

UNIVERSITY OF BRITISH COLUMBIA



Fall 2012 Transportation Status Report

25 March 2013

Fall 2012 Transportation Status Report

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1. INTRODUCTION

For the past fifteen 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 this information provides a measure of UBC's progress in achieving its transportation goals.

The Fall 2012 Transportation Status Report presents the most recent data that 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:

- **Place and Promise: The UBC Plan** is the strategic vision for the kind of university that UBC aspires to be. Prepared through widespread community consultation, Place and Promise establishes UBC's vision to be one of the world's leading universities, creating an exceptional learning environment that fosters global citizenship, advances a civil and sustainable society, and supports outstanding research to serve the people of British Columbia, Canada and the world. Place and Promise is focused around six core values — academic freedom, advancing and sharing knowledge, excellence, integrity, mutual respect and equity, and public interest — which are supported by specific commitments goals and actions.
- **The UBC Land Use Plan.** In June 2010, the Minister of Community and Rural Development enacted legislation that realigned the responsibility for this plan, previously known as the Official Community Plan. The OCP is no longer a regional district bylaw. The University is responsible for the Land Use Plan with direct oversight by the Minister. The Land Use Plan retains a number of transportation demand management objectives aimed at increasing walking, cycling and transit in preference to trips by single-occupant vehicles. The Land Use Plan also sets the framework for campus development, including the infill of academic lands and the ongoing development of residential neighbourhoods on campus.
- **The Vancouver Campus Plan.** In 2010, UBC adopted a new Vancouver Campus Plan, which covers the academic lands of UBC's Vancouver campus. This plan guides the institutional capital investment in facilities for teaching and research, student housing and campus infrastructure and services.

- **Neighbourhood Plans.** For each of the non-institutional neighbourhoods on campus, there is a neighbourhood plan describing site-specific land uses, development controls, design guidelines, and servicing and transportation strategies consistent with UBC's Land Use Plan. Each neighbourhood is designed to support the University's academic core, while providing the amenities and services required to achieve a compact, transit-oriented, pedestrian friendly community.
- **The Strategic Transportation Plan.** UBC has committed 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 and renewed in 2005. The targets in the STP provide the context for the annual monitoring exercise documented in this report.

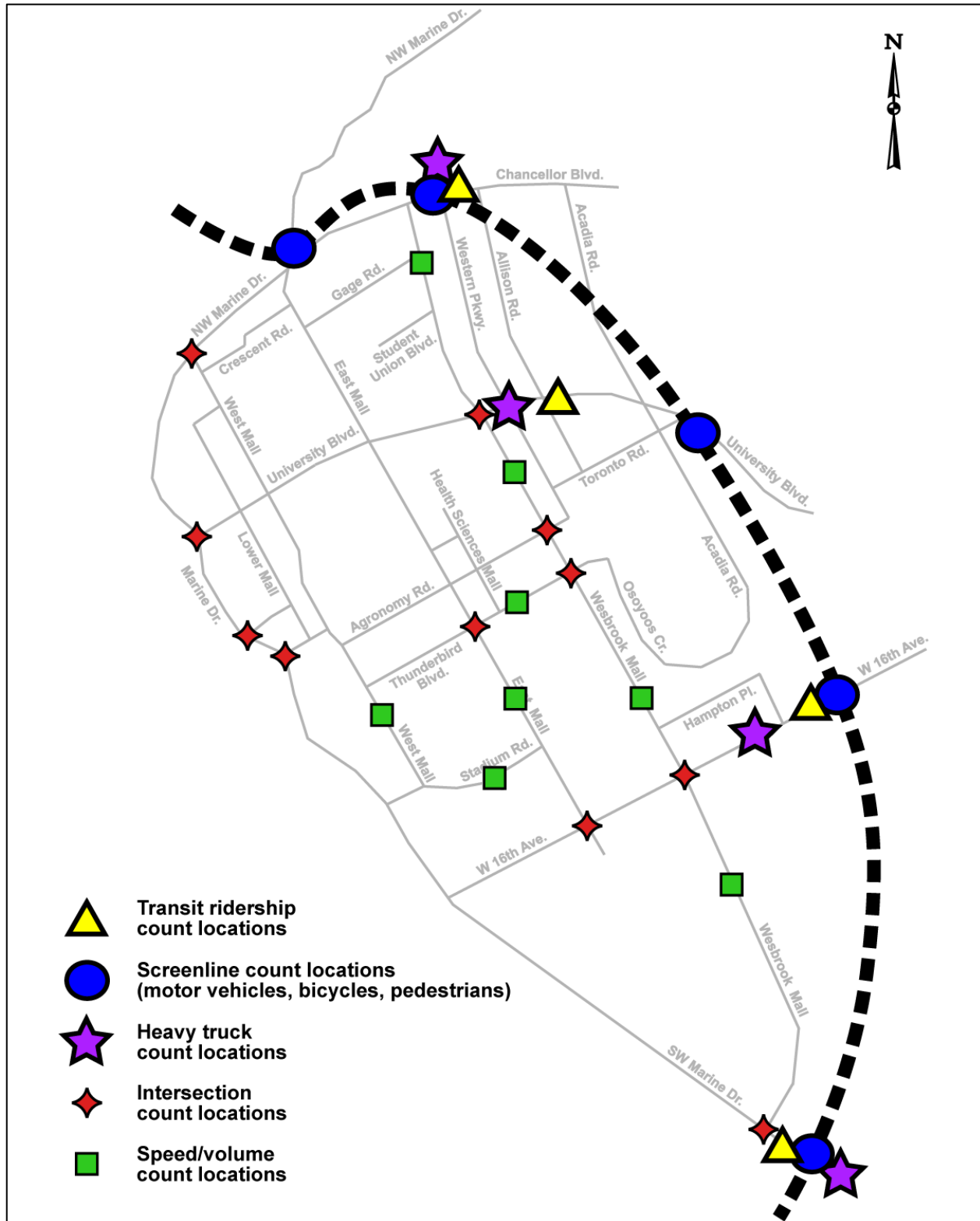
1.2. Annual Monitoring Program

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 13 hours (6:00 AM to 7:00 PM) for one day each quarter

Figure 1.1 – Data Collection Locations, 2012



The information presented in the Fall 2012 Transportation Status Report is based primarily on data collected through the annual transportation monitoring program from 1997 through 2012. 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 that have occurred at UBC since 1997.

- **Population.** The daytime population at UBC has increased 51% in the 15 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 2012.

Table 1.2 – Daytime Population at UBC, 2012 vs. 1997

	Fall 1997	Fall 2012	Increase	
Students	33,200	49,400	+16,200	+49%
Staff	7,250	11,150	+3,900	+54%
Faculty	1,850	3,150	+1,300	+71%
Totals	42,300	63,700	+21,400	+51%

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 \$30 per month. The U-Pass offers students unlimited access to TransLink Bus, SkyTrain and SeaBus services (all zones), and discounted West Coast Express fares.
- **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 new Route 33 on 16th Avenue, and several limited-stop express routes, including 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 \$6.00 in 2012, 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 SW Marine Drive, Wesbrook Mall, East Mall, Thunderbird Boulevard and 16th Avenue. All unrestricted roads on campus function as shared roadways that accommodate cyclists as well as motor vehicles. On campus, there are over 900 bicycle racks, plus an additional 800 bicycle parking spaces in secure bike cages and bike lockers.
- **Alternative modes of travel.** UBC has encouraged the use of non-SOV modes of travel through a range of programs, including a comprehensive transportation demand management strategy that includes carpooling, car sharing, cycling, on campus shuttles, transit discount programs, an emergency ride home program, and other sustainable transportation initiatives.
- **Campus development and land use.** 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 including motorcycles and trucks.

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 and other plans. It should be noted that Metro Vancouver, 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 include 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 or 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.

- **Rolling average.** Observed travel patterns fluctuate from year to year, and consequently the results for any particular year should not be considered in isolation. A more meaningful picture of travel patterns is obtained by considering trends over time. To better illustrate trends and minimize the apparent variability from year to year, charts illustrating trips by mode for each year since 1997 include a trend line based on a three-year rolling average. Rolling averages are calculated as the average of a particular year plus the years before and after. This means that for 2006, for example, the rolling average is calculated as the average number of trips in 2005, 2006 and 2007. Actual numbers are used for 1997 and 2012, not rolling averages, so that start and end points of the trend curve match the observed numbers of trips in the benchmark year and the most recent year.

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 2012 Transportation Status Report is available from UBC's [Transportation Planning website](#), along with several recent Transportation Status Reports.
- The 2005 Strategic Transportation Plan is available [here](#).
- 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 [here](#).
- Information on other transportation facilities and services on campus is available from [Transportation Planning](#).
- 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 138,900 person trips to and from UBC on a typical weekday in Fall 2012. Table 2.1 provides a comparison of daily person trips in Fall 1997 and Fall 2012, and Figure 2.1 illustrates the yearly changes in travel patterns during this time period.

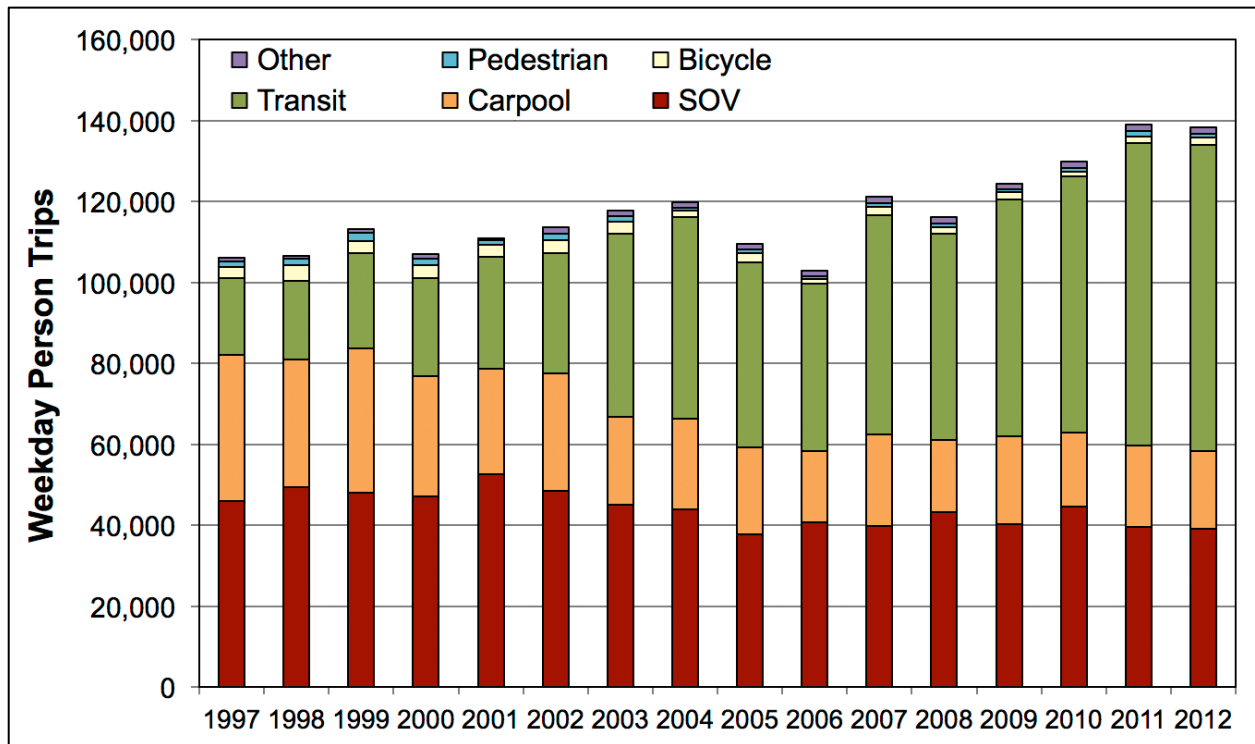
Table 2.1 – Weekday Person Trips Across UBC/UEL Screenline, 2012 vs. 1997

	Person Trips			
	Fall 1997	Fall 2012	Change	
Single occupant vehicle (SOV)	46,000	39,000	-7,000	-15%
Carpool and vanpool	36,100	19,400	-16,700	-46%
Transit	19,000	75,600	+56,600	+298%
Bicycle	2,700	1,800	-900	-33%
Pedestrian	1,400	1,000	-400	-29%
Truck and motorcycle	900	1,400	+500	+56%
Totals	106,100	138,200	+32,100	+30%

Highlights of the changes in travel patterns from 1997 to 2012 include:

- **Transit trips have quadrupled** from 19,000 trips per weekday in Fall 1997 to 75,600 in Fall 2012. More trips are made to and from UBC by transit than by all other modes combined.
- **Single-occupant vehicle (SOV) trips have decreased.** Since 1997, the number of daily SOV trips decreased 15%, despite a 51% increase in the daytime population on campus. The total number of SOV trips in Fall 2012 is 7,000 fewer trips per day than in Fall 1997.
- **Carpool and vanpool trips have steadily decreased** since 1997. In Fall 2012, carpool and vanpool trips were slightly more than half the number in Fall 1997. The 16,700 fewer carpool trips in Fall 2012 represent 7,100 fewer automobiles travelling to and from UBC each day.
- **Bicycle and pedestrians trips dropped significantly** after the student U-Pass was implemented, and have remained at approximately two-thirds of the numbers in years prior to the U-Pass.

Figure 2.1 – Weekday Person Trips Across UBC/UEL Screenline, 1997–2012



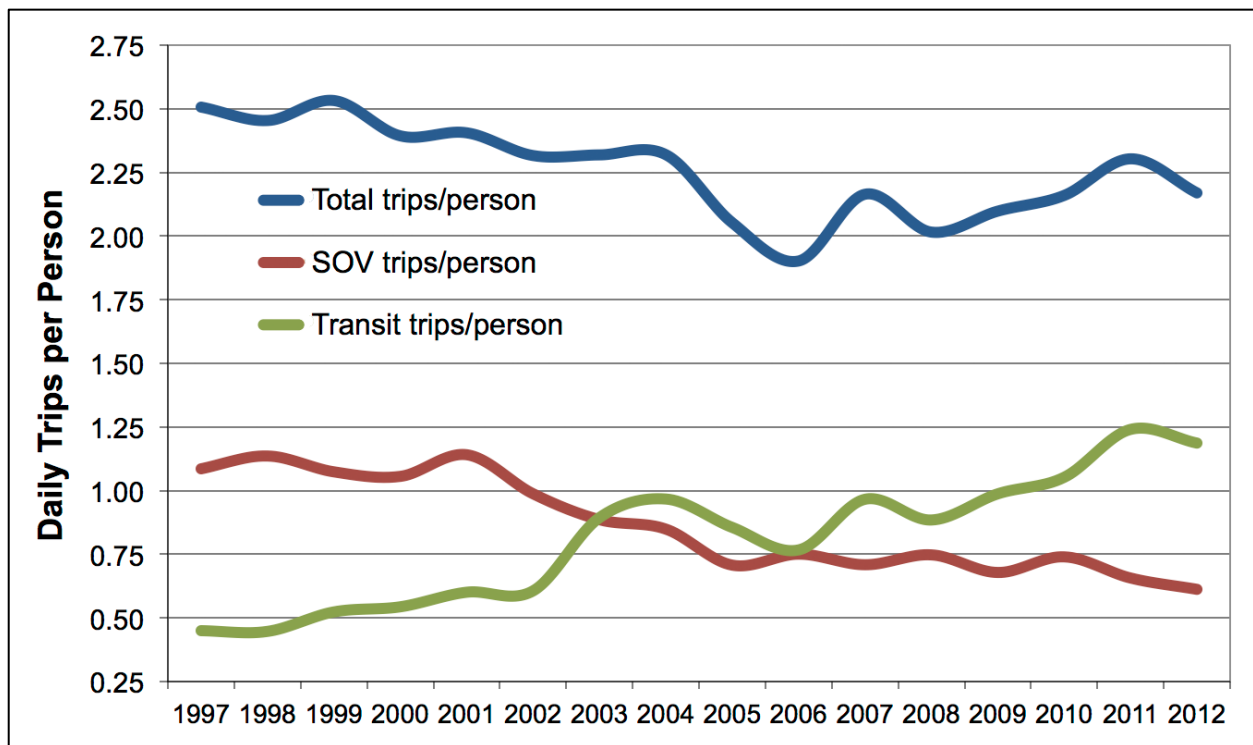
- **Other trips have fluctuated** from year to year. These fluctuations and the overall increase in other trips as compared with 1997 levels are primarily due to fluctuations in numbers of motorcycle trips and light truck trips (trucks with two axes).

Comparing numbers of daily person trips in 1997 and 2012 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 are 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, 2012 vs. 1997

	Trips per Person			
	Fall 1997	Fall 2012	Change	
Single occupant vehicle (SOV)	1.09	0.61	-0.48	-44%
Carpool and vanpool	0.86	0.30	-0.56	-64%
Transit	0.45	1.19	+0.74	+164%
Bicycle	0.06	0.03	-0.03	-56%
Pedestrian	0.03	0.02	-0.01	-53%
Truck and motorcycle	0.02	0.02	0	0
Totals	2.51	2.17	-0.34	-14%

Figure 2.2 – Weekday Trips per Person Across UBC/UEL Screenline, 1997–2012



The average number of trips per person in Fall 2012 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, working and studying on campus. In recent years, UBC has constructed several hundred housing units occupied by staff and faculty, as well as several new student residences.

- 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 2012. The significant change since 1997 has been the increase in the transit mode share, with the result that transit accounts for more than half of all trips to and from UBC, and more than all other modes combined.

Figure 2.3 – Weekday Mode Shares Across UBC/UEL Screenline, 2012 vs. 1997

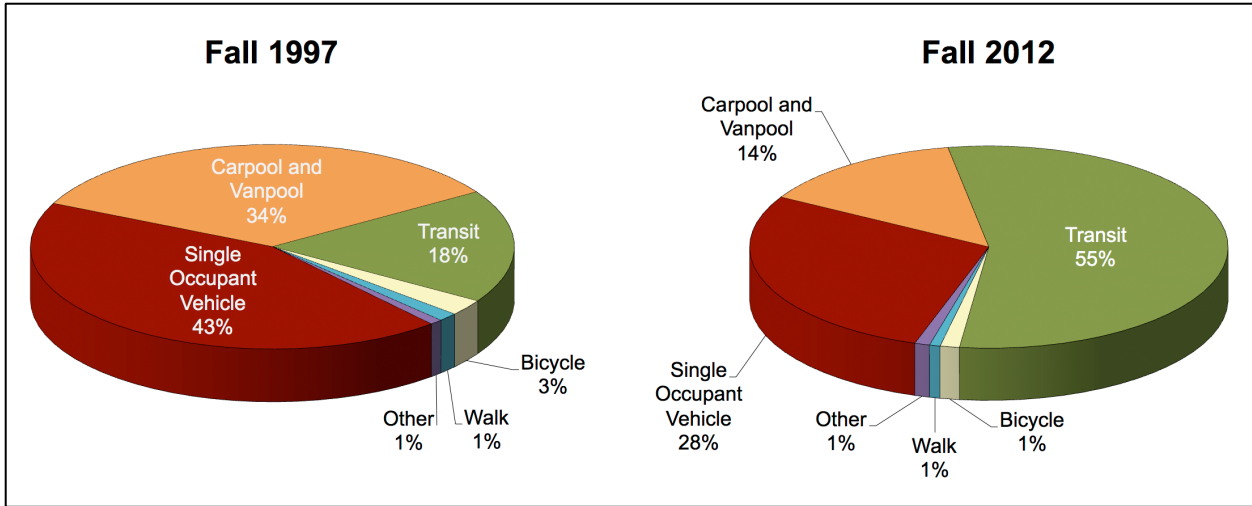
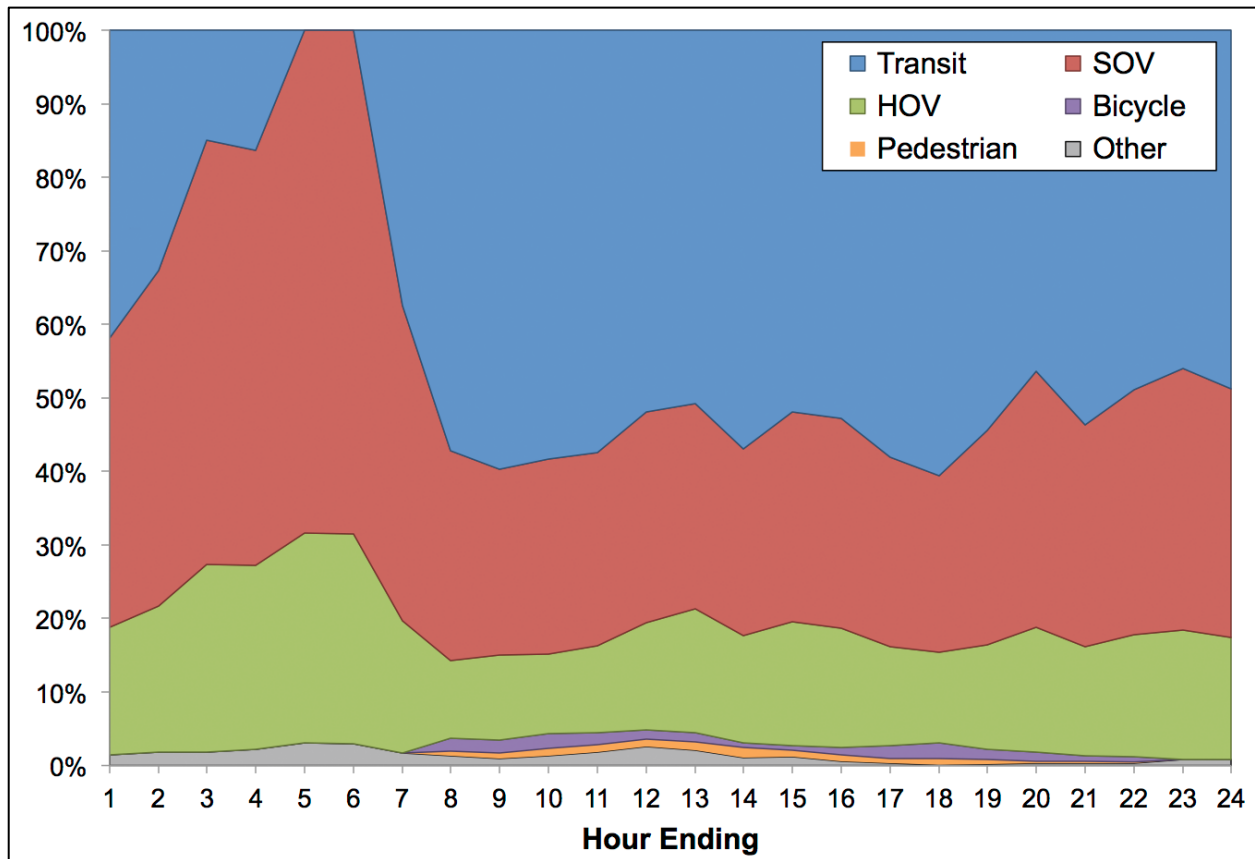


Figure 2.4 illustrates mode shares throughout the day. The transit mode share is highest during the morning from 8:00 to 9:00 a.m., and during the afternoon from 5:00 to 6:00 p.m. During these times, transit accounts for 60% of all trips to and from UBC. As expected, the single-occupant vehicle and carpool 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, 2012



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 2012. Table 2.3 provides a summary of peak hour person trips by mode. Significant observations include:

- Despite a 51% increase in the daytime campus population, the number of trips in the morning peak hour has increased only 13% since 1997. Instead, the morning peak has spread over a longer period of time, due in part to the change to class start times introduced in 2001. In Fall 1997, the morning peak occurred from 8:00 to 9:00 a.m., whereas in Fall 2012 it had spread to a two-hour period from 8:00 to 10:00 a.m.
- 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. Additionally, as with the morning peak period, the afternoon peak period has spread over a longer period of time.

Figure 2.5 – Weekday Person Trips Across UBC/UEL Screenline, 2012 vs. 1997

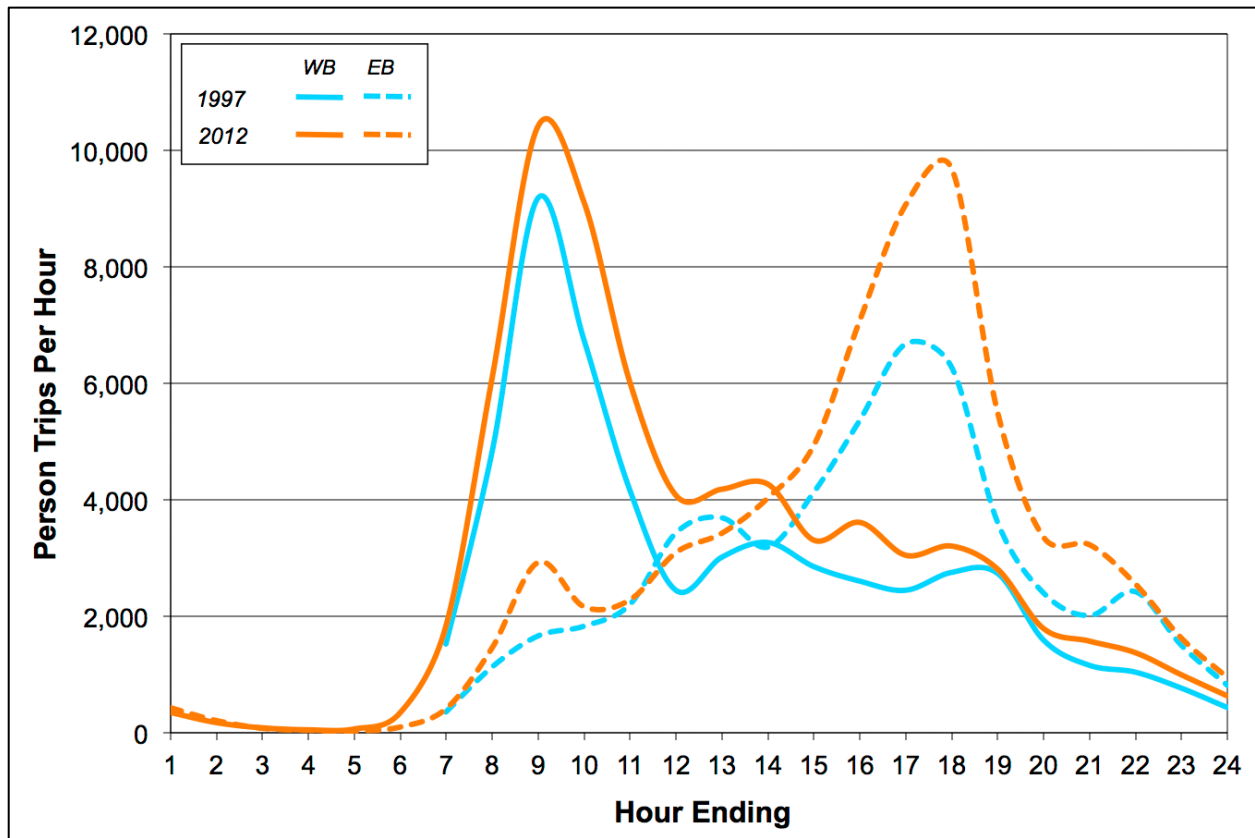


Table 2.3 – Weekday Peak Hour Person Trips Across UBC/UEL Screenline, 2012

	AM Peak Hour 8:45–9:45		PM Peak Hour 5:00–6:00	
	WB	EB	WB	EB
Single occupant vehicle (SOV)	2,210	1,160	1,270	1,820
Carpool and vanpool	1,000	540	290	1,300
Transit	6,750	790	1,520	6,300
Bicycle	210	70	80	190
Pedestrian	90	60	40	70
Truck and motorcycle	120	40	10	10
Totals	10,380	2,660	3,210	9,690

2.4. Traffic

Automobile traffic to and from UBC has decreased substantially — from 62,400 automobiles per weekday in Fall 1997 to 48,300 automobiles per weekday in Fall 2012. This amounts to a 23% reduction in automobile traffic, during the same time that the daytime population on campus increased 51%. Table 2.4 provides a summary of daily traffic volumes.

Table 2.4 – Weekday Automobile Volumes Across UBC/UEL Screenline, 2012 vs. 1997

	Fall 1997	Fall 2012	Change	
SOV vehicles	46,000	39,000	-7,000	-15%
Carpool and vanpool vehicles	16,400	9,300	-7,100	-43%
Total automobiles (SOV + carpool/vanpool)	62,400	48,300	-14,100	-23%

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 2012. Figure 2.6 indicates that the reduction in traffic volumes has occurred at all times of the day, including during both peak periods.

Table 2.5 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 20% lower in Fall 2012 than in 1997. Traffic volumes have decreased or remained the same on all roads leading to UBC, at the UBC/UEL screenline.

Table 2.5 – Distribution of Weekday Traffic Across UBC/UEL Screenline, 2012 vs. 1997

	Motor Vehicles			
	Fall 1997	Fall 2012	Change	
NW Marine Drive	2,040	950	-1,090	-53%
Chancellor Boulevard	11,660	9,360	-2,300	-20%
University Boulevard	14,610	11,360	-3,250	-22%
16 th Avenue	12,880	12,830	-50	-0.4%
SW Marine Drive	23,410	17,290	-6,120	-26%
Totals	64,600	51,800	-12,800	-20%

Figure 2.6 – Weekday Traffic Volumes Across UBC/UEL Screenline, 2012 vs. 1997

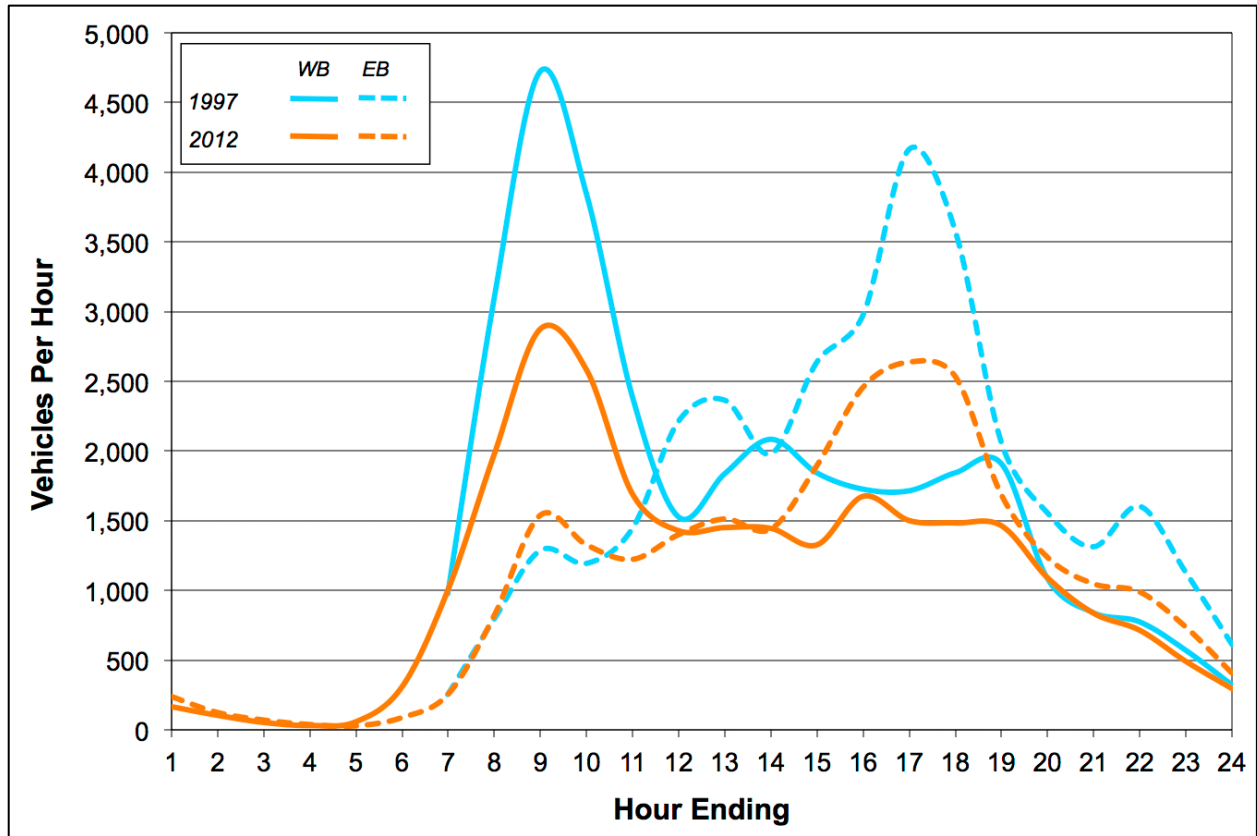
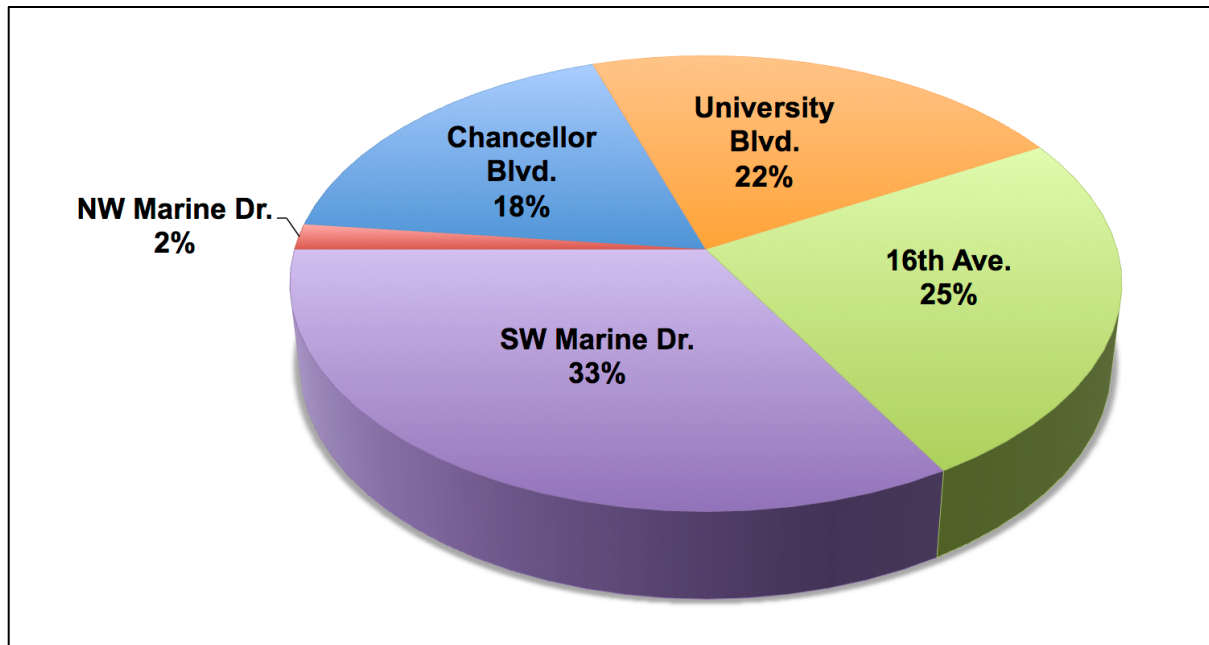


Figure 2.7 – Distribution of Weekday Traffic Across UBC/UEL Screenline, 2012



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 2012 was 1.21 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 2012 was 2.09 persons per vehicle, which reflects a reduced proportion of carpools with three and more persons as compared with Fall 1997.

Table 2.6 – 24-Hour Automobile Occupancies Across UBC/UEL Screenline, 2012 vs. 1997

	Fall 1997	Fall 2012	Change	
Automobiles (<i>SOVs + HOVs</i>)	1.32	1.21	-0.11	-8%
HOVs (<i>Carpools + Vanpools</i>)	2.20	2.09	-0.11	-5%

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. This pattern has been observed in previous years, and is likely the result of some persons travelling to UBC in the morning via transit and leaving campus in the afternoon in carpools, as transit ridership figures indicate 2,100 fewer eastbound transit trips per day from UBC than westbound trips to UBC.

Table 2.7 – Hourly Automobile Occupancies Across UBC/UEL Screenline, 2012

Hour Beginning	Westbound	Eastbound	Both Directions
7:00 a.m.	1.15	1.19	1.16
8:00 a.m.	1.20	1.21	1.20
9:00 a.m.	1.19	1.16	1.18
11:00 a.m.	1.18	1.25	1.21
12:00 p.m.	1.21	1.28	1.25
3:00 p.m.	1.18	1.26	1.23
4:00 p.m.	1.18	1.24	1.22
5:00 p.m.	1.11	1.28	1.21
8-Hour Average	1.17	1.24	1.21

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 in 15 years. Since 1997, ridership has quadrupled, increasing 298% to a total of 75,600 weekday transit trips to and from UBC. The transit mode share tripled from 18% in 1997 to 55% in Fall 2012, and transit now accounts for more than half of all trips to and from UBC.

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 2012, 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, 1997–2012

Weekday Transit Trips	Before U-Pass		After U-Pass		Change from 1997 to 2011	
	Fall 1997	Fall 2002	Fall 2003	Fall 2012		
Person trips	19,000	29,700	45,400	75,600	+56,600	+298%
Trips per person	0.45	0.61	0.89	1.19	+0.74	+164%
Transit mode share	18%	26%	39%	55%	+37 PP	+206%

Figure 3.1 – Transit Trips Across UBC/UEL Screenline, 1997–2012

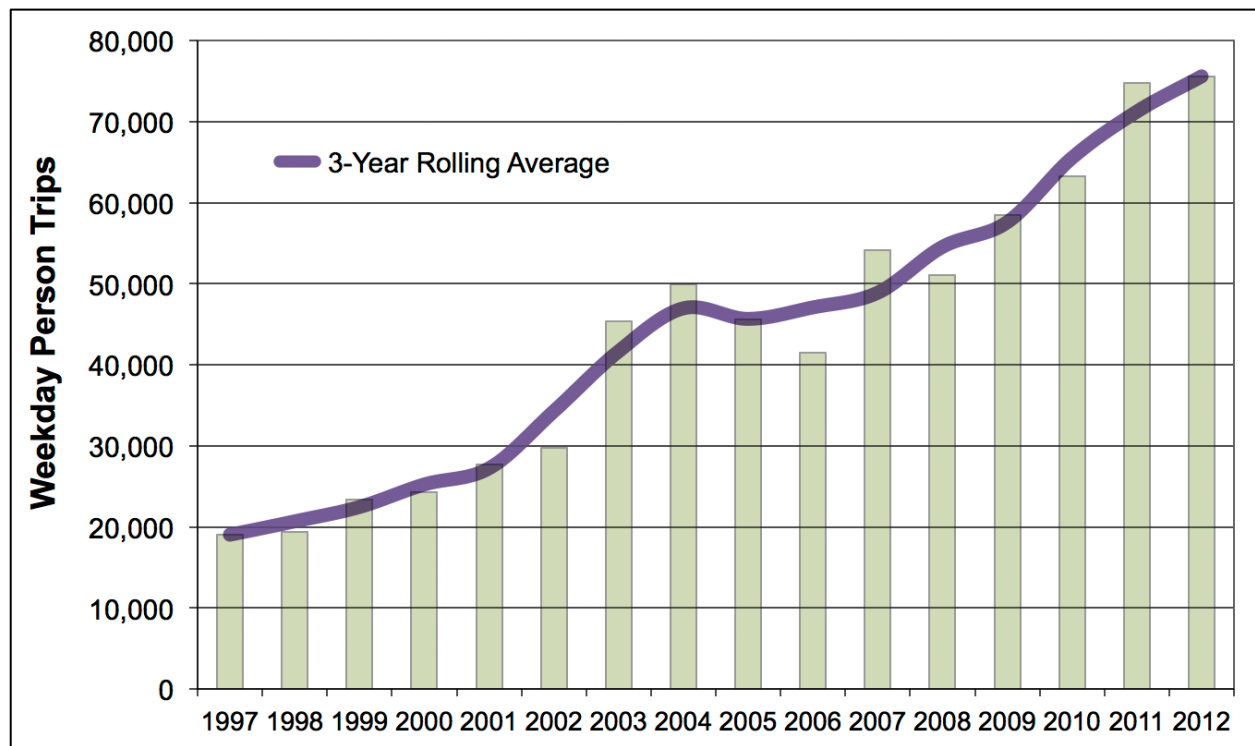


Table 3.2 provides a summary of transit trips by route and by time period, Table 3.3 provides a summary of transit trips by corridor, and Table 3.4 provides a summary of peak hour trips by route. Figure 3.2 compares ridership on bus routes in the UBC Line corridor with total ridership on all routes. Significant observations regarding transit trips include:

- Bus routes via University Boulevard (which includes the Route 99 B-Line service) account for 47% of all transit trips to and from UBC. Bus routes via 16th Avenue and Chancellor Boulevard account for 17% and 13%, respectively, which combined with ridership on University Boulevard means that ridership in the “UBC Line” corridor amounts to 77% of all transit trips. Bus routes via Southwest Marine Drive (the majority of which use 41st Avenue in the City of Vancouver) account for the remaining 23% of all transit trips.
- The Route 99 B-Line accounts for 34% of all transit trips. During the morning and afternoon peak hours it accounts for 28% and 33% of ridership, respectively. The lower share of peak period trips 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.
- Express bus services (Routes 43, 44, 84, 258 and 480) account for 24% of all transit trips to and from UBC. Adding the Route 99 B-Line increases this to 58% of all transit trips.
- Trolley bus Routes 4, 9 and 17 account for 12% of all transit trips.

Table 3.2 – Weekday Transit Trips Across UBC/UEL Screenline by Route, 2012

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	390	1,250	750	830	90	3,310	4.4%
9	Broadway	440	350	580	120	0	1,490	2.0%
14/N17	Broadway	540	1,540	980	1,060	160	4,280	5.7%
25	King Edward	1,840	3,050	1,680	1,310	10	7,890	10.4%
33	16 th Avenue	770	1,910	1,350	830	0	4,860	5.2%
41	41 st Avenue	940	2,720	1,390	1,260	30	6,340	8.4%
43	41 st Ave. limited stop	1,100	880	1,230	310	0	3,520	4.7%
44	4 th Ave. limited stop	1,090	2,210	940	460	0	4,700	6.2%
49	49 th Avenue	710	840	1,290	380	0	3,220	4.3%
84	4 th Ave. limited stop	1,010	2,070	1,450	670	0	5,200	6.9%
99	Broadway B-Line	3,450	9,280	7,270	5,600	200	25,800	34.1%
258	North Shore express	190	30	240	0	0	460	0.6%
480	Richmond express	670	1,800	1,340	550	0	4,360	5.8%
NIS	Not In Service	90	30	10	20	0	150	0.2%
Totals		13,230 17.5%	27,960 37.0%	20,500 27.1%	13,400 17.7%	490 0.6%	75,580	100%

Table 3.3 – Weekday Transit Trips Across UBC/UEL Screenline by Corridor, 2012

Corridor	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		
Chancellor Blvd.	2,100	4,280	2,390	1,140	0	9,910	13.1%
University Blvd.	5,070	12,470	9,820	7,610	450	35,420	46.9%
16 th Ave.	2,610	4,970	3,040	2,140	10	12,770	16.9%
SW Marine Dr.	3,450	6,240	5,250	2,510	30	17,480	23.1%
Totals	13,230 17.5%	27,960 37.0%	20,500 27.1%	13,400 17.7%	490 0.6%	75,580	100%

Table 3.4 – Weekday Peak Hour Transit Trips Across UBC/UEL Screenline, 2012

Route		AM Peak Hour Westbound 8:45–9:45 a.m.		PM Peak Hour Eastbound 4:45–5:45 p.m.	
4	4 th Avenue	170	2.5%	200	3.3%
9	Broadway	190	2.8%	170	2.7%
14/N17	Broadway	270	4.1%	310	4.9%
25	King Edward	1,090	16.1%	560	8.9%
33	16 th Avenue	560	8.3%	460	7.3%
41	41 st Avenue	720	10.7%	460	7.3%
43	41 st Ave. limited stop	560	8.3%	560	9.0%
44	4 th Ave. limited stop	510	7.6%	360	5.7%
49	49 th Avenue	340	5.1%	320	5.05
84	4 th Ave. limited stop	410	6.0%	500	7.9%
99	Broadway B-Line	1,610	23.8%	1,920	30.5%
258	North Shore express	40	0.5%	50	0.7%
480	Richmond express	280	4.2%	430	6.8%
NIS	Not In Service	0	0%	0	0%
Totals		6,750	100%	6,300	100%

Figure 3.2 – Transit Trips Across UBC/UEL Screenline, 2002–2012

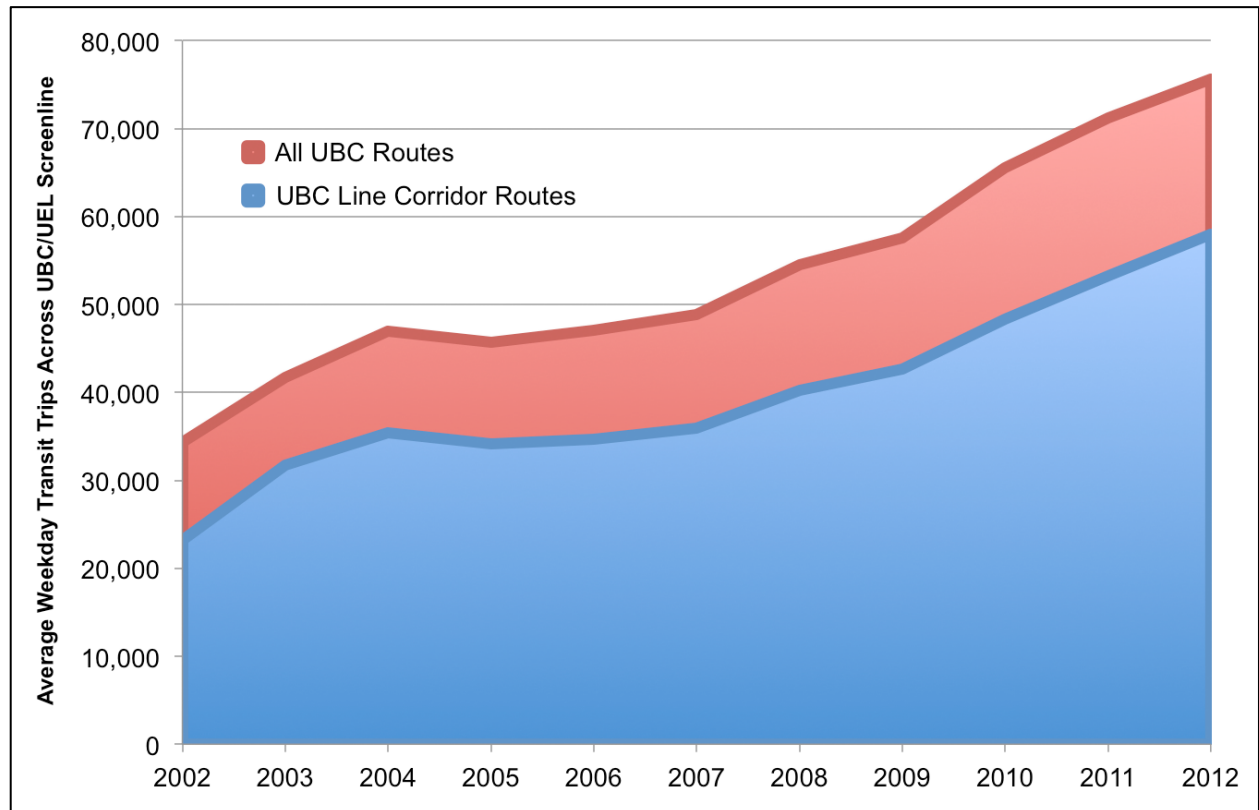


Figure 3.3 provides a comparison of westbound ridership to UBC during the morning peak hour with the capacity of transit services, represented by numbers of seats on buses. An additional 30% has been added to the numbers of seats in Figure 3.3 to reflect peak hour standing capacity, consistent with TransLink service design guidelines. The key observation is that transit capacity increased in tandem with ridership up to 2010, but has not increased significantly since 2010 while ridership continues to increase.

Figure 3.3 – Transit Capacity vs. Ridership Across UBC/UEL Screenline, 2002–2012

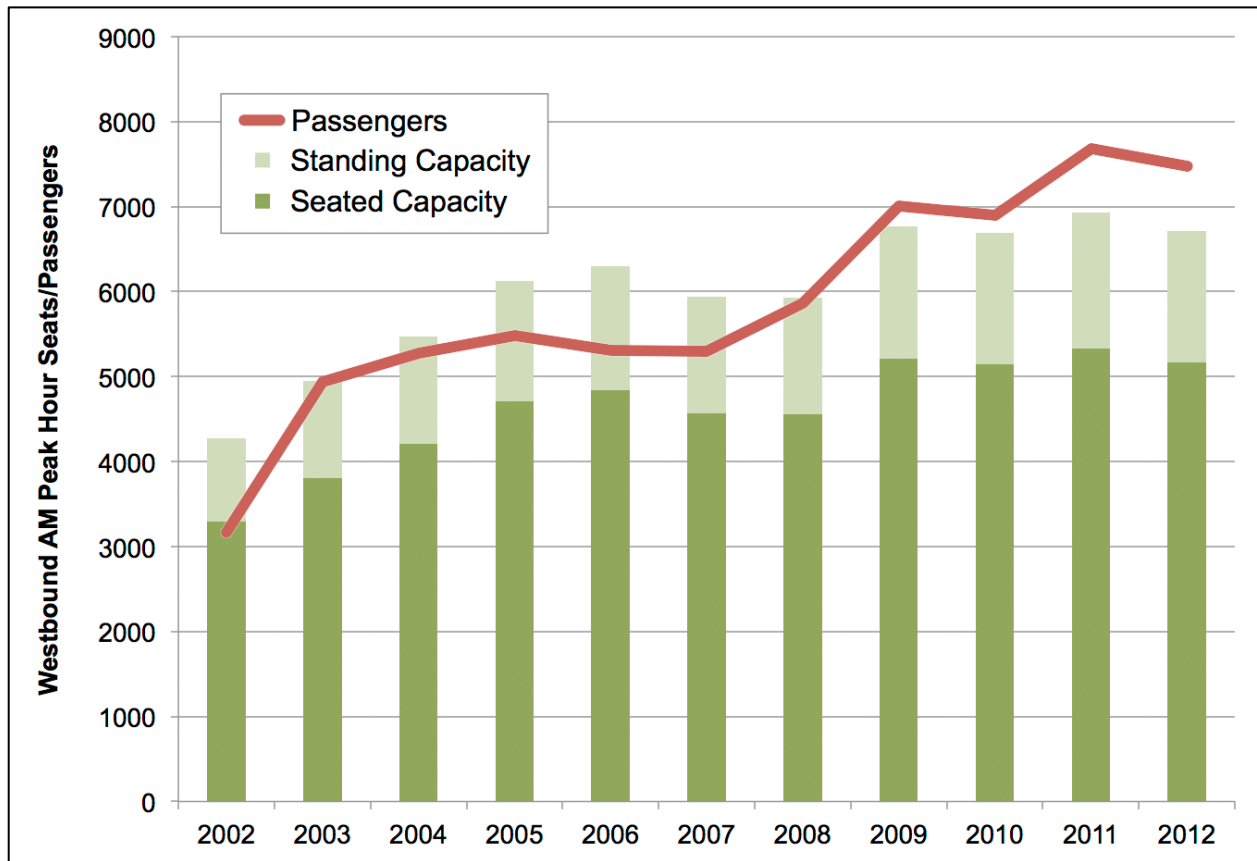
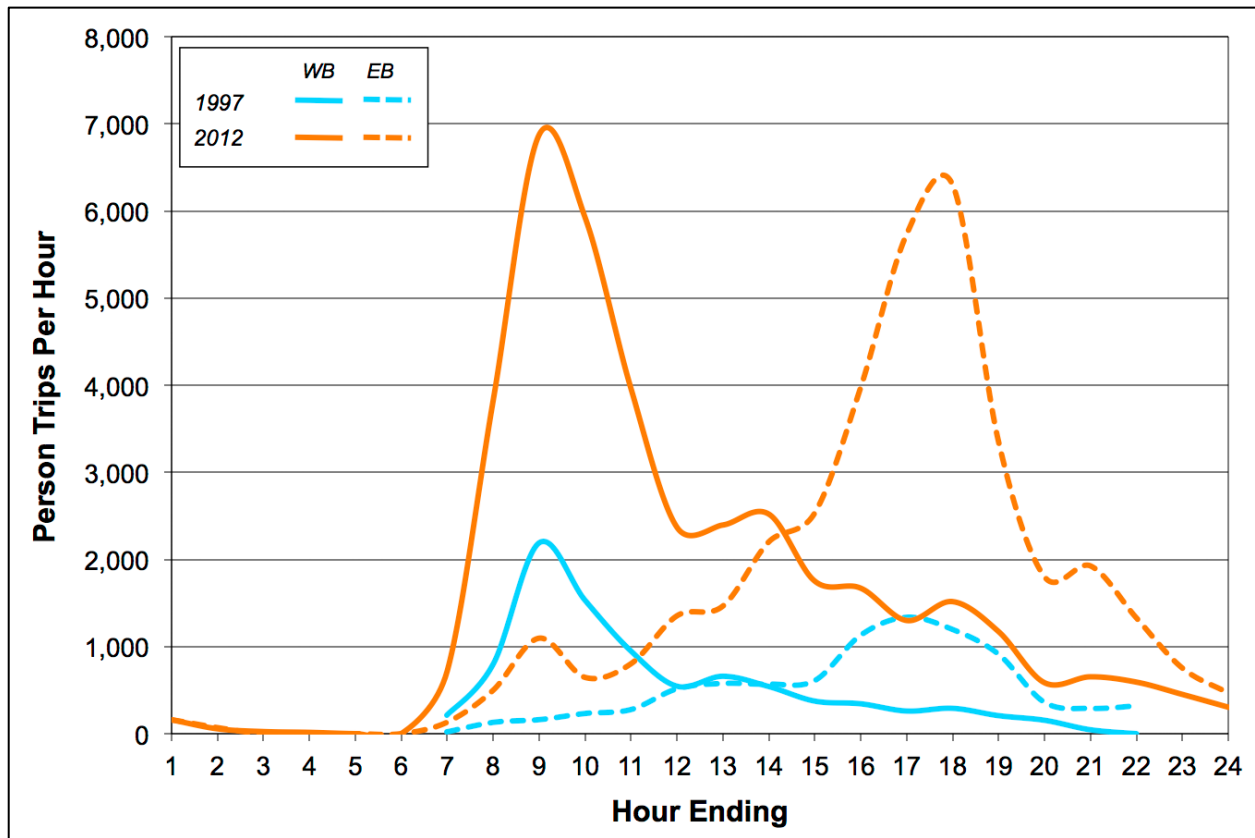


Figure 3.4 illustrates the arrival and departure patterns of transit trips to and from UBC throughout the day, including a comparison with Fall 1997 transit trips. Not only does this illustrate the significant increase in transit ridership since 1997, but it also illustrates the shift of the morning peak hour from 8:00 to 9:00 a.m. in 1997 to 8:45 to 9:45 a.m. in 2012. Peak period ridership has spread over a longer time period, particularly in the morning. This shift in the peak hour and spreading of peak demand 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 at that time, 12% more transit trips per day were accommodated on the same number of buses as a result of the spreading of the morning peak period.

Figure 3.4 – Transit Trip Patterns Across UBC/UEL Screenline, 2012 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 2012, there was an average of 0.61 SOV trips per person. This represents a 44% decrease from the Fall 1997 level of 1.09 SOV trips per person, and exceeds the STP policy of at least a 30% decrease.

Table 3.5 provides a comparison of SOV travel in Fall 1997 and Fall 2012, and Figure 3.5 provides a summary of year-by-year changes.

Table 3.5 – SOV Trips Across UBC/UEL Screenline, 2012 vs. 1997

Weekday SOV Trips	Fall 1997	Fall 2012	Change	
Person trips	46,000	39,000	-7,000	-15%
Trips per person	1.09	0.61	-0.48	-44%
SOV mode share	43%	28%	-15 PP	-35%

Figure 3.5 – SOV Trips Across UBC/UEL Screenline, 1997–2012

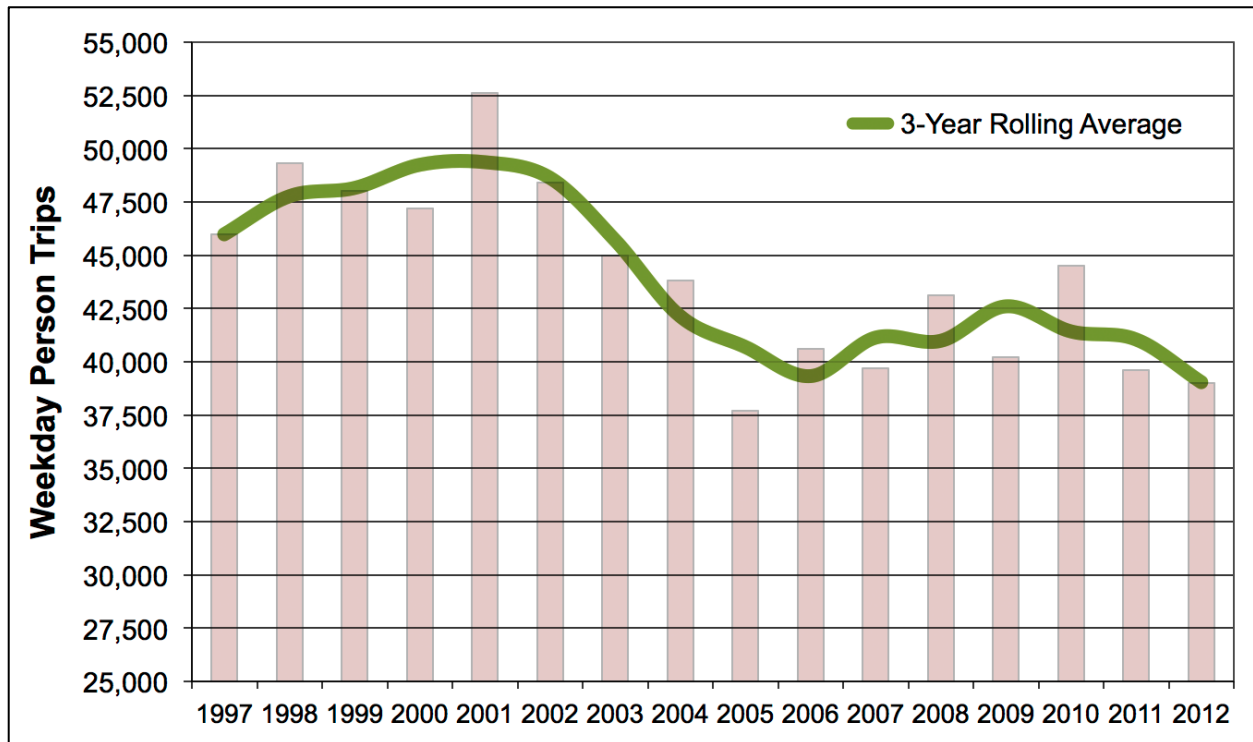
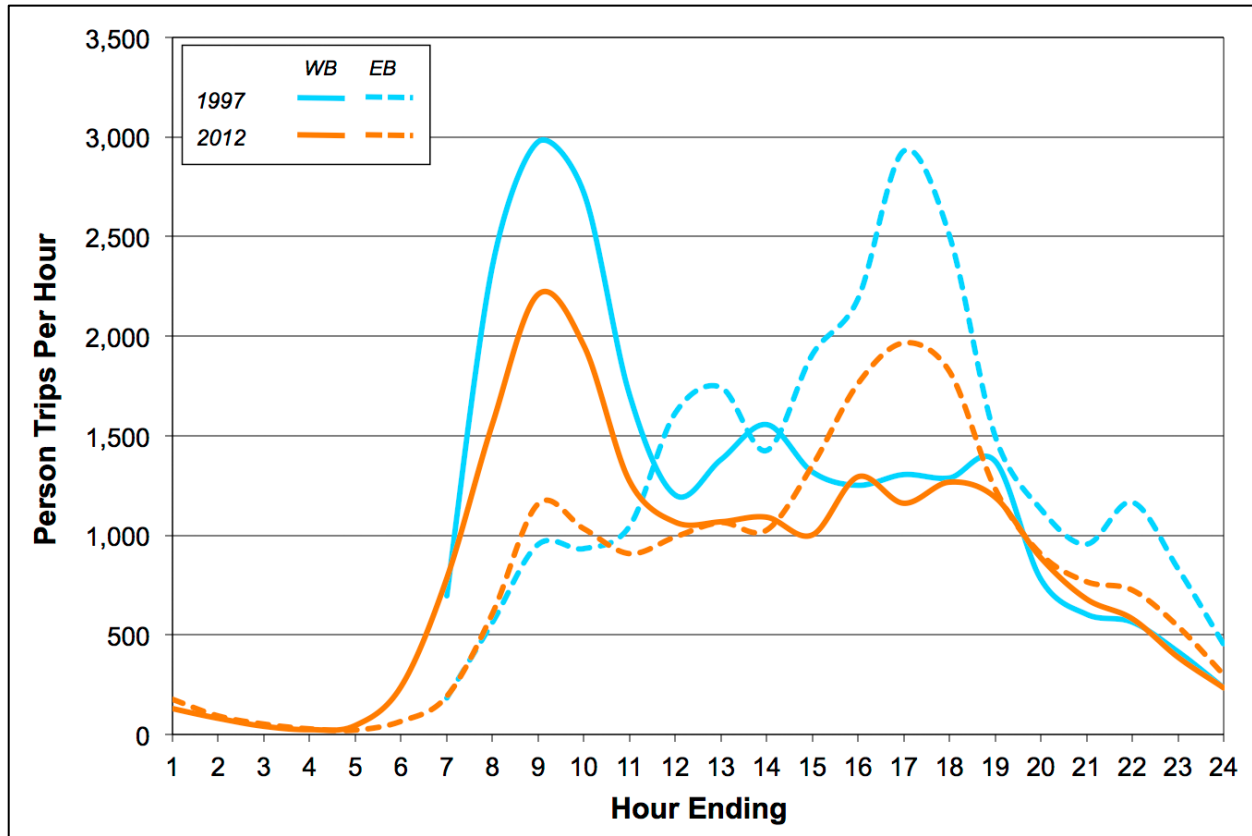


Figure 3.6 illustrates the arrival and departure patterns of SOV trips to and from UBC throughout the day, including a comparison with Fall 1997 SOV trips. The significant decreases in SOV trips are during peak periods in the peak directions — westbound in the morning and eastbound in the afternoon.

Figure 3.6 – SOV Trip Patterns Across UBC/UEL Screenline, 2012 vs. 1997

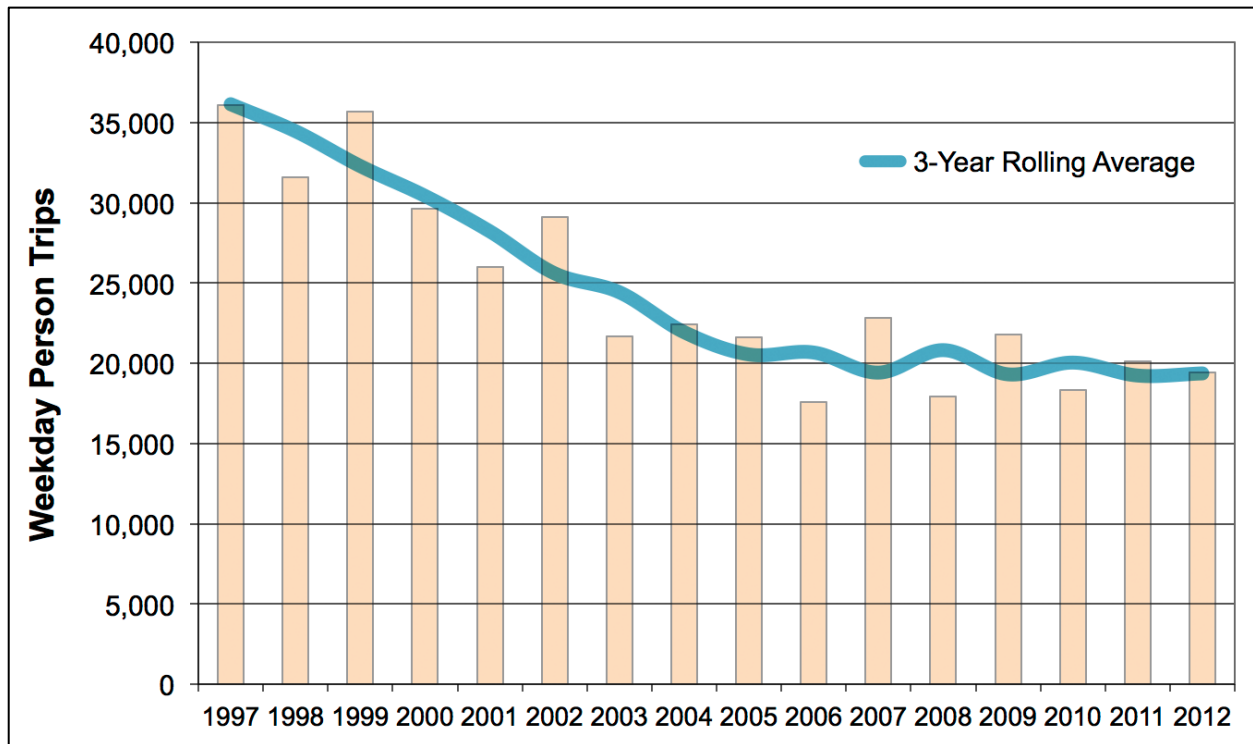


Carpooling has decreased substantially since 1997. Daily carpool and vanpool trips declined from 36,100 in Fall 1997 to 19,400 in Fall 2012, and the carpool and vanpool mode share declined from 34% to 14% during the same time. Table 3.6 provides a summary of the trend in carpool and vanpool travel from Fall 1997 to Fall 2012, and Figure 3.7 provides a summary of year-by-year changes.

Table 3.6 – Carpool and Vanpool Trips Across UBC/UEL Screenline, 2012 vs. 1997

Weekday Carpool/Vanpool Trips	Fall 1997	Fall 2012	Change	
Person trips	36,100	19,400	-16,700	-46%
Trips per person	0.86	0.30	-0.56	-64%
HOV mode share	34%	14%	-20 PP	-59%

Figure 3.7 – Carpool and Vanpool Trips Across UBC/UEL Screenline, 1997–2012



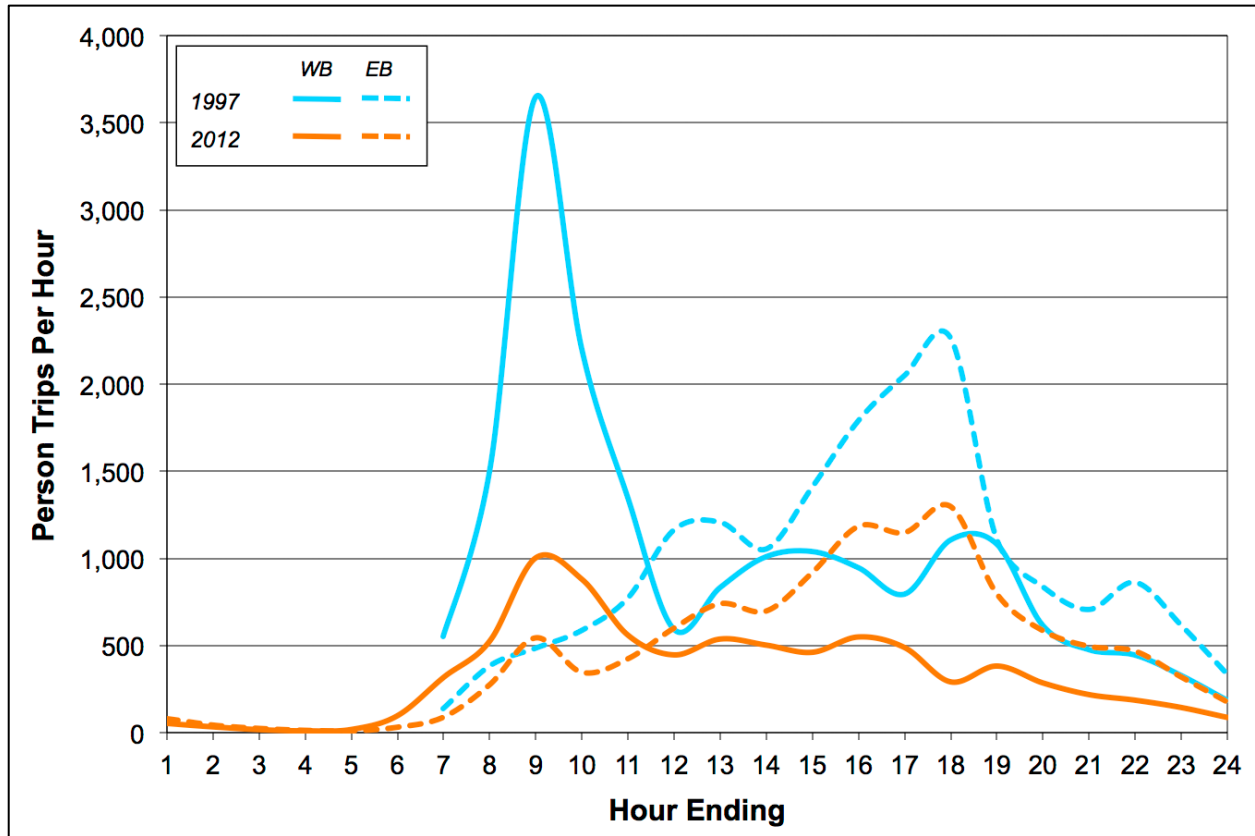
Since 1997, the proportion of carpools with three or more persons has decreased, with a corresponding increase in the proportion of two-person carpools. This has resulted in a reduction in the average carpool/vanpool vehicle occupancy from 2.20 persons per vehicle in Fall 1997 to 2.09 persons per vehicle in Fall 2012.

Figure 3.8 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 3.8 – Carpool/Vanpool Trip Patterns Across UBC/UEL Screenline, 2012 vs. 1997

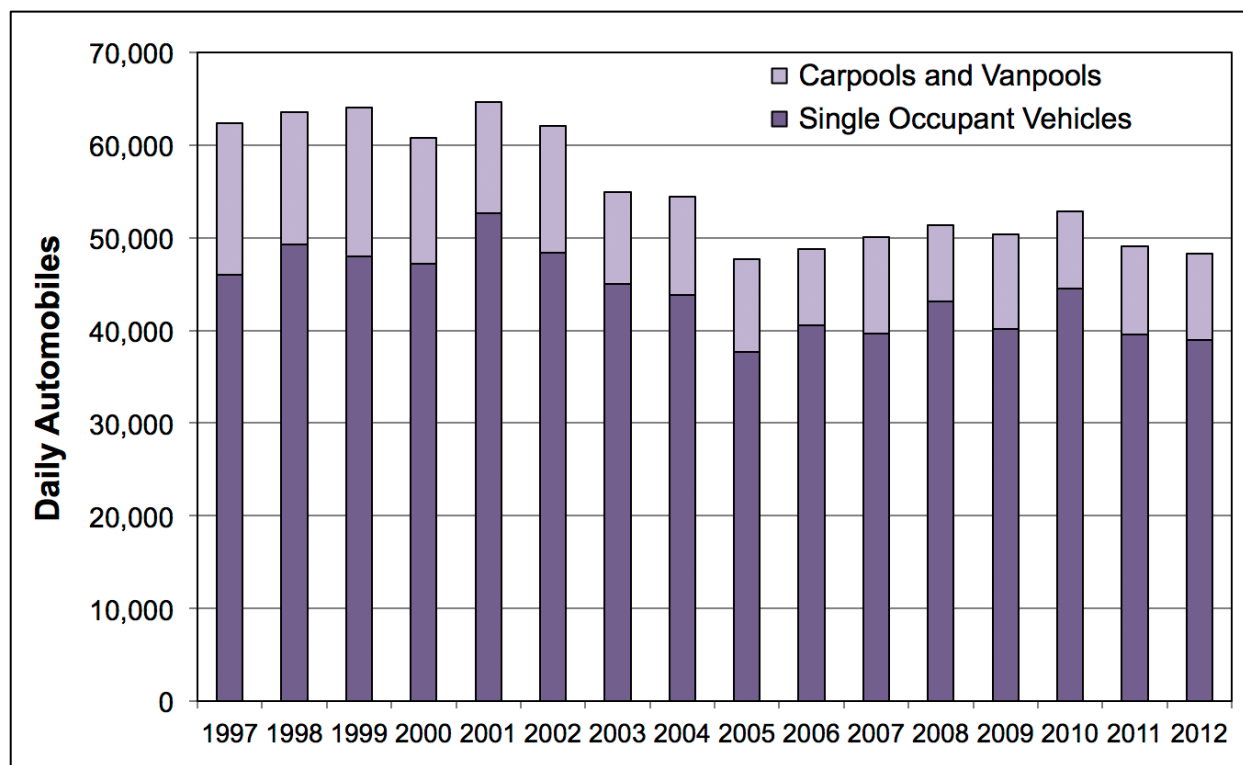


- The additional time involved in picking up or dropping of carpool partners adds significantly to commute times.
- Having to wait at work or school until the scheduled departure time, rather than being able to leave when ready.

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 2012, daily automobile traffic was 48,300 automobiles per day — 14,100 less than the 1997 level of 62,400 automobiles per day. Figure 3.9 provides a summary of the trend in daily automobile traffic volumes from 1997 to 2012.

Figure 3.9 – Weekday Automobile Volumes Across UBC/UEL Screenline, 1997–2012



3.3. Bicycles and Pedestrians

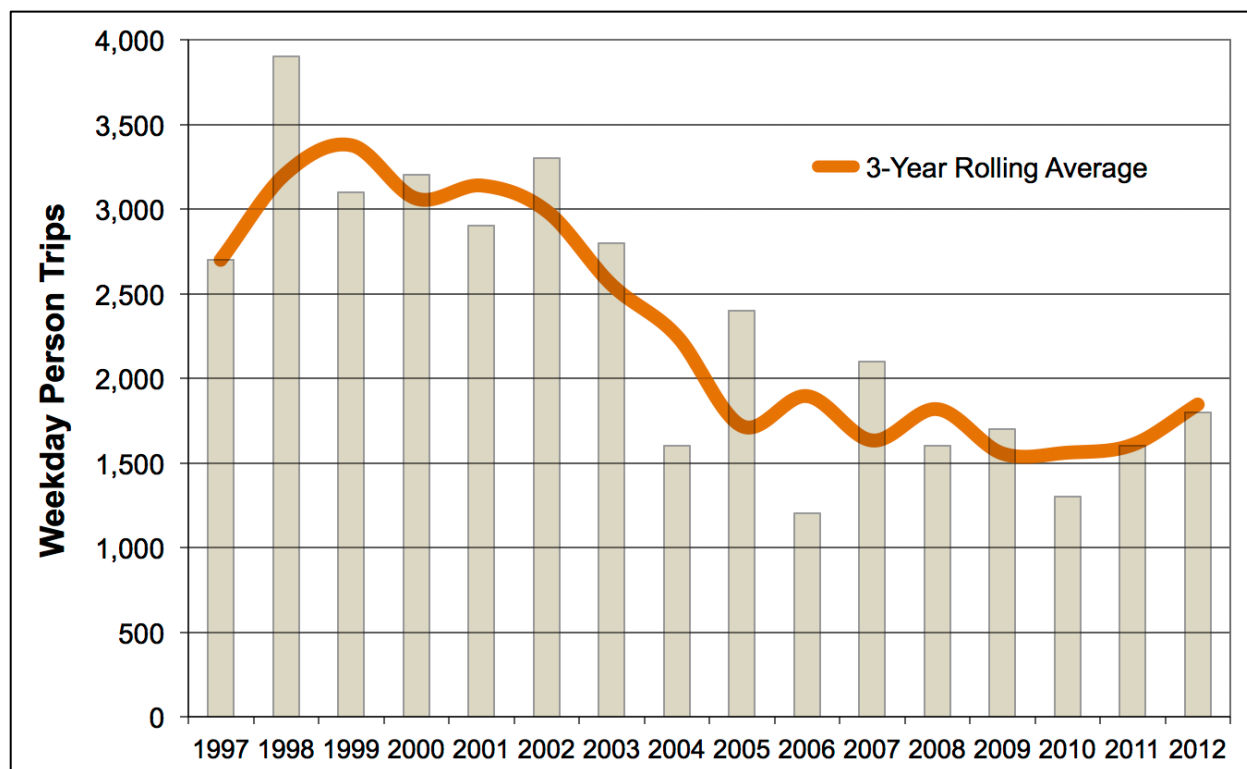
Prior to Fall 2004, cycling trips to and from UBC ranged from 2,700 to 3,900 trips per day. In Fall 2004, cycling trips dropped to 1,600 trips per day. In Fall 2012, cycling trips were 1,800 trips per day, reflecting a slight increase from 2004 levels.

Table 3.7 and Figure 3.10 provide summaries of the trend in bicycle trips from Fall 1997 to Fall 2012. Figure 3.11 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 3.7 – Bicycle Trips Across UBC/UEL Screenline, 1997– 2012

Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change from 1997 to 2011	
	Fall 1997	Fall 2002	Fall 2004	Fall 2012		
Person trips	2,700	3,300	1,600	1,800	-900	-33%
Trips per person	0.06	0.07	0.03	0.03	-0.03	-56%
Bicycle mode share	2.5%	2.9%	1.3%	1.3%	-1.2 PP	-49%

Figure 3.10 – Bicycle Trips Across UBC/UEL Screenline, 1997–2012



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 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 3.8 provides a summary of the numbers of bicycles on racks on buses. A total of 201 bicycles were observed in one day, representing an average of one bicycle in every tenth rack, or one bicycle per 20 rack spaces (0.05 bicycles per rack space). The most popular route for cyclists to travel with their bicycles was the 99 B-Line, and the highest use of bicycle racks was on Route 44.

Table 3.8 – Weekday Bicycles on Buses Across UBC/UEL Screenline, 2012

	Route													Totals
	4	9	14 N17	25	33	41	43	44	49	84	99	258	480	
Bicycles	8	2	18	13	4	10	6	32	3	20	75	1	9	201
Buses with racks	131	80	206	204	127	253	92	87	123	183	471	12	112	2081
Bikes per rack space	0.03	0.01	0.04	0.03	0.02	0.02	0.03	0.18	0.01	0.06	0.08	0.04	0.04	0.05

Figure 3.11 – Bicycle Trip Patterns Across UBC/UEL Screenline, 2012 vs. 1997

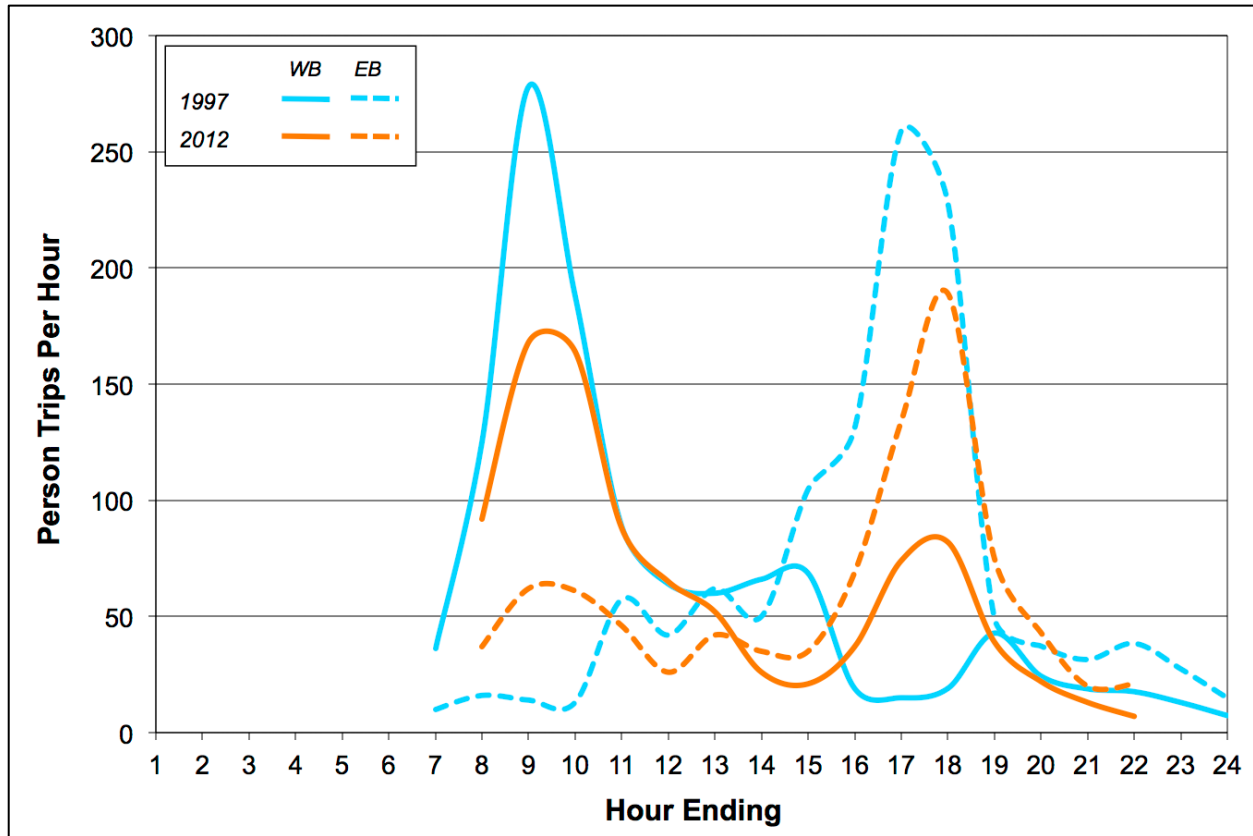
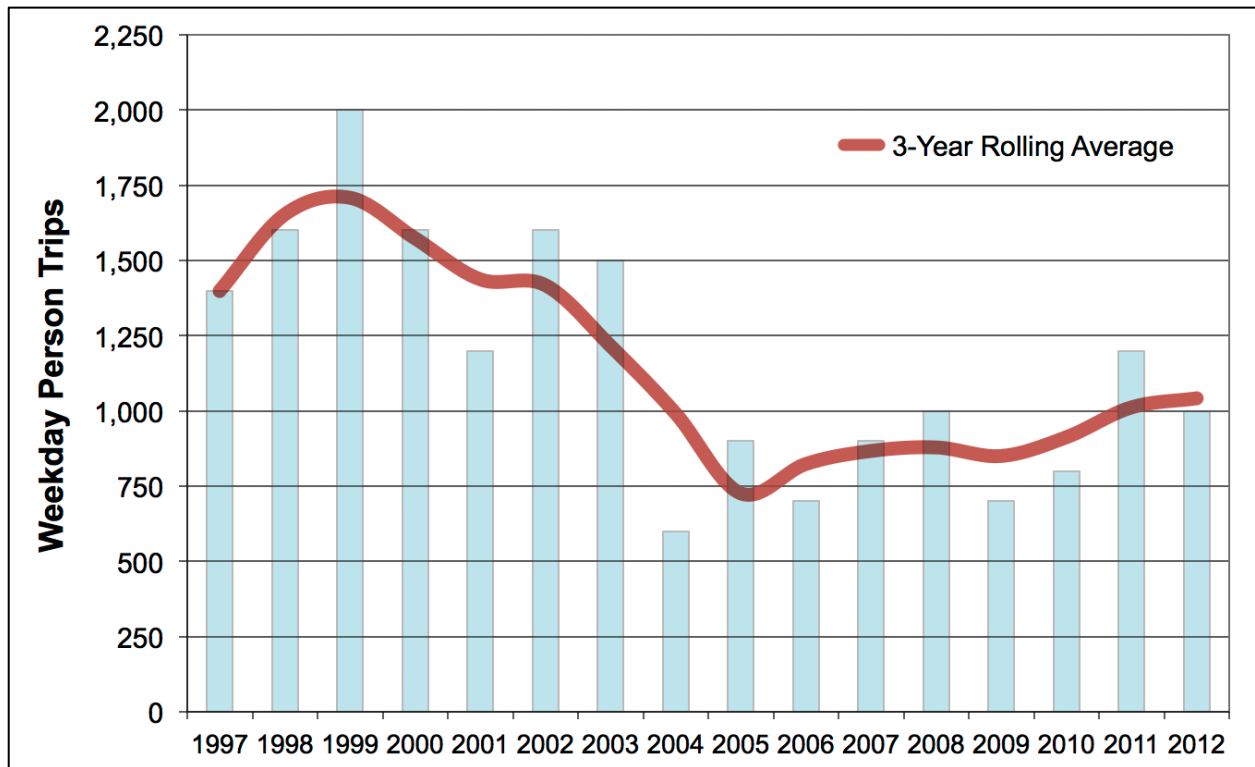


Table 3.9 provides a summary of the trend in pedestrian trips from Fall 1997 to Fall 2012, and Figure 3.12 illustrates year-by-year changes. Figure 3.13 illustrates the arrival and departure patterns of pedestrian trips to and from UBC throughout the day, including a comparison with Fall 1997 pedestrian trips.

Table 3.9 – Pedestrian Trips Across UBC/UEL Screenline, 1997–2012

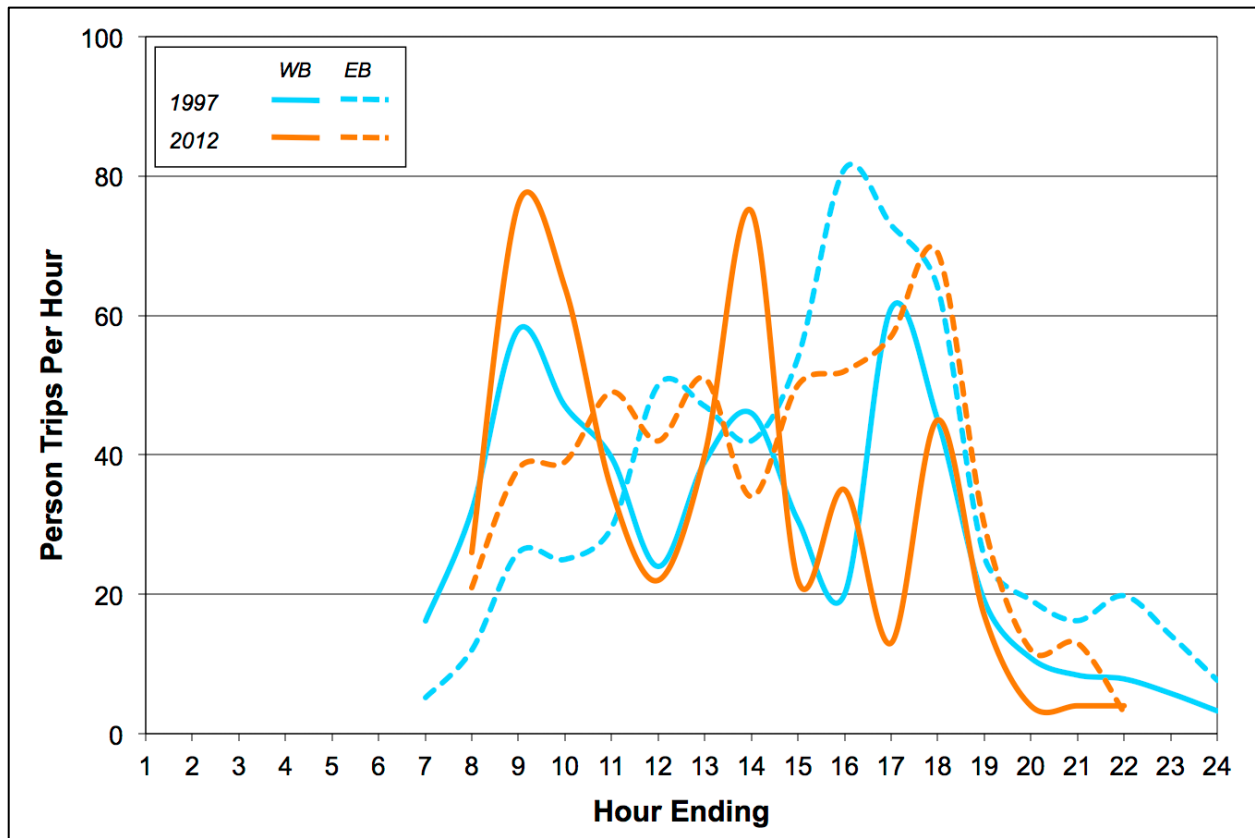
Weekday Pedestrian Trips	Before U-Pass		After U-Pass		Change from 1997 to 2011	
	Fall 1997	Fall 2002	Fall 2004	Fall 2012		
Person trips	1,400	1,600	600	1,000	-400	-29%
Trips per person	0.03	0.03	0.01	0.02	-0.01	-53%
Pedestrian mode share	1.3%	1.4%	0.5%	0.7%	-0.6 PP	-45%

Figure 3.12 – Pedestrian Trips Across UBC/UEL Screenline, 1997–2012



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 (as with bicycle trips, this decrease did not occur immediately following U-Pass implementation, but rather a year later in 2004). Prior to the student U-Pass program, walking trips to and from UBC ranged from 1,400 to 2,000 trips per day. In Fall 2004, walking trips dropped to 600 trips per day, but subsequently increased to 1,000 trips per day by Fall 2012.

Figure 3.13 – Pedestrian Trip Patterns Across UBC/UEL Screenline, 2012 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, which apply to all trucks with a gross vehicle weight (GVW) of more than 10,000 kg. Trucks with three or more axles exceed the 10,000 kg specified in the City of Vancouver’s bylaws, and consequently for the purposes of monitoring travel patterns to and from UBC, heavy trucks are defined 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 2012, in March, June, September and December. Table 3.10 provides a summary of average numbers of heavy trucks in 2012, and Figure 3.14 illustrates numbers of trucks observed in each of the four quarterly counts.

Table 3.10 – Average Heavy Truck Trips Across UBC/UEL Screenline, 2012

Route	Type of Truck		Totals
	Construction	Non-Construction	
Chancellor Boulevard	32.3	5.2	37.5
University Boulevard	10.3	19.0	29.3
16 th Avenue	39.5	14.3	53.8
SW Marine Drive and 41 st Avenue	304.0	47.0	351.0
Totals	386.1	85.5	471.6

An average of 472 heavy truck trips per day were observed crossing the UBC/UEL screenline in 2011. Of these, an average of 386 trips were construction trucks, representing 82% 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 2012 were:

- 79% via SW Marine Drive and 41st Avenue.
- 8% via Chancellor Boulevard/4th Avenue.
- 23% via University Boulevard/10th Avenue.
- 10% 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 3.14 – Heavy Truck Trips Across UBC/UEL Screenline, 2012

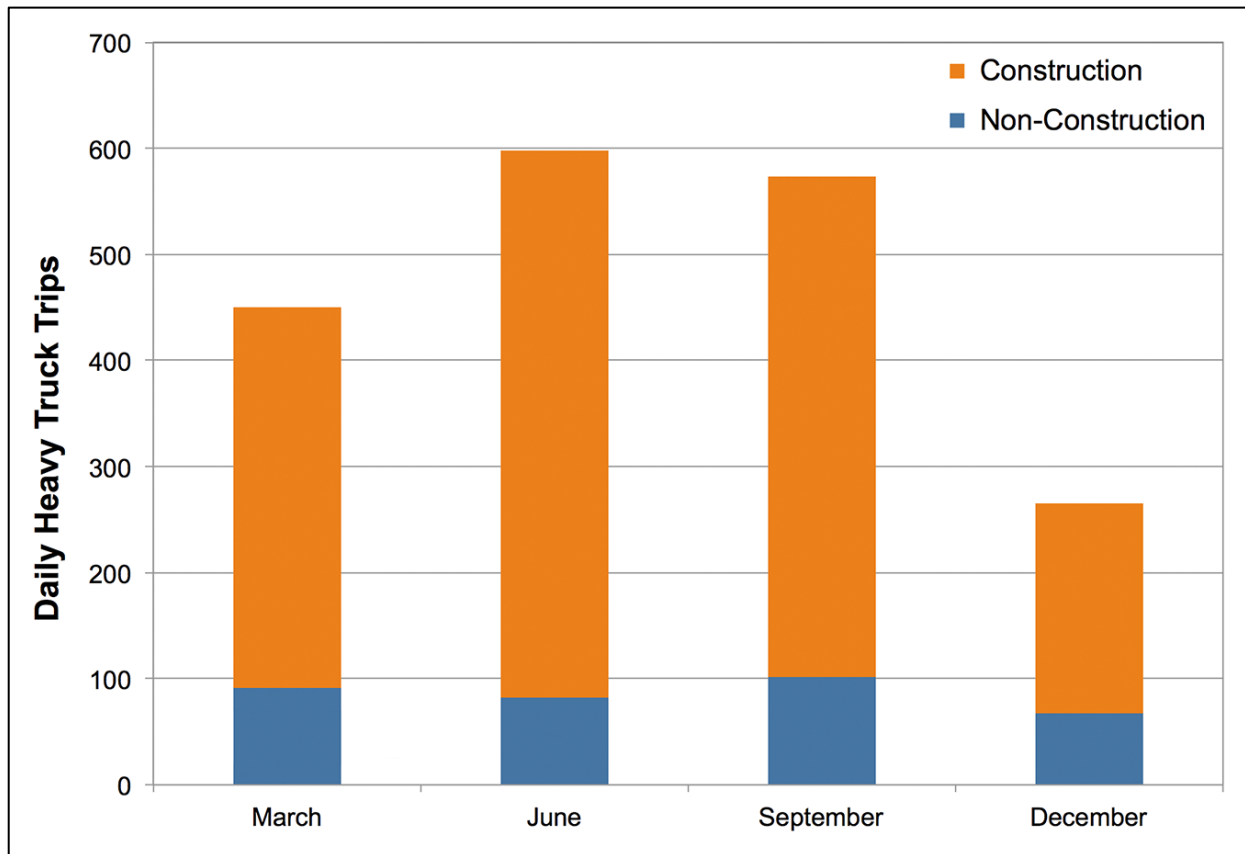


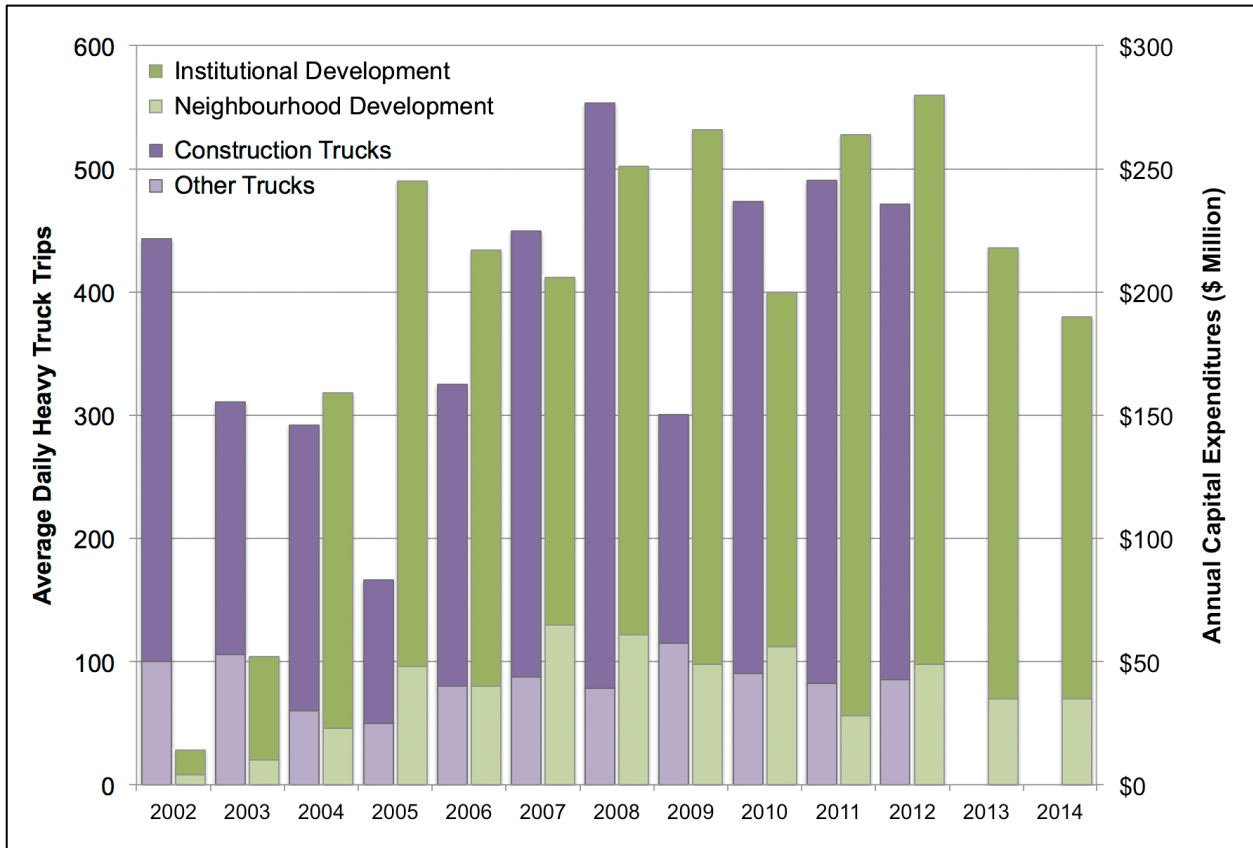
Figure 3.15 provides a comparison of average daily truck trips with annual capital expenditures, for the period from 2002 through 2012. Projected capital expenditures for 2012 through 2014 are also included.

Peak years for construction truck activity do not directly correspond to peak years of capital expenditures. Rather, peak years for construction trucks precede peak years for capital expenditures. This is because excavation at the beginning of a project creates considerable truck activity but does not incur much cost, whereas at the end of a project, finishing activities incur considerable cost but do not generate many truck trips.

Figure 3.15 illustrates that:

- The majority of truck trips are construction trucks. For the period from 2002 through 2012, construction trucks amounted to an average of 304 trips per day, representing 78% of all heavy truck trips. Other trucks amounted to an average of 85 trips per day.
- The majority of construction is institutional development, amounting to 80% of actual and projected capital expenditures. Neighbourhood development amounts to only 20% of capital expenditures.

Figure 3.15 – Heavy Truck Trips and Capital Expenditures, 2002–2014



4. CONDITIONS ON CAMPUS

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

4.1. Traffic Speeds

Traffic speeds were recorded at ten locations on campus, as illustrated in Figure 4.1 and as summarized in Tables 4.1 and 4.2. The indicated speeds 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.

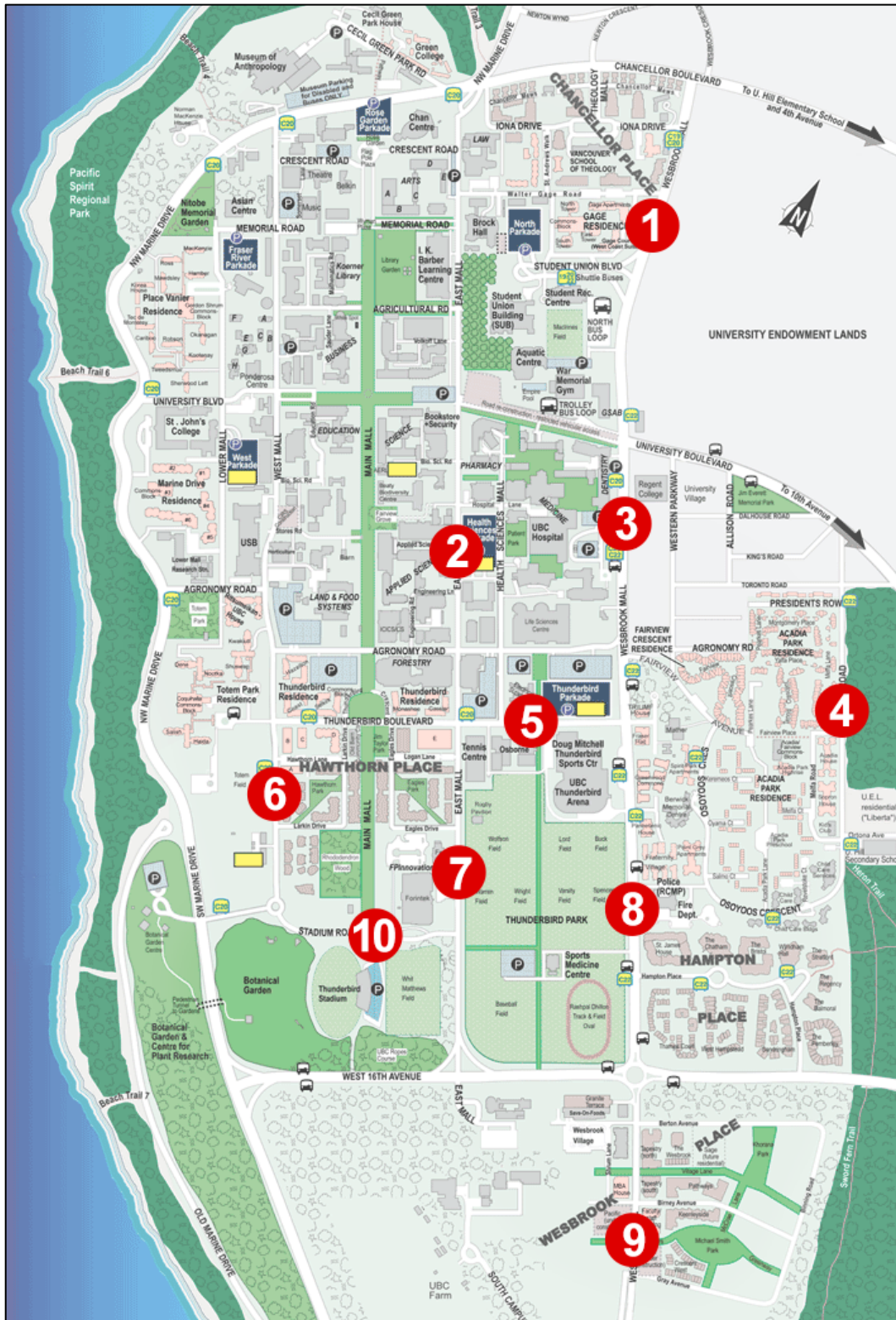
Table 4.1 – Average Daily 85th Percentile Traffic Speeds (km/h), 2008–2012

Location		Eastbound/Northbound				
		Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012
1	Wesbrook Mall s/o Gage	62.0	–	59.2	–	59.0
2	East Mall n/o Agronomy	–	40.6	–	37.8	–
3	Wesbrook Mall s/o University	59.2	–	53.6	–	55.5
4	Acadia Rd s/o Toronto	–	46.8	–	46.5	–
5	Thunderbird Blvd w/o Wesbrook	51.1	45.0	46.1	48.1	48.3
6	West Mall s/o Thunderbird	30.2	37.6	38.8	35.9	37.7
7	East Mall s/o Thunderbird	66.2	53.7	58.1	58.0	58.3
8	Wesbrook Mall n/o Hampton	58.8	57.0	56.8	57.7	50.9
9	Wesbrook Mall s/o 16 th Ave.	–	–	36.0	36.0	36.7
10	Stadium Rd at Main Mall	–	–	–	–	37.2

Table 4.2 – Average Daily 85th Percentile Traffic Speeds (km/h), 2008–2012

Location		Westbound/Southbound				
		Fall 2008	Fall 2009	Fall 2010	Fall 2011	Fall 2012
1	Wesbrook Mall s/o Gage	57.2	–	54.2	–	54.3
2	East Mall n/o Agronomy	–	39.4	–	37.9	–
3	Wesbrook Mall s/o University	56.8	–	51.5	–	57.9
4	Acadia Rd s/o Toronto	–	43.5	–	44.5	–
5	Thunderbird Blvd w/o Wesbrook	48.3	38.8	44.1	54.1	46.7
6	West Mall s/o Thunderbird	37.4	38.5	38.0	41.0	38.5
7	East Mall s/o Thunderbird	67.6	59.5	58.9	65.1	65.6
8	Wesbrook Mall n/o Hampton	62.4	58.6	58.2	58.5	55.7
9	Wesbrook Mall s/o 16 th Ave.	–	–	35.2	36.6	39.5
10	Stadium Rd at Main Mall	–	–	–	–	37.4

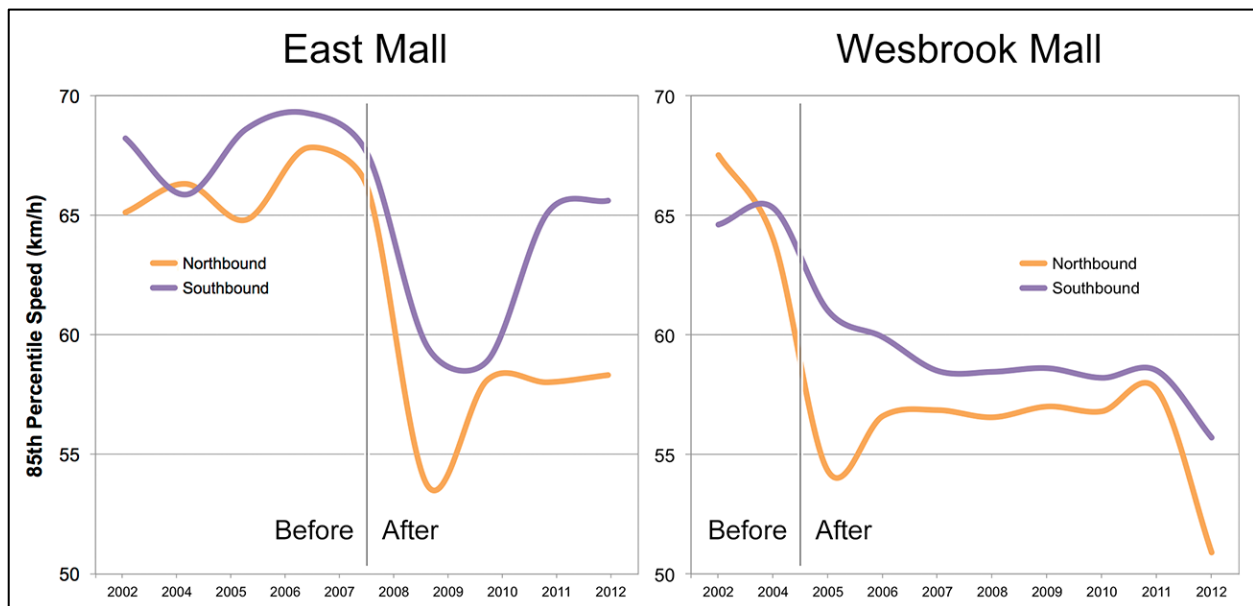
Figure 4.1 – Traffic Speed Count Locations, 2008–2012



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. As indicated in Figure 4.2, the road diet on Wesbrook Mall has been effective in reducing traffic speeds, as has the road diet on East Mall for northbound traffic. Southbound traffic speeds on East Mall had initially decreased a similar amount, but in Fall 2011 the recorded southbound speeds increased by more than 6 km/h to over 65 km/h, and remained at this level in Fall 2012.

Figure 4.2 – Traffic Speeds Before and After Road Diets



4.2. Traffic Through Wesbrook Place

To determine origins and destinations of traffic on Wesbrook Mall between 16th Avenue and SW Marine Drive, a licence plate trace was conducted over a 12-hour period from 7:00 a.m. to 7:00 p.m. This involved recording licence plates at locations along Wesbrook Mall, and matching them to determine where each vehicle began and ended its trip.

The results of the licence plate trace are illustrated in Figure 4.3 and summarized in Table 4.3. Destinations along Wesbrook Mall are grouped into “neighbourhood” (which includes all destinations in the Wesbrook Place neighbourhood north of the greenway) and “research” (which includes all destinations south of the greenway). Buses are not included in the numbers of vehicles in Figure 4.3 and Table 4.3.

Figure 4.3 – Traffic on Wesbrook Mall between 16th Avenue and SW Marine Drive, 2012

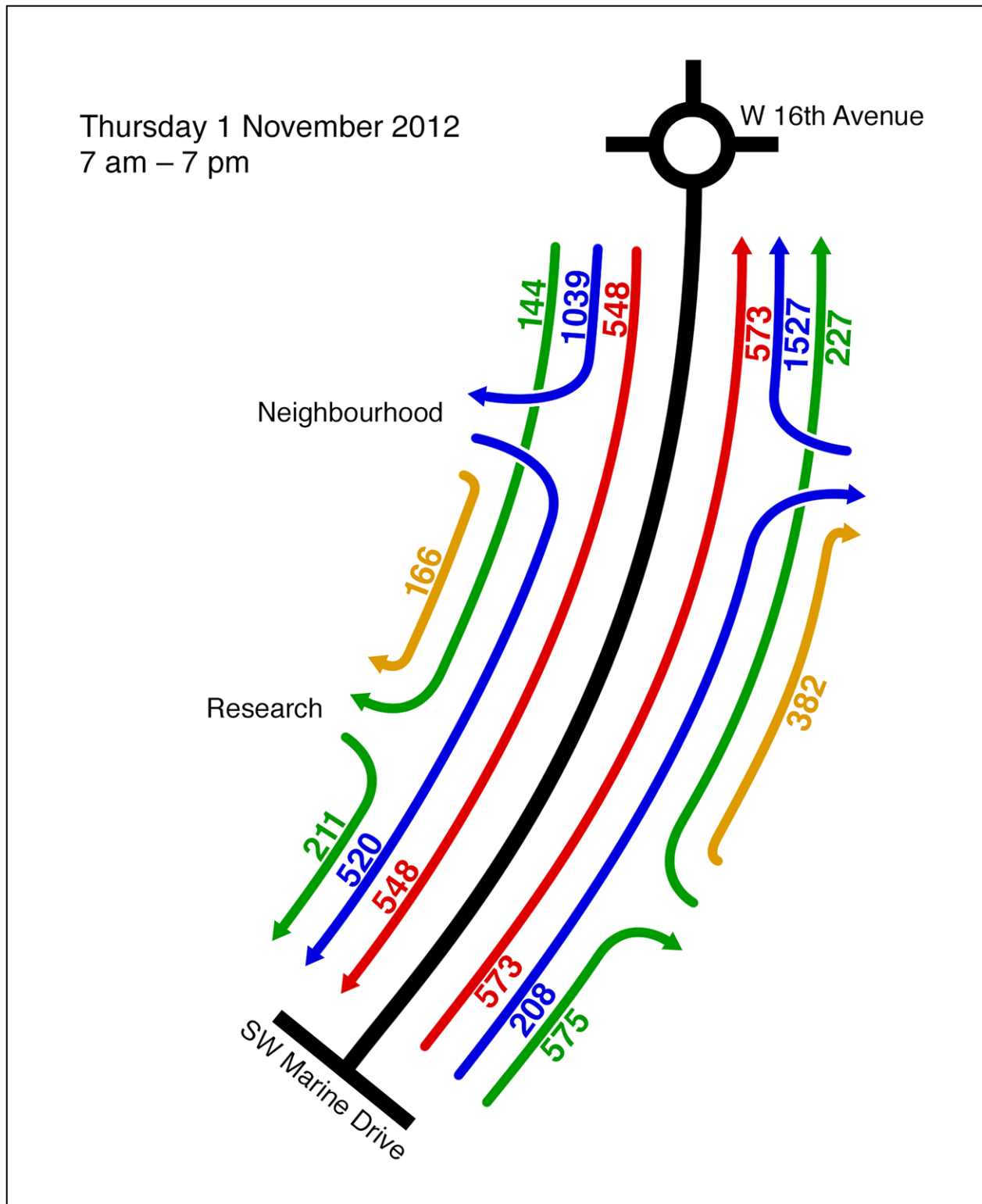


Table 4.3 – Traffic on Wesbrook Mall between 16th Avenue and SW Marine Drive, 2012

Southbound at 16 th Avenue			Northbound at SW Marine Drive		
Destination	Vehicles		Destination	Vehicles	
Neighbourhood	1039	60%	Neighbourhood	208	15%
Research precinct	144	8%	Research precinct	575	43%
SW Marine Drive	548	32%	16 th Avenue	573	42%
Total	1,731	100%	Total	1,356	100%

Vehicles that do not originate in and are not destined for the neighbourhood or research precinct are considered through traffic and are indicated in red in Figure 4.3. The significant finding from the licence plate trace is that through traffic represents 36% of all observed vehicles, and amounts to more than 1,100 vehicles between 7:00 a.m. and 7:00 p.m.

Traffic originating in or destined to the Wesbrook Place neighbourhood accounts for 40% of all vehicles, and traffic to and from the research precinct accounts for the remaining 24%.