CHAPTER 5. Existing Conditions

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Chapter 5. Existing Conditions

This chapter describes existing conditions for pedestrians, bicyclists, transit and automobiles as well as usage and safety/accident data.

PEDESTRIAN AND BICYCLE MODES

The existing pedestrian and bicycle travel conditions for the study area are well documented in the *University of Washington Master Plan Transportation Technical Report, October 2000.* This study relied on the data presented in that report. Although no attempt is made herein to duplicate all data provided in the report, key information from the report is summarized below.

Most of the streets in the commercial district west of the University campus have sidewalks and a high concentration of pedestrian activities. East of the campus, some arterials around the University Village and adjacent commercial areas lack sidewalks. The Burke-Gilman trail is the most significant bicycle and pedestrian facility in the study area.

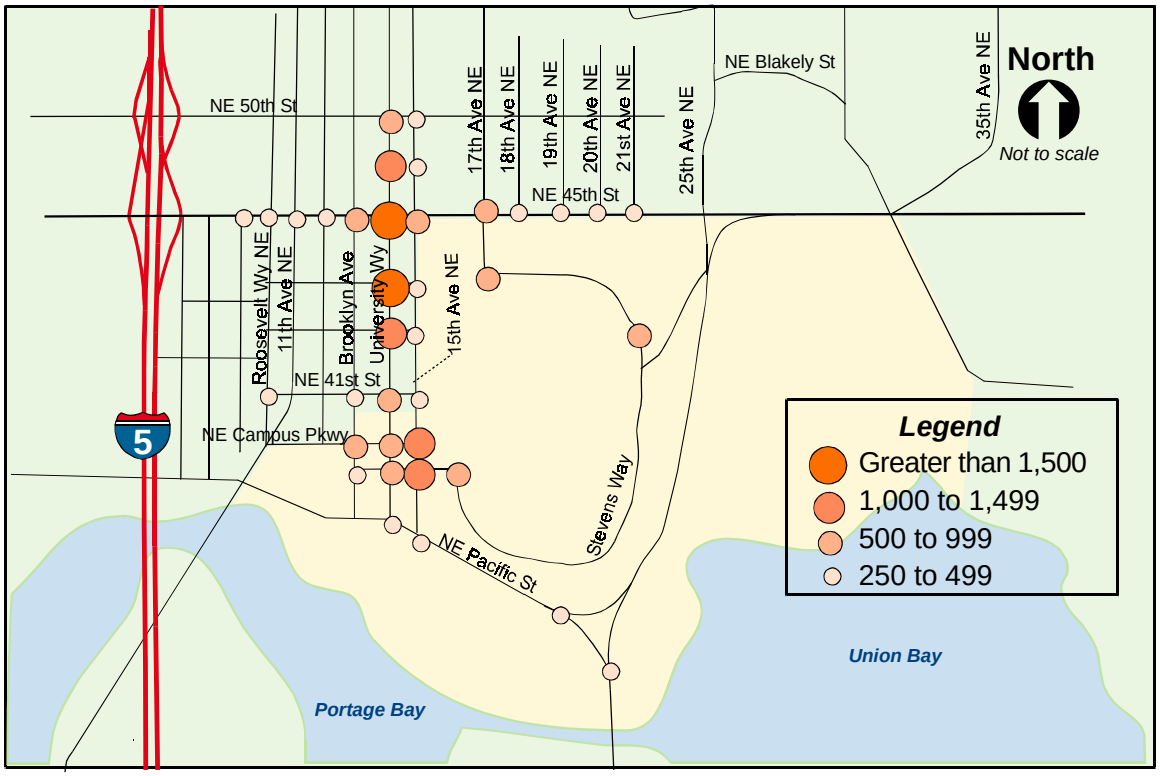
Walking is the largest single mode of transportation for U.W. students. In 1998, 27 percent of the students, faculty and staff at the U.W. walked to campus (*U.W. Master Plan Transportation Technical Report, October 2000).* That year, the students comprised approximately 63 percent of the total campus population. Previous studies showed the highest pedestrian volumes on University Way NE between NE 42nd Street and NE 45th Street.

Figure 5-1 shows the total pedestrian street crossing volume at each intersection during the PM peak hour. Note that the peak hour for pedestrian traffic may be different from the peak hour for vehicular traffic.

The following five intersections are identified as the intersections where significant pedestrian street crossings are taking place:

- University Way NE and NE 45th Street
- University Way NE and NE 43rd Street
- University Way NE and NE 42nd Street
- 15th Avenue NE and Campus Parkway
- 15th Avenue NE and NE 41st Street

Figure 5-1. Pedestrian Crossing Volumes at Street Intersections (PM-Peak Hour)



Source: U.W. Master Plan Transportation Technical Report, October 2000.

Figure 5-2 shows the volume of bicyclists crossing the streets at each intersection during the PM peak hour. In 1998, six percent of the students, faculty and staff at the UW biked to campus, according to the *U.W. Master Plan Transportation Technical Report, October 2000.* Other than the Burke-Gilman Trail, several bicycle lanes, and the trails within the University campus, the study area does not have a connected network of bicycle facilities.

A portion of the Burke-Gilman Trail provides continuous off-street bicycle access within the study area, running parallel to Northlake Way/Pacific Avenue on the southern boundary and continuing just west of Montlake Boulevard to the intersection of 25th Avenue NE and NE Blakely Street. The Trail then runs east-west along NE Blakely Street, just north of University Village, and continues roughly parallel to Sand Point Way NE.

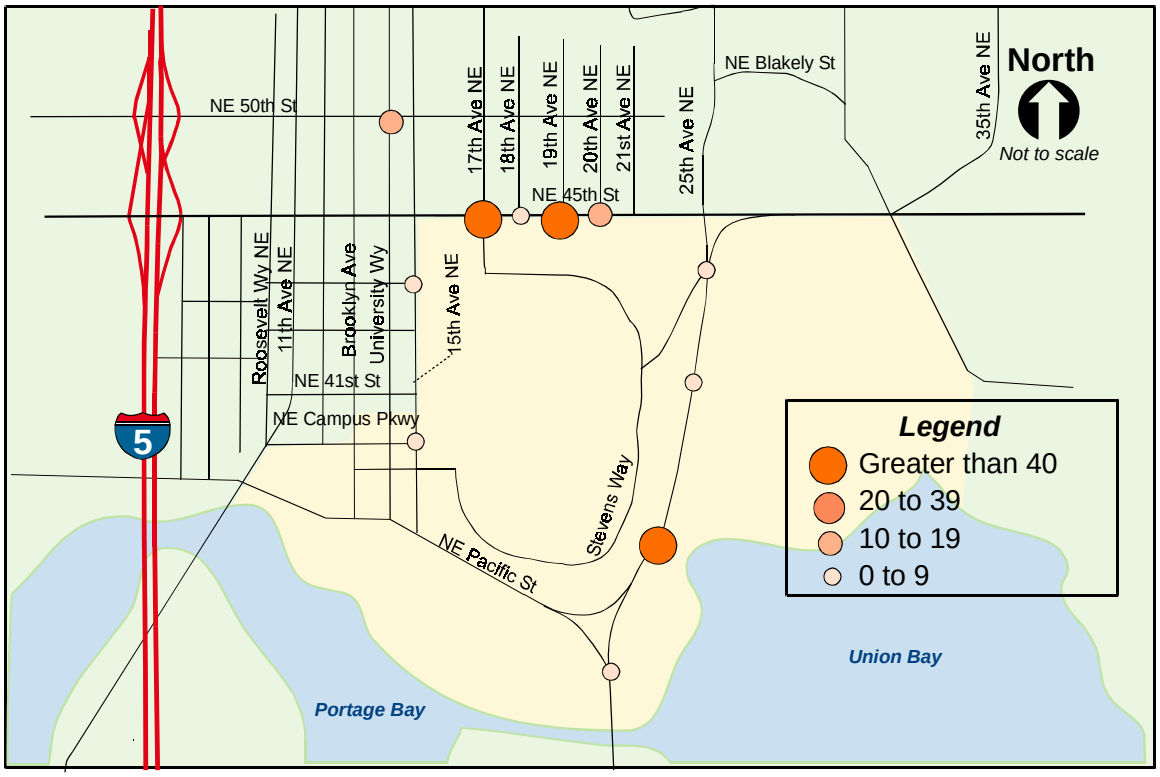
A number of roadways also provide on-street bike lanes, including

- NE 40th Street, east of Brooklyn Avenue NE, just west of the University Bridge,
- NE Pacific Street (between University Bridge and Brooklyn Avenue),
- University Bridge,
- NE Boat Street (east of Brooklyn Avenue to Columbia Road), and
- Brooklyn Avenue NE (south of NE 40th Street).

Other roadways commonly used by bicyclists include:

- Brooklyn Avenue NE (north of NE 40th Street),
- NE 17th Avenue, and
- NE 20th Avenue.

Figure 5-2. Bicyclist Crossing Volumes at Street Intersections (PM Peak Hour)



Source: U.W. Master Plan Transportation Technical Report, October 2000.

Pedestrian and Bicycle Accidents

One of the goals of the UATS is to improve safety for pedestrian and bicycle travel in the study area. The Seattle Transportation Department provided a list of traffic accidents, including those involving pedestrians and bicycles. The State assembles accident data for all jurisdictions, including the City of Seattle. The most recent data spans 1991 to 1996. This study relied on this data set as a baseline and judged whether safety improvements have since been made to accident locations since 1996.

Locations experiencing more than three accidents per year between 1991 and 1996 involving pedestrians and/or bicycles have been analyzed in this study and listed in **Table 5-1**.

The intersection of Eastlake Avenue E and Fuhrman Avenue E, located at the south end of University Bridge, had the highest number of bicycle accidents in the study area. This intersection and one just south, at Harvard Avenue E, have been reviewed as part of this study. The intersection of NE 15th Avenue NE and NE Pacific Street and the adjacent Burke-Gilman Trail approaches have been improved since 1996.

The Burke-Gilman Trail crosses 30th Avenue NE between Union Bay Place and NE Blakely Street. This mid-block crossing is one of the highest bicycle accident locations in the study area.

Table 5-1. Highest Bicycle Accident Locations in the Study Area (1991-1996 data)

Total Traffic Accidents Involving Bicycles (1991-96)			
Intersections			**Accidents**
Eastlake Ave E	Fuhrman Ave E		13
15th Ave NE	NE Pacific St		4
Roosevelt Way NE	NE 44th St		4
NE Pacific Pl	NE Pacific St		4
15th Ave NE	NE Ravenna Blvd		3
25th Ave NE	NE Blakely St		3
University Way NE	NE 45th St		3
University Way NE	NE 50th St		3
Mid-Block Sections			
Street	**From**	**To**	
30th Ave NE	NE Union Bay Pl	NE Blakely St	3
Roosevelt Way NE	NE 42nd St	NE 43rd St	3
NE 45th St	Montlake Blvd	Union Bay Pl NE	3

Source: Seattle Transportation Department, 2001.

Table 5-2 shows the highest pedestrian accident locations in the study area. Intersections along NE 45th Street and University Way NE contain many of the high pedestrian accident locations within the study area. It should be noted that there are four locations where a higher number of pedestrian accidents occurred *outside* the core commercial area of the University area. Those locations are:

- Intersection of NE 65th Street and 35th Avenue NE,
- Intersection of NE Pacific Place and NE Pacific Street,
- Intersection of Roosevelt Way and NE 65th Street, and
- Mid-block between NE Pacific Place and NE Pacific Street.

Table 5-2. Highest Pedestrian Accident Locations in the Study Area (1991-1996 data)

Total Traffic Accidents Involving Pedestrians (1991-96)			
Intersections			**Accidents**
Roosevelt Way NE	NE 45th St		10
University Way NE	NE 45th St		7
7th Ave NE	NE 45th St		5
University Way NE	NE 50th St		5
NE Pacific Pl	NE Pacific St		5
15th Ave NE	NE 50th St		4
17th Ave NE	NE 45th St		4
Brooklyn Ave NE	NE 45th St		4
11th Ave NE	NE 50th St		3
35th Ave NE	NE 65th St		3
Brooklyn Ave NE	NE 47th St		3
Roosevelt Way NE	NE 65th St		3
University Way NE	NE 47th St		3
Mid-Block Sections			
Street	**From**	**To**	
University Way NE	NE 43rd St	NE 45th St	3
NE 45th St	Montlake Blvd	Union Bay Pl NE	3
NE Pacific Pl	NE Pacific St	Montlake Blvd NE	3

Source: Seattle Transportation Department, 2001.

TRANSIT AND HIGH OCCUPANCY VEHICLE (HOV) MODES

Transit is an important part of the transportation system in the University area; transit service to and from the campus and the surrounding community is second only to transit service to the downtown Seattle core.

This study relies upon but does not duplicate all the data in the well-documented *U.W. Master Plan Transportation Technical Report, October 2000*. Key information from the report is summarized in this section.

Local agencies have classified the local roadway network in such a way as to prioritize transit in the University area. The City of Seattle designates a Transit Priority Network within the University area, and the University Community Urban Center Plan also emphasizes transit. The Metropolitan Transportation Plan (MTP), developed by the Puget Sound Regional Council, defines key transit corridors for the area. The recent HOV lane project on NE Pacific Street was aimed at reducing travel time for carpools, vanpools, shuttles, and transit, making scheduled transit service more reliable.

In the fall of 1991, the U-PASS program began at the U.W. As mentioned in Chapter 4, the U-PASS program is designed to reduce vehicle trips and mitigate the loss of parking due to campus development by providing alternative commute options for the campus population. As part of the U-PASS agreement, Metro Transit, Community Transit and Sound Transit provide transit services to the University population. The University "purchases" about 9.5 million passenger trips from these agencies annually.

Since 1992, the U.W. and King County Metro have conducted a biennial U-PASS survey to help estimate mode choice by users to and from the campus based on statistical sampling methodology. Compared to the SOV (drive alone) trips, HOV use, including transit, carpools and vanpools, represents the highest mode choice by students, faculty and staff for trips to and from campus. Most people use their U-PASS for riding buses: 90 percent reported using it to ride Metro buses, 27 percent use it on Community Transit; and 10 percent have used it to ride Sound Transit buses or commuter rail.

Boarding data for Community Transit on University commuter service has shown a reduction in ridership since 1997. Although Snohomish County has been the fastest growing county in the state, it is unknown at this time why there has been a ridership decline.

Some issues to consider that may have affected ridership include: I-695 service reductions; Safeco employee location changes; telecommuting; flextime options; compressed work week; increased fares; full buses; full park-and-ride lots; not enough service to retain riders; not meeting latent demand for service; and/or the start-up of the U.W./Bothell Campus. One possible reason is that the park-and-ride lots along I-5 fill up very early in the morning with cars of the work commuters. When students arrive to travel to the U.W. campus later in the morning, there may be no remaining parking spots, causing them to drive to campus.

Service Summary

The following section summarizes transit service within the study area, including the U.W. campus, from surrounding Seattle neighborhoods and other nearby communities in Puget Sound. Much of the transit service is focused on the U.W.

Approximately 50 different routes from agencies in King and Snohomish Counties provide transit service to the campus (see **Figure 5-3**). King County Metro operates approximately 32 regular transit routes to the University District area. Included in these 32 routes are 12 routes with direct service to Stevens Way on the U.W. campus. King County Metro has over 60 park-and-ride lots that act as transfer points for University bound users in King County.

Community Transit serves the U.W. campus directly from Snohomish County through seven campus routes along Stevens Way. The routes originate in several south Snohomish county cities and neighborhoods and serve park-and-ride lots near the I-5 corridor. Sound Transit provides two Express bus routes on streets near the campus, but has no buses that go onto the campus. Most of the regional routes originate at park-and-ride lots reached by car or by transfer from bus routes going through nearby residential neighborhoods.

Table 5-3 summarizes PM peak period service on these routes. The table shows the direct bus routes to and from the campus (no bus transfers) from Seattle neighborhoods, South Snohomish County, South King County, North King County and the Eastside of Lake Washington. In addition, the numbers of buses that leave the campus during the PM peak period are totaled for each location/region.

PotentialAreas for Improved Transit Service

The UATS did not conduct a comprehensive transit analysis of the study area, but a review of existing transit service did suggest several potential weaknesses as noted below. Additional analysis would be required to determine if these warrant creation of new service.

Direct Service to Study Area. There are a few areas in the region that are not currently served directly by the existing transit systems. The Beacon Hill, West Seattle, and upper Queen Anne neighborhoods as well as downtown Tacoma and the Tukwila park and ride facility are examples of areas not served by direct transit (no bus transfers) to/from the University District. Buses run quite frequently from these areas, but transfers must be made to buses going directly to the University area. Sound Transit offers Express transit service from Tacoma to Downtown Seattle, where riders can transfer to buses going to the University area.

Freeway Stations. Several Eastside routes and other regional connections require a transfer to get to the heart of the University District and University of Washington. Bus transfers occur at freeway station stops on the major freeways. Sound Transit has routes on I-5 that stop at the freeway station at NE 45th Street. Similarly, the Montlake freeway station on SR 520 serves as an arrival point using any one of a number of Metro and Sound Transit buses crossing the floating bridge from I-405 and cities on the eastside of Lake Washington (such as Bellevue, Kirkland, Redmond, Woodinville, Issaquah and Newcastle). Community Transit buses from Monroe/Snohomish also stop at the Montlake freeway station on SR- 520.

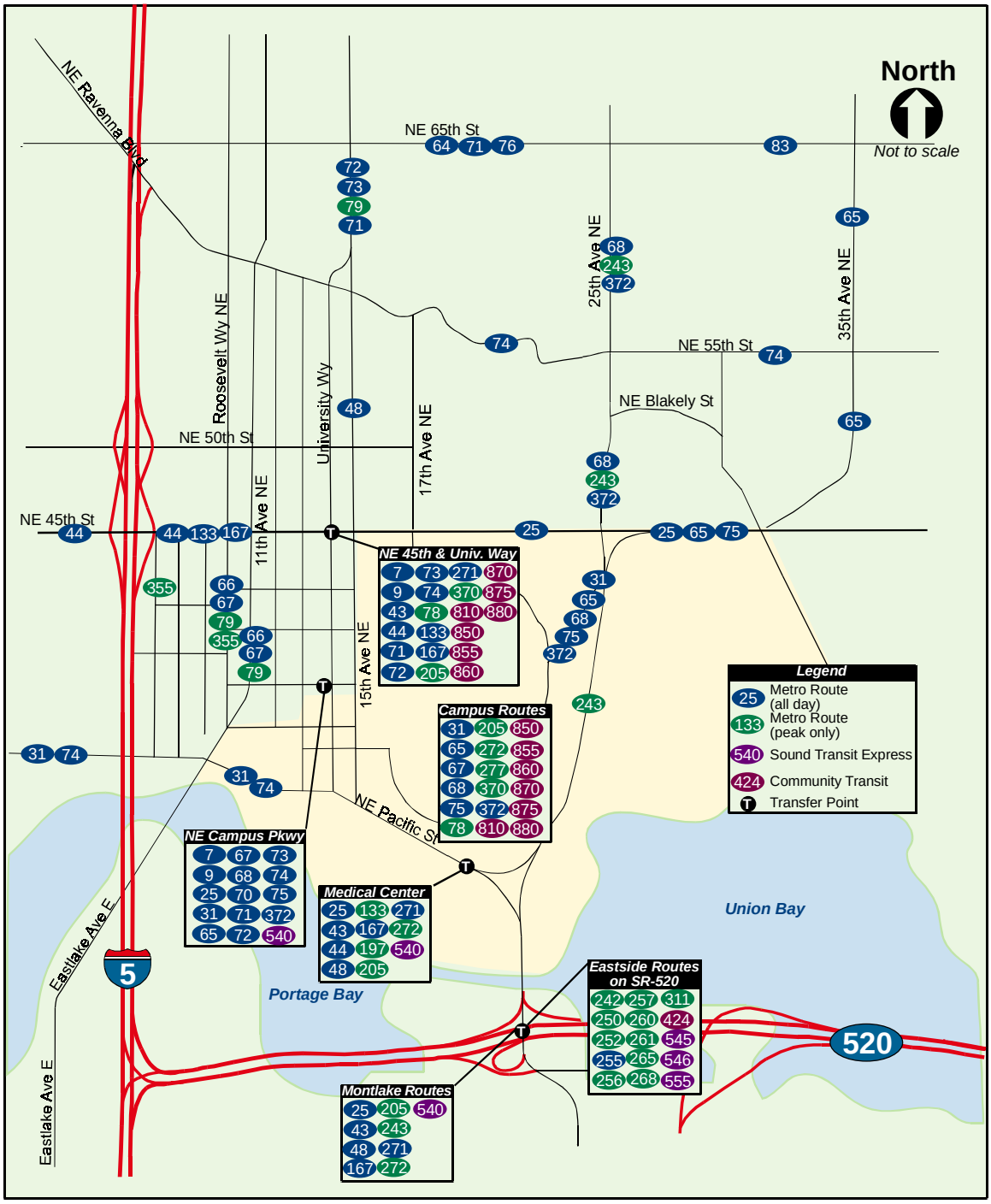
Most of the access to/from the campus from communities east of Lake Washington occurs at the Montlake Freeway transit station; there are four direct routes (no bus transfers) to the University District. Those routes are Metro Route 372 which originates in Woodinville and stops at Bothell and Kenmore along Lake City Way; Metro Routes 271 and 272, which originate in Issaquah and go through Bellevue; and Metro Route 277 which originates in the Juanita neighborhood north of Kirkland. Sound Transit's Route 540 connects NE Campus Parkway with Kirkland and Redmond. However, to get to Bellevue from Route 540 requires a transfer at Montlake, Evergreen Station or the South Kirkland Park and Ride lot.

Off-Peak Service. For connections outside of the Seattle, there is limited bus service to/from the campus outside of the peak period hours. Service for most routes traveling outside of Seattle ends at 5:30 or 6 pm. With increasing numbers of evening classes, and more employees working longer hours (flex time), there is a need for additional night service to suburban areas from campus such as the eastside (Bellevue and Kirkland), north (Northgate, Lynnwood, and I-5 park-and-ride lots), and south (Tukwila, Renton and Kent).

Service from Study Area Residential Neighborhoods. A number of the 32 Metro routes serve nearby residential areas, as well as the University campus (see Table 5-4, which also describes under "Transfer Centers" the King County Metro routes that link study area residential neighborhoods with communities east of Lake Washington). Close analysis suggests that nearby University area neighborhoods have a reduced level of transit service to areas outside of the University District or downtown Seattle. For example, Route 243 travels only in the peak period from the study area to Bellevue.

There are no bus routes from the residential neighborhoods that provide a direct connection to the major area freeway stops at I-5 at NE 45th or Montlake at SR 520 to provide easy connections to regional buses. These regional buses include Community Transit connecting downtown Seattle to the park-and-ride lots along I-5 in South Snohomish County. In addition, there are a number of bus routes that stop at the Montlake freeway station with destinations both directions, to downtown Seattle and to the Eastside communities.

Figure 5-3. Transit Service Summary to University Study Area



Source: King County Metro and Community Transit, 2001.

Table 5-3. Transit Service Summary to and from the U.W. Campus

JURISDICTION/LOCATION			
Neighborhood	**Bus Routes (number of PM peak period buses 3 to 6 PM for all routes)**	**Neighborhood**	**Bus Routes (number of PM peak period buses 3 to 6 PM for all routes)**
CITY OF SEATTLE			
Central Seattle			
Capitol Hill	7, 9, 25, 43, 48 (56)	First Hill	9, 205 (9)
Central Area	7, 9, 43, 48 (50)	International District	7, 9, 71, 72, 73 (39)
Downtown Seattle			
Seattle downtown	7, 25, 43, 66, 70, 71, 72, 73, 74E, 79 (83)		
Northeast Seattle			
Jackson Park	73, 78*, 243 (22)	Ravenna	65*, 68*, 71, 72, 73, 74, 79, 243 (50)
Lake City	65*, 72, 75, 79, 243, 372* (36)	Sand Point	74, 75* (15)
Laurelhurst	25, 75* (15)	University Village	25, 65*, 68*, 74, 75*, 243, 372 (48)
Maple Leaf	68*, 72, 72. 78*, 79 (20)	View Ridge	71 (6)
Northgate	66, 67*, 68, 75* (24)	Wedgwood	65*, 71 (17)
North/Northwest Seattle			
Ballard	44, 46 (19)	Magnolia	31* (6)
Fremont	31*, 46, 74 (16)	Queen Anne	31,*45,46, 74 (20)
Green Lake	48 (16)	Wallingford	31*,44,45,46,74 (35)
South Seattle			
Columbia City	7, 9, 48 (43)	White Center	133* (4)
Rainier Beach	7, 9, 48 (43)		
NORTH KING COUNTY			
Aurora Village	370* (4)	Lake Forest Park	372* (7)
Bothell	372* (7)	Richmond Highlands	370* (4)
Kenmore	372* (7)	Shoreline P&R	301, 370*
SOUTH KING COUNTY			
Auburn	167 (4)	Kent	167 (7)
Burien	133 (7)	Renton	167 (4)
Federal Way	197 (7)		

* Routes that go onto the campus. Unless noted, KC Metro provides service.

JURISDICTION/LOCATION OF SERVICE			
Neighborhood	**Bus Routes (number of PM peak period buses 3 to 6 PM for all buses)**	**Neighborhood**	**Bus Routes (number of PM peak period buses 3 to 6 PM for all buses)**
THE EASTSIDE - Lake Washington Communities			
Bear Creek P&R	540 (ST) (6)	Lake Hills	272* (5)
Bellevue	167, 271, 272*, 243 (21)	Medina	271 (10)
Crossroads	272* (5)	Mercer Island	205* (3)
Eastgate	271, 272* (15)	Newport Hills P&R	167 (4)
Evergreen Point and Yarrow Pt Stations.	167, 243, 272*, 271, 540 (ST) (28)	Redmond P&R	540 (ST) (6)
Houghton P&R	277 (6)	Rose Hill	277, 540 (ST) (12)
Issaquah	271 (10)	S Kirkland P&R	540 (ST) (6)
Juanita	277 (40)	Totem Lake	277 (6)
Kingsgate P&R	277 (6)	Wilburton P&R	167, 243 (7)
Kirkland	540 (ST) (6)	Woodinville P&R	372* (7)
SOUTH SNOHOMISH COUNTY – COMMUNITY TRANSIT DIRECT SERVICE TO CAMPUS			
Edmonds P&R	810*, 850*, 870*, 875* (11)	Lynnwood P & R	810*, 850*, 855* (11)
Everett, 128th St P&R	810*, 860* (6)	Mountlake Terrace P&R	810*, 850*, 875* (7)
Lynnwood, 164th St P&R	810*, 880* (6)	Mukilteo	880* (4)

* Routes that go onto the campus. Unless noted, KC Metro provides service.
Source: King County Metro and Community Transit, 2001.

Table 5-4. University Area Neighborhood Bus Routes

Neighborhood	Bus Routes
Ravenna	40, 64, 65, 68, 71, 74, 76, 93, 243
Laurelhurst	25
Maple Leaf	66, 67, 68, 72, 77, 78, 79, 93
Wedgwood	40, 64, 65, 71, 76
Sandpoint	74. 75
Roosevelt	48, 66, 67, 79
Transfer Centers	**Bus Routes**
NE Campus Pkwy	7, 9, 25, 31, 65, 67, 68, 70, 71, 72, 73, 74, 75, ST 540
U.W. Medical Ctr.	25, 43, 44, 48, 133, 167, 197, 205, 271, 272, 275, 276
Montlake Station	25, 43, 44, 48, 167, 205, 243, 271, 272, 275, 276, ST 540

Source: King County Metro, 2001

Park-and-Ride Lots

There are two park-and-ride lots at the edge of the study area: the Green Lake park and ride located at I-5/NE 65th St and at Calvary Temple located at NE 68th St & 8th Ave NE. These park-and-ride lots provide north-south service links to downtown Seattle, First Hill and Northgate, east-west links to Laurelhurst and Greenlake neighborhoods, as well as service to the University area and to Overlake. Transfers are available for Metro Routes 16E, 48, 64, 73, 76, 242, and 943.

High Occupancy Vehicle Facilities and Usage

One of the preferred alternatives selected for the *University District Transportation Program 1987 Draft EIS* called for construction of an HOV lane in the eastbound direction on NE Pacific Street from 15th Avenue NE to Montlake Boulevard NE. The *Final EIS* for this program, published in the late 1980s, recommended that the HOV lane on NE Pacific Street be built in two phases: the first phase from Pacific Place to Montlake Boulevard NE, and the second from 15th Avenue NE to Pacific Place.

In the mid-1990s, the City constructed an HOV lane from Pacific Place to Montlake Boulevard NE, with an advanced green signal for HOVs at the Montlake/Pacific Street intersection. There is no plan at this time to complete the second phase of the project. In addition, WSDOT provides ramp meters for HOV queue bypass lanes on the on- and off-ramps to SR 520 and I-5.

Only 25 percent of the U.W. students, staff and faculty drive alone to campus. The 24 other employers affected by the State Commute Trip Reduction (CTR) law that are within the same CTR zone have a drive-alone rate of 49 percent.

According to the PSRC model, 19.4 percent of employees and University students use carpools and vanpools for commuting compared to only 9.6 percent of residents in the study area who commute to work elsewhere in the region. The use of carpools for a non-work purpose is much higher---25 percent for residents who leave the area and 40 percent for those who travel within the study area.

The Metro Vanpool Program reports that within the study area, there are 27 registered vanpools that have the U.W. as their primary destination, 21 that have Safeco as their primary destination, and 15 destined for nearby Children's Hospital. These numbers include vanpools from Metro, Community Transit, Pierce Transit, Island Transit and Intercity Transit.

AUTOMOBILE MODE

Street Pattern

Topography and built-structures make the study area's street system unique. Lake Washington serves as a natural eastern boundary to the study area, with most local east-west streets terminating within residential areas along the waterfront. SR 520 is the only east-west road that carries traffic to and from the study area beyond the western shore of Lake Washington.

On the west side of the study area, I-5 divides the University District from Wallingford, requiring vehicles, pedestrians and bicyclists to use bridges to get from one neighborhood to the other. Construction of I-5 severed many east-west streets, causing the few streets that do cross it to be highly congested.

The Lake Washington Ship Canal borders the south side of the study area. Only two local streets cross the Canal: Montlake Boulevard on the Montlake Bridge and Eastlake Avenue on the University Bridge. Montlake Boulevard NE connects with SR 520 at an interchange at the east end of the Ship Canal, making it the more traveled, congested roadway. Eastlake Avenue has no direct connection to either I-5 or SR 520, but it provides connections to the South Lake Union area and downtown Seattle.

In contrast to these built and natural barriers to the east, west and south of the study area, several well-defined streets serve the north end. Except for the one-way couplet of Roosevelt Boulevard and 11th/12th Avenues NE, all other north-south streets that connect to the communities north of the study area are two-lane roads with on-street parking. These include Brooklyn Avenue NE, University Way, 15th Avenue NE, 20th Avenue NE, 25th Avenue NE and 35th Avenue NE.

Roadway Classifications

Principal arterials and other arterials in the study area, as designated in Seattle's Comprehensive Plan are shown in **Figure 5-4**. Characteristics of the principal arterials are briefly described below.

Figure 5-4. City of Seattle Street Classifications within the University Study Area

Source: City of Seattle Comprehensive Transportation Program, 2001

East-West Principal Arterials

NE 50th Street from 15th Avenue NE to the West and NE 45th Street from I-5 to Sand Point Way NE

These are the two most heavily used east-west corridors in the study area. Each has on- and off-ramps to I-5 and connects to the adjacent neighborhoods of Wallingford on the west and Hawthorne Hills and Laurelhurst on the east. The arterials are four to five lanes, with center turn lanes or left-turn pockets at major intersections. Heavy traffic and ramp metering on I-5 cause peak hour traffic back-ups.

NE Pacific Street

NE Pacific Street runs east/west between Montlake Boulevard NE and Northlake Way. It is a five-lane roadway including a two-way center turn lane from Brooklyn Avenue NE and Montlake Boulevard NE. It has an eastbound HOV lane in front of the U.W. Medical Center, connecting to a bus stop on southbound Montlake Boulevard NE. Afternoon peak hour traffic congestion on southbound Montlake Boulevard NE backs up to eastbound NE Pacific Street.

North-South Principal Arterials

Montlake Boulevard NE

Montlake Boulevard NE is a four-lane north/south roadway from NE 45th Street to SR 520. It carries the highest volumes of traffic among all arterials in the study area. The Montlake Bridge crosses the Ship Canal just north of SR 520, and Montlake Boulevard NE south of the bridge is a six-lane roadway. Ramp metering on SR 520 and generally heavy traffic volumes to and from the freeway result in queues spilling onto Montlake Boulevard NE during peak periods.

15th Avenue NE from Pacific Street to NE 50th Street

Running north/south, 15th Avenue NE borders the west side of the U.W and is a significant transit corridor with high bus volumes. Where classified as a major arterial, it has four lanes and turn pockets at most major intersections.

Roosevelt Way NE and 11th Avenue NE

This one-way couplet serves southbound traffic on Roosevelt Way NE and northbound traffic on 11th Avenue NE. The roadways converge to cross the Ship Canal as Eastlake Avenue on the University Bridge. Both arterials are four lane roadways with on-street parking in the two outer lanes during off-peak periods.

2000 Daily and PM Peak Hour Traffic Volumes

The principal arterials in the study area carry high volumes of traffic. **Figure 5-5** shows the 2000 average daily traffic volumes and **Figure 5-6** shows the 2000 PM peak traffic volumes. To determine whether traffic volumes have substantially increased on the arterials in the study area, **Table 5-5** compares the 1985/86 traffic volumes from the *University District Study Background Report (July 1989)* issued by the Seattle Office for Long-Range Planning with year 2000 volumes.

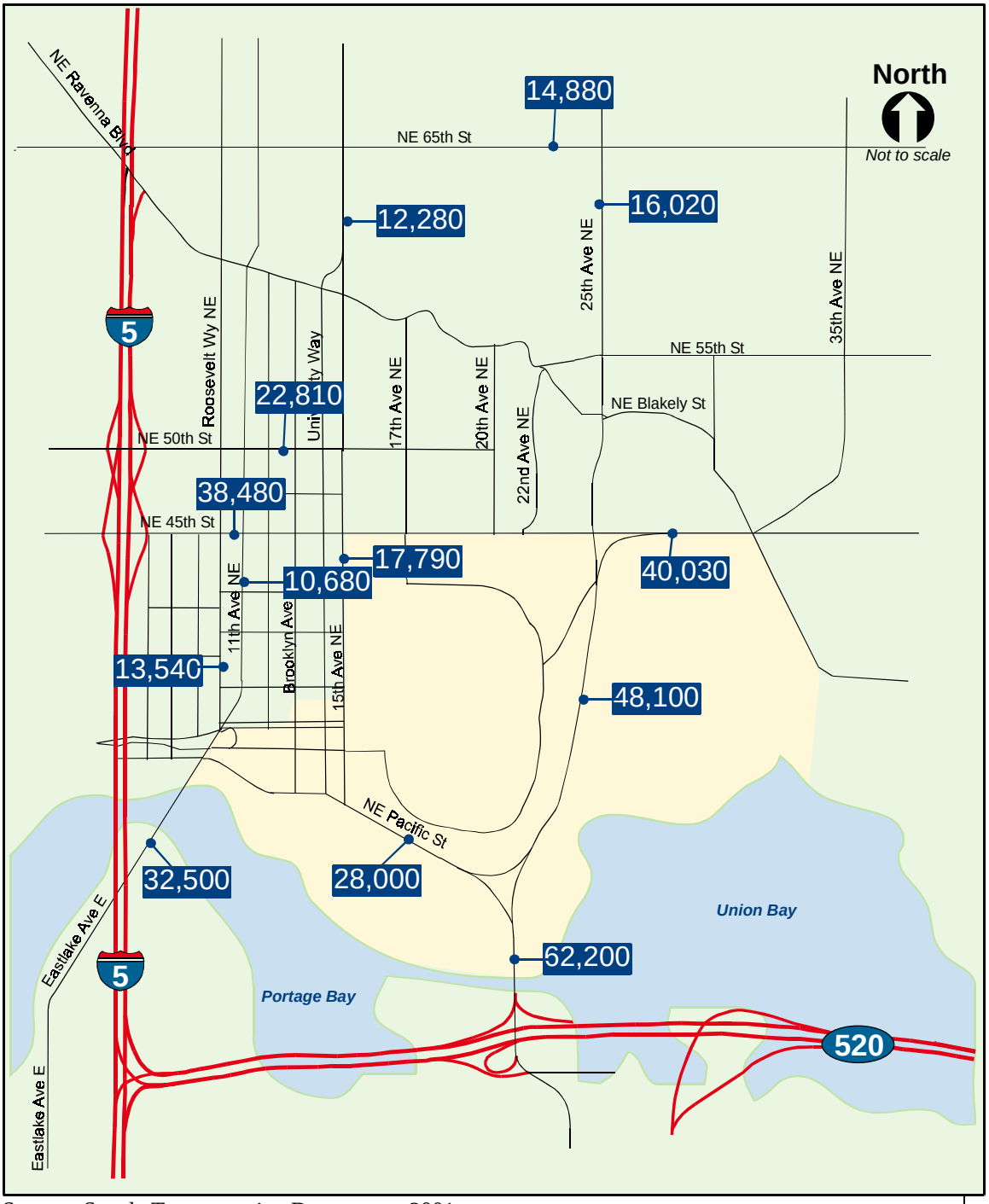
Among the principal arterials, 15th Avenue NE and NE 50th Street had the largest daily traffic growth in the past 15 years. The growth rate on those streets has averaged roughly two percent a year since 1985. Except for 11th Avenue NE, which experienced a minor reduction, all arterials had cumulative traffic growth of 8 to 23 percent over the last 15 years. The average traffic growth rates on those streets range from 0.5 percent to 1.5 percent a year since 1985. The AM and PM peak hours are the two most congested times in the day. Since those congested travel times often have different traffic growth characteristics than those shown by a daily average, **Tables 5-6 and 5-7** compare the 1985 and 1999 peak periods.

Table 5-5. Daily Traffic Volumes, 1985 and 2000

Street	Location	1985	2000	Difference	% Difference
Montlake Blvd.	South of Pacific Street	52,830	62,200	9,370	17.7%
Pacific Street	West of Pacific Place	22,830	28,000	5,170	22.6%
Eastlake Ave	At University Bridge	26,450	32,500	6,050	22.9%
NE 45th Street	East of Roosevelt Way NE	35,450	38,480	3,030	8.5%
NE 45th Street	West of Union Bay Pl.	34,960	40,030	5,070	14.5%
15th Ave NE	South of NE 45th Street	12,880	17,790	4,910	**38.1%**
NE 50th Street	East of Roosevelt Way	16,950	22,810	5,860	**34.6%**
Roosevelt Way	North of NE 41st Street	11,015	13,540	2,525	22.9%
11th Ave NE	South of NE 45th Street	11,830	10,680	-1,150	-9.7%

* The bold typeface indicates daily peak hour traffic growth of more than 30 percent since 1985.
Source: University District Study Background Report, July 1989 & Seattle Transportation Department, 2001.

Figure 5-5. Year 2000 Average Daily Traffic Volumes



Source: Seattle Transportation Department, 2001.

Figure 5-6. Year 2000 PM Peak Hour Traffic Volumes

Source: Seattle Transportation Department, 2001.

Table 5-6. AM Peak Hour Traffic Volumes, 1985 and 1999

Street	Location	1985	1999	% Difference
NB Montlake Blvd	South of Pacific Street	2170	2200	1.4%
SB Montlake Blvd.	South of Pacific Street	1950	2580	**32.3%**
WB Pacific Street	West of Pacific Place	630	570	-9.5%
EB Pacific Street	West of Pacific Place	1030	1510	**46.6%**
NB Eastlake Ave	At University Bridge	930	950	2.2%
SB Eastlake Ave	At University Bridge	1000	1520	**52.0%**
WB NE 45th Street	East of 7th Ave NE	750	790	5.3%
EB NE 45th Street	East of Roosevelt Way NE	1390	1260	-9.4%
WB NE 45th Street	West of Union Bay Pl.	1760	2320	**31.8%**
EB NE 45th Street	West of Union Bay Pl.	910	1190	**30.8%**
NB 15th Ave NE	South of NE 45th Street	340	420	23.5%
SB 15th Ave NE	South of NE 45th Street	560	710	26.8%
WB NE 50th Street	East of 11th Ave NE	330	500	**51.5%**
EB NE 50th Street	West of 11th Ave NE	540	770	**42.6%**
Roosevelt Way NE	North of NE 41st Street	1060	1600	**50.9%**
11th Ave NE	South of NE 45th Street	450	410	-8.9%

* The bold typeface indicates daily peak hour traffic growth of more than 30 percent since 1985.

Source: University District Study Background Report, July 1989 & Seattle Transportation Department, 2001.

A close examination of **Table 5-6** reveals that, during the AM peak hour, the outbound traffic, meaning the residents of the area traveling out of the area to work, had substantial increases in the last 15 years. It appears that most of the traffic growth is related to residents accessing jobs east of Lake Washington via SR 520. Except for eastbound NE 50th Street, inbound traffic increased very little and decreased at some locations, indicating that employment and student population growth during the last 15 years did not increase the AM peak hour traffic volumes.

Table 5-7. PM Peak Hour Traffic Volumes, 1985 and 1999

Street	Location	1985	1999	% Difference
NB Montlake Blvd	South of Pacific Street	2160	2540	17.6%
SB Montlake Blvd.	South of Pacific Street	2150	2580	20.0%
WB Pacific Street	West of Pacific Place	725	920	26.9%
EB Pacific Street	West of Pacific Place	1030	1550	**50.5%**
NB Eastlake Ave	At University Bridge	1630	1650	1.2%
SB Eastlake Ave	At University Bridge	1250	1310	4.8%
WB NE 45th Street	East of 7th Ave NE	1400	1300	-7.1%
EB NE 45th Street	East of Roosevelt Way NE	1160	1240	6.9%
WB NE 45th Street	West of Union Bay Pl.	1240	1350	8.9%
EB NE 45th Street	West of Union Bay Pl.	1700	1800	5.9%
NB 15th Ave NE	South of NE 45th Street	845	840	-0.6%
SB 15th Ave NE	South of NE 45th Street	435	390	-10.3%
WB NE 50th Street	East of 11th Ave NE	810	900	11.1%
EB NE 50th Street	West of 11th Ave NE	750	960	28.0%
Roosevelt Way NE	North of NE 41st Street	910	1240	**36.3%**
11th Ave NE	South of NE 45th Street	1600	1260	-21.3%

* The bold typeface indicates daily peak hour traffic growth of more than 30 percent since 1985.

Source: University District Study Background Report, July 1989 & Seattle Transportation Department, 2001.

Table 5-7 shows that there are only two locations where 1999 PM peak hour traffic growth from 1985 was higher than 30 percent: eastbound Pacific Street west of Pacific Place, and Roosevelt Way NE (southbound), north of NE 41st Street.

Four out of sixteen locations had negative growth. Most of the streets, whether inbound or outbound, had 5 to 25 percent traffic growth during the PM peak hour since 1985. Employment and student population growth appears to have had more impact on traffic during the PM peak hour than the AM peak hour.

Using only these two data points to draw conclusions about traffic growth in the study area could be misleading. It is possible that some of data points do not represent average conditions for that year, due to a traffic accident or traffic construction in the area. The following analysis uses daily traffic volumes for the last 10 years to supplement the above findings.

Traffic Distribution

A selected link analysis shows the origins and destinations of all vehicles at a particular location at a given time – in this instance, the PM peak hour. The result can be mapped to show the traffic distribution pattern to and from the selected location. This study analyzed the following five locations, with distribution results mapped on **Figures 5-7** through **5-11**.

- NE 50th Street east of I-5;
- NE 45th Street east of I-5;
- Montlake Boulevard on Montlake Bridge;
- Eastlake Avenue E on University Bridge; and
- Roosevelt Way NE and 12th Avenue NE, south of NE 65th Street.

The selected link analysis produced the following findings:

- The majority of the vehicles using NE 50th Street travel to or from I-5 north of NE 50th Street. Also, a significant portion of the traffic on NE 50th Street crosses I-5 to Wallingford.
- A great majority of the vehicles on NE 45th Street east of I-5 are going to or coming from I-5 south of NE 45th Street.
- The amount of traffic coming and going to Laurelhurst via NE 45th Street is relatively small.
- A great majority of the vehicles using the Montlake Bridge originate and end their trips within the study area. The volume of through trips coming from or going to the Lake City area is very small.
- The University Bridge service area is much wider than that of Montlake Bridge. Several arterials funnel traffic onto this bridge.
- Roosevelt Way and 12th Avenue NE as a one-way couplet carry a significant amount of through traffic.

Figure 5-7: PM Peak Hour Traffic Distribution: NE 50th Street Link East of I-5

Source: Mirai Associates, 2001.

Figure 5-8: PM Peak Hour Traffic Distribution: NE 45th Street Link East of I- 5

Source: Mirai Associates, 2001.

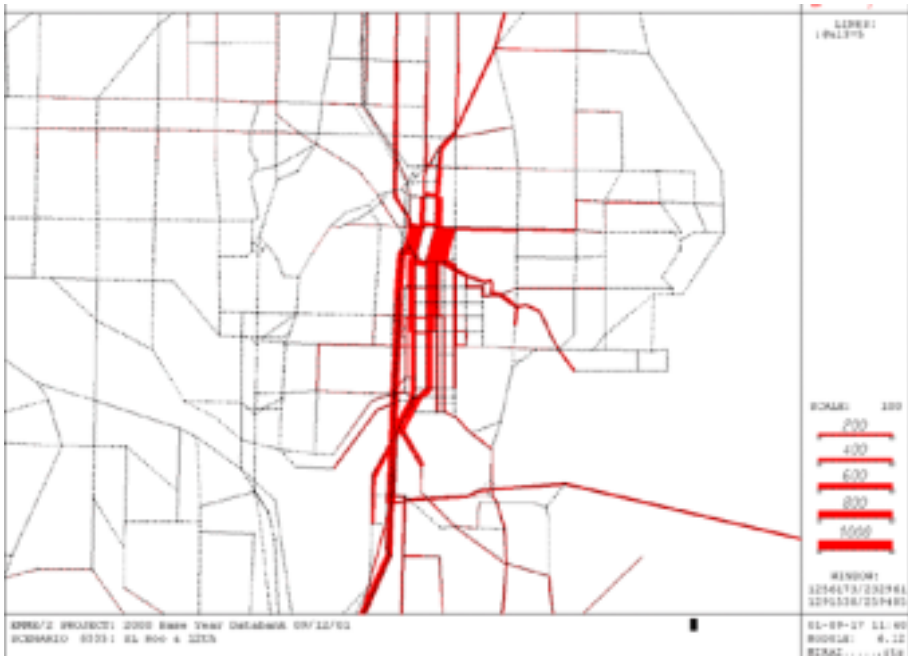
Figure 5-9. PM Peak Hour Traffic Distribution: Montlake Boulevard Link on Montlake Bridge

Source: Mirai Associates, 2001.

Figure 5-10. PM Peak Hour Traffic Distribution: Eastlake Avenue East Link on University Bridge

Source: Mirai Associates, 2001.

Figure 5-11. PM Peak Hour Traffic Distribution: Roosevelt Way and 12th Avenue NE Links South of NE 65th Street



Source: Mirai Associates, 2001.

Traffic Growth Trends

Daily Traffic Volume on North-South Arterials

Figure 5-12 shows average daily traffic volume trends on the north-south arterials within the study area.

- There has been a gradual increase in daily traffic on 25th Avenue NE since 1994 in the area of NE 65th Street.

- For the most part, traffic volume trends on the north-south streets have been flat, indicating that the daily traffic growth on the north-south arterials is relatively slight.

Daily Traffic Volume on East-West Streets

Figure 5-13 shows the daily traffic volume trends on the east-west streets within the study area.

- The volumes of NE 45th Street decreased from 1994 to 1995 and the current volume is lower than its peak on 1994.

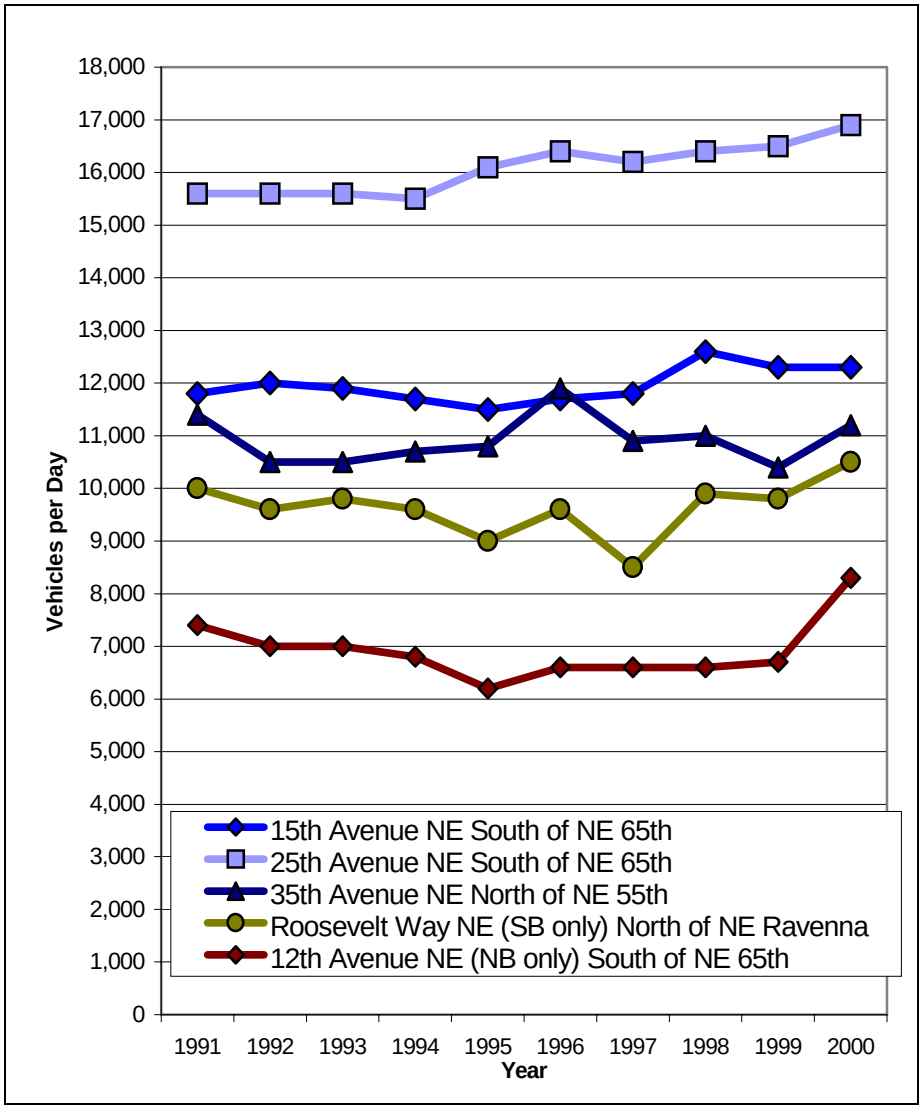
- The same trend occurred on NE 50th Street. No reason was identified for the reduction of the traffic volume on NE 45th Street and NE 50th Street.

- Pacific Street and NE 65th Street had steady, but not substantial, increases in traffic volumes over the last several years.

Daily Traffic Volume on Montlake and University Bridges

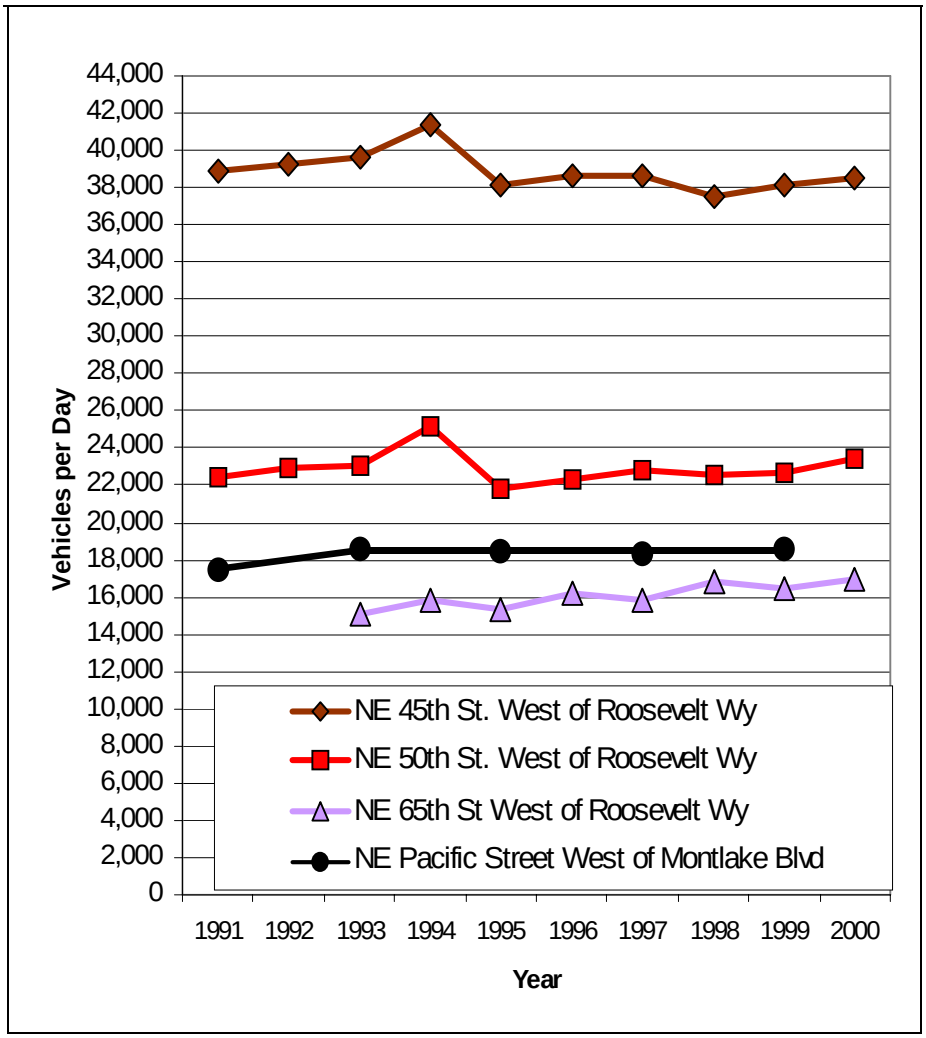
Figure 5-14 shows the daily traffic volume trends for the Montlake and University Bridges. The traffic volume trends for both Montlake and University Bridges have been steady and flat. There has not been a substantial increase in the daily vehicle use of the bridges over the last ten years.

Figure 5-12. Daily Traffic Volumes Trends for North-South Arterials



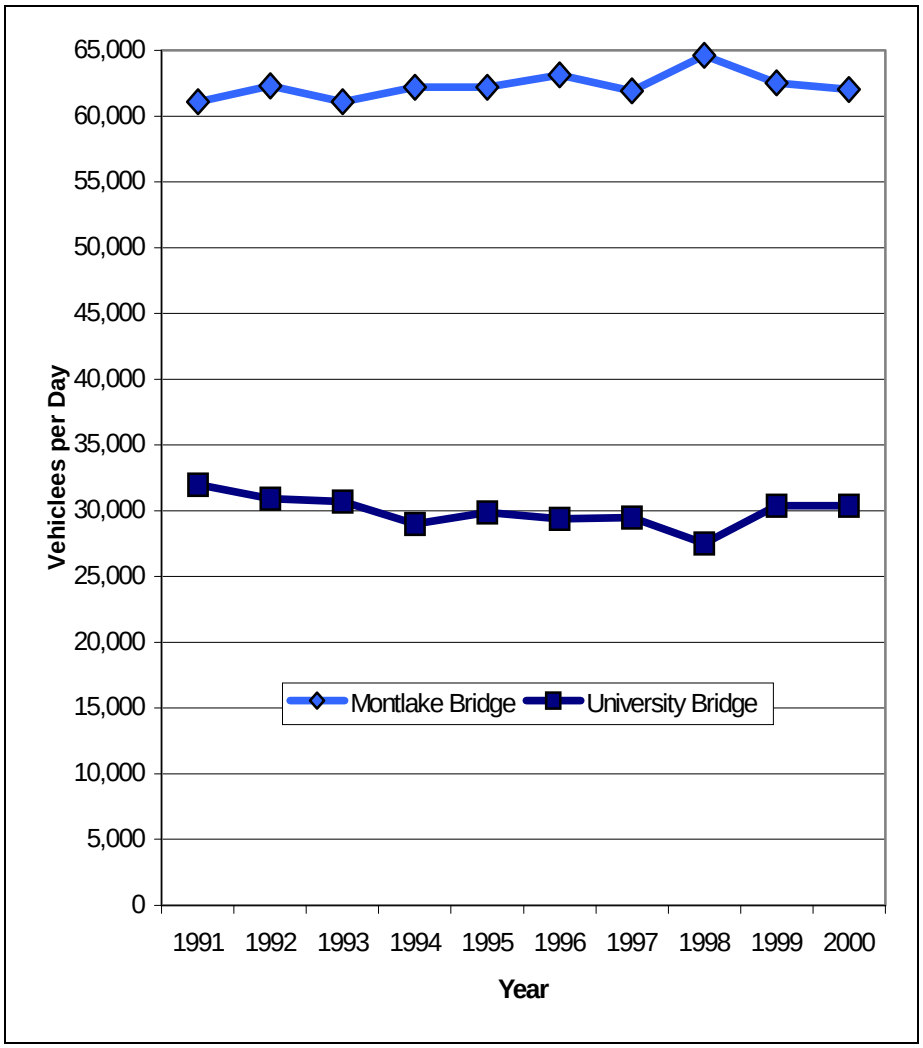
Source: Seattle Transportation Department, 2001.

Figure 5-13. Daily Traffic Volume Trends for East-West Arterials



Source: Seattle Transportation Department, 2001.

Figure 5-14. Daily Traffic Volume Trends for Bridges



Source: Seattle Transportation Department, 2001.

Levels of Service

Level of Service (LOS) is a quantitative measurement of traffic congestion and loss of travel time experienced by drivers. In urban areas like the UATS area, capacity and traffic signal operation at intersections strongly affect how well traffic flows without delays.

Intersection Level of Service

LOS at an intersection is rated with letters A through F (where "F" indicates the most congestion) and measured in terms of average delay per vehicle in seconds. The length of delay describes the traffic conditions at a given intersection. The Highway Capacity Manual (HCM 2000) defines intersection LOS as shown in **Table 5-8**.

Table 5-8. Definition of Level of Service (HCM 2000)

LOS	Delay per Vehicle
A	Less than or equal to 10 seconds
B	Greater than 10 and less than or equal to 20 seconds
C	Greater than 20 and less than or equal to 35 seconds
D	Greater than 35 and less than or equal to 55 seconds
E	Greater than 55 and less than or equal to 80 seconds
F	Greater than 80 seconds

Source: Highway Capacity Manual, 2000.

LOS calculated with the HCM 2000 method assumes that each intersection operates without interference from the vehicle queues at adjacent intersections or ramp meters. When vehicles departing an intersection with a green phase cannot move due to the queues from the next intersection or a ramp meter, the delay would be much greater than that calculated with the HCM 2000 method. The LOS is therefore not valid under such a circumstance. Some intersections along Montlake Boulevard near SR 520, and on NE 45th Street near I-5 experience this situation. Caution is therefore advised in reviewing the LOS results for congested intersections near the freeways or where intersections are closely spaced, as along Montlake Boulevard and NE 45th Street.

Figures 5-15 and 5-16 show 1999 PM peak hour LOS and average delays at the signalized arterial intersections as calculated with the HCM 2000 method. Intersections operating at LOS E or F have significant traffic congestion.

The LOS analysis shows that the study area does not have signalized intersections operating at LOS F. (There are some unsignalized intersections operating at LOS F, shown in the *U.W. Master Plan Transportation Technical Report*, October 2000).

The following signalized intersections are operating at LOS E:

- NE 45th Street and I-5 SB off ramp (58 seconds of delay)
- NE 45th Street and I-5 NB on ramp (64 seconds of delay)
- NE 45th Street and 15th Avenue NE (61 seconds of delay)
- NE Pacific Street and NE Pacific Place (64 seconds of delay)

As previously noted, the calculated intersection levels of service may not indicate the true levels of service and delays when traffic backs up from freeways, causing the City's arterials to not function as designed. The following section measures the extent of this problem by analyzing vehicle speeds and corridor LOS.

Corridor Travel Speed and Corridor LOS

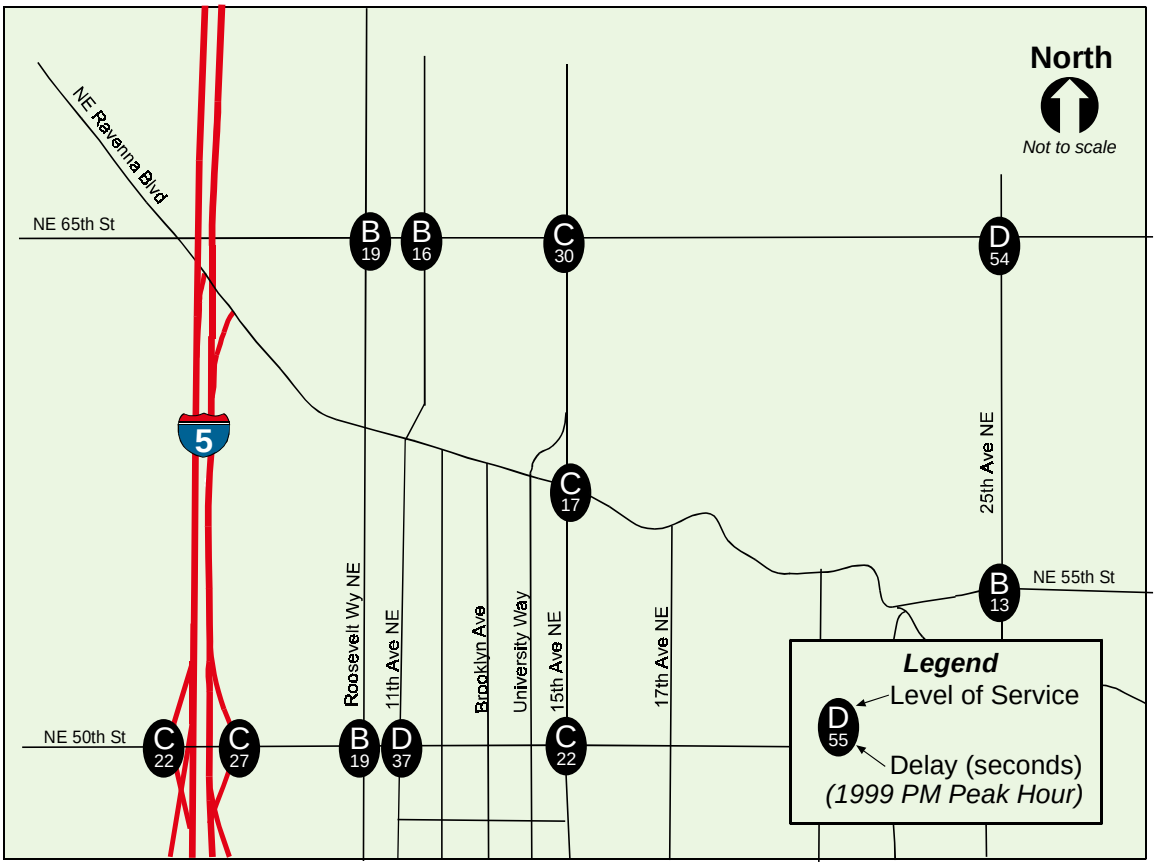
This analysis uses the speed study results reported in the *U.W. Master Plan Transportation Technical Report,* supplemented by field surveys conducted by Mirai Associates. The results are shown in **Table 5-9** and mapped in **Figure 5-17**.

During the PM peak hour, three corridors operate at LOS F:

- Montlake Boulevard;
- NE Pacific Street; and
- NE 45th Street.

The average speed of the vehicles on southbound Montlake Boulevard is 3 mph, although none of the intersections operate at LOS F. It takes 20 minutes in the PM peak hour to travel from NE 45th Street to the SR 520 interchange, a distance of about one mile. The average speed on southbound Montlake Boulevard in the AM peak hour is equally slow or worse than the PM peak hour. Low corridor LOS on Montlake Boulevard is due to the vehicle queues from the SR 520 ramps, which back up onto the travel lanes of Montlake Boulevard.

Figure 5-15. 1999 PM Peak Hour LOS and Average Delays (North Study Area)



Source: Mirai Associates, 2001.

Figure 5-16. 1999 PM Peak Hour LOS and Average Delays (South Study Area)

Source: Mirai Associate, 2001.

Table 5-9. PM Peak Hour Corridor Travel Time and Level of Service Results

Corridor & Direction	Distance (miles)	Average Time (seconds)	Average Speed (miles per hour)	Urban Street Class	LOS
15th Avenue NE - from NE 50th Street to Pacific Street					
Southbound	0.81 miles	279 sec	10 mph	III	E/F
Pacific Street - from Boat Street to Montlake Boulevard					
Eastbound	0.67 miles	444 sec	5 mph	III	F
Montlake Boulevard - from SR-520 to NE 45th Street					
Southbound	0.98 miles	1,255 sec	3 mph	II	F
Northbound	0.98 miles	302 sec	12 mph	II	F
Roosevelt Way - from NE 50th Street to Harvard Avenue					
Southbound	1.1 miles	270 sec	15 mph	III	D
11th Avenue NE - from Harvard Avenue to NE 50th Street					
Northbound	1.2 miles	319 sec	14 mph	III	D/E
NE 45th Street - from I-5 southbound ramps to 17th Avenue NE					
Eastbound	0.6 miles	346 sec	6 mph	IV	F
Westbound	0.6 miles	357 sec	6 mph	IV	F

Source: U.W. Master Plan Transportation Technical Report, October 2000, and Mirai Associates, 2001.

A similar situation occurs at the intersections of the I-5 ramps at NE 45th Street. Traffic flows on NE 45th Street are often blocked due to the lack of on-ramp capacity to south- and northbound I-5. When freeway-bound traffic blocks through traffic at one of the intersections on NE 45th Street, the operation of the intersection deteriorates rapidly and the delays soon telegraph along the entire corridor.

Corridor LOS on the principal arterial corridors in the study area will greatly improve if the spill-over from the freeway ramps onto the City arterials could be eliminated.

Figure 5-17. PM Peak Hour Corridor Travel Speed and Corridor LOS

Source: Mirai Associates, 2001.

Traffic Accidents

The Washington State Department of Transportation has been responsible for organizing traffic accident data. The most recent traffic accident data that are available for analysis are for the years up to and including 1996. This study assembled accident data from 1991 to 1996 and analyzed the total number of accidents at intersections and at mid-block locations. **Table 5-10** shows intersections averaging five or more traffic accidents per year.

- Of the five intersections with the most accidents, four are on NE 50th Street.
- Four of the twelve highest accident intersections are on NE 45 Street.
- The intersection at 15th Avenue NE and Ravenna Boulevard is not signalized.
- Signal phasings at the intersection of 15th Avenue NE and NE 65th Street have been modified to protect left turn vehicles, since this accident data was collected.
- The majority of accidents at these intersections involve two vehicles colliding at a right angle or left turn movements.

Table 5-10. Highest Traffic Accident Locations at Intersections in the Study Area (1991–1996 data)

Intersections		Accidents (1991-1996)	Accident Type
15th Ave NE	NE 50th St	60	37 Left Turn, 12 Right Angle
Roosevelt Way NE	NE 50th St	46	31 Right Angle, 9 Left Turn
Brooklyn Ave NE	NE 50th St	45	20 Right Angle, 22 Left Turn
Roosevelt Way NE	NE 45th St	44	11 Right Angle, 9 Left Turn
11th Ave NE	NE 50th St	37	30 Right Angle
15th Ave NE	NE Ravenna Blvd	36	25 Right Angle
5th Ave NE	NE 45th St	31	13 Right Angle
11th Ave NE	NE 42nd St	30	23 Right Angle
University Way NE	NE 45th St	30	7 Pedestrian
15th Ave NE	NE 65th St	29	18 Left Turn
25th Ave NE	NE 55th St	29	22 Left Turn
7th Ave NE	NE 45th St	29	11 Right Angle

Source: Seattle Transportation Department, 2001.

Table 5-11 shows the highest mid-block accident locations for the years 1991-96.

- Unlike the intersection accidents, the majority of the mid-block accidents are rear end accidents.
- The highest number of mid-block accidents in the study area occurred on Montlake Bridge, and Montlake Boulevard also had a high number of accidents
- Mid-block accidents on NE 45th Street occurred east of the University campus and in the vicinity of I-5.

Table 5-11. Highest Accident Locations at Mid-Block Locations in the Study Area (1991-1996 data)

Street	From	To	Accidents (1991-96)	Accident Type
Montlake Br	South End of Bridge	North End of Bridge	307	255 Rear End, 22 Sideswipe
Montlake Blvd NE	NE Pacific St	25th Ave NE	63	34 Rear End, 15 Other Type
NE 45th St	Montlake Blvd	Union Bay Pl NE	52	22 Rear End
NE 45th St	5th Ave NE	7th Ave NE	45	19 Rear End, 12 Sideswipe
NE 45th St	8th Ave NE	9th Ave NE	44	21 Rear End
University Br	Point A	Point B	43	22 Rear End
NE 45th St	University Way NE	15th Ave NE	43	20 Rear End
Montlake Blvd NE	NE Pacific St	NE Pacific Pl	40	32 Rear End
NE 45th St	21st Ave NE	Montlake Blvd	40	19 Rear End
NE 45th St	9th Ave NE	Roosevelt Way NE	39	22 Rear End
25th Ave NE	NE 49th St	NE Blakely St	37	15 Other Type
NE 45th St	12th Ave NE	Brooklyn Ave NE	35	26 Rear End
University Way NE	NE 45th St	NE 47th St	34	10 Other, 9 Rear End
NE 50th St	9th Ave NE	Roosevelt Way NE	34	24 Rear End
15th Ave NE	NE Pacific St	NE 40th St	33	8 Rear End, 11 Parked Car
25th Ave NE	NE 60th St	NE 65th St	33	25 Rear End
NE 45th St	7th Ave NE	8th Ave NE	31	15 Rear End

Source: Seattle Transportation Department, 2001

MODE SPLIT

The U.W. regularly conducts surveys to find about the modes of transportation used by its students, faculty and staff. The recent survey findings are published on its web site and in the *U.W. Master Plan Transportation Technical Report, October 2000*.

Since the survey done by the U.W. deals with the transportation conditions related to the institution, and this study covers a much wider area, the PSRC's model was used to estimate transportation mode use for those traveling to and from the area. The 2000 base model trip tables were aggregated into four groups:

Work and student commute trips

- Trips attracted (coming into the area in AM)
- Trips produced (going out from the area in AM)

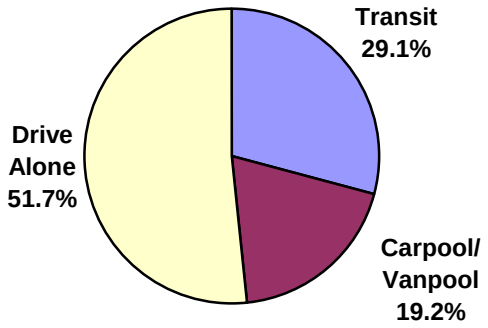
Non-work trips (shopping, business and recreational trips)

- Trips attracted (coming into the area in AM)
- Trips produced (going out from the area in AM)

Figures 5-18 through 5-21 show the mode split among transit, single occupant vehicles and high occupancy vehicles (carpools and vanpools).

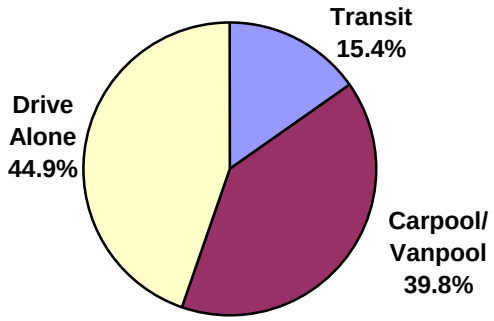
- Among the commuters coming into the study area (office and retail workers, University students, staff members and faculty), about 50 percent drive alone; 30 percent use buses; and 19 percent carpool or vanpool.
- Among the residents who commute to locations outside the area, 28 percent take the bus; 9.6 percent carpool; and, 62.4 percent drive alone.

Figure 5-18. Work/School Purpose Vehicle Trips Attracted



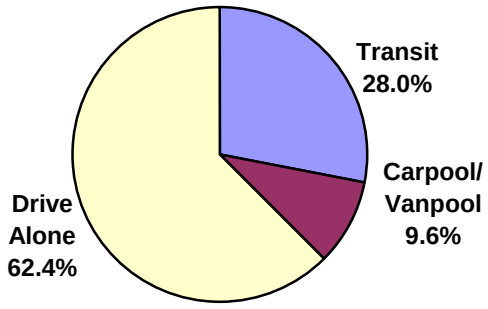
Source: Mirai Associates, 2001.

Figure 5-19. Non-Work Purpose Vehicle Trips Attracted



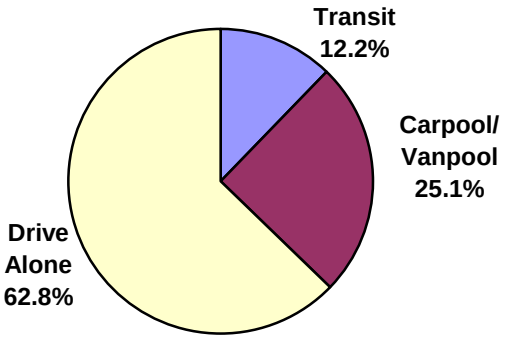
Source: Mirai Associates, 2001.

Figure 5-20. Work/School Purpose Vehicle Trips Produced



Source: Mirai Associates, 2001.

Figure 5-21. Non-Work Purpose Vehicle Trips Produced



Source: Mirai Associates, 2001.