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UBC Okanagan Transportation Status Report Fall 2017

December 2018

campus + community planning
transportation planning

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

1. Introduction

Consistent with its sustainability goals, UBC is working to reduce automobile trips to and from the UBC Okanagan campus (UBCO), 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.

In order to measure progress in achieving a shift to non-automobile modes of transportation, a biennial transportation data collection and monitoring program was initiated in 2009. Information regarding travel patterns, traffic volumes and transportation conditions at UBCO are collected every two years in odd-numbered years. Data collected in 2009 established the "benchmark" conditions against which progress in future years are measured.

This UBC Okanagan Transportation Status Report Fall 2017 presents a summary of data collected in late September 2017 at UBC Okanagan. This is the fourth year of "post-benchmark" data collection that is compared with travel patterns from fall 2009, 2011, 2013, and 2015. The monitoring program of the campus will evolve with the growth of campus and resulting travel pattern changes.

1.1. Context

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

- **The UBC Okanagan Campus Plan** was completed in September 2015 and builds on the foundations of the 2005 and 2009 Master Plans. The Plan describes how the campus will develop to accommodate increased student enrolment and expanded university activities. It provides a long-term planning framework for existing and future academic and research activities, student housing, and associated campus services and infrastructure for the next 20 years. The illustrated Campus Plan is provided in ***Figure 1.1***.
- **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.

Figure 1.1: Illustrative Plan of UBC Okanagan Campus from the 2015 Campus Plan

1.2. Transportation Monitoring Program

Travel patterns to and from UBCO are monitored on an on-going basis through a variety of different data collection methods. Data is collected during the 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.

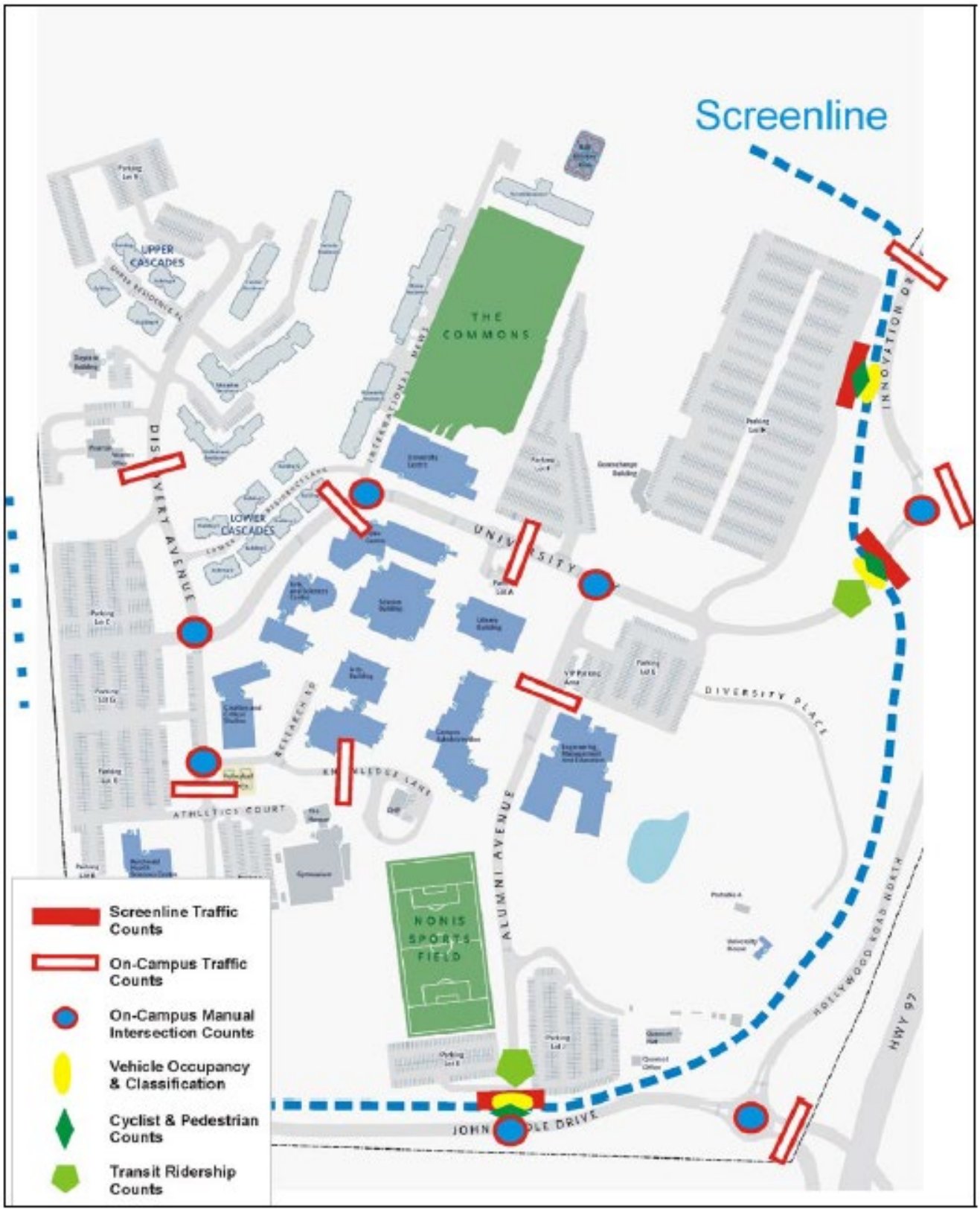
Data collection activities for the fall 2017 are summarized in ***Table 1.1***, and data collection locations are illustrated in ***Figure 1.2***.

In 2017, a screenline location was revised to reflect a change to travel patterns to / from and around the UBCO campus. The screenline formerly on John Hindle Drive west of the Hollywood Road roundabout was moved to Alumni Avenue just north of John Hindle Drive. This was done as a result of construction work on the John Hindle Drive extension and in preparation for a change in use of John Hindle Drive. For the 2019 data collection, a new screenline will be added on a new west campus access road, Upper Campus Way. As a result of these changes, it will take a few years for travel patterns to develop for better year to year comparison.

Table 1.1: Summary of 2015 Transportation Data Collection

Data Collection Activity	Locations	Description
Intersection Counts	At 6 intersections throughout campus.	Manual observation for 8 hours (3hrs in AM, 2hrs in Midday, 3hrs in PM) for one day.
Automatic Traffic / Speed Counts	At 10 locations on internal and external campus roads.	Automatic tube counters on roads for 7 days (24 hours / day).
Transit Ridership	At 3 screenline locations.	Manual observation from 6:00AM to 4:30AM for one day.
Vehicle Occupancy & Classification	At 3 screenline locations.	Manual observation for 8 hours (3hrs in AM, 2hrs in Midday, 3hrs in PM) for one day.
Bicycle and Pedestrian Counts	At 4 screenline locations.	Manual observation for 15 hours over one day.

Figure 1.2: Data Collection Locations



1.3. Understanding the Data

The following terms and measures are used throughout this report to describe various characteristics of travel patterns and trends at UBCO:

- A **screenline** is an imaginary line across which trips are recorded. At UBCO, the screenline around the campus is illustrated by the dotted blue line in ***Figure 1.2***.
- **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 500 vehicles travelling along a section of road 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 UBCO — students, staff, faculty and others — increases each year. 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 average weekday population. The population 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.
- Substantial effort and cost are required to collect travel data at UBCO. 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** (***Table 1.1*** indicates the time periods for each type of data collection activity). Traffic data on all routes leading to and from UBCO 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. These counts are undertaken for a total of 11 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.

2. Transportation To / From UBC Okanagan

This section of the *Transportation Status Report* describes travel patterns and trends for trips to and from the UBC Okanagan campus. Information regarding transportation conditions on campus is presented in Section 3.

For the 2017 monitoring program, the following changes around the university influenced travel patterns:

- The University South development opened for occupancy. A number of residential developments were completed and occupied in advance of the monitoring for 2017. As a result of this close residential neighbourhood, an increase in pedestrian and cyclist trips are anticipated.
- Construction of John Hindle Drive Extension Project and 6-Lane Project on Hwy 97. Campus travel patterns were significantly impacted from the two construction projects. Both projects increased travel delays resulting in shifts in travel patterns and mode choices.

2.1. Person Trips

The average weekday person trips to and from UBCO in fall 2017 was 19,460. A summary and comparison of daily person trips by mode for the fall of 2009, 2015 and 2017 are provided in ***Table 2.1*** and ***Figure 2.1***.

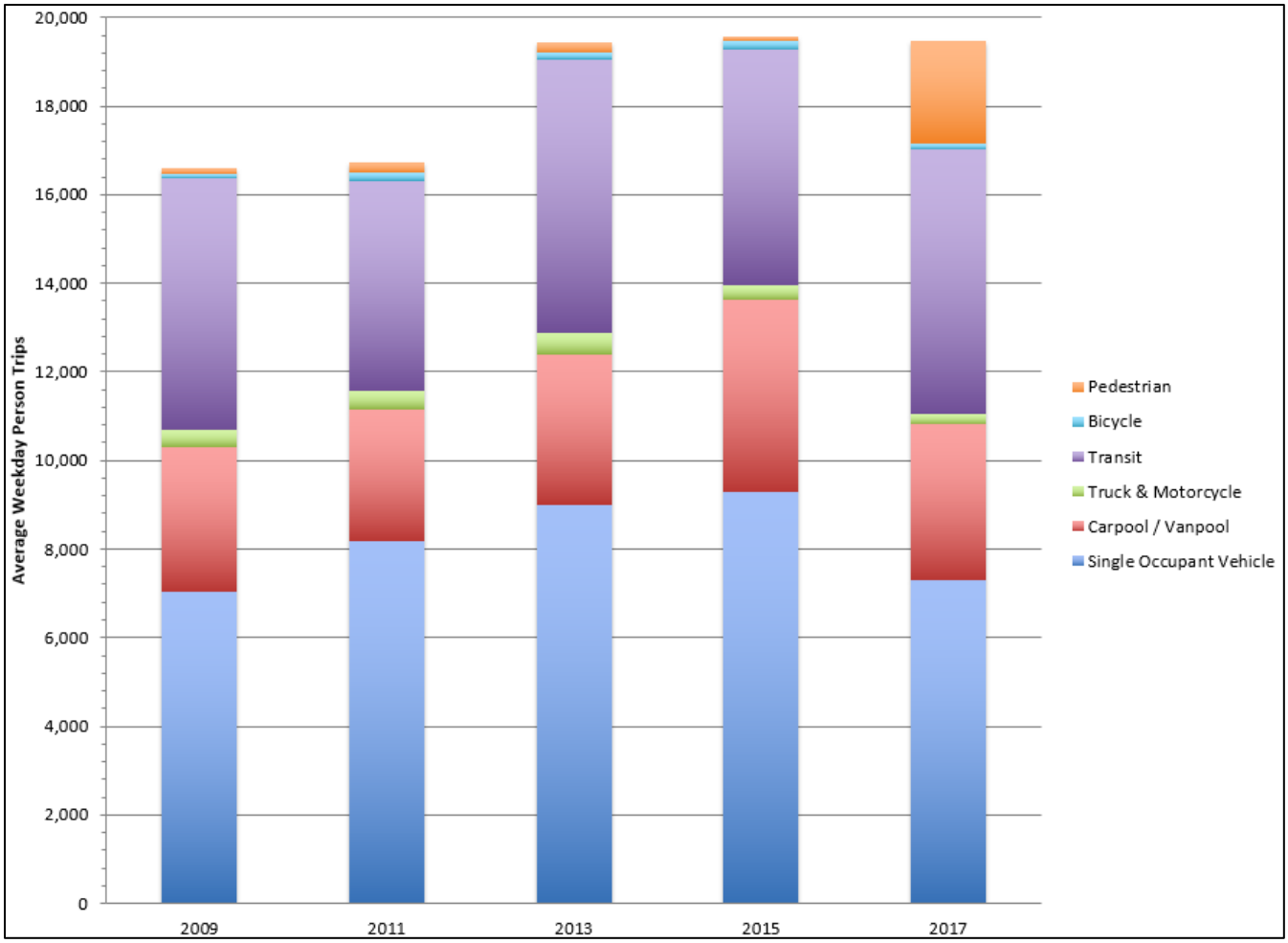
Table 2.1: Weekday Person Trips to / from UBC Okanagan

Travel Mode Classification	Person Trips					
	Fall 2009 Count	Fall 2009 Split	Fall 2015 Count	Fall 2015 Split	Fall 2017 Count	Fall 2017 Split
Single Occupant Vehicle (SOV)	7,040	42.4%	9,275	47.4%	7,305	37.5%
Carpool / Vanpool	3,260	19.7%	4,340	22.2%	3,530	18.1%
Truck & Motorcycle	400	2.4%	350	1.8%	200	1.0%
Transit	5,680	34.2%	5,300	27.1%	5,975	30.7%
Bicycle	100	0.60%	200	1.0%	155	0.8%
Pedestrian	120	0.70%	120	0.6%	2,295	11.8%
Totals	**16,600**	**100%**	**19,585**	**100%**	**19,460**	**100%**
Campus POP	***6,400***		***8,820***		***9,580***	

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

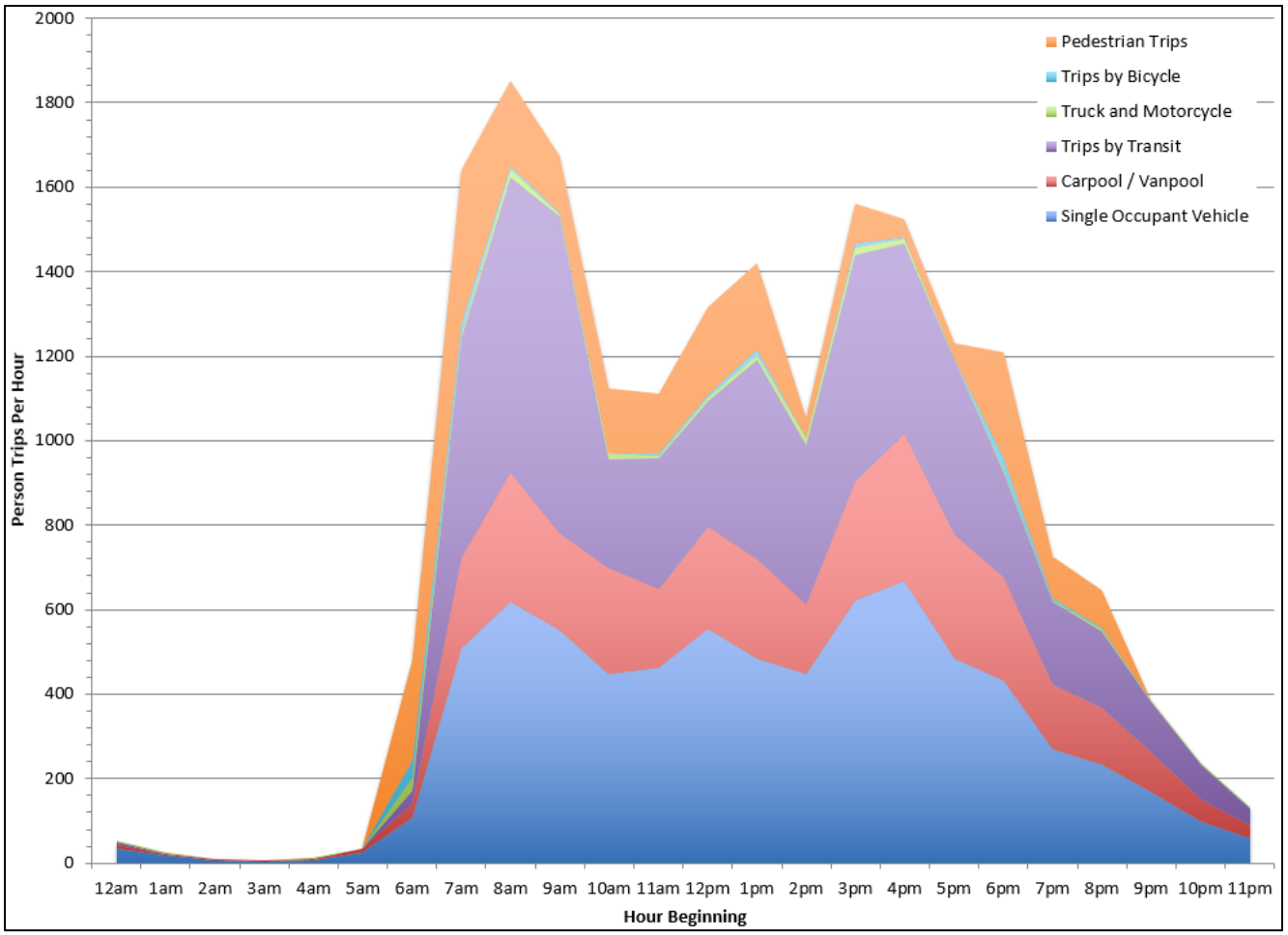
- There was a significant decrease in SOV trips reducing the mode share from 47% in 2015 to 37.5% in 2017. This could be attributed to a number of things including construction, a changed screenline location, and a new transit exchange.
- Trips by transit increased to 31% of all trips to / from Campus, which is up from the 27% mode share in 2015.
- Pedestrian trips significantly increased from 120 trips to 2,295 trips from 2015 to 2017, almost entirely as a result of the Academy South development. Both pedestrian and cyclist volumes are anticipated to continue to increase as that neighbourhood builds out and cycling becomes more of an option for the campus with new bike connections to campus.
- Trips by bicycle decreased in 2017, likely attributable to construction. It is anticipated that in 2019 there will be more trips by bike with the completion of multiple cycling connection to the campus since the 2015 count and the 2017 construction.

Figure 2.1: Weekday Person Trips to / from UBC Okanagan from 2009 to 2017



The daily arrival and departure patterns for all person trips to and from UBCO are illustrated in ***Figure 2.2.*** As shown in the graph, there are three clearly defined peaks for travel to and from UBCO representing the peak arrival (8am-9am) and departure (4pm-5pm) periods as well as the lunch hour peak.

Figure 2.2: Hourly Distribution of Person Trips To & From UBCO in Fall 2017



The hourly distribution of trips in the chart above shows a shift back to a heavy one hour morning peak period, while the afternoon peak is distributed over two hours. UBCO Campus Planning is exploring opportunities to distribute work start times and class start times to minimize this peak.

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 and are presented in ***Table 2.2***.

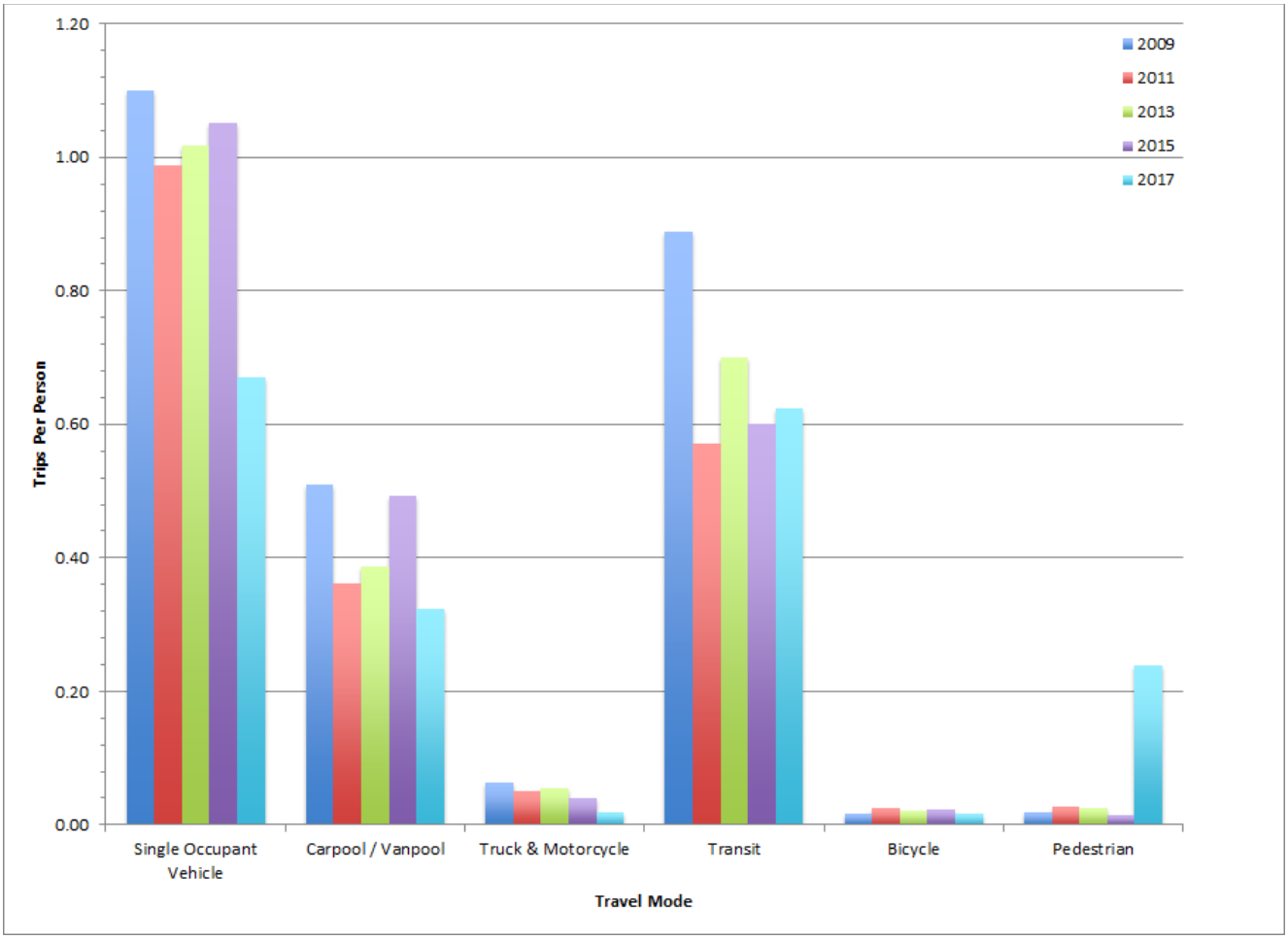
It is expected that the average total trips per person per day would be around two; a trip to campus and a trip from campus either for commuting or to run errands. The campus population and weekday trips per person to and from UBCO are presented in ***Table 2.2*** and ***Figure 2.2***.

Table 2.2: Weekday Trips Per Person to / from UBC Okanagan from 2011 to 2017

Travel Mode Classification	Trips Per Person				2017 Mode Share Split
	Fall 2011	Fall 2013	Fall 2015	Fall 2017	
Single Occupant Vehicle (SOV)	0.988	1.018	1.052	0.763	37.5%
Carpool / Vanpool	0.362	0.387	0.492	0.368	18.1%
Truck & Motorcycle	0.051	0.054	0.040	0.021	1.0%
Transit	0.571	0.700	0.601	0.624	30.7%
Bicycle	0.024	0.021	0.023	0.016	0.8%
Pedestrian	0.028	0.026	0.014	0.240	11.8%
Totals	**2.02**	**2.21**	**2.22**	**2.03**	**100.0%**
CAMPUS POPULATION*	***8,270***	***8,820***	***8,820***	***9,580***	

**Population reported from fall attendance values. 2013 values match 2015 values coincidentally.*

Figure 2.2: Weekday Trips Per Person to / From UBC Okanagan from 2009 to 2017



As shown in the results, the campus population increased, but the total number of trips per person decreased. This could be attributed to the adjusted screenline location to Alumni Avenue that eliminated counting all trips to Aberdeen School. Other notable positive changes are a decrease in single occupant trips and an increase in pedestrian trips per person. These trends will continue to be closely monitored into 2019.

2.2. Transit

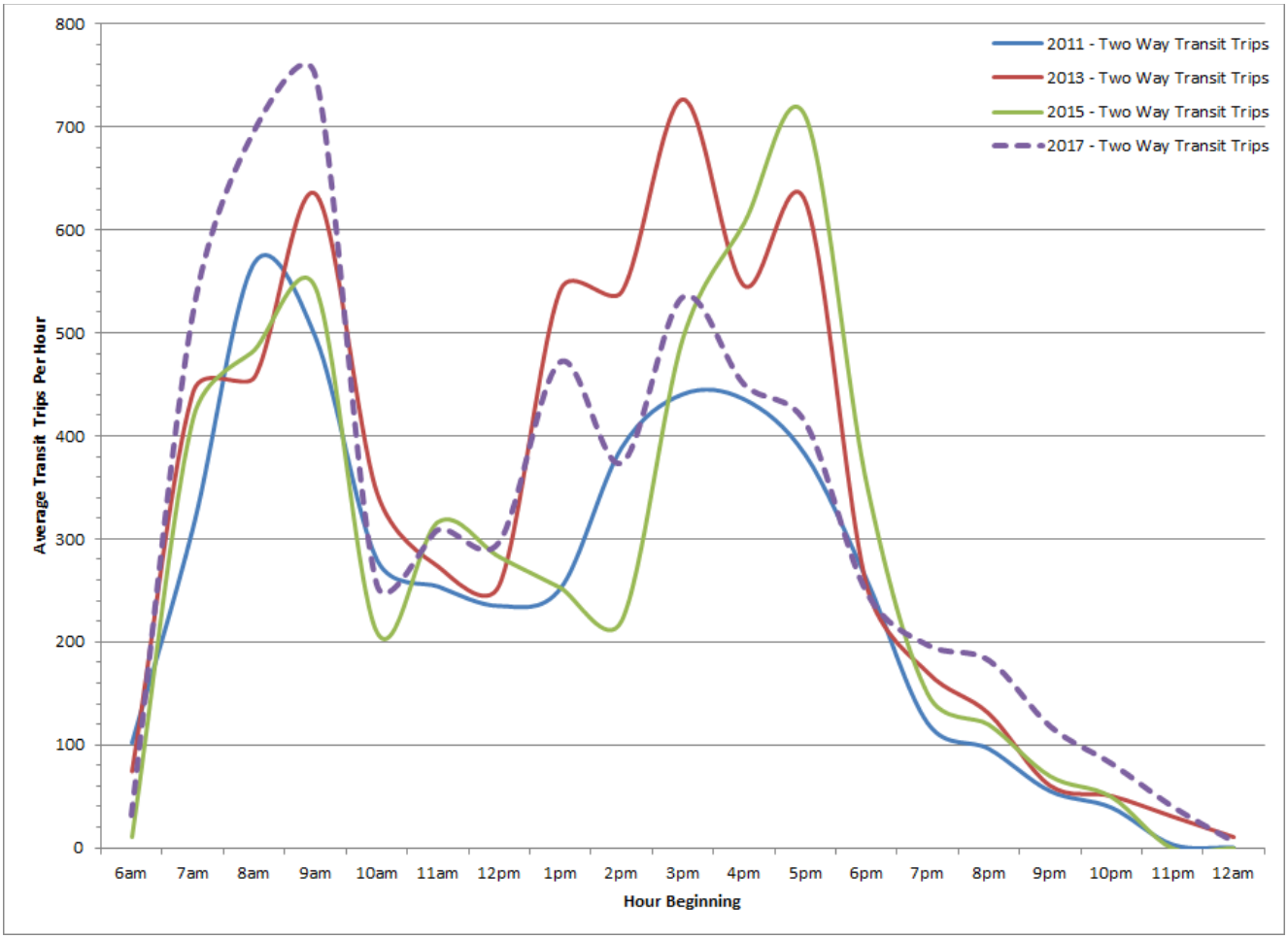
There was an average of 5,975 weekday transit trips to and from UBCO in fall 2017 on seven different transit routes. For the 2017 count, the new transit exchange opened to improve rider experience and transit capacity into the future. However, at the time of the counts there were not substantial services changes in place yet.

The transit trips are summarized in ***Table 2.3*** while ***Figure 2.5*** illustrates the transit ridership by hour for fall 2011 to fall 2017.

Table 2.3: Weekday Transit Trips to / from UBCO in Fall 2017

Route	AM Peak (6AM-9AM)	Midday (9AM-3PM)	PM Peak (3PM-6PM)	Evening (6PM-1AM)	Totals	
4 Pandosy Via Highway 97	52	0	48	0	**100**	**2%**
6 Glenmore	79	113	40	6	**238**	**4%**
8 Pandosy Via Rutland	439	1,011	564	277	**2,291**	**38%**
13 Quail Ridge	49	106	73	0	**228**	**4%**
23 Lake Country	188	160	137	80	**565**	**9%**
90 Vernon	80	114	36	32	**262**	**4%**
97 Express	359	955	500	478	**2,292**	**38%**
Totals (Rounded)	**1,245**	**2,460**	**1,400**	**875**	**5,975**	**100%**

Figure 2.5: Average Hourly Weekday Transit Trips to & from UBCO



There were approximately 675 more trips by transit per day and 3.8% more transit trips per person per day from 2015 to 2017. Other key observations regarding transit use at UBCO are as follows:

- There are significant peaks in transit usage throughout the day, with a particular sharp peak during the morning peak period.
- Ridership is highest on routes 8 Pandosy via Rutland and the 97 Express.
- Approximately 17% of transit trips were from areas north of UBCO, on routes 13, 23 and 90. This includes trips to and from the Quail Ridge residential development serviced by Route 13 (4% of trips).
- The morning peak period for transit trips occurs from 8:00 to 10:00 am. The afternoon peak period occurs between 3:00 and 5:00 pm.
- Compared to previous years, there were a lot less trips made by transit during the afternoon. This will be monitored in future years to understand this change.

2.3. Bicycles and Pedestrians

Table 2.4 and ***Figure 2.6*** summarize bicycle and pedestrian trips to and from UBCO from 2011 to 2017. Pedestrian and bicycle trips were counted at three access points in 2017: the north roundabout, on Alumni Avenue north of John Hindle Drive, and at the access to Lot H. The previous count location on John Hindle Drive west of the south roundabout was moved to Alumni Avenue and the count at H-Lot was added in 2013 to account for changes in road network and travel patterns.

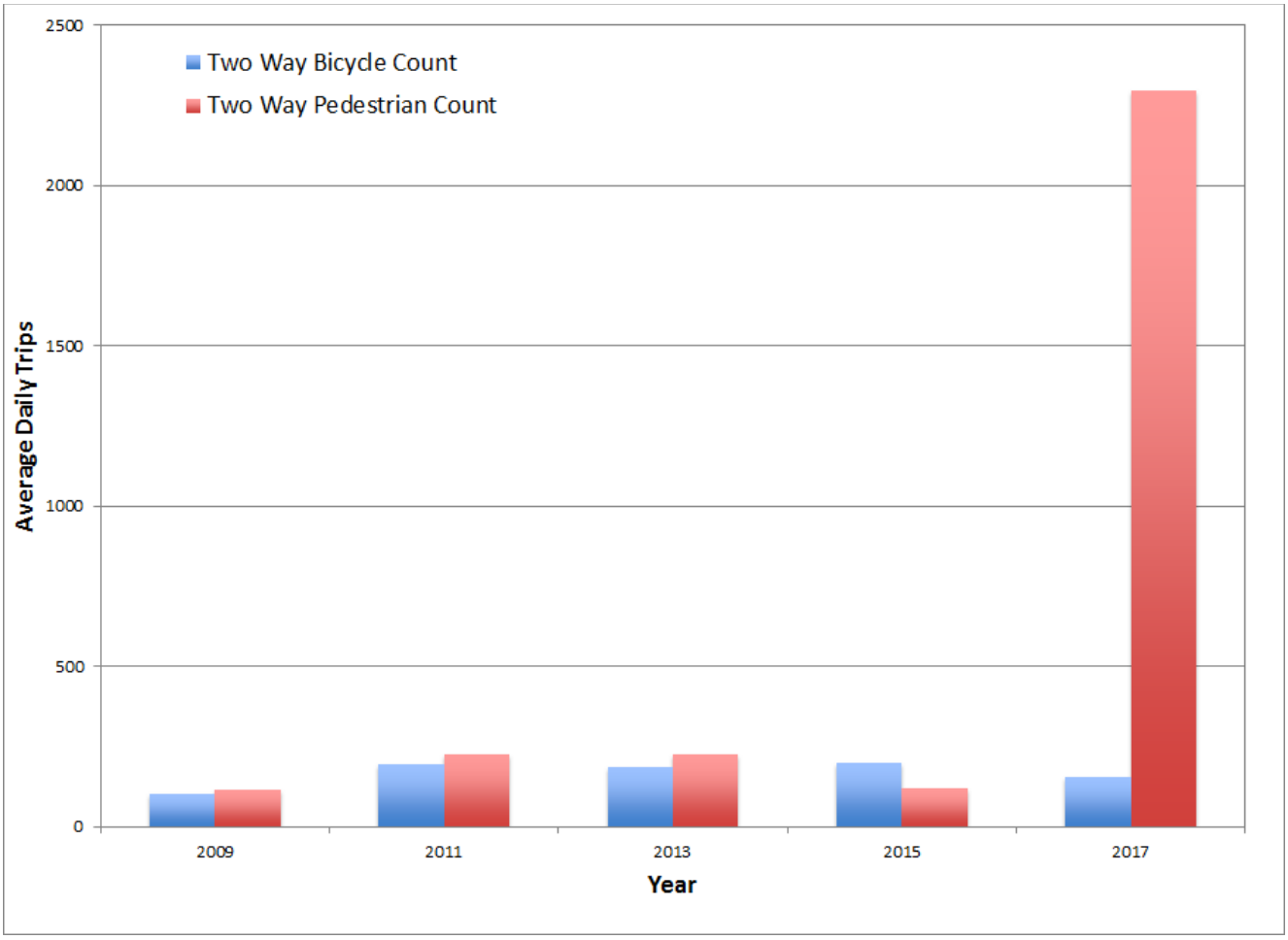
Table 2.4: Average Weekday Bicycle and Pedestrian Trips to & from UBC Okanagan

Count Location	Bicycles				Pedestrians			
	2011	2013	2015	2017	2011	2013	2015	2017
North Access	2	2	12	10	5	97	46	23
Alumni Avenue*	42	23	50	133	6	45	40	2028
West Access (Curtis Road)**	151	156	119	-	214	65	14	-
Lot H Access	N/A	6	17	13	N/A	20	22	244
Totals (rounded)	**195**	**185**	**200**	**155**	**225**	**225**	**120**	**2,295**

**New location in 2017, revised from John Hindle Drive west of roundabout.*

***Location removed in 2017 count.*

Figure 2.6: Trend of Average Weekday Bicycle and Pedestrian Trips to / from UBCO



Key observations regarding bicycle and pedestrian trips include:

- Pedestrian activity significantly increased in 2017 with a majority of the pedestrian activity occurring on Alumni Avenue with students walking between the campus and University South development and Aberdeen School.
- Number of cycling trips decreased from 2015 to 2017. Cyclist travel patterns were significantly impacted during the 2017 count as a result of construction and changes to access routes. Many cyclists did revise their routes to arrive at the campus via Alumni Avenue. It is anticipated that more cyclists will use this access point in addition to the new access point on Upper Campus Way, in 2019.
- All buses operating on transit routes serving UBCO are equipped with two bicycle racks. A total of 48 bicycles were counted throughout one full day of operations in fall 2017, representing an average rack utilization of 0.06 bicycles per available space.

2.4. Motor Vehicles

Table 2.5 provides a summary of weekday motor vehicle traffic to and from the UBCO campus. Key observations regarding automobile traffic include:

- There were 2,469 fewer automobiles travelling to and from UBCO in 2017 compared to 2015. This is likely attributable to the change in a screenline count location in addition to construction activity making it more challenging to get to / from campus.
- The mode share between 2015 and 2017 is relatively consistent.

The results from 2017 show a positive shift in vehicle trips to / from the campus. However, as previously mentioned no conclusions can be drawn because of the new screenline count location and impacts from construction. It is anticipated that 2019 monitoring will bring results more reflective of new travel patterns.

Table 2.5: Average Weekday Motor Vehicle Trips to / from UBC Okanagan Fall 2011 to 2017

Vehicle Classification	Fall 2011		Fall 2013		Fall 2015		Fall 2017	
	Count	Split	Count	Split	Count	Split	Count	Split
Single Occupant Vehicle (SOV)	8,170	80.6%	8,980	78.5%	9,280	77.0%	7,306	76.3%
Carpool / Vanpool	1,365	13.5%	1,660	14.5%	2,060	17.1%	1,673	17.5%
Motorcycles & Trucks	345	3.4%	390	3.4%	290	2.4%	163	1.7%
Transit Buses*	255*	2.5%	410	3.6%	420	3.5%	439	4.6%
Total Vehicles	**10,135**	**100%**	**11,440**	**100%**	**12,050**	**100%**	**9,581**	**100%**

**Previously reported counts of buses adjusted for consistent annual comparison.*

Table 2.6 summarizes weekly traffic volumes to and from UBCO. The AM and PM average weekday peak hour traffic volumes decreased in 2017. In the 2017 data, the weekday traffic volumes to and from campus are comparable throughout the week, with a slight decrease on Fridays compared to Monday through Thursday. Weekend traffic volumes are significantly less than weekday traffic volumes.

Table 2.6: Summary of Average Weekly Traffic Volumes to / from UBCO in Fall 2017

Time Period	Fall 2009	Fall 2011	Fall 2013	Fall 2015	Fall 2017
Weekday Average					
• AM peak hour	830	910	1,210	1,280	820
• PM peak hour	870	1,010	1,120	1,170	890
• 24 hours	9,100	10,135	11,440	12,040	9,580
Daily					
• Monday	8,910	10,100	11,480	12,310	9,780
• Tuesday	8,800	10,550	11,370	12,000	9,490
• Wednesday	9,280	10,290	11,420	12,030	9,720
• Thursday	9,280	10,360	11,410	12,290	9,660
• Friday	9,130	9,920	11,520	11,600	9,240
• Saturday	4,200	3,810	4,990	2,760	4,020
• Sunday	2,800	3,310	3,730	3,550	3,990

2.5. Vehicle Occupancy

Vehicle occupancy is a measure of the average number of people travelling per vehicle collected during the peak periods in a weekday. It is calculated by dividing the total number of person trips by the total number of vehicles during a specified time period. ***Table 2.7*** provides a summary of vehicle occupancies for personal vehicles including carpools and vanpools from 2009 to 2017. Key observations regarding vehicle occupancies include:

- The average automobile occupancy in fall 2017 was 1.20 persons per vehicle, the same as was observed in 2015.
- The average occupancy for carpools and vanpools increased slightly to 2.11 persons per vehicle up from 2.10 persons per vehicle in 2015.

Table 2.7: Vehicle Occupancy to / from UBC Okanagan in 2017

Vehicle Classification	Fall 2009	Fall 2011	Fall 2013	Fall 2015	Fall 2017
Single Occupant Vehicle	1.00	1.00	1.00	1.00	1.00
Carpool / Vanpool	2.15	2.18	2.08	2.10	2.11
All Motor Vehicles	1.20	1.17	1.17	1.20	1.20

UBC will continue to work on increasing the average vehicle occupancies by providing incentives to carpooling such as preferred parking locations, campus discounts, or other.

3. Transportation Within UBC Okanagan Campus

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

3.1. Traffic Volumes

Peak hour traffic volumes at key intersections on campus are illustrated in ***Figures 3.1 to 3.3***. Key observations regarding traffic volumes include:

- During all peak periods, traffic volumes were greatly different from previous year counts on John Hindle Drive and Hollywood Road as a result of the John Hindle Drive Extension Project. During the 2017 count, John Hindle Drive was closed just west of Alumni Avenue. As a result, UBCO traffic redistributed to other routes and Academy Hill Traffic was detoured away from campus.

Figure 3.1: Morning Peak Hour Traffic Volumes at UBC Okanagan

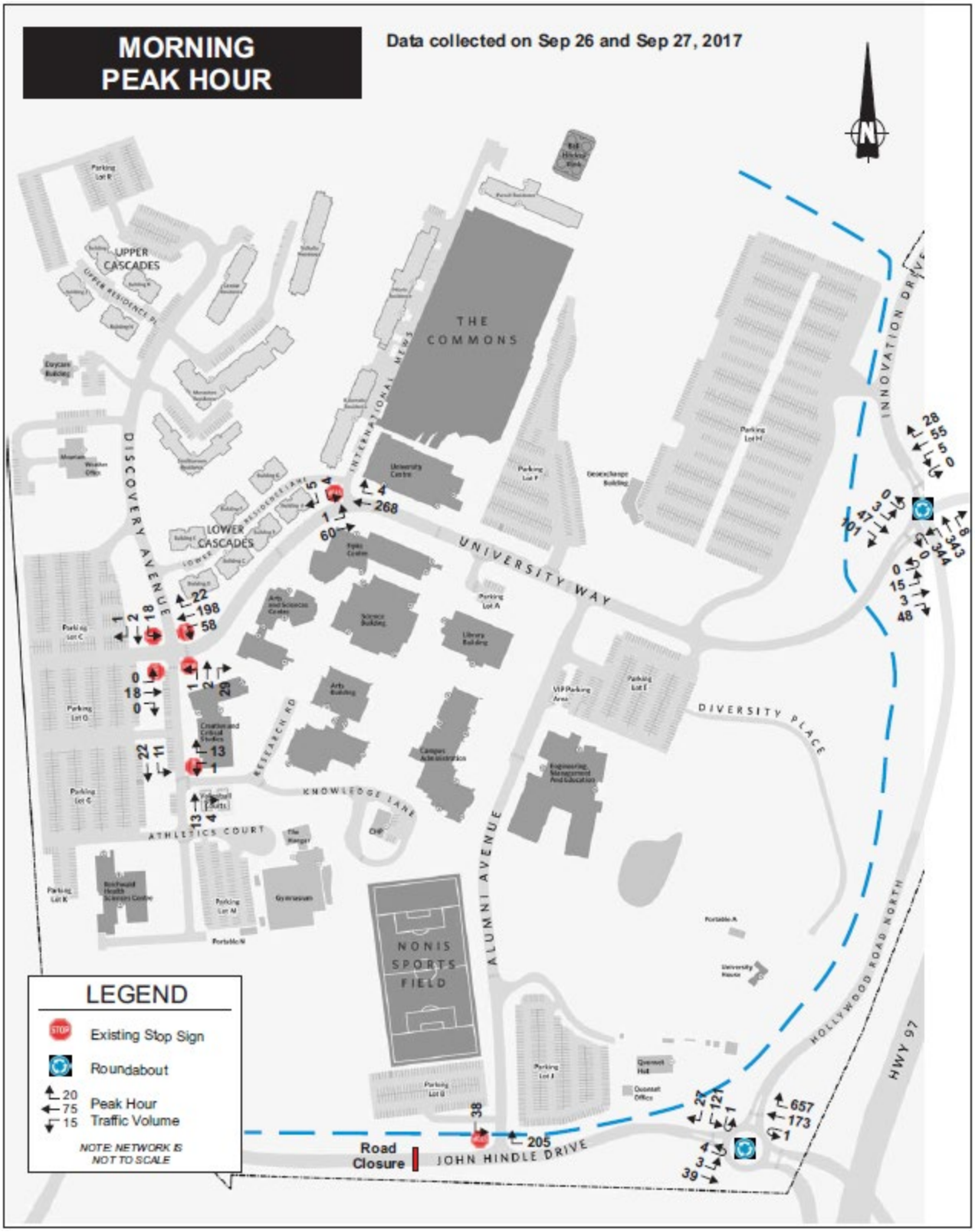


Figure 3.2: Midday Peak Hour Traffic Volumes at UBC Okanagan

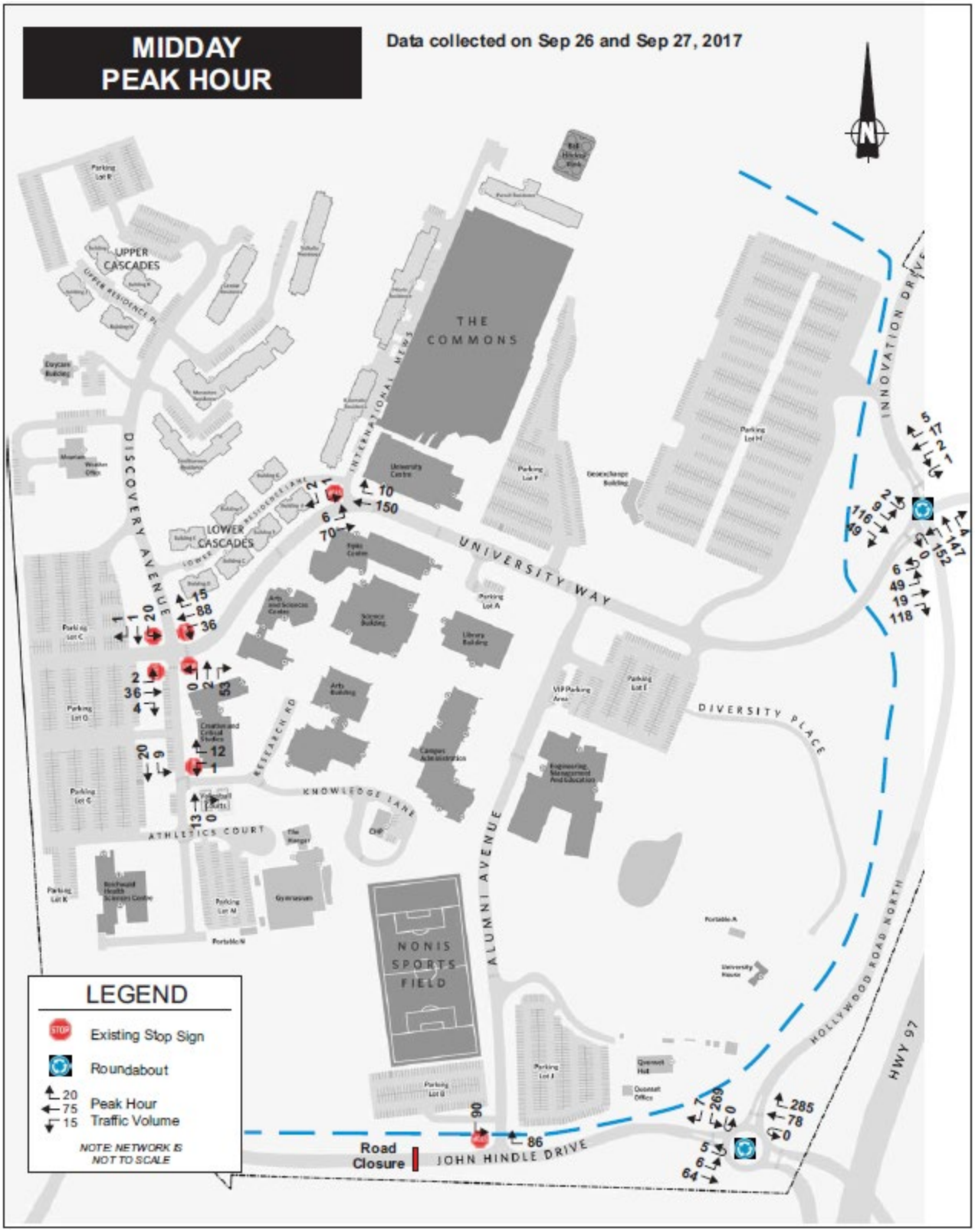
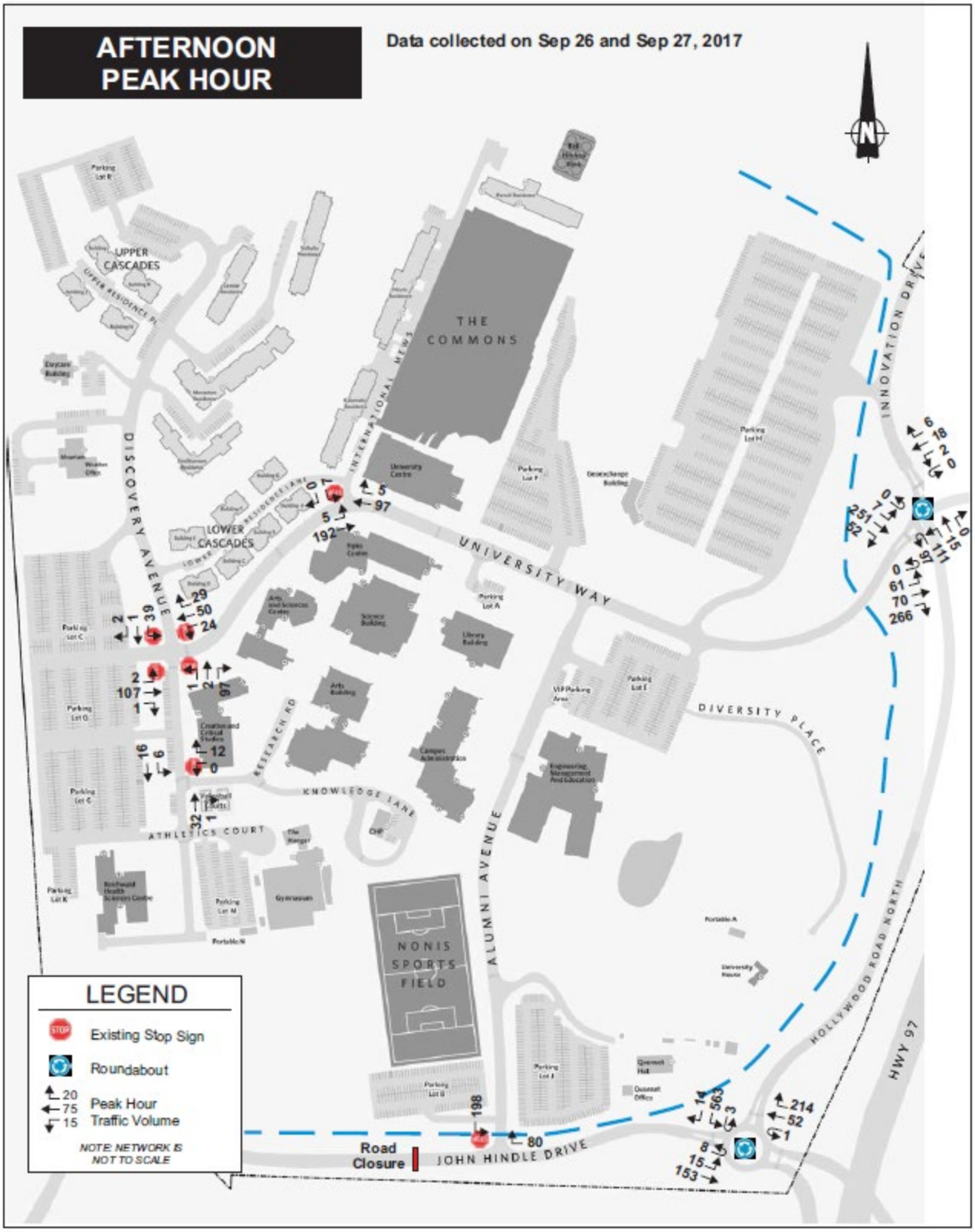


Figure 3.3: Midday Peak Hour Traffic Volumes at UBC Okanagan



3.2. Traffic Speeds

Traffic speeds were recorded at a number of locations on campus using pneumatic tubes, which were identified in ***Figure 1.2.*** 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 weekday 85th percentile speed data is summarized below in ***Table 3.1***. Monitoring locations move around each year, when locations are not counted in a year a dash is placed in the cell.

Key observations regarding traffic speeds on campus include:

- Speeds on University Way just west of the north roundabout reduce, but speeds on University Way west of Alumni Avenue increased over 2015 speeds.
- Speeds on Alumni Avenue north of John Hindle Drive reduced from 2015 values. Another count location further north may be added in future years to monitor speeds closer to pedestrian crossings.
- Speeds on Discovery Avenue north of University Way increased, this will be monitored in future years.

Table 3.1: Average Weekday 85th Percentile Traffic Speed (km/h)

Location	Eastbound / Northbound				Westbound / Southbound			
	Fall 2011	Fall 2013	Fall 2015	Fall 2017	Fall 2011	Fall 2013	Fall 2015	Fall 2017
1. University Way – Between roundabout and Alumni Ave	49.1	55.1	49.7	34.6	49.6	50.9	47.9	31.4
2. University Way – West of Alumni Avenue	39.3	38.5	38.0	44.3	36.2	36.0	33.3	41.6
3. University Way – East of Discovery Avenue	37.0	36.9	23.2	33.8	35.2	42.8	28.7	37.4
4. Discovery Avenue – North of Lot C Access	31.6	44.1	36.4	40.0	31.3	49.0	39.2	45.4
5. Discovery Avenue – North of Lot G Access	57.4	33.5	34.7	32.4	60.7	34.7	37.6	31.0
6. Knowledge Lane	29.4	29.1	28.2	25.7	29.5	28.8	28.3	24.6
7. Alumni Avenue – South of Library Access	37.1	29.0	44.3	41.4	36.7	28.5	44.8	43.5
8. Alumni Avenue – North of John Hindle Drive	-	49.5	52.4	42.4	-	54.9	53.8	43.3
9. John Hindle Drive – East of Alumni Avenue	-	58.9	55.2	-	-	54.8	54.5	-

**Speeds in red are at or above the campus speed limit of 50km/h.*