

UNIVERSITY OF BRITISH COLUMBIA



Fall 2009 Transportation Status Report

25 February 2010

Fall 2009 Transportation Status Report

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1. INTRODUCTION

For more than 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 2009 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 were a transit hub centrally-located on University Boulevard, retention of existing regional bus routes on campus, and phased implementation of a campus-wide community shuttle service. With the cancellation of the below-grade transit station which was a key outcome of the Campus Transit Plan, UBC has begun work to develop a new campus transit plan in 2010.

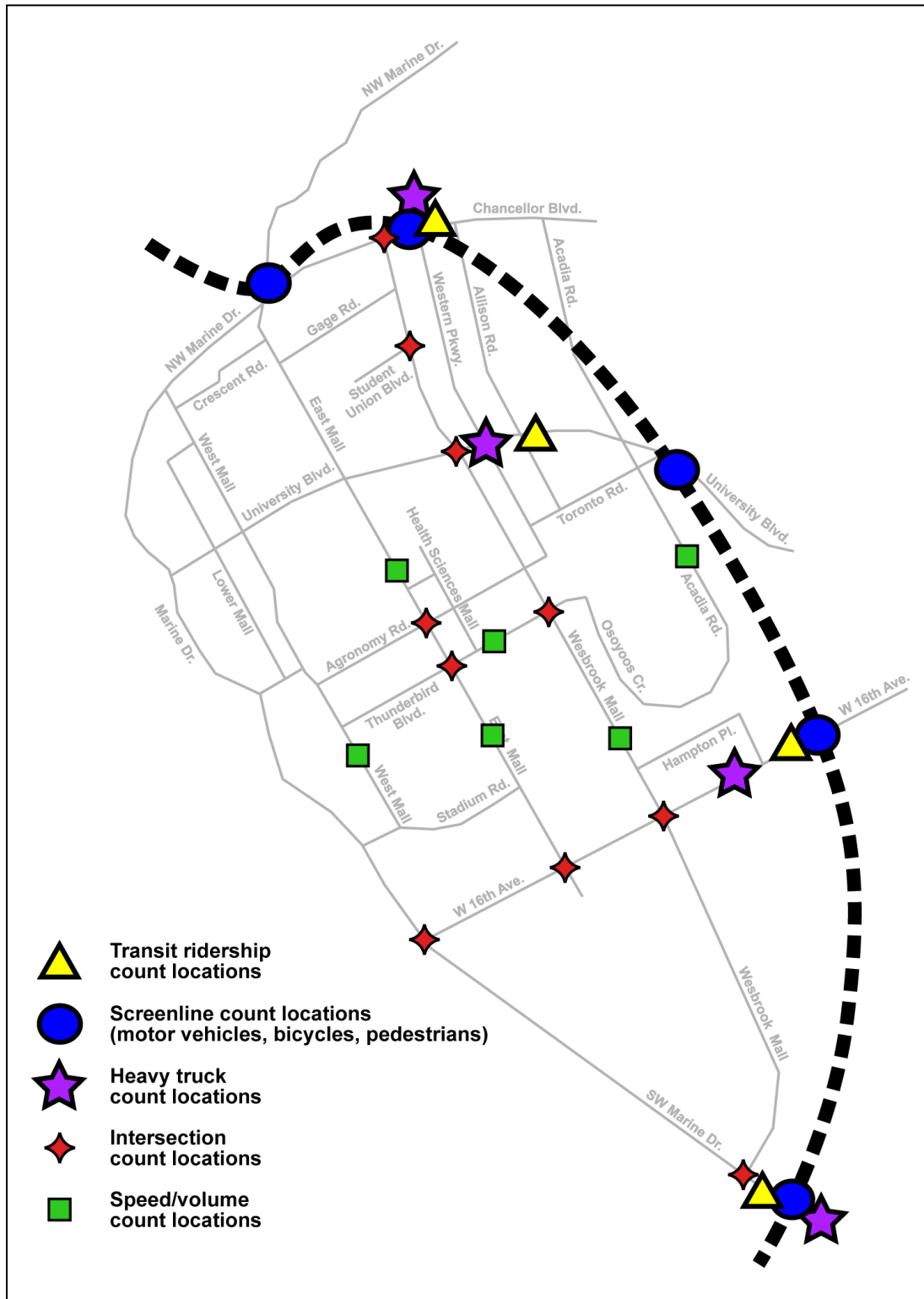
1.2. Annual Monitoring Program

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 per day
Campus traffic/speed counts	Roads throughout campus	Automatic counters (tubes) on road for 7 days, 24 hours per day
Intersection counts	Intersections throughout campus	Manual observation for 8 hours (7:00 AM to 10:00 AM, 11:00 AM to 1:00 PM, 3:00 PM to 6:00 PM) for one day
Vehicle occupancy and classification	Screenline	Manual observation for 8 hours (7:00 AM to 10:00 AM, 11:00 AM to 1:00 PM, 3:00 PM to 6:00 PM) for one day
Transit ridership	Screenline	Manual observation for 22.5 hours (6:00 AM to 4:30 AM) for one day
Bicycles and pedestrians	Screenline	Manual observation for 15 hours (7:00 AM to 10:00 PM) for one day
Heavy trucks	Screenline	Manual observation for 15 hours (6:00 AM to 9:00 PM) for one day each quarter

Figure 1.1 – Data Collection Locations, Fall 2009



The information presented in the Fall 2009 Transportation Status Report is based primarily on data collected through the annual transportation monitoring program from 1997 through 2009. 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 40% in the 12 years since 1997. This includes increased student enrolment, 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 2009.

Table 1.2 – Daytime Population at UBC, 2009 vs. 1997

	Fall 1997	Fall 2009	Increase	
Students	33,200	46,850	+13,650	41%
Staff	7,250	9,650	+2,400	33%
Faculty	1,850	2,750	+900	50%
Totals	42,300	59,250	+15,350	40%

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 \$23.75 per month. The U-Pass offers students unlimited access to TransLink Bus, SkyTrain and SeaBus services (all zones), discounted West Coast Express fares, and discounts at participating merchants. 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 33 on 16th Avenue, Route 43 on 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 at 8:30 a.m., and others 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 almost tripled from \$2.00 in 1997 to \$5.50 in 2009, and prices for parking permits and other parking on campus have also increased. In addition, UBC has worked with other agencies 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, East 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.

Throughout 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 enrolment 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 if they were included.
- **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 during the morning peak. Midday and 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 2009 Transportation Status Report is available at www.planning.ubc.ca, along with several recent Transportation Status Reports.
- The 2005 Strategic Transportation Plan, the 2003 Campus Transit Plan and other transportation plans and reports are also available on the [Campus and Community Planning website](#).
- A review of the first 18 months of the student U-Pass program and 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 124,300 person trips to and from UBC on a typical weekday in Fall 2009. Table 2.1 provides a comparison of daily person trips in Fall 1997 and Fall 2009, and Figure 2.1 illustrates the yearly changes in travel patterns during this time period.

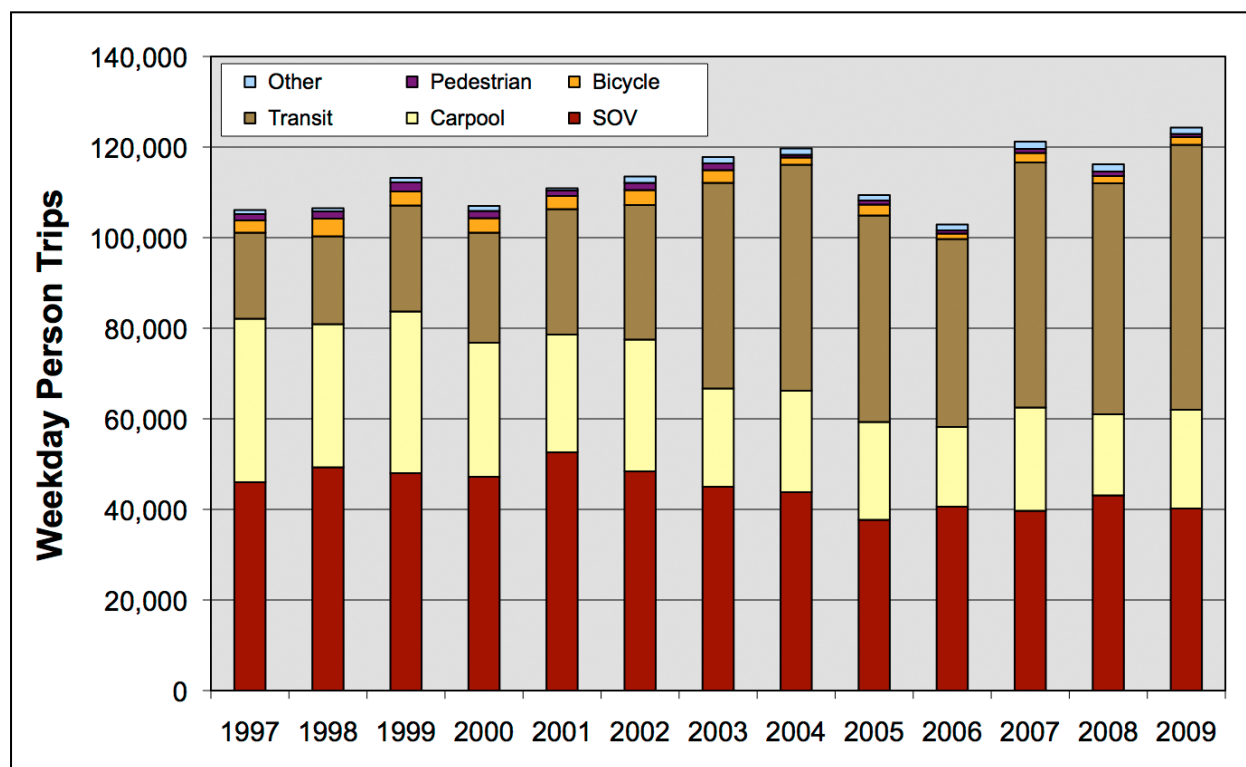
Table 2.1 – Weekday Person Trips Across UBC/UEL Screenline, 2009 vs. 1997

	Person Trips			
	Fall 1997	Fall 2009	Change from 1997 to 2009	
Single occupant vehicle (SOV)	46,000	40,200	-5,800	-13%
Carpool and vanpool	36,100	21,800	-14,300	-40%
Transit	19,000	58,500	+39,500	+208%
Bicycle	2,700	1,700	-1,000	-37%
Pedestrian	1,400	700	-700	-50%
Truck and motorcycle	900	1,400	+500	+56%
Totals	106,100	124,300	+18,200	+17%

Highlights of the changes in travel patterns from 1997 to 2009 include:

- **Transit trips have tripled**, increasing from 19,000 trips per weekday in Fall 1997 to 58,500 in Fall 2009. More trips are made to UBC by transit than by any other mode.
- **Single-occupant vehicle (SOV) trips have decreased.** Since 1997, the number of daily SOV trips decreased 13%, despite a 40% increase in the daytime population on campus. The total number of SOV trips in Fall 2009 is 5,800 trips per day less than in Fall 1997.
- **Carpool and vanpool trips have steadily decreased** since 1997. In Fall 2009, carpool and vanpool trips were 40% less than the number in Fall 1997. The 14,300 fewer carpool trips in Fall 2009 represent a reduction of 6,200 automobiles in the daily traffic volume.
- **Bicycle and pedestrians trips dropped significantly** after the student U-Pass was implemented. In Fall 2009, bicycle and pedestrian trips were 37% and 50% less than in Fall 1997, respectively.

Figure 2.1 – Weekday Person Trips Across UBC/UEL Screenline, 1997–2009



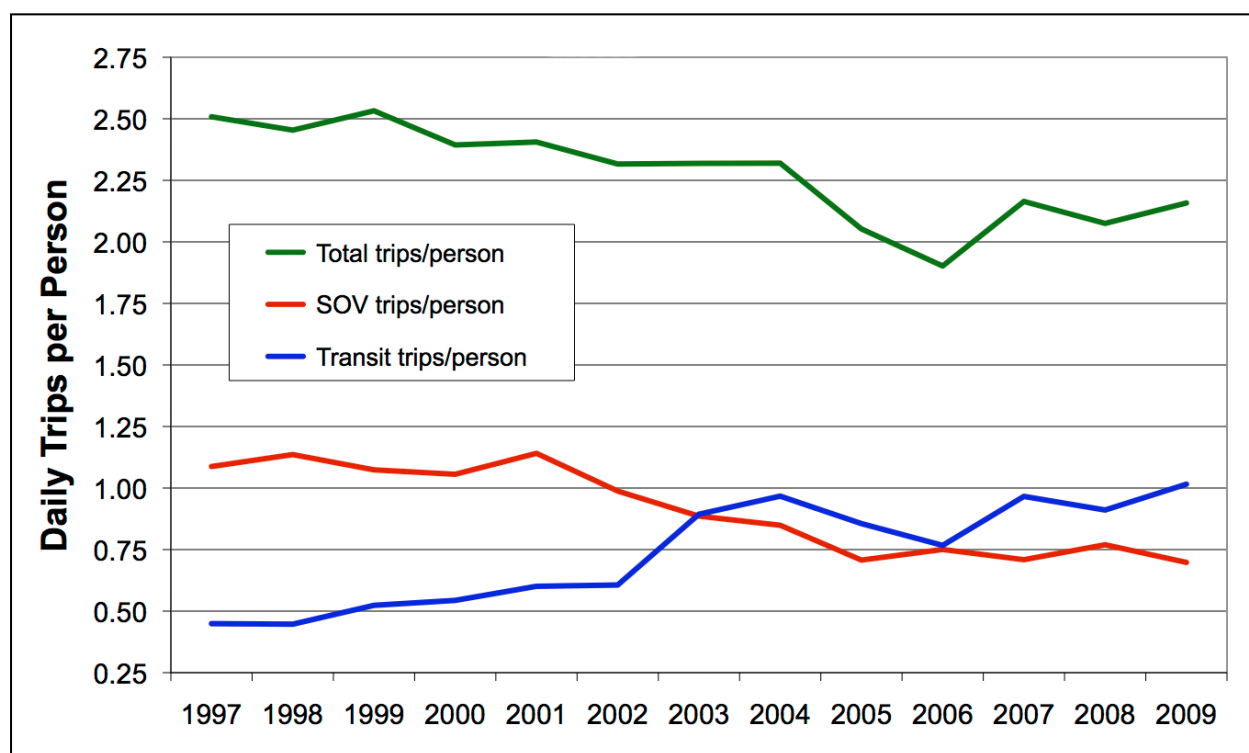
- **Other trips have fluctuated** from year to year. These fluctuations and the overall increase in other trips as compared with 1997 levels is primarily due to fluctuations in numbers of motorcycle trips and light truck trips (trucks with two axles).

Comparing the numbers of daily person trips in 1997 and 2009 does not take into account the effects of population and enrolment 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 enrolment 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, 2009 vs. 1997

	Trips per Person			
	Fall 1997	Fall 2009	Change from 1997 to 2009	
Single occupant vehicle (SOV)	1.09	0.70	-0.39	-31%
Carpool and vanpool	0.85	0.38	-0.47	-64%
Transit	0.45	1.02	+0.57	+126%
Bicycle	0.07	0.03	-0.03	-57%
Pedestrian	0.03	0.01	-0.02	-48%
Truck and motorcycle	0.02	0.02	-	+31%
Totals	2.51	2.16	-0.35	-14%

Figure 2.2 – Weekday Trips per Person Across UBC/UEL Screenline 1997–2009



The average number of trips per person in Fall 2009 was 2.16 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 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 1997 and 2009. 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, 2009 vs. 1997

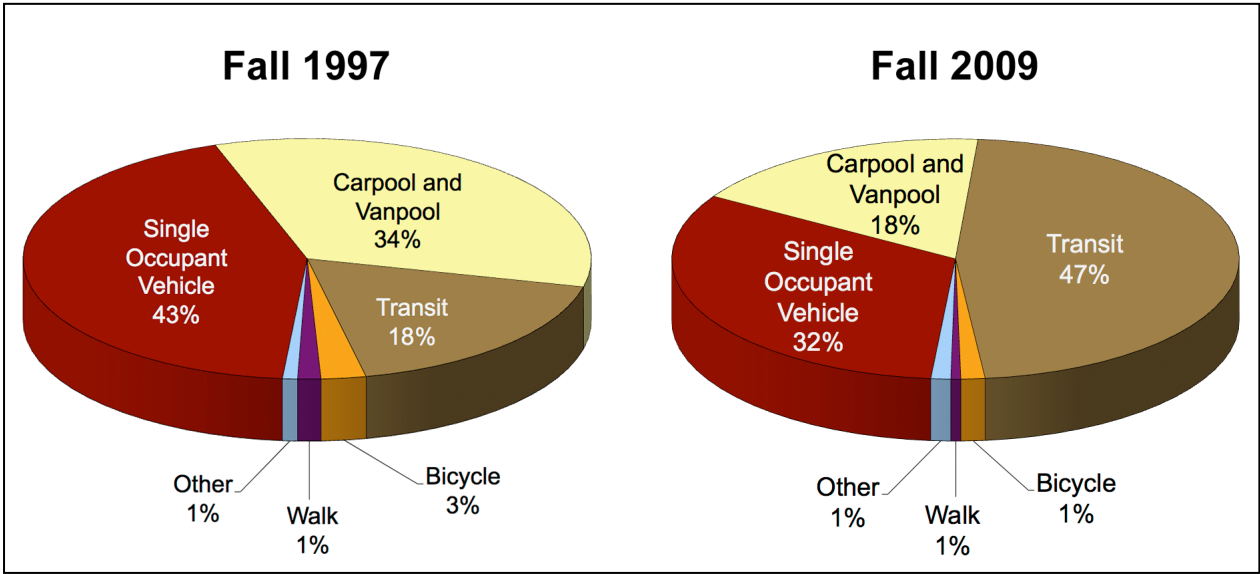
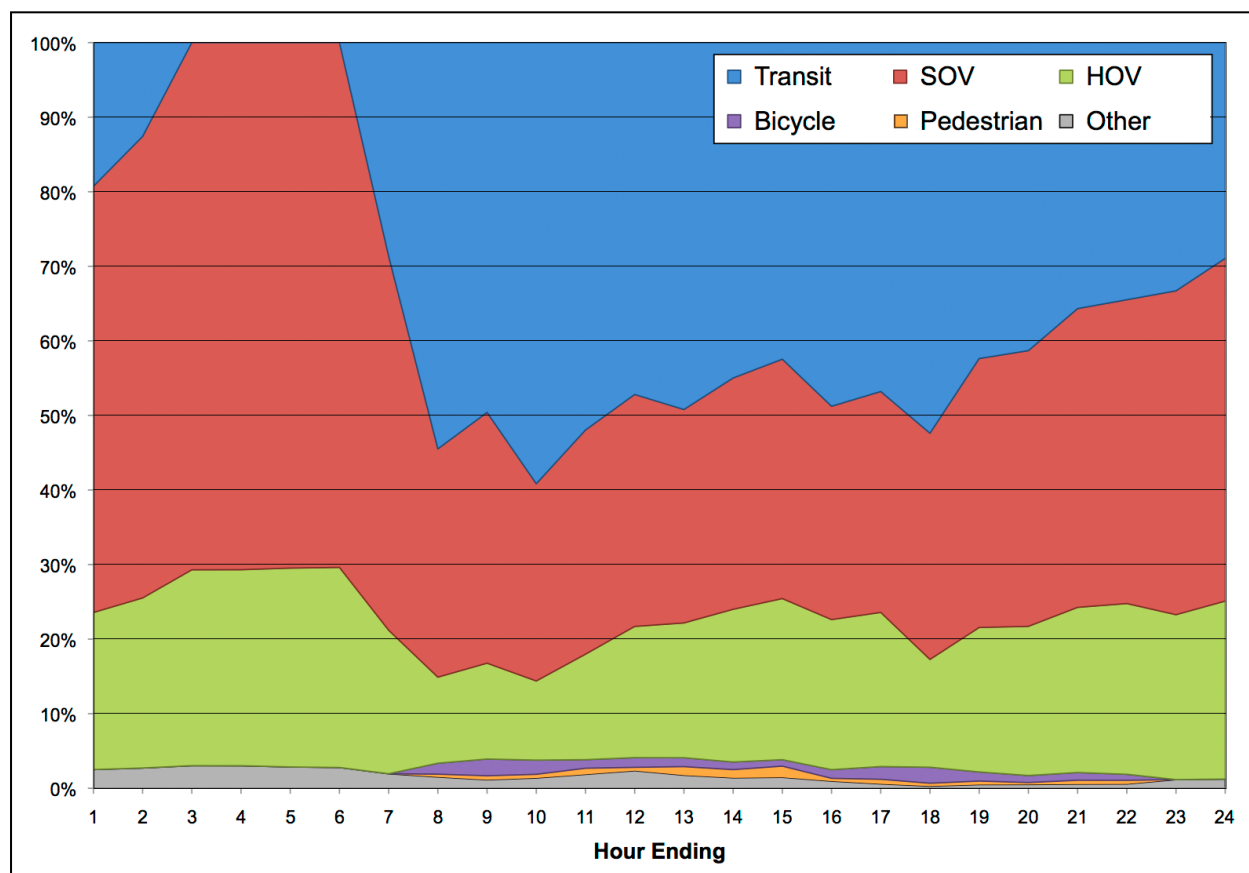


Figure 2.4 illustrates mode shares throughout the day. The transit mode share is highest during the morning peak period from 7:00 to 11:00 a.m., when 50% or more of all trips to and from UBC are by transit. As expected, the single-occupant vehicle and carpool mode shares are highest during the early morning hours when there is little or no transit service.

Figure 2.4 – Weekday Mode Shares Across UBC/UEL Screenline, 2009



2.3. Travel Patterns

Figure 2.5 illustrates the daily arrival and departure patterns for all person trips to and from UBC, by all modes, in Fall 1997 and Fall 2009. Table 2.3 provides a summary of peak hour person trips by mode. Significant observations include:

- The morning peak hour in 2009 is one hour later than it was in 1997.
- Despite a 40% increase in the daytime campus population since 1997, the number of trips in the morning peak hour has not increased significantly. Instead, the morning peak period has spread over a longer period of time, due in part to the change to class start times introduced in 2001.
- The number of trips in the afternoon peak hour has increased significantly since 1997, and is now almost as many as in the morning peak hour.

Figure 2.5 – Weekday Person Trips Across UBC/UEL Screenline, 2009 vs. 1997

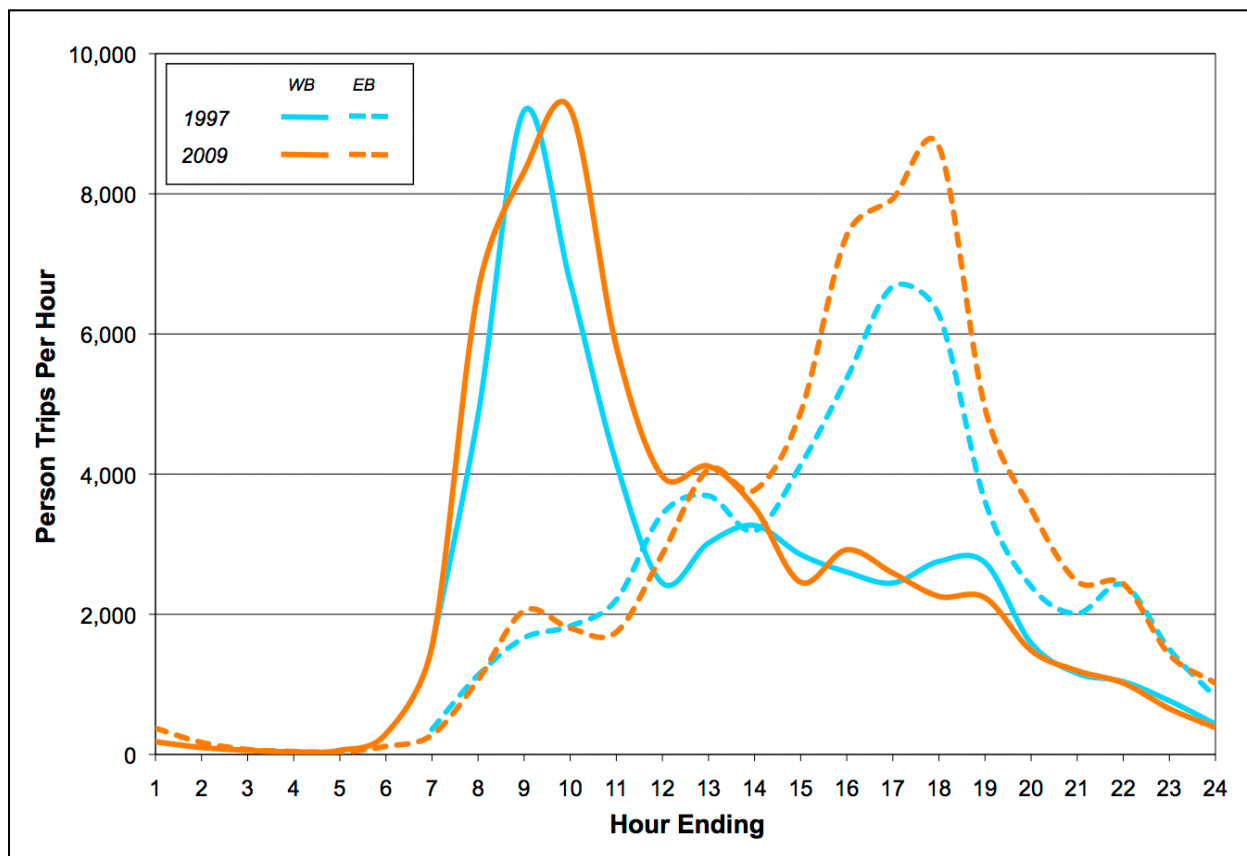


Table 2.3 – Weekday Peak Hour Person Trips Across UBC/UEL Screenline, 2009

	AM Peak Hour 8:30–9:30		PM Peak Hour 4:30–5:30	
	WB	EB	WB	EB
Single occupant vehicle (SOV)	2,160	1,040	1,250	1,970
Carpool and vanpool	770	480	360	1,510
Transit	6,960	170	750	5,270
Bicycle	200	20	30	180
Pedestrian	30	30	20	30
Truck and motorcycle	70	60	10	40
Totals	10,190	1,800	2,420	9,000

2.4. Traffic

Automobile traffic to and from UBC has decreased substantially — from 62,400 automobiles per weekday in Fall 1997 to 50,400 automobiles per weekday in Fall 2009. This amounts to an 19% reduction in automobile traffic, during the same time that the daytime population on campus increased 40%. Table 2.4 provides a summary of daily traffic volumes.

Figure 2.6 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 2009. Figure 2.6 indicates that the reduction in traffic volumes has occurred at all times of the day, including during both peak periods.

Table 2.4 – Weekday Automobile Volumes Across UBC/UEL Screenline, 2009 vs. 1997

	Fall 1997	Fall 2009	Change from 1997 to 2009	
SOV vehicles	46,000	40,200	-5,800	-13%
Carpool and vanpool vehicles	16,400	10,200	-6,200	-38%
Total automobiles (SOV + carpool/vanpool)	62,400	50,400	-12,000	-19%

Table 2.5 and Figure 2.7 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 17% lower in Fall 2009 than in 1997. Traffic volumes have decreased on all roads leading to UBC (at the UBC/UEL screenline).

Table 2.5 – Distribution of Weekday Traffic Across UBC/UEL Screenline, 2009 vs. 1997

	Motor Vehicles			
	Fall 1997	Fall 2009	Change from 1997 to 2009	
NW Marine Drive	2,040	1,250	-790	-39%
Chancellor Boulevard	11,660	9,990	-1,670	-14%
University Boulevard	14,610	12,800	-1,810	-12%
16 th Avenue	12,880	12,070	-810	-6%
SW Marine Drive	23,410	17,840	-5,570	-24%
Totals	64,600	53,900	-10,700	-17%

Figure 2.6 – Weekday Traffic Volumes Across UBC/UEL Screenline, 2009 vs. 1997

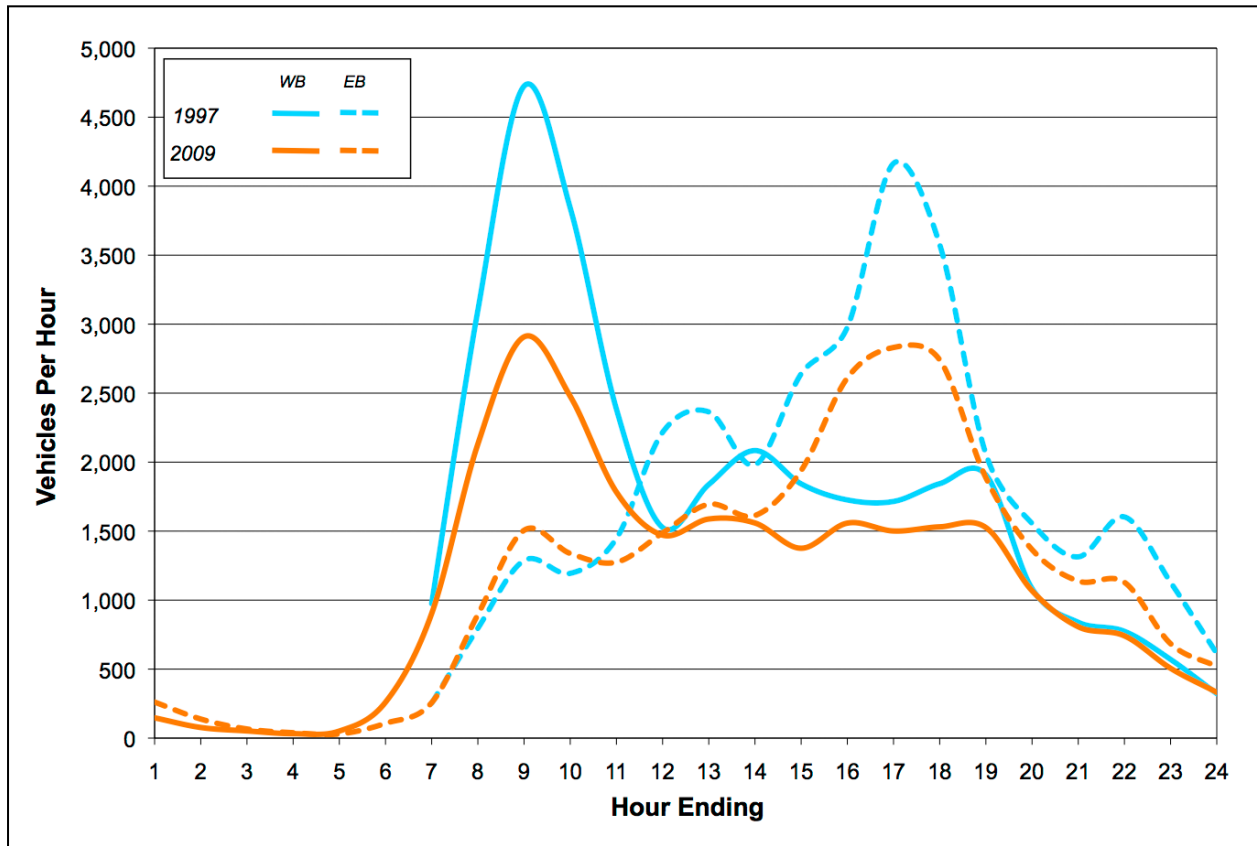
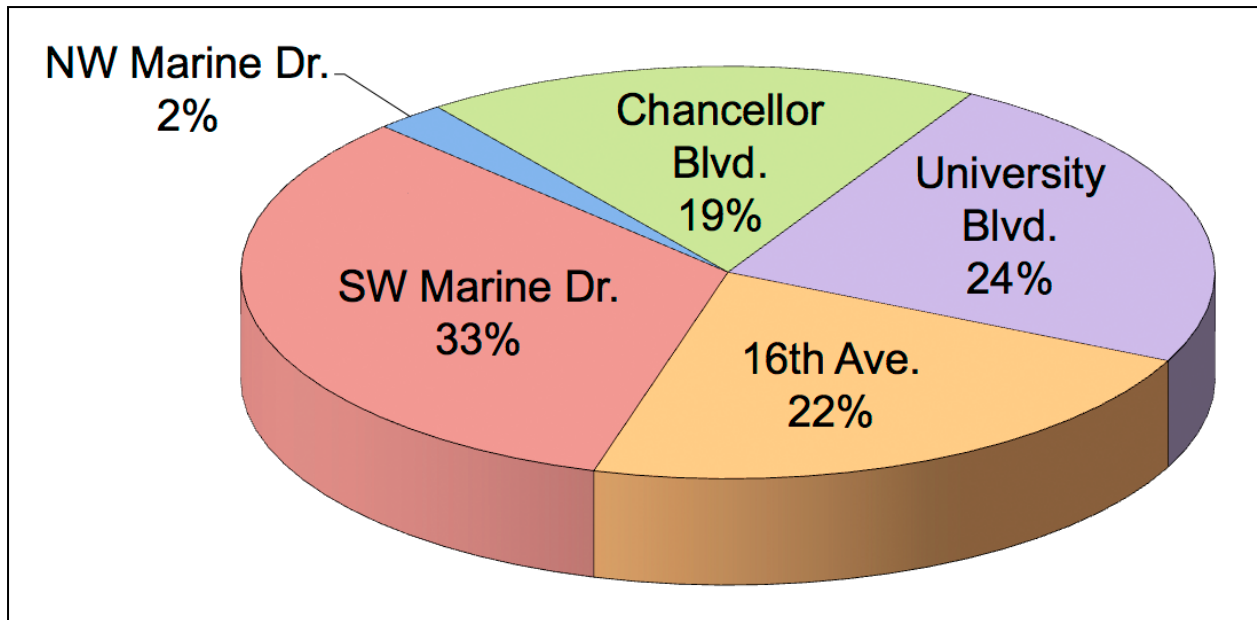


Figure 2.7 – Distribution of Weekday Traffic Across UBC/UEL Screenline, Fall 2009



2.5. 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 automobile occupancy in Fall 2009 was 1.23 persons per vehicle. As indicated in Table 2.6, average automobile occupancies have decreased since 1997, reflecting a reduced proportion of carpool trips as a result of the shift of many trips to transit. The average occupancy for carpools and vanpools in Fall 2009 was 2.13 persons per vehicle, which has also decreased since 1997, reflecting a reduced proportion of carpools with three and more persons.

Table 2.6 – 24-Hour Automobile Occupancies Across UBC/UEL Screenline, 2009 vs. 1997

	Fall 1997	Fall 2009	Change from 1997 to 2009	
Automobiles (<i>SOVs + HOVs</i>)	1.32	1.23	-0.09	-7%
HOVs (<i>Carpools + Vanpools</i>)	2.20	2.13	-0.07	-3%

Table 2.7 provides a summary of average automobile occupancies from 7:00 a.m. to 6:00 p.m. Automobile occupancies are lowest in the morning, and are significantly higher for eastbound trips. A likely reason for this is that some persons who travelled to UBC in the morning via transit left campus in carpools, as transit ridership figures indicate 1,600 fewer eastbound transit trips per day from UBC than westbound trips to UBC.

Table 2.7 – Hourly Automobile Occupancies Across UBC/UEL Screenline, Fall 2009

Hour Beginning	Westbound	Eastbound	Both Directions
7:00 a.m.	1.19	1.12	1.17
8:00 a.m.	1.16	1.20	1.17
9:00 a.m.	1.15	1.23	1.17
11:00 a.m.	1.24	1.22	1.23
12:00 p.m.	1.23	1.27	1.25
3:00 p.m.	1.26	1.31	1.29
4:00 p.m.	1.18	1.34	1.29
5:00 p.m.	1.09	1.26	1.20
8-Hour Average	1.18	1.27	1.22

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 208% to a total of 58,500 weekday transit trips to and from UBC. The transit mode share increased from 18% in 1997 to 47% in Fall 2009, and transit now accounts for more trips to and from UBC than any other mode of travel.

This ridership 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 2009, highlighting the change from 2002 to 2003 when the student U-Pass was introduced. Figure 3.1 illustrates the changes in transit ridership from year to year.

Table 3.1 – Transit Trips Across UBC/UEL Screenline, 1997–2009

Weekday Transit Trips	Before U-Pass		After U-Pass		Change from 1997 to 2009	
	Fall 1997	Fall 2002	Fall 2003	Fall 2009		
Person trips	19,000	29,700	45,400	58,500	+39,500	+208%
Trips per person	0.45	0.61	0.91	1.02	+0.57	+126%
Transit mode share	18%	26%	39%	47%	+29 PP	+163%

Figure 3.1 – Transit Trips Across UBC/UEL Screenline, 1997–2009

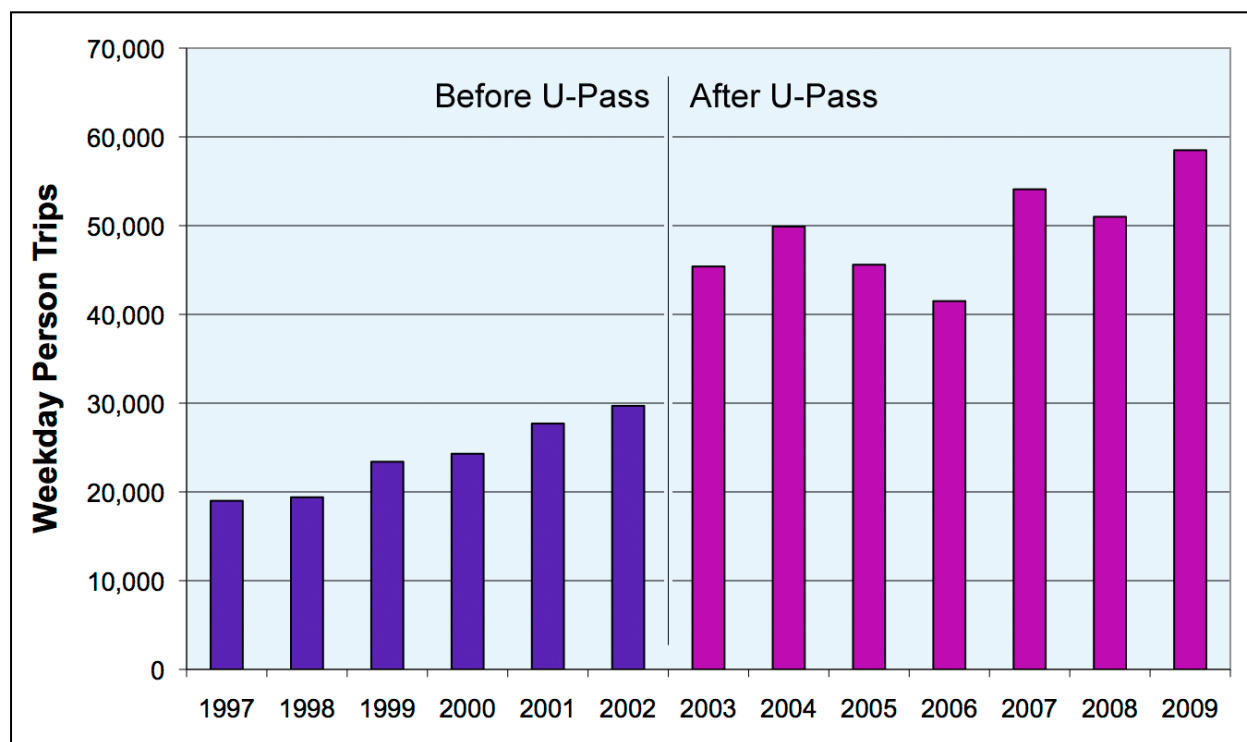


Table 3.2 provides a summary of transit trips by route and by time period, and Table 3.3 provides a summary of peak hour ridership by route.

Significant observations regarding transit ridership include:

- Bus routes via University Boulevard (which includes the 99 B-Line service) account for 50% of all transit trips to and from UBC. Bus routes via Southwest Marine Drive (the majority of which use 41st Avenue in the City of Vancouver) account for 26% of all transit trips. Bus routes via Chancellor Boulevard and 16th Avenue account for 13% and 11%, respectively.
- The Route 99 B-Line accounts for 38% of all transit trips, whereas during the morning peak hour it accounts for only 29% of ridership. This result reflects the different ridership characteristics on Route 99 compared with other routes. The B-Line is well-used during all time periods, as compared with other routes where a higher proportion of ridership occurs during peak periods.
- Route 33 is a new service introduced in September 2008. The combined ridership on Routes 25 and 33 (both of which travel along 16th Avenue) was 6,460 daily trips in Fall 2009, whereas ridership on Route 25 was 5,550 daily trips in Fall 2007. Introduction of the Route 33 service increased ridership in the 16th Avenue corridor by only 16% across the UBC/UEL screenline (although it may have increased ridership by a greater amount elsewhere along the route in the City of Vancouver).

Table 3.2 – Weekday Transit Trips Across UBC/UEL Screenline, Fall 2009

Route		AM Peak	Midday	PM Peak	Eve	Night	Totals	
		6:00 to 9:00	9:00 to 3:00	3:00 to 6:00	6:00 to midnight	midnight to 4:30		
4	4 th Avenue	270	930	570	570	0	2,340	4.0%
9	Broadway	220	270	350	80	0	920	1.6%
17	Broadway	560	1,230	730	680	60	3,260	5.6%
25	King Edward	830	1,840	790	620	20	4,100	7.0%
33	16 th Avenue	400	960	660	340	0	2,360	4.0%
41	41 st Avenue	550	2,110	1,080	680	20	4,440	7.6%
43	41 st Ave. limited stop	1,120	730	1,110	330	0	3,290	5.6%
44	4 th Ave. limited stop	920	1,950	980	320	0	4,170	7.1%
49	49 th Avenue	340	950	890	190	0	2,370	4.1%
84	4 th Ave. limited stop	660	1,700	860	400	0	3,620	6.2%
99	Broadway B-Line	2,940	9,150	6,170	3,920	40	22,220	38.0%
258	North Shore express	130	0	70	0	0	200	0.3%
480	Richmond express	910	2,270	1,420	570	0	5,170	8.8%
Totals		9,850 16.8%	24,090 41.2%	15,680 26.8%	8,700 14.9%	140 0.2%	58,460	100%

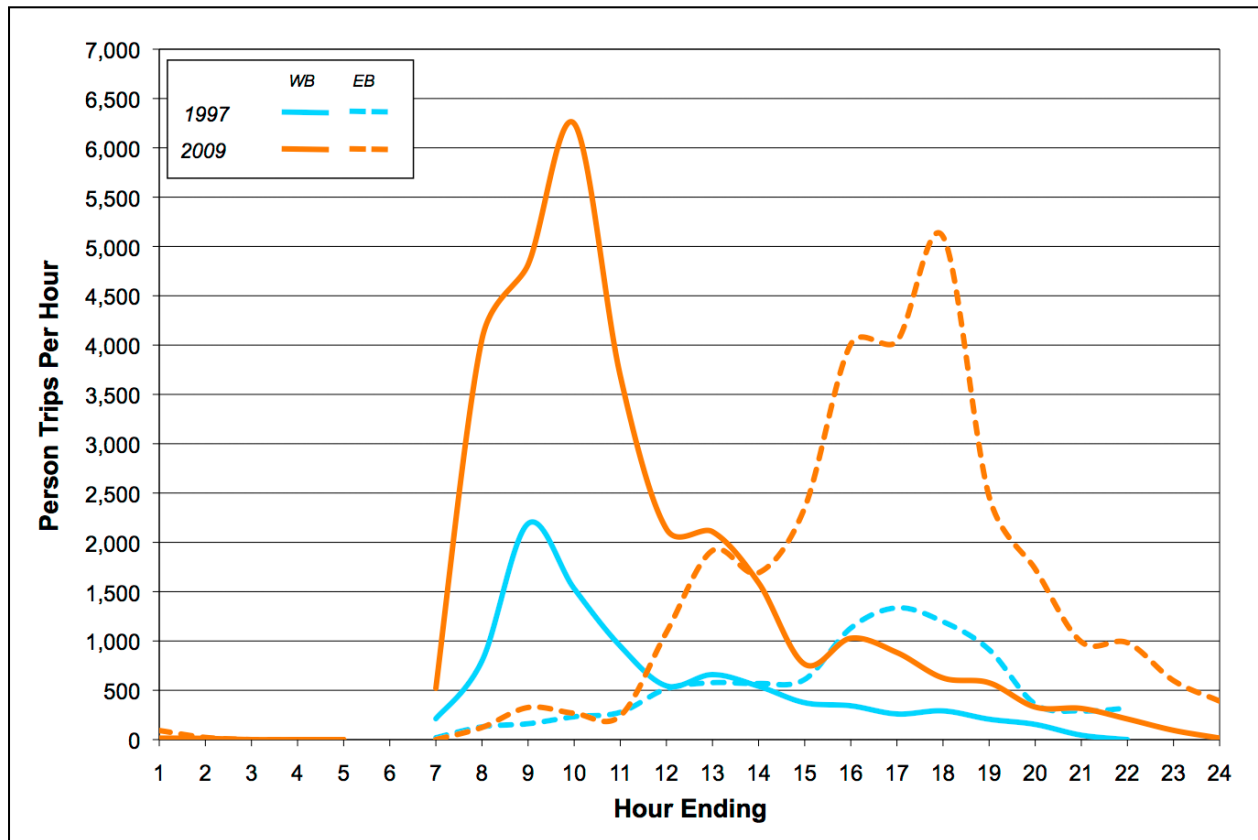
Table 3.3 – Weekday Peak Hour Transit Trips Across UBC/UEL Screenline, Fall 2009

Route		AM Peak Hour Westbound 8:30–9:30 a.m.		PM Peak Hour Eastbound 4:30–5:30 p.m.	
4	4 th Avenue	230	3.3%	170	3.2%
9	Broadway	240	3.4%	180	3.4%
17	Broadway	500	7.2%	210	4.0%
25	King Edward	560	8.1%	260	4.9%
33	16 th Avenue	210	3.0%	160	3.0%
41	41 st Avenue	310	4.5%	330	6.3%
43	41 st Ave. limited stop	740	10.6%	450	8.5%
44	4 th Ave. limited stop	590	8.5%	360	6.9%
49	49 th Avenue	250	3.6%	370	7.1%
84	4 th Ave. limited stop	400	5.7%	380	7.3%
99	Broadway B-Line	2,000	28.7%	1,890	35.9%
258	North Shore express	40	0.6%	0	0%
480	Richmond express	890	12.8%	510	9.5%
Totals		6,960	100%	5,270	100%

Figure 3.2 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 at that time, 12% more transit trips per day were accommodated on the same number of buses as a result of the change.

Figure 3.2 – Transit Trip Patterns Across UBC/UEL Screenline, 2009 vs. 1997



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 2009, there was an average of 0.70 SOV trips per person. This represents a 36% 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 3.4 provides a comparison of SOV travel in Fall 1997 and Fall 2009, and Figure 3.3 provides a summary of year-by-year changes.

Table 3.4 – SOV Trips Across UBC/UEL Screenline

Weekday SOV Trips	Fall 1997	Fall 2009	Change from 1997 to 2009	
Person trips	46,000	40,200	-5,800	-13%
Trips per person	1.09	0.70	-0.39	-36%
SOV mode share	43%	32%	-11 PP	-25%

Figure 3.3 – SOV Trips Across UBC/UEL Screenline, 1997–2009

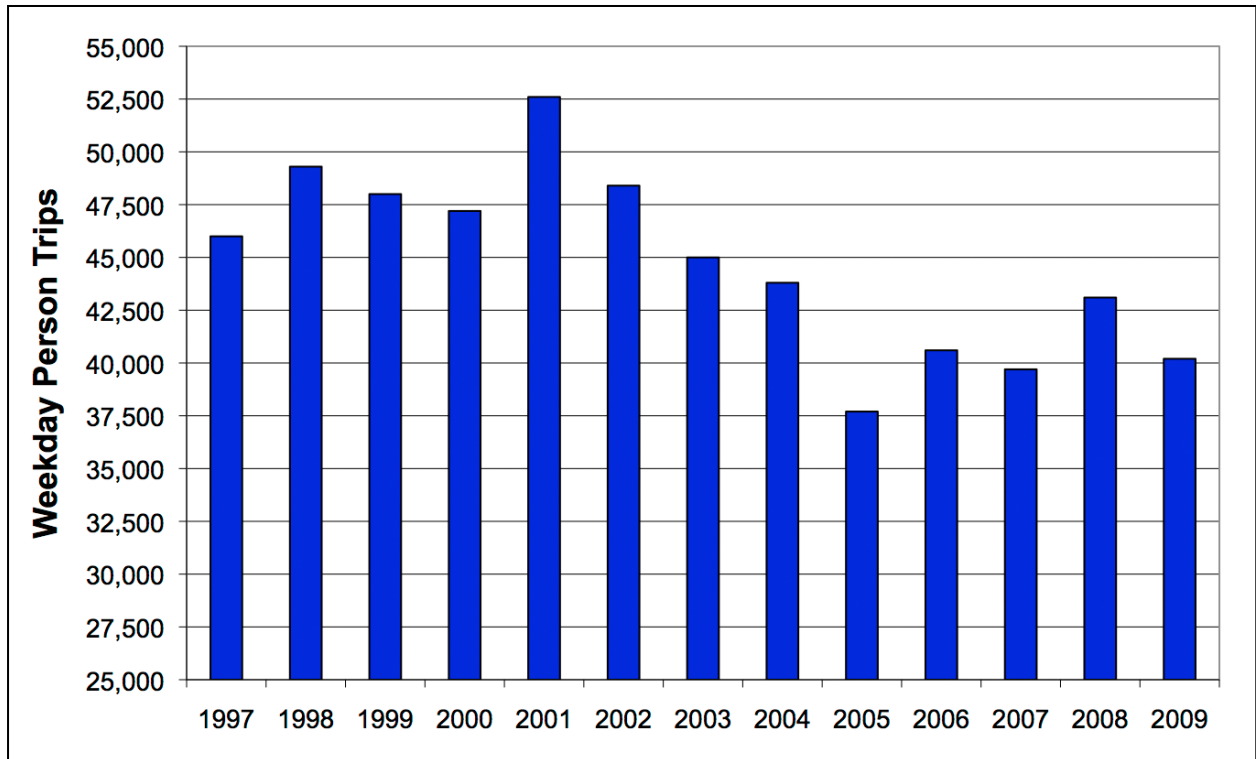
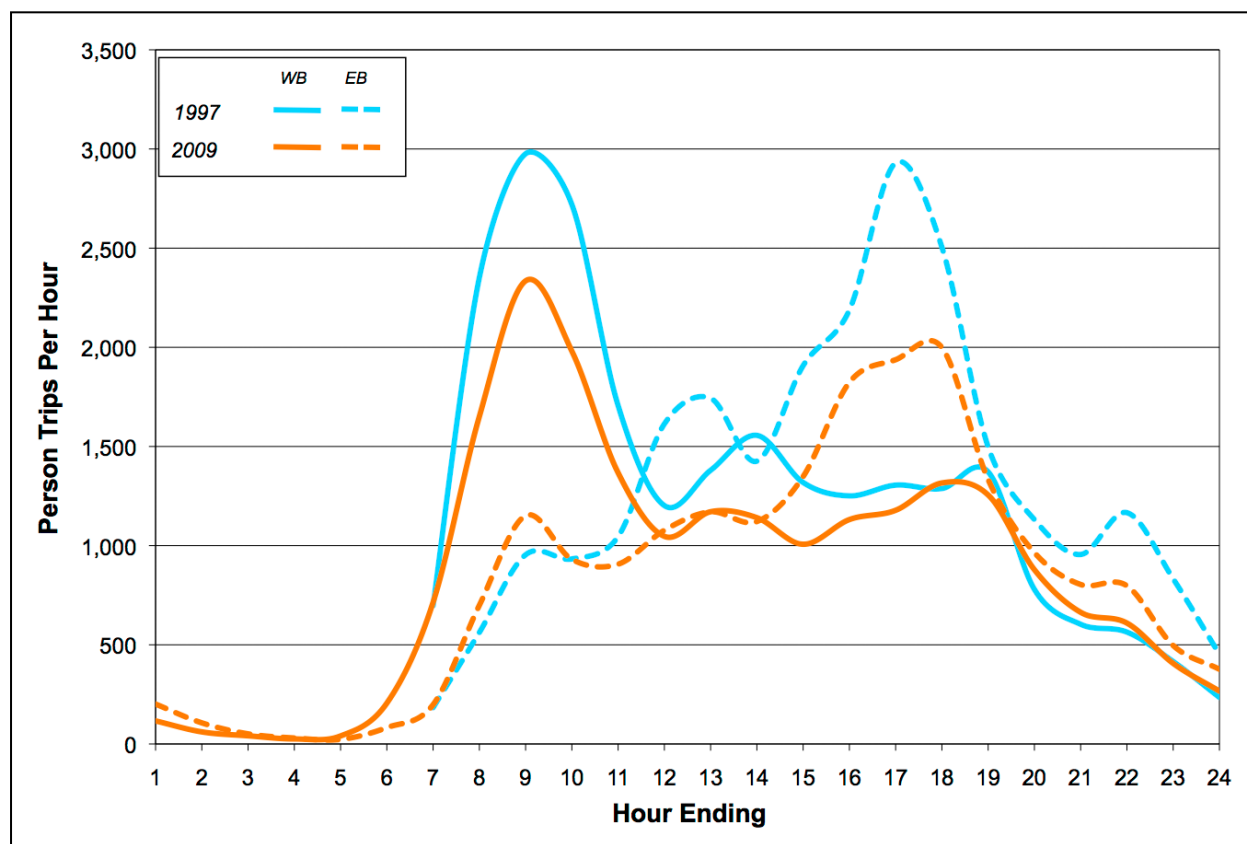


Figure 3.4 illustrates the arrival and departure patterns of SOV trips to and from UBC throughout the day, including a comparison with Fall 1997 SOV trips. The most significant reductions are for eastbound trips in the midday and afternoon peak period.

Figure 3.4 – SOV Trip Patterns Across UBC/UEL Screenline, 2009 vs. 1997

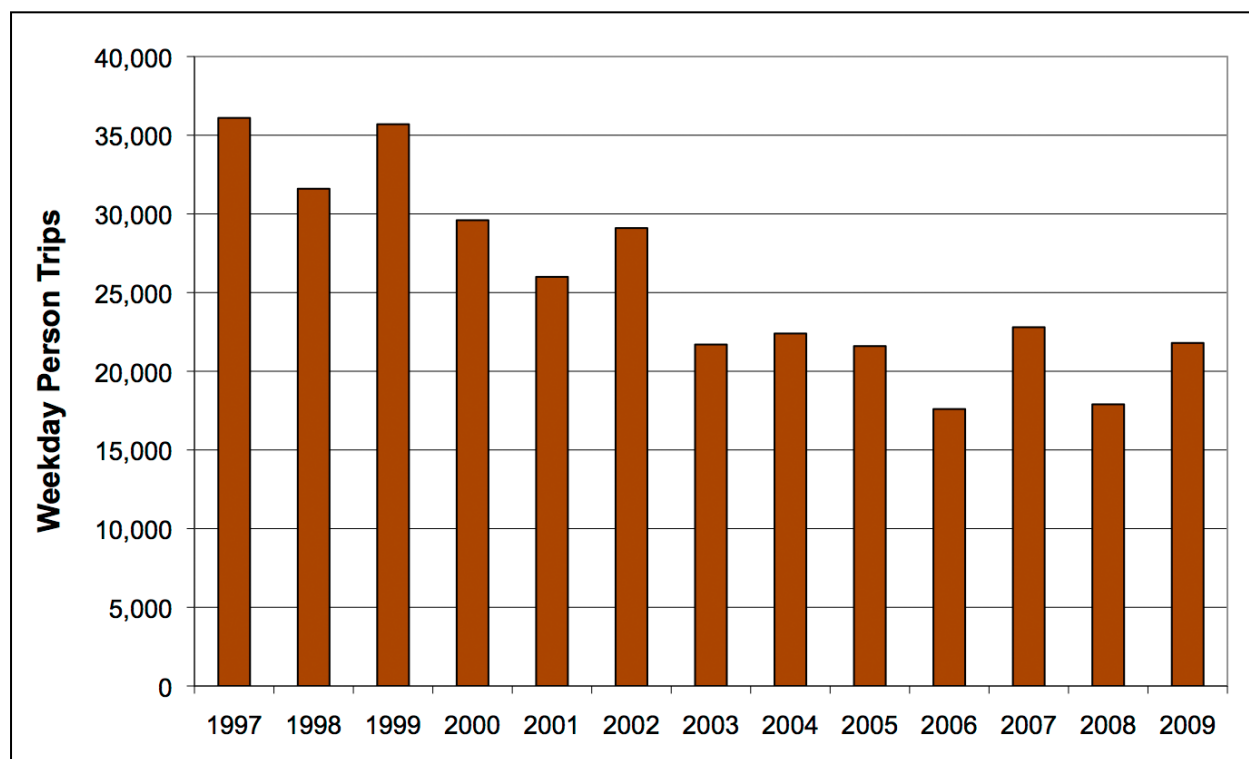


Carpooling has decreased steadily since 1997. Daily carpool and vanpool trips declined from 36,100 in Fall 1997 to 21,800 in Fall 2009, and the carpool and vanpool mode share declined from 34% to 18% during the same time. Table 3.5 provides a summary of the trend in carpool and vanpool travel from Fall 1997 to Fall 2009, and Figure 3.5 provides a summary of year-by-year changes.

Table 3.5 – Carpool and Vanpool Trips Across UBC/UEL Screenline, 2009 vs. 1997

Weekday Carpool/Vanpool Trips	Change from			
	Fall 1997	Fall 2009	1997 to 2009	
Person trips	36,100	21,800	-14,300	-40%
Trips per person	0.85	0.38	-0.47	-56%
HOV mode share	34%	18%	-16 PP	-48%

Figure 3.5 – Carpool and Vanpool Trips Across UBC/UEL Screenline, 1997–2009



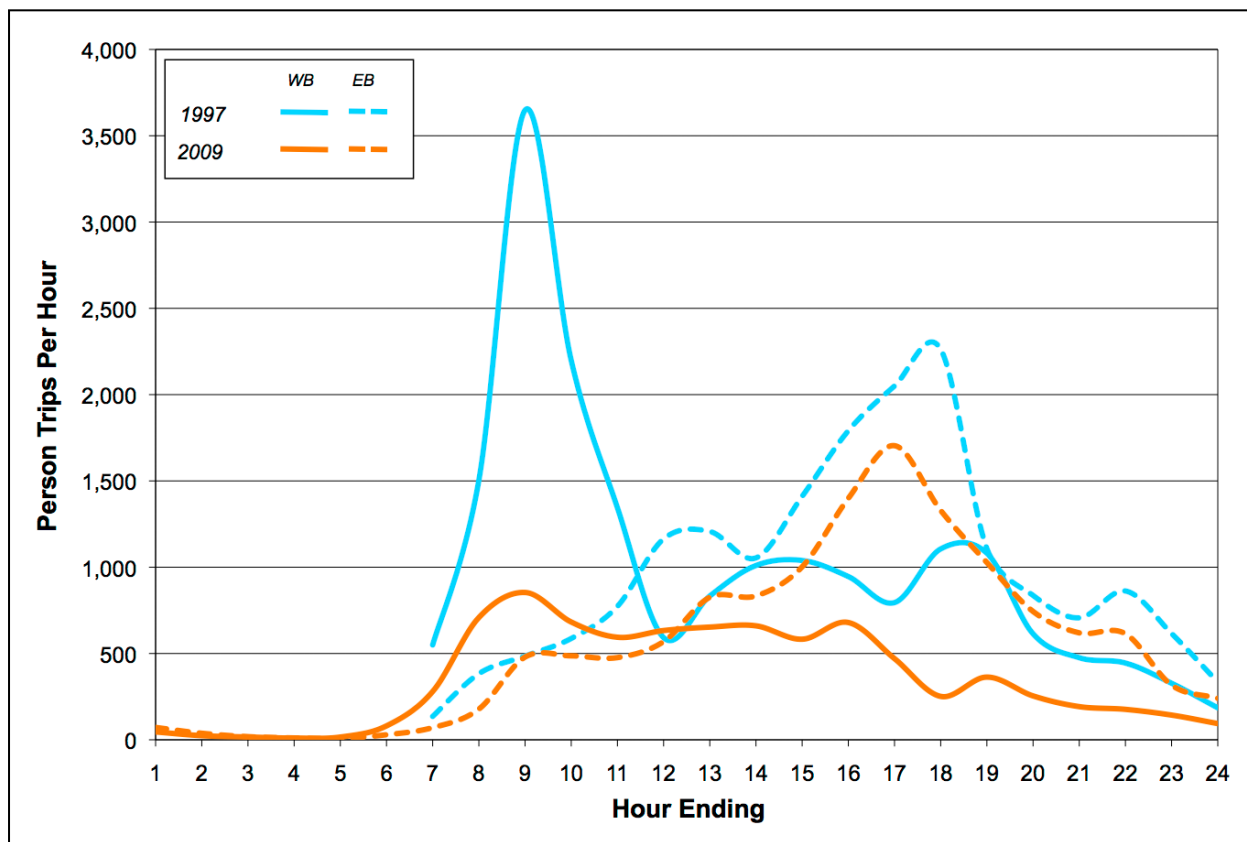
Since 1997, the proportion of carpools with 3 or more persons has decreased, with a corresponding increase in the proportion of 2-person carpools. This has resulted in a reduction in the average carpool/vanpool vehicle occupancy from 2.20 persons per vehicle in Fall 1997 to 2.13 persons per vehicle in Fall 2009.

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.

Figure 3.6 – Carpool/Vanpool Trip Patterns Across UBC/UEL Screenline, 2009 vs. 1997

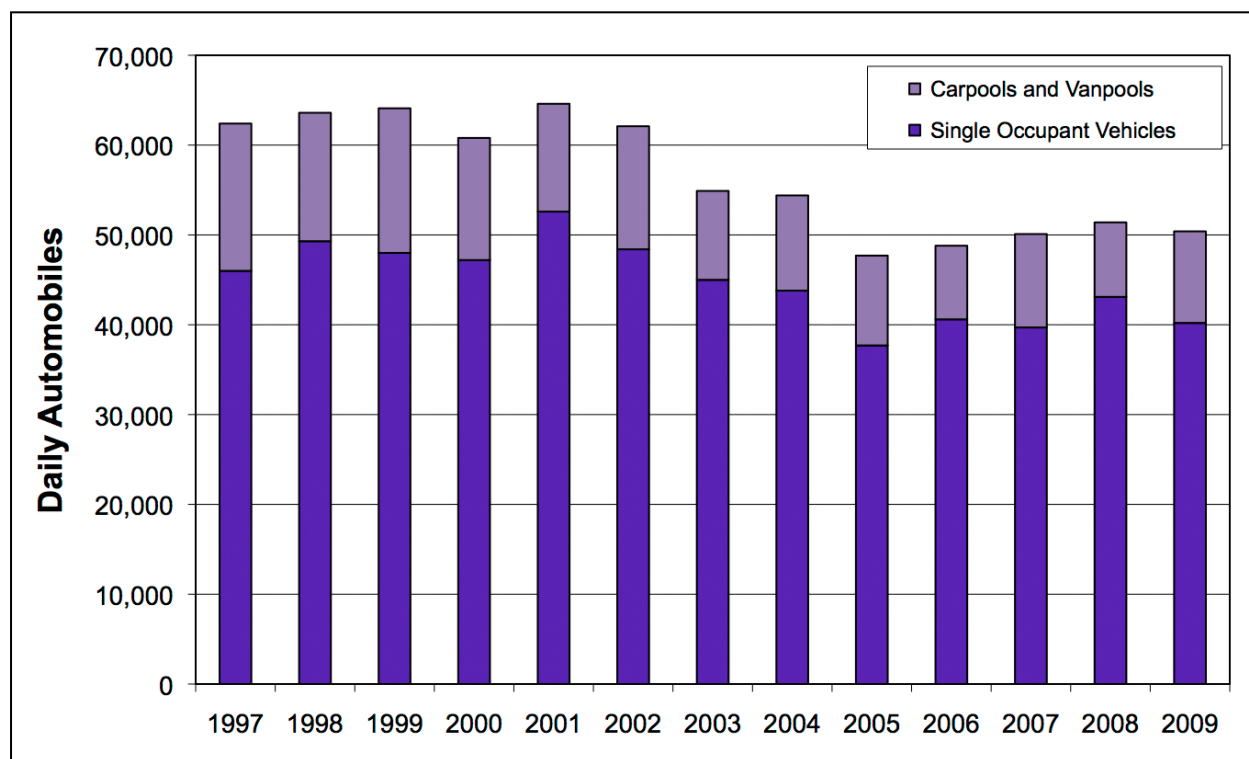


- The additional time involved in picking up or dropping of carpool partners adds significantly to commute times.
- Having to wait at work or school until the scheduled departure time, rather than being able to leave when ready to leave.

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.

In Fall 2009, daily automobile traffic was 50,400 automobiles per day — 12,000 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 2009.

Figure 3.7 – Weekday Automobile Volumes Across UBC/UEL Screenline, 1997–2009



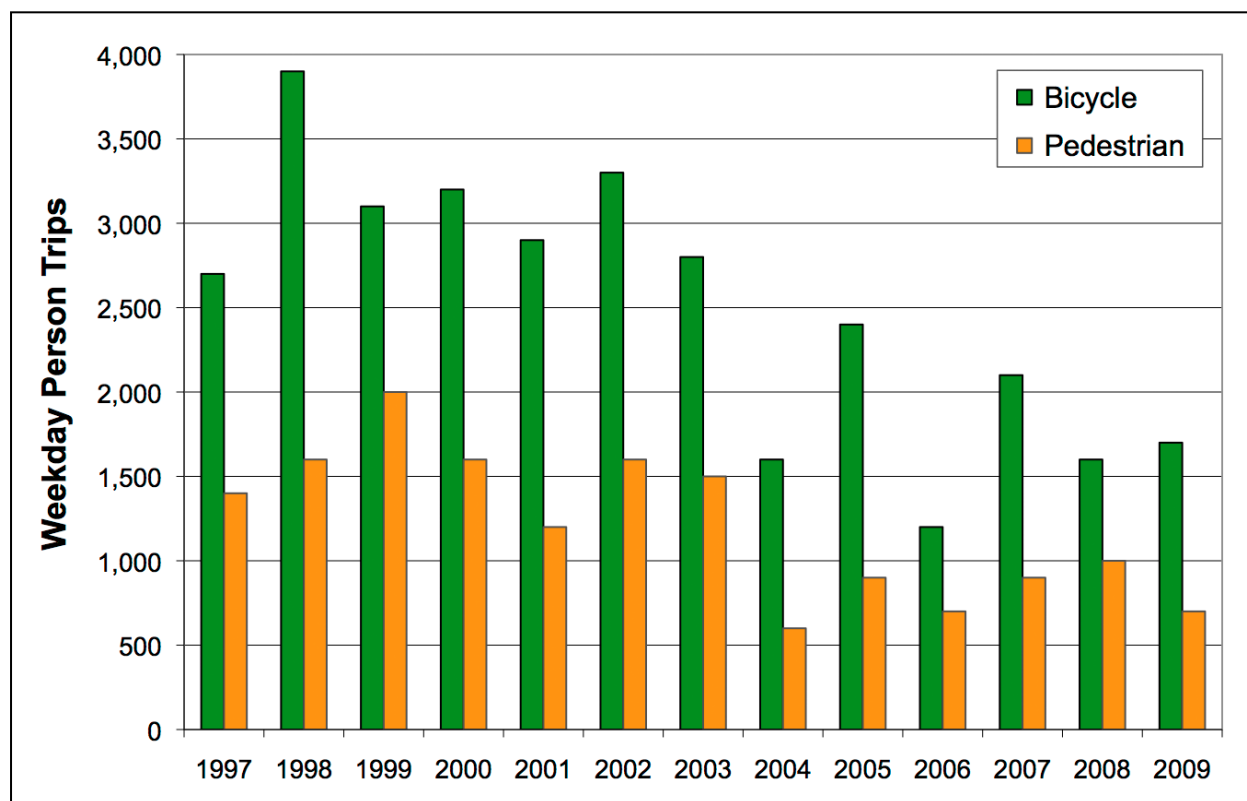
3.3. Bicycles and Pedestrians

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 2009, cycling trips were 1,700 trips per day, reflecting no significant change from 2004 levels. Table 3.6 and Figure 3.8 provide summaries of the trend in bicycle trips from Fall 1997 to Fall 2009. Figure 3.9 illustrates the arrival and departure patterns of bicycle trips to and from UBC throughout the day, including a comparison with Fall 1997 bicycle trips.

Table 3.6 – Bicycle Trips Across UBC/UEL Screenline, 1997– 2009

Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change from 1997 to 2009	
	Fall 1997	Fall 2002	Fall 2004	Fall 2009		
Person trips	2,700	2,900	1,600	1,700	-1,000	-37%
Trips per person	0.07	0.06	0.03	0.03	-0.04	-54%
Bicycle mode share	2.5%	2.6%	1.3%	1.4%	-1.1 PP	-46%

Figure 3.8 – Bicycle and Pedestrian Trips Across UBC/UEL Screenline, 1997–2009



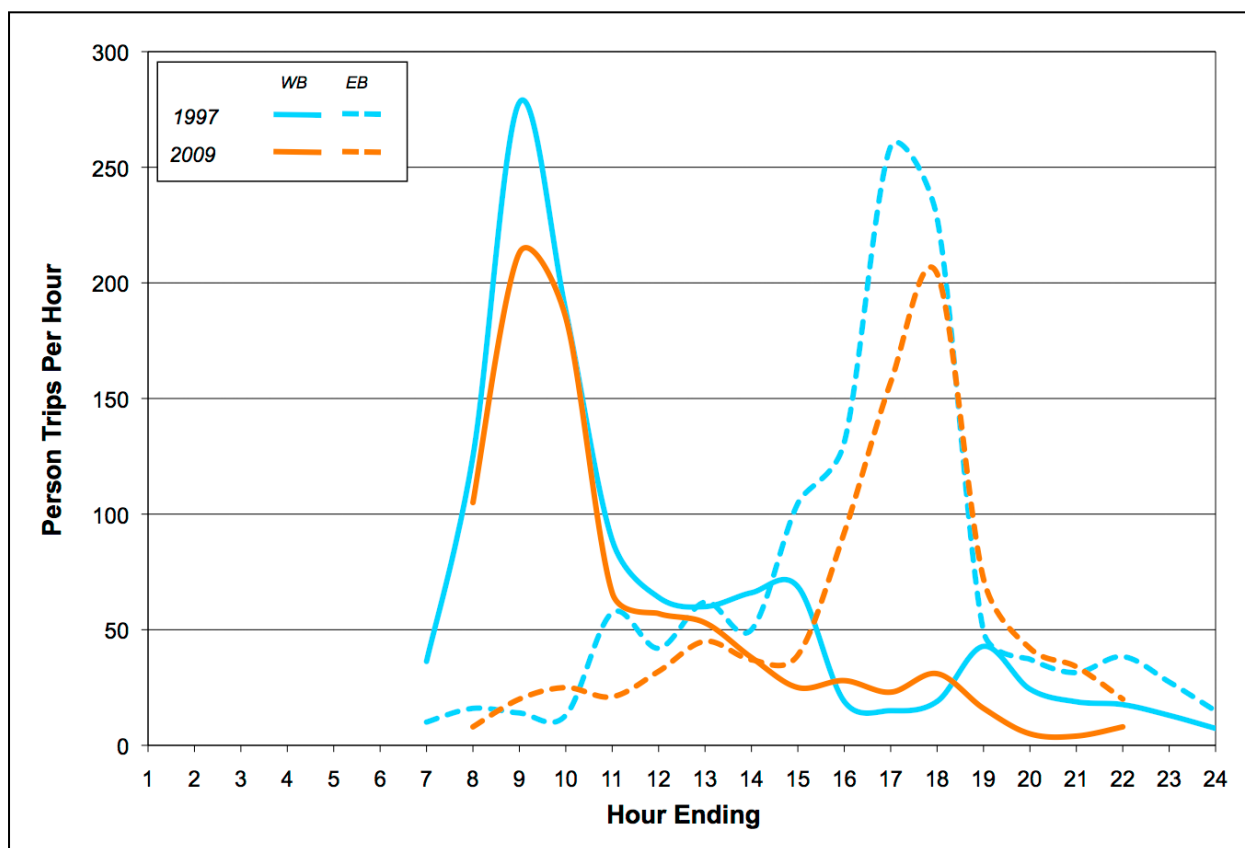
The student U-Pass program is the most-likely reason for the decrease in bicycle trips (it should be noted that the decrease did not occur immediately after the U-Pass was implemented, but rather occurred a year later in 2004).

All buses operating on transit routes serving UBC are equipped with bicycle racks, each of which has space for two bicycles. Table 3.7 provides a summary of the numbers of bicycles on racks on buses. A total of 190 bicycles were observed in one day, representing an average of one bicycle per 22 rack spaces (0.05 bicycles per rack space). The most popular route for cyclists to travel with their bicycles was the Route 99 B-Line.

Table 3.7 – Weekday Bicycles on Buses Across UBC/UEL Screenline, Fall 2009

	Route													Totals
	4	9	17	25	33	41	43	44	49	84	99	258	480	
Bicycles	6	3	8	21	11	22	8	14	1	20	71	1	4	190
Buses with racks	130	94	198	217	136	249	87	102	135	176	429	6	122	2081
Bikes per rack space	0.02	0.02	0.05	0.05	0.04	0.04	0.05	0.07	0.00	0.06	0.08	0.08	0.02	0.05

Figure 3.9 – Bicycle Trip Patterns Across UBC/UEL Screenline, 2009 vs. 1997

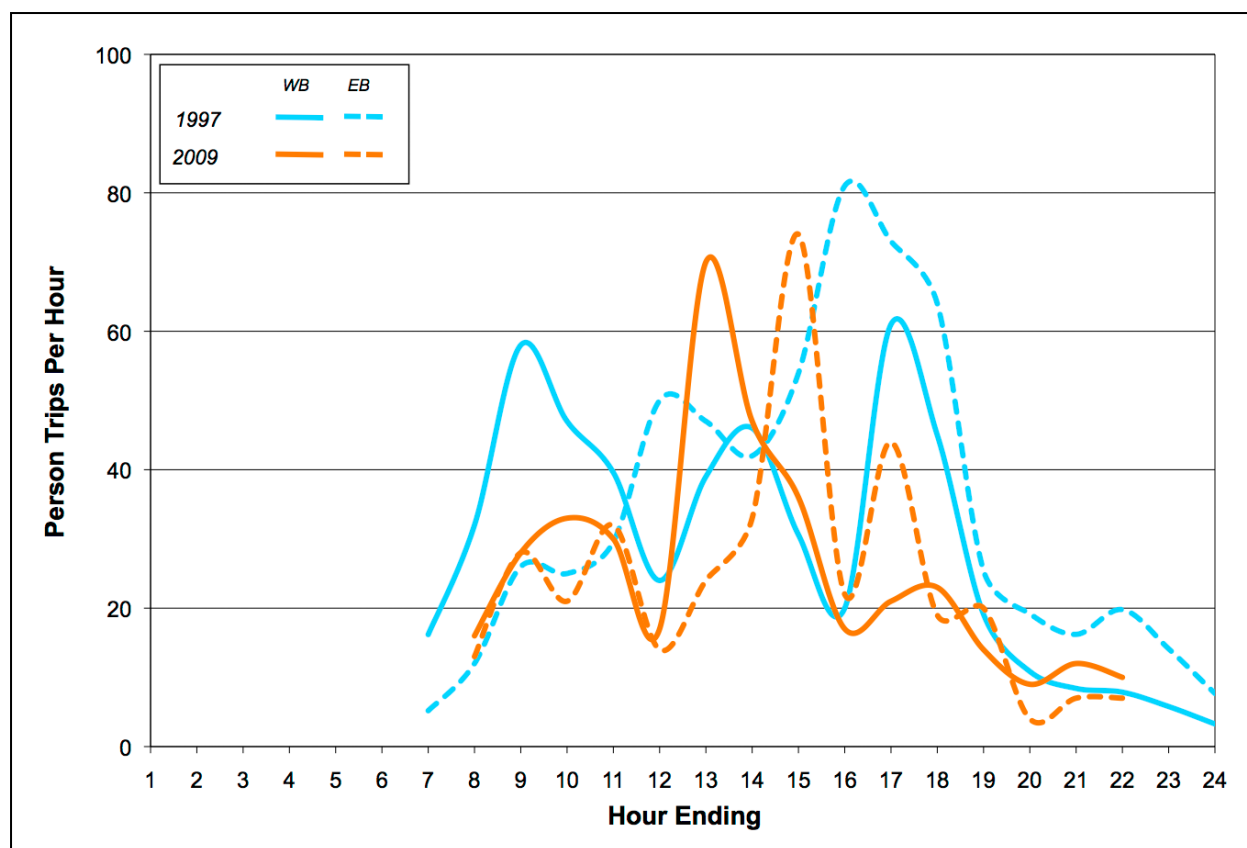


Walking trips to and from UBC have decreased since the student U-Pass program was introduced in Fall 2003, in a similar manner as bicycle trips. Prior to the student U-Pass program, walking trips to and from UBC ranged from 1,400 to 2,000 trips per day. By Fall 2009, walking trips had decreased to 700 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 3.8 provides a summary of the trend in pedestrian trips from Fall 1997 to Fall 2009, and Figure 3.8 illustrates year-by-year changes. Figure 3.10 illustrates the arrival and departure patterns of pedestrian trips to and from UBC throughout the day, including a comparison with Fall 1997 pedestrian trips.

Table 3.8 – Pedestrian Trips Across UBC/UEL Screenline, 1997–2009

Weekday Pedestrian Trips	Before U-Pass		After U-Pass		Change from 1997 to 2009	
	Fall 1997	Fall 2002	Fall 2004	Fall 2009		
Person trips	1,400	1,600	600	700	-700	-50%
Trips per person	0.03	0.03	0.01	0.01	-0.02	-63%
Pedestrian mode share	1.3%	1.4%	0.5%	0.6%	-0.7 PP	-57%

Figure 3.10 – Pedestrian Trip Patterns Across UBC/UEL Screenline, 2009 vs. 1997



3.4. 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 2009, in March, June, September and December. Table 3.9 provides a summary of average numbers of heavy trucks in 2009, and Figure 3.11 illustrates numbers of trucks observed in each of the four quarterly counts.

Table 3.9 – Average Heavy Truck Trips Across UBC/UEL Screenline, 2009

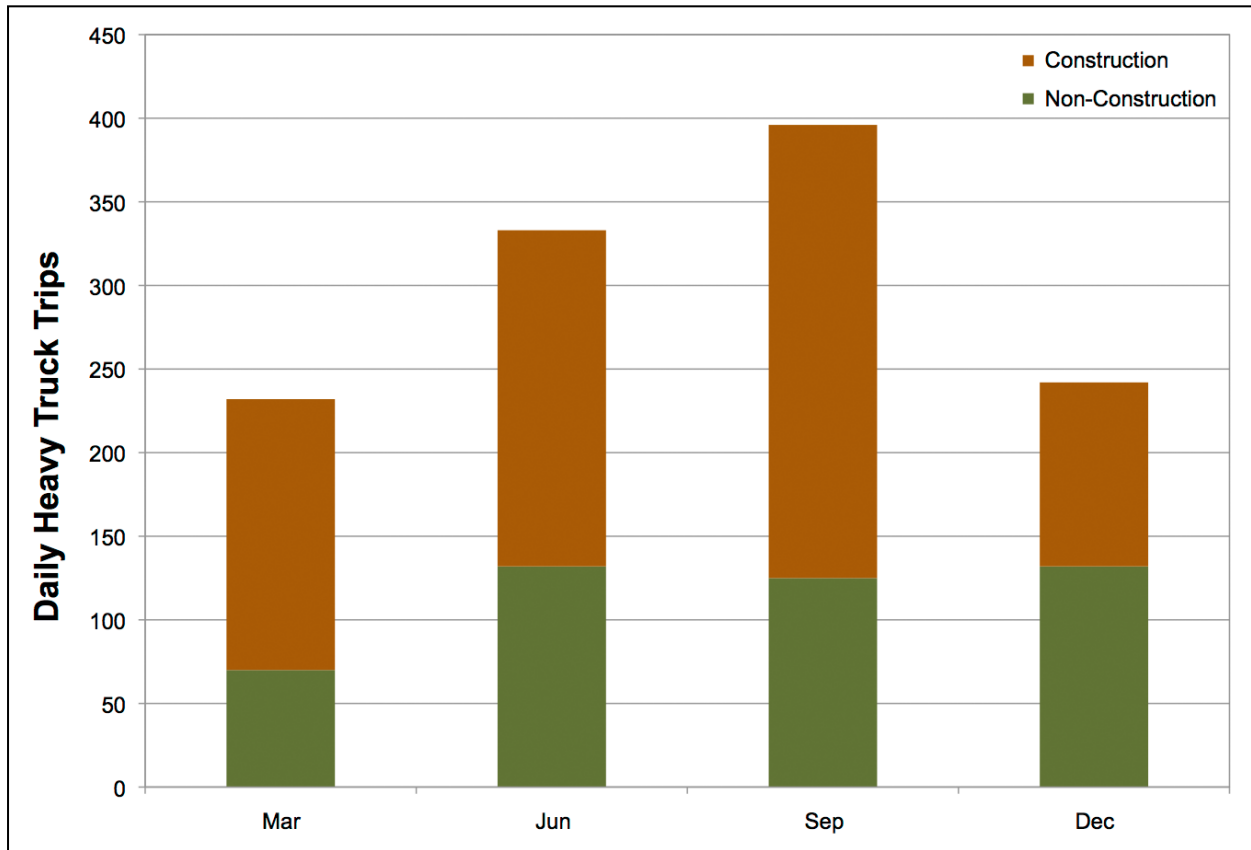
Route	Type of Truck		Totals
	Construction	Non-Construction	
Chancellor Boulevard	11.0	13.5	24.5
University Boulevard	1.8	13.3	15.1
16 th Avenue	11.5	16.8	28.3
SW Marine Drive and 41 st Avenue	161.8	71.3	233.1
Totals	186.1	114.9	301.0

An average of 301 heavy truck trips per day were observed crossing the UBC/UEL screenline in 2009. Of these, an average of 186 trips were construction trucks, representing 62% of heavy truck trips.

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 2009 were:

- 87% via SW Marine Drive and 41st Avenue
- 6% via Chancellor Boulevard/4th Avenue
- 1% via University Boulevard/10th Avenue
- 6% via 16th Avenue, which is not a truck route within the City of Vancouver. Observations of truck movements indicate that some of the trucks using 16th Avenue are non-UBC trucks travelling to and from destinations in Vancouver and the UEL.

Figure 3.11 – Heavy Truck Trips Across UBC/UEL Screenline, 2009



4. CONDITIONS ON CAMPUS

This section of the Transportation Status Report presents information regarding traffic speeds on campus.

Traffic speeds were recorded at eight locations on campus, as illustrated in Figure 4.1 and as summarized in Table 4.1. The speeds indicated in Table 4.1 are 85th percentile speeds, which are typically used for the purposes of assessing traffic speeds, as these represent the speeds below which 85% of the traffic is travelling.

Table 4.1 – Average Daily 85th Percentile Traffic Speeds (km/h), 2008 and 2009

Location	Eastbound/ Northbound		Westbound/ Southbound	
	Fall 2008	Fall 2009	Fall 2008	Fall 2009
1 Wesbrook Mall s/o Gage Rd.	62.0	–	57.2	–
2 East Mall n/o Agronomy Rd.	–	40.6	–	39.4
3 Wesbrook Mall n/o Agronomy Rd.	59.2	–	56.8	–
4 Acadia Rd. s/o Toronto Rd.	–	46.8	–	43.5
5 Thunderbird Blvd. e/o Health Sciences	51.1	45.0	48.3	38.8
6 West Mall s/o Thunderbird Blvd.	30.2	37.6	37.4	38.5
7 East Mall s/o Thunderbird Blvd.	66.2	53.7	67.6	59.5
8 Wesbrook Mall n/o Hampton Pl.	58.8	57.0	62.4	58.6

UBC has made significant changes to the cross-sections of East Mall and Wesbrook Mall between Thunderbird Boulevard and 16th Avenue. Both roads were reconfigured from four-lane divided roads (with two traffic lanes in each direction) to two-lane divided roads (with one traffic lane and one bicycle lane in each direction). This reduction in the number of traffic lanes is commonly referred to as a “road diet.” One of the objectives of these road diets was to discourage speeding, and as indicated in Figure 4.2, both road diets have been effective in reducing traffic speeds.

Figure 4.1 – Traffic Speed Count Locations, 2008 and 2009

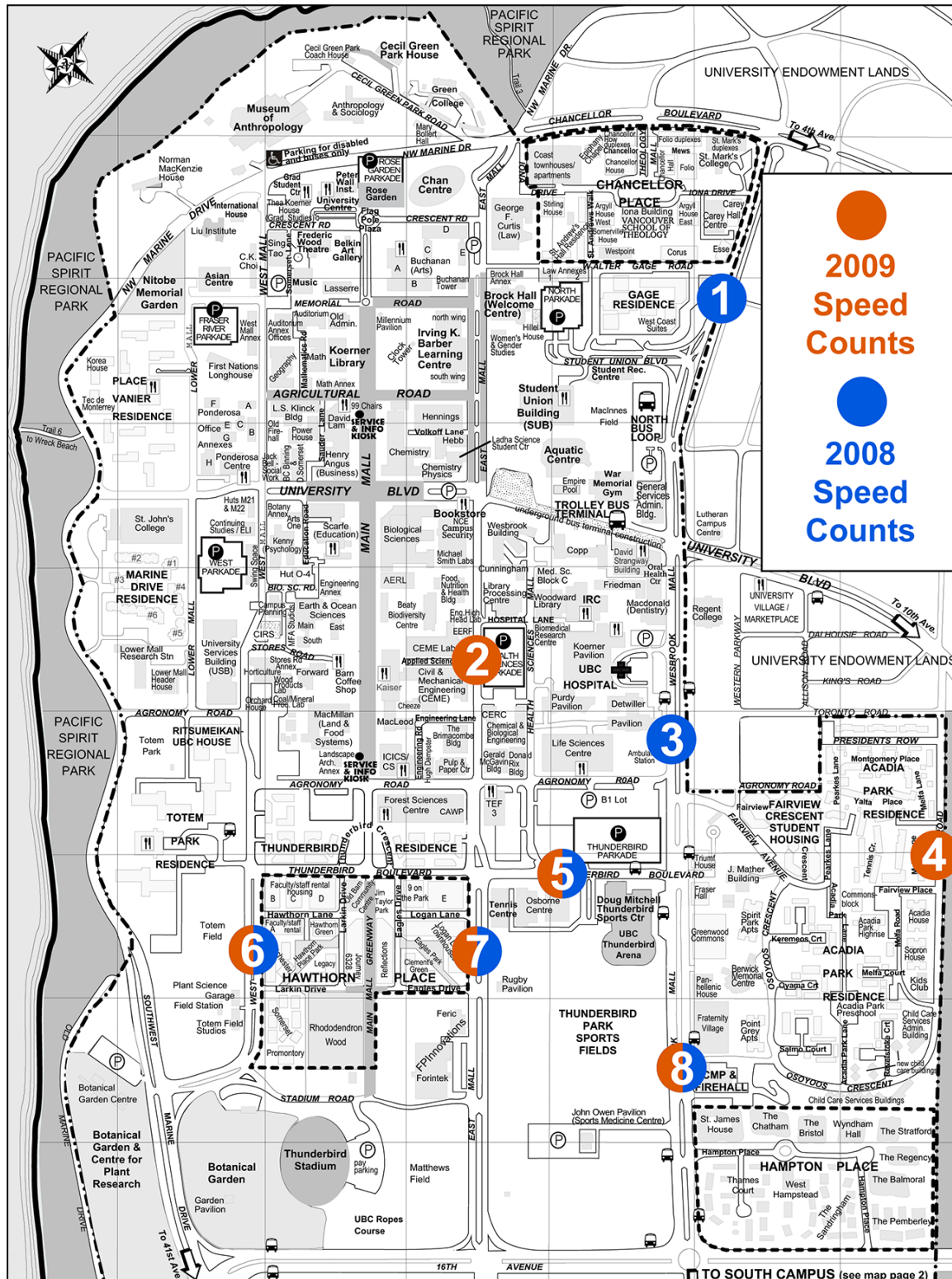


Figure 4.2 – Traffic Speeds Before and After Road Diets

