

University of British Columbia – Vancouver Campus

# Transportation Status Report Fall 2020



February 2021



THE UNIVERSITY OF BRITISH COLUMBIA

# Executive Summary

UBC has set a number of transportation targets to reduce greenhouse gas emissions from commuting and to enable the repurposing of existing parking lots. To meet these targets UBC encourages and supports more sustainable modes of transportation, including transit, biking, walking and carpooling, through a comprehensive and integrated transportation management strategy. Every fall since 1997, UBC has monitored travel patterns to and from campus to evaluate progress towards the transportation targets. These targets and the corresponding results from the 2020 data collection effort are summarized below.

*In 2020, data was collected during the 2020 COVID-19 pandemic during which classes were mostly online and staff and faculty were mostly working from home. As a result, the data in 2020 will be substantially different from previous years.*

**TARGET 1:** By 2040 at least two-thirds of all trips to and from UBC will be made by walking, cycling or transit and maintain at least 50% of all trips to and from the campus on public transit.

- × In 2020 31% of all trips were made by transit, walking and cycling.
- × In 2020 26% of all trips to and from the campus were made by transit.

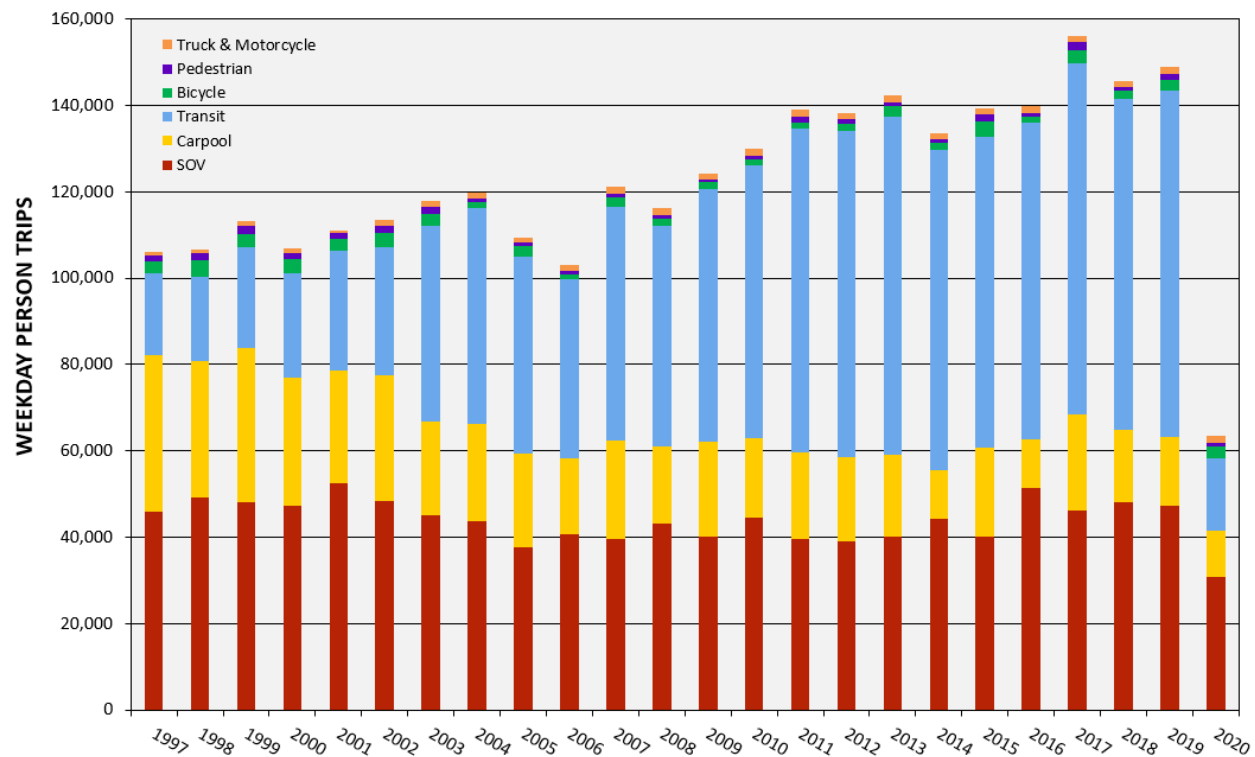
**TARGET 2:** Reduce single occupant vehicle trips to and from UBC by 20% from 1997 levels and reduce single occupancy vehicle trips per person to and from UBC by 30% from 1997 levels.

- ✓ In 2020 there were 30,900 SOV vehicle trips, which is a 32.8% decrease from 1997 values.
- ✓ In 2019 there were 0.42 SOV trips per person, which is a 61.2% reduction from 1997 values.

**TARGET 3:** Maintain daily private automobile traffic at or less than 1997 levels. Private automobiles include single occupant vehicles and carpools / vanpools, but do not include buses, motorcycles and trucks.

- ✓ In 2020 there were 35,900 private vehicles per day, which is a 12.2% reduction from 1997 values.

The focus of Target 1 is the mode of transportation used to travel to and from campus. Trips by mode are presented in **Figure A**, which shows substantial changes in the transportation mode share to and from campus since 1997. The number of trips per day has increased as a result of academic and neighbourhood residential growth on campus and most of the growth has been in trips by transit from the introduction of the student U-Pass in 2003. In 2020, the sustainable mode share (walking + cycling + transit) was 31%, however, in recent years the sustainable mode share was 55% or greater. Target 1 is a 66% sustainable mode share by 2040.

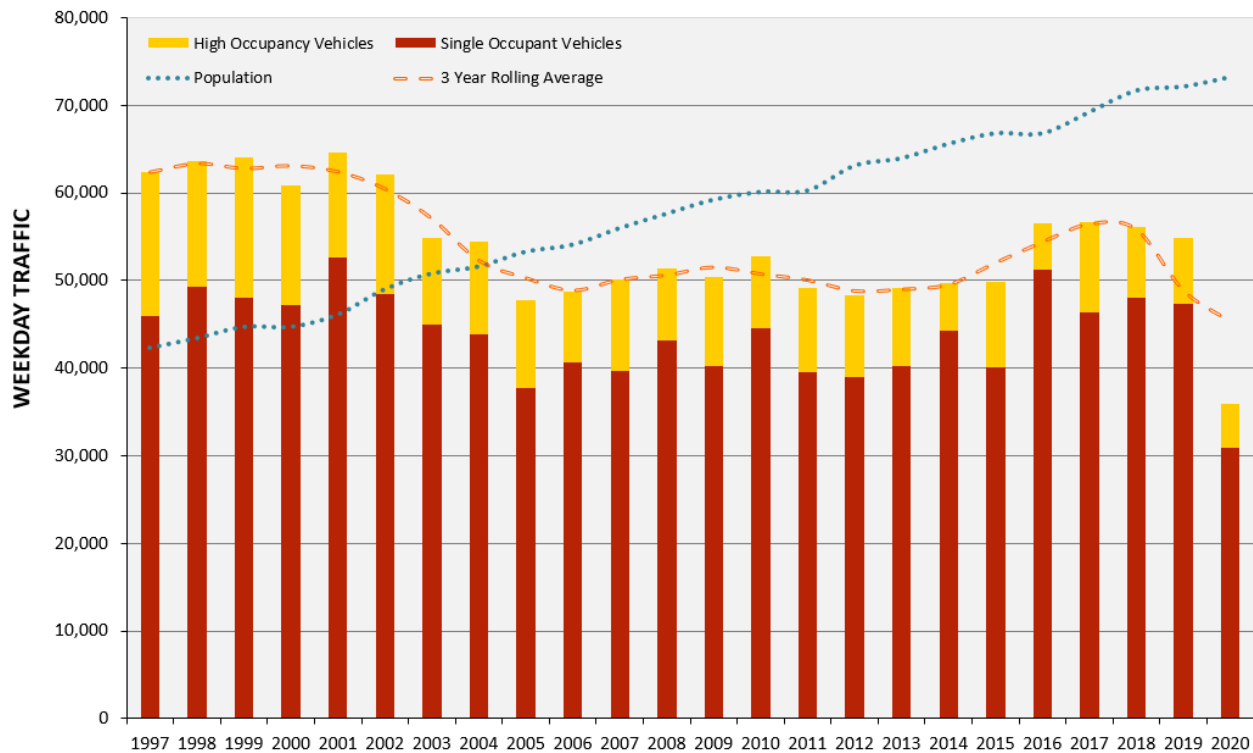


**Figure A: Weekday Person Trips to / from UBC, 1997 – 2020**

The bicycle and pedestrian mode shares to / from UBC are very low in comparison to transit and SOV mode shares, however, there are still an impressive amount of people biking to campus. In 2020, the highest number of cyclists over the past five years was recorded with 2,800 bicycle trips per day. This equates to a 4% bicycle mode share in 2020. It is anticipated that the number of pedestrian and bicycle trips will continue to gradually increase, but the mode share for these two modes are not expected to increase much as a result of the substantial number of trips to and from UBC per day.

For the first time UBC achieved Target 2, a 20% reduction in SOV trips to and from UBC from 1997 levels, which can be attributed to COVID-19 and the impact it had on travel patterns and mode choices. It is anticipated that traffic volumes will increase again when the campus resumes operations. In order for UBC to achieve Target 2 in future years, the number of trips to campus will need to reduce. This can be accomplished with strong support for remote working and ongoing efforts to encourage and support sustainable mode choices. A permanent fixture of some online classes can also result in a reduction of trips to / from campus.

Target 3 focuses on automobile traffic, which includes single occupant and high occupant vehicle trips. **Figure B** captures the trend in automobile traffic to / from UBC since 1997. Included in the chart is a representation of the three-year rolling average, to soften fluctuations in data year to year, as well as the campus population, to add context.



**Figure B: Average Weekday Motor Vehicle Traffic to / from UBC, 1997 – 2020**

As shown, automobile traffic declined in 2003, which correlates with the introduction of the student U-Pass, and remained relatively steady until 2016 at which point vehicle trips began to rise again. It is believed this increase is partially attributed to an at capacity transit system. Although the number of vehicle trips has increased over the past five years, it does not surpass 1997 levels despite a 73% increase in the campus population.

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# 1 INTRODUCTION

Since 1997, UBC has collected data each fall to monitor travel patterns to and from the Vancouver Campus. This UBC Transportation Status Report Fall 2020 provides a snapshot 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 trend lines since 1997 at UBC. This 2020 data was collected during the COVID-19 pandemic when nearly all classes were provided online and most staff and faculty were working from home.

UBC is striving to reduce automobile trips to and from the UBC Vancouver Campus by encouraging the use of sustainable 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, bicycle infrastructure and end-of-trip facilities, carshare parking, a vanpool pilot program, and is exploring carpooling programs and incentives. In addition, TransLink, in collaboration with UBC, has made ongoing efforts to improve transit service and increase transit capacity to UBC.

## 1.1 Context

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

- **UBC Strategic Plan: Shaping UBC's Next Century** sets out UBC's collective vision and purpose, as well as goals and strategies for the years ahead. The Plan builds on the university's previous strategic plan, Place and Promise, and focuses on three themes that are believed to be critical to society today: Inclusion, Collaboration and Innovation. Shaping UBC's Next Century will guide decisions, actions and interactions into the future, and will create a framework for resource allocation across the University.
- **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 establishes goals toward building complete communities thereby helping to reduce demands placed on transportation infrastructure.
- **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 UBC Transportation Plan.** UBC has committed to implement a comprehensive and integrated transportation management strategy. The Transportation Plan is the result of that commitment, and was approved by UBC's Board of Governors in November 1999 and renewed in 2014. The Plan includes

targets to ensure accountability, shape decision making and inspire the community to act in ways to achieve UBC's campus vision. The targets identified in The Plan include:

- **TARGET 1:** By 2040 at least two-thirds of all trips to and from UBC will be made by walking, cycling or transit and maintain at least 50% of all trips to and from the campus on public transit.
- **TARGET 2:** Reduce single occupant vehicle trips to and from UBC by 20% from 1997 levels and reduce single occupancy vehicle trips per person to and from UBC by 30% from 1997 levels.
- **TARGET 3:** Maintain daily private automobile traffic at or less than 1997 levels.

## 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 at the end of October to early November 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, but are not documented in this report. The annual monitoring results are used to assess progress towards meeting UBC's transportation targets and also help guide future implementation priorities.

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

**Table 1.1: Summary of 2020 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. Every other year.



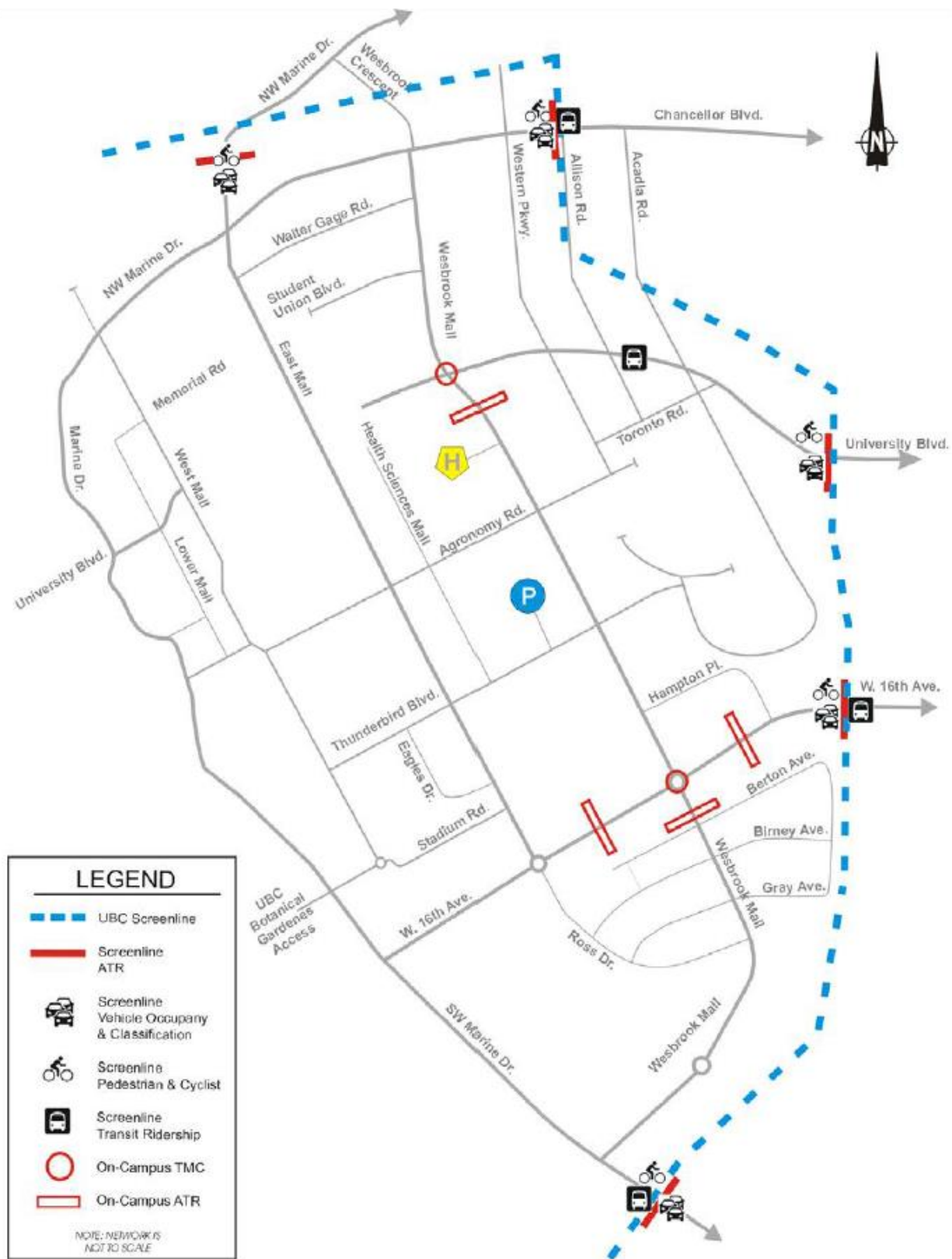


Figure 1.1: Data Collection Locations



## 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 community members. This section of the report identifies key changes that have occurred at UBC since 1997.

- **Population.** The daytime population at UBC has increased by over 73% 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 2020.

It is important to 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, 2020 vs. 1997**

Group	Fall 1997	Fall 2020	Increase (count / percentage)	
Students	33,200	56,950	+23,750	+71.5%
Staff	7,250	12,050	+4,800	+66.2%
Faculty	1,850	4,300	+2,470	+135%
<b>Totals</b>	<b>42,300</b>	<b>73,300</b>	<b>+31,030</b>	<b>+73.4%</b>

*Source: UBC Planning and Institutional Research Department*

- **Compass Card (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 \$41 per month. The U-Pass offers students unlimited access to TransLink Bus, SkyTrain and SeaBus services (all zones), and discounted West Coast Express fares. The Compass Card came into effect for the 2016 data collection period, which replaced the U-Pass card, but the U-Pass program continues.
- **Increased transit service.** In conjunction with introduction of the student U-Pass, TransLink has substantially increased the level of transit service provided to UBC and continues to make service improvements annually. The majority of the increase has been on the Route 99 B-Line. Other improvements since 1997 include new Route 33 on 16<sup>th</sup> Avenue, and several express routes including the new R4 RapidBus Route launched in January 2020 that connects UBC to Joyce Station via 41<sup>st</sup> Avenue. TransLink ridership data indicates routes to UBC carry the highest passenger volumes in the region year over year. More effort is being made on transit priority in the region as well, UBC has participated by providing bus lanes on Wesbrook Mall between 16<sup>th</sup> Avenue and University Boulevard.
- **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. Although there are limitations with further efforts to spread class start times, Campus Planning will continue to emphasize the importance with scheduling services to continue to spread the class start times out.

- **Parking supply and costs.** UBC has eliminated approximately 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 have increased from \$2.00 in 1997 to \$16.00 in 2019, and prices for parking permits and short term parking have also increased. As a result of the growth in Electric Vehicle (EV) ownership in the Lower Mainland, UBC has been adding EV charging stations in the parkades across campus. Currently UBC Parking offers access to over 70 EV chargers (both Level 2 and fast chargers), which is the highest in the region per capita and will continue to add more as capacity permits and UBC has started implementing strategies to increase turnover of the use of the stations.
- **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 16<sup>th</sup> Avenue. Similarly, the City of Vancouver has made significant progress on bike facilities that connect to the five key routes to and from UBC. All unrestricted roads on campus function as shared roadways that accommodate cyclists as well as motor vehicles. Bicycle racks are provided at every building on campus in addition to secure 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, bike-share, carpooling, car sharing, cycling, a vanpool pilot, an emergency ride home program, and other sustainable transportation programs.
- **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 commuting population. At the same time, an increased number and range of commercial services and amenities are now available on campus and in the University Endowment Lands adjacent to campus to reduce the need to travel off 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 between the end of October and early November using automatic counters placed on the roadway. 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 are estimated by combining occupancy and classification data with the average daily traffic data.

- **Rolling average.** Much of the data presented in this report is from a single day to a week and observed travel patterns fluctuate from year to year and are heavily influenced by weather. 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. Most of this information can be found at UBC's Campus and Community Planning [website](#):

- This UBC Transportation Status Report Fall 2020, along with previous Transportation Status Reports.
- The 2017 Transportation Survey.
- 2014 UBC Transportation Plan.
- 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

This section presents 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

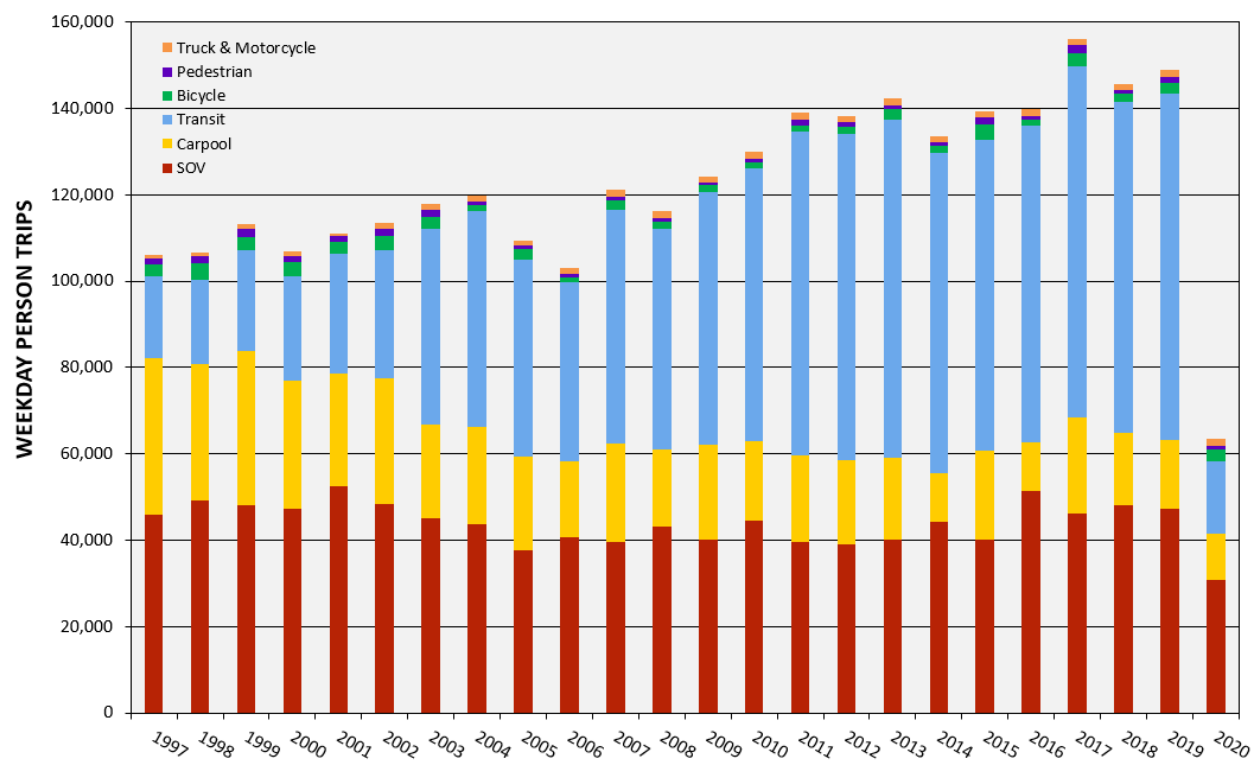
The average weekday person trips to and from UBC in fall 2020 was 63,400, which is significantly less than recent years past. A summary and comparison of daily person trips by mode for 1997 and 2020 are provided in **Table 2.1** and **Figure 2.1**.

**Table 2.1: Weekday Person Trips to / from UBC Vancouver**

Travel Mode Classification	Person Trips				
	Fall 1997	Fall 2019	Fall 2020	Change 2020-1997 (count / %)	
Single Occupant Vehicle (SOV)	46,000	47,300	30,900	-15,100	-32.8%
Carpool / Vanpool (HOV)	36,100	16,000	10,500	-25,600	-70.9%
Transit	19,000	80,200	16,800	-2,200	-11.6%
Bicycle	2,700	2,500	2,800	+100	+3.7%
Pedestrian	1,400	1,300	800	-600	-42.9%
Truck & Motorcycle	900	1,500	1,600	+700	+77.8%
<b>Totals</b>	<b>106,100</b>	<b>148,800</b>	<b>63,400</b>	<b>-42,700</b>	<b>-40.2%</b>

In 2020, only trips by truck & motorcycle and trips by bicycle were above 1997 and 2019 values while all other modes were less. The most drastic difference compared to 2019 is trips by transit going from over 80,000 trips per day to under 17,000 trips per day. SOV trips were relatively high considering there were few classes on campus and very few staff and faculty working on campus.

There is a lot of variability in trips by mode year over year and the data collected in 2020 will be unique. To help smooth the variability, a three-year rolling average is referenced throughout the report.



**Figure 2.1: Weekday Person Trips to / from UBC, 1997 – 2020**

The number of person trips leveled off between 2011 and 2020 with the exception of 2017 where a spike in person trips occurred, and 2020 where a significant drop occurred as a result of COVID-19.

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 for 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 are presented in **Table 2.2**.

**Table 2.2: Weekday Trips Per Person to / from UBC**

Travel Mode Classification	Trips Per Person			
	Fall 1997	Fall 2019	Fall 2020	% Change 2020-1997
Single Occupant Vehicle (SOV)	1.09	0.66	0.42	-61.2%
Carpool / Vanpool	0.86	0.22	0.14	-83.2%
Transit	0.45	1.11	0.23	-49.0%
Bicycle	0.06	0.03	0.04	-40.2%
Pedestrian	0.03	0.02	0.01	-67.0%
Truck & Motorcycle	0.02	0.02	0.02	+2.6%
<b>Totals</b>	<b>2.51</b>	<b>2.06</b>	<b>0.86</b>	<b>-65.5%</b>
<b>CAMPUS POPULATION*</b>	<b>42,300</b>	<b>72,200</b>	<b>73,300</b>	<b>+73.3%</b>

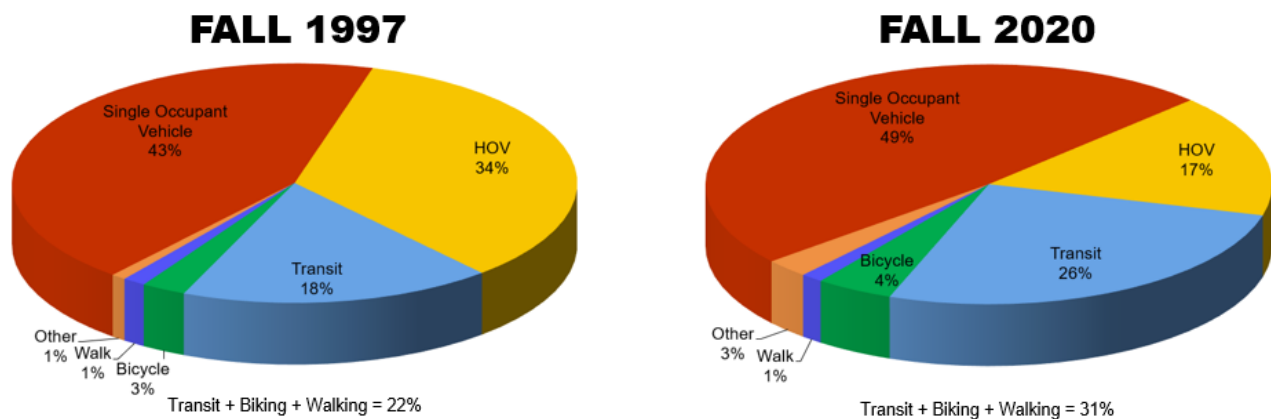
\*Population numbers obtained from PAIR website and include students, staff and faculty as of fall 2020.



The trips per person in 2020 are substantially different from recent years as a result of a limited number of people travelling to / from campus for work or school. A majority of trips in 2020 were made by personal vehicles (SOV and HOV), followed by transit.

## 2.2 Mode Share Summary

The mode share comparison for 1997 and 2020 are shown in **Figure 2.2**. Unfortunately, in 2020 the single occupant vehicle mode share was up to nearly 50% of all trips in 2020. Over the last few years transit mode share was over 50%, but with concerns about COVID-19 transmission, trips by transit were significantly down across the region in 2020. On a positive note, bicycle mode share is up from 1997 levels to 4% of all trips.

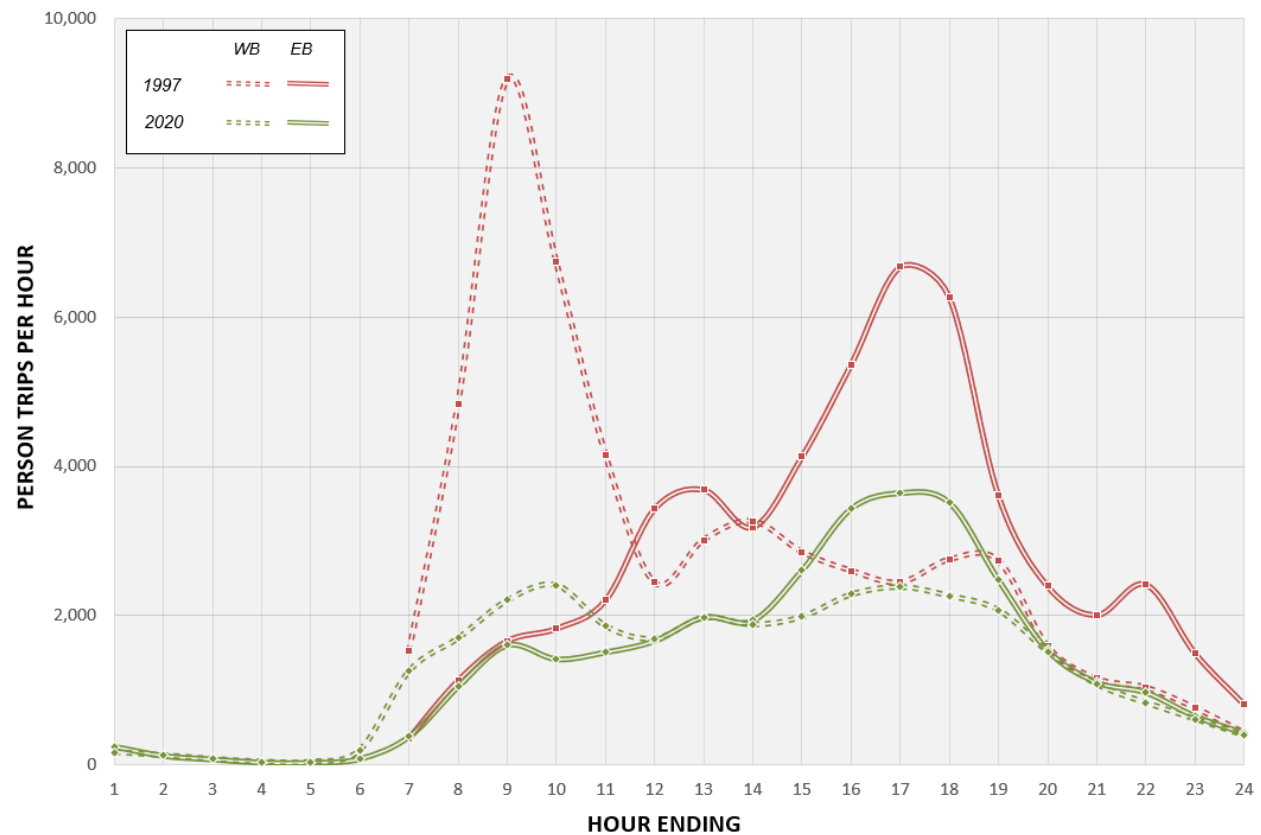


**Figure 2.2: Average Weekday Trips by Mode to / From UBC, 1997 vs. 2020**

**TARGET 1:** By 2040 at least two-thirds of all trips to and from UBC will be made by walking, cycling or transit and maintain at least 50% of all trips to and from the campus on public transit.

- × In 2020 31% of all trips were made by transit, walking and cycling.
- × In 2020 26% of all trips to and from the campus were made by transit.

The distribution of weekday person trips throughout the day is shown below in **Figure 2.3**. The most notable difference in the 2020 data compared to 1997 and more recent years is the absence of a morning peak period. There is a small peak in the afternoon, but more rounded compared to previous years where sharp peaks were observed. The goal is to achieve a more rounded peak to reduce the strain on the transportation network and more importantly the public transit system. Peak demands similar to the westbound 1997 series shown in **Figure 2.3**, translate to overcrowding and poor service / experience to transit riders, which tends to push people to less sustainable alternatives.



**Figure 2.3: Distribution of Average Weekday Person Trips to / from UBC, 1997 vs. 2020**

The peak hour summary of trips by mode is summarized in **Table 2.3**. Typically, the number of trips in the AM peak hour are close to the number of trips in the PM peak hour, but in 2020 this was not observed with much more activity on the roads during the evening peak hour.

**Table 2.3: Average Peak Hour Person Trips by Mode to/from UBC, 2020**

Travel Mode Classification	AM Peak Hour (8am to 9am)		PM Peak Hour (5pm to 6pm)	
	Westbound	Eastbound	Westbound	Eastbound
Single Occupant Vehicle (SOV)	1,097	875	1,136	1,380
High Occupancy Vehicle	169	158	362	479
Transit	751	415	536	1,316
Bicycle	103	68	161	250
Pedestrian	33	52	34	45
Truck & Motorcycle	55	40	38	50
<b>Totals</b>	<b>2,208</b>	<b>1,608</b>	<b>2,267</b>	<b>3,520</b>

## 2.3 Automobile Traffic

Automobile traffic (single occupant and high occupant vehicles only) to and from UBC has decreased substantially over the years from 1997. In 2020, there was an even larger decrease as a result of COVID-19, as shown in **Table 2.4**.

The second target in UBC's transportation plan is to reduce single occupant vehicle trips to and from UBC by 20% from 1997 levels. In 2020, this target was met for the first time with SOV trips reduced by 32.8% from 1997 levels.

**Table 2.4: Average Weekday SOV and HOV Traffic Volume to/from UBC, 1997 vs. 2020**

Travel Mode Classification	Fall 1997	Fall 2020	Change (count / percentage)	
Single Occupant Vehicle (SOV)	46,000	39,000	-15,100	-32.8%
High Occupant Vehicle (HOV)	16,400	5,000	-11,400	-69.5%
<b>Totals</b>	<b>62,400</b>	<b>35,900</b>	<b>-26,500</b>	<b>-42.5%</b>

**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 so the numbers in this table won't match those presented in **Table 2.4**.

**Table 2.5: Summary of Average Weekday Traffic Volumes at Screenlines**

Screenline	Average Daily Traffic Volume			
	Fall 1997	Fall 2018	Fall 2019	Fall 2020 (%)
NW Marine Drive	2,040	1,160	1,220	1,440 (4%)
Chancellor Boulevard	11,660	11,300	9,850	4,610 (12%)
University Boulevard	14,610	10,330	10,180	7,250 (18%)
16th Avenue	12,880	16,450	16,720	11,890 (30%)
SW Marine Drive	23,410	21,910	20,830	14,120 (36%)
<b>Totals</b>	<b>64,600</b>	<b>61,160</b>	<b>58,800</b>	<b>39,310</b>

Overall, traffic volumes were much lower in 2020. However, there was an increase in traffic along NW Marine Drive compared to recent years. This could possibly be attributed to recreational driving during COVID-19.

Vehicle occupancy allows UBC to understand travel patterns of the community. Vehicle occupancy is a measure of the average number of people travelling per vehicle during a certain period of time. The average daily vehicle occupancies are presented in **Table 2.6**, which interestingly have not changed over the past three years.

**Table 2.6: Average Daily Vehicle Occupancy to / from UBC**

Travel Mode Classification	Fall 1997	Fall 2018	Fall 2019	Fall 2020
Vehicles (SOV's + HOV's)	1.32	1.14	1.14	1.14
HOV's (Carpools / Vanpools)	2.20	2.07	2.07	2.07

## 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

Generally, transit usage has been very high as a result of the student U-Pass program, continued improvements in transit service, a reduced supply of commuter parking, and higher parking costs on campus. In recent years, transit ridership was nearly four times the ridership observed in 1997. However, in 2020 transit ridership was significantly less as a result of few classes being offered on campus and most staff and faculty working from home.

**Table 3.1** provides a summary of the increase in transit trips and the transit mode share from fall 1997 to fall 2020, 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 – 2020**

Transit Trips	Before U-Pass		After U-Pass		Change 2020-1997 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2003	Fall 2020		
Person Trips	19,000	29,700	45,400	16,800	-2,200	-11.6%
Trips Per Person	0.45	0.61	0.89	0.23	-0.22	-49%
Transit Mode Share	18%	26%	39%	26.5%	+8.5%	+48%

**Table 3.2** provides a summary of transit trips by corridor while **Table 3.3** provides a summary of transit trips by route comparing the last three years.

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

Corridor	Fall 2017	Fall 2018	Fall 2019	Fall 2020 (%)
Chancellor Blvd.	9,840	11,757	11,124	1,284 (7.5%)
University Blvd.	37,045	33,993	31,202	5,213 (31%)
16th Avenue	9,857	11,064	10,229	3,332 (20%)
SW Marine Drive	24,644	19,827	27,636	7,006 (41.5%)
<b>Totals</b>	<b>81,386</b>	<b>76,641</b>	<b>80,191</b>	<b>16,835</b>

In January 2020, the new R4 RapidBus was launched. The full impact of this new express service cannot be evaluated in 2020 due to COVID-19, but in 2020 SW Marine Drive had the highest transit ridership compared to all other routes for the first time. This could be attributed to the new RapidBus service. The R4 route also had the highest ridership in 2020, when typically it was the 99 B-Line that had the highest ridership.

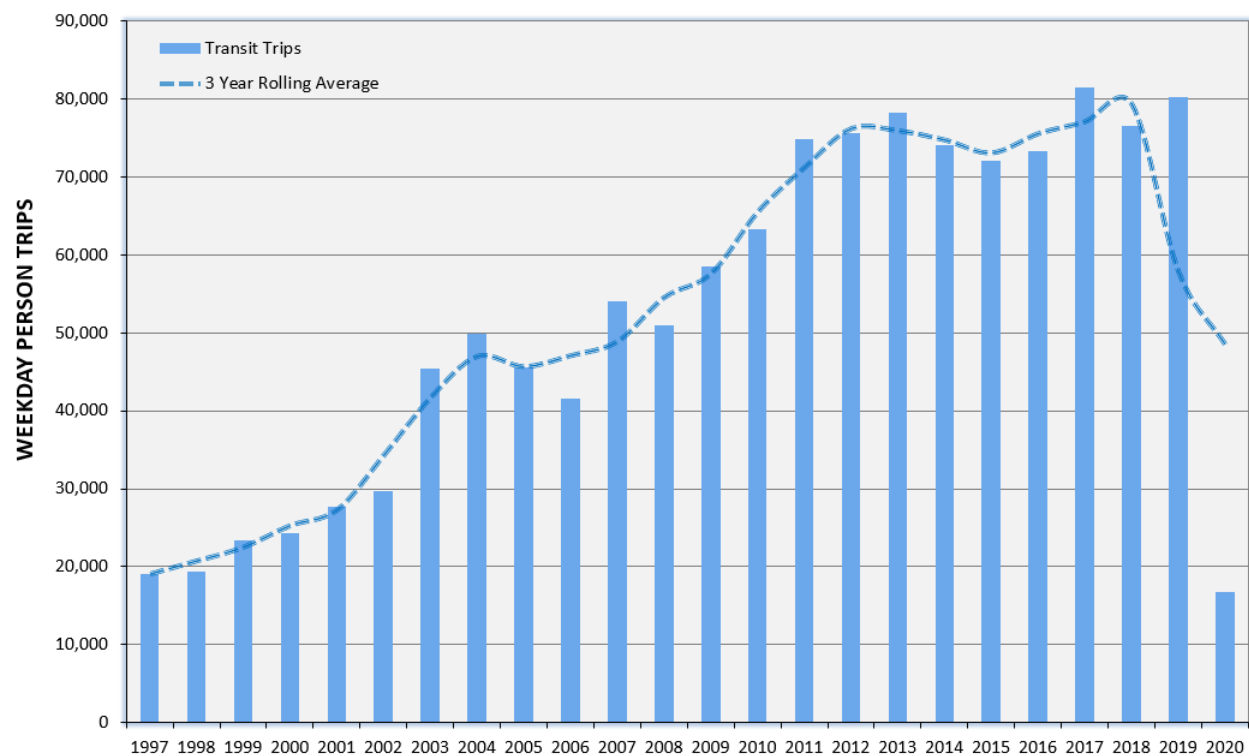
**Table 3.3: Average Weekday Daily Transit Trips to / from UBC by Route**

	Route	Fall 2018	Fall 2019	Fall 2020 (%)
4	4th Avenue	3,458	3,429	650 (4%)
9	Broadway	1,394	1,861	-
14/N17	Broadway	5,827	5,041	1,042 (6%)
25	King Edward	7,062	6,548	2,047 (12%)
33	16th Avenue	3,992	3,593	1,285 (7.5%)
44	4th Ave. Express	4,483	5,017	-
49	49th Avenue	5,973	8,394	2,877 (17%)
84	4th Ave. Express	6,921	5,867	1,274 (7.5%)
99	Broadway B-Line	23,102	20,543	3,486 (20.5%)
258	North Shore Express	471	402	-
480	Richmond Express	3,511	4,789	-
R4	41st Ave RapidBus	10,343*	14,243*	4,051 (24%)
NIS	Not In Service	104	464	123 (0.7%)
	<b>Totals</b>	<b>76,641</b>	<b>80,191</b>	<b>16,835</b>

\*Routes 43 and 41 replaced by R4 RapidBus January 2020.

**Figure 3.1** illustrates transit ridership from year to year and includes the three-year rolling average to help balance out the variation year over year. A sharp increase was observed in 2003 when the u-pass was introduced, which was followed by a steady increase until it leveled off in 2011. It is anticipated that these numbers will increase again in 2021, but possibly not back to pre-2020 ridership as a result of travel pattern changes and remote working / online learning.





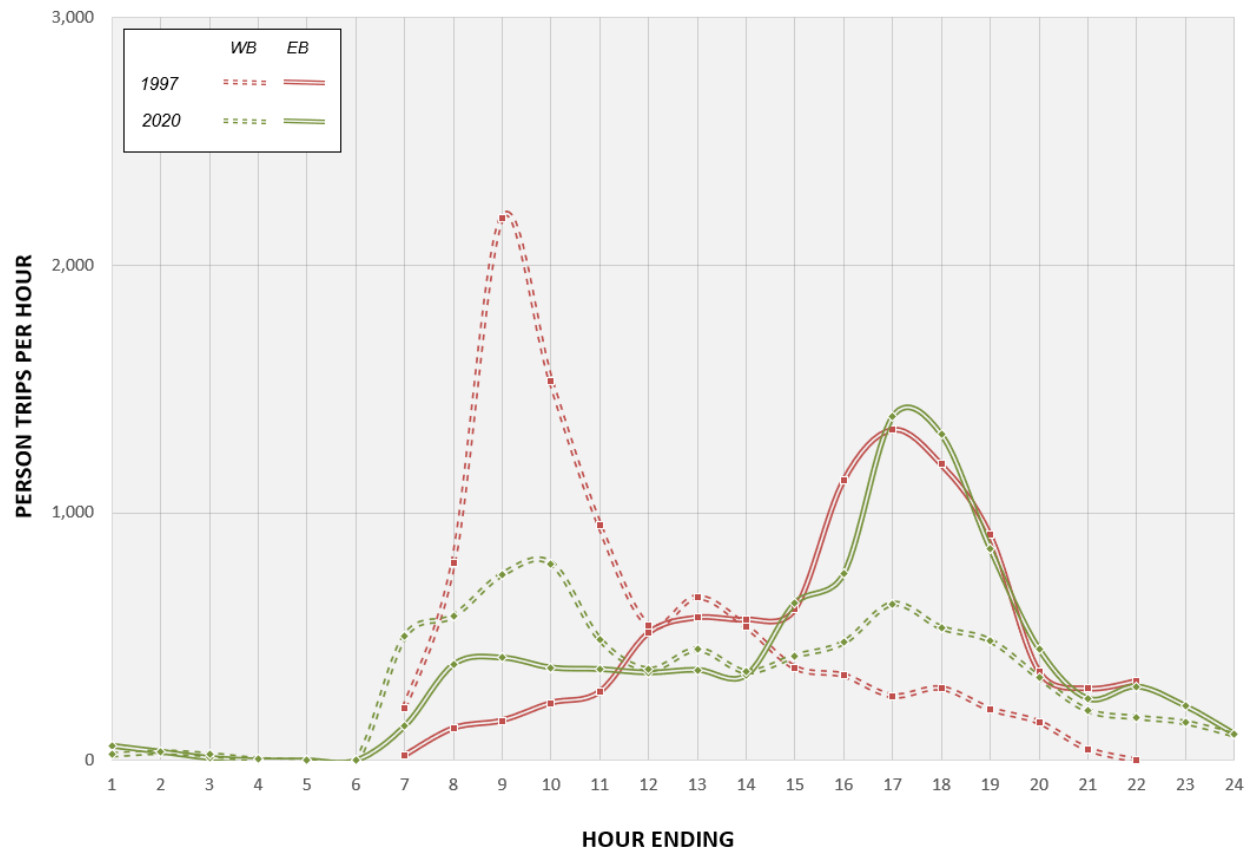
**Figure 3.1: Average Weekday Transit Trips to / from UBC, 1997 – 2020**

A summary of the most significant observations about transit trips to / from UBC is as follows:

- Bus routes using SW Marine Drive account for 41.5% of all transit trips to / from UBC in 2020. This varies from previous years when University Boulevard carried the highest number of transit trips. This change is likely attributable to the new R4 RapidBus route.
- Ridership in the “UBC Line”<sup>1</sup> corridor amounts to 58.5% of all transit trips to and from UBC.
- The R4 RapidBus route carries 24% of all transit trips and the 99 B-Line carries 20.5% of all transit trips.
- All express bus routes carry 52% of all transit trips. In 2020, this doesn’t include trips by the 258 or the 480 that were not running due to transit service cuts in 2020.
- Trolley bus Routes 4 and 14/17 account for 10% of all transit trips, which is down from previous years. The trolley route 9 was not operating to UBC in 2020.

<sup>1</sup> 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 16<sup>th</sup> Avenue.

The daily distribution of transit trips to and from UBC in 2020 and 1997 is shown in **Figure 3.2**. The typical morning peak in transit trips westbound was not observed in 2020 and the peak in the afternoon was more evenly distributed across a three-hour period as opposed to the usual single peak hour. In a typical year, a majority of the transit routes serving UBC are at capacity during the peak periods with overcrowding consistently observed. This results in unsatisfied customers and people choosing alternative modes instead as evidenced by the 2017 transportation survey discussed below.



**Figure 3.2: Distribution of Average Weekday Transit Trips to / from UBC, 1997 vs. 2020**

In 2017, UBC carried out a transportation survey of the campus community to gather more detailed information about travel to / from and around campus. Their top three responses to a question about what would increase the likelihood of travelling to campus by public transit more often were shorter travel times, less overcrowding of buses, and increased frequency of service. Of people that currently do take transit to travel to / from UBC the average travel time from respondents was 50.5 minutes, one way. Given this information it suggests strong support for rapid transit and a high likelihood that vehicle trips would be replaced by rapid transit trips if there was a rapid transit connection to UBC.

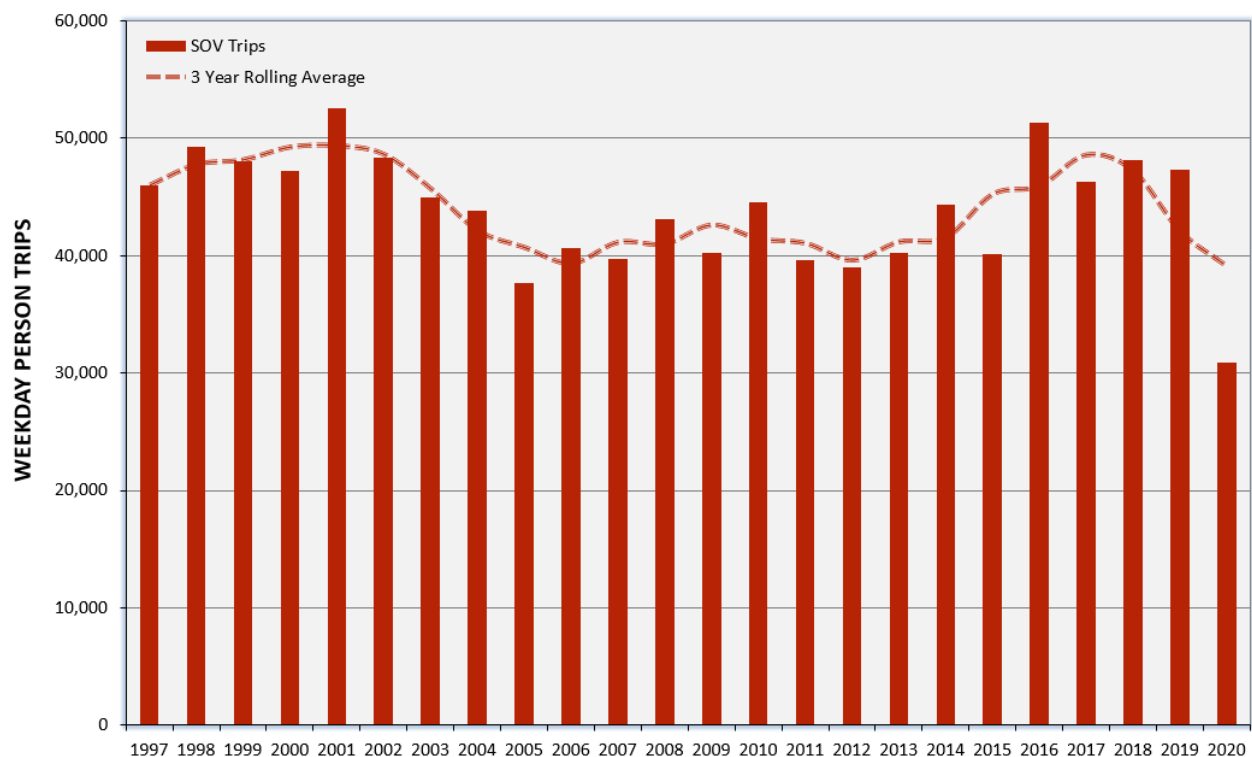
## 3.2 Motor Vehicles

UBC is committed to reducing the amount of vehicle traffic travelling to and from UBC each day as proven with two of the three transportation targets (**Section 1.1**) focusing on vehicle traffic.

**Table 3.4** provides a comparison of SOV travel in fall 1997 and fall 2020, and **Figure 3.3** provides a summary of year-by-year changes and the three-year rolling averages.

**Table 3.4: Summary of SOV Trips to / from UBC, 1997 vs. 2020**

Average Weekday SOV Trips	Fall 1997	Fall 2019	Fall 2020	Change 2020-1997	
				(count / percentage)	
Person Trips	46,000	47,300	30,900	-15,100	-32.8%
Trips Per Person	1.09	0.66	0.42	-0.67	-61.2%
SOV Mode Share	43%	32%	48.7%	+5.4%	+12.4%



**Figure 3.3: Average Weekday SOV Trips to / from UBC, 1997 - 2020**

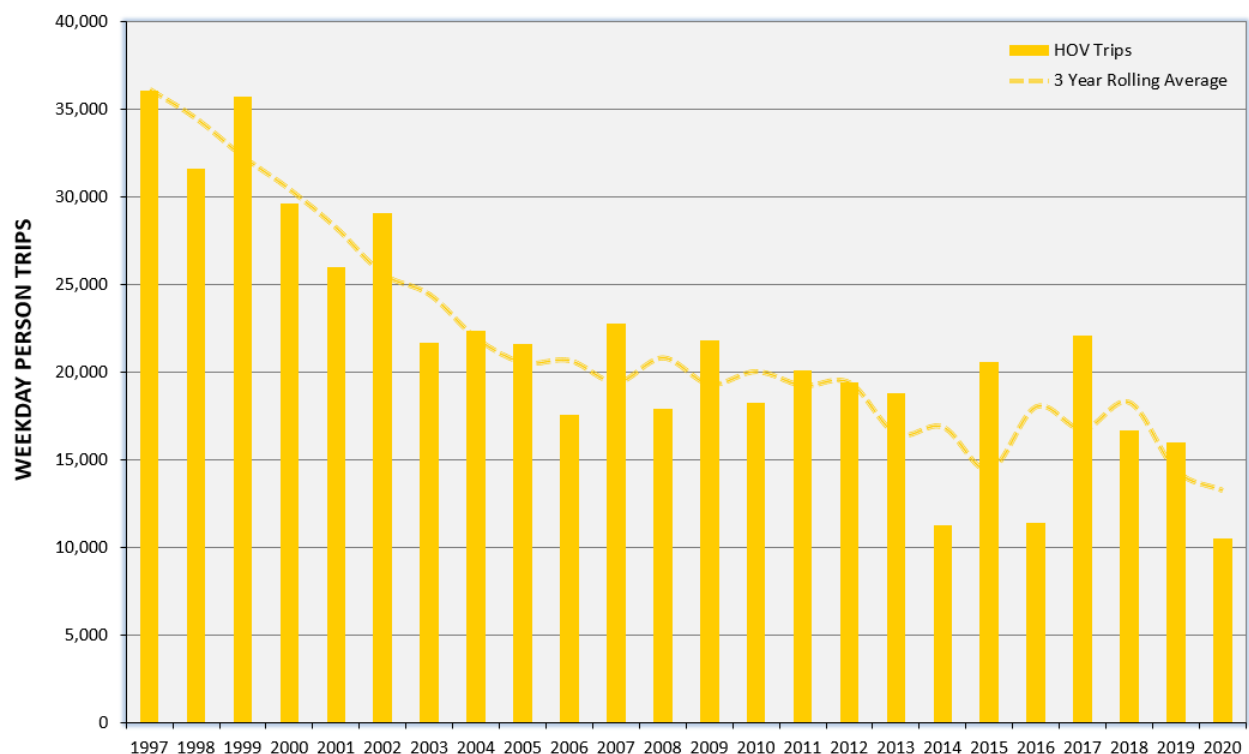
This year there was a significant decrease in the number of SOV trips, but the share of SOV trips increased. This means that there was a greater proportion of people driving alone compared previous years, which is likely attributable to COVID-19 with fewer people sharing rides or taking transit.

From the 2017 Transportation Survey the campus community was asked why they chose to drive alone. Their top three responses were to pick-up children from daycare and schools, public transit is not an option because they live too far away, and they do not like to take public transit in general. Of the respondents that identified they travelled alone, 75% of them said they would take transit if there was a rapid transit connection to UBC. Although rapid transit isn't planned for quite a while, a new RapidBus route, R4, started running to UBC in January 2020 to provide the desired express service.

Carpooling, or High Occupancy Vehicle travel (HOV), has decreased substantially since 1997. A summary of the trend in HOV travel is provided in **Table 3.5**, and a summary of year-by-year changes and the three-year rolling average is provided in **Figure 3.4**.

**Table 3.5: Summary of HOV Trips to / from UBC**

Average Weekday HOV Trips	Fall 1997	Fall 2019	Fall 2020	Change 2020-1997 (count / percentage)	
Person Trips	36,100	16,000	10,500	-25,600	-70.9%
Trips Per Person	0.85	0.22	0.14	-0.71	-83.2%
HOV Mode Share	34%	10.8%	16.6%	-17.5%	-51.3%

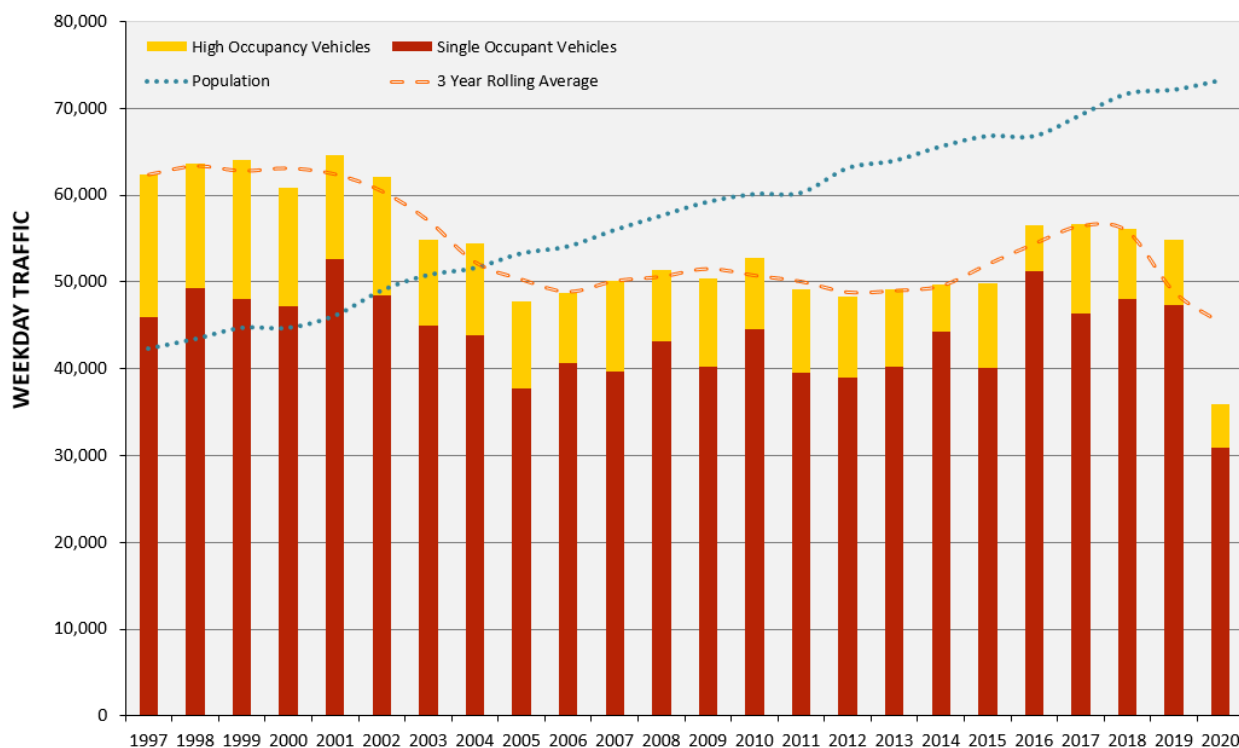


**Figure 3.4: Average Weekday HOV Trips to / from UBC, 1997 – 2020**

HOV trips have generally decreased since 1997 with quite a bit of fluctuation year to year. In 2020, there was a significant decrease in the number of HOV trips and the HOV mode share.

The 2017 Transportation Survey asked the campus community why they drive alone and what would make them choose to travel by more sustainable options such as carpooling. The primary response was the need to carry out other errands such as picking children up from daycare / school, indicating that flexibility is a requirement when exploring carpooling programs. Respondents also identified that more carpool incentives would increase the likelihood of them carpooling over travelling alone. UBC is working on increasing the HOV mode share with pilot programs and incentives in addition to ongoing research to understand the barriers to carpooling / vanpooling.

**Figure 3.5** shows the change in daily motor vehicle traffic volumes from 1997 to 2020. In fall 2020, daily motor vehicle traffic was 35,900 vehicles per day, which is a 42.5% decrease from 1997. Up to 2016, daily traffic to / from UBC decreased while over the same period the campus population increased. Unfortunately, since 2016 there has been an increase in the number of motor vehicle trips, which may be attributed to the growing on campus neighbourhoods.



**Figure 3.5: Average Weekday Motor Vehicle Traffic to / from UBC, 1997 – 2020**

**TARGET 2:** Reduce single occupant vehicle trips to and from UBC by 20% from 1997 levels and reduce single occupancy vehicle trips per person to and from UBC by 30% from 1997 levels.

- ✓ In 2020 there were 30,900 SOV vehicle trips, which is a 32.8% decrease from 1997 values.
- ✓ In 2019 there were 0.42 SOV trips per person, which is a 61.2% reduction from 1997 values.

**TARGET 3:** Maintain daily private automobile traffic at or less than 1997 levels. Private automobiles include single occupant vehicles and carpools / vanpools, but do not include buses, motorcycles and trucks.

- ✓ In 2020 there were 35,900 private vehicles per day, which is a 12.2% reduction from 1997 values.

Although UBC met all the targets in 2020, UBC typically does not achieve the target of a 20% reduction in SOV trips to / from UBC from 1997. This will be a challenging target for UBC to meet once the campus returns to normal operations, even with a rapid transit connection. However, if remote work and online learning continue to some degree, it is very possible UBC can reach this target.

As a result of the significant uptake of car sharing in Vancouver, UBC started tracking the number of car share trips to and from campus. Car share vehicles were counted at screenline locations over an eight-hour period, which is presented below in **Table 3.6**. UBC provides around 160 dedicated parking stalls to Modo and Evo carshare in addition to overflow parking on the roof level of parkades. In 2020, Car2Go stopped operating in Vancouver, leaving Evo as the only one-way car share provider for the city. It was going to be very interesting to see how this impacted the number of car share trips, however, due to COVID-19 it was not possible to assess the impact. This will need to be done in 2021.

**Table 3.6: Summary Car Share Trips to and from UBC**

Car-Share Vehicle Trips	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
1-Person Trips	299	388	408	503	497	163
2-Person Trips	45	41	73	41	101	45
3+ Person Trips	5	7	39	9	13	18
<b>Totals</b>	<b>349</b>	<b>436</b>	<b>520</b>	<b>553</b>	<b>611</b>	<b>226</b>

There has been a significant increase in car share trips to / from UBC with an increase over 75% in just four years between 2015 and 2019. Results from the 2017 Transportation Survey of the campus community identified Car2Go and Evo as the top two car share providers that respondents had memberships to. Respondents also identified the top three reasons they use car share vehicles are to run errands / shopping, when the weather is poor, and for commuting to school / work.

More research is required to determine the overall benefits of car share at UBC. For example, what travel mode is being replaced by car share and how many times do the vehicles that are driven to campus move throughout the day.

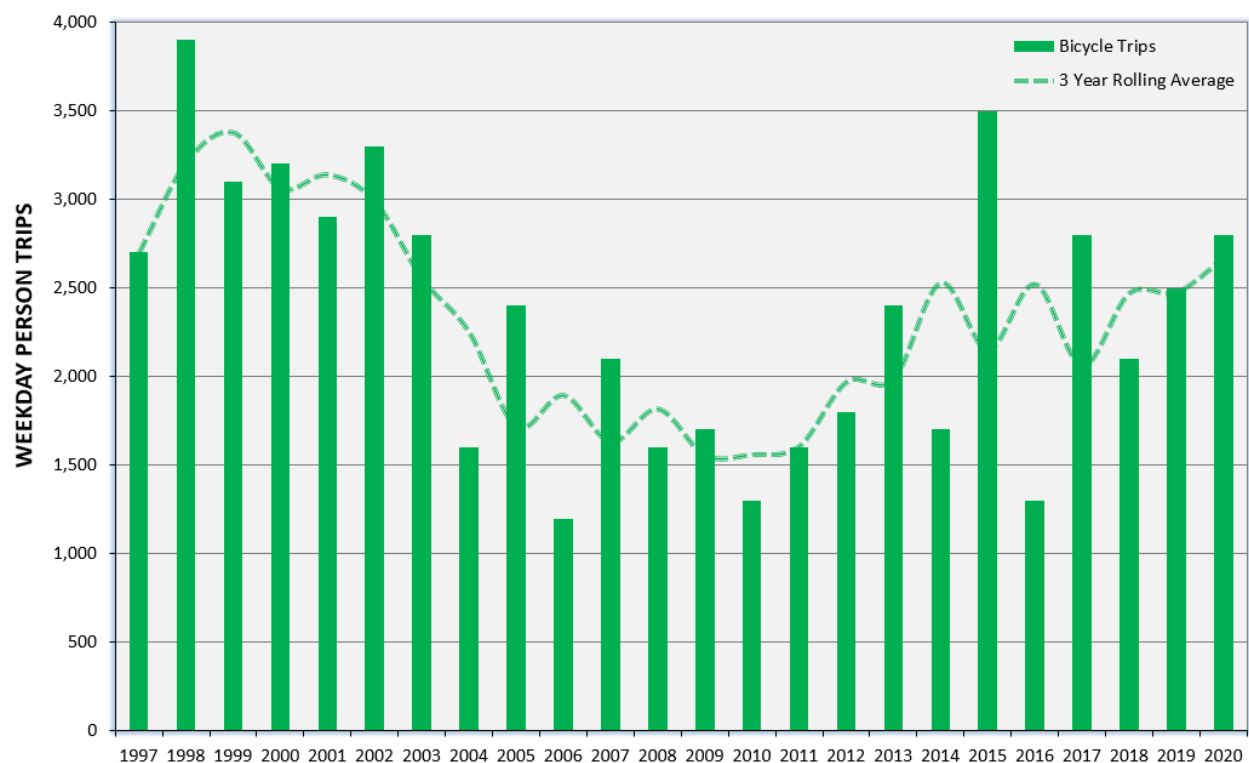


### 3.3 Bicycles and Pedestrians

**Table 3.7** and **Figure 3.6** provide summaries of the trend in bicycle trips from fall 1997 to fall 2020. There was a significant decrease in trips by bike after the U-Pass program was introduced in 2003. However, with the exception of a few years there has been a general increase in the number of bicycle trips since 2010. This is likely credited to continued improvements to bike infrastructure at UBC and in the City of Vancouver as well as the general popularity of biking in the region including the uptake of e-bikes that increases the distance cyclists are willing to travel to commute. Since data is recorded over a single day, variations in data year over year are highly anticipated, particularly as weather has a direct correlation with the number of bike trips.

**Table 3.7: Summary of Average Weekday Bicycle Trips to / from UBC, 1997 vs. 2020**

Average Weekday Bicycle Trips	Before U-Pass		After U-Pass		Change 2020-1997 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2003	Fall 2020		
Person Trips	2,700	3,300	1,600	2,800	+100	+3.7%
Trips Per Person	0.06	0.07	0.03	0.04	-0.03	-40%
Bicycle Mode Share	2.5%	2.9%	1.3%	4.4%	+1.9%	+73%



**Figure 3.6: Average Weekday Bicycle Trips to / from UBC, 1997 – 2020**

As can be seen, the number of trips by bike increased slightly in 2020 over previous years. This is likely attributed to the popularity of biking during the COVID-19 pandemic.

In 2019, UBC entered into a new bike share program with HOPR on campus. This program does not have an impact on commuter trips since the program services on campus trips only. In the future, if there is a united bike share program between UBC and the City of Vancouver, it is likely the number of bike commuter trips would increase. However, it is unlikely to have a significant impact on the mode share for the campus given the volume of trips to and from UBC each day.

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 three years:

- In 2020, total of 38 bicycles were on buses at a 1% usage rate.
- In 2019, total of 212 bicycles were on buses at a 4.6% usage rate.
- In 2018, total of 130 bicycles were on buses at a 2.8% usage rate.

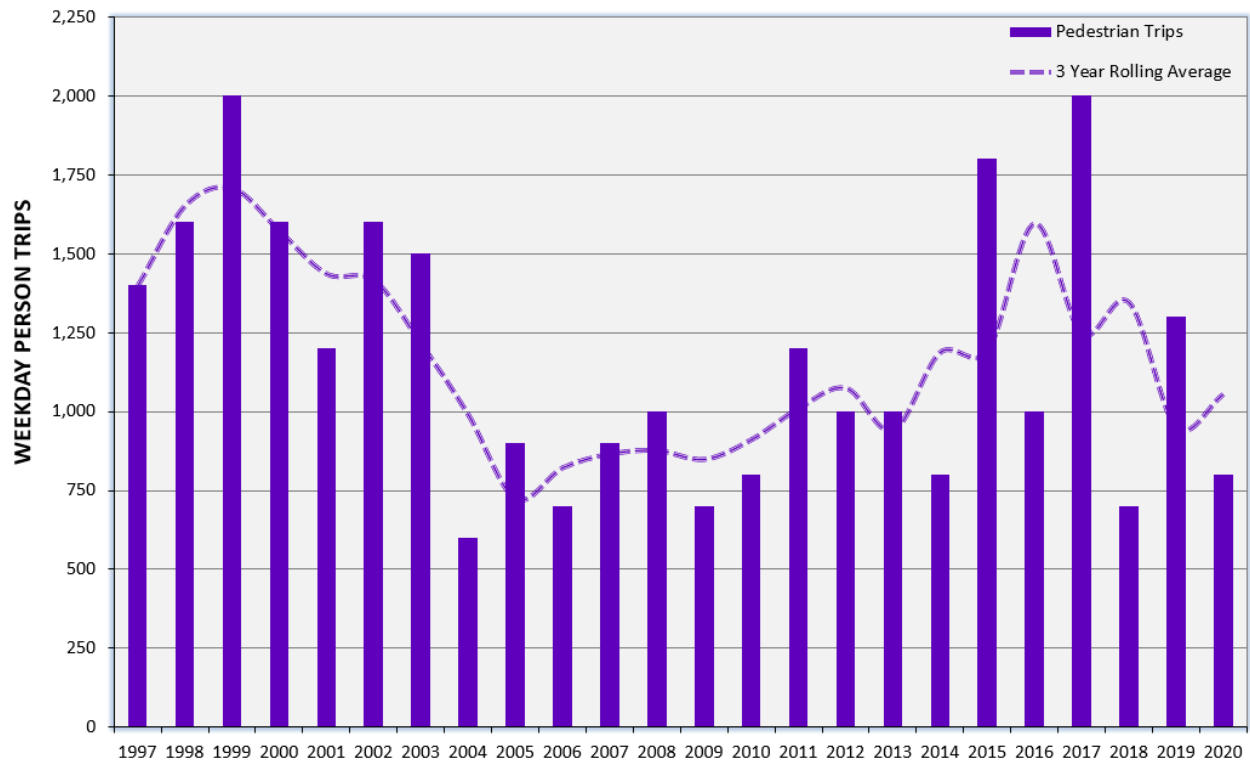
UBC tracks this usage to identify capacity issues. It is not uncommon for bike racks on popular routes to be full to campus in the morning because more cyclists bring their bikes on buses westbound to campus (up the hill). The most popular transit routes for cyclists to travel with their bicycles are the 99 B-Line, route 49 that connects the campus to Metrotown, and route 84 that connects the campus to downtown.

**Table 3.8** provides a summary of the trend in pedestrian trips, and **Figure 3.7** illustrates year-by-year changes. Similar to bicycle trips, pedestrian trips decreased significantly after the U-Pass was introduced and have fluctuated over the past few years. In general, pedestrian trips have followed an upward trend since 2004 as shown by the three-year rolling average, up until 2018. In 2018, there was a significant drop in the number of pedestrians counted. This was most likely attributed to weather, as the count was back up in 2019.

**Table 3.8: Summary of Average Weekday Pedestrian Trips to / from UBC, 1997 vs. 2020**

Average Weekday Pedestrian Trips	Before U-Pass		After U-Pass		Change 2020-1997 (count / percentage)	
	Fall 1997	Fall 2002	Fall 2003	Fall 2020		
Person Trips	1,400	1,600	600	800	-600	-43%
Trips Per Person	0.03	0.03	0.01	0.01	-0.02	-67%
Pedestrian Mode Share	1.3%	1.4%	0.5%	1.3%	-0.1%	-4.4%

Over the long term, UBC doesn't anticipate to see a significant increase in pedestrian trips or pedestrian mode share to and from campus as a result of the location of the campus and the distance to where a majority of the campus population lives. However, UBC will continue to make improvements to infrastructure to enhance the experience on campus and will work with the BC Ministry of Transportation and Infrastructure to identify improvements to bike and pedestrian connections to the campus. Late in 2020, the Ministry paved a multi-use pathway along 16<sup>th</sup> Avenue, which may have an impact on the number of people using 16<sup>th</sup> Avenue to bike or walk to campus in 2021.



**Figure 3.7: Average Weekday Pedestrian Trips to / from UBC, 1997 – 2020**

### 3.4 Heavy Trucks

Construction activity at UBC and the day-to-day operation of the university generate truck traffic. The City of Vancouver, through which all trucks must travel to reach UBC, manages heavy truck traffic with a number of bylaws and regional regulations. 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 is to make 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”. In addition, the purpose of the monitoring is more related to volume and noise not vehicle weights.

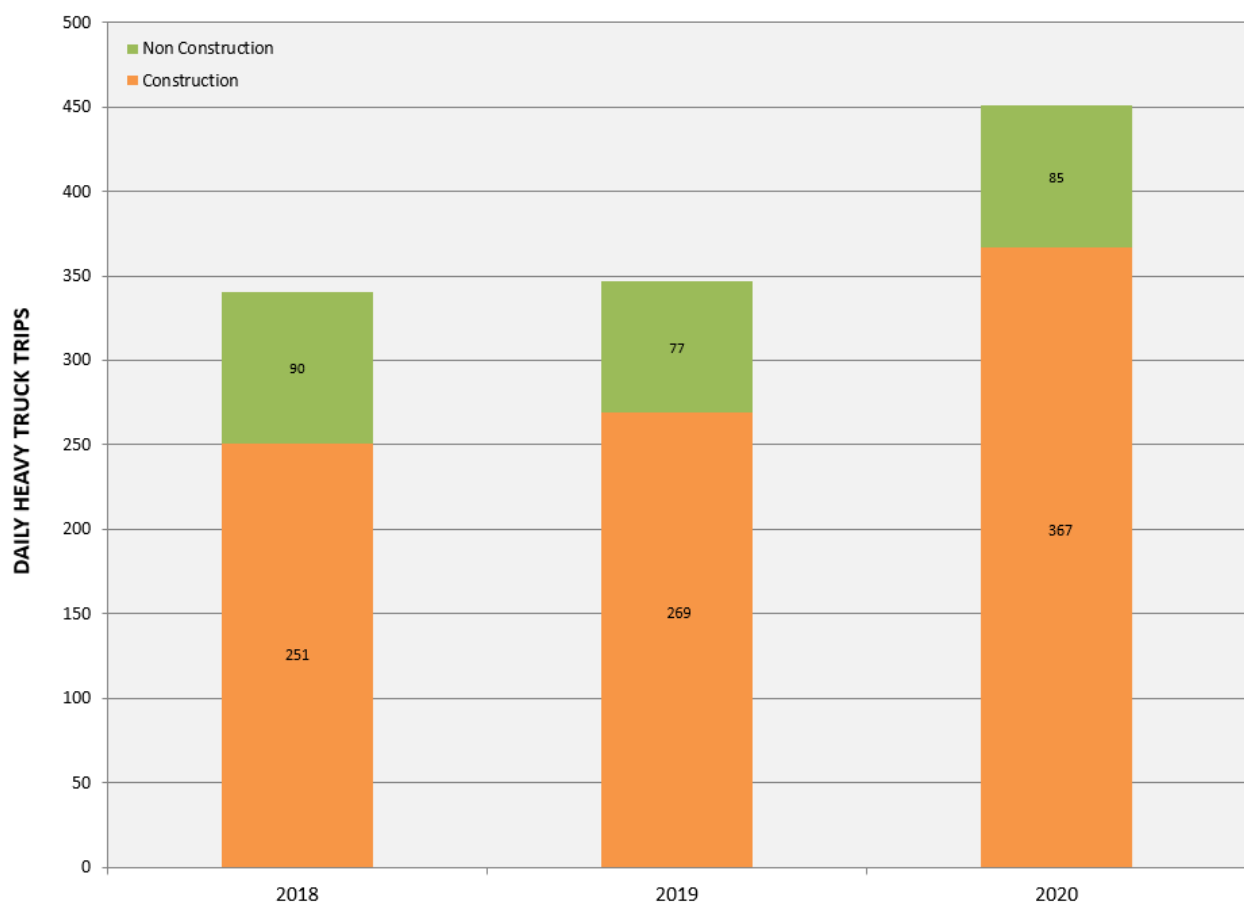
Counts of heavy truck traffic were undertaken on a quarterly basis during 2020, which are summarized by route. **Table 3.9. Figure 3.8** compares the total construction on non-construction related truck traffic at UBC over the last three years.

**Table 3.9: Average Weekday Heavy Truck Trips to / from UBC, 2020**

Route	Type of Truck		Totals By Route
	Construction	Non-Construction	
Chancellor Boulevard	13	6	19 (3.5%)
University Boulevard	96	15	111 (24.5%)
W 16 <sup>th</sup> Avenue	54	12	66 (14.5%)
SW Marine Drive	203	53	256 (56.5%)
<b>Totals</b>	<b>366 (81%)</b>	<b>85 (19%)</b>	<b>451 (100%)</b>

As shown in the table, 451 heavy truck trips per day were counted to / from UBC. Of the 451 trips, 81% of them were construction related trips. Of the four routes to / from UBC, SW Marine Drive carries a majority of the truck traffic.

Comparing the last three years, truck traffic increased in 2020 from an increase in construction traffic. This increase is attributed to the number of large construction projects active on campus during 2020.



*Figure 3.8: Heavy Truck Trips to / from UBC*

## 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 85<sup>th</sup> percentile speed is typically used for the purposes of representing travel speeds and is the speed below which 85% of the traffic travels. The average 85<sup>th</sup> percentile speed data from 2017 to 2020 is summarized in **Tables 4.1 and 4.2** for eastbound / northbound traffic and westbound / southbound traffic, respectively. Fewer count locations were set up in 2020 as a result of COVID-19. Data highlighted in red represents locations where collected speed data is above the posted speed limit.

**Table 4.1: Average 85<sup>th</sup> Percentile Traffic Speeds (km/h) Eastbound / Northbound, 2017 – 2020**

Location	Speed Limit (km/h)	Eastbound / Northbound			
		Fall 2017	Fall 2018	Fall 2019	Fall 2020
Wesbrook Mall s/o Gage	50	55	54	50	-
Wesbrook Mall s/o University	50	49	49	45	51
Thunderbird w/o Wesbrook	30	47	53	37	-
West Mall s/o University Blvd	30	30	29	33	-
West Mall n/o Thunderbird	30	-	-	-	-
East Mall s/o Thunderbird	30	51	51	48	-
Wesbrook Mall n/of 16 <sup>th</sup> Ave	50	52	52	53	-
Wesbrook Mall s/o 16th Ave.	50	33	33	33	40
Stadium Rd at Main Mall	30	50	-	-	-
16th Ave w/o East Mall	60	71	68	68	-
16th Ave w/o Wesbrook Mall	50	57	66	56	67
16th Ave e/o Wesbrook Mall	50	67	66	67	63
Chancellor e/o Western Pkwy	50	55	58	54	58
University e/o Toronto Rd	50	59	60	61	63



**Table 4.2: Average 85<sup>th</sup> Percentile Traffic Speeds (km/h) Westbound / Southbound, 2017 – 2020**

Location	Speed Limit (km/h)	Westbound / Southbound			
		Fall 2017	Fall 2018	Fall 2019	Fall 2020
Wesbrook Mall s/o Gage	50	51	50	44	-
Wesbrook Mall s/o University	50	48	49	49	51
Thunderbird w/o Wesbrook	30	40	54	47	-
West Mall s/o University Blvd	30	31	32	30	-
West Mall n/o Thunderbird	30	-	-	-	-
East Mall s/o Thunderbird	30	53	54	57	-
Wesbrook Mall n/of 16 <sup>th</sup> Ave	50	53	53	54	-
Wesbrook Mall s/o 16th Ave.	50	33	32	31	43
Stadium Rd at Main Mall	30	48	-	-	-
16th Ave w/o East Mall	60	71	71	68	-
16th Ave w/o Wesbrook Mall	50	59	58	61	58
16th Ave e/o Wesbrook Mall	50	61	60	60	64
Chancellor e/o Western Pkwy	50	60	61	58	62
University e/o Toronto Rd	50	60	62	60	57

Overall, speeds in 2020 have increased from previous years. Possibly attributable to less congestion and more visitors less familiar with the speed limits. Other 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 limit of 50 km/h. This includes 16th Avenue, University Boulevard, and Chancellor Boulevard. Speed limits on 16<sup>th</sup> Avenue were changed in 2017 to extend the 50 km/h speed limit into Pacific Spirit Park from the City of Vancouver.
- According to the UBC Road and Traffic Rules, internal road speed limits are 30km/h (not including Wesbrook Mall). Roads on campus with average speeds in excess of 30 km/h include East Mall, and Thunderbird Blvd. Reasons for less speeding on the internal roadways include heavy pedestrian traffic and traffic calming measures. To address speeding on East Mall traffic calming measures are being implemented in early 2021.

These locations of excessive speeds will be shared with the BC Ministry of Transportation and Infrastructure to flag this issue as well as with the RCMP to inform their speed enforcement program.

## 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.

**MORNING  
PEAK HOUR**

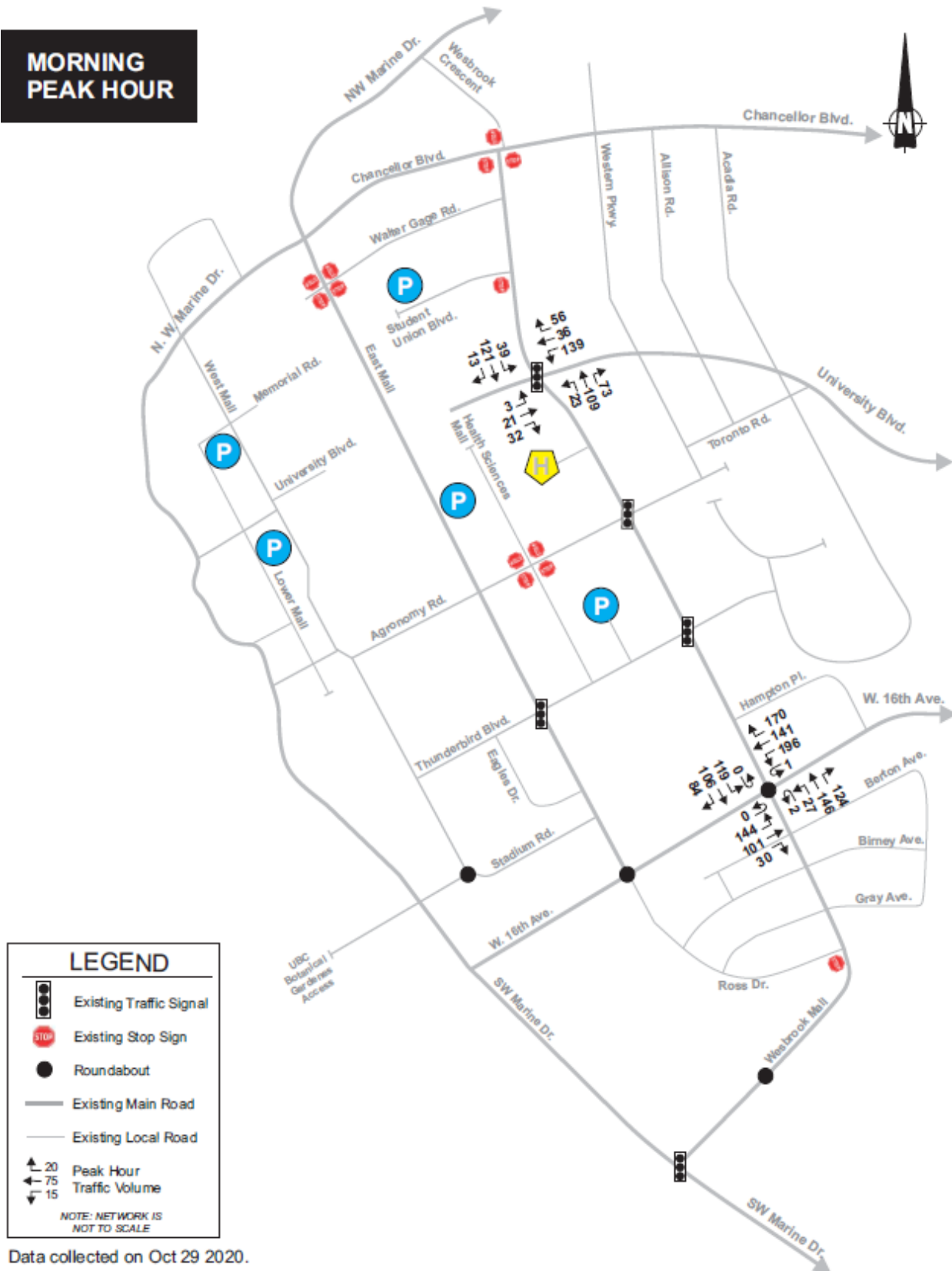


Figure 4.1: Morning Peak Hour Traffic Volumes at UBC, 2020

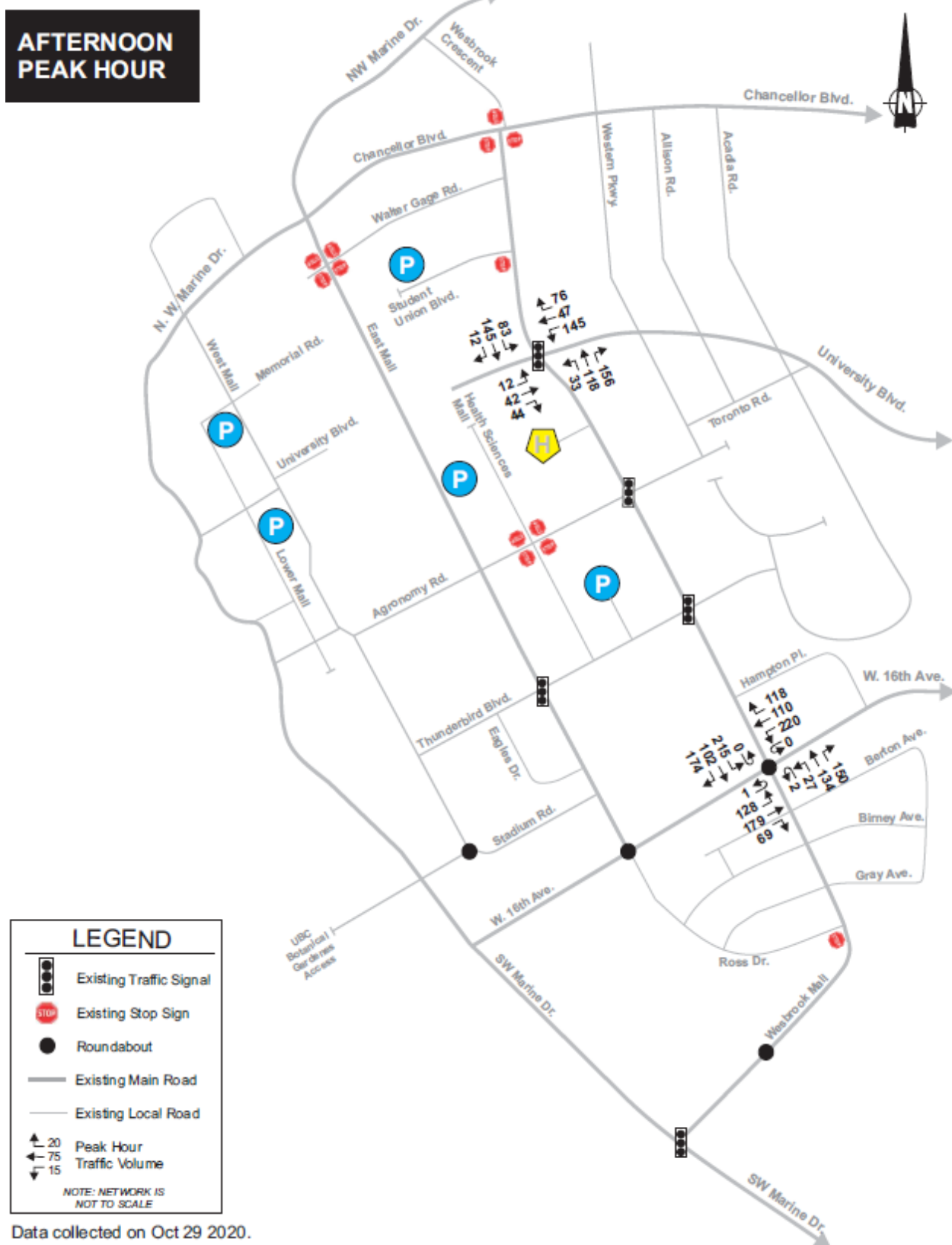


Figure 4.2: Afternoon / Evening Peak Hour Traffic Volumes at UBC, 2020