided for the average of the three-week period as well as for the peak day. This shows that terminal truck traffic peaks in the morning between 8:00 and 9:00 AM and again in the afternoon between 1:00 and 2:00 PM. During the afternoon commuter peak period (between 4:00 and 6:00 PM), the terminal generates very little traffic. The amount of time a truck spends inside the terminal ranges from 10 to 20 minutes. Therefore, trucks generally exit the terminal in the same hour that they enter it. The graph below shows that the temporal distribution of truck trips through the gate is similar on an average day and a peak day. These percentages would apply to the total volume of truck traffic at all of the Port's terminals.

1 Terminal 18 South Gate, Monitoring of Truck Volumes and Queues, DRAFT (Heffron Transportation, Inc., December 14, 2005.)

Figure 6 Trucks per Hour Entering Terminal 18 (2005)

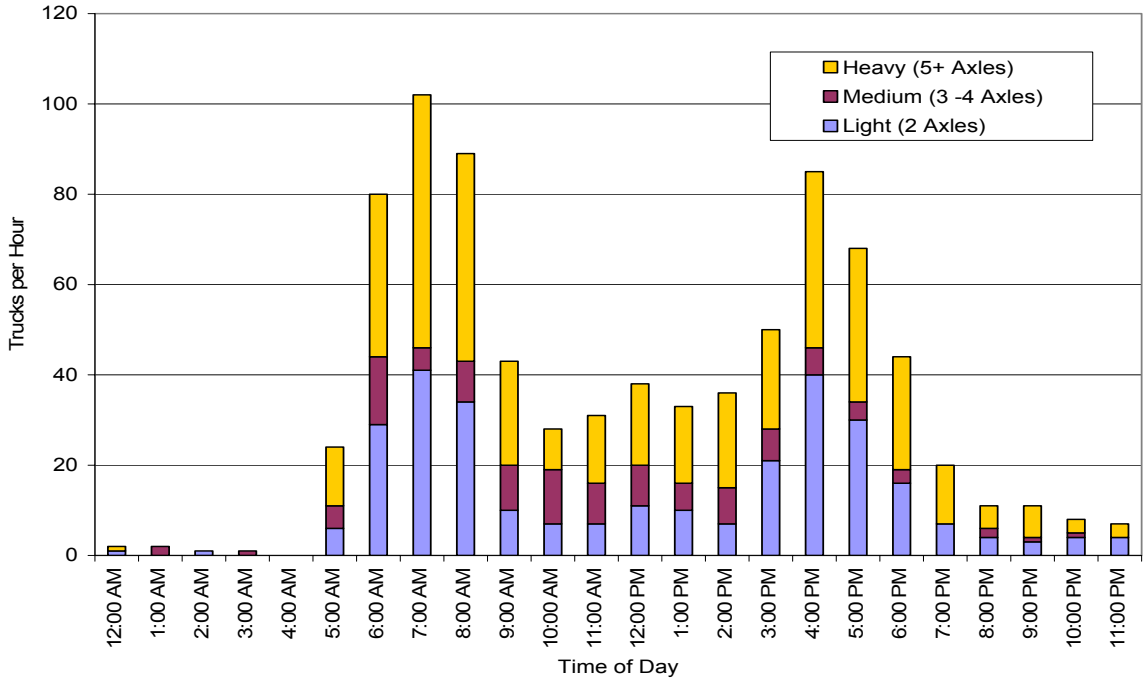


Source: Terminal 18 Turn Time Summary Report, provided by SSA. Average of three-week period from October 10 through 28, 2005. The peak volumes are from October 26, 2005.

Deliveries to Downtown

Trucks entering the downtown core reflect a peaking trend that is similar to all traffic. Figure 7 shows an hourly profile for trucks on 4th Avenue south of James Street. The profile is similar to the profile on Stewart Street and Boren Avenue. During the PM peak hour, trucks represented 9.8% of all traffic on this street. The counts would include delivery trips and construction trips.

Figure 7 Trucks by Time of Day - 4th Avenue South of James Street



Source: Count commissioned by Traffic Count Consultants, Inc., May 30, 2007.

Construction Trucks

Research was conducted to investigate if there are factors relating the level of construction activity in an area with the number of construction related trucks trips. To date, such a methodology has not been found. However, individual projects provide an indicator of the volume of truck trips generated by a construction project.

As shown in Figure 7 above, many of the trucks on 4th Avenue are heavy vehicles that are supposed to be prohibited from the downtown core during daytime hours. A city ordinance restricts vehicles over 30 feet in length in the Downtown Traffic Control Zone between the hours of 6:00 AM and 7:00 PM, Monday through Friday, except with a special permit. Construction vehicles are one example of permitted vehicles. These permits prohibit large trucks on city streets between 6:00 and 9:00 AM and between 3:00 and 7:00 PM .On 4th Avenue alone, about 270 trucks per day were heavy vehicles with five or more axles. As described below, this volume is not unreasonable given the amount of building construction that is occurring in downtown Seattle.

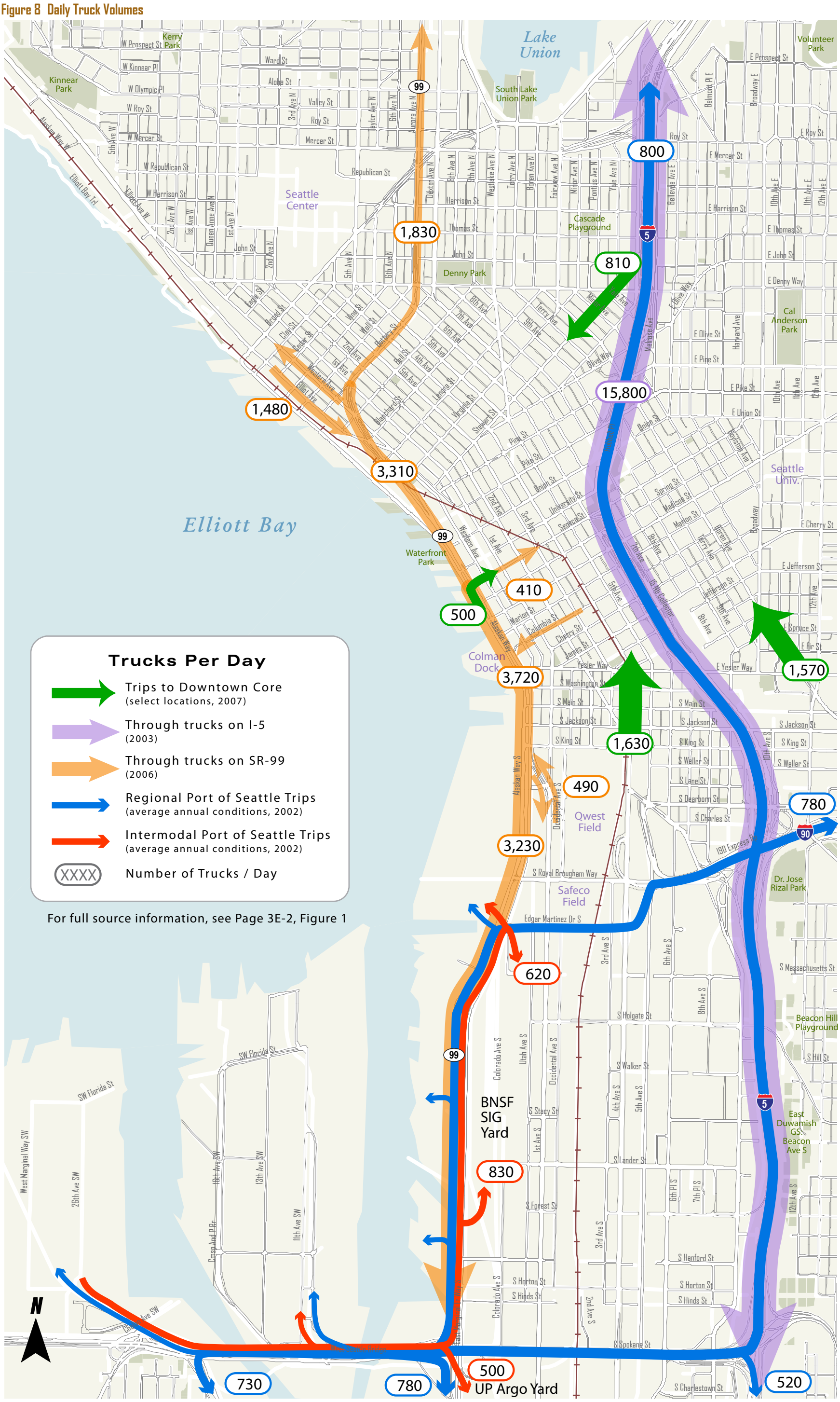
When a downtown office highrise is under construction, peak truck activity occurs first during excavation and then during concrete pours. During excavation, up to 1,500 cubic yards of material could be removed from a single site each day. Each dump truck with a trailer can hold about 18 cubic yards of material, and each truck leaves full and returns empty. Therefore, each site could generate up about 170 truck trips per day. During a concrete pour, a site may require a continuous flow of 100 cubic yards of concrete each hour. This volume requires about 15 trucks cycling between a site and the batch plant, with about 12 loads being delivered in any one hour. During the course of the day, this could generate almost 150 truck trips for each building site. Large trucks are also used to deliver steel, cladding, windows, fixtures, and other materials.

Source: isourcephoto.com, #3813272

Is there anywhere trucks don't go?

Trucks use every street in Seattle. The truck data in this memorandum reflect a sample of major locations. However, trucks use all streets to pick up garbage/recycling and make deliveries.

Figure 8 Daily Truck Volumes



Nelson|Nygaard consulting associates

Fact Sheet

Bicycle Routes and Volumes

What are the components of Seattle's current bicycle network?

Seattle adopted its first Bicycle Master Plan in 1972. Over the past thirty-five years the city has constructed approximately 39 miles of multi-use trails and 26 miles of striped bicycle lanes (see Figure 1).

Figure 1 Seattle Bicycle Network

Seattle's current bicycle network inventory	Miles
Bicycle lanes	25.5
Shared lane pavement markings	0.3
Bicycle boulevards	0.0
Other on-road bicycle facilities	2.2
Multi-use trails	39.4
Other off-road facilities	0.2
Total Network	67.6
Total miles of arterial roads	1,524
% of arterial roads with bike lanes	2%
% of Metro buses with bike racks	100%
Number of park-and-ride bike lockers	126
Bicycle racks on public sidewalks	2,300

Source: City of Seattle, Bicycle Information; City of Seattle (2007), Bicycle Master Plan; City of Seattle, SDOT Transportation Infrastructure Inventory.

Seattle's current bicycle network is primarily made up of the following components:

- Multi-Use Trails, such as the Burke-Gilman Trail, Elliott Bay Trail, I-90 Trail, Alki Trail, Duwamish Trail, Interurban Trail, and Chief Sealth Trail.
- Bicycle lanes on streets such as NE Ravenna Boulevard, Dexter Avenue N, Fremont Avenue N, Martin Luther King, Jr. Way E, and S Jackson Street.
- Non-arterial streets throughout the city with low traffic volumes and speeds.
- Facilities complementing the existing bikeways include bicycle route signs, bicycle parking racks and lockers, and bicycle racks on buses.

The majority of Seattle's available bikeways are located on non-arterial roads, generally in neighborhood streets where traffic volumes and speeds are lower. The city anticipates developing 18 miles of "bike boulevards" with treatments to favor bicycle use on these heavily used routes. While bike routes on non-arterial roadways may allow for safer and more pleasant rides, these routes are problematic for traveling longer distances between neighborhoods, as many run into dead ends, go up steep hills or cross major arterial roadways without sufficient crossing facilities.

Seattle has approximately 40 miles of multi-use trails. Approximately 1,800 bicyclists use the Burke-Gilman Trail on a typical weekday, and 2,200 bicyclists use the trail on a typical Saturday.[1] While the city has noted that these trails are heavily used, many are difficult to access due to a lack of connectors to the main trail. The intensity of their use varies widely in different parts of the city, based largely on the quality of access to the trail.

Bicycle lanes are the predominant treatment for improving biking conditions on Seattle's arterial roads. Arterial bike lanes provide continuous connections between neighborhoods and are often the most direct and least hilly routes available. While paint lines and bike lane markings provide a place for cyclists to ride out of traffic, many more timid bikers prefer not to travel on arterial streets where travel speeds are higher and traffic volumes are heavy. Today only 2% of Seattle's arterial roadways feature bike lanes.

The recently updated and adopted Bicycle Master Plan 2007 is designed to complete the many gaps in the current network, expand the network into signage of routes, and address critical bicycle facility issues and current route barriers such as roadway and bridge crossings. The plan is designed with specific targets to triple the amount of bicycling and reduce the rate of bicycle crashes by one-third in Seattle between 2007 and 2017.

1 City of Seattle (2007), Bicycle Master Plan.

What is the quality of bike access to downtown Seattle?

Figure 3 from the 2007 Seattle Bicycle Master Plan (Draft) provides a conceptual illustration of the quality of bike connections to downtown. The plan calls for improvements to downtown bike routes including the addition of many new lane miles of bicycle climbing lanes, bus/bike lanes and shared pavement markings.

What is the current volume of cyclists using the network?

The City of Seattle estimates that there are approximately 4,000 to 8,000 cyclists commuting each day, depending on the time of year and weather conditions.[2] In September, the city counted 2,273 cyclists commuting into the downtown precinct.[3] This represents a 31% increase in cycling trips since 2000 and an increase of over 100% since 1992. Seattle has seen a corresponding population increase of 13%[4] and employment growth of 25%[5] during this time (see Figure 2). The US Census does not capture trips made for recreational, social, or shopping purposes or trips made by children under the age of 16 and as such undercounts the number of trips being made in local neighborhood centers. Bike and walking trips are particularly under counted since they have much higher mode shares for short, locally-focused trips.

Where are the highest levels of bike commuting today?

The 2000 Census reported that 1.9% of Seattle residents indicated cycling was their primary mode for traveling to and from work. Some Seattle neighborhoods have significantly higher percentages of bicycle commute trips. University District, Wallingford, Fremont, Ballard, and Capitol Hill all have over five percent of residents who commute by bike.

Bicycle counts conducted by the city of Seattle in 2007 show where the most cyclists enter downtown. Those entry points to the city with the highest number of cyclists were Dexter Avenue (7th Avenue) at Bell Street, the Seattle Ferry Terminal, and the multi-use trails along the waterfront (the Elliot Bay Bike Path from the north and the Alki and Duwamish Trails from West Seattle via the Alaskan Way at Royal Brougham Way). Figure 5 illustrates bicycle volumes at key Center City intersections during the AM peak period at several years between 1992 and 2007. The 2007 counts are also displayed on a map in Figure 7.

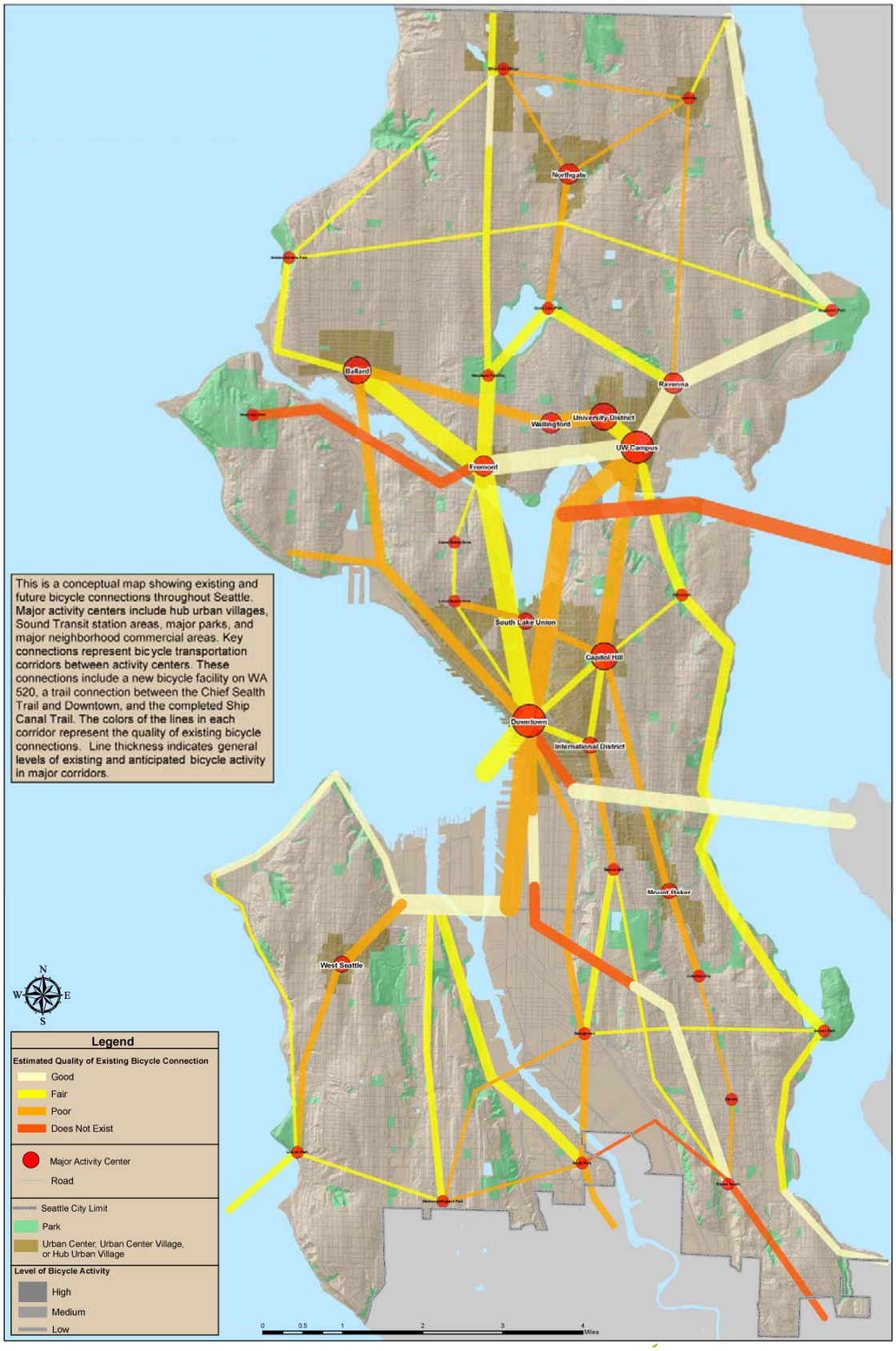
Figure 2 Bicycle Counts

	1992	1995	2000	2007
Total Bicycle Counts	1,104	1,406	1,737	2,273
% increase since 1992		27%	57%	106%
% annual increase		27%	24%	31%

Source: The City of Seattle has conducted bike counts at 29 locations along the periphery of the downtown area since 1992. The 2007 Downtown Bicycle Counts took place on Wednesday, 19 September 2007 between 6:30 to 9:00 AM at the 29 locations surrounding downtown. City of Seattle (2007), Bike Counts 2007 data file 19 September.

2 City of Seattle, Bicycle Program.
3 City of Seattle (2007), Bike Counts 2007 data file, 19 September.
4 US Census 2000, Population Finder Seattle City, WA: Population figures for 1990-2006. Accessed online at: http://www.census.gov/
5 Bureau of Labor Statistics, Employment at a Glance: Seattle-Bellview-Everette, WA: Employment 1990-2006. Accessed online at http://www.bls.gov/eag/eag.wa_seattle_md.htm

Figure 3 Conceptual Map of Major Bicycle Destinations and Key Bicycle Corridors



Source: Seattle Bicycle Master Plan

Figure 4 Seattle Bicycle Commuting (2000)

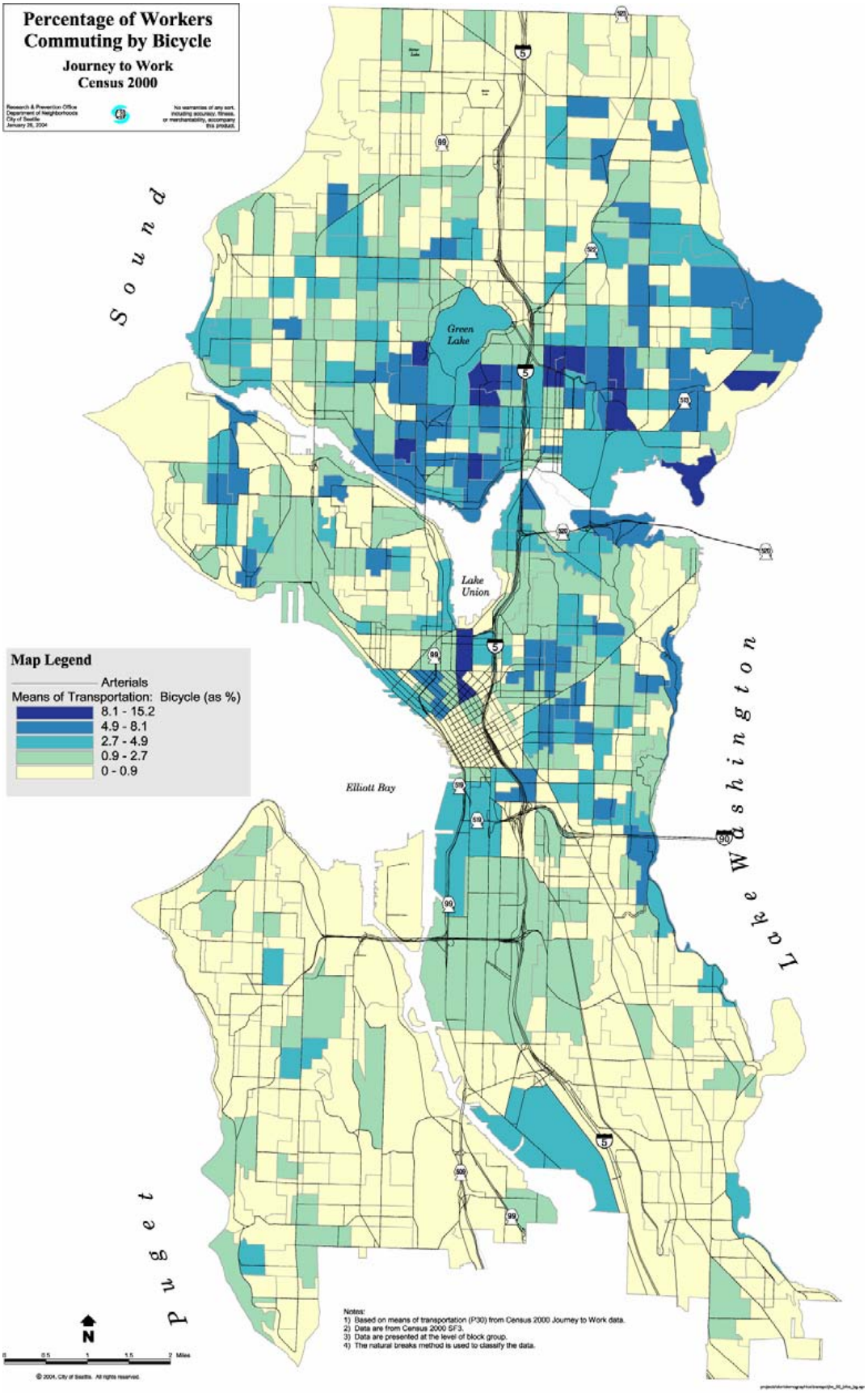
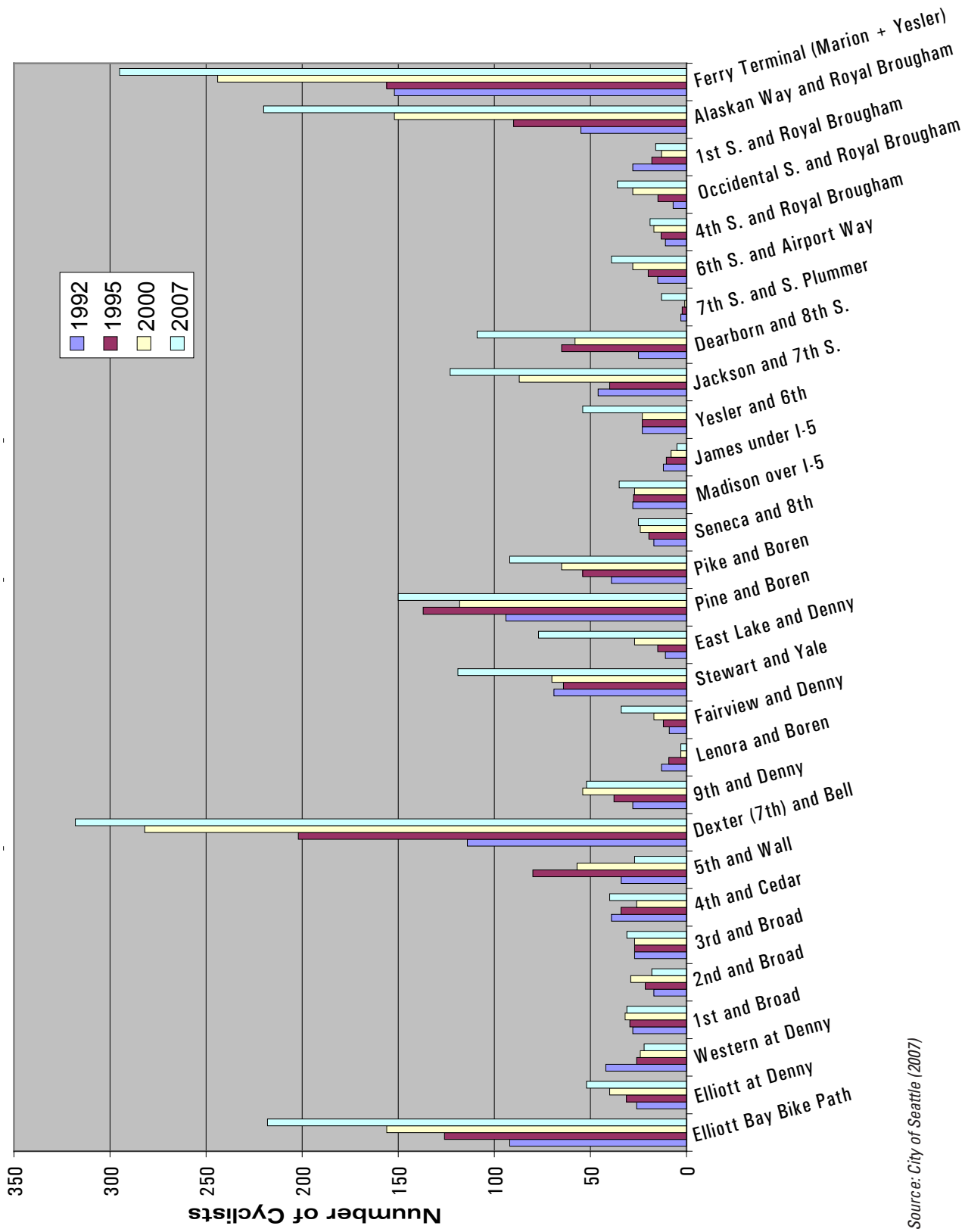


Figure 5 AM Peak Period (3 Hours) Bicycle Volumes – Comparison By Location and Year



Source: City of Seattle (2007)

Who is cycling in Seattle?

Like most U.S. cities, Seattle's cyclists are largely male. The 2007 downtown counts indicate that only 21% of cycling commuters are women[6]. This is lower than the U.S. overall average of 24%. The percentage of women cycling in a region is often a good indicator of the level of perceived safety. As such it is not surprising that in the Puget Sound Household Transportation Survey, nearly 60 percent of respondents felt that the region and/or their community was not as pedestrian- and bicycle-friendly as it should be.[7]

When are Seattle residents cycling?

The majority of cyclists travelling downtown enter the city at 7:30-7:45 AM followed by a second peak at 8:15-8:30 AM.[8] (See Figure 6)

6 City of Seattle (2007), 2007 Bicycle Counts.
7 Cascade Bicycle Club (2005), Left By the Side of the Road.
8 City of Seattle (2007), 2007 Bicycle Counts.

How does transit support cycling?

King County Metro has a reputation as one of the most bicycle friendly transit providers in the nation. King County Metro was on of the first agencies to equip its vehicles with front-loading bike racks and today has a rack on every bus. It is currently upgrading to racks that hold three bikes to prevent overcrowding of racks on high demand routes. In the peak biking season, as many as 60,000 bicycles are loaded on King County Metro buses each month. Sound Transit has also adopted policies that will support long-haul commuters carrying bicycles on board LINK light rail trains.

Figure 6 Time of Travel for Downtown Seattle Bicycle Commute Trips

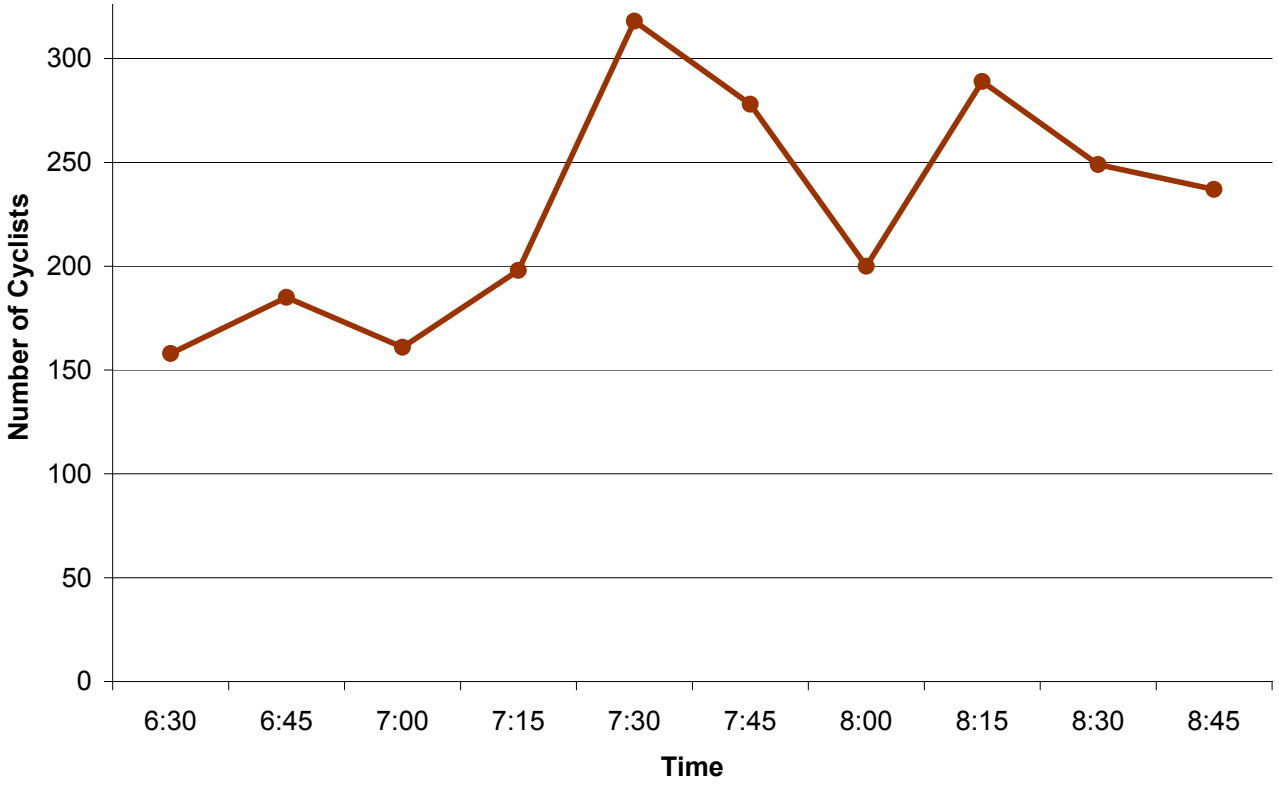
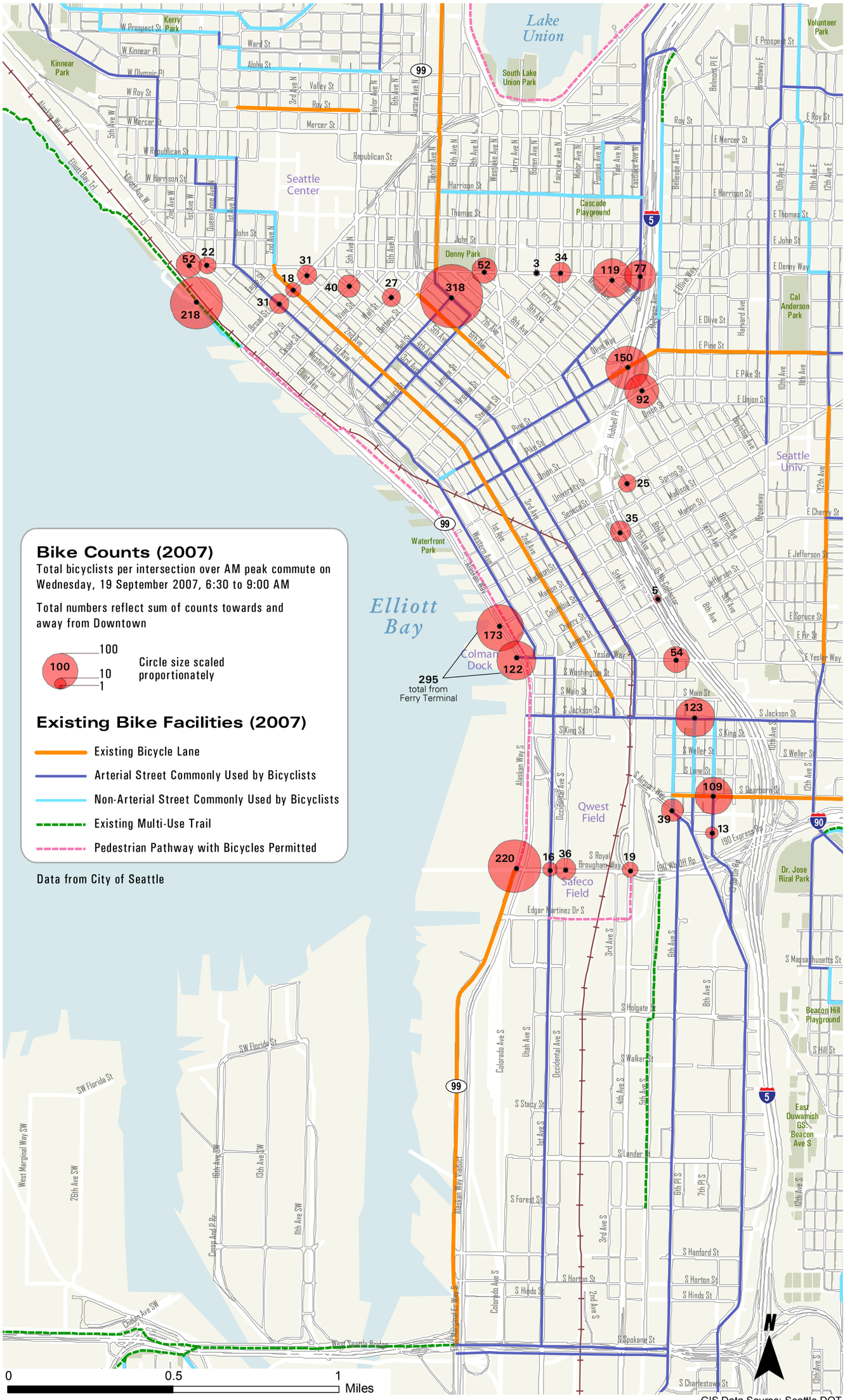


Figure 7 Downtown Bicycle Counts and Existing Bike Facilities



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Fact Sheet

Pedestrians in Downtown

Seattle residents and elected officials have shown significant and growing support for programs that encourage walking and pedestrian safety. The Bridging the Gap levy, passed by voters in November 2006, promises 18% of its funding to pedestrian and cycling infrastructure. In 2005, the Mayor issued a *10 Point Plan for Pedestrian Safety*, and the City Council named pedestrian safety its top issue in 2007. The Pedestrian Master Plan – also funded by Bridging the Gap – will include safety education and enforcement along with built projects aimed to increase the number of people walking in the city.[1] With all of this attention, what does Seattle – and especially downtown Seattle – look like for pedestrians today?

Awnings like those shown above on Western Avenue provide shade from the sun, shelter from the rain, and frame a human-scaled space for pedestrians
Source: Nelson\Nygaard

What are the volumes of pedestrians on downtown Seattle streets?

Increasing numbers of jobs, residents, and destinations in downtown Seattle will ensure that the number of pedestrians continues to grow. Land use greatly affects walking behavior, and areas like Center City that offer a rich mix of uses, including housing, employment, services, and retail, allow residents and visitors to reach a wide number of daily destinations within distances comfortable for walking. Exact pedestrian volumes are difficult to model and estimate, as pedestrians can enter a street system at infinite points and travel in sporadic, unpredictable patterns. Unlike drivers, transit riders, or even cyclists, people on foot need not take any particular route, follow a continuous line, or cross single entry points. Individual intersection counts are the most common means for surveying pedestrian presence.

Two groups have recently completed counts at selected Seattle intersections. Sustainable Seattle counted pedestrians for a cumulative four-hour period at 10 intersections from October 2005 to February 2006. Surveyors observed 3,761 pedestrians over the four hours at Maynard Avenue and S. King Street in the International District, and 6,510 during these four sample weekday hours at 1st Avenue North and Mercer Street in Uptown/Queen Anne.[2]

In a longer-term study over the course of a year, the Downtown Seattle Association observed pedestrians crossing at 10 downtown intersections during the morning, lunch, and evening rush periods. Counts varied slightly across seasons and at different intersections, and ranged from 1,500 pedestrians over four and a half hours at 9th Avenue and Westlake to 7,700 at 6th Avenue and Pine Street. Evening counts were generally highest, reaching over 3,500 pedestrians in a single hour-and-a-half period at the most heavily-walked sites.[3]

1 City of Seattle, "Pedestrian Master Plan," Seattle Department of Transportation, http://www.seattle.gov/transportation/ped_masterplan.htm (accessed November 14, 2007)

2 Sustainable Seattle, "Pedestrian Counts," Sustainable Seattle, http://www.sustainableseattle.org/Programs/SUNI/researchingconditions/Streetlevelresearch/pedestriancounts/ (accessed November 14, 2007)

3 Downtown Seattle Association, "Economic information: Pedestrian counts," Downtown Seattle Association, http://www.downtownseattle.com/content/businesses/PedCount.cfm (accessed November 14, 2007)

How many people cross into downtown on foot each day?

U.S. Census questions eliciting "Journey-to-Work" behavior reveal that an increasing number of Seattle-area residents choose walking as their primary commute mode. A Puget Sound Regional Council analysis of Census data indicates that, among employees who work in the Seattle Central Business District, the percentage who walk to work increased from 2.9% to 3.9% between 1990 and 2000.[4] Considering commute trip origins rather than employment destinations, workers who live in Central Seattle – including downtown and Capitol Hill – are commuting on foot in far greater proportions than those living elsewhere in the city. The higher walking commute percentages in these areas are due to the proximity of these commuters' homes to downtown employment destinations.

Figure 1. Journey to work by trip origin, 2000

Home address	Total workers	% walking or biking to work
Central Seattle	86,434	15.6
North Seattle	135,420	7.3
South Seattle	87,025	3.1

Note: North Seattle: north of the Ship Canal. Central Seattle: south of the Ship Canal, north of Yesler Way, including downtown, Capitol Hill, Madison Park, and Magnolia. South Seattle: south of Yesler Way, including Beacon Hill and West Seattle.

Data source: Puget Sound Regional Council, "Census 2000 data illustrate diverse commute modes," PSRC, http://www.psrc.org/publications/pubs/trends/t21nov03.pdf (accessed November 14, 2007)

This of course only captures commute behavior and does not reflect other visitors or non-work trips. Once in the Center City's mixed-use neighborhoods and downtown core, the dense array of land uses means that employees, residents, and visitors are within walking distance of many types of destinations. None of these trips are generally captured by household transportation surveys that describe trips originating and ending at home. Also, Census data only reflect individuals who walk or bike "for the greatest part" of the commute. The journey to work bike/walk numbers cannot capture walking trips made from bus to office building or between destinations. Indeed, drivers as well as transit riders become pedestrians upon arrival in downtown.

Other land use, economic, and demographic factors will continue to spur greater proportions of walking trips in downtown Seattle. As stated in the city's *Transportation Strategic Plan* 2005 update, "Generally, in Seattle, the number of vehicles available per household decreases as residential density, access to transit, parking restrictions, and/or proximity to downtown Seattle all increase."[5] As centralized locations become more populated, individuals who do not need to own cars or who find it inconvenient or fiscally imprudent to operate vehicles downtown will become increasingly prevalent. Seattle's comprehensive plan targets high numbers of new residents and jobs for Seattle's Center City, and newcomers to these mixed-use neighborhoods will have ample destinations within walking distance of their front doors at home and at work. With gas prices, parking costs, and downtown population on the rise, more pedestrians are likely to appear on city streets for work and leisure purposes.

Highway structures are imposing physical and mental barriers to people on foot
Source: Nelson\Nygaard

4 Puget Sound Regional Council, "Commuting to the Region's Downtown Areas," PSRC, http://www.psrc.org/publications/pubs/trends/t22mar04.pdf (accessed November 14, 2007)

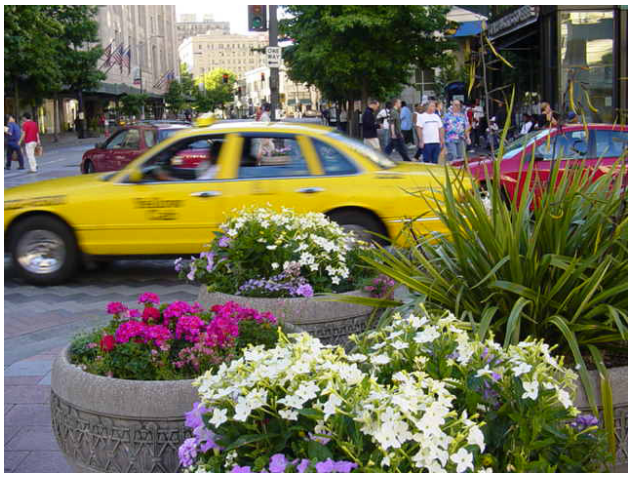
5 City of Seattle, "Transportation Strategic Plan – Adopted October 21, 2005," SDOT, http://www.seattle.gov/transportation/tsphome. htm (accessed November 14, 2007)

What challenges do people walking into downtown face?

Seattle's *Center City Circulation Report* documents hurdles for those who enter downtown on foot. Downtown Seattle is water-bound on the west and north by Puget Sound and the Ship Canal. Pedestrian access from ferry terminals is impeded by steep hills into the downtown core, and poor pedestrian conditions paralleling the waterfront. Natural bluffs and ridges separate many surrounding neighborhoods from downtown, and railway and highway structures along the perimeter present imposing barriers. I-5 is the major hurdle for anyone approaching downtown from the east, and Aurora impedes walking connections between Queen Anne and South Lake Union at the north of Center City.[6]

What is the quality of the downtown pedestrian environment?

Seattle has over 2,000 miles of sidewalks, 4,700 crosswalks, 479 stairways, 24,000 curb ramps and 30,000 city-owned street trees.[7] Downtown enjoys a largely high-quality pedestrian environment, offering a network of wide sidewalks and signal-controlled crossings. Though elevators and escalators are located inside buildings and are not visible from the outside, these various hill-climbing assists are publicly accessible in many locations for steep east-west connections, to those who are aware of their presence. This network links abundant pedestrian-attractive destinations including a rich mix of uses, plazas, and parks.



Planters along the sidewalk provide a buffer between pedestrians and moving vehicles
Source: Nelson\Nygaard

Seattle's Center City main internal pedestrian challenges are the steep hills and confusing intersections where two street grids intersect, such as at Olive Way and Stewart Avenue and along Denny Way. In a few locations in Center City, certain major streets such as Mercer still lack sidewalks on one side or have other maintenance needs. Though fully accessible curb cuts and grade separations are less of a problem in Center City as compared to Seattle at large, some spot improvements can still be made. Freeway ramps, bridges, and hills combine to create traffic bottlenecks that confuse vehicle flow and threaten pedestrians. Special attention must be given to locations where highway traffic enters the city street grid at high speeds where people cross on foot.[8]

Continuous improvements are being made throughout Seattle. Downtown, accessibility features, countdown crossing timers, and repainted stop lines and crosswalks are positive additions. Existing sidewalk buffers including planters, bollards, and on-street parking separate sidewalks from moving traffic and reassure pedestrians. The Seattle Department of Transportation's Pedestrian Program focuses on four core programs throughout the city: sidewalks, crossing improvements,

Countdown timers help pedestrians gauge crossing decisions
Source: Nelson\Nygaard

6 City of Seattle, 2003, "Center City Circulation Report," SDOT, http://www.ci.seattle.wa.us/transportation/ppmpcentercity. htm (accessed November 14, 2007)

7 City of Seattle, "Transportation Strategic Plan – Adopted October 21, 2005"

8 City of Seattle, 2003, "Center City Circulation Report"

curb ramps, and school safety. Sidewalk projects are prioritized that will most impact safety, enable more people to walk, improve network connectivity, and link to schools, transit, or other major pedestrian generators.

With increasing residential development, downtown Seattle is becoming another neighborhood, with many of the same short distance trips that are commonly made on foot in other mixed-use neighborhoods throughout the city. During the work day, residents and employees in Center City walk to lunch, to meetings and to run errands. As downtown diversifies, pedestrian volumes can be expected to increase significantly.

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