UBC Vancouver Transportation Status Report Fall 2015

March 2016

campus + community planning
transportation planning

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

1. Introduction

Consistent with its sustainability goals, UBC wishes to reduce automobile trips to and from the UBC Vancouver campus, and encourage the use of other modes of transportation, including transit, carpooling, cycling and walking. To date, UBC has implemented several initiatives in support of non-automobile modes of transportation, including a student U-Pass program and bicycle parking facilities.

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.

This Fall 2015 Transportation Status Report presents the most recent data that UBC has collected. This report provides a picture of overall travel trends, and details of travel patterns for each mode of transportation to and from UBC as well as an overview of transportation at UBC.

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 (STP).** 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, identified in later sections of this report, provide the context for the annual monitoring exercise documented in this report.

1.2. Transportation Monitoring Program

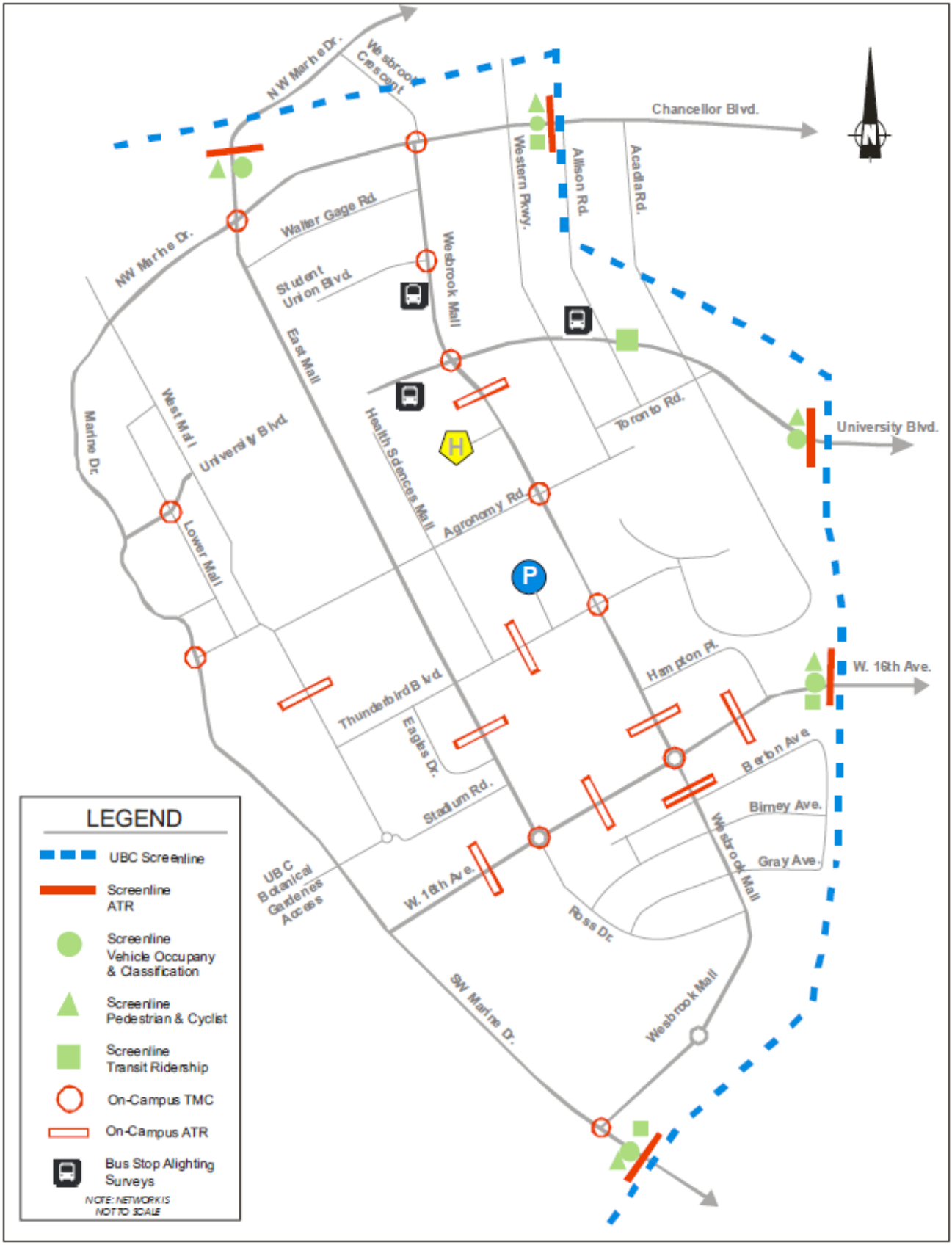
Travel patterns to and from UBC are monitored on an on-going basis through a variety of different data collection methods. Data is collected each Fall to enable consistent year to year comparisons of travel patterns, mode shares, and traffic volumes. Additional data collection activities may be undertaken at other times of the year to obtain information regarding specific modes of travel, seasonal variations and localized traffic volumes. The annual monitoring results are used to assess progress towards meeting the STP goals and also helps guide future implementation priorities.

Data collection activities for 2015 are summarized in ***Table 1.1***, and data collection locations are illustrated in ***Figure 1.1***.

Table 1.1: Summary of 2015 Transportation Data Collection

Data Collection Activity	Locations	Description
Intersection Counts	At intersections throughout campus.	Manual observation for 8 hours (3hrs in AM, 2hrs in Midday, 3hrs in PM) for one day.
Campus Traffic / Speed Counts	Roads throughout campus.	Automatic tube counters on roads for 7 days (24 hours / day).
Screenline Traffic Counts	Screenlines	Automatic tube counters on roads for 7 days (24 hours / day).
Transit Ridership	Screenlines	Manual observation from 6:00AM to 4:30AM for one day.
Vehicle Occupancy & Classification	Screenlines	Manual observation for 8 hours (3hrs in AM, 2hrs in Midday, 3hrs in PM) for one day.
Bicycle and Pedestrian Counts	Screenlines	Manual observation for 15 hours over one day.
Heavy Trucks	Screenlines	Manual observation for 13 hours (6:00AM to 7:00PM) for one day each quarter.
Licence Plate Surveys	South Campus / Wesbrook Village	Licence plate surveys are conducted to understand travel patterns.

Figure 1.1: Data Collection Locations



1.3. Changes at UBC Affecting Travel Patterns

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

- **Population.** The daytime population at UBC has increased 58% in the 18 years since 1997. This includes increased student enrolment and associated increases in faculty and staff. 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 2015.

  It is important to also note that the estimate of campus population is challenging. It is dependent on the means by which the data is collected and grouped and is impacted by the increasing trend in online courses and expanding residential campus community. However, efforts are made to allow for consistent cross comparison in the status reports.

Table 1.2: Daytime Population at UBC, 2015 vs. 1997

Group	Fall 1997	Fall 2015	Increase (count / percentage)	
Students	33,200	52,720	+19,520	+59%
Staff	7,250	10,590	+3,340	+46%
Faculty	1,850	3,530	+1,680	+91%
Totals	**42,300**	**65,840**	**+24,540**	**+58%**

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 $35 per month. The U-Pass offers students unlimited access to TransLink Bus, SkyTrain and SeaBus services (all zones), and discounted West Coast Express fares. For the 2016 year, the Compass Card will be in effect, which will replace the U-Pass card.
- **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 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. Recent TransLink ridership data suggests routes to UBC carry the highest passenger volumes in the region.
- **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 almost 3,500 commuter parking stalls on campus since 1997 — a reduction in the commuter parking supply of over 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 have increased from $2.00 in 1997 to $14.00 in 2015, and prices for parking permits and other parking on campus have also increased. In addition, UBC has worked with other agencies to restrict parking in the neighbourhoods and roadways adjacent to UBC, particularly 16th Avenue and SW Marine Drive.
- **Bicycle facilities.** Since 1997, new bicycle lanes have been implemented on several roadways on campus and to / from campus. Most notable was 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, bicycle racks are provided at each building, in addition to bike lockers, bike cages and numerous end of trip facilities.
- **Alternative modes of travel.** UBC has encouraged the use of non-single occupancy vehicle (SOV) modes of travel through a range of programs, including a comprehensive transportation demand management strategy that includes transit discount programs, carpooling, car sharing, cycling, on campus shuttles, 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 for students, staff, and faculty on-campus as a means of reducing the proportion of persons who travel to UBC from off-campus. 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 this report to describe various characteristics of travel patterns and trends at UBC:

- A **screenline** is an imaginary line across which trips are recorded. At UBC, the screenline around the campus illustrated by the dotted blue line in ***Figure 1.1***. As shown, there are approximately five different entry and exit options.
- **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 and trucks.
- The data presented in the Transportation Status Report include **traffic volumes** and **person trips**. Traffic volumes are simply the number of vehicles passing a point, whereas person trips are the number of people passing a point 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 this report, unless otherwise stated all reported trips are in **person trips.***
- The population at UBC — students, staff, faculty and residents —has increased every year from 1997. 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 distinguish changes in travel patterns from changes due to population increase, 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 (full and part time), as reported by UBC's Planning and Institutional Research department. Numbers of on-campus residents are not included in the population count, in many cases it could be a double count as a result of many staff, faculty and students living on campus.
- Substantial effort and cost are required to collect travel data at UBC. Consequently, it is neither 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). Traffic data on all routes leading to and from UBC are collected over a period of one week using automatic counters placed on the roadway. 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 8 hours from the morning peak through the afternoon peak periods. Daily totals can be estimated by combining occupancy and classification data with the average daily traffic data.

- **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.

1.5. More Information

The following resources provide additional information regarding travel patterns and trends at UBC, as well as transportation services and facilities. All this information can be found at UBC's Campus and Community Planning website:

- This Fall 2015 Transportation Status Report, along with several recent Transportation Status Reports.
- The 2005 Strategic Transportation Plan.
- A review of the first 18 months of the student U-Pass program and the results of the Community Transportation Pass (ComPASS) demonstration project.
- Information on other transportation facilities and services on campus.
- Information regarding campus plans and neighbourhood plans.

2. Summary of Transportation at UBC

The following sections present a general summary of transportation to and from UBC including person trips, trips per person, mode share, and vehicle occupancy. Details for each different mode of transportation are presented in ***Section 3.***

2.1. Person Trips

The average weekday person trips to and from UBC in Fall 2015 was 139,400. A summary and comparison of daily person trips by mode from the Fall of 1997 to the Fall of 2015 are provided in ***Table 2.1*** and ***Figure 2.1***.

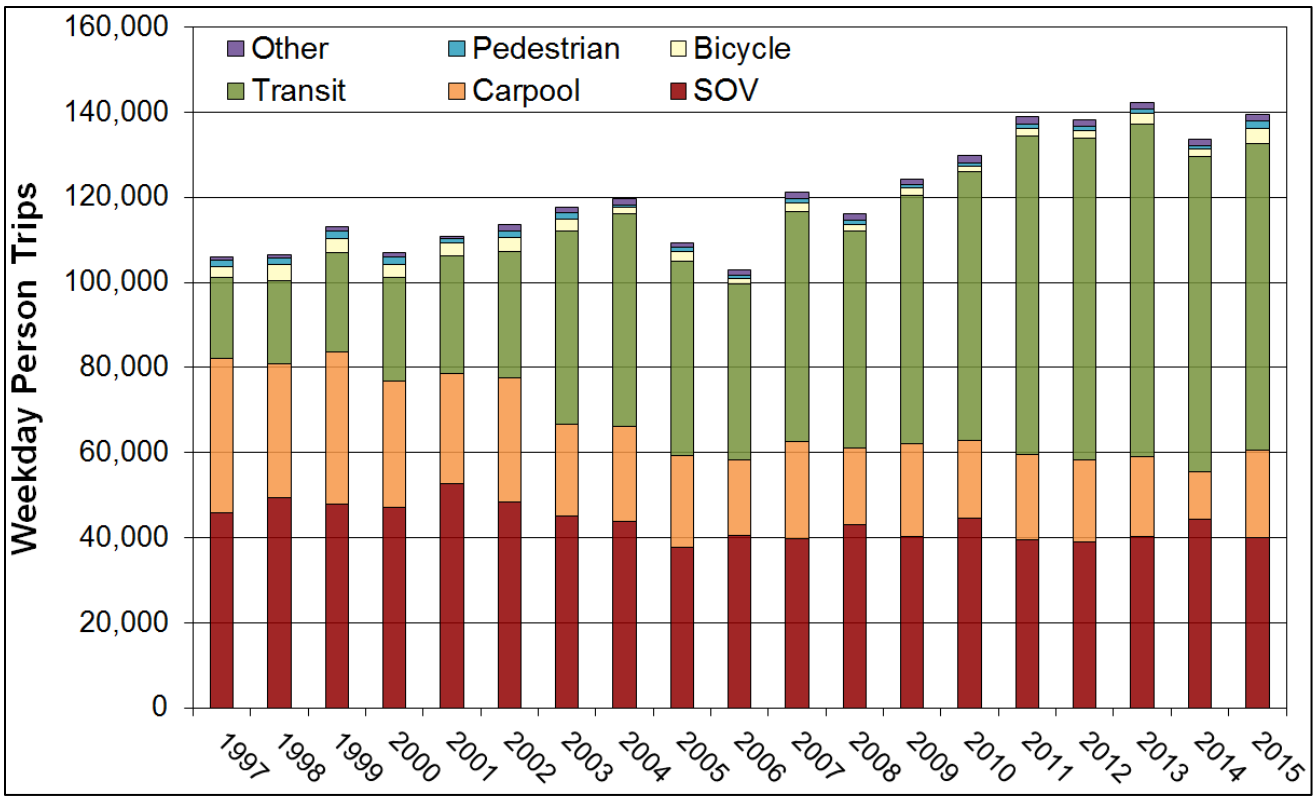
Table 2.1: Weekday Person Trips to / from UBC Vancouver, 1997 vs. 2015

Travel Mode Classification	Person Trips			
	Fall 1997	Fall 2015	Change (count / percentage)	
Single Occupant Vehicle (SOV)	46,000	40,100	-5,900	-12.8%
Carpool / Vanpool (HOV)	36,100	20,600	-15,500	-42.9%
Transit	19,000	72,000	+53,000	+278.9%
Bicycle	2,700	3,500	+800	+29.6%
Pedestrian	1,400	1,800	+400	+28.6%
Truck & Motorcycle	900	1,400	+500	+55.6%
Totals	**106,100**	**139,400**	**+33,300**	**+31.4%**

Key observations regarding modes of travel to and from UBC include:

- The proportion of SOV trips has decreased by 13% from 1997.
- The proportion of HOV trips has decreased by 43% from 1997.
- Trips by transit have almost quadrupled since 1997.
- Bicycle and pedestrian trips do not represent a significant portion of the trips to and from campus. The numbers dropped significantly after the student u-pass program was implemented, but in general have increased since with a particular spike in both modes in 2015.

Figure 2.1: Weekday Person Trips to / from UBC, 1997 – 2015



In order to compare travel patterns from year to year on a consistent basis, it is important to negate the effects of population / enrolment growth. To compare the Trips Per Person by mode the average weekday person trips by each mode is divided by the average weekday campus population. The average weekday campus population values include all full and part time students, staff and faculty.

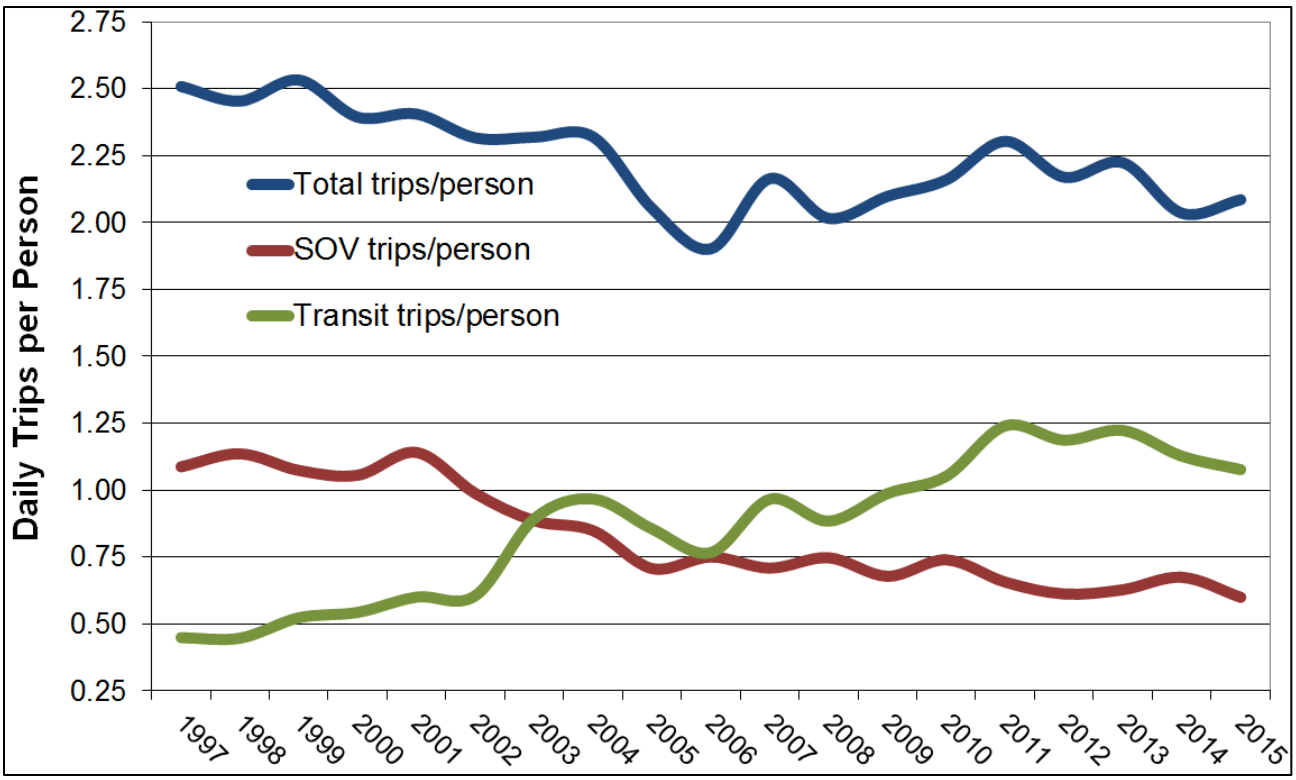
The campus population and trips per person to and from UBC from Fall 1997 to Fall 2015 are presented in ***Table 2.2*** and ***Figure 2.2***, respectively.

Table 2.2: Weekday Trips Per Person to / from UBC, 1997 – 2015

Travel Mode Classification	Trips Per Person			
	Fall 1997	Fall 2015	Change (count / percentage)	
Single Occupant Vehicle (SOV)	1.09	0.60	-0.49	-44.8%
Carpool / Vanpool	0.86	0.31	-0.55	-63.9%
Transit	0.45	1.08	+0.63	+139.8%
Bicycle	0.06	0.05	-0.01	-18.0%
Pedestrian	0.03	0.03	-0.01	-18.6%
Truck & Motorcycle	0.02	0.02	-0.00	-1.6%
Totals	**2.51**	**2.09**	**-0.42**	**-16.9%**
CAMPUS POPULATION*	***42,300***	**65,850**	**+24,550**	**+58%**

**Population reported from Fall attendance values.*

Figure 2.2: Weekday Trips Per Person to / From UBC, 1997 – 2015



The average number of trips per person in 2015 was 2.09 trips per day, which is a 17% decrease from 1997. Since 1997 the number of trips made by transit has, in general, increased while the number of trips by single occupant and high occupant vehicles has decreased.

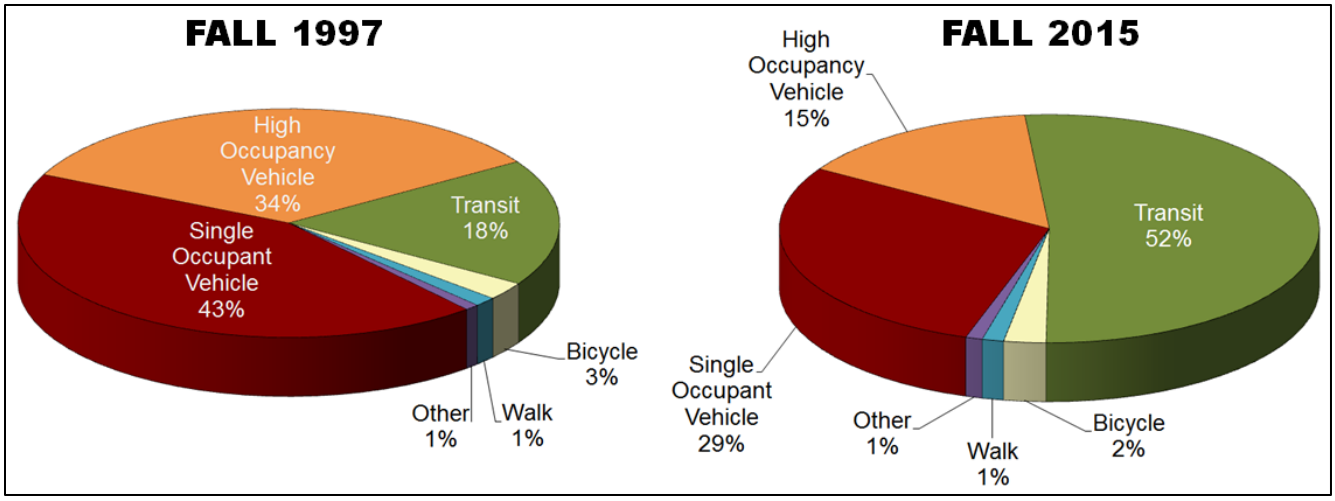
Possible reasons for the decrease in trips per person overall since 1997 include:

- More people are living, working and studying on campus.
- 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 Share Summary

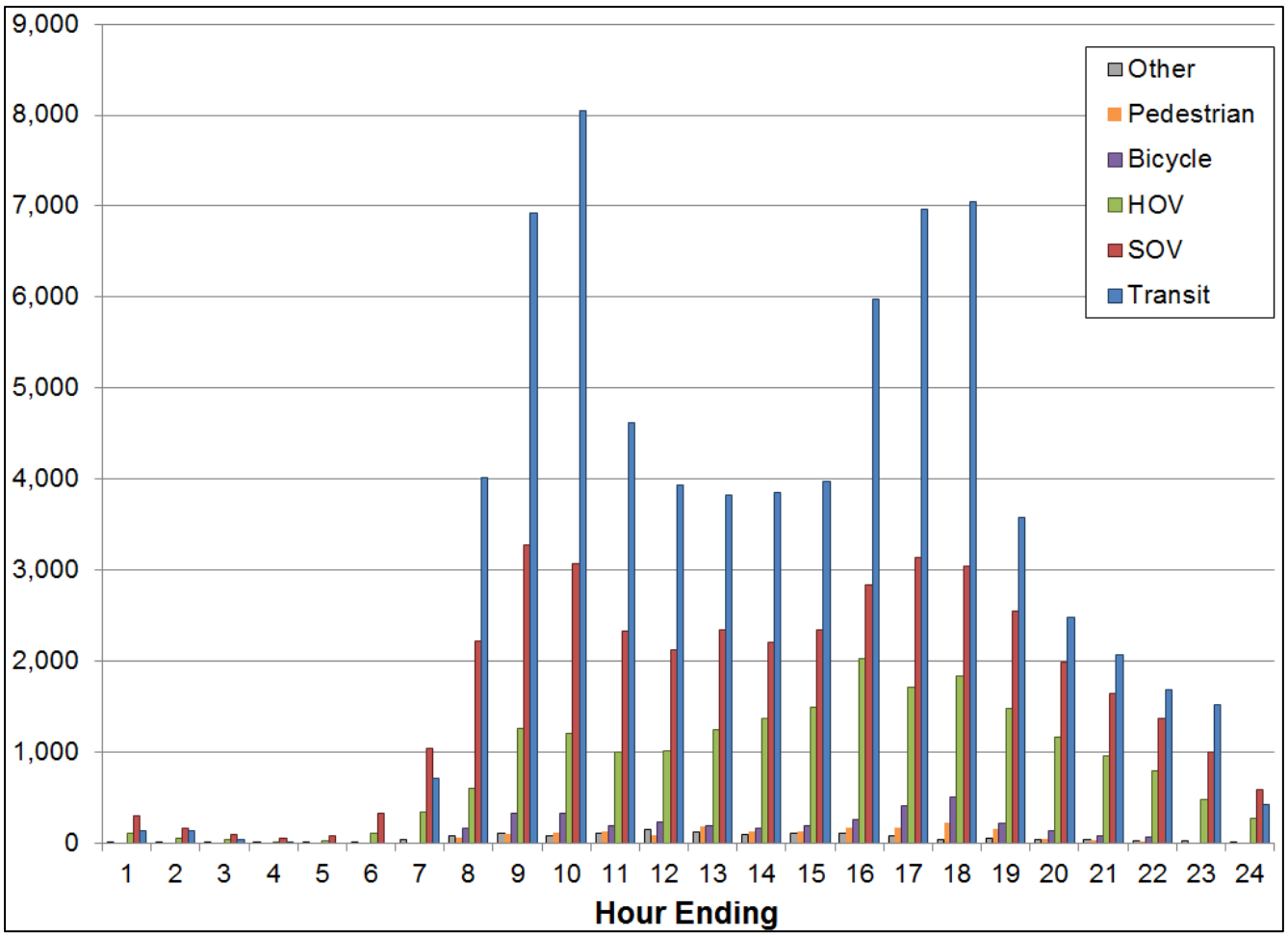
The mode share comparison for 1997 and 2015 are shown in ***Figure 2.3***. The significant change since 1997 has been the increase in the transit mode share, with trips by transit accounting for just over half of all trips to and from UBC.

Figure 2.3: Average Weekday Trips by Mode to / From UBC, 1997 vs.2015



The distribution of these trips throughout the day by mode is shown in ***Figure 2.4***. Aside from the early morning period when only a few night buses are in operation, the transit mode share is highest with peaks during the morning from 9:00 am to 10:00 a.m., and during the afternoon from 4:00 pm to 6:00 p.m. In general a wave profile can be seen to match the standard work and study hours with rounded peaks around 9am and 5pm.

Figure 2.4: Hourly Distribution of Average Weekday Trips by Mode to / From UBC, 2015



The weekday person trips in 1997 compared to 2015 is shown in ***Figure 2.5*** and the peak hour summary of trips by mode is summarized in ***Table 2.3***. Significant observations in the data include:

- Despite a 58% increase in campus population, the number of trips to campus during the morning peak and from campus during the afternoon peak only increased 15% and 29%, respectively. This is as a result of the introduction of travel demand measurement tools such as shifting class start times.
- The peak travel periods have spread out resulting in more trips throughout the day.

Figure 2.5: Distribution of Average Weekday Person Trips to / from UBC, 1997 vs. 2015

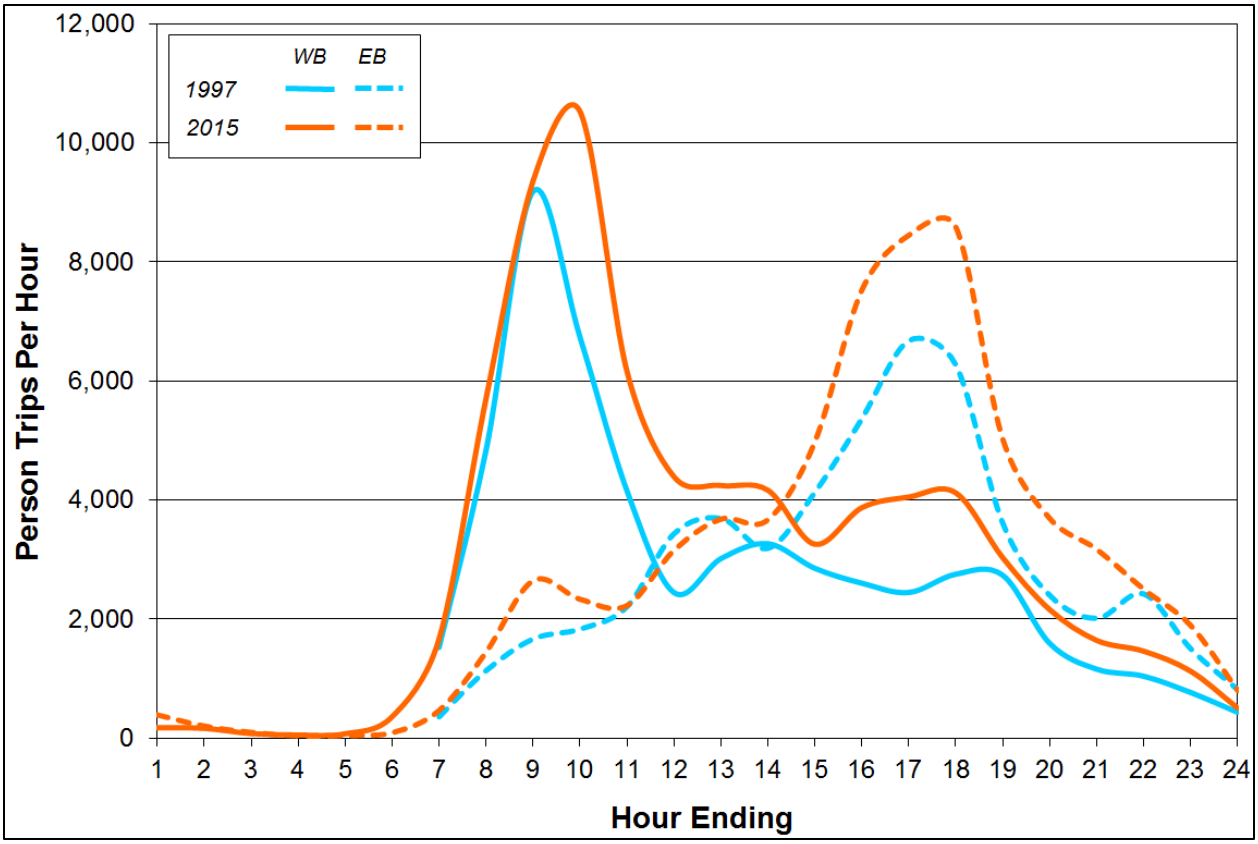


Table 2.3: Average Peak Hour Person Trips by Mode to/from UBC, 2015

Travel Mode Classification	AM Peak Hour 9:00am – 10:00am		PM Peak Hour 5:00pm – 6:00pm	
	Westbound	Eastbound	Westbound	Eastbound
Single Occupant Vehicle (SOV)	2,113	959	1,148	1,896
Carpool / Vanpool	776	425	690	1,153
Transit	7,223	829	2,078	4,974
Bicycle	298	32	118	387
Pedestrian	65	54	68	152
Truck & Motorcycle	53	34	19	28
Totals	**10,528**	**2,333**	**4,121**	**8,590**

2.3. Traffic Patterns and Vehicle Occupancy

Automobile traffic (single occupant and high occupant vehicles only) to and from UBC has decreased substantially from 62,400 automobiles per weekday in Fall 1997 to 49,900 automobiles per weekday in Fall 2015 despite a 51% increase in daytime population, as shown in ***Table 2.4***.

Table 2.4: Average Weekday SOV and HOV Traffic Volume to/from UBC, 1997 vs. 2015

Travel Mode Classification	Fall 1997	Fall 2015	Change (count / percentage)	
Single Occupant Vehicle (SOV)	46,000	40,100	–5,900	–13%
Carpool / Vanpool	16,400	9,800	–6,600	–40%
Totals	**62,400**	**49,900**	**–12,500**	**–19%**

The average weekday traffic volumes to / from UBC in a 24-hour period for both Fall 1997 and Fall 2015 are shown in ***Figure 2.6***. As shown, the traffic volumes have reduced throughout the entire day, not just at peak periods.

Figure 2.6: Distribution of Average Weekday Traffic Volumes to / from UBC, 1997 vs.2015

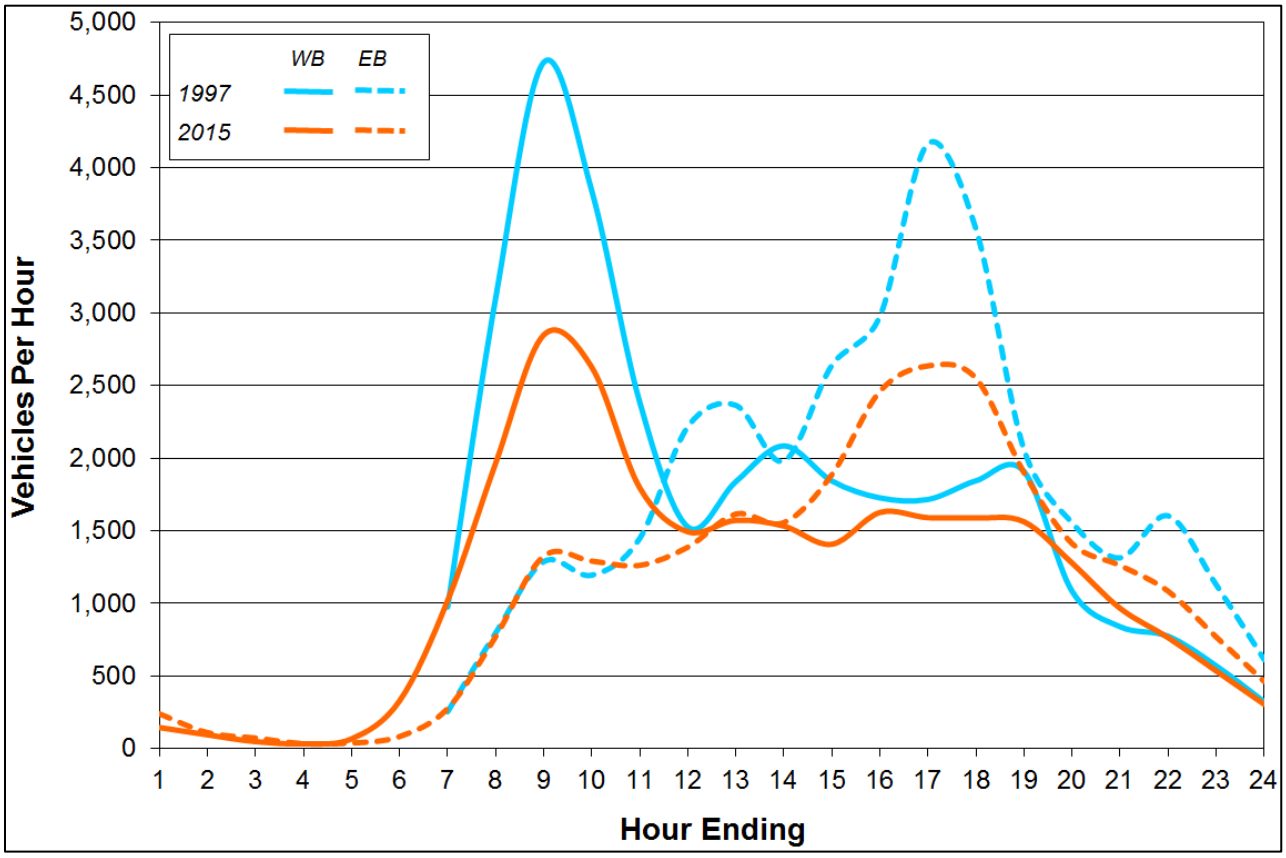


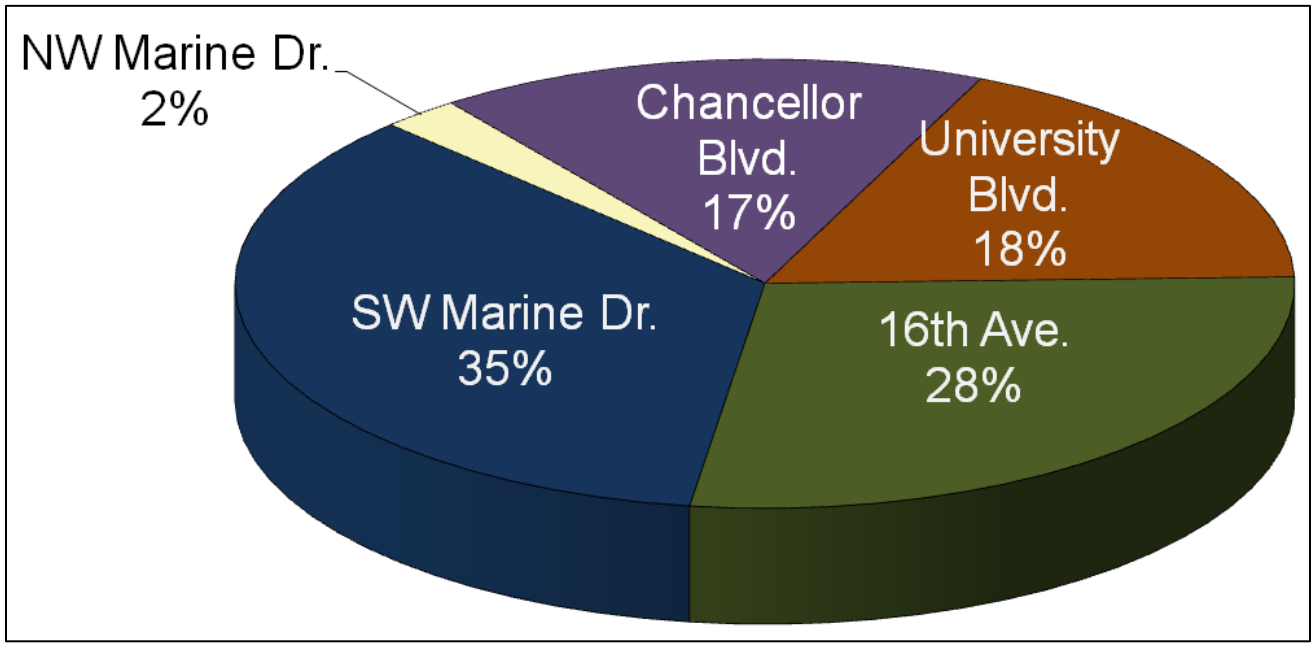
Table 2.5 summarizes the daily traffic volumes at each screenline location. It is important to note that these figures include trucks, buses and motorcycles, in addition to SOV's and HOV's. Overall, traffic volumes were 17% lower in Fall 2015 than in 1997 with a general decrease observed at all screenline locations with the exception of 16th Avenue where there has been an increase of 16%. The increase on 16th Avenue can likely be attributed to the population growth in Wesbrook Village.

Table 2.5: Summary of Average Weekday Traffic Volumes at Screenlines, 1997 vs.2015

Screenline	Average Daily Traffic Volume			
	Fall 1997	Fall 2015	Change (count / percentage)	
NW Marine Drive	2,040	1,280	-760	-37.3%
Chancellor Boulevard	11,660	9,020	-2,640	-22.6%
University Boulevard	14,610	9,580	-5,030	-34.4%
16th Avenue	12,880	14,880	+2,000	+15.5%
SW Marine Drive	23,410	18,910	-4,500	-19.2%
Totals	**64,600**	**53,700**	**-10,900**	**-16.9%**

The distribution of all traffic volumes to / from UBC by screenline is shown in ***Figure 2.7***. As shown, a majority of traffic uses SW Marine Drive followed by 16th Avenue and University Boulevard.

Figure 2.7: Distribution of Average Weekday Traffic to / from UBC by Screenline, 2015



Vehicle occupancy is a measure of the average number of people travelling per vehicle during a certain period of time. As shown in ***Table 2.6***, the average vehicle occupancy of all vehicles in 2015 was 1.22 persons per vehicle, down from 1.32 persons per vehicle in 1997. In addition, the average occupancy for high occupancy vehicles decreased 5% to 2.10, resulting from more vehicles carrying less than three people compared to 1997.

Table 2.6: Average Daily Vehicle Occupancy to / from UBC

Travel Mode Classification	Fall 1997	Fall 2013	Fall 2014	Fall 2015
Vehicles (SOV's + HOV's)	1.32	1.20	1.12	1.22
HOV's (Carpools / Vanpools)	2.20	2.11	2.08	2.10

Table 2.7 provides a summary of average automobile occupancies from 7:00 a.m. to 6:00 p.m. Overall there is very little variation in the vehicle occupancies, but they appear to be higher for trips from campus compared to trips to campus.

Table 2.7: Hourly Vehicle Occupancies to / from UBC, 2015

Hour Beginning	Westbound	Eastbound	Both Directions
7:00 a.m.	1.12	1.13	1.12
8:00 a.m.	1.14	1.22	1.17
9:00 a.m.	1.16	1.19	1.17
11:00 a.m.	1.14	1.26	1.20
12:00 p.m.	1.16	1.29	1.22
3:00 p.m.	1.29	1.28	1.28
4:00 p.m.	1.27	1.21	1.23
5:00 p.m.	1.25	1.25	1.25
8-Hour Average	**1.18**	**1.24**	**1.21**

3. Transportation To and From UBC

This section of the Transportation Status Report describes travel patterns and trends for trips to and from the UBC Vancouver campus for each mode of travel. Information regarding transportation conditions on campus is presented in ***Section 4***.

3.1. Transit

Transit ridership at UBC has nearly quadrupled since 1997, increasing 279%, which equates to 72,000 weekday transit trips to and from UBC and an increase in mode share of 34%.

This ridership increase has been the result of the student U-Pass program, continued improvements in transit service, and a reduced supply of commuter parking and higher parking costs on campus. ***Table 3.1*** provides a summary of the increase in transit trips and the transit mode share from Fall 1997 to Fall 2015, highlighting the change from 2002 to 2003 when the student U-Pass was introduced.

Table 3.1: Summary of Average Weekday Transit Trips to / from UBC, 1997 – 2015

Transit Trips	Before U-Pass		After U-Pass		Change 1997-2015 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2003	Fall 2015		
Person Trips	19,000	29,700	45,400	72,000	+53,000	+279%
Trips Per Person	0.45	0.61	0.89	1.08	+0.63	+140%
Transit Mode Share	18%	26%	39%	52%	+34%	+188%

Figure 3.1 illustrates the three year rolling average in transit ridership from year to year, illustrating the sharp peak in 2003 and a steady increase since. ***Table 3.2*** provides a summary of transit trips by corridor, ***Table 3.3*** provides a summary of transit trips by route and by time period, and ***Table 3.4*** provides a summary of peak hour trips by route.

Table 3.2: Average Weekday Transit Trips to / from UBC by Corridor, 2015

Corridor	AM Peak 6am to 9am	Midday 9am to 3pm	PM Peak 3pm to 6pm	Evening 6pm to Midnight	Night Midnight to 4:30am	Totals	
Chancellor Blvd.	2,232	4,957	3,092	925	0	11,206	15.6%
University Blvd.	3,392	10,727	7,833	5,772	290	28,014	38.9%
16th Avenue	1,296	4,280	2,615	2,619	47	10,857	15.1%
SW Marine Drive	4,737	8,295	6,452	2,461	0	21,945	30.5%
Totals	**11,657**	**28,259**	**19,992**	**11,777**	**337**	**72,022**	**100%**
	16.2%	**39.2%**	**27.8%**	**16.4%**	**0.5%**		

Figure 3.1: Average Weekday Transit Trips to / from UBC, 1997 – 2015

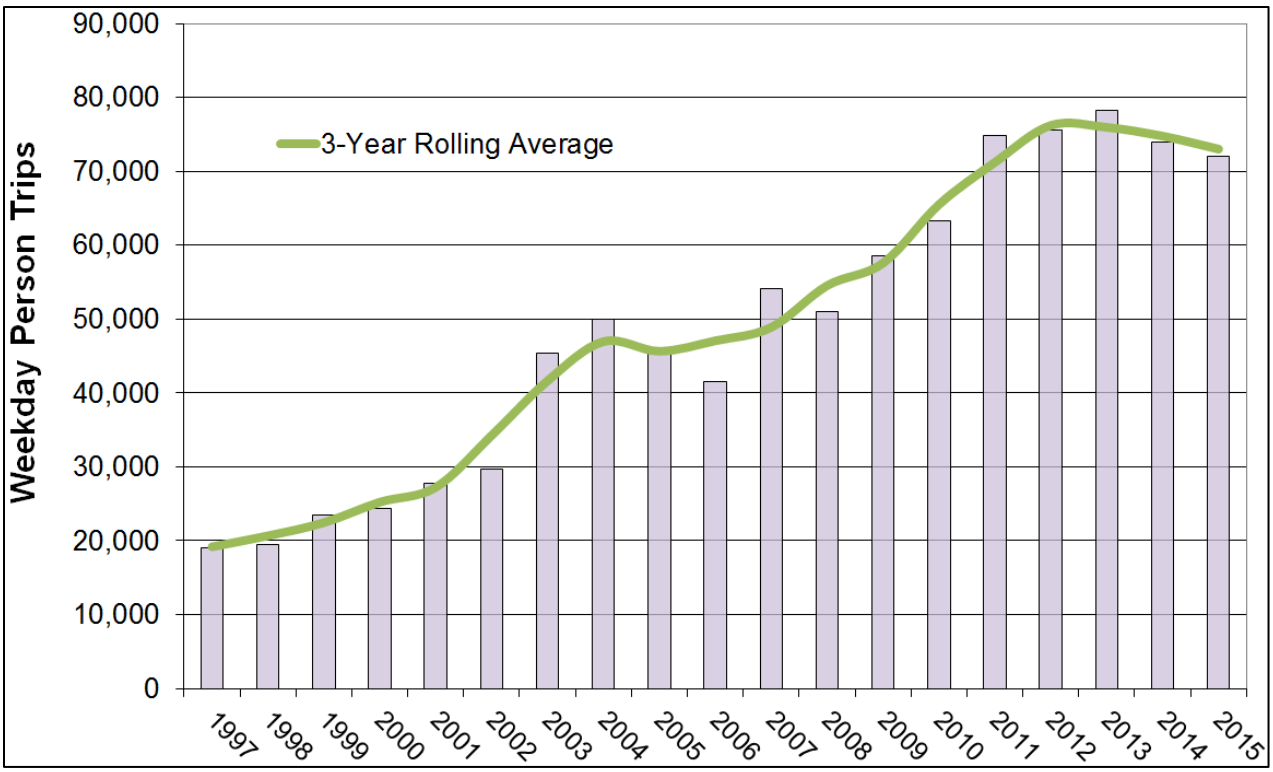


Table 3.3: Average Weekday Transit Trips to / from UBC by Route, 2015

Route		AM	Midday	PM Peak	Evening	Night	Totals	
		6am to 9am	9am to 3pm	3pm to 6pm	6pm to Midnight	Midnight to 4:30am		
4	4th Avenue	267	1,176	833	644	-	2,920	4.1%
9	Broadway	329	417	441	47	-	1,234	1.7%
14/N17	Broadway	453	1,383	913	1,038	144	3,931	5.5%
25	King Edward	722	2,609	1,613	1,671	47	6,662	9.2%
33	16th Avenue	574	1,671	1,002	948	-	4,195	5.8%
41	41st Avenue	1,178	2,811	1,961	1,235	-	7,185	10.0%
43	41st Ave Express	1,725	739	1,013	122	-	3,599	5.0%
44	4th Ave. Express	1,108	2,234	1,421	383	-	5,146	7.1%
49	49th Avenue	598	2,715	2,123	693	-	6,129	8.5%
84	4th Ave. Express	889	2,608	1,671	542	-	5,710	7.9%
99	Broadway B-Line	2,343	7,751	5,497	4,043	146	19,780	27.5%
258	North Shore	235	110	149	-	-	494	0.7%
480	Richmond Express	1,236	2,025	1,331	390	-	4,982	6.9%
NIS	Not In Service	-	10	24	21	-	55	0.1%
Totals		**11,657**	**28,259**	**19,992**	**11,777**	**337**	**72,022**	**100%**
		16.2%	**39.2%**	**27.8%**	**16.4%**	**0.5%**		

Table 3.4: Average Peak Hour Weekday Transit Trips to / from UBC by Route, 2015

Route		AM Peak Hour Westbound 8:45am – 9:45am		PM Peak Hour Eastbound 5:00pm – 6:00pm	
4	4th Avenue	201	2.7%	185	3.7%
9	Broadway	264	3.6%	47	0.9%
14/N17	Broadway	346	4.7%	335	6.7%
25	King Edward	575	7.8%	472	9.5%
33	16th Avenue	394	5.4%	327	6.6%
41	41st Avenue	594	8.1%	334	6.7%
43	41st Ave.(limited stops)	702	9.6%	203	4.1%
44	4th Ave.(limited stops)	747	10.2%	419	8.4%
49	49th Avenue	612	8.3%	364	7.3%
84	4th Ave.(limited stops)	623	8.5%	476	9.6%
99	Broadway B-Line	1670	22.7%	1558	31.3%
258	North Shore Express	141	1.9%	55	1.1%
480	Richmond Express	478	6.5%	175	3.5%
NIS	Not In Service	0	0.0%	24	0.5%
Totals		**7,347**	**100%**	**4,974**	**100%**

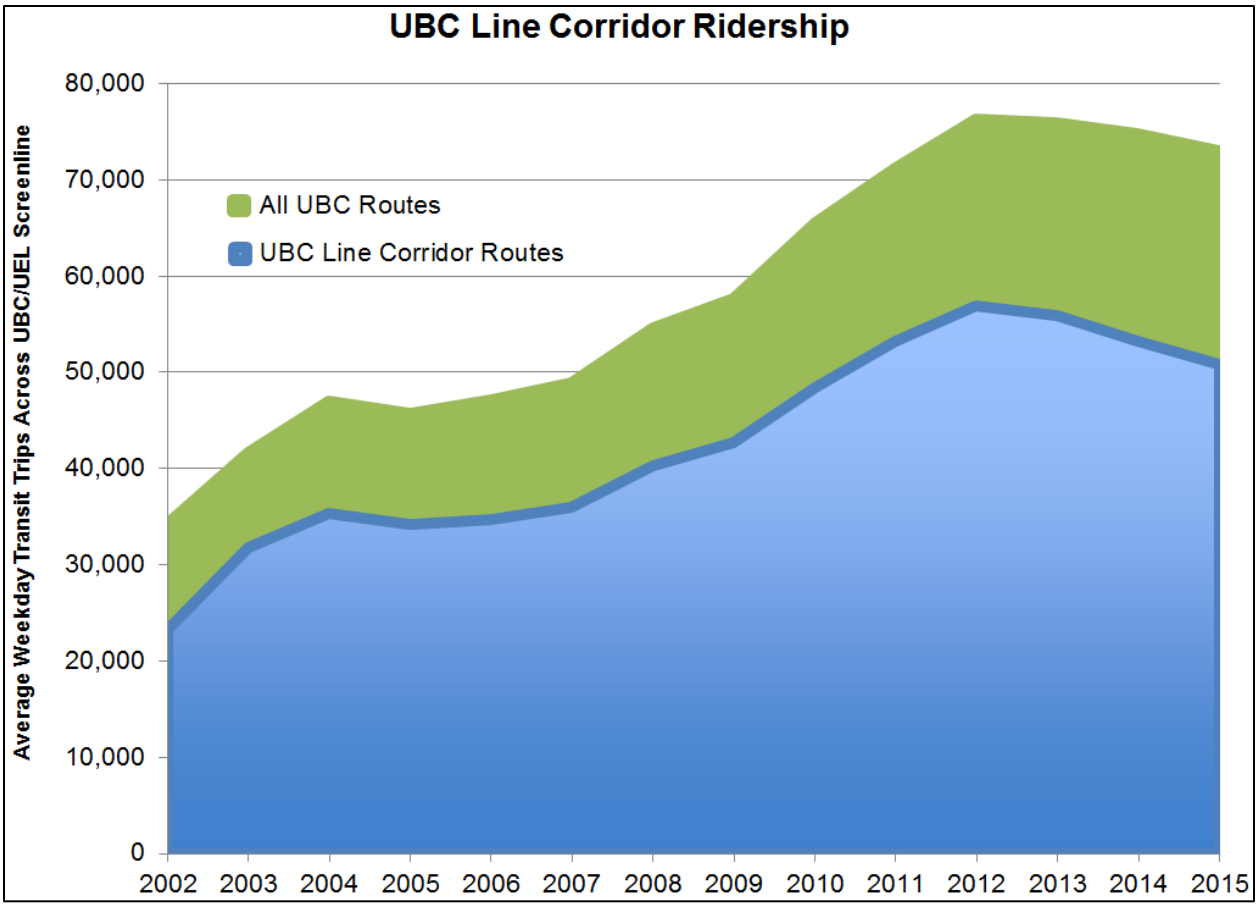
Significant observations about transit trips to and from UBC include:

- The number of transit trips has been decreasing the past three years. In the past two years it has not affected the mode share split, however this year it has with an overall decrease in mode share of 4%. Nonetheless, transit mode share is still very high. This will continue to be monitored over the next few years, and work is already underway to understand reasons for this possible shift.
- Bus routes via University Boulevard (which includes routes 4, 9, 14, 99, and 258) account for 39% of all transit trips to and from UBC. Bus routes via 16th Avenue and Chancellor Boulevard both account for 15%. When combined, ridership in the "UBC Line"[1] corridor amounts to 70% of all transit trips to and from UBC. Bus routes via SW Marine Drive (the majority of which use 41st Avenue in the City of Vancouver) account for the remaining 30% of all transit trips.
- The 99 B-Line accounts for 27% of all transit trips; this is the same as last year and is an overall reduction compared to previous years. This will also be monitored closely in the coming years.
- Express bus services (Routes 43, 44, 84, 258 and 480) account for 28% of all transit trips to and from UBC. Adding the Route 99 B-Line increases this to 55% of all transit trips, indicating popularity for more rapid options to / from UBC.
- Trolley bus Routes 4, 9 and 14/17 account for 11% of all transit trips.

[1] UBC Line refers to the future rapid transit line to UBC that is expected to be used by people currently taking transit to / from UBC via Chancellor Boulevard, University Boulevard and 16th Avenue.

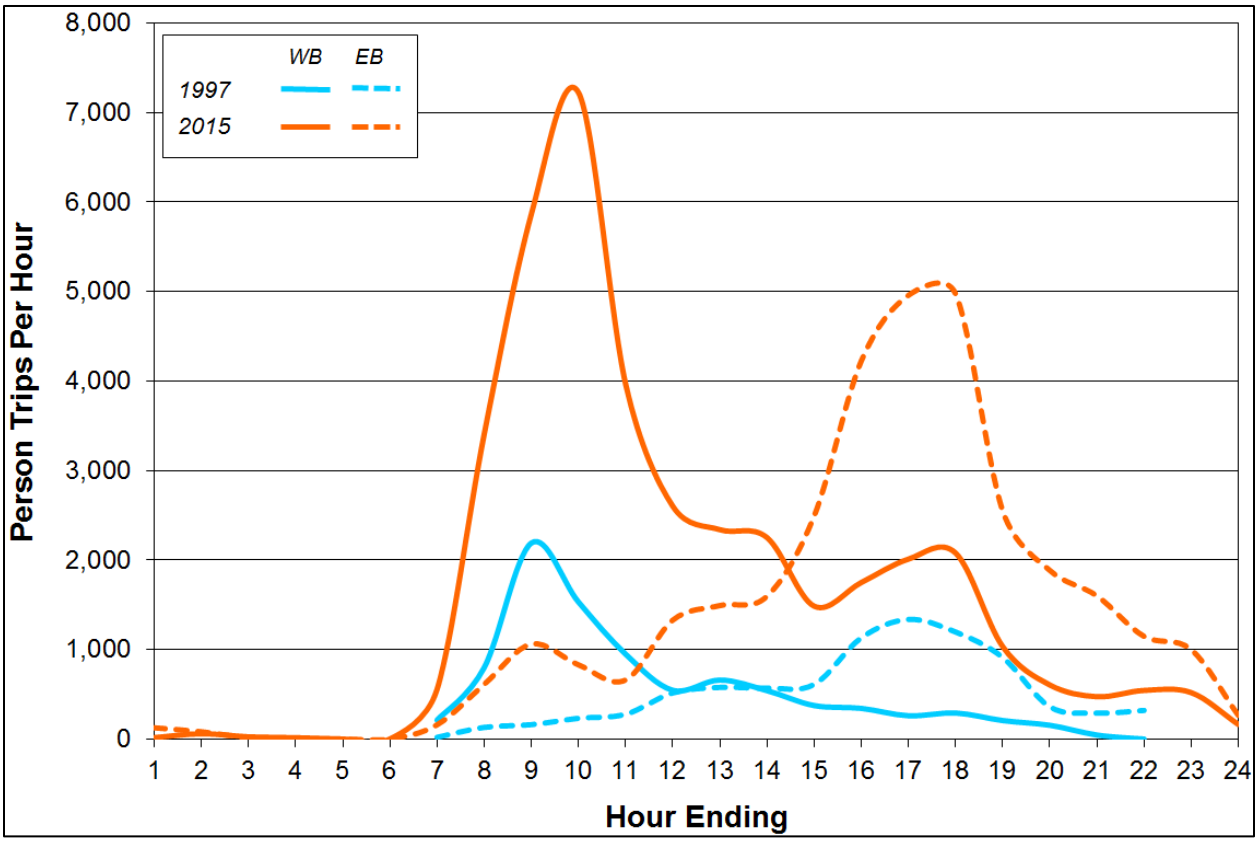
Figure 3.2 compares ridership on bus routes in the UBC Line corridor with total ridership on all routes.

Figure 3.2: Average Weekday Transit Trips to / from UBC by Route, 2015



The daily distribution of transit trips to and from UBC in 2015 is shown in ***Figure 3.3*** 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 8:00am - 9:00am in 1997 to 9:00am - 10:00am in 2015 (rounded to the hour) and more of a spread of the peak periods.

Figure 3.3: Distribution of Average Weekday Transit Trips to / from UBC, 1997 vs.2014



3.2. Motor Vehicles

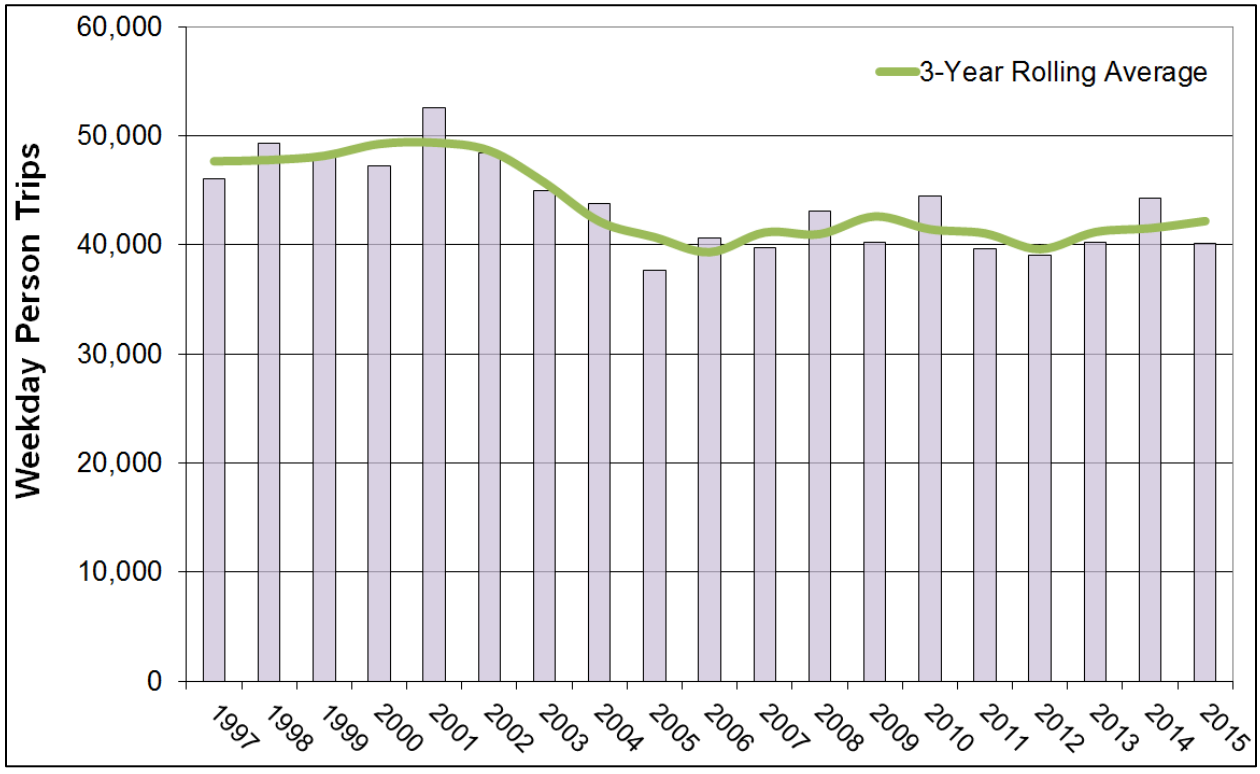
The 2005 Strategic Transportation Plan identified a long-term policy to reduce daily single occupant vehicle (SOV) trips per person by 30% from 1997 levels. In Fall 2015, there was an average of 0.60 SOV trips per person. This represents a 45% decrease from the Fall 1997 level of 1.09 SOV trips per person, 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 2015, and ***Figure 3.4*** provides a summary of year-by-year changes.

Table 3.5: Summary of SOV Trips to / from UBC, 1997 vs. 2015

Average Weekday SOV Trips	Fall 1997	Fall 2015	Change 1997-2015 (count / percentage)	
Person Trips	46,000	40,100	-5,900	-12.8%
Trips Per Person	1.09	0.60	–0.49	–45%
SOV Mode Share	43%	29%	–14	–32%

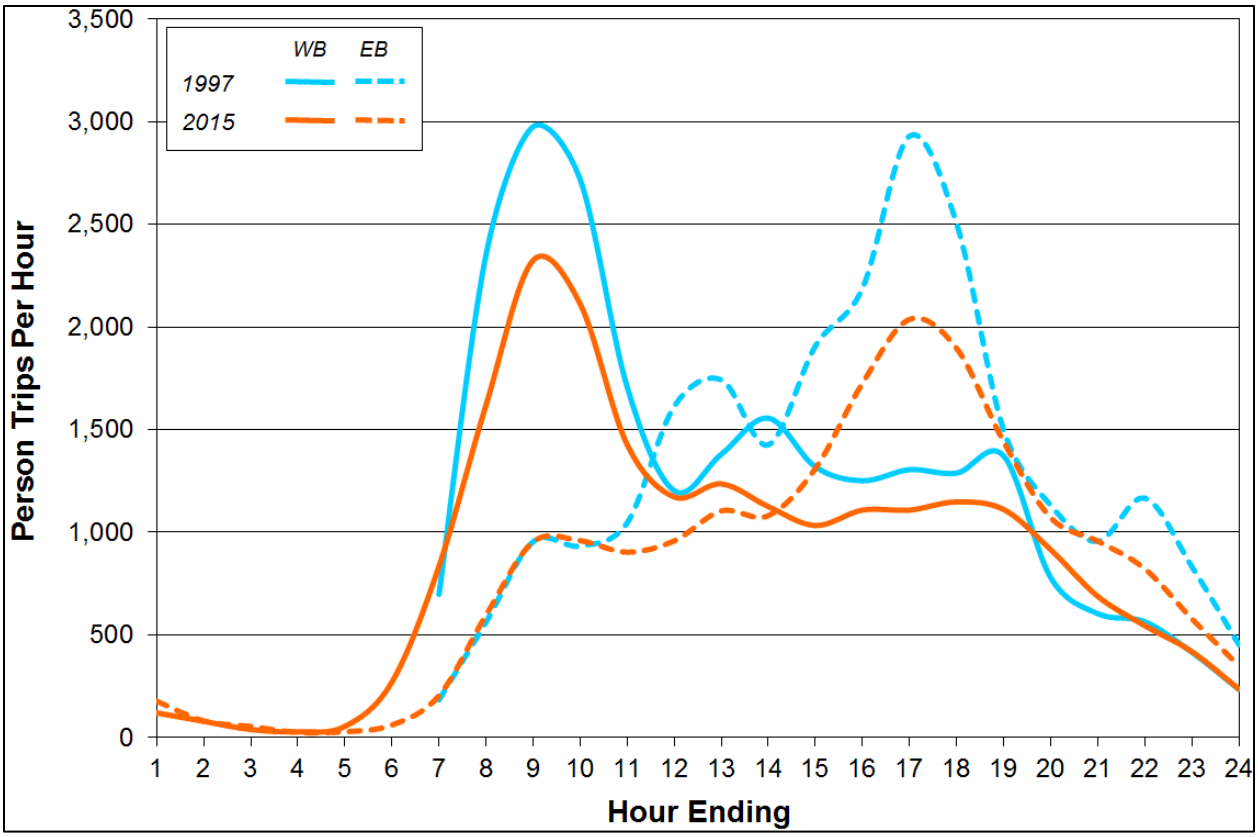
Figure 3.4: Average Weekday SOV Trips to / from UBC, 1997 - 2015



In 2014 there was a spike in the number of SOV trips. It is reassuring to see that in 2015 the number of SOV trips have returned to previous year trends. Small fluctuations year to year are normal and expected. Nonetheless this metric will be monitored over the next few years to see if the three year rolling average evens out.

Figure 3.5 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 3.5: Distribution of Average Weekday SOV Trips to / from UBC, 1997 vs.2015

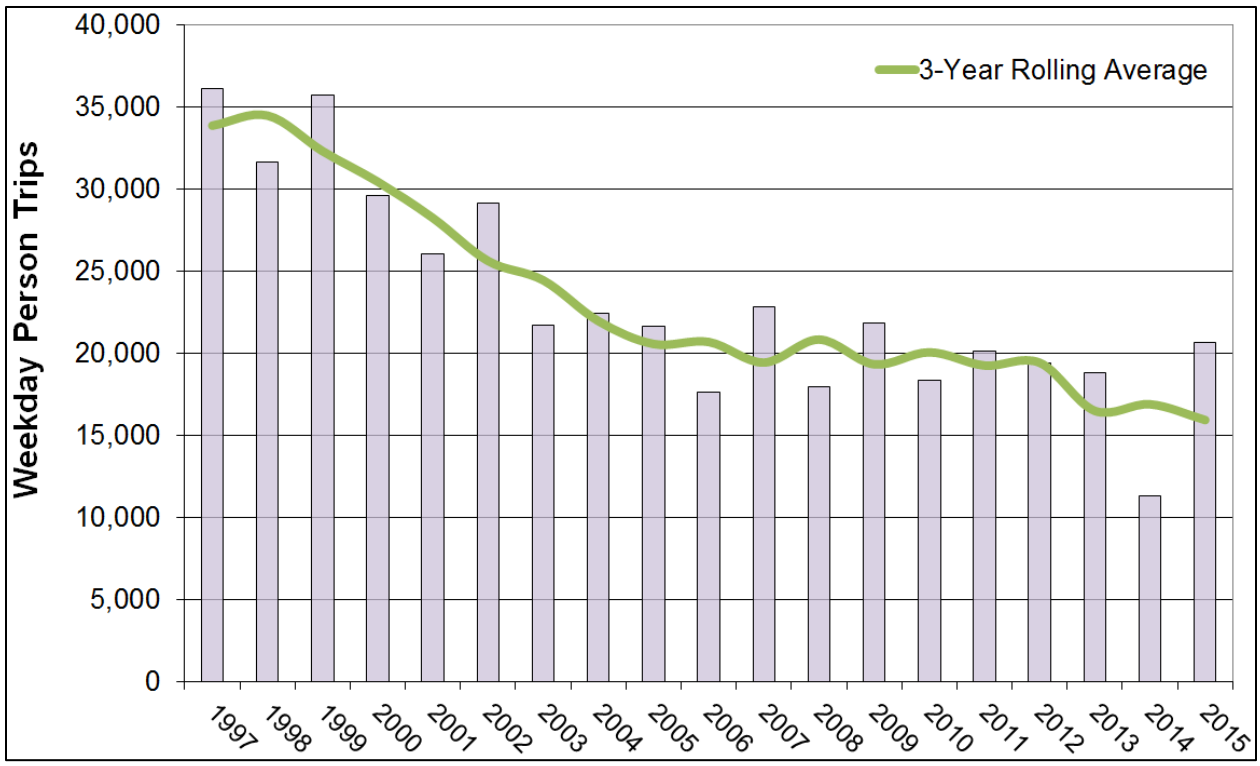


Carpooling, or high occupancy vehicle travel (HOV), has decreased substantially since 1997. Daily carpool and vanpool trips declined from 36,100 in Fall 1997 to 20,600 in Fall 2015, and the equivalent mode share decrease was from 34% to 15%. A summary of the trend in carpool and vanpool travel from Fall 1997 to Fall 2015 is provided in ***Table 3.6***, and a summary of year-by-year changes is provided in ***Figure 3.6***.

Table 3.6: Summary of HOV Trips to / from UBC, 1997 vs. 2015

Average Weekday HOV Trips	Fall 1997	Fall 2015	Change 1997-2015 (count / percentage)	
Person Trips	36,100	20,600	–15,500	–13%
Trips Per Person	0.85	0.31	–0.55	–64%
HOV Mode Share	34%	15%	–19	–56%

Figure 3.6: Average Weekday HOV Trips to / from UBC, 1997 – 2015



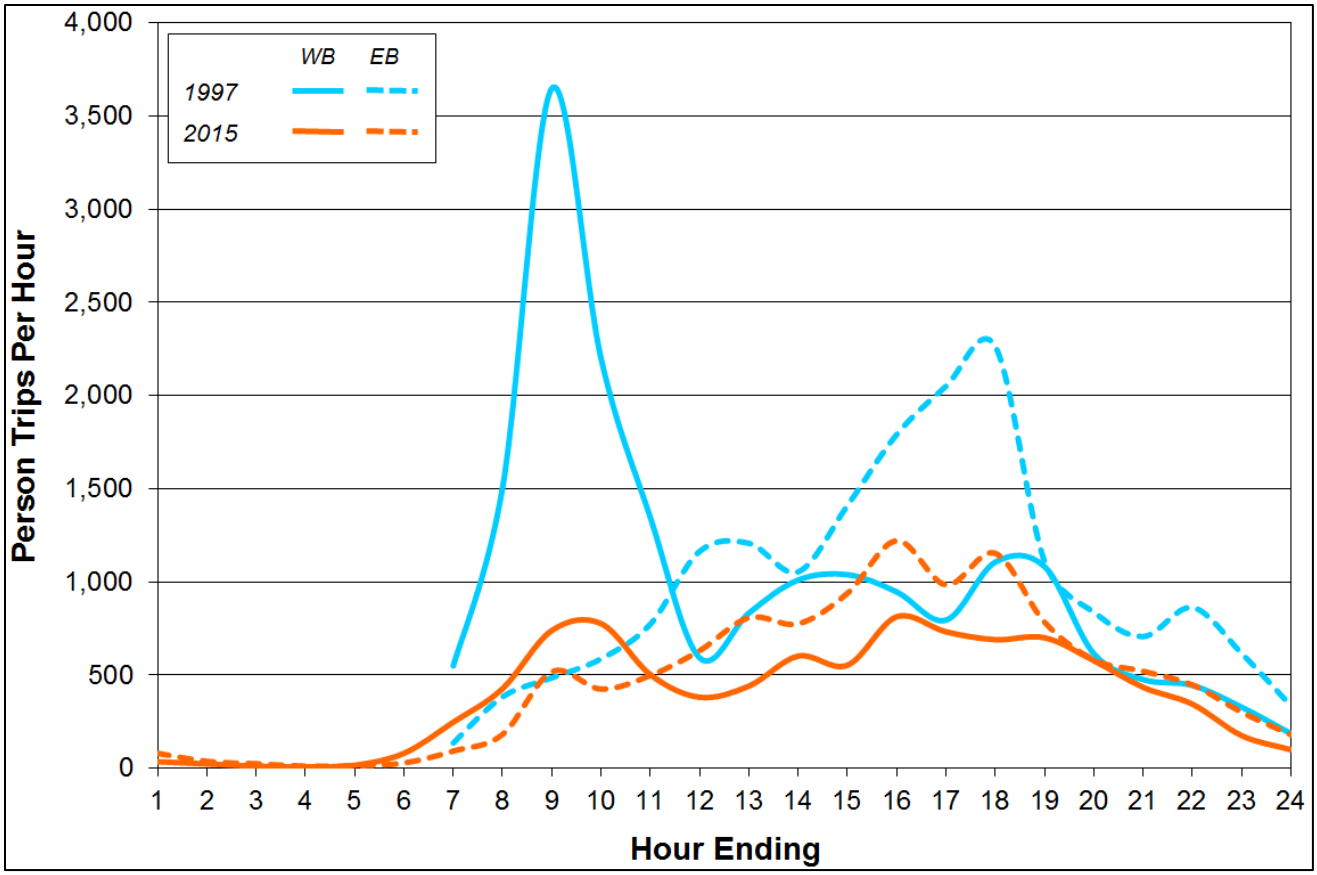
As shown in ***Figure 3.6***, there is an improvement to HOV trips in 2015 compared to 2014 when an significant drop in HOV trips was captured. UBC C+CP is aiming to increase HOV trips by introducing incentives and collaborating with application developers to make carpool trips more convenient and easy. As a result, HOV trips will be closely tracked over the next few years.

Figure 3.7 illustrates the arrival and departure patterns of HOV trips to and from UBC throughout the day, including a comparison with Fall 1997 HOV trips. As with SOV trips, the significant change with HOV trips is a decrease in peak period, peak direction trips — westbound in the morning and eastbound in the afternoon.

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 carpoolers, 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 included:

- Variable work and school schedules are inconsistent with a fixed carpool schedule.
- Errands and commitments before and after work are not compatible with carpool trips.
- Unexpected work demands and emergencies that would mean missing a scheduled carpool trip.
- The time to pick up and drop off 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.

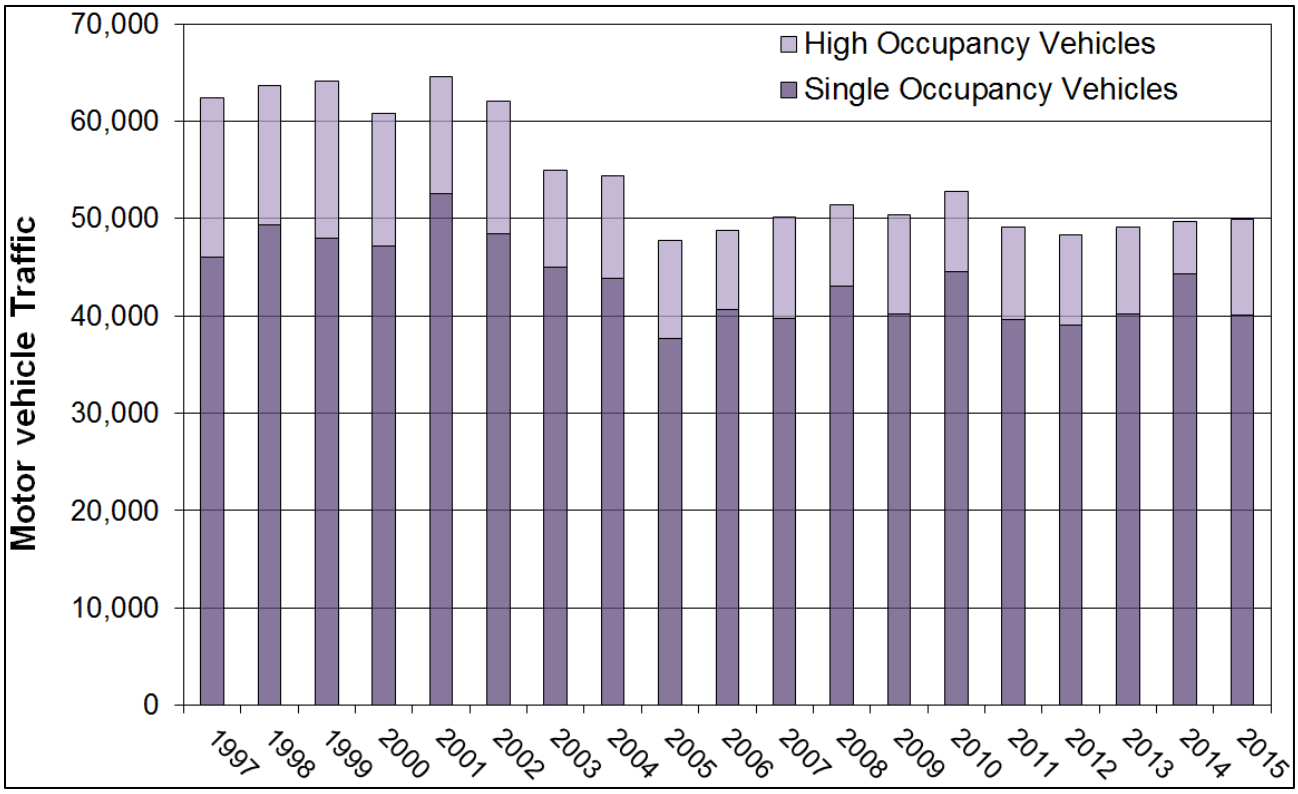
Figure 3.7: Distribution of Average Weekday HOV Trips to / from UBC, 1997 vs. 2015



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

In Fall 2015, daily motor vehicle traffic was 49,900 vehicles per day — 12,500 less than the 1997 level. ***Figure 3.8*** provides a summary of the trend in daily motor vehicle traffic volumes from 1997 to 2015. Despite an increase of nearly 2% in the campus population between 2014 and 2015, the number of automobile trips to and from the campus is nearly the same.

Figure 3.8: Average Weekday Motor Vehicle Trips to / from UBC, 1997 – 2015



As a result of the significant uptake of carsharing in Vancouver, there is interest in tracking the number of carshare trips to and from campus. Data was requested from car2go to match the annual monitoring period. It is acknowledged that there is more than one carsharing provider at UBC, but car2go was the only group willing to share data for this report.

In 2015, car2go reported they had over 1,200 members with a registered address at UBC (excluding the UEL). The peak period of car2go trips to and from campus are 8am to 10am and although the usage in the afternoon is more distributed the peak is around 4pm.

The average number of car2go trips to and from campus weekdays was 225 trips. This is more than in 2014 when the average number of weekday trips was 175. The 225 trips represent 0.5% of all traffic to and from UBC.

3.3. Bicycles and Pedestrians

Table 3.7 and ***Figure 3.9*** provide summaries of the trend in bicycle trips from Fall 1997 to Fall 2015. As shown, there was a significant decrease in trips by bike after the U-Pass program was introduced. However, with the exception of 2014 there has been a steady increase in the number of bicycle trips since 2010, which is likely correlated with continued improvements to bike infrastructure at UBC and in the City of Vancouver as well as the general popularity of biking in the region. The lower number of trips by bike in 2014 was correlated with the lower number of total trips to and from UBC and in 2015 the higher number of trips could be attributed to weather. It is anticipated that the 2 year rolling average will smooth out with the 2016 data.

Table 3.7: Summary of Average Weekday Bicycle Trips to / from UBC, 1997 vs. 2015

Average Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change 1997-2015 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2004	Fall 2015		
Person Trips	2,700	3,300	1,600	3,500	+800	+30%
Trips Per Person	0.06	0.07	0.03	0.05	–0.01	–18%
Bicycle Mode Share	2.5%	2.9%	1.3%	2.5%	-	-

Figure 3.10 illustrates the arrival and departure patterns of bicycle trips to and from UBC throughout the day, for 2015 and 1997 bicycle trips.

As can be seen the trend of bike trips matches peak morning (westbound) and evening (eastbound) travel patterns. What is different compared to 1997 values is the number of trips in the off peak directions. This is likely attributable to our growing residential population that are commuting to work and school off campus.

All buses operating on transit routes serving UBC are equipped with bicycle racks, each of which has space for two bicycles. Below is a summary of the usage of racks over the past four years:

- In 2015, total of 245 bicycles were on buses out of an available 4,180 racks – 5.9% usage rate.
- In 2014, total of 278 bicycles were on buses out of an available 4,366 racks – 6.4% usage rate.
- In 2013, total of 234 bicycles were on buses out of an available 4,214 racks – 5.5% usage rate.
- In 2012, total of 201 bicycles were on buses out of an available 4,162 racks – 4.8% usage rate.

Cyclists more commonly bring their bikes on buses westbound to campus and the most popular route for cyclists to travel with their bicycles is the 99 B-Line.

Figure 3.9: Average Weekday Bicycle Trips to / from UBC, 1997 – 2015

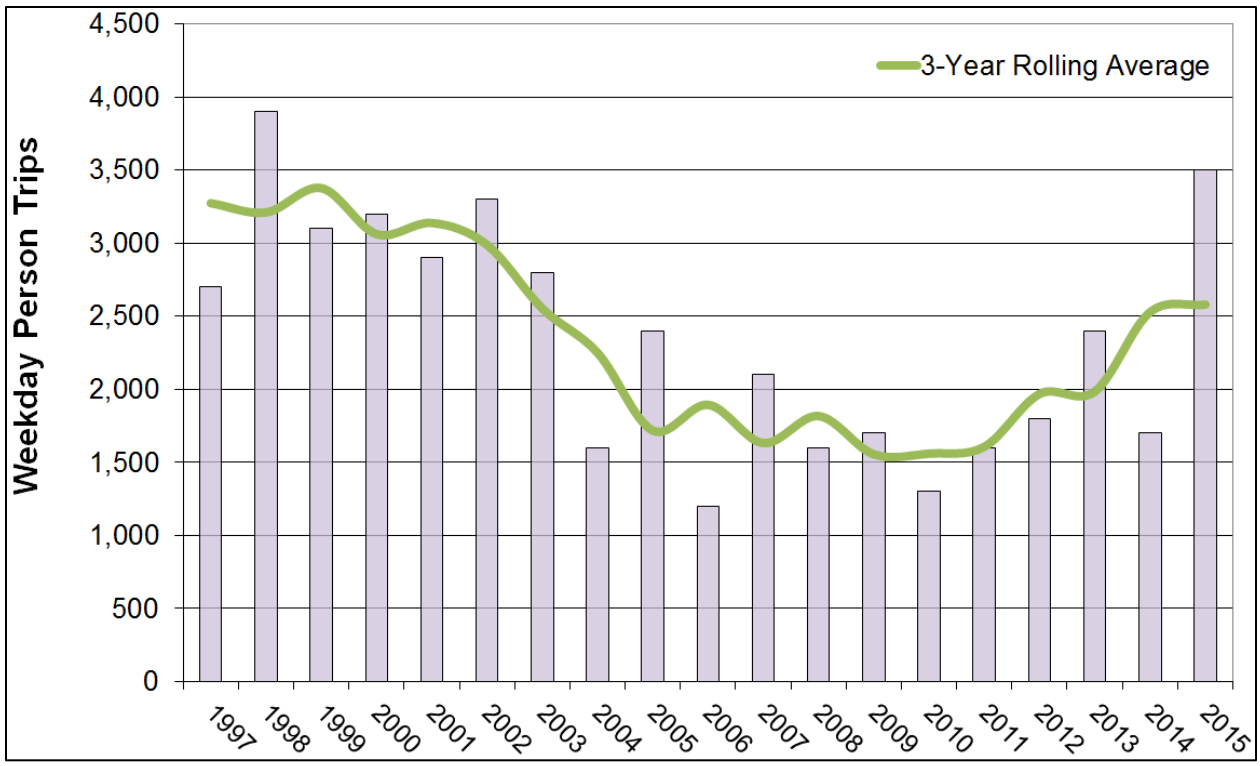


Figure 3.10: Distribution of Average Weekday Bicycle Trips to / from UBC, 1997 vs. 2015

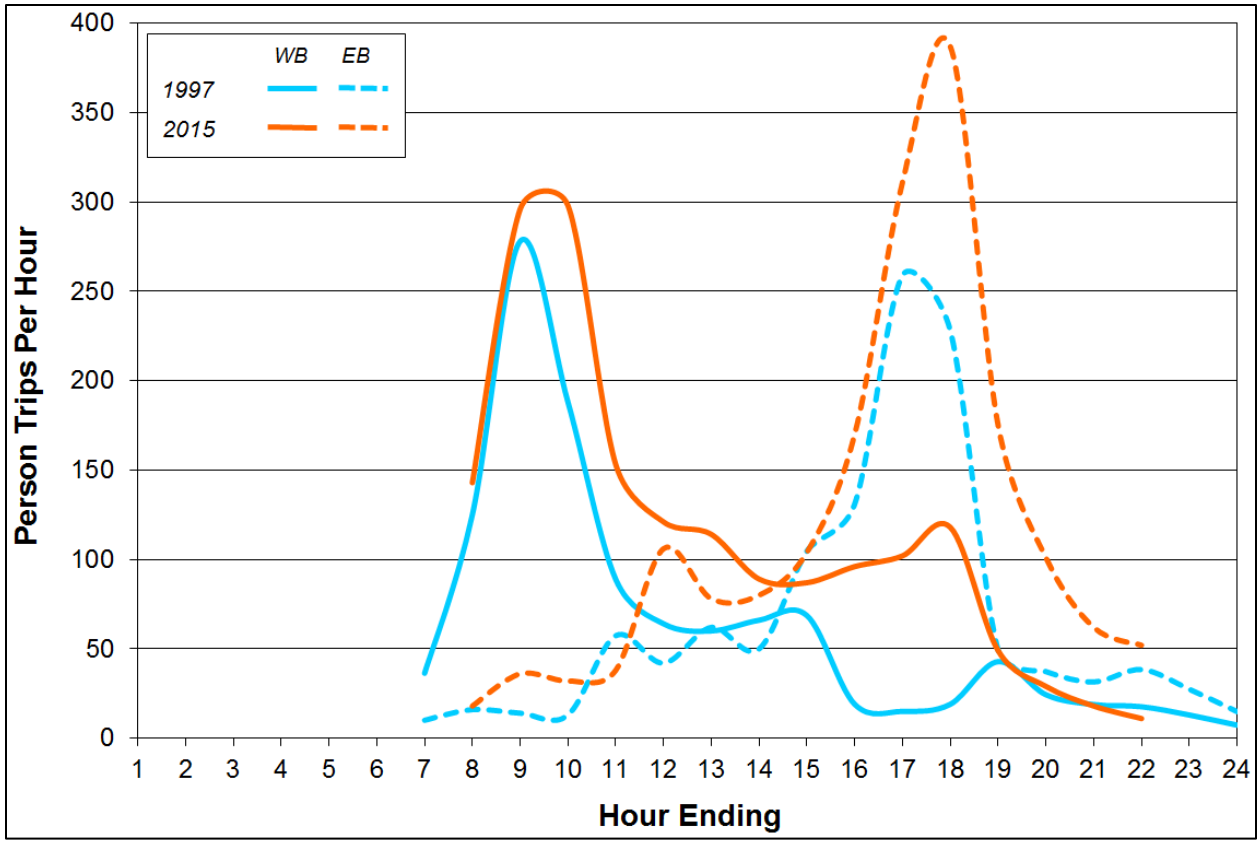


Table 3.8 provides a summary of the trend in pedestrian trips from Fall 1997 to Fall 2015, and ***Figure 3.11*** illustrates year-by-year changes. Similar to bicycle trips, pedestrian trips decreased significantly after U-Pass was introduced, but in general have been following an increasing trend since. Alike to the results observed for bicycle trips, the number of pedestrian trips dropped in 2014 and spiked in 2015. This supports the hypothesis that the reason for the jump in 2015 was good weather. Over the long term, UBC doesn't anticipate to see a significant increase in pedestrian trips or pedestrian mode share to and from campus due to the location of the campus with respect to residential areas.

Table 3.8: Summary of Average Weekday Pedestrian Trips to / from UBC, 1997 vs. 2015

Average Weekday Pedestrian Trips	Before U-Pass		After U-Pass		Change 1997-2015 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2004	Fall 2015		
Person Trips	1,400	1,600	600	1,800	+400	+29%
Trips Per Person	0.03	0.03	0.01	0.03	–0.01	–19%
Pedestrian Mode Share	1.3%	1.4%	0.5%	1.3%	-	–2.1%

Figure 3.11: Average Weekday Pedestrian Trips to / from UBC, 1997 – 2015

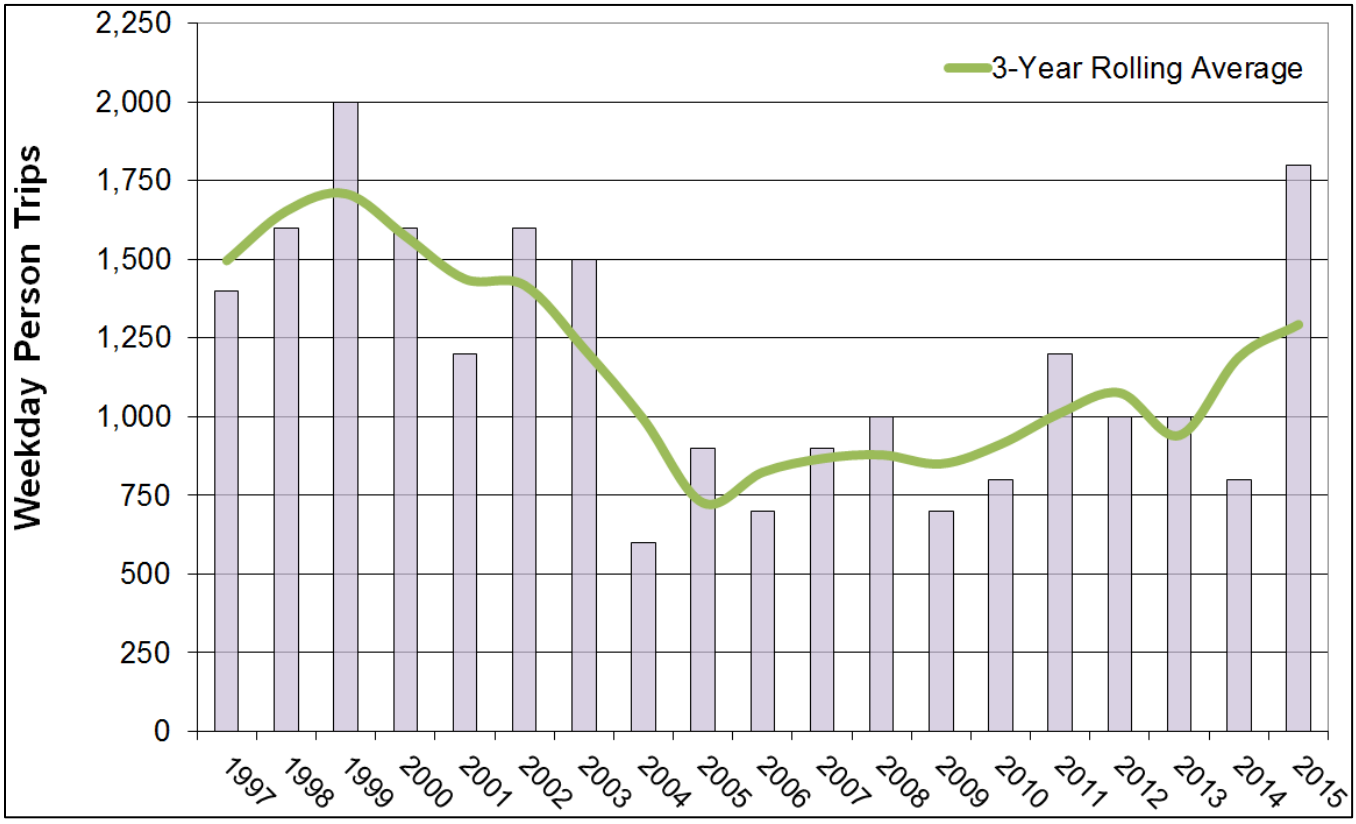
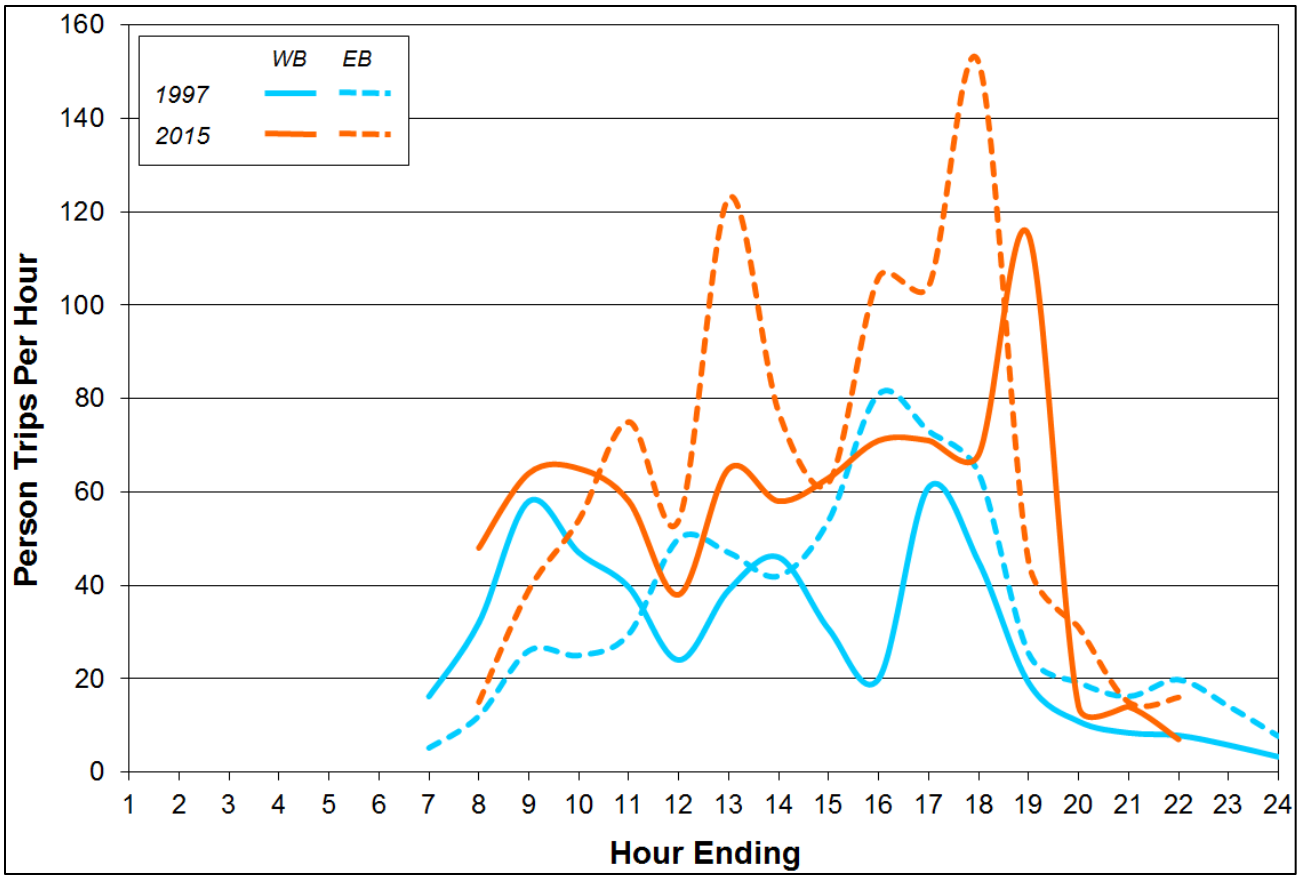


Figure 3.12 illustrates the arrival and departure patterns of pedestrian trips to and from UBC throughout the day, including a comparison with Fall 1997 pedestrian trips. There are more pedestrian trips from campus throughout the day and overall more trips both to and from campus in 2015 compared to 1997.

Figure 3.12: Distribution of Average Weekday Pedestrian Trips to / from UBC, 1997 vs. 2015



3.4. Heavy Trucks

Construction activity at UBC and the day-to-day function 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."

Counts of heavy truck traffic were undertaken on a quarterly basis during 2015; in March, June, September and December, which are summarized in ***Table 3.9. Figure 3.13*** illustrates numbers of trucks observed in each of the four quarterly counts.

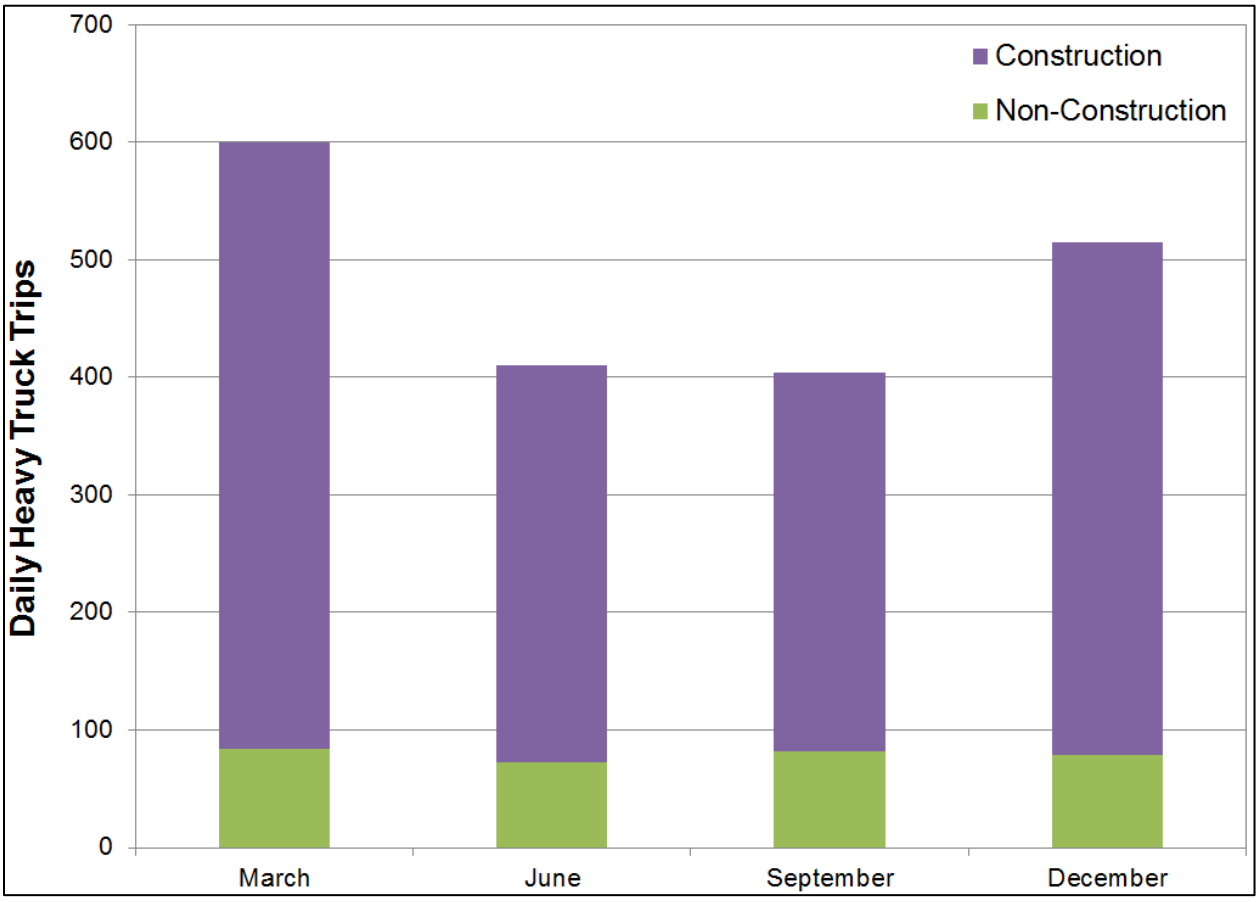
Table 3.9: Average Weekday Heavy Truck Trips to / from UBC, 2015

Route	Type of Truck		Totals
	Construction	Non-Construction	
Chancellor Boulevard	28.8 (7%)	4.5 (6%)	33.3 (7%)
University Boulevard	12.3 (3%)	20.8 (26%)	33.0 (7%)
16th Avenue	42.8 (11%)	12.0 (15%)	54.8 (11%)
SW Marine Drive and 41st Avenue	319 (79%)	42.3 (53%)	361.3 (75%)
Totals	**402.8**	**79.5**	**482.3**

As shown in the table, an average of 482 heavy truck trips per day were counted to / from UBC. This is consistent to 2014 truck activity when 483.3 trips were observed. Of the 482 trips, 403 (83%) of them were construction related trips. Similar to 2014, 2015 was a busy construction year with the completion of the District Energy Project, projects in the thunderbird fields, orchard commons, ponderosa commons phase II, and the new aquatic centre.

Of the four routes to / from UBC, SW Marine Drive carries 75% of construction related trips. The remaining trips are closely distributed to the other three routes.

Figure 3.13: Heavy Truck Trips to / from UBC, 2015



4. Traffic Conditions At UBC

This section of the *Transportation Status Report* summarizes transportation conditions on campus, particularly traffic volumes and speeds at key locations throughout the campus.

4.1. Traffic Speeds

Traffic speeds were recorded over one week on campus using pneumatic tubes. The locations are identified in ***Figure 1.1***.

The 85th percentile speed is typically used for the purposes of representing travel speeds and represents the speed below which 85% of the traffic travels. The average 85th percentile speed data from 2010 to 2015 is summarized in ***Tables 4.1 and 4.2*** for eastbound / northbound traffic and westbound / southbound traffic, respectively. Data highlighted in red represents locations where collected speed data is above the posted speed limit.

Table 4.1: Average 85th Percentile Traffic Speeds (km/h) Eastbound / Northbound, 2010 – 2015

Location		Eastbound / Northbound					
		Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
1	Wesbrook Mall s/o Gage	59.2	–	59.0	–	–	–
2	East Mall n/o Agronomy	–	37.8	–	–	–	–
3	Wesbrook Mall s/o University	53.6	–	55.5	47.1	49.3	51.2
4	Thunderbird w/o Wesbrook	46.1	48.1	48.3	47.1	47.1	47.0
5	West Mall s/o Thunderbird	38.8	35.9	37.7	–	–	--
6	West Mall n/o Thunderbird	-	-	-	-	38.9	36.0
7	East Mall s/o Thunderbird	58.1	58.0	58.3	66.0	50.7	52.6
8	Wesbrook Mall n/of 16th Ave	56.8	57.7	50.9	49.0	54.4	49.8
9	Wesbrook Mall s/o 16th Ave.	36.0	36.0	36.7	37.5	32.8	37.2
10	Stadium Rd at Main Mall	–	–	37.2	–	–	–
11	16th Ave w/o East Mall	–	–	–	78.3	72.1	69.5
12	16th Ave w/o Wesbrook Mall	–	–	–	68.6	67.0	56.3
13	16th Ave e/o Wesbrook Mall	–	–	–	74.8	72.9	72.1
14	Chancellor e/o Western Pkwy	–	–	–	56.3	57.1	55.7
15	University e/o Toronto Rd	–	–	–	77.5	59.6	58.1

Table 4.2: Average 85th Percentile Traffic Speeds (km/h) Westbound / Southbound, 2010 – 2015

Location		Westbound / Southbound					
		Fall 2010	Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall 2015
1	Wesbrook Mall s/o Gage	54.2	–	54.3	–	–	–
2	East Mall n/o Agronomy	–	37.9	–	–	–	–
3	Wesbrook Mall s/o University	51.5	–	57.9	44.2	49.6	53.8
4	Thunderbird w/o Wesbrook	44.1	54.1	46.7	44.2	40.4	42.4
5	West Mall s/o Thunderbird	38.0	41.0	38.5	–	–	–
6	West Mall n/o Thunderbird	-	-	-	-	39.1	35.6
7	East Mall s/o Thunderbird	58.9	65.1	65.6	56.6	50.5	55.9
8	Wesbrook Mall n/of 16th Ave	58.2	58.5	55.7	55.5	50.1	55.5
9	Wesbrook Mall s/o 16th Ave.	35.2	36.6	39.5	38.4	31.6	36.5
10	Stadium Rd at Main Mall	–	–	37.4	–	–	–
11	16th Ave w/o East Mall	–	–	–	72.6	69.4	75.8
12	16th Ave w/o Wesbrook Mall	–	–	–	60.1	58.2	61.7
13	16th Ave e/o Wesbrook Mall	–	–	–	73.9	65.0	63.2
14	Chancellor e/o Western Pkwy	–	–	–	71.2	60.7	59.2
15	University e/o Toronto Rd	–	–	–	58.7	56.9	58.1

Key observations regarding traffic speeds on campus include:

- Traffic speeds on BC Ministry of Transportation and Infrastructure roadways to and from campus exceed the posted speed limits (speed limits vary from 50km/h to 70km/h). This includes 16th Avenue, University Boulevard, and Chancellor Boulevard. This metric will be closely monitored in future years.
- UBC's internal roadways generally do not experience excessive speeding above 50km/h, though according to the UBC Road and Traffic Rules internal road speed limits are 30km/h. As a result, speeds on Thunderbird Blvd are in excess of the 30km/h speed.

These locations of excessive speeds will be shared with the RCMP to inform their speed enforcement program and will also be shared with the Ministry for their records.

4.2. Traffic Volumes

Peak hour traffic volumes collected over one day at key intersections on campus are illustrated in ***Figures 4.1*** and ***4.2***. The turning volumes are not intended to represent average daily traffic volumes or conditions, but are intended to provide a general overview of traffic patterns to / from and on campus during the AM and PM peak hours.

Figure 4.1: Morning Peak Hour Traffic Volumes at UBC, 2015

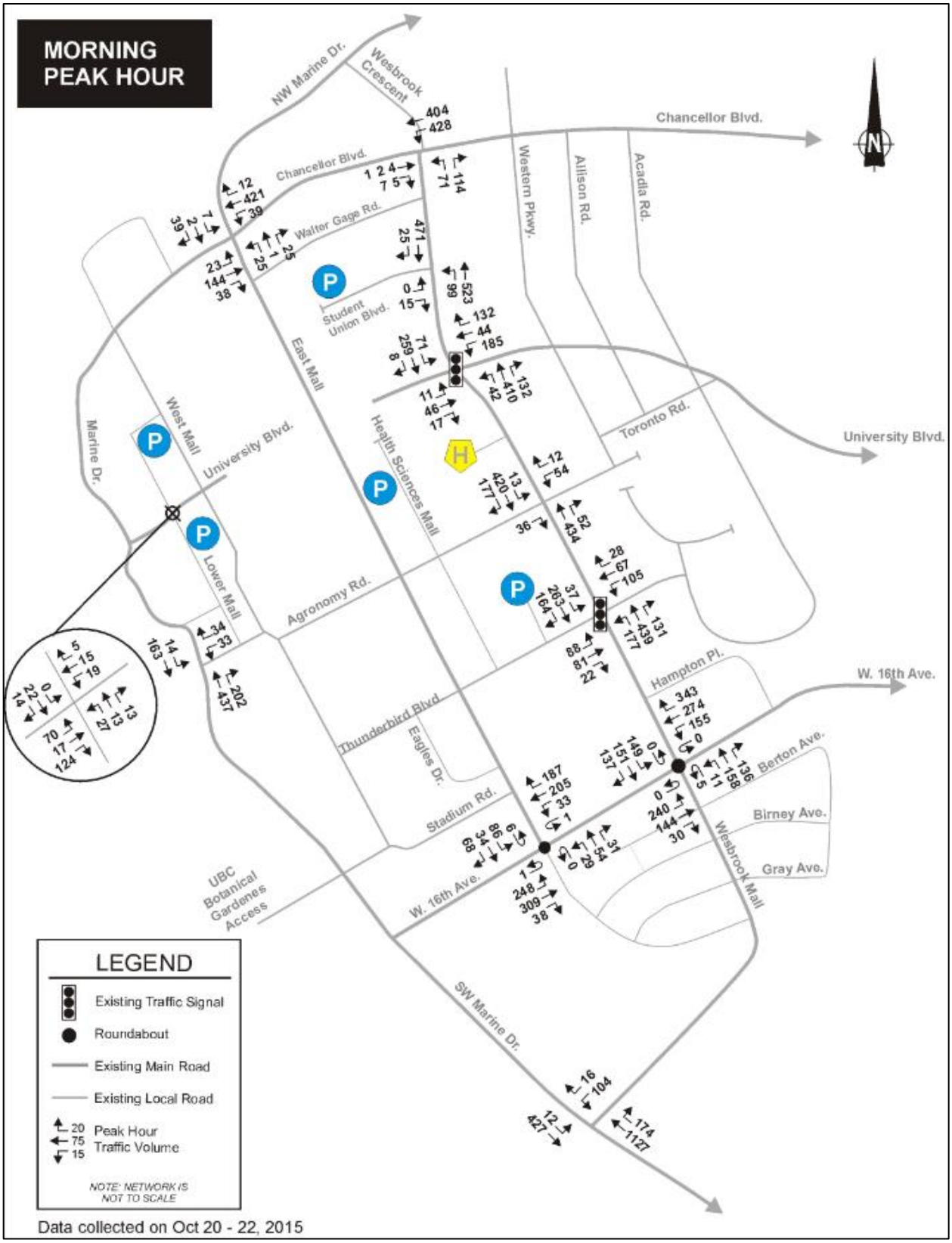


Figure 4.2: Afternoon / Evening Peak Hour Traffic Volumes at UBC, 2015