

UNIVERSITY OF BRITISH COLUMBIA



Fall 2007
Transportation Status Report

February 2008

Fall 2007 Transportation Status Report

Contents

1. INTRODUCTION.....	1
1.1. Context.....	1
1.2. Annual Monitoring Program.....	2
1.3. Changes at UBC Affecting Travel.....	4
1.4. Understanding the Data.....	6
1.5. More Information.....	7
2. TRAVEL TO AND FROM UBC.....	8
2.1. Person Trips	8
2.2. Mode Shares.....	10
2.3. Travel Patterns	11
2.4. Traffic	12
2.5. Trip Generation.....	13
2.6. Vehicle Occupancy	15
3. TRENDS BY MODE	16
3.1. Transit	16
3.2. Automobiles	18
3.3. Bicycles.....	24
3.4. Pedestrians	25
3.5. Heavy Trucks	25

1. INTRODUCTION

For the past ten years, UBC has been working to reduce automobile trips to and from UBC, and encourage the use of other modes of transportation, including transit, carpooling, cycling and walking. Since 1997, UBC has collected data each year regarding travel patterns to and from the Point Grey campus. A year-to-year comparison of these data provides a measure of UBC's progress in achieving its transportation goals.

The Fall 2007 Transportation Status Report presents the most recent data which UBC has collected. This report provides a picture of overall travel trends, as well as details of travel patterns for each mode of transportation. Data are also provided regarding on-campus transportation conditions.

1.1. Context

Transportation planning at UBC is undertaken within the direction and context provided by several plans and policies, including:

- The **Official Community Plan and Memorandum of Understanding**. In July 1997, the GVRD adopted an Official Community Plan (OCP) bylaw for UBC. The OCP described a number of transportation objectives which UBC would pursue. An accompanying Memorandum of Understanding (MoU) described in more detail how these objectives would be achieved and how key objectives would be measured. The original MoU was prepared in July 1997, and was updated in December 2000.
- The **Strategic Transportation Plan**. One of the commitments which UBC made through the OCP and MoU was to implement a “comprehensive and integrated transportation management strategy.” The Strategic Transportation Plan is the result of that commitment, and was approved by UBC's Board of Governors in November 1999. The STP is to be updated every five years to account for what had been accomplished during that time, and what changes have occurred on campus. The updated STP was adopted in July 2005.
- **Trek 2010** is the strategic vision for the kind of university that UBC aspires to be. Prepared through widespread community consultation, Trek 2010 establishes that UBC's vision is to be one of the world's best universities, to prepare students to become exceptional global citizens, to promote the values of a civil and sustainable society, and to conduct outstanding research to serve the people of British Columbia, Canada, and the world. The Trek 2010 objectives focus around five pillars of a sustainable, complete community — people, learning, research, community and internationalization.
- The **Comprehensive Community Plan (CCP)** establishes the principles for detailed neighbourhood planning in the eight neighbourhoods identified in the OCP. The principles

outlined in the CCP pertain to housing types, open space, urban form, and circulation (transportation). To date, detailed neighbourhood plans have been approved for six neighbourhoods, in accordance with the OCP. Each neighbourhood plan incorporates a range of transportation features, such as pedestrian and bicycle facilities, provision for transit services, traffic calming features, and maximum parking ratios.

- The **Campus Transit Plan** describes how the UBC campus will be served by transit in the future, including transit routes and facilities. The key outcomes of the Campus Transit Plan are construction of a new below-grade transit station on University Boulevard, retention of existing regional bus routes on campus, and implementation of a campus-wide community shuttle service.

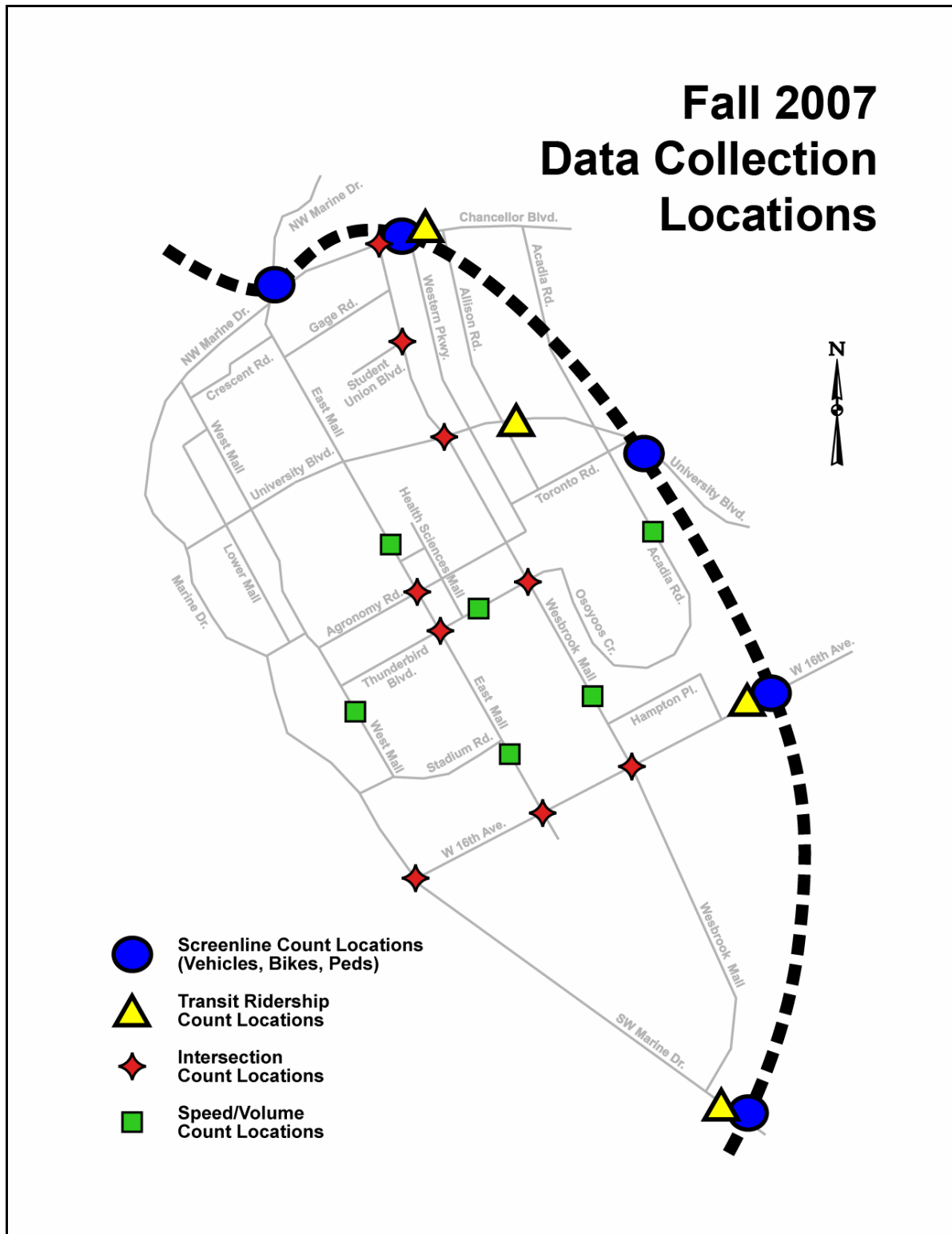
1.2. Annual Monitoring Program

Travel patterns to and from UBC are monitored on an on-going basis through a variety of different data collection methods. The majority of the data are collected during the fall, which provides a consistent basis for year-by-year comparisons of travel patterns, mode shares and traffic volumes. Additional data collection activities are undertaken at other times of the year to obtain information regarding specific modes of travel, seasonal variations and localized traffic volumes. Annual data collection activities are summarized in Table 1.1. Count locations are illustrated in Figure 1.1.

Table 1.1 – Annual Data Collection Activities

Data Collection Activity	Locations	Description
Screenline traffic counts	Screenline	Automatic counters (tubes) on road for 7 days, 24 hours/day
Campus traffic/speed counts	Roads throughout campus	Automatic counters (tubes) on road for 7 days, 24 hours/day
Intersection counts	Intersections throughout campus	Manual observation for 8 hours (3 in AM, 2 in midday, 3 in PM) for one day
Vehicle occupancy and classification	Screenline	Manual observation for 8 hours (3 in AM, 2 in midday, 3 in PM) for one day
Transit ridership	Screenline	Manual observation from 6:00 AM to 4:30 AM for one day
Bicycles and pedestrians	Screenline	Manual observation for 8 hours (3 in AM, 2 in midday, 3 in PM) or 15 hours for one day
Heavy trucks	Screenline	Manual observation for 15 hours for one day each quarter

Figure 1.1 – Fall 2007 Data Collection Locations



The information presented in the Fall 2007 Transportation Status Report is based primarily on data collected through the annual transportation monitoring program from 1997 through 2007. Because the program was initiated in Fall 1997, the results from that year have served as the benchmark against which progress has been measured.

In addition to these annual data collection activities, UBC undertakes a campus-wide transportation survey every few years. The survey provides information regarding the travel patterns, attitudes and needs of students, staff, faculty and residents on campus.

1.3. Changes at UBC Affecting Travel

There have been a number of changes at UBC that have affected attitudes towards travel among students, staff, faculty and others at UBC, and as a result, affected travel patterns. This section of the report identifies key changes which have occurred at UBC since 1997.

- **Population.** The daytime population at UBC has increased 32% in the ten years since 1997. This includes increased student enrollment, associated increases in faculty and staff, and increased numbers of residents on campus. For the purposes of monitoring trends in travel to and from UBC, the daytime population comprised of students, staff and faculty is used to calculate person trips. Table 1.2 summarizes population figures for Fall 1997 and Fall 2007.

Table 1.2 – Daytime Population at UBC

	Fall 1997	Fall 2007	Increase	
Students	33,200	44,100	+10,900	33%
Staff	7,250	9,200	+1,950	27%
Faculty	1,850	2,700	+850	46%
Totals	42,300	56,000	+13,700	32%

Source: UBC Planning and Institutional Research Department

- **U-Pass.** One of the most significant changes affecting travel patterns at UBC has been the student U-Pass, which was introduced in September 2003. The U-Pass is a universal transportation pass that is mandatory for students at a cost to students of \$22 per month. The U-Pass offers students unlimited access to TransLink Bus, SkyTrain and SeaBus services (all zones), discounted West Coast Express fares, discounts at participating merchants, and access to a variety of other transportation programs available on campus. UBC and TransLink are now considering extending the U-Pass program to staff, faculty and residents on campus.
- **More transit service.** In conjunction with introduction of the student U-Pass, TransLink has substantially increased the level of transit service provided to UBC. The majority of the increase has been on the Route 99 B-Line. Other improvements since 1997 include several new limited-stop routes, including Route 43 along 41st Avenue, Route 44 from downtown, Route 84 from the VCC-Clark SkyTrain station, and Route 480 from Richmond Centre.

- **Class start times** were changed in September 2001. In an effort to spread the transit demand in the morning peak period, UBC adjusted morning class start times. Previously, the first classes in the morning all began at 8:30 a.m. This was changed so that some students begin classes at 8:00 a.m., some remained at 8:30 a.m., and others begin classes at 9:00 a.m. Subsequent analysis showed that the desired spreading of morning peak demands was achieved, and that as a result, 12% more transit trips per day were accommodated on the same number of buses.
- **Parking supply and costs.** UBC has eliminated more than 3,000 commuter parking stalls on campus since 1997 — a reduction in the commuter parking supply of approximately 25%. At the same time, the price of parking on campus has increased (UBC does not provide any free parking spaces on campus for commuters). Daily parking rates in surface lots have more than doubled from \$2.00 in 1997 to \$4.50 in 2007, and prices for parking permits and other parking on campus have also increased. In addition, UBC has worked with the GVRD and the Ministry of Transportation to restrict parking on roadways adjacent to UBC, particularly 16th Avenue and SW Marine Drive.
- **Bicycle facilities.** New bicycle lanes were implemented on several roadways on campus and leading to campus. Most notable is the conversion of University Boulevard west of Blanca, from two lanes in each direction to one travel lane and one bicycle lane in each direction. Bicycle lanes were also added on Wesbrook Mall, Thunderbird Boulevard and 16th Avenue. On campus, changes include the addition of over 200 new bicycle racks bringing the on-campus total to more than 500 racks, plus secure bicycle cages, bicycle lockers, and services to encourage and support the UBC cycling community.
- **Alternative modes of travel.** UBC has encouraged the use of non-SOV modes of travel through a range of programs, including a comprehensive carpooling program (including a web-based ride-matching service, preferred carpool parking and a rewards program), an emergency ride home program, additional campus shuttles, a car-sharing program, a public bike program, bicycle carts and traffic calming measures.
- **Campus development.** UBC has developed and is continuing to develop additional housing on-campus, as a means of reducing the proportion of persons who travel to UBC from off-campus. This housing includes student housing, housing for staff and faculty, and market housing. At the same time, an increased number and range of commercial services are now available on campus and in the University Endowment Lands adjacent to campus.

1.4. Understanding the Data

The following terms and measures are used throughout the Transportation Status Report to describe various characteristics of travel patterns and trends at UBC:

- **Mode share** (also called “mode split”) refers to the relative proportions of trips by various travel modes during a particular time period. Mode shares are generally reported for single occupant vehicles (SOVs), carpool and vanpools (also called high occupancy vehicles or HOV’s), transit, bicycle, pedestrians and other modes such as motorcycles.

UBC has used these mode share categories to document travel patterns since 1997. These mode share categories are consistent with UBC’s Strategic Transportation Plan, the OCP and MoU. It should be noted that the GVRD, the City of Vancouver and some other agencies sometimes report mode shares using different categories — typically, for automobile drivers and automobile passengers, rather than for SOV trips and carpool/vanpool trips.

- **Person trips.** The data presented in the Transportation Status Report include traffic volumes and person trips. Traffic volumes are simply the number of vehicles crossing a screenline or passing a specified point. Person trips are the number of *people* crossing a screenline or passing a specified point, and includes trips by all modes of transportation. A person trip is a one-way trip made by one person. For example, in one hour there might be 500 vehicles travelling along a section of road (traffic volumes generally reflect vehicles travelling in both directions). These 500 vehicles might include 450 automobiles with a total of 600 persons in them, 30 buses with a total of 1,000 persons in them, and 20 light and heavy trucks with 25 persons in them. The total number of person trips associated with these 500 vehicles is 1,625 person trips.

In the Transportation Status Report, unless otherwise stated, all reported trips are person trips.

- **Trips per person.** The population at UBC — students, staff, faculty and residents — has increased since 1997 and will continue to increase. This means that when comparing absolute numbers of person trips and traffic volumes, and changes from one year to another reflect the effects of two different factors — changes in travel patterns and increases in population growth. To provide a clearer picture of just the changes in travel patterns from year to year, a different measure is used — trips per person. This provides a consistent basis for monitoring travel trends regardless of how much or how little population growth occurs. Trips per person are calculated as the number of person trips divided by the number of persons at UBC during the weekday daytime. The number of persons is calculated as the student enrollment plus the number of staff and faculty, as reported by UBC’s Planning and Institutional Research department. Numbers of on-campus residents are not included, as many of these residents are also students, staff and faculty, and would therefore be counted twice.

- **Time periods.** Substantial effort and cost are required to collect travel data at UBC. Consequently, it is not reasonable nor necessary to collect all data in all locations at all hours of the day and night. Instead, some data are collected during selected time periods only (Table 1.1 indicates the time periods for each type of data collection activity). Screenline traffic data on all routes leading to and from UBC are collected over a period of one week. These data are collected using automatic counters placed on the roadway, and consequently it is cost-effective to collect a full week of data. On the other hand, vehicle occupancy and classification counts are done manually, and as a result are relatively expensive. These counts are undertaken for a total of eight hours over the morning peak, the midday and the afternoon peak periods. When combined with other 24-hour data, daily totals can be reliably estimated from occupancy and classification data collected for eight hours in a day.

1.5. More Information

The following resources provide additional information regarding travel patterns and trends at UBC, as well as transportation services and facilities:

- This Fall 2007 Transportation Status Report is available at www.planning.ubc.ca.
- The 2005 Strategic Transportation Plan is available at www.planning.ubc.ca.
- A review of the first 18 months of the student U-Pass program is available at www.trek.ubc.ca.
- The Campus Transit Plan is available at www.trek.ubc.ca.
- The results of the Community Transportation Pass (ComPASS) demonstration project are available at www.trek.ubc.ca.
- Information on other transportation facilities and services on campus is available from the [TREK Program Centre](#).
- Information regarding campus plans and neighbourhood plans is available from [Campus and Community Planning](#).

2. TRAVEL TO AND FROM UBC

This section of the Transportation Status Report describes travel patterns and trends for trips to and from UBC's Point Grey campus. Details regarding specific modes of transportation are presented in Section 3.

2.1. Person Trips

On average, there were 121,200 person trips to and from UBC on a typical weekday in Fall 2007. Table 2.1 provides a comparison of daily person trips in Fall 1997 and Fall 2007, and Figure 2.1 illustrates the yearly changes in travel patterns during this time period.

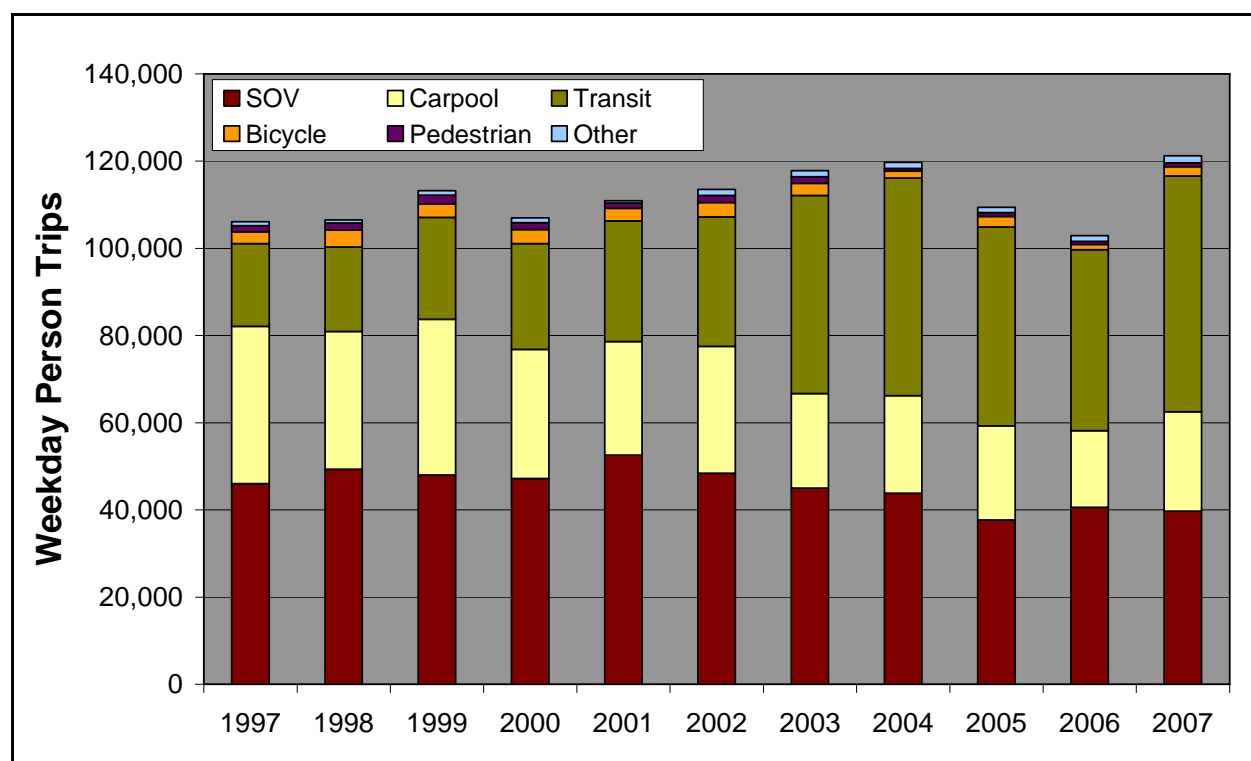
Table 2.1 – Weekday Person Trips Across UBC/UEL Screenline

	Person Trips			
	Fall 1997	Fall 2007	Change from 1997 to 2007	
Single occupant vehicle (SOV)	46,000	39,700	-6,300	-14%
Carpool and vanpool	36,100	22,800	-13,300	-37%
Transit	19,000	54,100	+35,100	+185%
Bicycle	2,700	2,100	-600	-22%
Pedestrian	1,400	900	-500	-36%
Truck and motorcycle	900	1,600	+700	+78%
Totals	106,100	121,200	+15,100	+14%

Highlights of the changes in travel patterns from 1997 to 2007 include:

- **Transit trips have almost tripled.** From Fall 1997 to Fall 2007, the number of daily transit trips to and from UBC increased 185%. In the first year of the U-Pass program (Fall 2003), transit ridership increased 53% from the previous year.
- **Single-occupant vehicle (SOV) trips have decreased.** Since 1997, the number of daily SOV trips decreased 14%, even with a 32% increase in the daytime population on campus. The total number of SOV trips in Fall 2007 is 6,300 trips per day less than in Fall 1997.
- **Carpool and vanpool trips have steadily decreased** since 1997. In Fall 2007, carpool and vanpool trips were 37% less than in Fall 1997. The 22,800 fewer carpool trips in Fall 2007 represent a reduction of 6,000 automobiles in the daily traffic volume.
- **Bicycle and pedestrians trips dropped significantly** in Fall 2004, and have remained at low levels since then. In Fall 2007, bicycle and pedestrian trips were 22% and 36% less than in Fall 1997, respectively.
- **Other trips have fluctuated** from year to year. These fluctuations and the overall increase in other trips as compared with 1997 levels is primarily due to fluctuations in numbers of motorcycle trips and light truck trips (trucks with two axles).

Figure 2.1 – Weekday Person Trips Across UBC/UEL Screenline

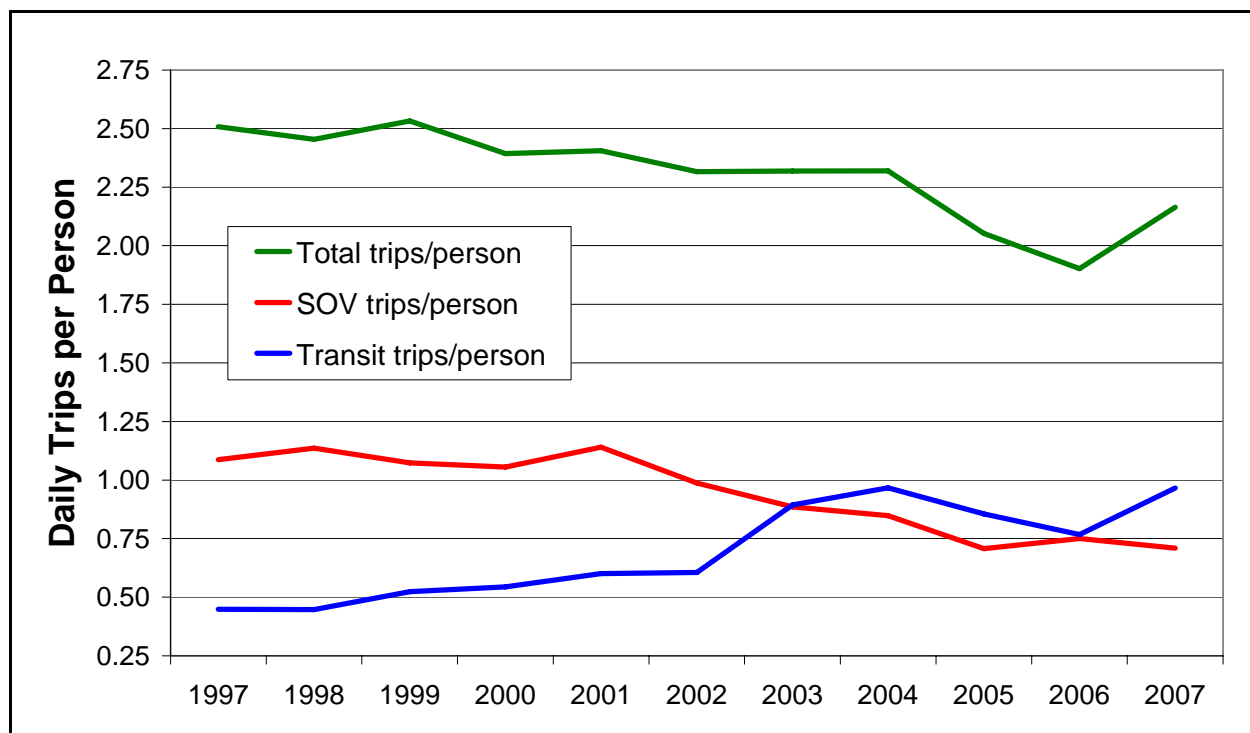


Comparing the numbers of daily person trips in 1997 and 2007 does not take into account the effects of population and enrollment growth at UBC. For this reason, it is important to examine travel patterns from year to year on a consistent basis where the effects of population and enrollment growth have been neutralized. This means comparing trips per person, where the number of daily person trips is divided by the daytime campus population of students, staff and faculty, as summarized in Table 2.2 and Figure 2.2.

Table 2.2 – Weekday Trips per Person Across UBC/UEL Screenline

	Trips per Person			
	Fall 1997	Fall 2007	Change from 1997 to 2007	
Single occupant vehicle (SOV)	1.09	0.71	-0.38	-35%
Carpool and vanpool	0.85	0.41	-0.44	-52%
Transit	0.45	0.96	+0.51	+115%
Bicycle	0.07	0.04	-0.03	-41%
Pedestrian	0.03	0.02	-0.01	-51%
Truck and motorcycle	0.02	0.03	+0.01	+34%
Totals	2.51	2.17	-0.34	-14%

Figure 2.2 – Weekday Trips per Person Across UBC/UEL Screenline



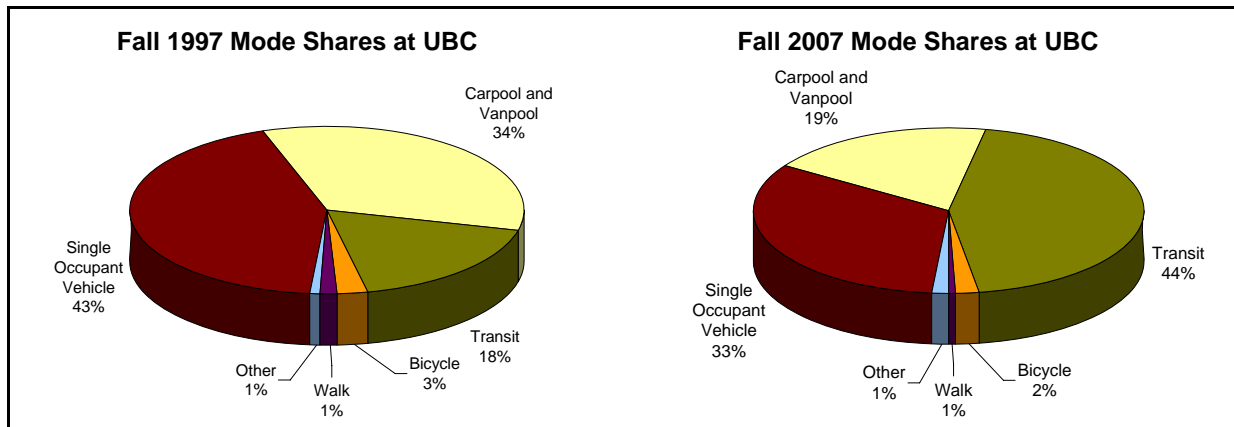
The average number of trips per person in Fall 2007 was 2.17 trips per day, which is a 14% decrease from Fall 1997. Possible reasons for the decrease in trips per person include:

- More people are living on campus. In recent years, UBC has constructed several hundred housing units occupied by staff, faculty and students. A recent survey of residents on campus indicates that 68% work and/or study at UBC.
- More services are available on campus, reducing the need for people to travel off campus for shopping and services.
- Distance education and Internet access to resources has reduced the need for some students and faculty to travel to campus each day.

2.2. Mode Shares

Figure 2.3 illustrates mode shares for Fall 1997 and Fall 2007. The significant change since 1997 has been the increase in the transit mode share — so much so that there are now more trips by transit to and from UBC than by any other mode.

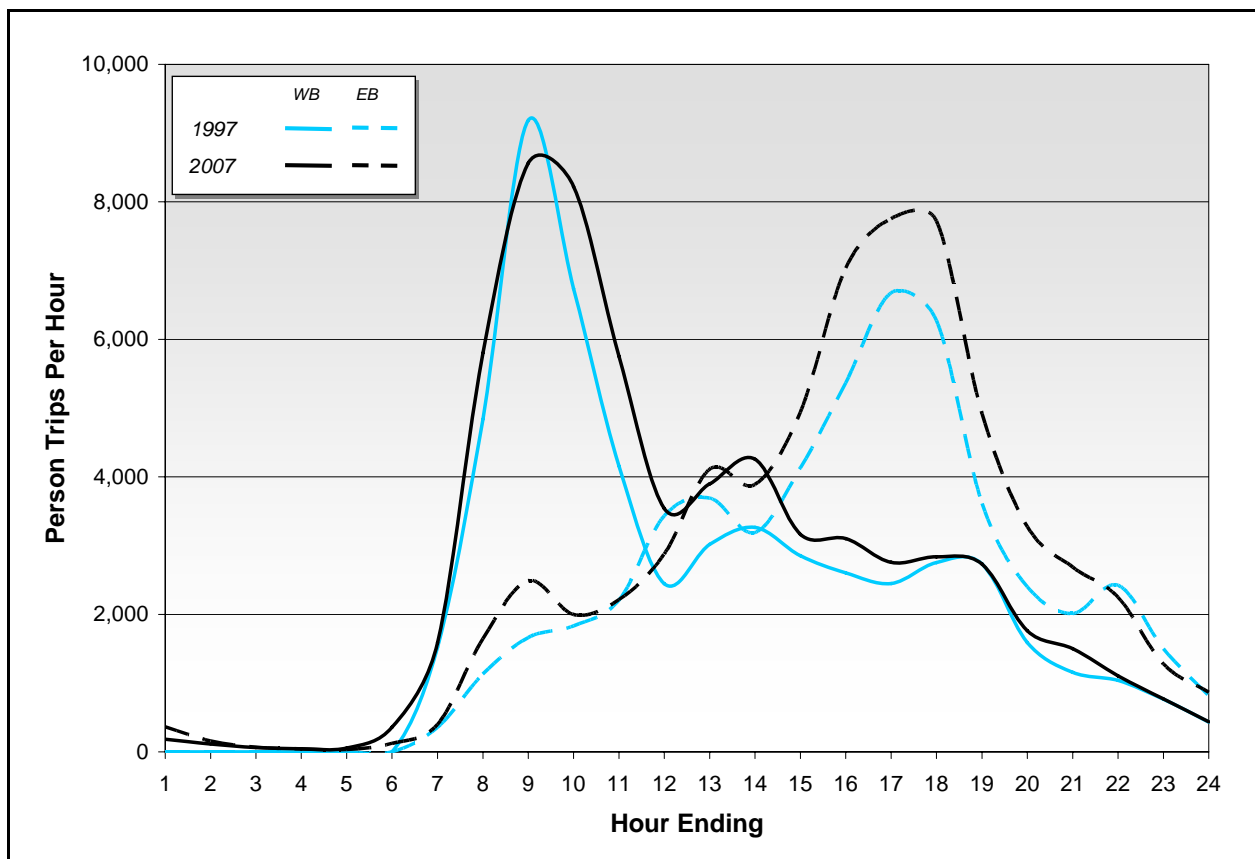
Figure 2.3 – Weekday Mode Shares Across UBC/UEL Screenline



2.3. Travel Patterns

Figure 2.4 illustrates the daily arrival and departure patterns for all person trips to and from UBC, by all modes, in Fall 1997 and Fall 2007.

Figure 2.4 – Weekday Person Trips Across UBC/UEL Screenline



2.4. Traffic

Automobile traffic to and from UBC has decreased substantially — from 62,400 automobiles per weekday in Fall 1997 to 50,100 automobiles per weekday in Fall 2007. This amounts to a 20% reduction in automobile traffic, during the same time that the daytime population on campus increased 32%. Table 2.3 provides a summary of daily traffic volumes.

Table 2.3 – Weekday Automobile Volumes Across UBC/UEL Screenline

	Fall 1997	Fall 2007	Change from 1997 to 2006	
SOV vehicles	46,000	39,700	-6,300	-14%
Carpool and vanpool vehicles	16,400	10,400	-6,000	-37%
Total automobiles (SOV + carpool/vanpool)	62,400	50,100	-12,300	-20%

Figure 2.5 illustrates the arrival and departure patterns of all vehicles travelling to and from UBC in a 24-hour period for both Fall 1997 and Fall 2007. Figure 2.5 indicates that the reduction in traffic volumes has occurred at all times of the day, including during both peak periods.

Figure 2.5 – Weekday Traffic Volumes Across UBC/UEL Screenline

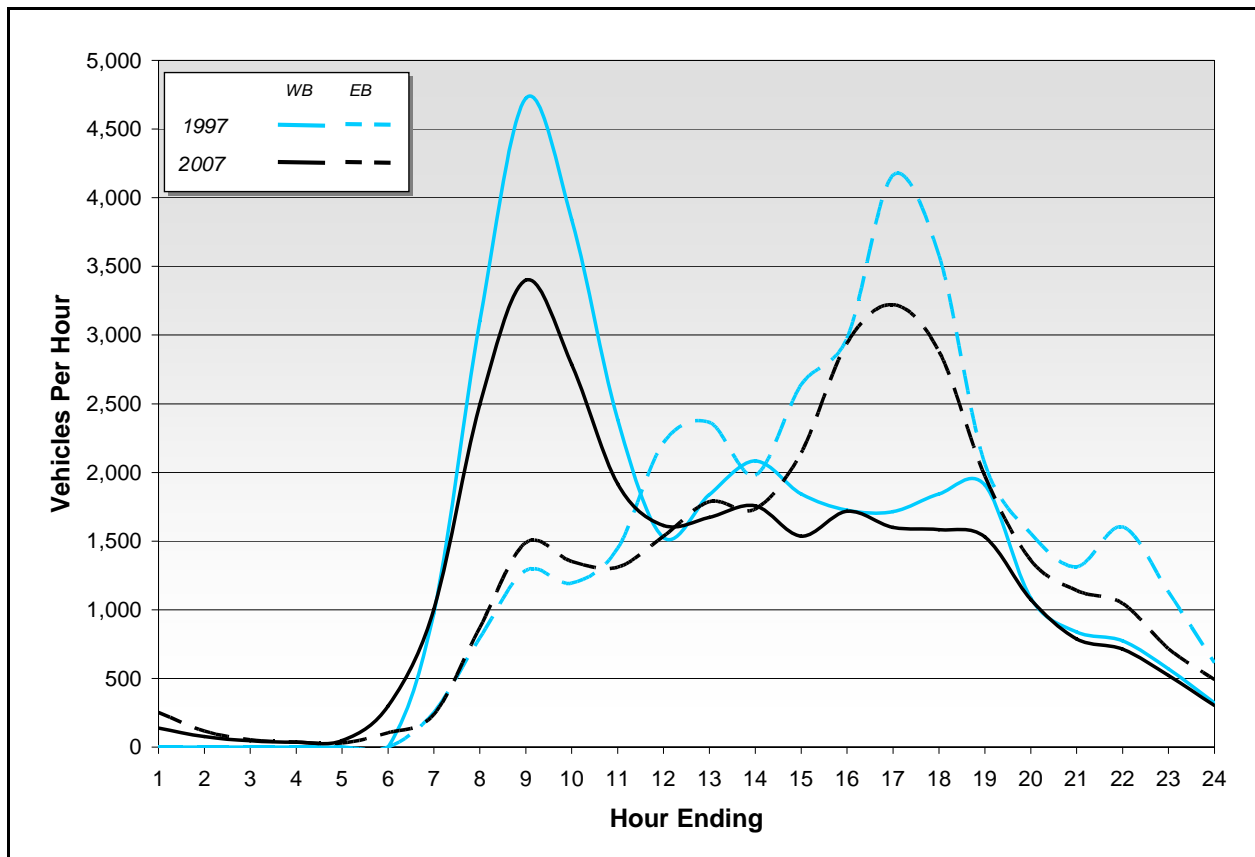
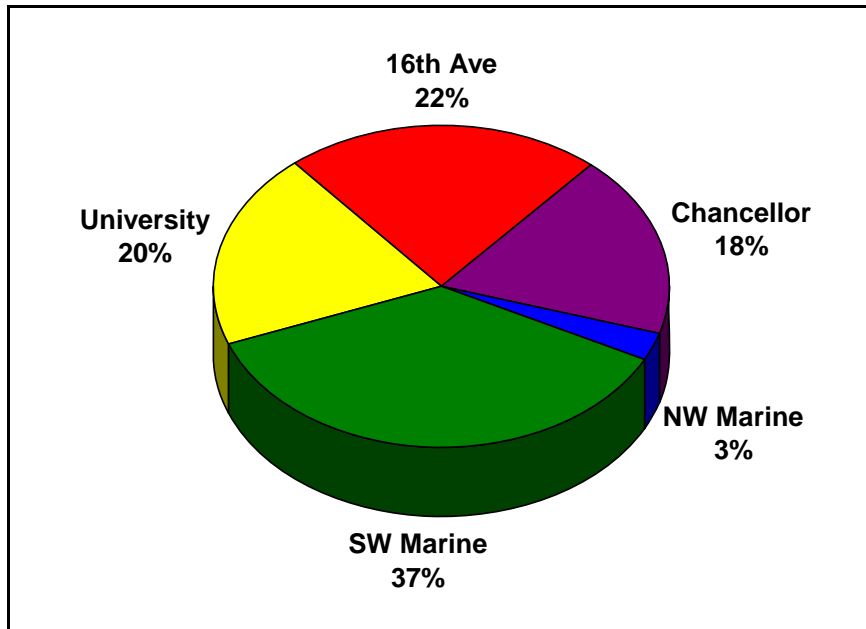


Table 2.4 and Figure 2.6 summarize daily traffic volumes crossing the UBC/UEL screenline (it is important to note that these figures include trucks, buses and motorcycles, in addition to automobiles). Overall, traffic volumes were 11% lower in Fall 2007 than in 1997. Traffic volumes decreased on all roads leading to UBC, at the UBC/UEL screenline, with the exception of 16th Avenue, where Fall 2007 traffic volumes are virtually unchanged from 1997 levels.

Table 2.4 – Distribution of Weekday Traffic Across UBC/UEL Screenline

	Motor Vehicles			
	Fall 1997	Fall 2007	Change from 1997 to 2007	
NW Marine Drive	2,040	1,640	-400	-20%
Chancellor Boulevard	11,660	10,550	-1,110	-10%
University Boulevard	14,610	11,360	-3,250	-22%
16 th Avenue	12,880	12,920	+40	no change
SW Marine Drive	23,410	21,030	-2,380	-10%
Totals	64,600	57,500	-7,100	-11%

Figure 2.6 – Distribution of Weekday Traffic Across UBC/UEL Screenline



2.5. Trip Generation

One of the reasons for the reductions in SOV trips and automobile traffic is that residents at UBC make fewer automobile trips than residents elsewhere in the region. The phrase “trip generation” refers to the average number of automobile trips per household. At UBC, trip generation rates are only 58% to 67% of “typical” trip generation rates for comparable developments elsewhere.

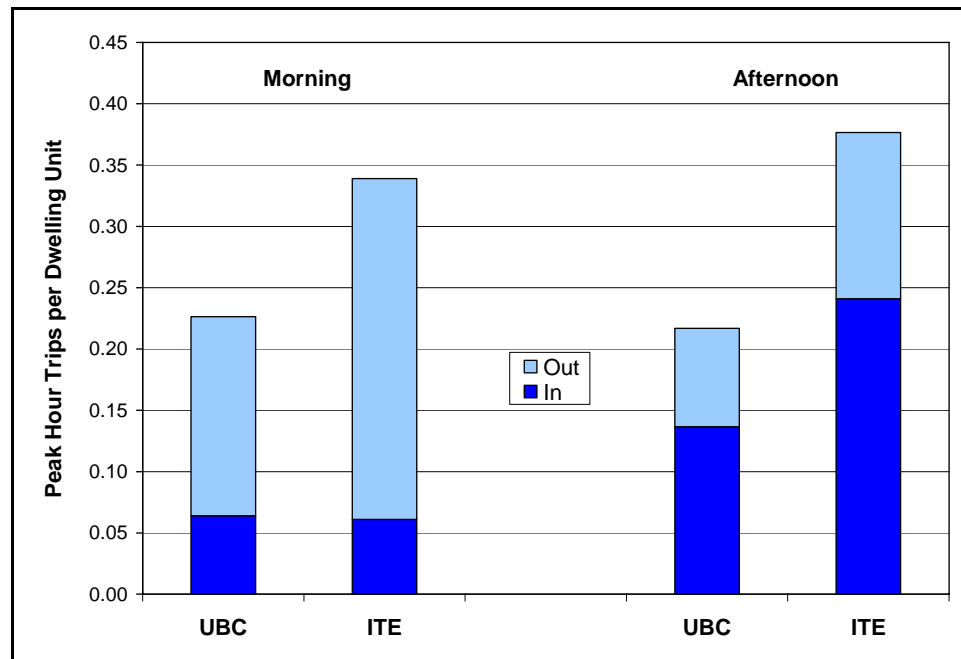
Trip generation rates for existing residential development at UBC were determined through studies undertaken in the Hampton Place, Hawthorn Place and Chancellor Place neighbourhoods on the UBC campus in October and November 2007. Observations were made of the numbers of automobiles entering and exiting the parkades of 18 residential buildings on campus — seven buildings in Hampton Place, seven in Hawthorn Place, and four in Chancellor Place. In total, these buildings represent 1,047 dwelling units. Trip generation rates were calculated for the morning and afternoon peak hours — the time periods when the greatest numbers of automobiles were observed. The resulting trip generation rates are summarized in Table 2.5 and Figure 2.7.

Table 2.5 — UBC and ITE Weekday Automobile Trip Generation Rates

		Motor Vehicle Trips/Dwelling Unit			Comparison to ITE
		In	Out	Total	
Morning Peak Hour	UBC	0.06	0.16	0.22	67%
	ITE	0.06	0.28	0.34	100%
Afternoon Peak Hour	UBC	0.14	0.8	0.22	58%
	ITE	0.24	0.14	0.38	100%

ITE trip generation rates are for “Residential Condominium/Townhouse” (code 230), weekday peak hour of generator

Figure 2.7 — UBC and ITE Weekday Automobile Trip Generation Rates



ITE trip generation rates are for “Residential Condominium/Townhouse” (code 230), weekday peak hour of generator

Trip generation rates for “typical” residential multi-family developments are represented by data published by the Institute of Transportation Engineers. These data are based on trip generation studies conducted in communities across North America, in the same manner as the trip generation studies conducted at UBC. As indicated in Table 2.5 and Figure 2.7, automobile trip generation rates at UBC are only 58% to 67% of “typical” trip generation rates for comparable

developments elsewhere. At UBC there are significantly fewer outbound trips in the morning and inbound trips in the afternoon, suggesting that the key difference is a substantially lower automobile mode share for work and school trips.

2.6. Vehicle Occupancy

Vehicle occupancy is a measure of the average number of people travelling per vehicle during a certain period of time. It is calculated by dividing the total number of person trips by the total number of vehicles during a specified time period.

The average 24-hour automobile occupancy for Fall 2007 was 1.25 persons per vehicle. As indicated in Table 2.6, average automobile occupancies have decreased since 1997, reflecting a reduced proportion of carpool trips (due to the shift of many trips from carpools to transit). The average occupancy for carpools and vanpools in Fall 2007 was 2.18 persons per vehicle, which has also decreased slightly since 1997, reflecting a reduced proportion of carpools with three persons.

Table 2.6 – Average 24-Hour Automobile Occupancies Across UBC/UEL Screenline

	Fall 1997	Fall 2007	Change from 1997 to 2007	
Automobiles (<i>SOVs + HOVs</i>)	1.32	1.25	-0.07	-5%
HOVs (<i>Carpools + Vanpools</i>)	2.20	2.18	-0.02	-1%

3. TRENDS BY MODE

This section of the Transportation Status Report summarizes key trends and other factors affecting travel by each major mode —transit, automobiles, bicycles, pedestrians and heavy trucks.

3.1. Transit

Transit ridership at UBC has increased considerably. Since 1997, ridership has increased 185% — almost tripling — to a total of 54,100 weekday transit trips to and from UBC. This increase has been the result of the student U-Pass program, significant improvements in transit service levels (including new routes to UBC and extended hours of service), and a reduced supply of commuter parking and higher prices for parking on campus.

Table 3.1 provides a summary of the increase in transit trips and the transit mode share from Fall 1997 to Fall 2007. Transit now accounts for more trips to and from UBC than any other mode of travel. The transit mode share has increased from 18% in 1997 to 45% in Fall 2007.

Table 3.1 – Transit Trips Across UBC/UEL Screenline

Weekday Transit Trips	Before U-Pass		After U-Pass		Change from 1997 to 2007	
	Fall 1997	Fall 2002	Fall 2003	Fall 2007		
Person trips	19,000	29,700	45,400	54,100	+35,100	+185%
Trips per person	0.45	0.61	0.91	0.97	+0.52	+115%
Transit mode share	18%	26%	39%	45%	+27	+149%

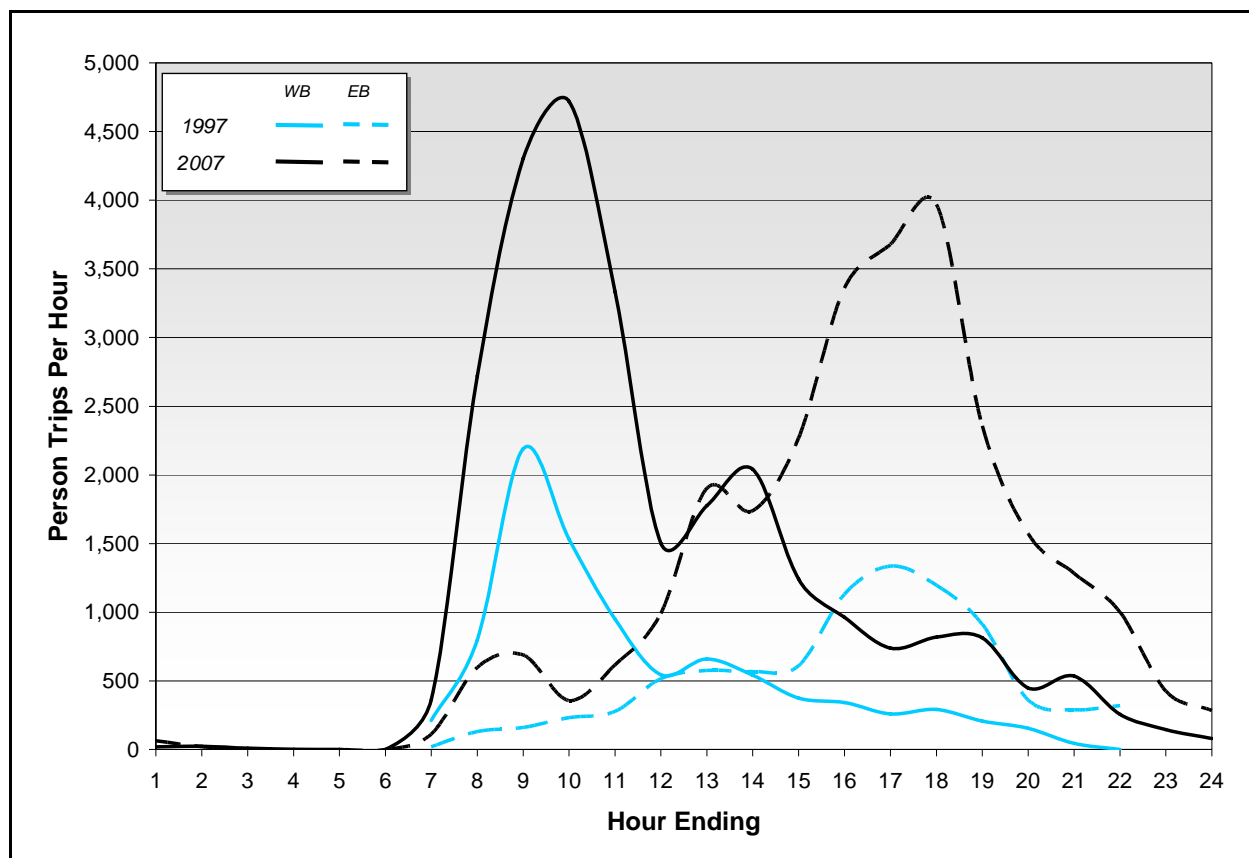
Table 3.2 provides a summary of transit trips by route and by time period. A significant change from previous years is that the Route 99 B-Line's share of all transit trips has decreased from 45% in Fall 2005 to 37% in Fall 2007, with the difference being that trips have shifted to the new Route 84 limited-stop service between UBC and the VCC-Clark SkyTrain station, as well as the Route 44 limited-stop service between UBC and downtown Vancouver.

Figure 3.1 illustrates the arrival and departure patterns of transit trips to and from UBC throughout the day, including a comparison with Fall 1997 transit trips. Not only does this illustrate the significant increase in transit ridership since 1997, but it also illustrates the spreading of peak period ridership over a longer time period — particularly morning peak period ridership to UBC. This spreading of the peak is partly the result of the changes to class start times implemented in September 2001. Analysis of the effects of the change in class start times in Fall 2001 showed that the desired spreading of morning peak demands was achieved, and that as a result, 12% more transit trips per day were accommodated on the same number of buses.

Table 3.2 – Weekday Transit Trips Across UBC/UEL Screenline

Route		AM Peak	Midda y	PM Peak	Evenin g	Night	Totals	
		0600 to 0900	0900 to 1500	1500 to 1800	1800 to 2400	2400 to 0400		
4	4 th Avenue	200	820	450	640	0	2,110	3.9%
9	Broadway	300	320	370	160	10	1,160	2.1%
17	Broadway	470	1,450	780	1,110	100	3,910	7.2%
25	King Edward	1,420	2,020	1,250	860	0	5,550	10.2%
41	41 st Avenue	720	3,380	1,070	890	0	6,060	11.2%
43	41 st Avenue limited stop	500	260	750	140	0	1,650	3.0%
44	4 th Avenue limited stop	680	1,430	1,290	20	0	3,420	6.3%
49	49 th Avenue	520	1,050	890	250	0	2,710	5.0%
84	4 th Avenue limited stop	490	1,840	960	200	0	3,490	6.4%
99	Broadway B-Line	2,720	8,210	4,670	4,230	30	19,860	36.7%
258	North Shore express	140	50	90	0	0	280	0.5%
480	Richmond express	620	1,660	960	700	0	3,940	7.3%
Totals		8,780 16.2%	22,490 41.5%	13,530 25.0%	9,200 17.0%	140 0.3%	54,140	100%

Figure 3.1 – Transit Trip Patterns Across UBC/UEL Screenline



3.2. Automobiles

The Strategic Transportation Plan identifies a long-term policy to reduce daily single occupant vehicle (SOV) trips per person by 30% from 1997 levels. In Fall 2007, there was an average of 0.71 SOV trips per person. This represents a 35% decrease from the Fall 1997 level of 1.09 SOV trips per person, which exceeds the STP policy of at least a 30% decrease.

Table 3.3 provides a comparison of SOV travel in Fall 1997 and Fall 2007, and Figure 3.2 provides a summary of the year-by-year changes. The total 39,700 daily SOV trips in Fall 2007 represents a 14% reduction from the Fall 1997 number of 46,000 daily SOV trips.

Table 3.3 – SOV Trips Across UBC/UEL Screenline

Weekday SOV Trips	Weekday SOV Trips		Change from 1997 to 2007	
	Fall 1997	Fall 2007	Change	Percentage
Person trips	46,000	39,700	-6,300	-14%
Trips per person	1.09	0.71	-0.38	-35%

SOV mode share	43%	33%	-10	-24%
----------------	-----	-----	-----	------

Figure 3.2 – SOV Trips Across UBC/UEL Screenline

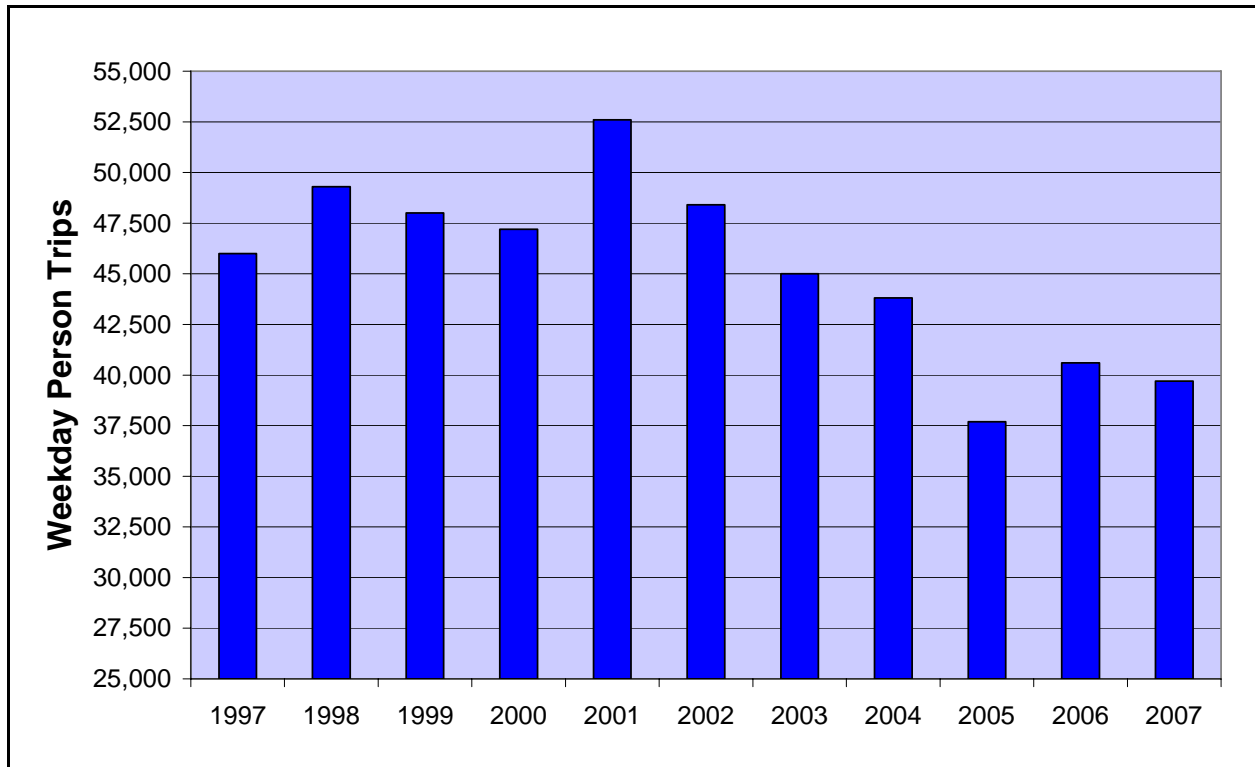
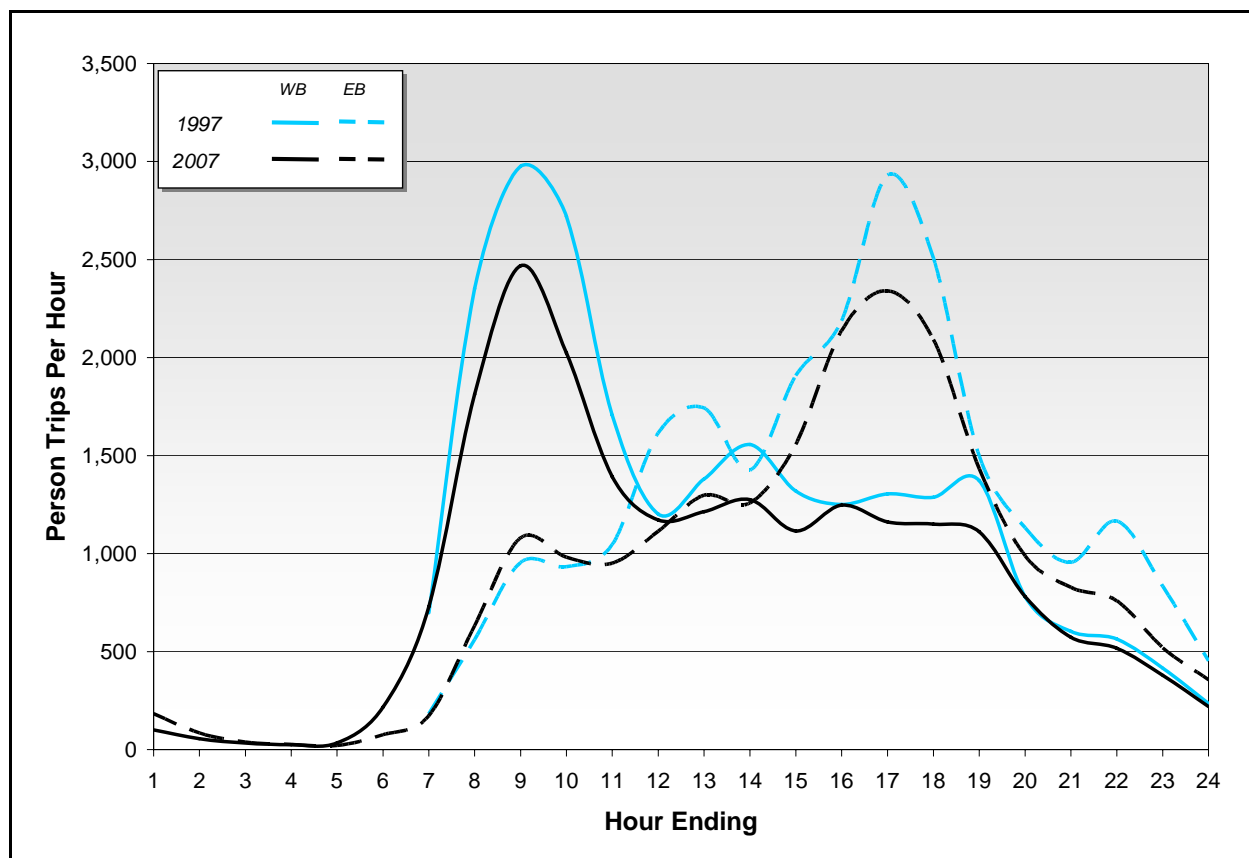


Figure 3.3 illustrates the arrival and departure patterns of SOV trips to and from UBC throughout the day, including a comparison with Fall 1997 SOV trips. The significant change is a decrease in peak period, peak direction SOV trips — trips to UBC in the morning peak period, and trips from UBC in the afternoon peak period.

Figure 3.3 – SOV Trip Patterns Across UBC/UEL Screenline



Carpooling has decreased steadily since 1997. Daily carpool and vanpool trips declined from 36,100 in Fall 1997 to 22,800 in Fall 2007, and the carpool and vanpool mode share declined from 34% to 19% during the same time. Table 3.4 provides a summary of the trend in carpool and vanpool travel from Fall 1997 to Fall 2007, and Figure 3.4 provides a summary of the year-by-year changes.

Figure 3.5 illustrates the proportions of 2-person, 3-person and 4-or-more-person carpools and vanpools in 1997 and 2007. Since 1997, the proportion of carpools with 3 persons has decreased, with a corresponding increase in 2-person carpools. This has resulted in a slight reduction in the average carpool/vanpool vehicle occupancy from 2.20 persons per vehicle in Fall 1997 to 2.18 persons per vehicle in Fall 2007.

Table 3.4 – Carpool and Vanpool Trips Across UBC/UEL Screenline

Weekday Carpool/Vanpool Trips	Fall 1997	Fall 2007	Change from 1997 to 2007	
Person trips	36,100	22,800	-13,300	-37%
Trips per person	0.85	0.41	-0.44	-52%

Capool/vanpool mode share	34%	19%	-15	-45%
---------------------------	-----	-----	-----	------

Figure 3.4 – Carpool and Vanpool Trips Across UBC/UEL Screenline

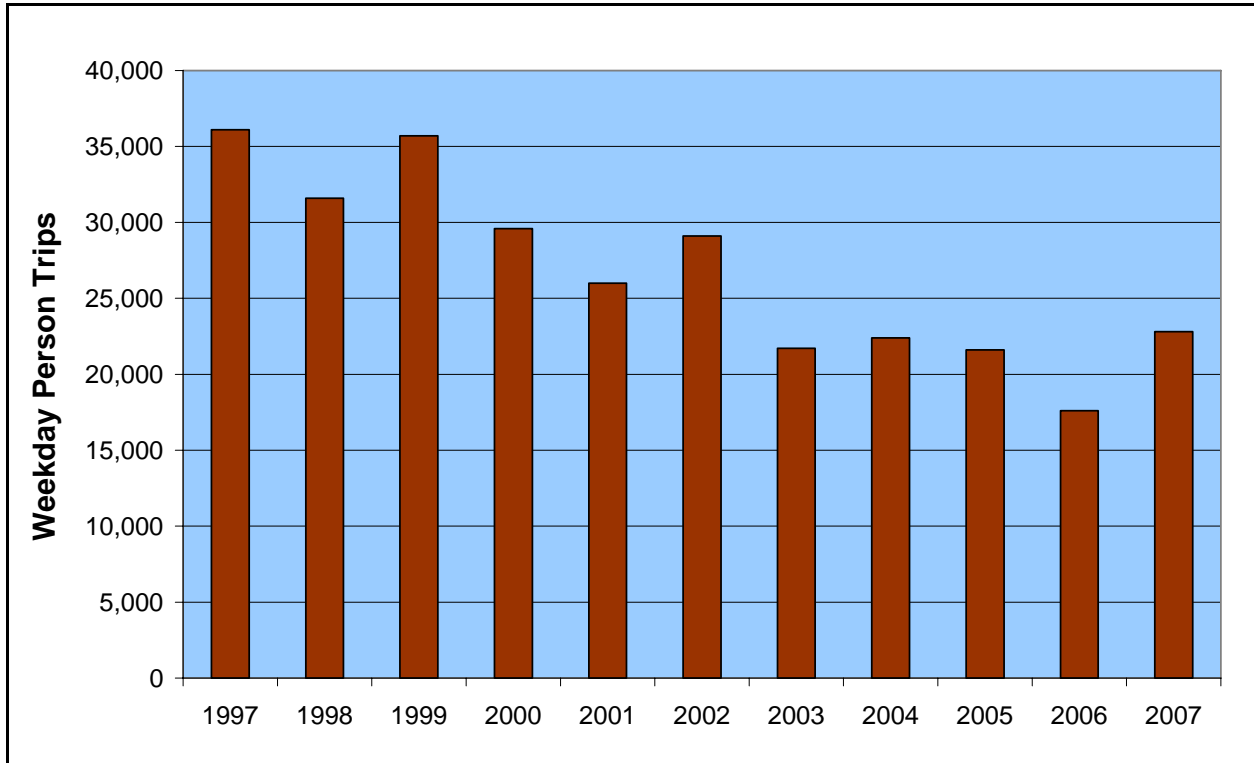


Figure 3.5 – Average Weekday Carpools and Vanpools

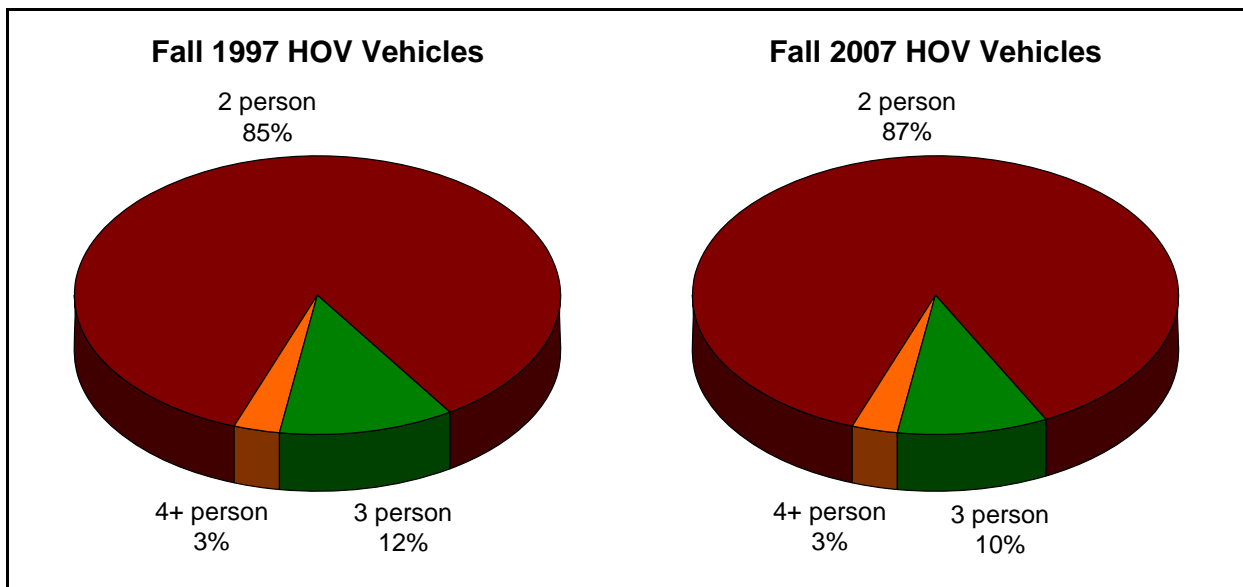


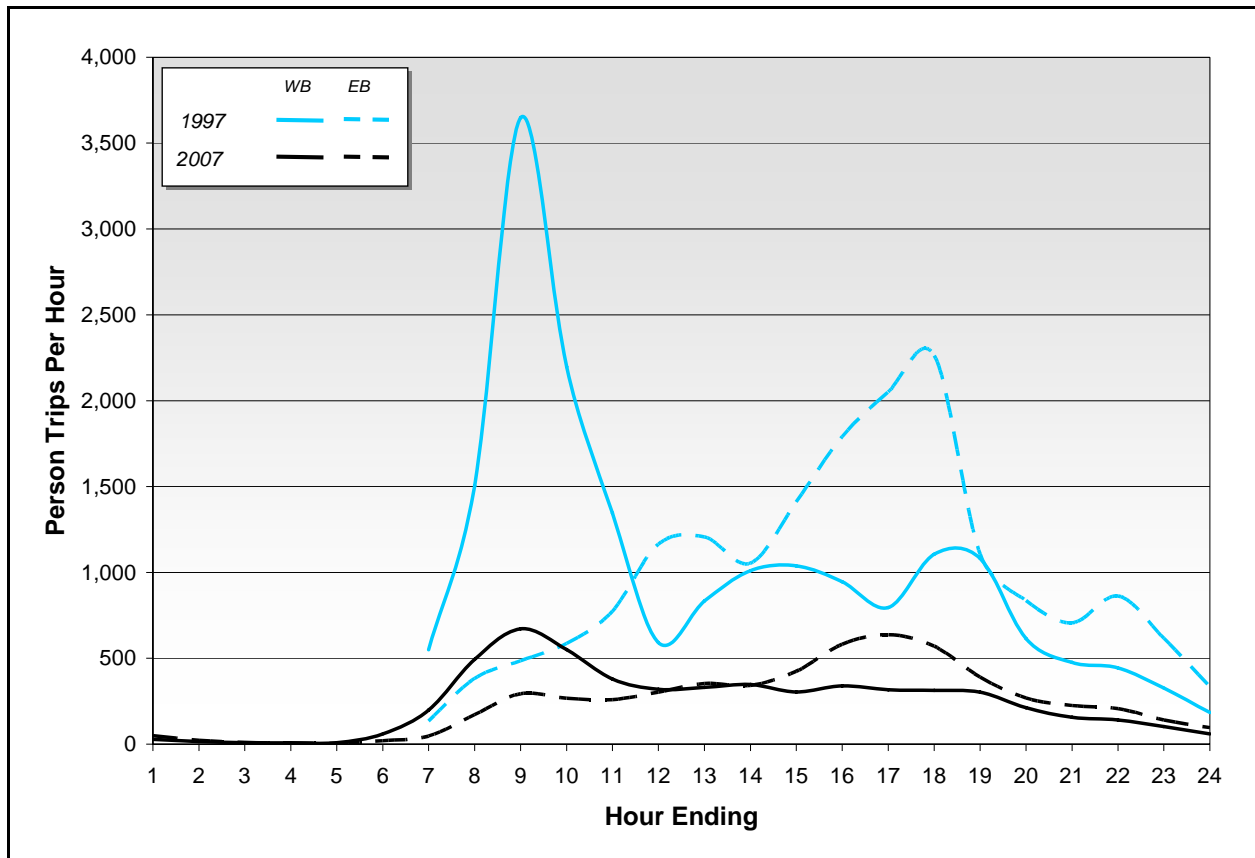
Figure 3.6 illustrates the arrival and departure patterns of carpool and vanpool trips to and from UBC throughout the day, including a comparison with Fall 1997 carpool and vanpool trips. As with SOV trips, the significant change with carpool and vanpool trips is a decrease in peak period, peak direction trips — trips to UBC in the morning peak period, and trips from UBC in the afternoon peak period.

In response to declining carpool trips, UBC conducted a series of focus groups in 2002 with students, staff and faculty. The input from focus group participants clearly indicated that for current and former carpools, transit is a preferred mode of travel. Reasons why carpooling is not considered an attractive or practical mode of transportation for many people at UBC include:

- Variable work and school schedules that are inconsistent with a fixed carpool schedule.
- Errands and commitments before and after work that are not compatible with carpool trips.
- Unexpected work demands and emergencies that would mean missing a scheduled carpool trip.
- The additional time involved in picking up or dropping of carpool partners adds significantly to commute times.
- Having to wait at work or school until the scheduled departure time, rather than being able to leave when ready to leave.

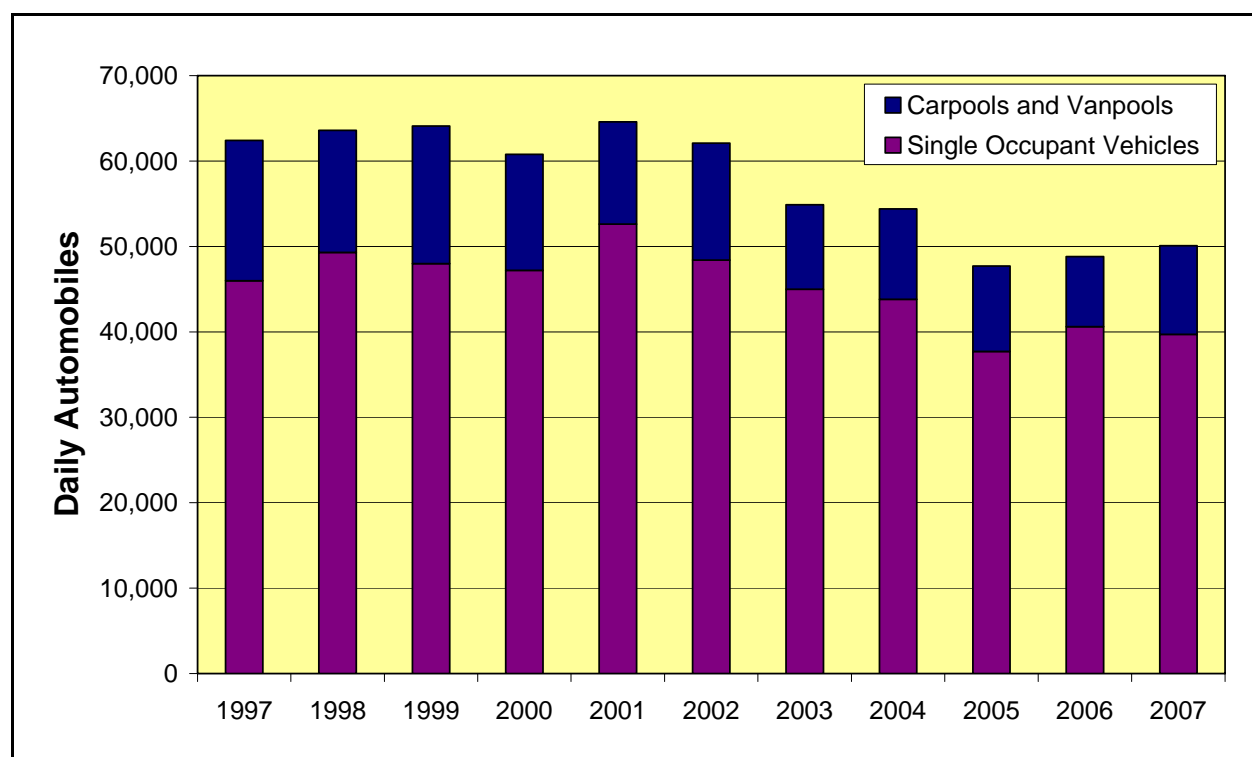
The Strategic Transportation Plan also includes a target for overall automobile traffic. This target indicates that daily automobile traffic will not exceed 1997 levels of 62,400 automobiles per day. Automobiles include all private vehicles — single occupant vehicles plus carpools and vanpools. Automobiles do not include buses, motorcycles and trucks.

Figure 3.6 – Carpool/Vanpool Trip Patterns Across UBC/UEL Screenline



In Fall 2007, daily automobile traffic was 50,100 automobiles per day — 12,300 less than the 1997 level of 62,400 automobiles per day. Figure 3.7 provides a summary of the trend in daily automobile traffic volumes from 1997 to 2007.

Figure 3.7 – Weekday Automobile Volumes Across UBC/UEL Screenline



3.3. Bicycles

Prior to Fall 2004, cycling trips to and from UBC ranged from 2,700 to 3,900 trips per day. In Fall 2004, cycling trips dropped to 1,600 trips per day. In Fall 2007, cycling trips increased slightly to 2,100 trips per day. The student U-Pass program is the most-likely reason for the decrease in bicycle trips (it should be noted that the decrease did not occur immediately after the U-Pass was implemented, but rather occurred a year later in 2004). Table 3.5 provides a summary of the trend in bicycle trips from Fall 1997 to Fall 2007.

Table 3.5 – Bicycle Trips Across UBC/UEL Screenline

Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change from 1997 to 2007	
	Fall 1997	Fall 2002	Fall 2004	Fall 2007		
Person trips	2,700	2,900	1,600	2,100	-600	-22%
Trips per person	0.07	0.06	0.03	-0.04	-0.03	-41%
Bicycle mode share	2.5%	2.6%	1.3%	1.7%	-0.8	-32%

All diesel buses operating on transit routes serving UBC are equipped with bicycle racks which can hold up to two bicycles, as are new trolley buses. Some older trolley buses remain in operation as of Fall 2007, however, which means that on the three trolley routes (Routes 4, 9 and 17), some buses are not equipped with bicycle racks. Table 3.6 provides a summary of the numbers of bicycles on racks on buses. A total of 244 bicycles were observed in one day, representing an average of 0.15 bicycles per rack or one bicycle for every seven buses. The most popular route for cyclists to travel with their bicycles was the Route 99 B-Line.

Table 3.6 – Weekday Bicycles on Buses Across UBC/UEL Screenline

	Route												Totals
	4	9	17	25	41	43	44	49	84	99	258	480	
Bicycles	1	12	10	28	13	3	7	7	13	138	0	12	244
Buses with racks	62	89	185	177	235	42	70	100	143	401	11	87	1,602
Avg. bikes/rack	0.02	0.13	0.05	0.16	0.06	0.07	0.10	0.07	0.09	0.34	0.00	0.14	0.15
<i>Note: Routes 4, 9 and 17 are trolley routes, and in Fall 2007 some trolley buses on routes serving UBC were not equipped with bicycle racks.</i>													

3.4. Pedestrians

Walking trips to and from UBC have decreased since the student U-Pass program was introduced in Fall 2003, in a similar manner as bicycle trips. Prior to the student U-Pass program, walking trips to and from UBC ranged from 1,400 to 2,000 trips per day. By Fall 2007, walking cycling trips had decreased to 900 trips per day (as with bicycle trips, this decrease did not occur immediately following U-Pass implementation, but rather a year later in 2004). Table 3.7 provides a summary of the trend in pedestrian trips from Fall 1997 to Fall 2007.

Table 3.7 – Pedestrian Trips Across UBC/UEL Screenline

Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change from 1997 to 2007	
	Fall 1997	Fall 2002	Fall 2004	Fall 2007		
Person trips	1,400	1,600	600	900	-500	-36%
Trips per person	0.03	0.03	0.01	0.02	-0.01	-51%
Pedestrian mode share	1.3%	1.4%	0.5%	0.7%	-0.6	-44%

3.5. Heavy Trucks

Construction activity at UBC and the day-to-day operations of the university generate truck traffic. The City of Vancouver — through which all trucks must travel to reach UBC — manages heavy truck traffic through a number of bylaws and regulations. “Heavy trucks” are

defined by the City as vehicles with a gross vehicle weight (GVW) of more than 4,500 kg, and three or more axles. Trucks with three axles have GVW's of as much as 25,000 kg, and trucks with more than three axles have GVW's of as much as 75,000 kg. All trucks with three or more axles exceed the 4,500 kg specified in the City of Vancouver's bylaws, which means that the GVW limit is redundant. Consequently, for the purposes of monitoring travel patterns to and from UBC, the definition of a heavy truck is simplified as "vehicles with three or more axles." This simpler definition makes it easier to monitor heavy truck traffic, as it is only necessary to count the number of axles on a truck to determine whether it is a "heavy truck."

Key Strategic Transportation Plan policies regarding heavy truck traffic include:

- A target of a maximum annual average of 300 heavy truck trips/day, calculated as an annual average based on a six-day week (reflecting the Monday–Saturday construction schedule).
- A target of no more than 50% of annual construction truck trips via any one truck route.

Counts of heavy truck traffic were undertaken on a quarterly basis during 2007, in February, June, September and December. Table 3.8 provides a summary of the average numbers of trucks observed in these counts. An average of 480 heavy truck trips were observed crossing the UBC/UEL screenline in 2007.

Table 3.8 – 2007 Average Heavy Truck Trips Across UBC/UEL Screenline

Route	Type of Truck			Totals
	Dump Truck	Cement Truck	Other Construction	
Chancellor Blvd.	7	3	10	31
University Blvd.	5	0	5	21
16 th Ave.	33	4	5	52
41 st Ave.	8	0	2	21
SW Marine Dr.	209	39	32	325
Totals	262	46	55	450

The City of Vancouver conducted a count of heavy trucks on SW Marine Drive at the same time as UBC's December quarterly count was undertaken. A total of 340 heavy trucks were recorded by the City between 6 a.m. and 9 p.m. on December 12, compared with 339 recorded in UBC's count on the same day. It is important to note that these figures include non-UBC trucks travelling via UBC whereas the figures in Table 3.8 exclude non-UBC trucks.

A significant issue which emerged during 2007 is that some of the heavy trucks crossing the UBC/UEL screenline are not travelling to or from UBC — they are travelling to or from destinations in the UEL or the City of Vancouver. Travelling through UBC is the shortest route for these trucks. The problem is that it is difficult to identify non-UBC trucks, and consequently some non-UBC trucks are counted as UBC trucks. Each truck that travels through UBC to and

from a destination in the UEL or Vancouver is counted as four heavy truck trips, unless the truck can be identified as a non-UBC truck.

Results from the September count illustrate the magnitude of the issue — of the 377 heavy trucks observed crossing the UBC/UEL screenline, at least 54 were non-UBC trucks. Unfortunately, this issue was not recognized in time to implement additional data collection measures to help identify non-UBC trucks, especially for the February and June counts. What this means is that despite efforts to exclude non-UBC trucks, the 450 truck trips tabulated in Table 3.8 include some non-UBC trucks.

Four truck routes in the City of Vancouver serve UBC — 4th Avenue, 10th Avenue, 41st Avenue and Southwest Marine Drive. Proportions of construction truck trips by truck route in Fall 2007 were:

- 77% via SW Marine Drive
- 3% via 41st Avenue
- 3% via University Boulevard/10th Avenue
- 6% via Chancellor Boulevard/4th Avenue
- 11% via 16th Avenue, which is not a truck route within the City of Vancouver. As noted above, some of the trucks using 16th Avenue are non-UBC trucks travelling to and from destinations in Vancouver.