

UBC Okanagan Transportation Status Report Fall 2019

February 2020

campus + community planning
transportation planning



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

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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 2019 presents a summary of data collected in late September 2019 at UBC Okanagan. This is the fifth year of “post-benchmark” data collection that is compared with travel patterns from previous years. The monitoring program of the campus has evolved and will continue to 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.

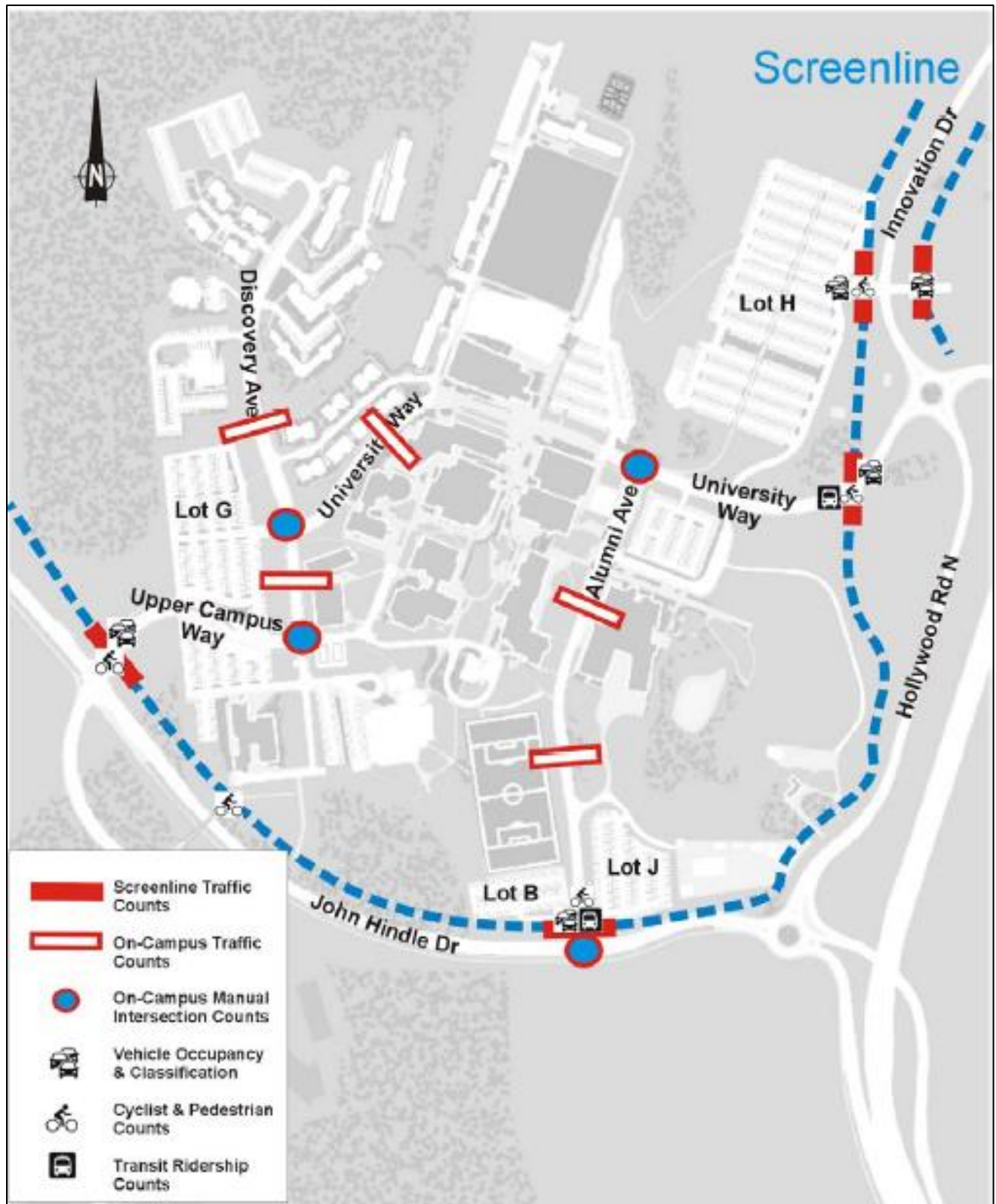
Data collection activities for the fall 2019 are summarized in **Table 1.1**, and data collection locations are illustrated in **Figure 1.2**.

Traffic monitoring in 2019 marks a significant year as it is the first year of collection following substantial campus access changes. The extension of John Hindle Drive to Glenmore Road and a new west campus access, Upper Campus Way, were completed in 2018. In addition, a new pedestrian overpass was built to connect the campus to the University South neighbourhood. As a result of the new transportation infrastructure, there were many changes to the screenline locations in 2019. A new screenline was added to Upper Campus Way as well as on the overpass for pedestrian and cyclist counts. Other screenline locations were also added as a result of campus growth including the pedestrian pathway off of Discovery Avenue up to Quail Ridge and the temporary overflow parking lot across from Lot H. With all these changes it will take a few years for travel patterns to develop for better year to year comparison.

Table 1.1: Summary of 2019 Transportation Data Collection

Data Collection Activity	Locations	Description
Intersection Counts	At 4 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 5 locations on internal and external campus roads.	Automatic tube counters on roads for 7 days (24 hours / day).
Transit Ridership	At 2 screenline locations.	Manual observation from 6:00AM to 1:00AM for one day.
Vehicle Occupancy & Classification	At 5 screenline locations.	Manual observation for 8 hours (3hrs in AM, 2hrs in Midday, 3hrs in PM) for one day.
Bicycle and Pedestrian Counts	At 5 screenline locations.	Manual observation from 6:00AM to 9:00PM for 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 2019 monitoring program, the following changes around the university influenced travel patterns:

- John Hindle Drive Extension and Upper Campus Way were completed and opened in September 2018. These new connections have significantly altered travel patterns to from and around campus.
- University Way between Alumni Avenue and International Mews was closed in September 2018 to all vehicular traffic, except emergency vehicles.
- A new pedestrian overpass across John Hindle Drive connecting the campus to the University South neighbourhood was completed early in 2019.
- The University South development is nearly fully developed bringing a lot more of the campus community within walking and biking distance of the campus.

2.1. Person Trips

The average weekday person trips to and from UBCO in fall 2019 was 23,590. A summary and comparison of daily person trips by mode are provided in **Table 2.1** and **Figure 2.1**.

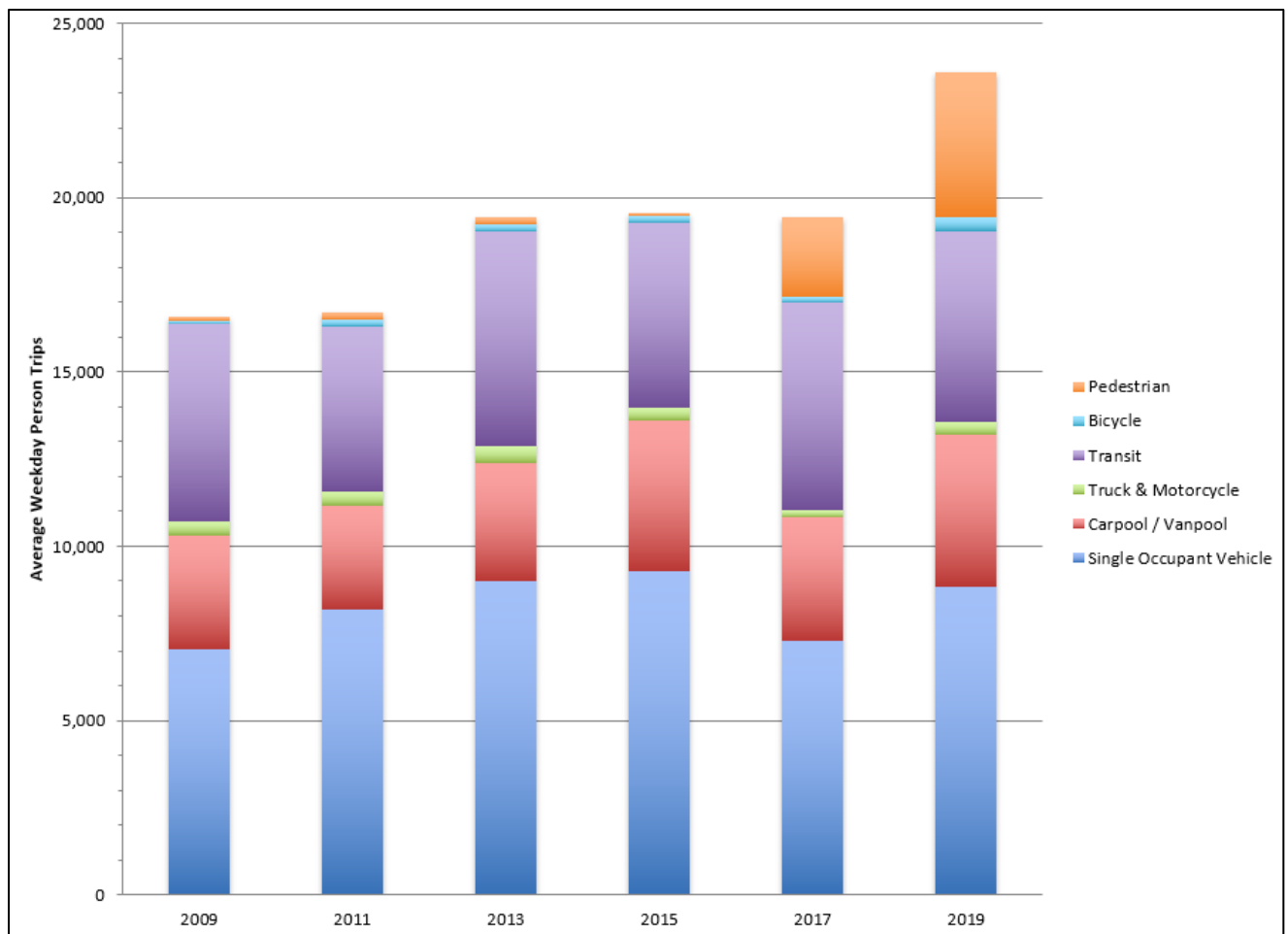
Table 2.1: Weekday Person Trips to / from UBC Okanagan

Travel Mode Classification	Person Trips					
	Fall 2009 Count	Fall 2009 Split	Fall 2017 Count	Fall 2017 Split	Fall 2019 Count	Fall 2019 Split
Single Occupant Vehicle (SOV)	7,040	42.4%	7,305	37.5%	8,820	37.4%
Carpool / Vanpool	3,260	19.7%	3,530	18.1%	4,365	18.5%
Truck & Motorcycle	400	2.4%	200	1.0%	370	1.6%
Transit	5,680	34.2%	5,975	30.7%	5,495	23.3%
Bicycle	100	0.60%	155	0.8%	380	1.6%
Pedestrian	120	0.70%	2,295	11.8%	4,160	17.6%
Totals	16,600	100%	19,460	100%	23,590	100%
Campus POP	6,400		9,580		11,290	

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

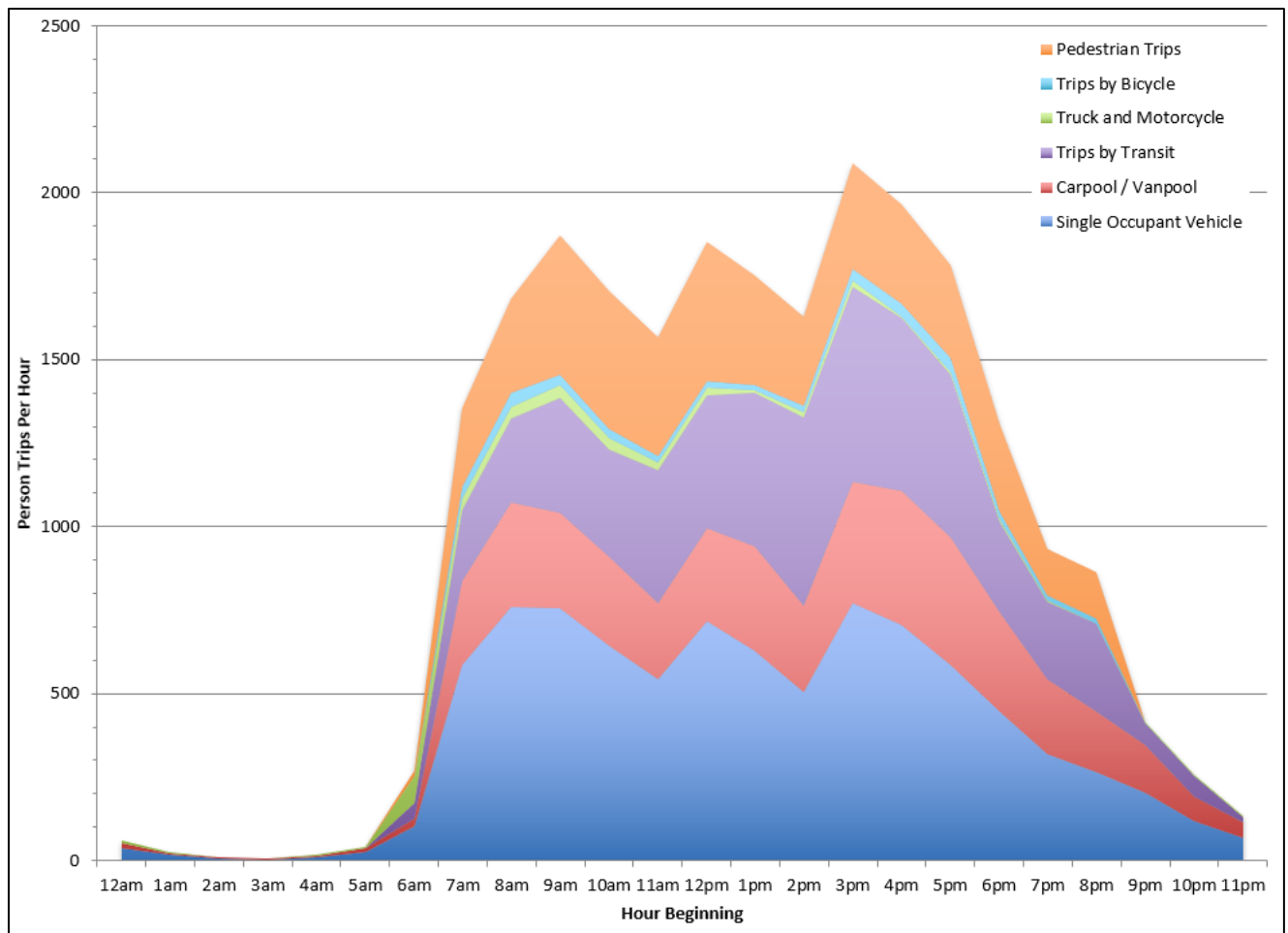
- The number of SOV trips increased in 2019 after a drop in SOV trips in 2017. However, the mode share of SOV trips between 2017 and 2019 remained the same.
- Pedestrian trips significantly increased again from 2,295 trips in 2017 to 4,160 trips in 2019 raising the pedestrian mode share to 18%, which is momentous. This is attributable to the ongoing growth of the University South neighbourhood and the implementation of a pedestrian overpass connecting campus to the neighbourhood.
- Trips by transit decreased to 23% of all trips to / from campus, which is down 7.3% from 2017. This is likely as a result of more students living in the University South neighbourhood and instead walking or biking to campus.
- Trips by bicycle increased in 2019 to the highest levels yet with 380 trips per day. This number will hopefully continue to grow as more people cycle in the region and more infrastructure is completed in the city, not to mention growth in e-bike use.

Figure 2.1: Weekday Person Trips to / from UBC Okanagan from 2009 to 2019



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 (9am-10am) and departure (3pm-4pm) periods as well as the lunch hour peak. The lunch hour peak has grown over the past few years. Possibly attributable to trips home for lunch in the University South neighbourhood as well as trips off campus for lunch.

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



The hourly distribution of trips in the chart above shows a reduction in the size of the peak travel periods and instead a consistent high demand for travel throughout the day. There are still peaks though, which does strain the transit system. UBCO Campus Planning is exploring opportunities to distribute work start times and class start times to reduce the peaks.

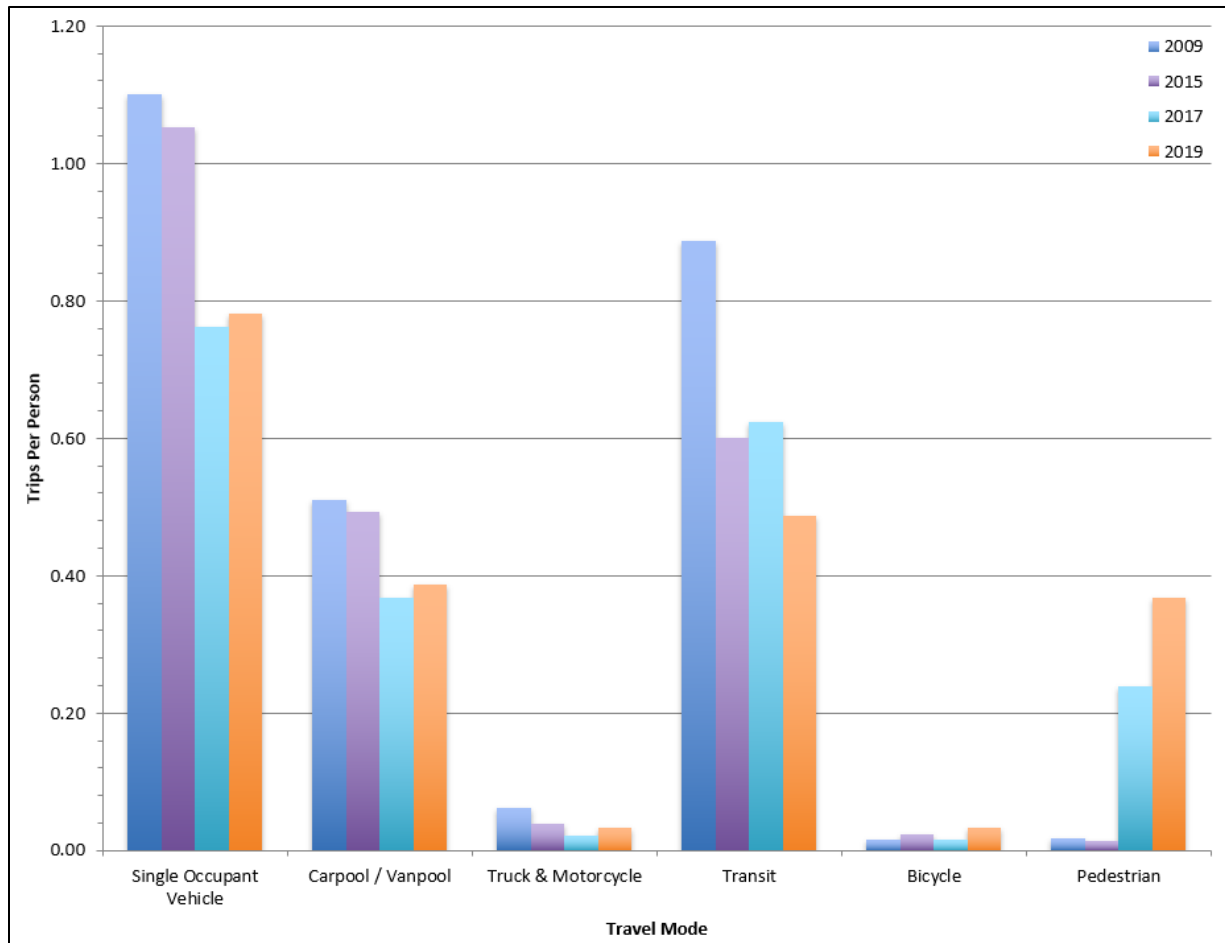
In order to compare travel patterns from year to year on a consistent basis, it is important to negate the effects of population / enrolment growth. To compare the Trips Per Person by mode, the average weekday person trips by each mode is divided by the average weekday campus population. The average 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

Travel Mode Classification	Trips Per Person				2019 Mode Share Split
	Fall 2009	Fall 2015	Fall 2017	Fall 2019	
Single Occupant Vehicle (SOV)	1.100	1.052	0.763	0.781	37.4%
Carpool / Vanpool	0.509	0.492	0.368	0.387	18.5%
Truck & Motorcycle	0.063	0.040	0.021	0.033	1.6%
Transit	0.888	0.601	0.624	0.487	23.3%
Bicycle	0.016	0.023	0.016	0.034	1.6%
Pedestrian	0.019	0.014	0.240	0.368	17.6%
Totals	2.59	2.22	2.03	2.09	100.0%
CAMPUS POPULATION	6,400	8,820	9,580	11,290	

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



As shown in the results, the total number of trips per person slightly increased from 2017 up to 2.09 trips per person. This slight increase could be attributable to the addition of two screenlines that were not included in previous years including the Pine Trail up to Quail Ridge and the overflow parking lot across from Lot H. The most notable changes from 2017 by mode is a decrease in trips per person by transit and an increase in trips per person by walking. These two observations will be closely monitored in future years.

2.2. Transit

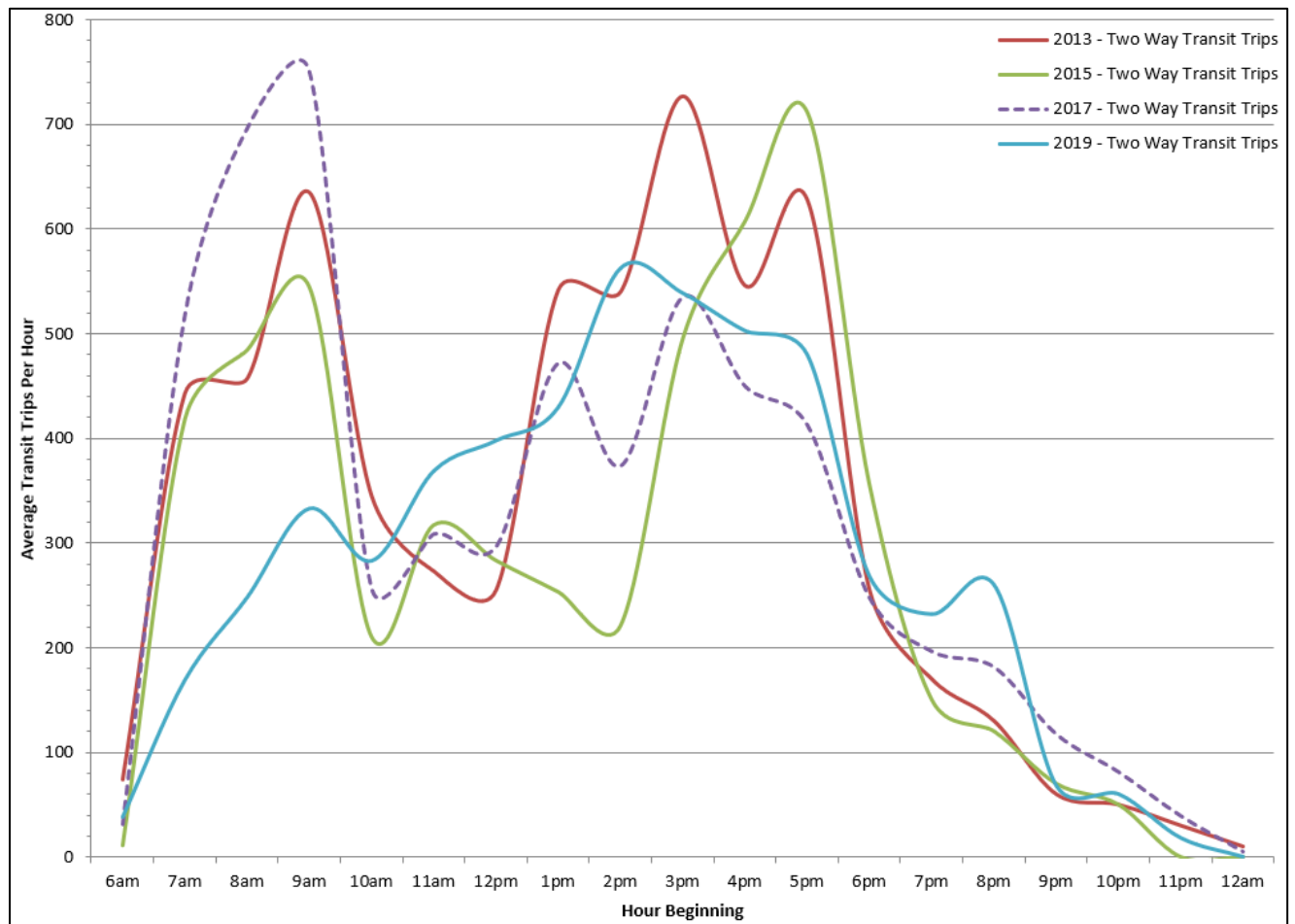
There was an average of 5,260 weekday transit trips to and from UBCO in fall 2019 on seven different transit routes.

The transit trips are summarized in **Table 2.3** while **Figure 2.5** illustrates the transit ridership by hour for fall 2013 to fall 2019.

Table 2.3: Weekday Transit Trips to / from UBCO in Fall 2019

Route	AM Peak (6AM-9AM)	Midday (9AM-3PM)	PM Peak (3PM-6PM)	Evening (6PM-1AM)	Totals	
4 Pandosy Via Highway 97	76	0	200	86	362	7%
6 Glenmore	76	208	180	64	528	10%
8 Pandosy Via Rutland	94	694	338	268	1,394	27%
13 Quail Ridge	37	186	52	0	275	5%
23 Lake Country	86	372	198	92	748	14%
90 Vernon	20	114	68	6	208	4%
97 Express	66	802	486	390	1,744	33%
Totals (Rounded)	455	2,375	1,520	905	5,260	100%

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



There were approximately 717 fewer trips by transit per day in 2019 compared to 2017. Other key observations regarding transit use at UBCO are as follows:

- There was a significant improvement in the reduction of transit peak periods compared to previous years, most notably in the morning where a peak was not observed at all. Instead, transit ridership extended for a longer period throughout the day with more trips in the evening.
- Ridership is highest on routes 8 Pandosy via Rutland and the 97 Express.
- Although not shown in this table, route 6 Glenmore was rerouted in 2018 as a result of the John Hindle Drive extension project and ridership increased from 238 in 2017 to 538 in 2019.
- Approximately 23% (up from 19% in 2017) of transit trips were to/ 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 (5% of trips).
- Compared to previous years, there was a significant drop in trips made by transit during the morning. This will be monitored in future years to determine if this is a new pattern.

2.3. Bicycles and Pedestrians

Table 2.4 and **Figure 2.6** summarize bicycle and pedestrian trips to and from UBCO. Pedestrian and bicycle trips were counted at five access points in 2019: west of the north roundabout, on Alumni Avenue north of John Hindle Drive, on Upper Campus Way, at the access to Lot H, the new John Hindle Drive (JHD) overpass, and on Pine Trail off of Discovery Avenue.

There have been quite a few changes to pedestrian and bike infrastructure accessing campus since 2013. The impact of those infrastructure projects has positively changed travel to and from the campus giving the community active transportation options.

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

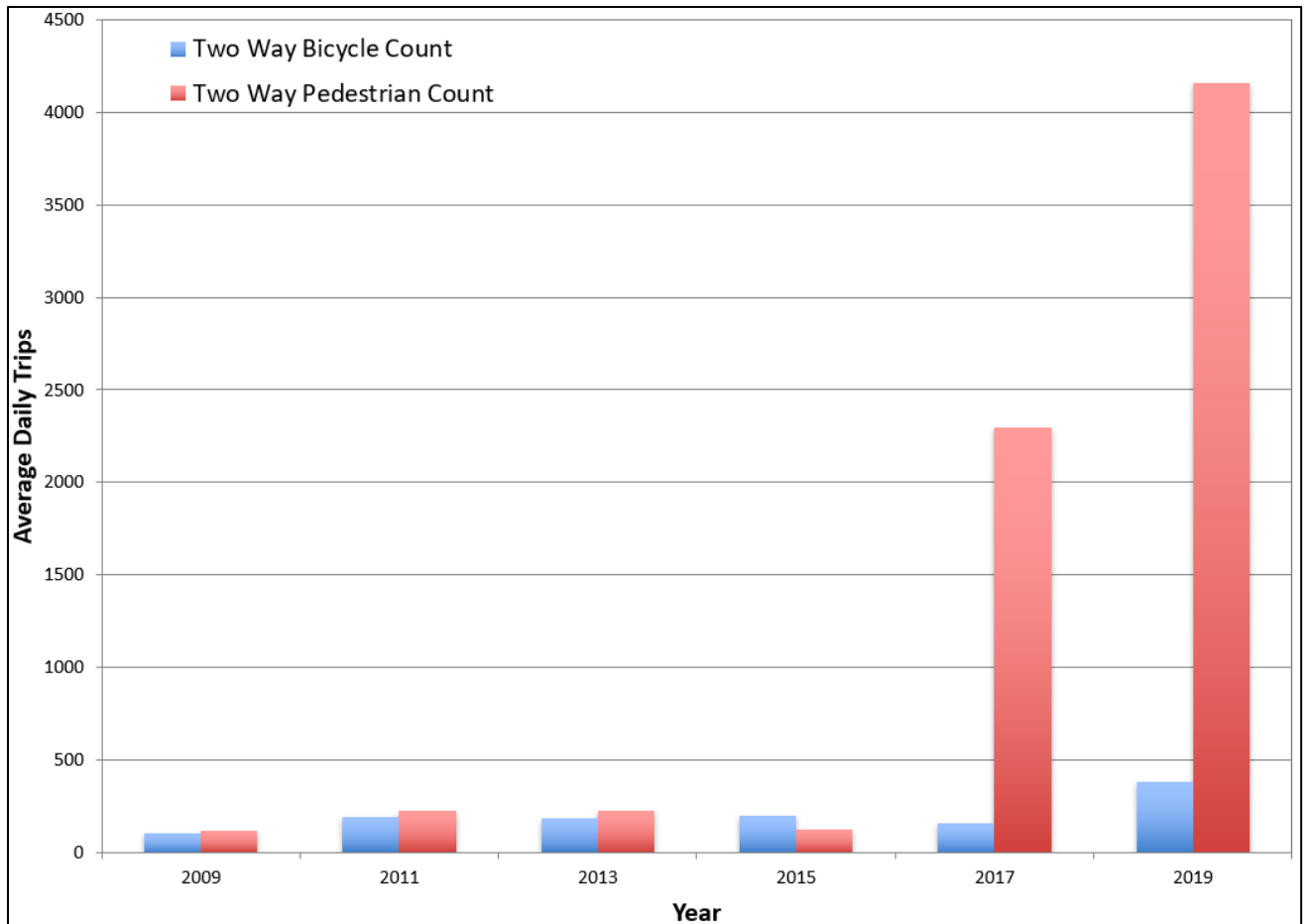
Count Location	Bicycles				Pedestrians			
	2009	2015	2017	2019	2009	2015	2017	2019
North Access	2	12	10	26	3	46	23	444
Alumni Avenue**	12	50	133	190	3	40	2028	144
Upper Campus Way*	87	119	-	102	111	14	-	163
Lot H Access	-	17	13	-	-	22	244	-
JHD Overpass***	-	-	-	29	-	-	-	3213
Pine Trail***	-	-	-	33	-	-	-	195
Totals (rounded)	100	200	155	380	115	120	2,295	4,160

*Location changed to Upper Campus Way in 2019, previously Curtis Road / West Campus.

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

***New locations in 2019.

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



Key observations regarding bicycle and pedestrian trips include:

- Pedestrian activity increased substantially again in 2019, but with a shift of routes from Alumni Avenue to the new overpass.
- The number of cycling trips more than doubled from 2017 counts. The number of cycling trips is anticipated to keep growing as infrastructure is built within the City of Kelowna and bike share programs expand to campus.
- Bike trips to and from campus are distributed mostly between Alumni Avenue for trips arriving from the south / east and Upper Campus Way for trips arriving from the west.
- Nearly all buses operating on transit routes serving UBCO are equipped with two bicycle racks. A total of 55 bicycles were counted throughout one full day of operation in fall 2019, representing an average rack utilization of 0.07 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 2,083 more automobiles travelling to and from UBCO in 2019 compared to 2017, but still fewer vehicles in 2019 compared to 2015, which is a positive improvement for comparison since in 2017 there were significant construction influences.
- The mode share between 2017 and 2019 is relatively consistent, but with a slight growth in truck traffic, likely attributable to the construction activity on campus.

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

Vehicle Classification	Fall 2009		Fall 2015		Fall 2017		Fall 2019	
	Count	Split	Count	Split	Count	Split	Count	Split
Single Occupant Vehicle (SOV)	7,040	77.4%	9,280	77.0%	7,306	76.3%	8,820	75.6%
Carpool / Vanpool	1,520	16.7%	2,060	17.1%	1,673	17.5%	2,065	17.7%
Motorcycles & Trucks	325	3.6%	290	2.4%	163	1.7%	309	2.6%
Transit Buses*	210	2.3%	420	3.5%	439	4.6%	470	4.0%
Total Vehicles	9,095	100%	12,050	100%	9,581	100%	11,664	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 increased compared to 2017 values, but are in general still less than 2015 values. In the 2019 data, Wednesday and Thursday were the two busiest days and Monday and Friday were the two lightest days of the week. Weekend traffic volumes are significantly less than weekday traffic volumes, but are notably higher than any previous year.

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

Time Period	Fall 2009	Fall 2013	Fall 2015	Fall 2017	Fall 2019
Weekday Average					
• AM peak hour	830	1,210	1,280	820	970
• PM peak hour	870	1,120	1,170	890	1,000
• 24 hours	9,100	11,440	12,040	9,580	11,660
Daily					
• Monday	8,910	11,480	12,310	9,780	11,410
• Tuesday	8,800	11,370	12,000	9,490	11,550
• Wednesday	9,280	11,420	12,030	9,720	11,940
• Thursday	9,280	11,410	12,290	9,660	12,030
• Friday	9,130	11,520	11,600	9,240	11,390
• Saturday	4,200	4,990	2,760	4,020	5,960
• Sunday	2,800	3,730	3,550	3,990	4,330

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 2019. Key observations regarding vehicle occupancies include:

- The average automobile occupancy in fall 2019 was 1.15 persons per vehicle, which is the lowest occupancy rate since collecting data.
- The average occupancy for carpools and vanpools increased slightly to 2.12 persons per vehicle up from 2.11 persons per vehicle in 2017.

Table 2.7: Vehicle Occupancy to / from UBC Okanagan

Vehicle Classification	Fall 2009	Fall 2011	Fall 2013	Fall 2015	Fall 2017	Fall 2019
Single Occupant Vehicle	1.00	1.00	1.00	1.00	1.00	1.00
Carpool / Vanpool	2.15	2.18	2.08	2.10	2.11	2.12
All Motor Vehicles	1.20	1.17	1.17	1.20	1.20	1.15

These numbers indicate that there are more people driving to UBCO alone in 2019 compared to previous years and those that do carpool are mostly travelling with two people in the vehicle. UBC plans to work on increasing the average vehicle occupancies by providing incentives to carpooling such as preferred parking locations, campus discounts, or other as carpooling has a lot of potential of reducing the number of vehicles arriving to campus and reducing the strain on parking capacity on campus.

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**. During all peak periods, traffic volumes are greatly different from previous year counts on campus as a result of all the network changes to, from, and on campus.

Figure 3.1: Morning Peak Hour Traffic Volumes at UBC Okanagan

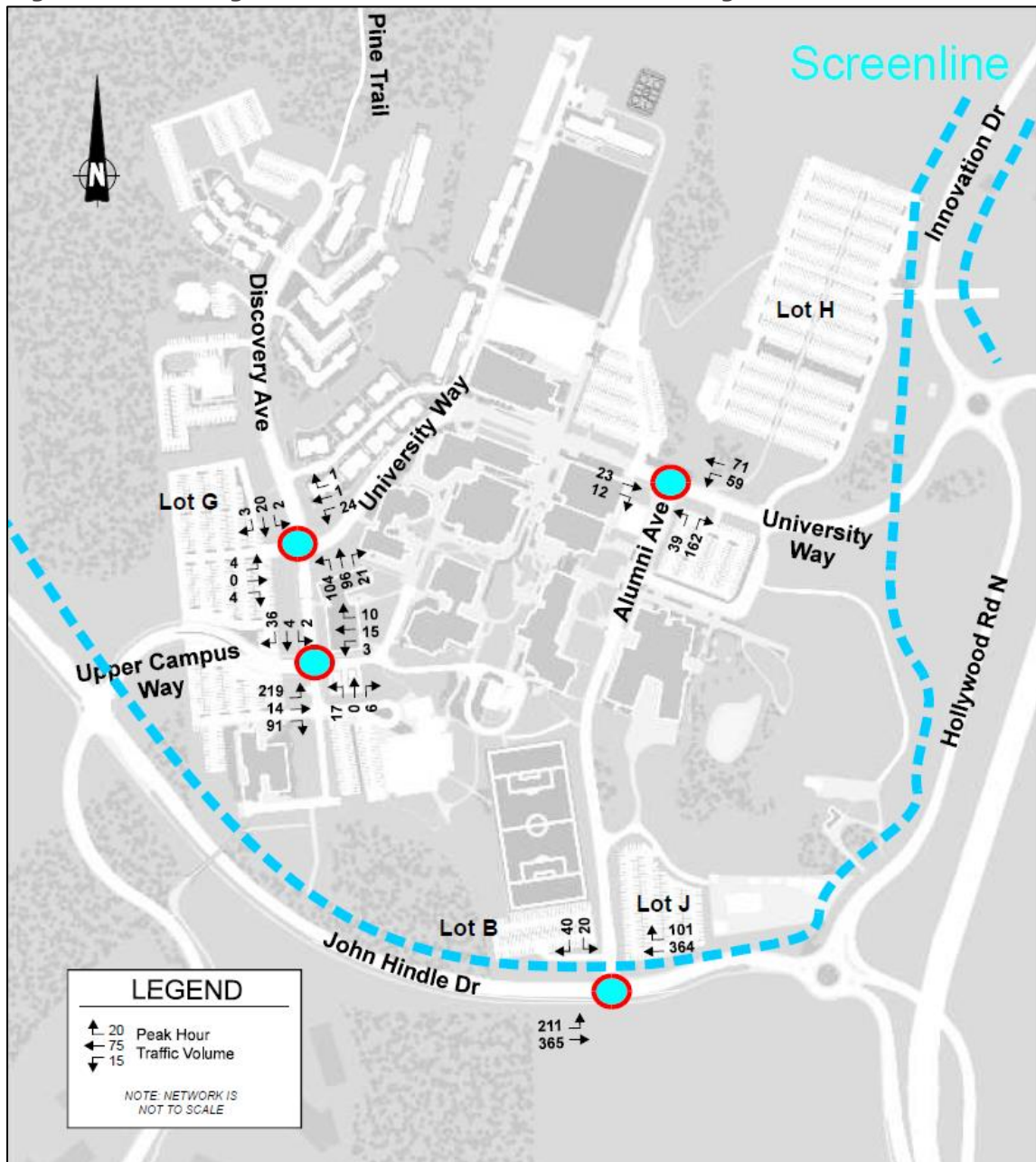


Figure 3.2: Midday Peak Hour Traffic Volumes at UBC Okanagan

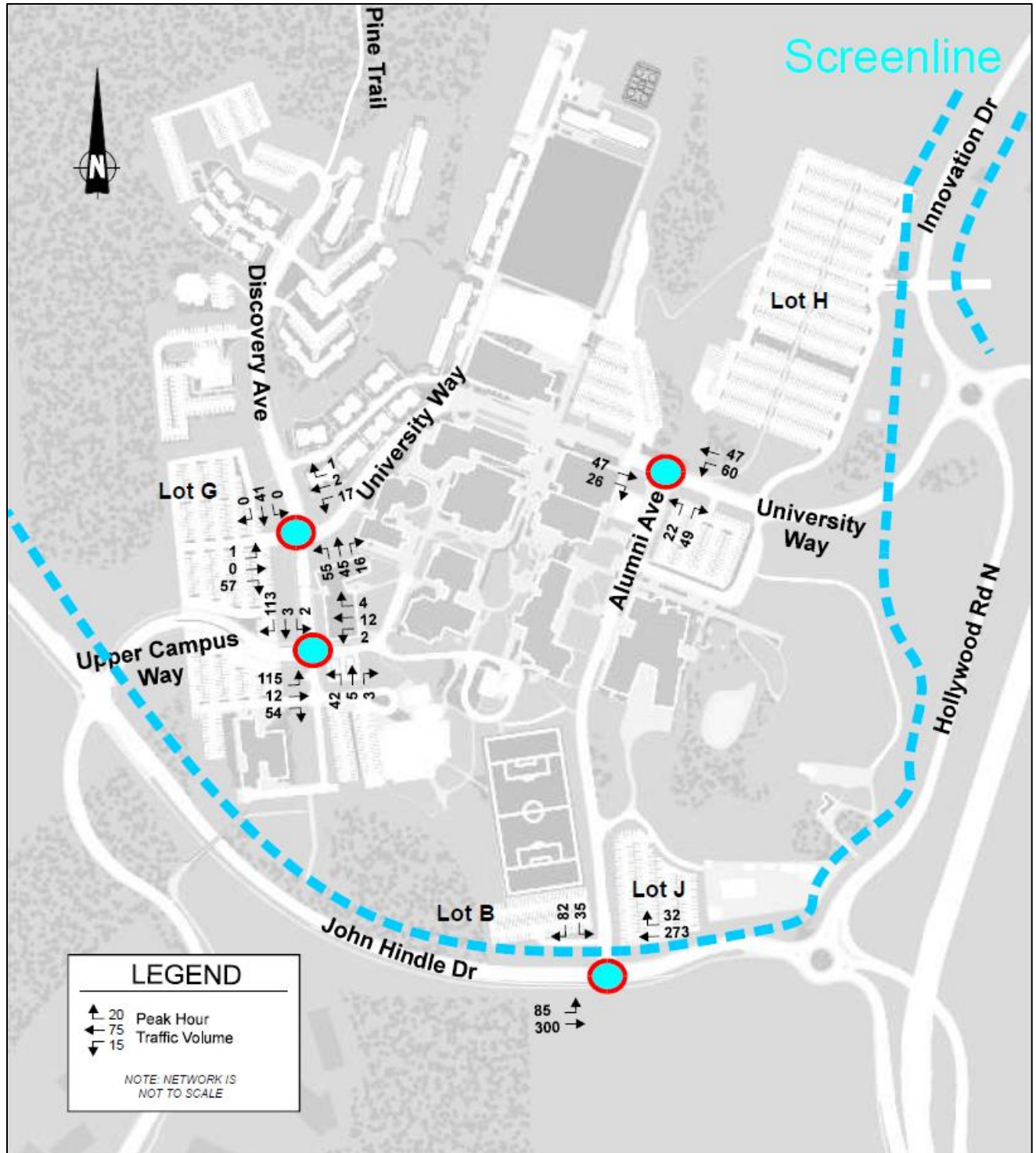
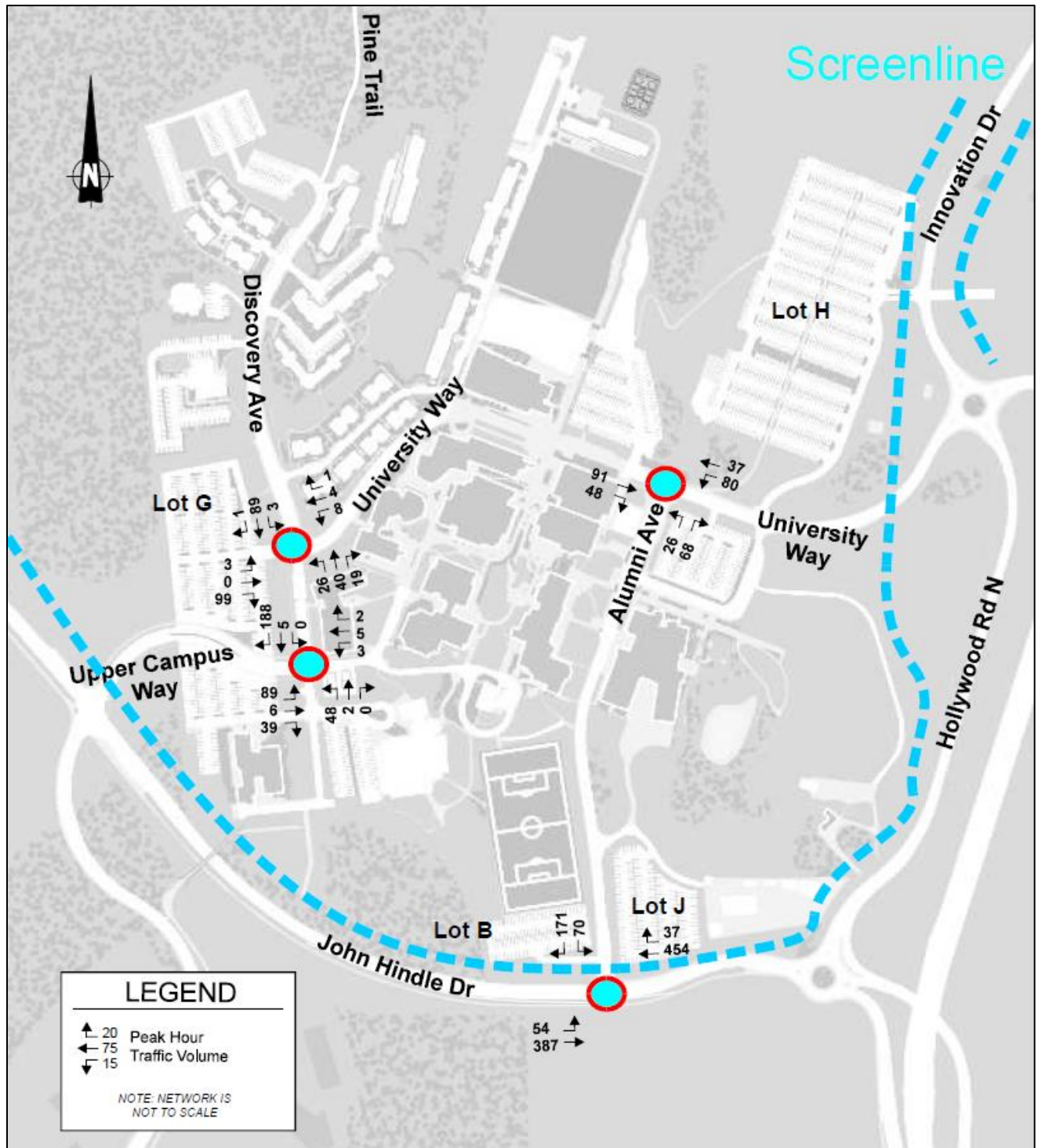


Figure 3.3: Evening Peak Hour Traffic Volumes at UBC Okanagan



3.2. Traffic Speeds

Traffic speeds were recorded at a number of locations on campus using pneumatic tubes, which are 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.

For 2019, significant changes on campus affecting travel patterns and speeds include the closure of University Way between Alumni Avenue and International Mews, the opening of Upper Campus Way, and a new roundabout at Discovery Avenue and University Way.

Key observations regarding traffic speeds on campus include:

- Speeds on University Way west of the roundabout increased in 2019. This will be closely monitored for consideration of traffic calming since there are many pedestrians crossing University Way.
- Speeds on Alumni Avenue north of John Hindle Drive are at or just above the 50 km/h speed limit. Traffic calming is planned near pedestrian crossings to reduce vehicle speeds along this corridor, which will be complete for monitoring in future years.
- Speeds on Discovery Avenue north of University Way decreased, but increased north of Upper Campus Way as a result of the increased traffic using the roadway to access parking lot G.

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

Location	Eastbound / Northbound				Westbound / Southbound			
	Fall 2013	Fall 2015	Fall 2017	Fall 2019	Fall 2013	Fall 2015	Fall 2017	Fall 2019
1. University Way – Between roundabout and Alumni Ave	55.1	49.7	34.6	47.8	50.9	47.9	31.4	48.4
2. University Way – West of Alumni Avenue	38.5	38.0	44.3	-	36.0	33.3	41.6	-
3. University Way – East of Discovery Avenue	36.9	23.2	33.8	39.2	42.8	28.7	37.4	34.3
4. Discovery Avenue – North of University Way	44.1	36.4	40.0	36.4	49.0	39.2	45.4	32.1
5. Discovery Avenue – North of Upper Campus Way	33.5	34.7	32.4	35.9	34.7	37.6	31.0	36.9
6. Knowledge Lane	29.1	28.2	25.7	-	28.8	28.3	24.6	-
7. Alumni Avenue – South of University Way	29.0	44.3	41.4	36.2	28.5	44.8	43.5	39.0
8. Alumni Avenue – North of J Lot Access	49.5	52.4	42.4	49.3	54.9	53.8	43.3	52.3
9. Upper Campus Way	-	-	-	43.2	-	-	-	41.6

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