UBC TREK Program Centre

Transportation Status Report

Fall 1997 to Fall 2002

Prepared for the UBC TREK Program Centre
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Vancouver, BC

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SUMMARY

For five years, UBC has been working to change travel patterns for trips to and from campus. Through the TREK Program Centre, UBC has developed and implemented a range of transportation facilities and programs, and is continuing to work on implementing other initiatives, such as a U-Pass.

This status report provides a review of current transportation conditions and travel patterns, as well as changes which have occurred in the past five years. This report also draws conclusions regarding the reasons for changes in travel patterns, and provides recommendations regarding additional initiatives that UBC could pursue to achieve further changes.

Background

The Official Community Plan (OCP) for UBC was adopted by the GVRD in July 1997. The OCP contains several transportation-related objectives that UBC has committed to pursue, including:

- Reducing single-occupant vehicle travel to and from UBC by 20%.
- Increasing transit use to and from UBC by 20%.
- Pursuing implementation of a universal transportation pass (known as a U-Pass).

As a means of meeting these OCP objectives and achieving other related transportation goals, UBC developed a Strategic Transportation Plan (STP), which was adopted in November 1999. The STP describes a comprehensive and integrated transportation strategy, and establishes specific targets consistent with the OCP objectives. These targets are summarized in **Table S.1** below, as well as 1997 benchmark travel conditions upon which these targets are based. The date for achieving these targets was set as 2002, the year in which the first review and update of the OCP is scheduled.

Table S.1 — Strategic Transportation Plan Targets (24-hour person trips)

Mode	Benchmark (Fall 1997)	Target (Fall 2002)
Single occupant vehicles	46,000	42,800
Transit	19,000	26,500
Heavy trucks	300	300 max.

Source: Table 1, Strategic Transportation Plan, UBC, November 1999

Since 1997, UBC has implemented several transportation programs intended to change travel patterns and achieve the STP targets, including modified class start times, carpooling programs, bicycle lanes on University Boulevard, more bicycle racks on campus and a guaranteed ride home program. UBC has also worked with TransLink to add 30% more transit service to campus, and is currently working with TransLink on the implementation of a U-Pass.

Changes from 1997 to 2002

Each year, counts are undertaken of trips to and from UBC by all modes of transportation. The first counts were undertaken in 1997, and established benchmark conditions. The most recent counts were undertaken in October 2002. **Table S.2** summarizes the results of these counts for Fall 1997 and Fall 2002 travel conditions.

Table S.2 — Comparison of 1997 and 2002 Travel Conditions (24-hour period)

Mode	Fall 1997 Actual		Fall 2002 Actual	
	Person Trips	Mode %	Person Trips	Mode %
Single occupant vehicles	46,000	43.4%	48,400	42.6%
Carpools and vanpools	36,100	34.0%	29,100	25.6%
Transit	19,000	17.9%	29,700	26.2%
Bicycles	2,700	2.5%	3,300	2.9%
Pedestrians	1,400	1.3%	1,600	1.4%
Heavy trucks	300	0.3%	400	0.4%
Motorcycle, other	600	0.6%	1,000	0.9%
Totals	**106,100**	**100%**	**113,500**	**100%**

As indicated in **Table S.2,** the most significant change since 1997 is a 56% increase in transit trips. The other significant change is a 20% reduction carpooling and vanpooling. Trips by other modes have remained relatively constant since 1997. The number of trucks was higher in Fall 2002 due to on-campus construction, such as the new Life Sciences building — at all other times since 1997, the number of trucks has remained below 300 per day.

Tables S.3 and S.4 provides a comparison of 1997 and 2002 travel conditions during morning and afternoon peak hours. The change in travel patterns during peak hours is much different than the change in travel patterns on a 24-hour basis. The most significant change is that the number of trips during the morning peak hours has decreased, likely as a result of the change in class start times.

Table S.3 — Peak Hour Travel Patterns (person trips)

Mode	AM Peak Hour				PM Peak Hour			
	Fall 1997		Fall 2002		Fall 1997		Fall 2002	
Single occupant vehicles	3,930	36.3%	4,338	41.5%	4,240	46.4%	3,935	36.7%
Carpools and vanpools	4,130	38.1%	2,394	22.9%	2,840	31.1%	2,606	24.3%
Transit	2,350	21.7%	3,194	30.6%	1,600	17.5%	3,654	34.1%
Bicycles	290	2.7%	286	2.7%	270	3.0%	288	2.7%
Pedestrians	80	0.7%	84	0.8%	130	1.4%	125	1.2%
Heavy trucks	30	0.3%	55	0.5%	40	0.4%	18	0.2%
Motorcycle, other	20	0.2%	103	1.0%	20	0.2%	99	0.9%
Totals	**10,830**	**100%**	**10,454**	**100%**	**9,140**	**100%**	**10,725**	**100%**

Table S.4 — Peak Hour Trips By Direction (person trips)

Mode	AM Peak Hour				PM Peak Hour			
	Fall 1997		Fall 2002		Fall 1997		Fall 2002	
	EB	WB	EB	WB	EB	WB	EB	WB
Single occupant vehicles	950	2,980	978	3,360	2,930	1,310	2,840	1,095
Carpools and vanpools	480	3,650	430	1,964	2,050	790	1,812	794
Transit	160	2,190	221	2,973	1,340	260	2,438	1,216
Bicycles	15	275	14	272	255	15	176	112
Pedestrians	25	55	7	77	70	60	93	32
Heavy trucks	5	25	35	20	30	10	17	1
Motorcycle, other	5	15	30	73	15	5	79	20
Totals	**1,640**	**9,190**	**1,715**	**8,739**	**6,690**	**2,450**	**7,455**	**3,270**

The number of automobile trips to and from UBC during peak hours decreased from 1997 to 2002, due to a reduction in carpooling.

Figures S.1 through S.5 provide a comparison of travel patterns throughout the day, by mode, for Fall 1997 and Fall 2002 travel conditions.

Figure S.1 — SOV Travel Patterns

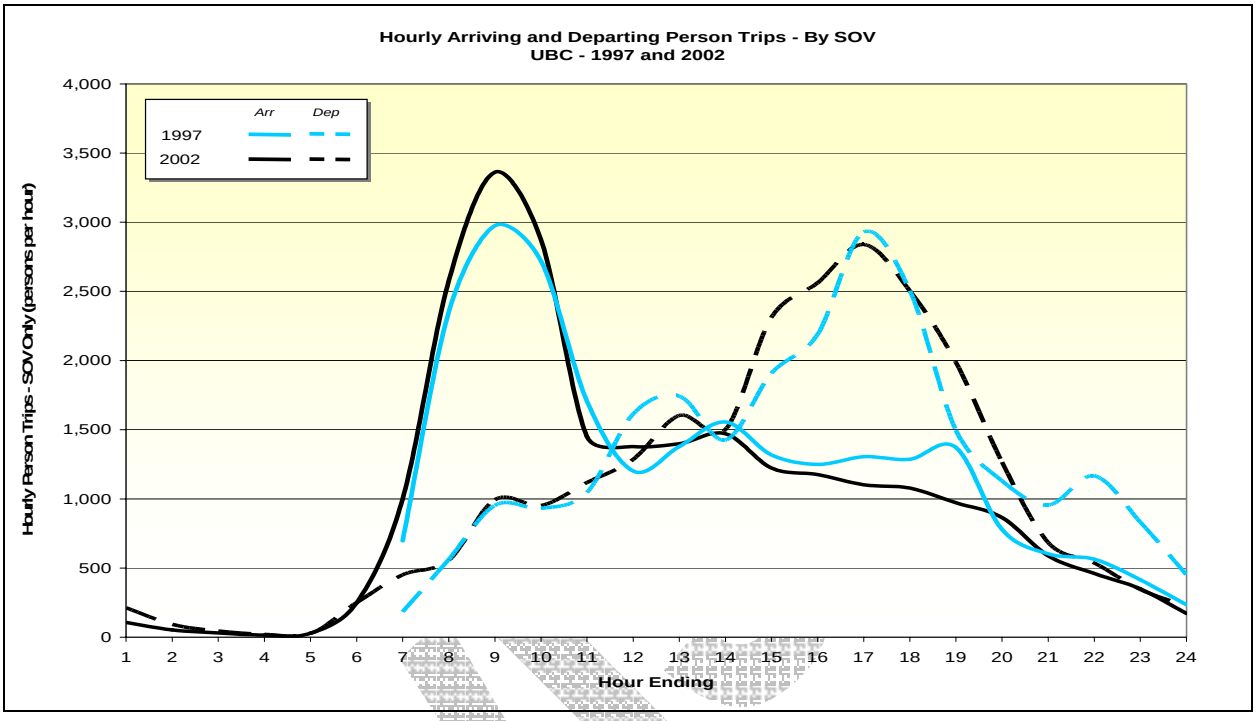


Figure S.2 — HOV Travel Patterns

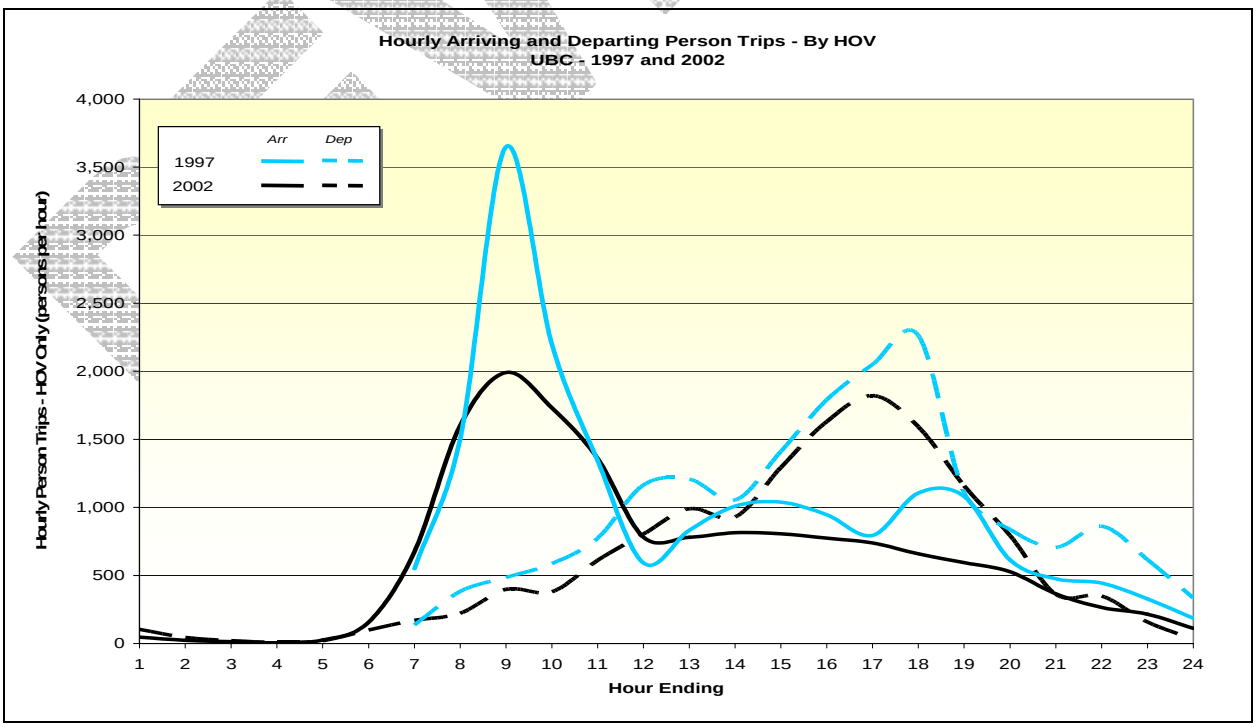


Figure S.3 — Transit Travel Patterns

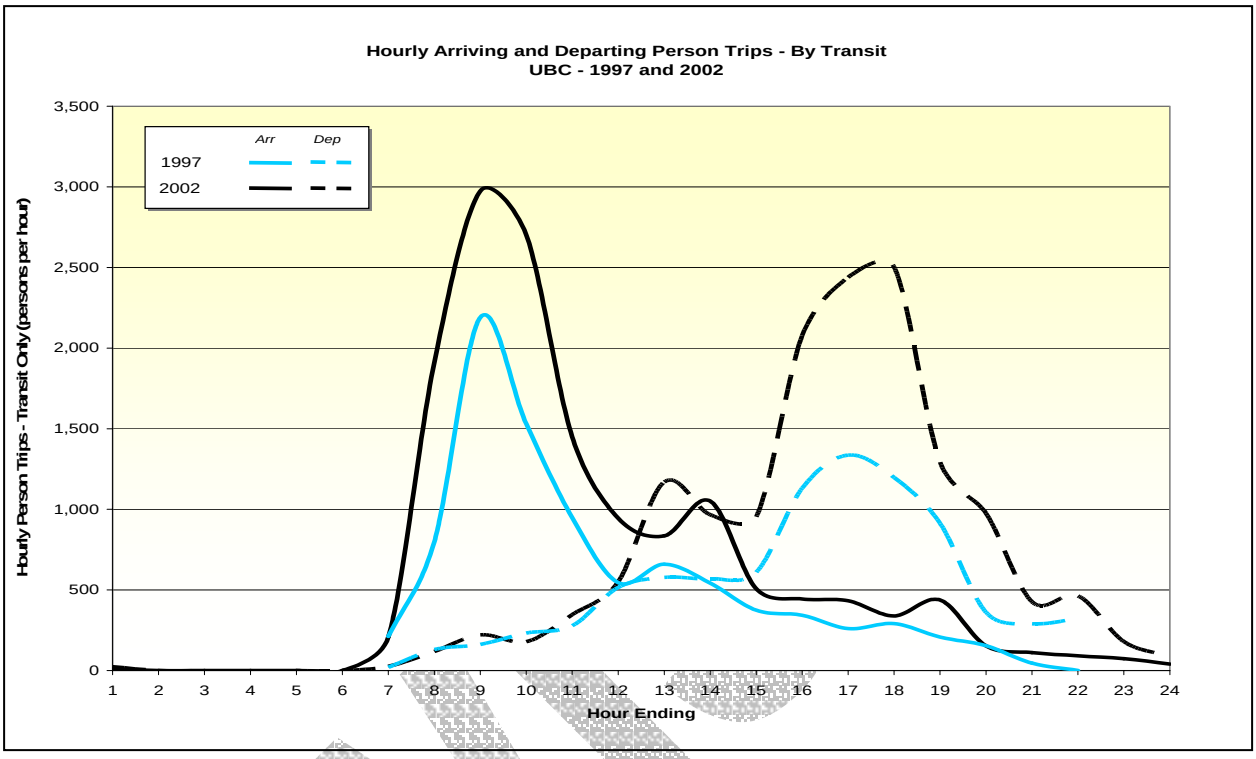


Figure S.4 — Bicycle Travel Patterns

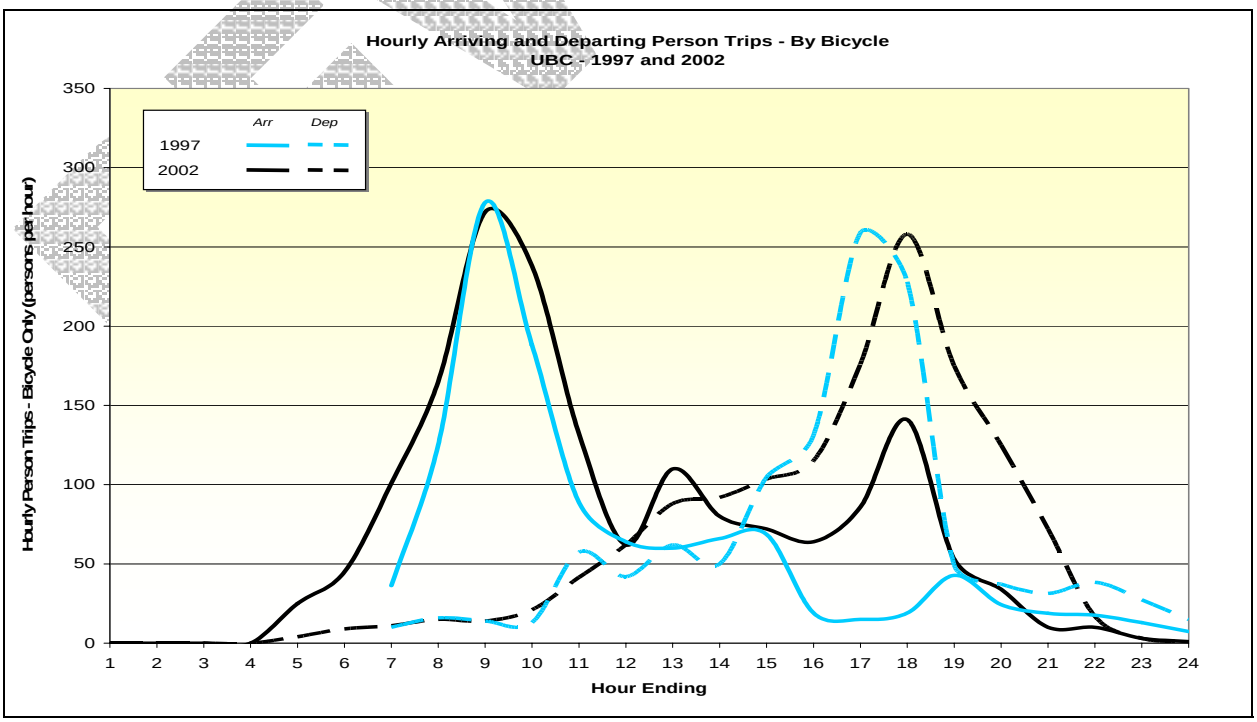
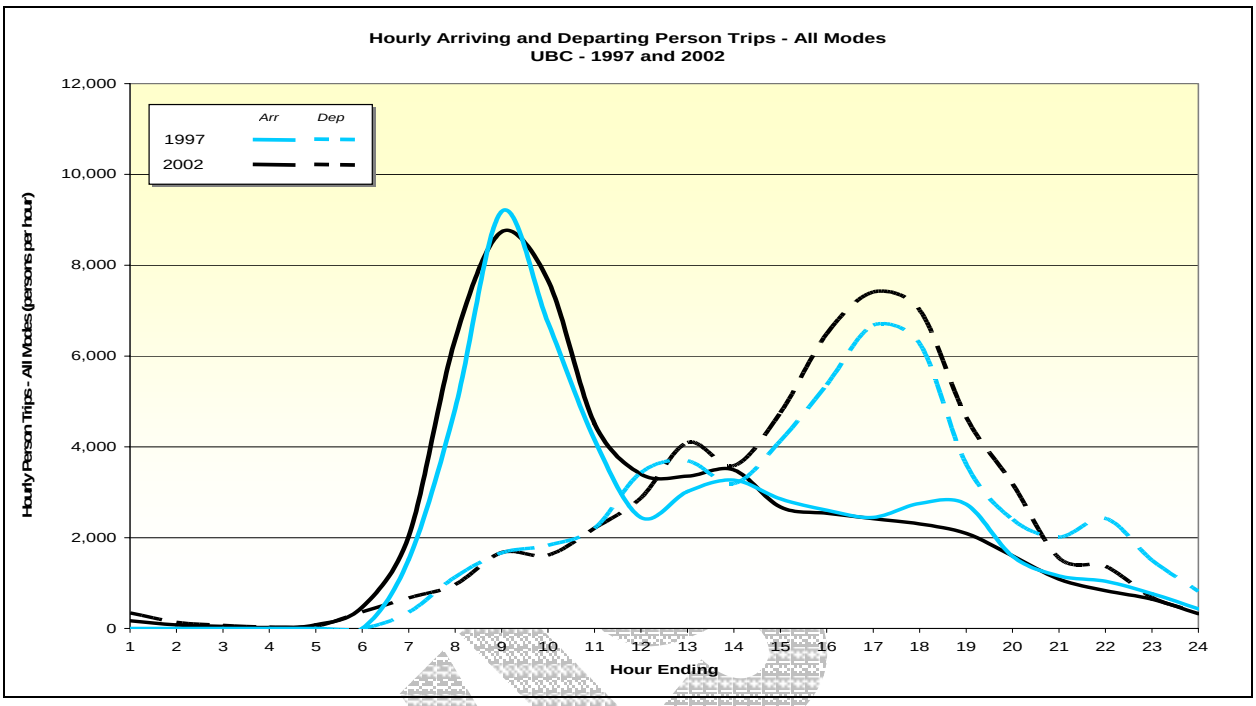


Figure S.5 — Travel Patterns for All Modes



The most significant change in travel patterns from 1997 to 2002 is that peak period arrivals and departures have spread over a longer time period, likely as a result of the change in class start times introduced in September 2001. This spreading effect is clearly illustrated in **Figure S.5**.

The change in class start times means that transit services are able to carry 12% more passengers

Another benefit of the shift in travel times is that transit services are able to carry more passengers to and from UBC with the same number of buses. Analysis of transit ridership before and after the class start times were changed indicates that approximately 12% of the ridership increase during the past two years has occurred because of a spreading of the peak demand over a longer time period. This means that buses serving UBC are now able to carry approximately 12% more passengers during the peak period because more people are now travelling earlier and later than before the class start time change.

The other significant change in travel conditions since 1997 is an overall reduction in the rate of trips to and from UBC each day. As indicated in **Table S.5**, although the number of daily trips has increased since 1997, the amount of the increase is less than the increase in the daytime population on campus. Overall, **Table S.5** indicates that the total trip rate

has declined by 8% since 1997. In other words, 8% fewer trips are made per person in Fall 2002 than in Fall 1997.

Table S.5 — Person Trips and Growth at UBC

	Fall 1997 Actual	Fall 2002 Actual	Change
Daily person trips to/from UBC (24-hour period)	106,100	113,500	7.0%
Daytime population at UBC	42,300	49,000	15.8%
Trip rate (person trips per capita)	2.51	2.31	-8.0%

The decrease in the trip rate is matched by a comparable decrease in the rate of single-occupant vehicle travel. The average daily number of SOV trips per person decreased by 9.2%, from 1.09 SOV trips per person in 1997 to 0.99 trips per person in 2002.

Comparison with Fall 2002 Targets

Table S.6 provides a comparison of actual conditions in Fall 2002 with Strategic Transportation Plan (STP) targets by mode. The targets for Fall 2002 identified in the STP were determined by extrapolating 1997 benchmark transportation conditions to a forecast of 2002 trend conditions, assuming the same mode shares as in 1997, and an increase in trips due to enrolment growth and additional on-campus housing at UBC. Targets for 2002 were established by calculating a 20% reduction in the trend forecast number of single-occupant vehicle trips, and a 20% increase in transit trips. Targets for other modes were established by determining appropriate mode shares such that the total number of person trips equalled the forecast trend number of trips.

Table S.6 — Fall 2002 Conditions vs. Fall 2002 Targets

Mode	Fall 2002 Actual		Fall 2002 Targets	
	Trips	Mode %	Trips	Mode %
Single occupant vehicles	48,400	42.6%	42,800	34.8%
Carpools and vanpools	29,100	25.6%	46,200	37.6%
Transit	29,700	26.2%	26,500	21.5%
Bicycles	3,300	2.9%	4,900	4.0%
Pedestrians	1,600	1.4%	1,800	1.5%
Heavy trucks	400	0.4%	300 max.	0.2%
Motorcycle, other	1000	0.9%	500	0.4%
Total Person Trips	**113,500**	**100%**	**122,700**	**100%**
Total Vehicles	**64,900**		**62,900***	
**Estimated based on target SOV and HOV trips*				

The significant differences between actual and target conditions include:

- **Transit.** Current transit ridership to and from UBC is 3,200 trips per day more than the Fall 2002 target. Ridership has exceeded the target by 12%.

- **Single-occupant vehicles.** The current number of single-occupant vehicle trips is 5,600 higher than the target number of trips, equivalent to 13% more trips than the target.

- **Carpools and vanpools.** The number of carpool and vanpool trips is 17,100 less than the target, equivalent to 37% less than the target number of trips.

- **Bicycles.** The number of recorded bicycle trips has fluctuated slightly each year. The number of bicycle trips in Fall 2002 is 3,300 trips or 33% less than the target number of trips.

- **Heavy trucks.** In all traffic counts conducted since Fall 1997, the number of heavy trucks travelling to and from UBC each day has not exceeded 300 — until Fall 2002 when slightly more than 400 trucks were observed travelling to and from UBC. This increase in truck traffic is due to several construction projects on campus during Fall 2002, including a new Life Sciences building.

- **Daily trips.** The number of daily person trips in Fall 2002 is almost 10,000 trips less than anticipated, equivalent to 7.8% fewer trips.

- **Daily traffic.** Because single-occupant vehicle trips are higher than forecast, daily traffic volumes are 2,000 vehicles higher than the traffic volumes expected with the Fall 2002 targets.

Conclusions

The most significant change since 1997 is the large increase in transit ridership. This is due primarily to corresponding increases in transit service. Since 1997, transit service levels have been increased more than 30%, and as a result, total ridership has increased by 56% since 1997.

This result reflects a strong latent demand for transit service to UBC, which was not accommodated by previous transit service levels. On a regular basis, buses travelling to UBC would "pass up" commuters waiting at bus stops west of Granville Street because they were already full. Although reports of "pass ups" have decreased as transit service levels have been improved, continued reports indicate that there may still be some latent demand for transit service to UBC that is not being served. Transit ridership data support

this conclusion, indicating that during peak periods, many buses travelling to and from UBC are carrying full passenger loads. It can therefore be expected that further increases in transit service will result in further increases in ridership.

Despite the large increase in transit use, single-occupant vehicle trips have not decreased to the same degree. Since 1997, UBC has made noticeable progress towards their goal of reducing the total amount of single-occupant vehicle trips by 20%. The number of SOV person trips per capita has decreased by approximately 9% since Fall 1997. Although this decrease does not meet the overall target of reducing the total number of SOV person trips by 20%, it does indicate that in comparison to previous years, commuters at UBC are slowly beginning to switch out of their vehicles and use other modes of travel.

What has also decreased is the number of carpool and vanpool trips being made. This decrease suggests that as transit services have been improved and transit capacity increased and people who formerly carpooled and vanpooled have switched to transit.

Subjective data collected through a series of focus groups conducted in December 2001 supports the conclusion that carpoolers and vanpoolers have switched to transit. Participants in the focus groups identified several major reasons why carpooling is not attractive for many commuters, including variable schedules that are not consistent with fixed carpool schedules, the need to run errands and make other stops on the way to or from UBC, unexpected work demands and emergencies which would mean missing a scheduled carpool trip, and the additional time involved in picking up or dropping off carpool partners. Several participants had tried carpooling — particularly during the transit strike — but had stopped carpooling in favour of transit and other means of travel. Most participants indicated that transit was a far more attractive commute option than carpooling.

UBC should focus efforts on increasing transit ridership

The conclusion from the focus groups was that in the short term, UBC should not expect to substantially reduce drive-alone commuting through carpool efforts (but should continue to promote carpooling and provide supporting services such as ridematching in order to maximize the level of carpooling). Rather, UBC should focus efforts on increasing transit ridership, as transit is a more attractive alternative for the majority of commuters.

Data from the focus group sessions also provides an indication as to *why* improvements in transit service have not reduced single-occupant vehicle trips. The two key reasons that were identified are:

- The cost of parking at UBC is currently less than the cost of a round trip on transit (that is, a trip from home to UBC and then back home). Several focus group participants commented that they would not consider using transit unless there was a significant price advantage as compared with the cost of parking.
- Many SOV commuters use parking permits, which are purchased on a monthly basis. Once the permit has been paid for, the marginal cost to park on campus is zero. Consequently, there is no incentive not to drive some days — in fact, the incentive is to drive every day so as to obtain the greatest value from the parking permit. Many focus group participants indicated that they would like the flexibility to pay for parking only on the days they actually use it. Participants indicated that this flexibility would enable them to use transit and other commute options some of the time.

Bicycle trips have not increased as significantly as originally anticipated. Reasons identified by focus group participants include a lack of bicycle routes in some parts of Vancouver to provide efficient connections to UBC, and the need for additional bicycle routes and parking on campus. Another likely reason is that increases in transit service have made transit a more attractive commute option for some cyclists. A similar result was observed at the University of Victoria, where the introduction of a U-Pass and corresponding increases in transit service resulted in a 37% reduction in the number of bicycle trips to and from the university each day.

Recommendations

Travel demand management (TDM) is the term used to describe measures that are intended to alter travel patterns, reduce the use of single-occupant vehicles and increase the use of other modes. TDM initiatives — such as those identified in UBC's Strategic Transportation Plan — are typically intended to achieve one or more of the following objectives:

- Reduce single occupant vehicle (SOV) trips
- Increase transit trips, as well as trips by other non-SOV modes
- Shift travel times away from peak periods
- Reduce the number of trips per capita (set target of 42,800 person trips per day)

As **Table S.7** indicates, UBC has already achieved three of these four TDM objectives. Only the objective of reducing single-occupant vehicles to 42,800 trips per day or less remains to be achieved.

Table S.7 — Travel Demand Management Objectives

TDM Objective	Status (as of Fall 2002)
Single occupant vehicle trips ≤ 42,800	✘
Transit trips ≥ 26,500	✓
Reduce trip rate per capita	✓
Shift travel times away from peak periods	✓

In order to achieve the outstanding objective of reducing SOV trips to 42,800 person trips per day or less, UBC must continue to develop and implement appropriate transportation programs and facilities. Based on experience at other post-secondary institutions and analysis of conditions at UBC, the following initiatives would have the greatest effect in changing travel patterns, and would enable UBC to achieve this objective. It is recommended that these initiatives be emphasized in future planning work, including updates to the Strategic Community Plan and Official Community Plan.

- **Implement a U-Pass program.** This would be the single most effective means of achieving changes in travel patterns. At the University of Victoria, transit ridership increased 50% as a result of U-Pass. At the Southern Alberta Institute of Technology in Calgary, transit ridership increased 35%, with an increase of 70% in midday ridership. Planning work undertaken by UBC and TransLink indicates that implementing a U-Pass program would increase transit ridership to and from UBC by a minimum of 25%, which would mean an increase to at least 37,000 trips per day.

  Other programs associated with U-Pass — such as shuttle services, a guaranteed ride home and carpooling services — would also increase use of other non-SOV modes.

- **Price all parking on a daily basis.** This would provide commuters with the flexibility to drive some days, and use transit or cycle other days, thereby reducing single-occupant vehicle trips. Many commuters who currently drive to UBC have indicated that they would like the flexibility to pay for parking only when they use it, and use alternative means of commuting at other times. Potential impacts to parking revenues could be avoided by adjusting parking prices as described below, so that even if parking demand decreases as a result of higher parking prices, revenues could be maintained. For example, if the parking demand decreased by 20% consistent with the target to reduce SOV trips by 20%, parking revenues could be maintained by increasing parking prices. As described below, indexing parking prices to transit fares would achieve this.

  Many commuters would like the flexibility to pay for parking only when they use it

- **Index parking prices to transit fares.** This would reduce the number of single-occupant vehicle trips by encouraging some commuters to use transit, carpool or cycle to avoid paying higher parking prices. Currently, the daily cost of parking at UBC is approximately $3.00 to $3.50, depending on whether a commuter purchases a monthly parking permit or pays the daily B-Lot rate. In comparison, the cost of a round-trip on transit ranges from $4.00 to $8.00, depending on the number of fare zones a commuter travels through. Most commuters consider that driving costs less than taking transit, and consequently there is little incentive to switch to from driving transit. Indexing parking prices to the one-zone round trip transit cash fare of $4.00 would mean an increase of approximately 25%, which as discussed above, would offset any reductions in parking demand (due to reductions in SOV traffic as well as reductions due to on-campus development). It should be noted that indexing parking prices to transit fares is a policy which UBC has adopted in the Strategic Transportation Plan, but has not yet implemented.

- **Provide additional bicycle facilities on campus,** including improved bicycle routes, additional bicycle racks and secure parking facilities. These facilities would minimize concerns about safety in traffic and bicycle theft, and as a result encourage more people to cycle to UBC. These improvements are identified in UBC's Five-Year Bicycle Capital Plan.

- **Promote carpooling.** In the short-term, reductions in SOV trips will be achieved primarily through increases in transit use. In the longer-term, after a U-Pass is implemented and transit use has stabilized at a higher level, carpooling will provide the means to achieve further reductions in SOV trips. Consequently, UBC should continue to promote carpooling, and to develop and implement new programs to encourage carpooling. Key initiatives include expanding the database of persons interested in carpooling, offering parking incentives for carpoolers, and marketing efforts to maintain awareness of carpooling programs.

- **Continue to develop housing on campus.** Developing housing on campus — much of which would be occupied by staff, faculty and students — reduces trips to and from UBC, as well as reducing the overall number of trips. Studies conducted at Hampton Place indicate that the number of vehicle trips per household is approximately 40% less than at comparable developments elsewhere in the region.

1.0 INTRODUCTION

As one of UBC's commitments made in the joint GVRD/UBC Memorandum of Understanding regarding the GVRD's Official Community Plan Bylaw for the UBC area, UBC has undertaken a comprehensive transportation data collection and monitoring program. This program was implemented as part of the plan outlined in the UBC Strategic Transportation Plan (STP, adopted in November 1997) that was created to help the University pursue the transportation targets laid out in the OCP.

The data collection program officially began in 1997 when the UBC TREK Program Centre was created. The data collected through this program are used to assess the effectiveness of the UBC TREK Program Centre in achieving its goals of reducing single-occupant and heavy truck travel to and from the University, increasing transit ridership, and implementing a U-PASS program at UBC.

Each year, screenline, on-campus intersection, speed, volume, classification and bicycle and pedestrian counts are undertaken at and adjacent to the University. These data are summarised and compared with data from previous years to determine how the UBC TREK Program is progressing with its plans.

In their efforts to pursue and achieve these goals, the STP outlined a number of transportation targets that would be used to steer their efforts and measure the overall effectiveness of the TREK Program Centre's activities. These targets were based on a five-year timeframe, and set for Fall 2002 – the same year that UBC would embark upon its first OCP update.

Fall 2002 marks the end of this timeframe and so in addition to reviewing the current transportation conditions and travel patterns on campus, this report will also address how well the University has progressed towards achieving its goals of reducing SOV use, reducing heavy truck travel and increasing transit ridership and other more sustainable travel modes. As part of this review, this document will draw conclusions regarding the reasons for changes in travel patterns, and provide recommendations regarding additional initiatives that UBC could pursue to achieve further changes.

2.0 ANNUAL MONITORING PROGRAM

A number of different methods are used to collect travel data at UBC, as part of a comprehensive annual program. The majority of the data are collected during the Fall, providing a consistent basis for year-by-year comparison of traffic volumes, travel patterns, and mode split. Additional specialized data collection activities, such as travel surveys, are also conducted throughout the year and are used to obtain information regarding commuters' attitudes and needs. Localized traffic counts are also conducted, as required for other projects, to study additional issues that may not be adequately addressed by the annual count program.

The information presented in this report is based primarily on data collected through the annual transportation monitoring program from 1997 to present. Because the program was initiated in Fall 1997, the data results from that year have served as the benchmark against which progress has been measured. The results of any additional data collection programs throughout this period have typically been published at the conclusion of each program.

2.1 Count Program Methodology

The following section of this document describes the various types of counts that have been conducted annually at UBC's Point Grey Campus. The number of and types of counts have changed slightly over the years as new locations and/or types of data have been required. The following discussion highlights the major types of data collection activities that are undertaken.

Table 2.1 provides a summary of the annual count program as of Fall 2002 and **Figure 2.1** illustrates all count locations. Note that due to construction of the roundabout at West Mall and Stadium Road, some locations along West Mall were not counted in the Fall, but will be completed when the University reopens in the New Year. As part of the UBC Transit Plan that is concurrently being prepared, a number of additional counts were added to the program this year. Although this data was collected for a separate initiative, the results of those counts will also be included in this report for reference.

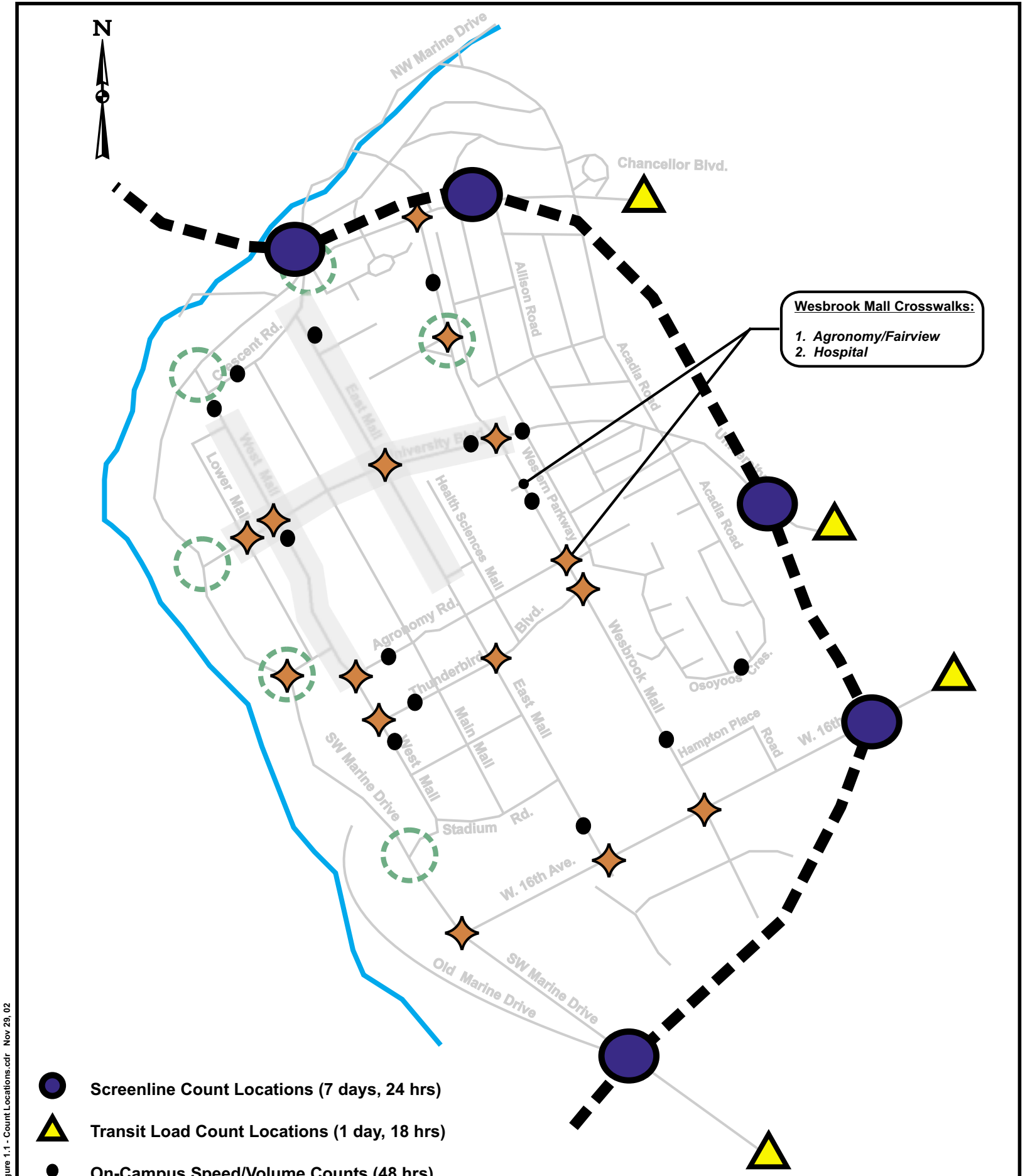


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Figure 2.1
Data Collection Locations

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Table 2.1 - Summary of Annual Data Collection Program

Type of Count	Location(s)	Duration	Timing
Automatic Screenline Counts	• SW Marine Drive • University Boulevard • Chancellor Boulevard • 16th Avenue • NW Marine Drive	24-hrs for 7 days per location	Annually (typ. in Oct/Nov)
Vehicle Occupancy and Classification Counts	Same as above	8-hrs for 1 day per location	Annually (typ. in Oct/Nov)
Bicycle and Pedestrian Counts	Same as above	8-hrs for 1 day per location	Annually (typ. in Oct/Nov)
Transit Ridership Counts	• SW Marine Dr near Camosun • W. 16th Ave at Blanca • University Blvd at Blanca • 4th Avenue at Blanca	6:00 AM – Midnight	Annually (typ. in Oct/Nov)
On-Campus Speed and Volume Studies	On alternating years: *Year 1* • University Blvd e/o Wesbrook • University Blvd w/o Wesbrook • East Mall s/o Crescent Road • West Mall s/o Thunderbird • Thunderbird Blvd e/o West Mall • Agronomy e/o West Mall • Crescent Road e/o West Mall *Year 2* • East Mall n/o 16th Avenue • West Mall s/o Crescent Road • West Mall s/o University Blvd • Wesbrook Mall n/o Hampton Rd • Wesbrook Mall s/o University • Wesbrook Mall s/o SUB Blvd • Osoyoos Crescent w/o Revelstoke	48-hrs per location	Bi-Annually (typically in Oct/Nov)
Manual On-Campus Intersection Counts	On Alternating Years: *Year 1* • University Blvd/Wesbrook Mall • Thunderbird/Wesbrook Mall • University Blvd/East Mall • Thunderbird/East Mall • W. 16th Ave/East Mall • Wesbrook Mall/Fairview Crescent *Year 2* • Chancellor/Wesbrook Mall • Sub Blvd/Wesbrook Mall • W. 16th Ave/Wesbrook Mall	48-hrs per location	Bi-Annually (typically in Oct/Nov)

	• Agronomy Rd/SW Marine Drive • W. 16th Ave/SW Marine Drive		
Additional Pedestrian Counts	• Wesbrook Mall: at Fairview and Hospital crosswalks • East Mall Pedestrian Corridor: CEME accesses to Chancellor Blvd • West Mall Pedestrian Corridor: Memorial Road to Agronomy Road • University Blvd Pedestrian Corridor: West Mall to Wesbrook Mall	8-hrs for 1 day per location	Conducted for use in preparation of the UBC Transit Plan
University Gate Counts	• West Mall/Marine Dr North(Gate 4) • West Mall/Marine Dr South (Gate 8) • East Mall/Marine Dr (Gate 3) • University Blvd/Marine Dr (Gate 6) • Westbrook Mall/ SUB Blvd (Gate 2) • Agronomy Rd/marine Dr (Gate 7)	8-hrs for 1 day per location	Bi-Annually (typically in Oct/Nov)
Bi-Annual Campus Wide Transportation Survey	Campus wide survey of staff, faculty, and students to monitor travel behaviour and attitude information.		Bi- Annually (typically in February)

- **Screenline Counts**

  In November 1997, screenline traffic counts were conducted in six locations along the Vancouver City and University Endowment Land (UEL) boundary. These counts collected travel data for all SOV, transit, HOV, bicycle, and pedestrian trips made across this boundary. However, the data collected along this screenline included vehicles travelling to the Endowment Lands and adjacent areas and did not represent the number of trips being made to and from the University alone. The 1997 data were extrapolated to estimate the number of trips made to and from UBC, but in future the count locations would be adjusted to capture only UBC commuters.

  In 1998, the count locations were changed and instead taken along the boundary of UBC and the UEL. These counts would accurately capture only those trips being made to and from UBC. It should be noted however, that although the screenlines have been adjusted to capture only traffic that is related to UBC, the volumes recorded invariably include a small number of non-UBC trips to destinations such as Wreck Beach. As the annual counts are conducted in October and November, it is estimated that very few trips to this destination are still occurring, and therefore have little effect on the overall volumes recorded.

  The data collected in 1998 from these new locations was also used to produce an estimate of the amount of traffic along the City and UEL boundary, in order to compare with 1997. Annual counts have since only been conducted along the

UEL/UBC screenline. All count locations, on both screenlines, are as shown in **Figure 2.1**.

- ## On-Campus Counts

Also in 1998, six on-campus count locations were added to collect traffic volume data along major internal roads on campus. Vehicle occupancy, detailed vehicle classification, bicycle, and pedestrian counts were conducted each year as part of the program in these same locations. Manual intersection counts were also conducted starting that year to monitor the performance of on-campus intersections.

Since 1998, the number of on-campus count locations (for both manual intersection counts and speed/volume studies) has changed and increased to approximately 25 locations. To better manage this aspect of the program, starting in Fall 2001 a bi-annual count schedule was introduced for on-campus locations. This schedule allows for about half of the locations to be counted in alternating years, and is outlined in the following table. Additional count programs are continually conducted on-campus throughout the year, some of these additional counts are also noted on **Figure 2.1**.

- ## Spring Bicycle Counts

Beginning in 1999, spring bicycle counts were added to the program. The spring counts were added to identify whether the warmer temperatures and improved weather conditions, which can generally be expected in the spring, affect bicycle travel patterns. As they coincide with the end of the school year, these counts also provide a basis to compare whether the bicycle mode share changes at all throughout the school year.

- ## Transit Ridership Counts

In past years, transit ridership counts have been conducted annually by BC Transit, and subsequently the Coast Mountain Bus Company (CMBC). In Fall 2001 however, due to constraint issues, the Coast Mountain Bus Company was not able to conduct their annual transit load counts. As this data is important to TREK's annual monitoring program, independent transit ridership counts were organized and conducted to provide the data that was required.

Typically CMBC conducted their counts over 14 and 16-hour periods, but increased in 1998 to 18-hour count periods to reflect the changing spread of transit service. In 2001, rider- ship counts were scaled down from what CMBC would normally

conduct, but captured the data that was required to complete this report. Spring 2002 transit counts were again conducted over a longer period, from 6 AM to midnight.

- ## Transit Strike Counts – April 2001

On April 2, 2001 Lower Mainland and Victoria transit operators walked off the job leaving these areas with no public transit, except for SkyTrain in the Lower Mainland. Being the Lower Mainland's second largest transit attractor, a special count program was organised at UBC to collect traffic volume and mode split data in order to analyse the impact of the strike. It was intended that this data would provide a basis for comparison of mode split before and after the strike, which will show any lasting impacts of the strike on travel behaviour.

Counts were conducted during the first week of the strike, in the same six locations that are counted each Fall, and were performed using the same methods as the annual program. Data collected in April 2001 is included in the annual data summary table in addition to the regularly scheduled Fall 2001 data. The final report regarding the transit strike count program is included in the **Appendix** as Technical Memo A.

- ## Additional Pedestrian Counts

To address some of the data needs of the UBC Transit Plan that is concurrently being prepared at the time of this report, additional pedestrian-related counts were added to the Fall program. These counts were conducted in a number of new locations to provide an indication of the travel patterns and flows of pedestrians at key locations on-campus.

Pedestrian Corridor Counts were conducted along University Boulevard, West Mall and East Mall to measure the number of pedestrian crossings and level of pedestrian activity across these three corridors. A number of crosswalks on Wesbrook Mall were also observed this Fall to measure the level of activity at these crosswalk locations.

- ## Bi-Annual Campus-Wide Transportation Survey

An integral part of the transportation monitoring program at UBC is the bi-annual transportation survey conducted campus-wide via the web, email and hard-copy. This transportation survey began in 1998 and has evolved into a comprehensive questionnaire to gather information regarding the attitudes and behaviours of UBC commuters.

In past years the survey has provided valuable information about attitudes towards parking, the proposed U-TREK Card, cycling behaviours and transit. For 2002, the survey was tailored to gather feedback on a variety of existing and proposed programs and issues relating to transportation at UBC, in particular carpooling, parking and the class time-change.

As part of the development process, a series of focus group sessions were co-ordinated to solicit input on some of the major issues prior to release of the survey. These sessions, which included two sessions for each staff, students and faculty, were very helpful and provided insight that helped to shape how some of the issues were presented in the survey. A summary report of the focus group sessions was prepared and has been released under separate cover. This report is also available on the UBC TREK Program Centre website at www.trek.ubc.ca.

Results of the 2002 Transportation Survey will be used to build a behavioural model of travel at UBC and direct planners on a number of important initiatives.

- **Parking at UBC**

Parking data has typically not been included in the annual transportation monitoring program at UBC and has instead been examined through a number of independent reviews, as required. In 2002 however, some parking information was collected and is included in this report. It is expected that in future years of this program, parking information will be made a part of the annual collection program.

- **Data Collection Summary Table**

A detailed data summary of all counts has been maintained since 1997. This table includes the results for each year of the monitoring program, in both person trips and traffic volumes, and has been organised by time period and route. The data summary table for Fall 1997 through Fall 2002 is included in the **Appendix**. All calculations and assumptions that have been applied to this data are documented in Technical Memo B also in the **Appendix**.

2.2 Assumptions

Due to the magnitude of UBC and the number of commuters travelling to and from the campus each day, a number of assumptions are required as the data is tabulated and summarised. This section of the report describes some of the basic assumptions made in compiling this information, in order to make the results presented within more easily understood by the average reader.

2.2.1 Mode Split

Mode split, or *modal share*, refers to the relative proportions of each travel mode used in a particular time period. It is a way of representing the percentage of total travellers using each type of travel mode – for UBC mode splits are generally shown for SOV, HOV, transit, bicycle, pedestrian, trucks and sometimes motorcycle. Modal shares for UBC are monitored from year to year as they provide an important indication of how people are getting to UBC, and whether the trend changes over time.

In their regional travel surveys, the GVRD reports their mode shares in the following categories: automobile driver, automobile passenger, transit passenger, walking and bicycle trips and other (including taxi, school and other buses). These categories are also used by the City of Vancouver to report their mode share data. While the GVRD would make a logical 'standard' for way of reporting mode shares, UBC maintains their slightly different mode share categories as they are more easily understood by the average reader. The UBC categories also explicitly report the number of single occupant vehicles and carpools – both of which are of key importance to the TREK Program and their goals.

Mode shares are a way of expressing the proportion of travellers using each mode of travel

It should be noted that while the categories are slightly different, reasonable comparisons can still be made between the GVRD regional data, the City of Vancouver and UBC mode shares. Throughout this report, data and trends reported from the most recent Greater Vancouver Trip Diary Survey have been included as a basis for comparison between UBC and the rest of the region.

2.2.2 Duration of Counts and Time Periods Reported

Due to the magnitude of the effort and cost required to collect data at the University, it is not reasonable to collect all types of data for the same duration. The following table lists the type of count program conducted and the typical duration for each.

Type of Count Program	Typical Duration
Screenline Counts	24 hours per day for 7 days per location
Vehicle Occupancy/Classification Counts	8 hours per day, 1 day per location
On-Campus Intersection Movement Counts	8 hours per day, 1 day per location
On-Campus Speed and Volume	48 hours per location
Transit Ridership Counts	16 – 18 hours per day, 1 day per location

It should be noted that volume data on all routes leading to and from UBC (screenline counts) is collected over a period of one week. This data is easy to collect and provides a reasonable amount of data to summarise the total vehicle volumes travelling to and from UBC on a daily basis. The occupancy counts however, are done manually so they are limited to an 8-hour period that captures the peak AM, midday and PM periods. This data is what provides the mode share, and is assumed to be representative for all days. Occupancy data for early morning and late night periods are estimated, if required.

Limiting the hours for which data is collected is a reasonable method when you consider the fact that the peak hours are typically of most importance. Historically for UBC, the peak hours have been 8:00 to 9:00 AM and 4:00 to 5:00 PM. Other time periods reported include the AM peak period (7:00 to 10:00 AM), midday (11:30 AM to 1:30 PM) and the PM peak period (3:00 to 6:00 PM). It has been found that most indicators of changing trends are noticed in the peak periods, however, the 24-hour period is also examined and presented.

2.2.3 Person Trips Vs. Vehicle Trips

The screenline counts provide the average number of vehicles travelling to and from the University on a daily basis. This information is valuable in that it monitors the number of vehicle trips being made and reflects any changes to which routes people are using. However, the vehicle volumes alone do not provide enough information to draw any conclusions regarding the mode choices made by UBC commuters. And it is this information that is critical to the UBC TREK Program Centre.

A person trip is a one-way trip, to or from the University, made by a single person.

In order to monitor how people are getting to UBC, i.e. by bus, automobile, bike etc., count data is reported in terms of the number of *person trips*. A person trip is a one-way trip, either to or from the University, made by a single person. For example, an automobile with three people in it represents one vehicle trip, but it also represents three one-way person trips. It has been found that this measure of travel most accurately reflects the number of commuters travelling to and from UBC and also which mode they are using.

In this report, unless otherwise stated, all data is presented in terms of the number of person trips, typically by mode.

2.2.4 Yearly Fluctuations of Data

As noted elsewhere in this report, traffic volumes can be expected to fluctuate on a daily basis by as much as 10%, and can be expected to fluctuate on a seasonal basis as well. The annual data

collection program is only conducted over a period of one to two weeks each year, and some of the count activities are conducted over only a one-day period. Although this is sufficient to reliably estimate changes in travel patterns over time, the inherent variability in the data limits its usefulness for detailed analysis of localized traffic conditions. What is needed for more detailed analysis is traffic data collected over lengthier periods of time.

The most cost-effective way to collect traffic data over long periods of time is to use a permanent automatic counter. UBC may wish to consider installing one or more permanent count stations in key locations on campus. A permanent count station is a traffic data recorder connected to a detector loop placed permanently within the pavement of each lane on a roadway. Permanent count stations can be incorporated into actuated traffic signals at little additional cost. Permanent count stations are used by several municipalities and are used throughout B.C. on provincial highways.

Data collected from one or more permanent count stations at UBC could be used to calibrate and expand traffic data collected through the annual data collection program to represent a full year's worth of data. To accomplish this, the following locations are recommended as locations for permanent count stations, because they are located on or close to the cordon around UBC:

- Signalized intersections along Wesbrook Mall (16th Avenue, Thunderbird Boulevard and University Boulevard)
- 16th Avenue and SW Marine Drive

Each of these locations is illustrated on **Figure 2.2** below.

3.0 CHANGES AFFECTING TRAVEL AT UBC (SINCE 1997)

There have been a number of changes at the University since 1997 that may have had an impact on the attitudes of people within the UBC community and their travel choices. This section of the report outlines what some of those changes are and the reasoning behind their implementation.

3.1 UBC Population and Growth

One of the most obvious changes at the University since 1997 is the ever-changing population made up of students, campus residents, employees, faculty and staff members. The UBC Planning and Institutional Research department (PAIR) provides statistics regarding the size of UBC's daytime population based on full- and part-time enrolment figures, faculty and staff. Between 1997 and 2002, population data consistently showed a growth rate of approximately 3% to 4% per year. This corresponds with a 16% increase overall of the UBC population between 1997 and 2002.

Table 3.1 - Annual Daytime Population Growth at UBC

	1997	1998	1999	2000	2001	2002
Total Population at UBC (headcount)	42,300	43,430	44,750	44,700	46,100	49,000
Overall Growth	16%					

Source: UBC Planning and Institutional Research Department

In order to reflect this growth in year-to-year travel data, *trip rates* are used when comparing the number of trips between two or more years. A trip rate is the number of person trips or vehicle trips expressed per 10,000 members or per individual (capita) of the UBC population. This method of comparison brings the total number of trips down to a common basis (i.e. 10,000 members of the community or capita). Trip rates are used throughout this report to compare data among years, independent of growth effects.

A trip rate is the number of person or vehicle trips expressed per 10,000 members or per capita of the UBC population

3.2 Community Plans

There are a number of community plans that have been developed and implemented to help shape the work of transportation planners at UBC. The following describes the major plans that are currently in place.

UBC Official Community Plan

The UBC Official Community Plan is the result of years of discussions regarding the land that UBC and part of the Pacific Spirit Regional Park is situated on. With a growing community the need for a comprehensive and cohesive planning process was evident. In July 1997, the final Official Community Plan (OCP) Document was adopted – in it are goals relating to the preservation of Pacific Spirit Park, providing a diverse range of transportation and housing options, promoting ecological preservation, providing community and social services and promoting sustainability of the UBC community.

A major component of the UBC OCP relates to improving the transportation choices available for all members of the UBC community and maintaining a transit-oriented, automobile restrained transportation system. As part of its responsibility to pursue this goal, UBC has agreed to the following commitments:

- Building on the success UBC has already achieved with its TDM programs to date, UBC will actively pursue the GVRD's goal of reducing SOV travel, by pursuing a reduction in SOV travel of 20% below the daily number of SOV trips recorded in Fall 1997.
- In support of sustainable transportation options, UBC will also pursue a complementary increase in transit ridership of 20%.
- UBC will be the lead agency in working towards developing and implementing a U-TREK Card program, a University transportation pass similar to the U-Pass program of the University of Washington, in place since 1991. This work will be completed in collaboration with other agencies such as the City of Vancouver, the GVRD, TransLink and UBC neighbours.
- As a top priority, UBC would also develop and implement a comprehensive transportation management strategy – the UBC Strategic Transportation Plan.
- UBC will also work towards developing truck travel. Dispersal routes and hours of operation for campus in cooperation with the City of Vancouver.

While the OCP invariably lead to many more transportation initiatives and objectives, the above commitments encompass the major transportation ideals put forth in the OCP. Some of these additional commitments included reducing the number of roadside parking spaces available adjacent to UBC, investigating and implementing class schedules that would reduce traffic and transit peak flows, creating the UBC TREK Program Centre, improvements to the bicycle network to, from and at UBC, advancing the opportunities for "telecommuting" and incorporating traffic calming principles in both residential and academic areas on campus.

As an outcome of the commitments listed above, the UBC Strategic Transportation Plan was developed and implemented in 1999. In it, a number of transportation-related goals were established to help guide the University towards the OCP objectives. As the OCP will begin its first official update in Fall 2002, this was chosen as a logical timeframe in which to measure UBC's transportation achievements.

The UBC Strategic Transportation Plan

The STP recommends a comprehensive and integrated TDM strategy in support of the Trek 2000 Vision and the transportation-related commitments agreed to in the UBC Official Community Plan.

The Strategic Transportation Plan is a living document that contains a policy framework in support of TREK 2000 and OCP implementation through to the year 2021. Included in the Plan are policies regarding regular reviews, ongoing policy references, and STP updates as needed to best serve the transportation needs of the UBC community. Although the STP policies provide a long-term framework, the targets set out in the STP have been deliberately set on a short-term scale. These targets, which are to be met by the year 2002, are a major focus of this report as the annual monitoring program is intended to gauge TREK's success in meeting its goals.

Comprehensive Community Plan (CCP)

The CCP provides overall parameters for the development of the eight local areas identified in the OCP. The CCP establishes the principles for detailed neighbourhood planning in the eight areas, which are:

- North Campus
- Theological Precinct
- Gage South
- University Boulevard
- Thunderbird

- East Campus
- Mid Campus
- South Campus

The principles outlined in the CCP pertain to housing types, open space, urban form, and circulation (transportation).

TREK 2000

TREK 2000 is UBC's strategic vision for the next millennium. Prepared through a widespread community consultation, TREK 2000 establishes the University's objectives in the next millennium and confirms UBC's goal to be a leading public university in Canada and around the world.

The TREK 2000 objectives focus around five pillars of a sustainable, complete community. They are:

- **People** – UBC recognizes that people are its most important resource and places a high value on its students, faculty and staff. The TREK 2000 goal is to attract and retain outstanding students, faculty, and staff through a number of strategies.
- **Learning** – UBC is committed to maintaining the highest standards of teaching, learning, research, and service, in order to provide a learning environment that will inspire and enable individuals to grow. The TREK 2000 goal is to offer students an intellectually challenging education that takes advantage of the unique social and cultural make-up, geographical location, and research environment of UBC.
- **Research** – UBC encourages original research and scholarship to increase knowledge and understanding for the benefit of society. The TREK 2000 goal is to enhance UBC's research capacity, research performance and to become recognized for their research contributions.
- **Community** – UBC is dedicated to furthering the social, cultural, and economic interests of Greater Vancouver, British Columbia and Canada. UBC is committed to collaborate with local and regional communities to foster intellectual, social, cultural, and economic development through a number of strategies.
- **Internationalization** – UBC is part of a network of learning that stretches around the world, and in an increasingly global environment it encourages the development of teaching, learning, and research.

3.3 The UBC TREK Program Centre

Primary responsibility for development and implementation of the UBC STP rests with the Director of Transportation Planning at UBC and the UBC TREK Program Centre. This section outlines some of the changes that have occurred at UBC since the UBC TREK Program Centre began in 1997.

The TREK Program Centre's mission is to improve transportation choices by promoting sustainable transportation at UBC

- **Class start-time changes in September 2001.** In an effort to spread the transit demand in the AM peak period, UBC adjusted morning class start times from the existing campus-wide 8:30 AM start time. This change saw a portion of students begin classes at 8:00 AM, a portion of students remain at 8:30 AM and the remaining students begin classes at 9:00 AM. The desired effect was that by spreading out the start times for students, the demand on transit would also be spread out more and would relieve some of the congestion and overcrowding being experienced in the mornings.

  Preliminary monitoring since the change was implemented indicates that the class start-time change has achieved the desired effect. Many buses are still crowded in the morning, but the peak is now spread over a longer period of time, allowing better use of transit vehicles.

- **Parking supply and costs.** Commitments in the OCP and STP saw changes to parking practices at UBC such as the amount of parking available on roadways adjacent to and at UBC. For example, part of the B-Lot parking area was removed in order to construct new on-campus housing. Roadside parking has also been decreased since 1997 - parking is no longer allowed on portions of SW Marine Drive, 16th Avenue and other roadways leading into campus. Parking costs have also changed since 1997 – for example, the daily parking cost in B-Lot is now $3.50 from 7:00 AM to 2:00 AM, or part thereof as compared to $2.00 in 1997. These sorts of changes in parking supply and cost are used as incentives for commuters to try other modes besides the automobile.

- **30% more transit service.** Since 1997, transit service to UBC has increased so that there are now 30% more buses travelling to and from UBC each day. The majority of this increase has been on the Route 99 B-Line, with additional improvements to the Route 43 express along 41st Avenue, increased service on the

Route 44 express from downtown, and all day service on Route 480 from Richmond Centre.

- **Improvements to bicycle facilities and services at and adjacent to UBC.** In an effort to improve the safety for cyclists riding to and from UBC, as well as enhancing the bicycle route network, new bicycle lanes have been constructed on several roadways leading to the University. Most notably, this includes the conversion of University Boulevard west of Blanca, from two lanes in each direction, to one travel lane and one full bicycle lane in each direction. Bicycle lanes have also been added to 16th Avenue to improve safety and reduce cyclist-vehicle conflicts.

  On campus, there have also been changes including the addition of new over 200 bicycle racks bringing the on-campus total to over 500 racks, bicycle lockers at the War Memorial Gym, and new services such as the AMS Bike Co-op, the purple and yellow bike program, TREK bike-buddy matching and the Bike Kitchen to encourage and support the UBC cycling community.

- **UBC Carpooling Program.** In an effort to promote carpooling to UBC and thereby reduce the number of single occupancy vehicles (SOV) coming to campus, the UBC TREK Program Centre implemented a comprehensive carpooling program in 2001. The program includes access to a web-based ridematching service to help commuters organise carpools, in addition to access to preferred carpool parking and a rewards program that includes transit vouchers, gift certificates and vehicle maintenance vouchers.

- **UBC Emergency Ride Home (ERH) Program.** When asked why they don't use non-automobile modes to get to or from UBC, many people respond that being without a ride home in the event of an emergency is a major consideration. The UBC Emergency Ride Home Program is run through the UBC TREK Program Centre and offers commuters who regularly use a non-automobile mode of travel (at least 3 times per week) a 90% reimbursement for costs associated with getting home by taxicab in the event of an emergency.

3.4 Campus Development

Since 1997, UBC has developed additional housing on-campus, as a means of reducing the proportion of persons who travel to UBC from off-campus. As well, an increased number and range of commercial services are now available on campus and in the University Endowment Lands adjacent campus, which is intended to further reduce the number of off-campus trips. For example, numerous street-level commercial spaces have been situated in the "village" area just off campus with additional residential

development above. A number of additional construction projects are currently on-going at the Point Grey Campus including the construction of a new Life Sciences Building at the corner of Thunderbird Boulevard and East Mall.

4.0 TRAVEL TO AND FROM UBC

This section presents the number of trips made to and from the University's Point Grey campus each day. Details regarding mode share, occupancies and on-campus travel from Fall 1997 through Fall 2002 are also included.

4.1 How many trips are made each day?

Person Trips

Approximately 113,500 one-way person trips are made to and from UBC each day

The daily number of person trips to and from UBC reflects the total number of one-way trips crossing the UBC/UEL screenline in a 24-hour period. In 1997, approximately 106,000 person trips were made to and from the University each day. The total number of trips has fluctuated each year since, and in Fall 2002 there were approximately 113,500 daily person trips to and from the University's Point Grey campus. For comparison, in the City of Vancouver and the University Endowment Lands combined, 1.7 million person trips are made daily and 5.5 million person trips are made each day in the entire GVRD. The number of person trips to and from UBC accounts for approximately 2% of all person trips made each day in the GVRD.

Table 4.1 summarises the total number of person trips by year and the overall growth since 1997.

Table 4.1 - Total Person Trips at UBC by Year (24-hour period)

	Fall 1997	1998	1999	2000	2001	Fall 2002
Total Daily Number of Person Trips	106,100	106,500	113,200	107,000	110,900	113,500
Overall Growth	7.0%					

The total number of person trips since the benchmark year has increased by approximately 7%, which does not indicate a significant change in the daily number of person trips. Fluctuations from year to year may be partly or entirely due to daily variations in travel patterns. Because the travel data are only collected over a short period of time each year, these daily fluctuations can be expected to account for variations in travel numbers of about 5% to 10%.

Absolute increases and decreases are still important results, but in order to represent changes in travel patterns while taking into account the inherent growth of the University,

trip rates are also be considered in order to separate growth effects and changes in trip-making.

Table 4.2 summarises trip rates for person trips to and from UBC over a weekday 24-hour period, since 1997.

Table 4.2 - Trip Rates To/From UBC (24-hr person trips per capita)

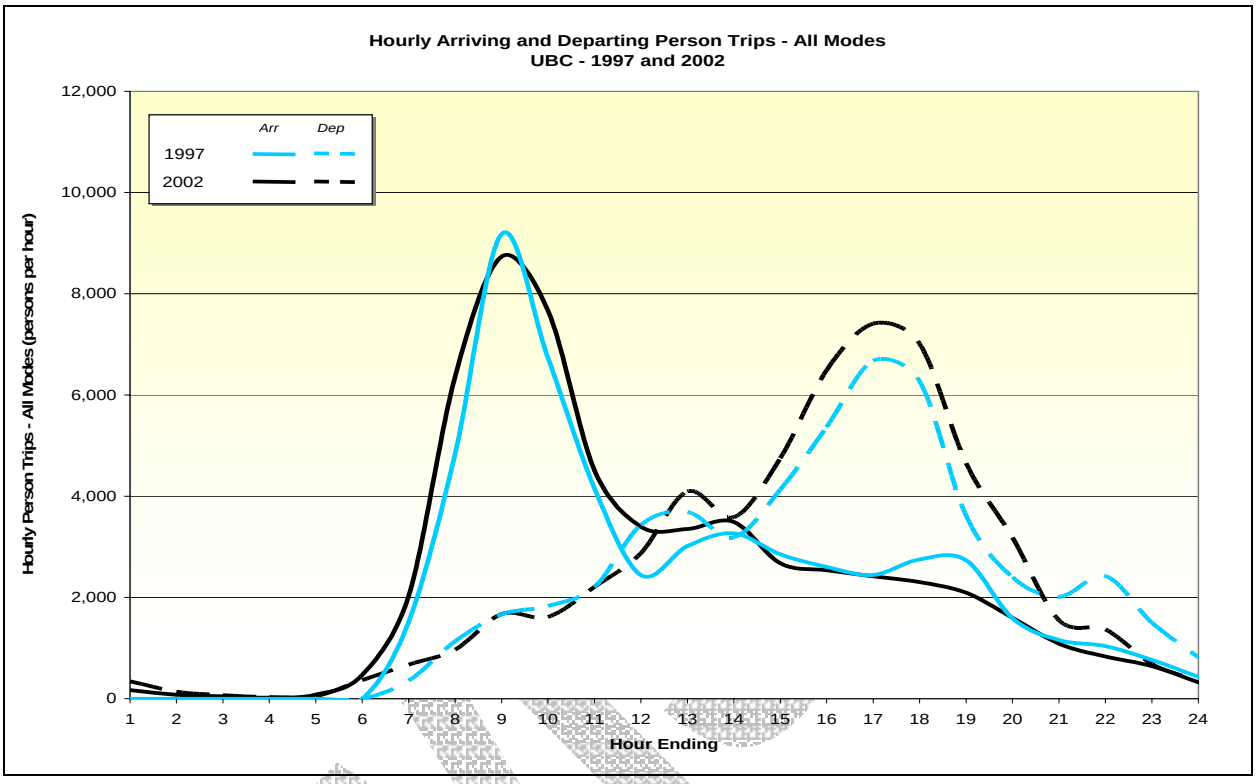
	1997	1998	1999	2000	2001	2002
Trip Rate	2.51	2.45	2.53	2.39	2.41	2.31
Change	- 7.9%					

It is interesting to note in **Table 4.2** that the number of trips made per person has actually decreased by approximately 8% since 1997 even though both the total population and total number of person trips at UBC have increased. This is the more important result because although the absolute number of person trips increased (as shown in **Table 4.1**) when you consider how the population has grown at the same time, it becomes apparent that on a unit basis, fewer trips were made on in Fall 2002. It should also be noted, however, that some or all of this apparent decrease could be due to normal fluctuations in data from year to year, and consequently it cannot be determined conclusively that trip rates have declined significantly.

The trip rate – the number of trips per capita – has decreased by 8% since 1997

Figure 4.1 illustrates the hourly arrival and departure patterns for all person trips recorded in a 24-hour period at UBC for both 1997 and 2002. From this profile, the AM and PM peak periods are quite obvious.

Figure 4.1 - Arrival and Departure Profile (All Modes)



What should be noted is the apparent decrease in number of person trips arriving at UBC during the AM peak hours in Fall 2002 as compared to Fall 1997. This reduction suggests that commuters are spreading their trips over a longer period of time, which can be noted in the profile shown above.

Table 4.3 summarizes the person trips that were observed during the AM and PM peak hours for both directions in Fall 1997 and Fall 2002.

Table 4.3 - Peak Hour Trips By Direction (person trips)

Mode	Fall 1997		Fall 2002		Fall 1997		Fall 2002	
	EB	WB	EB	WB	EB	WB	EB	WB
Single occupant vehicles	950	2,980	978	3,360	2,930	1,310	2,840	1,095
Carpools and vanpools	480	3,650	430	1,964	2,050	790	1,812	794
Transit	160	2,190	221	2,973	1,340	260	2,438	1,216
Bicycles	15	275	14	272	255	15	176	112
Pedestrians	25	55	7	77	70	60	93	32
Heavy trucks	5	25	35	20	30	10	17	1
Motorcycle, other	5	15	30	73	15	5	79	20
Totals	**1,640**	**9,190**	**1,715**	**8,739**	**6,690**	**2,450**	**7,455**	**3,270**

The results shown in **Table 4.3** indicate that during the AM peak hour there has been both a decrease since 1997 in the number of person trips arriving on campus, and an increase in the number of person trips departing campus. The number of trips made during the PM peak hour (in both directions) on the other hand has increased since 1997.

Vehicle Trips

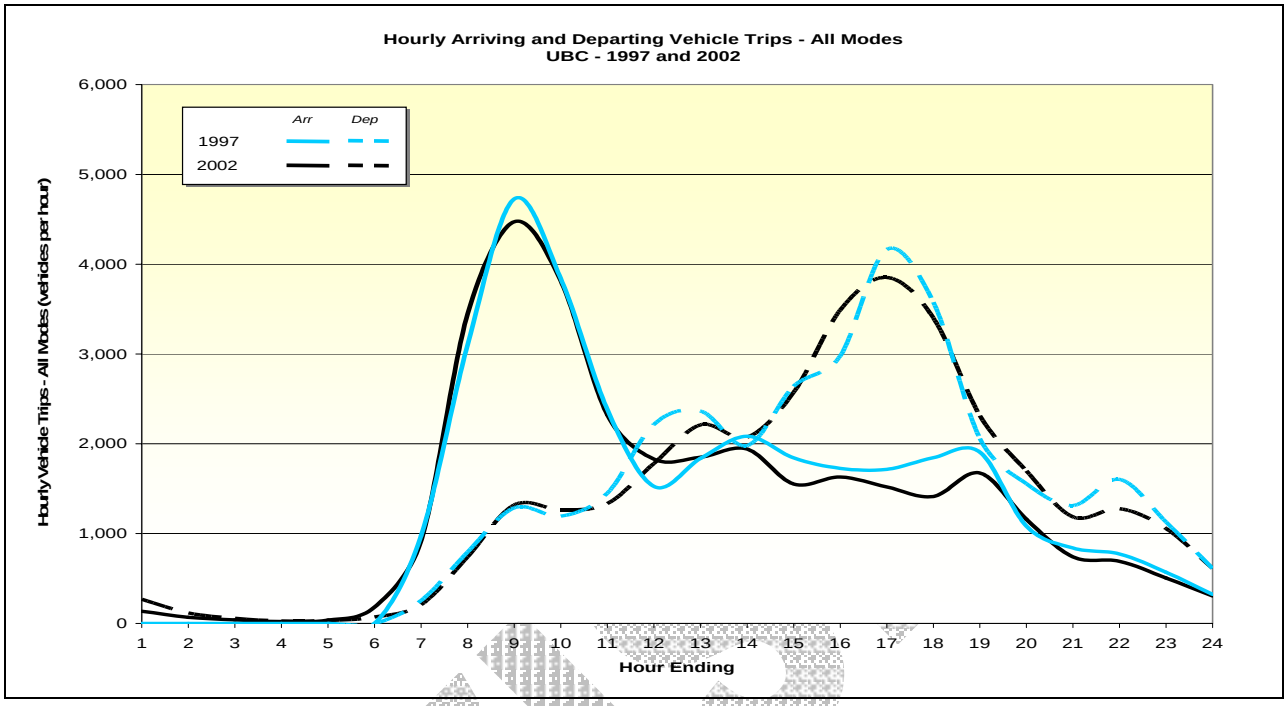
It is also interesting to note the patterns observed in vehicle trips made to and from the campus on a daily basis. As mentioned, there were 113,500 person trips made on a daily basis in Fall 2002 – this number of trips corresponds to approximately 64,900 vehicle trips in the same time period. This number is actually slightly greater than the 63,700 vehicles trips recorded in 1997.

To put the amount of vehicle traffic into comparative terms, in 1997 the number of vehicles per capita in a 24 hour period was approximately 1.5, whereas in Fall 2002, there were only 1.3 vehicles per capita. On a comparative basis, the amount of traffic travelling to and from UBC per capita has decreased by approximately 13% since 1997 indicating that UBC has achieved one of its goals to reduce auto-dependence and vehicular emissions. Of these vehicle trips, almost half were made during the AM and PM peak periods of both years.

The vehicle trip rate – total number of vehicles per capita – has decreased by 13% since 1997

Figure 4.2 illustrates the arrival and departure patterns of all vehicles travelling to and from UBC in a 24-hour period for both 1997 and 2002.

Figure 4.2 - Vehicle Arrival and Departure Profile



4.2 How do people get to UBC?

Comparing yearly travel data by mode presents a clear picture of how people travel to and from the University's Point Grey campus each day. **Table 4.4** compares the total number of person trips by mode that were made daily to and from UBC from Fall 1997 through Fall 2002.

Table 4.4 - Person Trips at UBC (24-hr period, Fall 1997 – Fall 2002)

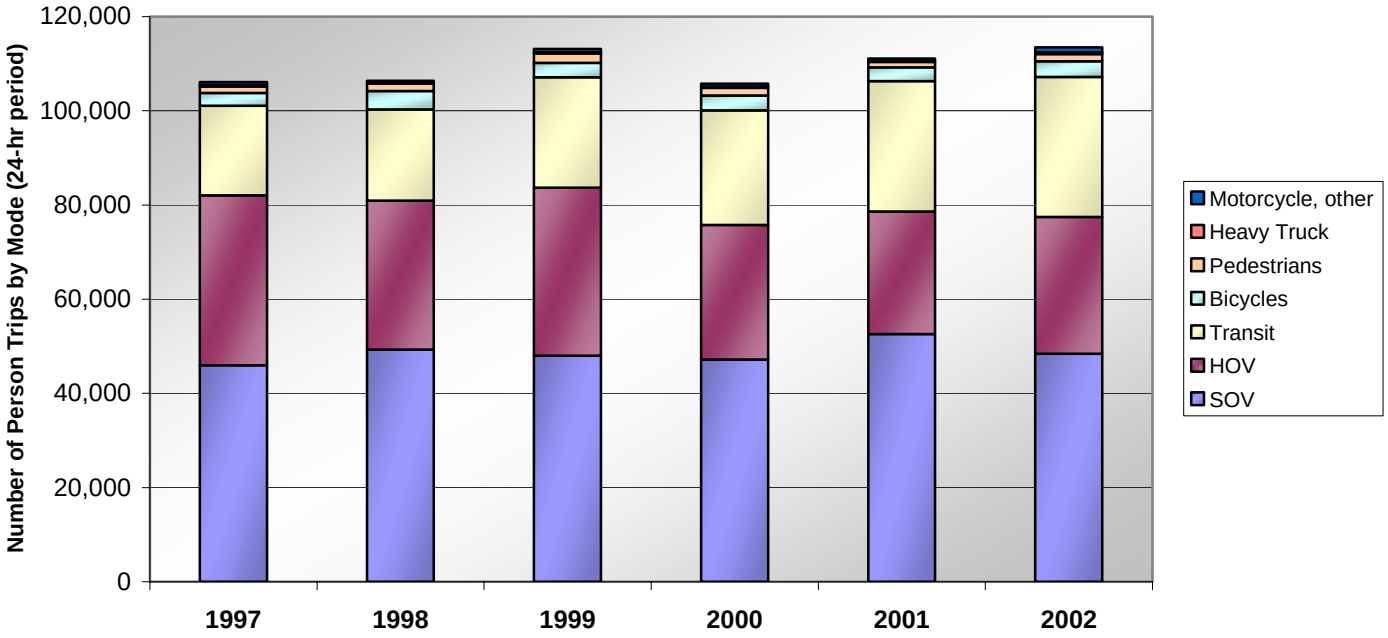
Mode	1997	1998	1999	2000	2001	2002
Single Occupant Vehicles (SOV)	46,000	49,300	48,000	47,200	52,600	48,400
Carpools and Vanpools (HOV)	36,100	31,600	35,700	28,600	26,000	29,100
Transit	19,000	19,400	23,400	24,300	27,700	29,700
Bicycles	2,700	3,900	3,100	3,200	2,900	3,300
Pedestrians	1,400	1,600	2,000	1,600	1,200	1,600
Heavy Trucks	300	85	250	250	150	400
Motorcycles, other	600	530	700	600	550	1000
Total	**106,100**	**106,500**	**113,200**	**105,800**	**110,900**	**113,500**

Source: UBC Annual Data Collection Program 1997 - 2002

Figure 4.3 shows how the total person trips by mode for Fall 2002 compares with data that was collected each year since 1997. While some changes in mode shares can be

noted, for the most part, the overall mode split has remained relatively unchanged. The most notable change however, would be the steady increase in transit ridership each year, particularly notable when you compare 1997 to 2002. This change in transit ridership is discussed in more detail in **Section 5.3**.

Figure 4.3 - Person Trips by Mode (24-hour period, Fall 1997 - Fall 2002)



The following results are reflected in **Figure 4.3**.

- **Transit** - Ridership has continued to increase and in Fall 2002 accounted for more than 26% of all person trips to and from UBC on a daily basis. This figure is approximately 56% higher than the 19,000 daily transit trips in 1997 – a mode share at the time of only 18%.
- **SOV** - The absolute number of SOV person trips to/from UBC on a daily basis has increased, by approximately 5% since 1997. Per capita however,
- **HOV** – The number of person trips made by carpools and vanpools have declined since 1997. In the benchmark year, HOV trips accounted for 34% of all person trips, while in 2002 the HOV share is down to only 26% of all person trips. This represents a decrease of almost 20% in the actual number of person trips. The most recent *Greater Vancouver Trip Diary Survey* reported a carpool/vanpool mode share of 32% of all trips in the GVRD each day.

When compared with the City of Vancouver/UEL and the rest of the region, it is interesting to note that the transit mode share is currently 26% at UBC, whereas it is only 17% in Vancouver/UEL and 10% in the entire GVRD (according to the most recent *Greater Vancouver Trip Diary Survey*).

The UBC transit mode share is 26% compared to 10% in the entire GVRD (for all trip purposes)

When considering the results shown above, it is important to consider the effects of population growth. The figures shown above are not adjusted to reflect the growth that has occurred at UBC each year. As previously discussed, the UBC community has shown overall growth of approximately 16% since 1997. Given this growth, it is important to recognize that a portion of the increases and decreases summarized above is likely due to growth in the UBC population, rather than increased trip-making.

A more detailed review of the trends noted for each individual mode of transportation is discussed in following sections. To mitigate the effects of growth, trip rates are used in the following discussions to examine travel patterns on campus.

4.3 How does that compare to the rest of the Region?

The most recent *Greater Vancouver Trip Diary Survey* and *Usage and Attitude Survey* were conducted in 1999. These surveys jointly conducted, collected detailed information regarding the travel patterns and attitudes of residents in the Greater Vancouver Region. Comparing UBC travel data to that obtained during the GVRD surveys provides a good indication of how UBC is progressing towards its transportation goals in relation to the rest of the region.

The following table shows how the daily UBC mode share compares to that of the rest of the Greater Vancouver Region. Compared to the region as a whole, more people at UBC use transit (almost twice as many), yet fewer people at UBC make use of carpools or vanpools for commuting.

Table 4.5 - GVRD Mode Shares Vs. UBC Fall 2002 Mode Shares, All Trips (person trips, 24 hours)

Mode	GVRD (Fall 1999)		UBC Screenline (Fall 2002)	
	Trips	**Mode Share**	**Trips**	**Mode Share**
Single occupant vehicles	2,329,000	42.5%	48,400	42.6%
Carpools and vanpools	1,735,000	31.7%	29,100	25.6%
Transit	565,000	10.3%	29,700	26.2%
Bicycles	91,000	1.7%	3,300	2.9%
Pedestrians	694,000	12.7%	1,600	1.4%
Other	62,000	1.1%	1,400	1.3%
Totals	**5,476,000**	**100%**	**113,500**	**100%**

Source: Greater Vancouver Trip Diary Survey, GVRD/TransLink, 1999

The following table provides a comparison of work and post-secondary school trips in the region with trips to and from UBC, which are predominantly work and school trips. The proportion of SOV trips is significantly higher for regional work and school trips than for all regional trips and for UBC trips, and carpooling is proportionately lower.

Table 4.6 - GVRD and UBC Mode Shares, Work/School Trips (person trips, 24 hours)

Mode	GVRD (Fall 1999)		UBC Screenline (Fall 2002)
	Work/School Trips	**Other Trips**	**All Trips (predominantly work/school trips)**
Single occupant vehicles	57.9%	31.6%	42.6%
Carpools and vanpools	14.9%	43.4%	25.6%
Transit	17.3%	6.1%	26.2%
Bicycles	9.1%	17.5%	2.9%
Pedestrians			1.4%
Other	0.8%	1.4%	1.3%
Totals	**100%**	**100%**	**100%**

Source: Greater Vancouver Trip Diary Survey, GVRD/TransLink, 1999

4.4 Vehicle Occupancy

Vehicle occupancy is a measurement that reflects the average number of people travelling per vehicle during a certain period of time. It is calculated by dividing the total number of people travelling to or from the University by the total number of vehicles observed within the same time period.

In Fall 2002, the average vehicle occupancy, not including transit or heavy trucks, averaged over a 24-hour period was 1.21 persons per vehicle. **Table 4.8**, below, shows how the UBC vehicle occupancy for the AM and PM peak periods compares with that determined in the most recent *Greater Vancouver Trip Diary Survey*. As shown, the UBC AM peak period occupancy is slightly lower than Vancouver/UEL and the GVRD. The PM peak period vehicle occupancy however, is about the same for all regions. Like many data at UBC, the average vehicle occupancy has fluctuated over the years since 1997 but has shown an increase since Fall 2001.

Table 4.7 - UBC Occupancy Compared with the Region

	UBC	Vancouver/UEL	GVRD
AM Peak Period Occupancy	1.23	1.28	1.30
PM Peak Period Occupancy	1.26	1.30	1.31

Source: UBC Annual Data Collection Program 2002 and TransLink Strategic Planning Department

5.0 TRENDS BY MODE

This section of the report summarizes key trends by mode that were identified in travel patterns at UBC from 1997 to 2002.

5.1 SOV Travel

As shown in the table below, the number of person trips by single occupant vehicle has fluctuated each year since 1997. Overall, the data indicate that there has been a slight increase in the absolute number of SOV person trips - approximately 5%.

Table 5.1 - Total SOV Trips (24-hour period, Fall 1997 – Fall 2002)

	1997	1998	1999	2000	2001	2002
Total Number of Person Trips by SOV	46,000	49,300	47,800	47,200	52,570	48,400
Overall Change	5.2%					

Source: UBC Annual Data Collection Program, 1997 - 2002

When the effects of UBC's overall growth are taken into consideration and the number of person trips is presented as the number of trips per capita, the following results are observed.

Table 5.2 - SOV Trip Rates (24-hr period, 1997 – 2001)

	1997	1998	1999	2000	2001	2002
Total Number of SOV Person Trips per 10,000 Population	1.09	1.14	1.07	1.06	1.14	0.99
Overall Change	-9.2%					

Source: UBC Annual Data Collection Program, 1997 - 2002

As noted from the above table, the actual change in number of person trips by SOV shows a decrease of approximately 9% when the data is presented as a trip rate, and independent of population growth. This result shows that UBC has made some progress towards achieving their goal of reducing SOV travel at UBC.

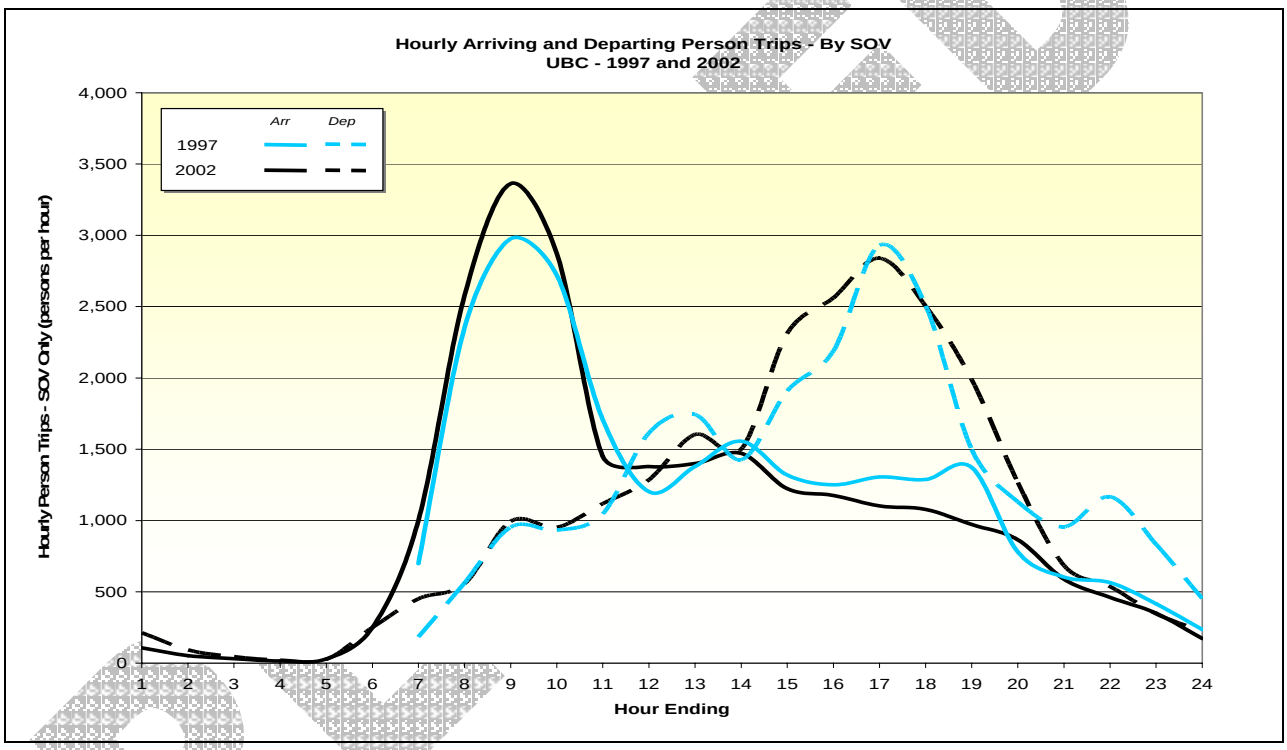
24 hour SOV trip rates to/from UBC have decreased by 9% since 1997

It is interesting to note that the most recent *Greater Vancouver Trip Diary Survey* reports that for all trips made daily in the GVRD approximately 43% are made by SOV automobile, but for work and post-secondary purposes, the proportion is even higher -

nearly 58% are made by SOV. Although UBC data includes trips made for all purposes, trips made for work and school purposes are clearly the majority and therefore, UBC's 43% SOV mode share in Fall 2002 is significantly lower than the 58% daily GVRD average for work and post secondary trips.

Figure 5.1 illustrates the hourly arrival and departure profile for SOV person trips, Fall 1997 compared to Fall 2002.

Figure 5.1 - SOV Arrival and Departure Profile (1997 and 2002)



From this profile, the AM and PM peak periods are clearly visible. What is important to note is the slight reduction in SOV person trips for 2002 in the PM peak period. This slight reduction in automobile travel has been partially supported by increased transit use during the peak periods. Another pattern that is noticeable in this profile that SOV trips have increased in the AM peak periods but there has been no spreading of the peak. In the PM peak period, the peak number of SOV trips hasn't increased but the peak has spread

Key observations regarding SOV travel from the Fall 2002 data also include the following:

- The number of SOV person trips per capita (in a 24 hour period) has decreased by approximately 9% since 1997 indicating that UBC has made progress towards reducing the amount of SOV travel at UBC.
- Although the number of SOV person trips per capita has decreased since 1997, in absolute terms, the total number of SOV person trips observed in a 24 hour period has actually increased since 1997 by approximately 2,400 trips overall – an increase of only 5%. In comparison, the daytime population of the University has increased approximately 3 times as much in the same amount of time.

5.2 HOV Travel

High occupancy vehicles include both carpools (two or more people in one vehicle) and vanpools travelling to the University. In Fall 2002, HOV travel accounted for a total of 26% of all person trips made daily to/from UBC. The following table shows how HOV travel has varied since 1997.

Table 5.3 - HOV Person Trips (24-hour period, Fall 1997 - Fall 2002)

	1997	1998	1999	2000	2001	2002
2 person	28,000	24,700	27,600	23,500	21,500	25,050
3 person	5,700	4,500	4,800	4,300	2,500	2,350
4+ person	2,500	2,400	3,300	1,800	2,000	1,650
Total	36,200	31,600	35,700	29,600	26,000	29,050
Total HOV Mode Split	34%	30%	32%	28%	23%	26%
Overall Change	-19.8%					

Source: UBC Annual Data Collection Program, 1997 - 2002

The results summarized in **Table 5.3** indicate that the total number of HOV person trip to/from the University each day has decreased since the monitoring program began in 1997. Given the increase in daytime population at UBC over the same amount of time, HOV travel on a per capita basis shows an even greater decrease of approximately 31%.

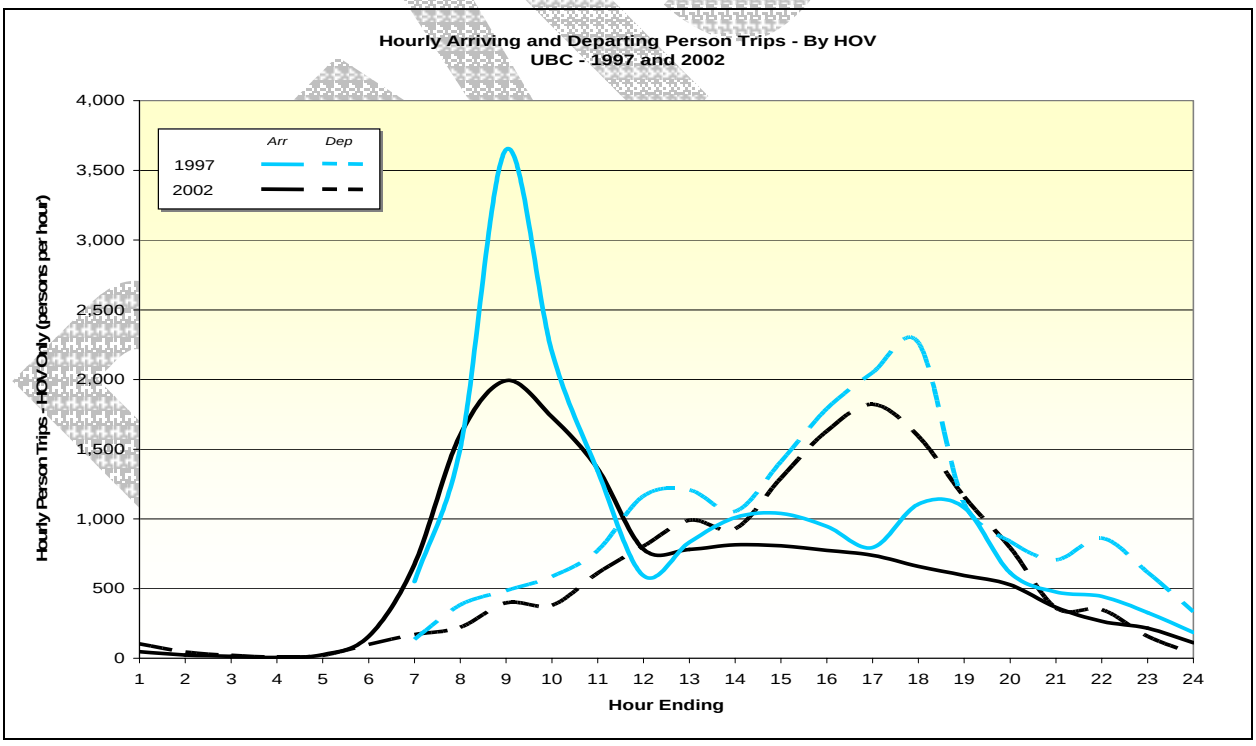
This change in travel behaviour is most likely due to the increases in transit services to and from UBC that have occurred over the same time period. Focus group sessions conducted with UBC students, faculty and staff revealed that transit is a much more attractive mode of travel for many, therefore it is likely that as transit service has increased, more and more commuters are choosing to use it instead of carpooling.

Similar attitudes regarding carpooling behaviour were reported in the most recent TransLink Usage and Attitude Survey. The corresponding *Greater Vancouver Trip Diary Survey* reported that carpooling/vanpooling account for approximately 32% of all trips made daily in the GVRD for all trip purposes. When considering work and post-secondary trips only, the regional carpooling mode share is approximately 15%, indicating that comparatively, UBC commuters carpool more than rest of the region.

UBC's carpooling mode share is 26%, as compared with 15% of work and post-secondary trips in the entire GVRD

Figure 5.2 illustrates the arrival and departure patterns of all HOV trips made to the University, 1997 compared with 2002. This figure shows clearly that the majority of decreases in HOV commuter travel are experienced during the AM and PM peak periods, which could be due to the corresponding increase in use of other modes during these periods.

Figure 5.2 - HOV Arrival and Departure Profile (1997 and 2002)



Key observations regarding HOV travel from the Fall 2002 data include the following:

- The number of HOV person trips per capita (in a 24 hour period) has decreased by approximately 31% since 1997 indicating that increasingly, carpool and vanpool commuters are choosing to use other modes of travel.
- Corresponding increases in transit ridership per capita (since 1997) make it likely that many carpool and vanpool commuters have chosen transit as their new travel mode.
- The total number of HOV person trips observed in a 24 hour period in Fall 2002 is approximately 20% lower than that observed in Fall 1997.

5.3 Transit

The total trips by transit in a 24 hour period have increased by approximately 56% since 1997

Travel by transit has shown a steady and very significant increase since 1997. In Fall 2002, 26% of all person trips to/from UBC on a daily basis were made by transit. This level of ridership is 56% greater than the number of transit trips observed in 1997.

Table 5.4 indicates how trips by transit have steadily grown since 1997.

Table 5.4 - Person Trips by Transit (24-hr period, 1997 to 2002)

	1997	1998	1999	2000	2001	2002
Total Number of Transit Person Trips	19,000	19,370	23,700	24,320	27,700	29,700
Overall Change	56.3%					

Source: UBC Annual Data Collection Program, 1997 – 2002

When the total number of person trips by made by transit is expressed independent of growth effects, the increase is still apparent, as shown in **Table 5.5**.

Table 5.5 - Person Trips by Transit per Capita (24-hr period, 1997 – 2002)

	1997	1998	1999	2000	2001	2002
Total Number of Transit Person Trips per 10,000 pop.	0.45	0.45	0.53	0.54	0.60	0.61
Overall Change	34.8%					

Source: UBC Annual Data Collection Program, 1997 - 2002

Even when growth in the UBC population is taken into consideration, the increase in person trips made by transit on a daily basis is still significant and has increased by approximately 35%.

This result reflects a strong latent demand for transit service to UBC, which was not accommodated by previous transit service levels. On a regular basis, buses travelling to UBC would "pass up" commuters waiting at bus stops west of Granville Street because they were already full. Although reports of "pass ups" have decreased as transit service levels have been improved, continued reports indicate that there may still be some latent demand for transit service to UBC that is not being served. Transit ridership data support this conclusion, indicating that during peak periods, many buses travelling to and from UBC are carrying full passenger loads. It can therefore be expected that further increases in transit service will result in further increases in ridership.

Key observations in Fall 2002 transit ridership patterns are as follows:

- The total number of person trips made by transit on a daily basis increased by approximately 56% since Fall 1997 to 29,700 trips. This result indicates a very significant increase in the total number of transit trips made each day and brings UBC transit ridership to a level that is 12% above the Fall 2002 target.
- On a per capita basis, daily transit ridership has also increased by 35%.
- Fall 2002 ridership increases indicate that there may still be a latent demand for more transit service as "pass ups" are still continuing to occur on heavily used routes.

5.3.1 Effects of the Class Start Time Change on Travel Patterns

In September 2001, UBC changed their morning class start-times from the campus-wide 8:30 AM start time in an effort to relieve some of the existing morning congestion and to minimize the need for additional buses to accommodate the increased transit rider- ship as a result of the U-PASS. In order to spread the morning peak demand over a longer period of time, class start-times were changed to a mix of 8:00 AM, 8:30 AM and 9:00 AM. The desired result would be that all commuters would no longer be travelling at the same time – resulting in a peak demand spread out over a longer period of time. Additionally, this change would make better use of existing transit vehicles by increasing the peak period capacity, and lessening the need to purchase new vehicles.

Fall 2000 and Fall 2001 transit counts confirmed that the class start time change has had the desired effect on the morning peak hour transit demand. Although the number of trips by transit in the AM peak period did not change significantly, the figure below

illustrates that morning transit trips in the westbound direction have, in fact, spread over time.

As shown in **Figure 5.3**, the morning peak has spread out over a longer period of time, with more transit trips being made before 8:00 AM, and fewer being made after 8:00 AM. This effect is further illustrated by **Figure 5.4** which illustrated hourly transit arrivals and departures for Fall 1997 and Fall 2001. This figure clearly illustrates how this spread of transit trips has continued to occur and has become more significant. This figure clearly indicates that the class start time shift has had the desired effect on transit travel patterns.

Figure 5.4 - Shift in AM Peak Period Transit Trips to UBC
(Westbound, 6:00 AM to 10:00 AM)

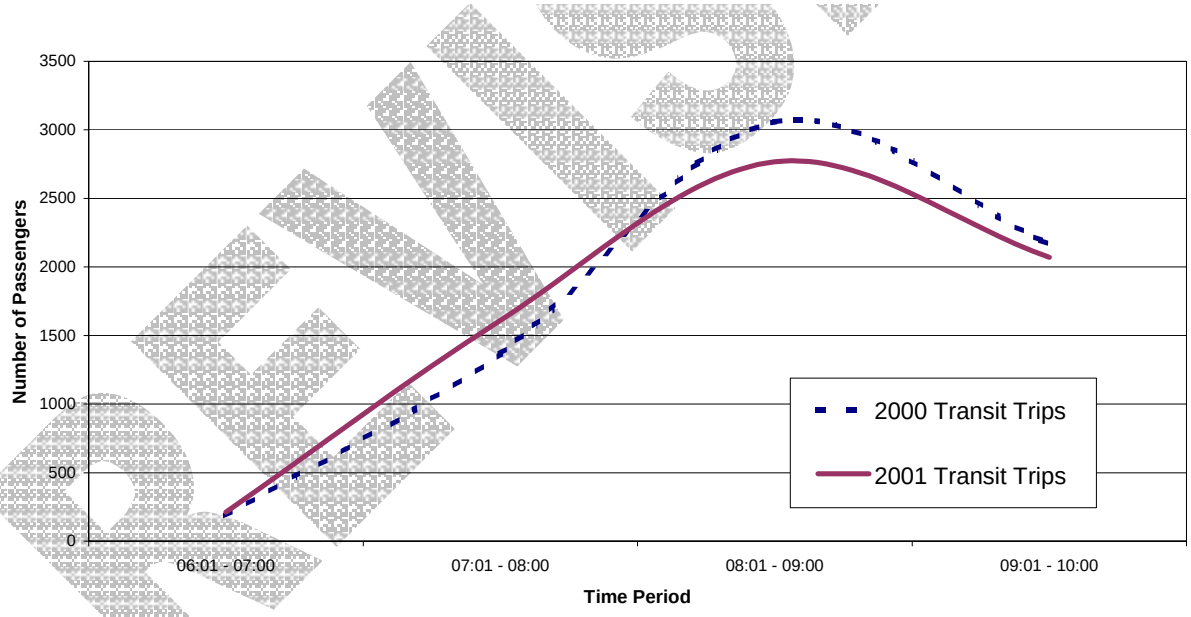
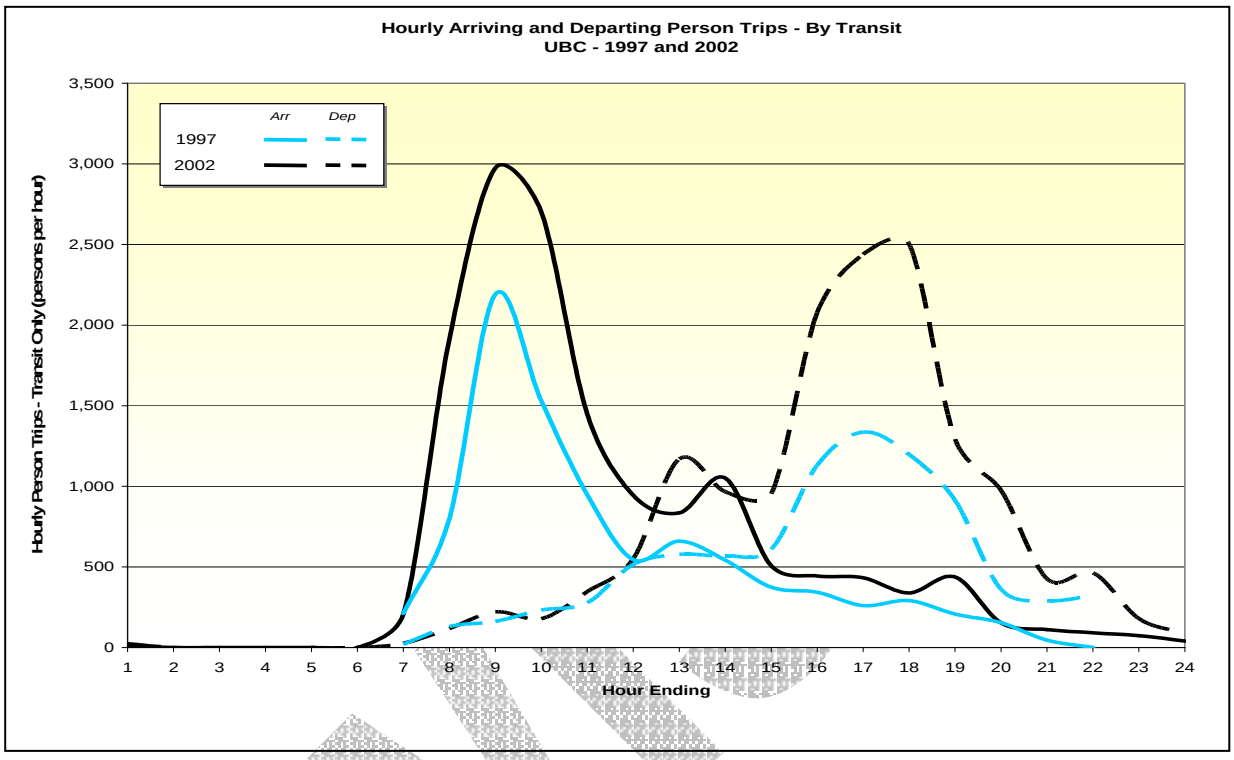


Figure 5.5 – Hourly Transit Travel Patterns



5.3.2 Effects of the Transit Strike on Travel Patterns

In April 2001, Lower Mainland transit operators went on strike, leaving no public transit services except for SkyTrain in the Lower Mainland. The absence of public transit undoubtedly affected the travel behaviour of those commuters going to and from UBC. **Table 5.6** shows how SOV, HOV and transit travel has been affected by the strike.

Table 5.6 - Effects of the Transit Strike on Travel Patterns (24-hour period)

	Fall 2000	April 2001	Fall 2001
Single Occupant Vehicles (SOV)	47,200	45,300	52,600
Carpools and Vanpools (HOV)	29,600	54,750	26,000
Transit	24,300	0	27,700

Source: UBC Annual Data Collection Program, 2000 - 2002

The following results are reflected in the table above:

- The major result is that HOV travel increased dramatically during the strike, by 85% from 29,600 person trips to 54,570 person trips.
- Single occupant vehicle trips decreased during the strike, likely due to a number of regular SOV drivers carpooling to help others during the strike.
- The dramatic increase in carpools and vanpools and reduction in SOV trips indicates that if given the proper incentive (in this case, no available transit service) commuters will change their travel patterns.
- It is also important to note that the level of transit travel has returned and exceeded the level of transit use prior to the strike. Experience in other communities has shown that transit levels typically do not return to pre-strike levels for up to a year after the strike ends. In 2001, the strike ended only two months prior to the data collection program.

Travel patterns during the transit strike showed that if given the proper incentive, commuters will change their travel behaviour

It should also be noted that person trips by bicycle also increased by about 50% during the strike, and pedestrian travel increased by almost 62%. While Fall 2001 data did not show bicycle and pedestrian travel at nearly the same levels, this result further supports the fact that commuters are willing to changes their travel mode if given the proper incentive.

5.4 Bicycles

The Fall 2002 data indicates that the total number of bicycle trips on a daily basis is higher this year than in 1997. The following table shows how the total number of person trips by bicycle has changed since 1997.

Table 5.7 - Person Trips by Bicycle (24-hr period, Fall 1997 to Fall 2002)

	1997	1998	1999	2000	2001	2002
Total Number of Person Trips by Bicycle	2,700	3,850	3,090	3,200	2,900	3,300
Overall Change	22.2%					

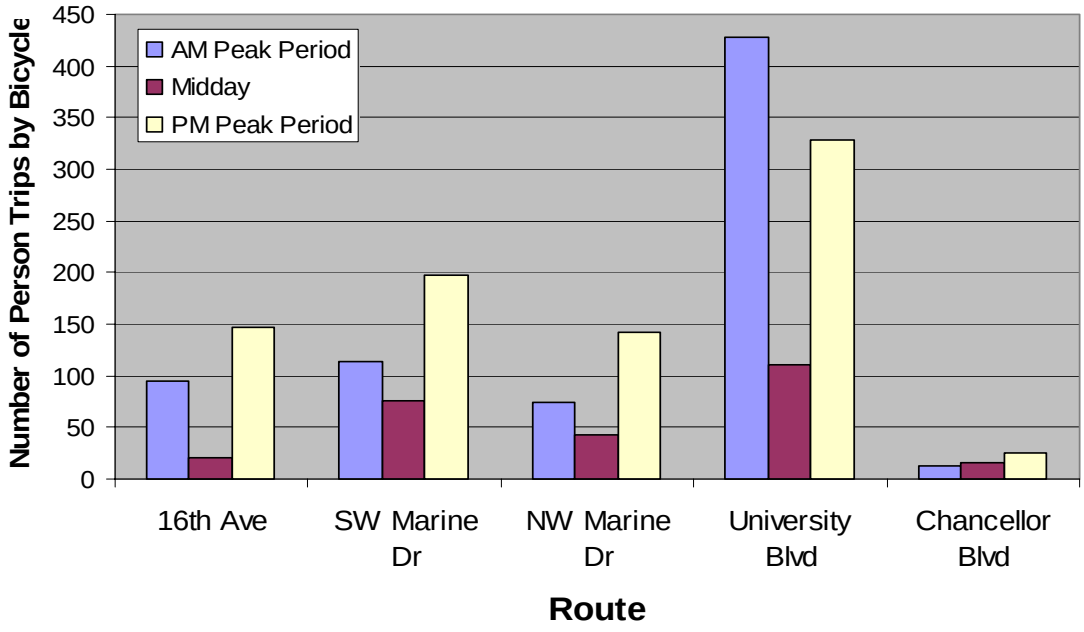
Source: UBC Annual Data Collection Program, 1997 - 2002

As noted above, the actual number of person trips made by bicycle to and from UBC on a daily basis has increased by 22% since 1997. On a trip rate basis the number of bicycle person trips per capita has increased by 5%. However, as the number of trips made by

bicycle has fluctuated from year to year it should be noted that increases or decreases noted in the above table may be due entirely or in part to these inherent fluctuations.

Figure 5.4 illustrates how the number of person trips by bicycle varies by route to and from UBC. As can be seen, University Boulevard is the most popular route for bicycle commuters to use to and from UBC, comprising approximately 60% of all bicycle trips to and from the campus in the AM peak period.

Figure 5.6 - Bicycle Trips to and From UBC by Route (Fall 2002)



University Boulevard Bicycle Lanes

As noted above, University Boulevard currently experiences the highest amount of bicycle traffic of all routes leading to and from UBC. This result is a definite confirmation that the University Boulevard Bicycle Lane Project, completed in Fall 1999, was a success. Since 1971 community members had been requesting a safe and efficient bicycle facility along University Boulevard. After obtaining funding from a variety of sources (BCTFA, TransLink, ICBC, UBC Alma Mater Society, and UBC TREK Program Centre) this narrow four-lane stretch of University Boulevard between Blanca Street and Wesbrook Mall was converted to one vehicle lane and one bicycle lane in each direction.

The University Boulevard bicycle lanes are pictured in **Figure 5.5**.

Figure 5.7 - University Boulevard Bicycle Lanes

The new bicycle lanes have not only provided a safer route for existing cyclists, but have also encouraged new cyclists to try riding to UBC. The new bicycle lanes provide a sense of security to cyclists on the road. The bicycle lanes are widened at bus stops to provide a sufficient space for both vehicles and bicycles to pass buses when they are stopped. Not only have these improvements benefited cyclists, but they also have an impact on pedestrians walking this route. Now, instead of some cyclists riding on the road and some trying to ride on the sidewalk, the sidewalk is now clear of cyclists making the route more enjoyable for pedestrians.

By Fall 2000 daytime bicycle trips on University Blvd increased by nearly 50%

Table 5.8 summarizes the number of bicycle trips made throughout the day each day from 1997 through to 2002.

Table 5.8 - Bicycle Trips Along University Boulevard (1997 – 2002)

Year		1997	1998	1999	2000	2001	2002
AM Peak Period	EB	12	12	12	33	30	22
	WB	194	263	348	295	437	406
Midday Period	EB	40	58	35	52	52	48
	WB	45	70	63	56	80	63
PM Peak Period	EB	219	277	221	301	271	258
	WB	15	75	39	42	38	71

Source: UBC Annual Data Collection Program, 1997 - 2002

It is important to note that in 1999, bicycle trips along University Boulevard already showed an increase (traffic counts were conducted in November 1999 and the bicycle lanes were substantially complete by August 1999). This increase is particularly noticeable in the AM peak period westbound direction where bicycle trips increased by approximately 32% since Fall 1998 and by almost 80% since Fall 1997. By Fall 2002 a more general increase is noticeable as approximately 870 bicycle trips were recorded on University Boulevard (both directions) during the AM, midday and PM peak hours combined. This corresponds to an increase of approximately 110% in the morning WB direction since 1997. Bicycle volumes along University Boulevard have fluctuated each year since. In Fall 2002 University Boulevard experienced approximately 48% of all bicycle travel in the AM and PM peak periods.

Key observations regarding bicycle travel at UBC from the Fall 2002 data include:

- The total number of bicycle trips made to and from UBC on a daily basis in Fall 2002 was 3,300. This number of trips is 22% higher than the number of trips observed in Fall 2002.
- On a per capita basis, bicycle trips have also increased by approximately 5%.
- As has been observed in past years, University Boulevard remains the most heavily used bicycle route into campus, carrying approximately 48% of all AM and PM peak period bicycle travel to and from UBC.

5.5 Pedestrians

Walking differs from other vehicle dependent modes of transportation in that the commuter is much more susceptible to environmental and geographical factors such as weather and terrain than other modes. Distance is also a limiting factor, and commuters will typically only choose to walk if their trip is going to be 30 minutes or less. Since

there are very few locations that are within this range of UBC, it is not expected that there will be much, if any, increase in the number of pedestrians commuting to and from UBC.

For example, most walking trips would be expected to originate from within the University Endowment Lands and perhaps no farther than the Vancouver City limits. As no significant increases have been noted in the populations of these areas, it is not expected that a significant change would be reflected in the Fall 2002 data. These factors would also further support some of the normal fluctuations noted among years of historical pedestrian data.

The following table outlines how pedestrian volumes have varied to and from UBC since 1997.

Table 5.9 – Pedestrian Person Trips (24-hr period, Fall 1997 to Fall 2002)

	1997	1998	1999	2000	2001	2002
Total Number of Pedestrian Person Trips	1,400	1,590	1,970	1,570	1,190	1,560
Overall Change	11.4%					

Source: UBC Annual Data Collection Program, 1997 - 2002

As noted, the total pedestrian volume travelling to and from UBC has remained relatively constant over the last five years, which is to be expected considering that there haven't been any significant changes to the residential neighbourhoods adjacent the campus that would affect these volumes. Overall, the total number of pedestrians observed in Fall 2002 has grown by approximately 11% since Fall 1997. The following table compares the total number of pedestrian person trips made daily to and from UBC for Fall 1997 and Fall 2002.

Table 5.10 - Number of Pedestrian Person Trips (24-hour period, 1997 & 2002)

	1997		2002	
	Number of Person Trips	Mode Share	Number of Person Trips	Mode Share
Pedestrian Person Trips	1,400	1.3%	1,560	1.4%

Source: UBC Annual Data Collection Program, 1997 - 2002

Key observations regarding pedestrian travel in Fall 2002 include the following:

- Since Fall 1997, pedestrian volumes to and from UBC have remained relatively constant.
- Fall 2002 observed pedestrian volumes indicate that there were approximately 11% more pedestrians travelling to and from UBC in Fall 2002 than there were in Fall 1997.
- Strategic Transportation Plan targets were set at 1,800 pedestrians for Fall 2002. Currently UBC is approximately 11% below this target.

5.6 Heavy Trucks

The amount of heavy truck activity on the UBC campus is one of the issues being addressed by the UBC TREK Program Centre as a result of planning policies such as the STP and OCP. Although the actual proportion of freight vehicles on campus is relatively small, heavy vehicles tend to have a greater impact such as greater congestion, noise and air pollution and road and parking facility costs. Because of this impact, even a small reduction in the amount of heavy truck travel can have a significant benefit. The number of heavy truck trips per year since 1997 is highlighted in **Table 5.10** below.

Table 5.11 – Heavy Truck Trips (24-hr period, Fall 1997 to Fall 2002)

	Fall 1997	Fall 1998	Fall 1999	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002
Total Number of Heavy Truck Trips	298	83	240	254	209	136	289	443
Overall Change	48.7%							

Source: UBC Annual Data Collection Program, 1997 - 2002

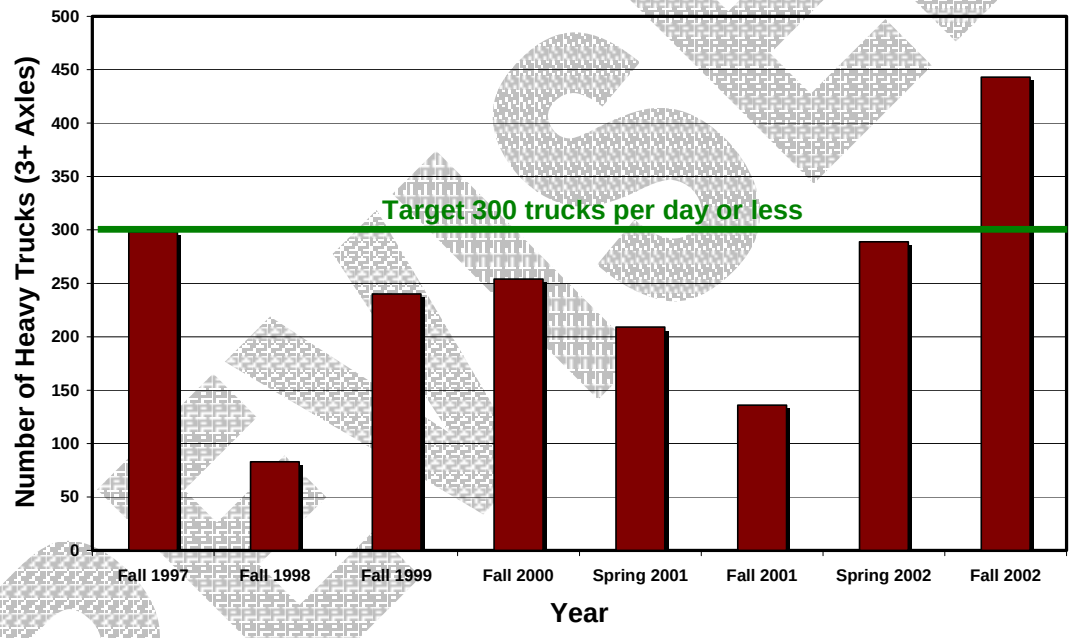
By the year 2002, UBC was pursuing a reduction or maintenance of the number of heavy truck trips on-campus. For each year up to and including Spring 2002, traffic count data showed that UBC was maintaining its level of heavy truck traffic at or below the target of 300 trips per day. Fall 2002 count data however shows that the amount of heavy truck traffic has increased from the 300 trips observed in 1997 to approximately 440 trips this year, an overall increase of 49%. As heavy trucks may have a higher degree of variability by day or week dependent on construction activities, deliveries etc. some of this apparent increase is most likely due to the inherent variable nature of heavy truck activity at UBC. In particular, a significant amount of new construction is currently on-going on the campus which undoubtedly has contributed to the increased number of heavy truck trips this fall.

The important result to note is that up to and including Spring 2002, UBC had achieved its goal as set out in the Strategic Transportation Plan – to maintain heavy truck volumes at 300 vehicles per day. It is only due to increased construction activities during the time of the count program that the number of heavy truck trips is above the Fall 2002 target.

By Spring 2002, UBC had achieved its target of maintaining heavy truck travel at 300 vehicles per day

Figure 5.8 illustrates how the number of heavy truck trips has varied by year since 1997 in comparison to the 300 heavy trucks per day objective.

Figure 5.8 – Daily Truck Volumes to/from UBC (24-hr period (1997 – 2002)



As mentioned, this figure clearly illustrates how UBC has maintained the daily heavy truck volume below the target of 300 vehicles per day until Fall 2002. Given the high level of construction that is currently underway at UBC, it is likely that this increased level of heavy truck traffic is not permanent and it should be noted that all major development projects on campus are required to have a traffic management plan that would govern truck movements on campus. However, this can not be conclusively determined until similar counts are conducted in the Spring or Fall of 2003.

The distribution of heavy truck trips among routes leading into UBC is also an important observation to note. These patterns are important in helping to disperse and regulate truck volumes accessing the campus.

Figure 5.9 illustrates the distribution of heavy truck trips for Fall 2002.

Figure 5.9 – Heavy Truck Traffic by Route at UBC (24-hrs, Fall 2002)

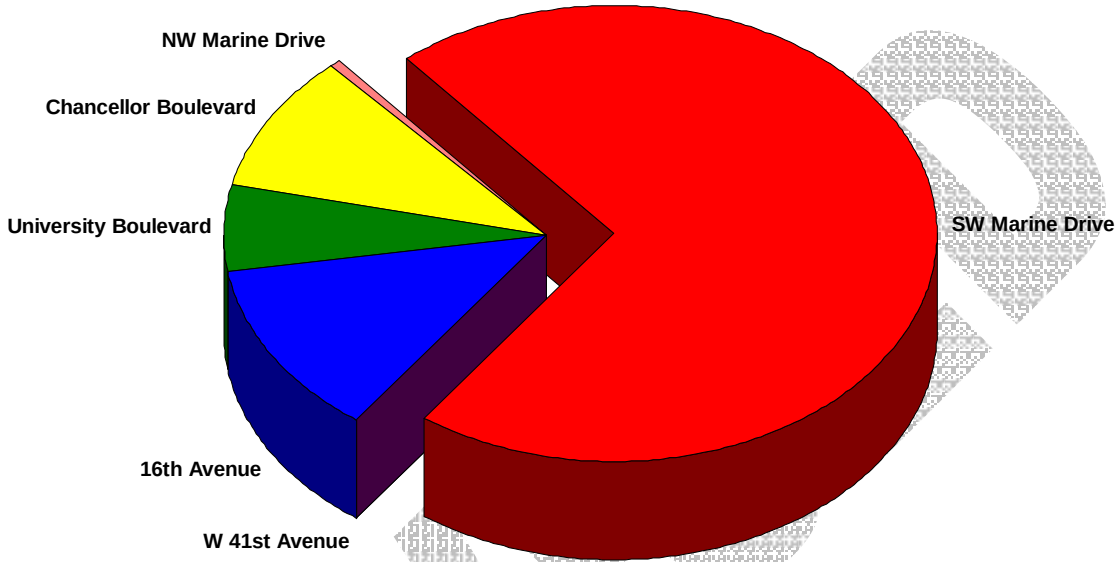


Figure 5.9 clearly shows that SW Marine Drive carries the highest proportion of heavy truck travel to and from the University. Approximately 71% of all heavy truck trips per day use this route. In comparison, the second most heavily used route is 16th Avenue, with only 12% of the daily heavy truck volume. It should also be noted however, that 16th Avenue is not a designated City of Vancouver truck route.

Key observations regarding heavy truck travel at UBC for Fall 2002 include:

- Fall 2002 count data indicates that there were approximately 440 heavy truck trips made on a daily basis. This represents an overall increase of 49% since Fall 1997.
- For every year since 1997, up to and including Spring 2002, UBC has maintained the total number of heavy truck trips below the 300 vehicle target set in the Strategic Transportation Plan.
- In Fall 2002, as with previous years, SW Marine Drive carried the highest proportion of heavy truck trips. Approximately 71% of daily heavy truck travel is made along this route.

6.0 TRAVEL PATTERNS AT UBC

On-campus counts were added to the annual count program in order to examine how people travel around on-campus. This section of the report describes the travel patterns observed on the UBC campus. Results include traffic volumes and speed, general travel patterns, intersection performance and a brief discussion of candidate locations for traffic calming on campus.

6.1 On-Campus Travel Patterns

The following table highlights the daily traffic volumes that have been recently observed on internal campus roads at UBC. **Figure 6.1** illustrates graphically the on-campus traffic volumes in addition to those volumes observed on major roadways leading to and from the Point Grey Campus. On-campus volumes counts are scheduled on a bi-annual basis, therefore not all locations campus were counted in Fall 2002. To reflect this, Fall 2002 volumes are shown as solid lines and to complement this data, Fall 2001 volumes are also on the map, shown as dashed lines. In **Table 6.1**, the year of each count is indicated in the last column.

Table 6.1 -Traffic Volumes on Internal Campus Roads

Location	24-Hour 2 Way Volumes (veh/day)	Year
Crescent Road e/o West Mall	1,380	2001
Agronomy Road e/o West Mall	1,280	2001
Thunderbird Boulevard e/o West Mall	2,510	2001
University Blvd w/o Wesbrook	6,870	2001
West Mall s/o Thunderbird	1,800	2001
East Mall s/o Crescent	2,430	2001
East Mall n/o 16th Avenue	8,400	2002
West Mall s/o Crescent Road	3,270	2002
West Mall s/o University Blvd	1,590	2002
Wesbrook Mall n/o Hampton Place	12,000	2002
Wesbrook Mall n/o Thunderbird Crescent	13,630	2002
Wesbrook Mall between Chancellor and SUB Blvd	5,670	2002
Osoyoos Crescent	1,230	2002

As can be seen on **Figure 6.1**, the external routes that connect UBC to the rest of Vancouver carry the highest volumes. In general, these volumes vary from approximately 1,600 veh/day on NW Marine Drive to approximately 25,000 veh/day on

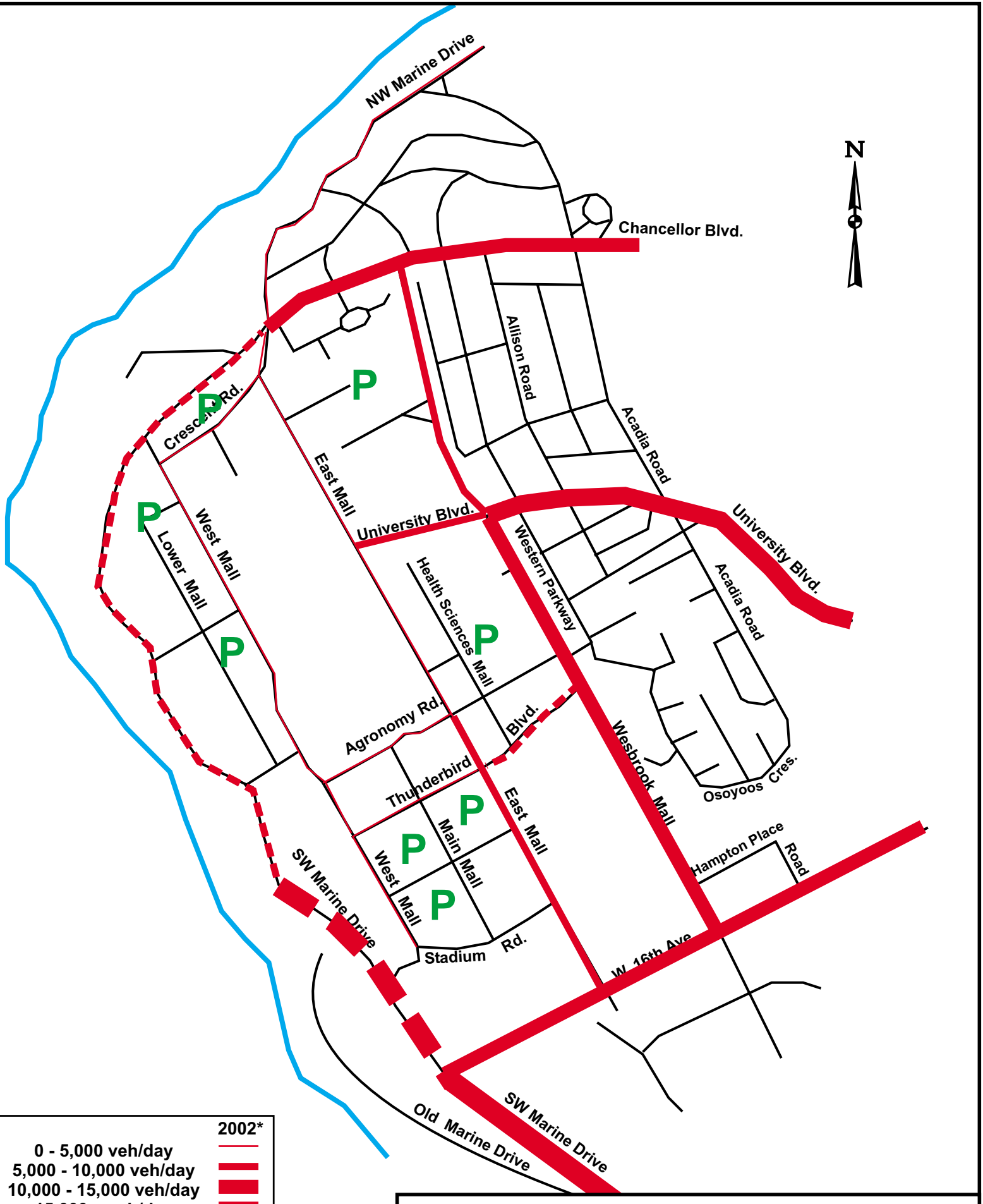


Figure 6.1
On-Campus Traffic Volumes
24-Hour Volumes - Fall 2000 & Fall 2001

Transportation Status Report - January 2003

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U:projects/61657/06.1/graphics/Figure 6.1 - On Campus Volumes.cdr NDS November 28, 2002

SW Marine. Internal roadways, such as Thunderbird Boulevard, Crescent Road, Wesbrook Mall and East Mall have significantly lower vehicle volumes.

When campus and parking accesses are considered, these patterns are consistent with what would be expected. The highest volumes are seen on roadways leading to and from the campus, with moderately high volumes leading to and ending at most major parking facilities on campus. As well, campus roads such as East Mall north of Agronomy Road, that generally have a high level of pedestrian activity, were found to have lower vehicle volumes that some of the major campus through-roads such as Wesbrook Mall. This is in contrast to a much higher level of vehicle traffic on East Mall south of Agronomy Road, which can be attributed to vehicles travelling to and from the B-Lot parking facilities.

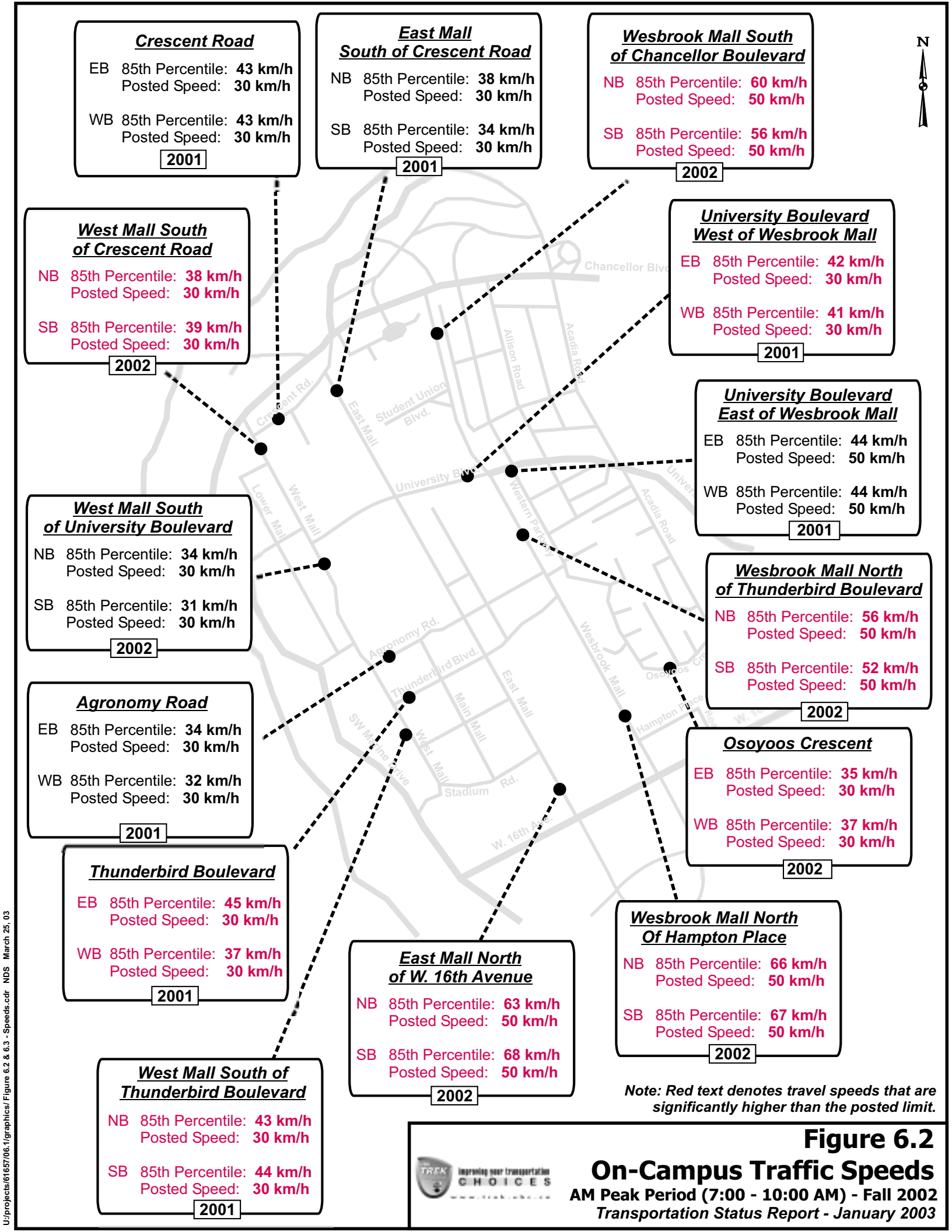
On-campus travel patterns can be expected to change as the UBC Campus develops

In this regard, the general on-campus travel pattern has not changed significantly in the past several years. This is to be expected, as there has been no significant change in the road network on campus, and a relatively minor amount of additional development on campus. In the coming years, when significant new development occurs on the campus – especially where that development includes new residences or commercial areas – travel patterns could be expected to change as new attractors and/or generators are established on-campus.

6.2 On-Campus Speeds

The previous section discussed *where* vehicles are travelling on-campus – but in general, how fast are they going? On-campus speed data was collected most recently in Fall 2002 to monitor this aspect of on-campus vehicle traffic. **Figure 6.2** and **Figure 6.3** present the 85th percentile speeds that were recorded in six locations on-campus, for the AM and PM peak periods respectively. As this data is collected in conjunction with the on-campus volume counts, as more locations are counted on the bi-annual basis, this figure will continue to be updated.

At the University, speed limits on campus roads are mostly 30 km/h, with 50 km/h zones on perimeter roadways only. In general, areas that are posted 30 km/h such as East Mall, West Mall and University Boulevard west of Wesbrook Mall, are those that experience a high level of pedestrian and/or bicycle activity. Posted speed limits of 50 km/h or above are generally limited to major routes leading to and from UBC, and some routes across campus such as Wesbrook Mall.



Note: Red text denotes travel speeds that are significantly higher than the posted limit.

Figure 6.2
On-Campus Traffic Speeds
AM Peak Period (7:00 - 10:00 AM) - Fall 2002
Transportation Status Report - January 2003

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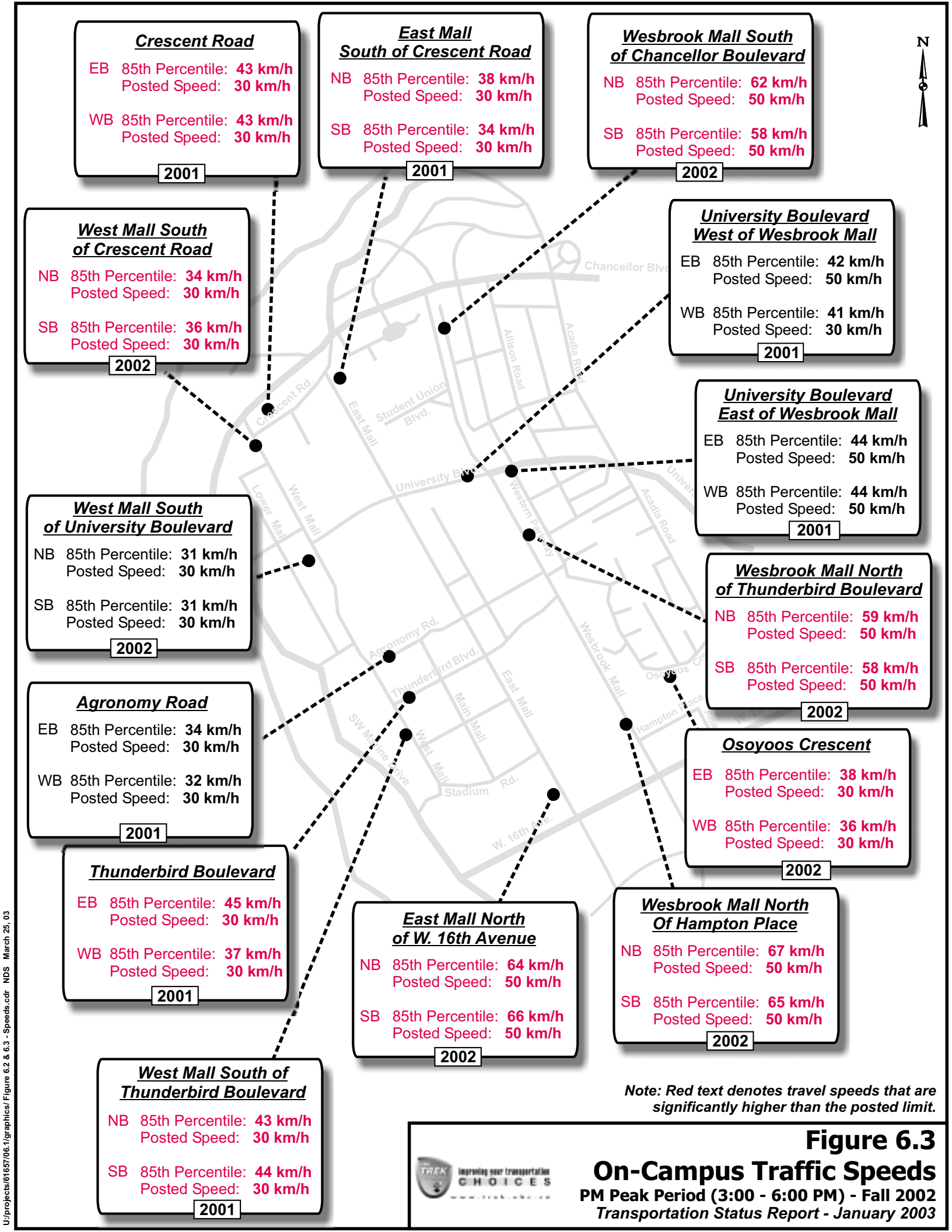

Note: Red text denotes travel speeds that are significantly higher than the posted limit.

Figure 6.3
On-Campus Traffic Speeds
PM Peak Period (3:00 - 6:00 PM) - Fall 2002
Transportation Status Report - January 2003

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U:/projects/61657/06.1/graphics/Figure 6.2 & 6.3 - Speeds.cdr NDS March 25, 03

As seen in **Figures 6.2 and 6.3**, most roadways on campus have 85th percentile speeds[1] that range between 30 km/h and 45 km/h. Observed 85th percentile travel speeds that are significantly higher than the posted speed limit are denoted on **Figures 6.2** and **6.3** with red text. In order to maintain reasonable speeds in many areas of campus without requiring extensive police enforcement, UBC Campus Planning and Development has implemented a variety of traffic calming measures on an "as-needed" basis. An example of this is the series of speed humps, raised crosswalks and raised intersections along West Mall that control speed and make the corridor safer and more comfortable for both pedestrians and cyclists. A series of traffic calming measures has also been placed along East Mall north of University Boulevard to reduce vehicle speeds through this section.

Wesbrook Mall and East Mall south of Thunderbird Boulevard are definite exceptions to this observation however, and have recorded 85th percentile speeds that range between 50 km/h and 70 km/h during the AM and PM peak periods. The higher speeds observed along these two portions of roadway are not entirely unexpected, as pedestrian volumes are significantly lower along these two roadways as compared with most other roadways on campus. In addition, both Wesbrook and East Mall are 4 lane, divided roads which in general provide more capacity than would typically be required by the volumes that are currently experienced. However, in order to lower and maintain reasonable speeds along busier campus roads UBC may wish to consider implementing traffic management measures or devices that are more appropriate for arterial roads.

Consistent with campus objectives to maximize safety for all road users, UBC may wish to consider implementing traffic calming measures or other measures as appropriate to discourage speeding on the following roads. These locations were identified based on speed data collected in Fall 2002. In all cases, recorded 85th percentile speeds significantly exceed applicable speed limits.

- West Mall south of Thunderbird Boulevard (It should be noted that speed cushions have been installed on this section of West Mall (November 2002) and following completion of the roundabout construction the speed limit along this section of West Mall will be lowered to 30 km/h)
- Agronomy Boulevard, Thunderbird Boulevard and Crescent Boulevard between West Mall and East Mall
- Wesbrook Mall south of University Boulevard
- East Mall south of Thunderbird Boulevard

Figure 6.4 illustrates where each of these locations are on campus.

[1] 85th percentile speed is a measure that indicates the speed at which 85% of all vehicles are travelling slower than, and 15% of all vehicles are travelling faster than. It is a recognized standard used throughout North America to measure traffic speeds.

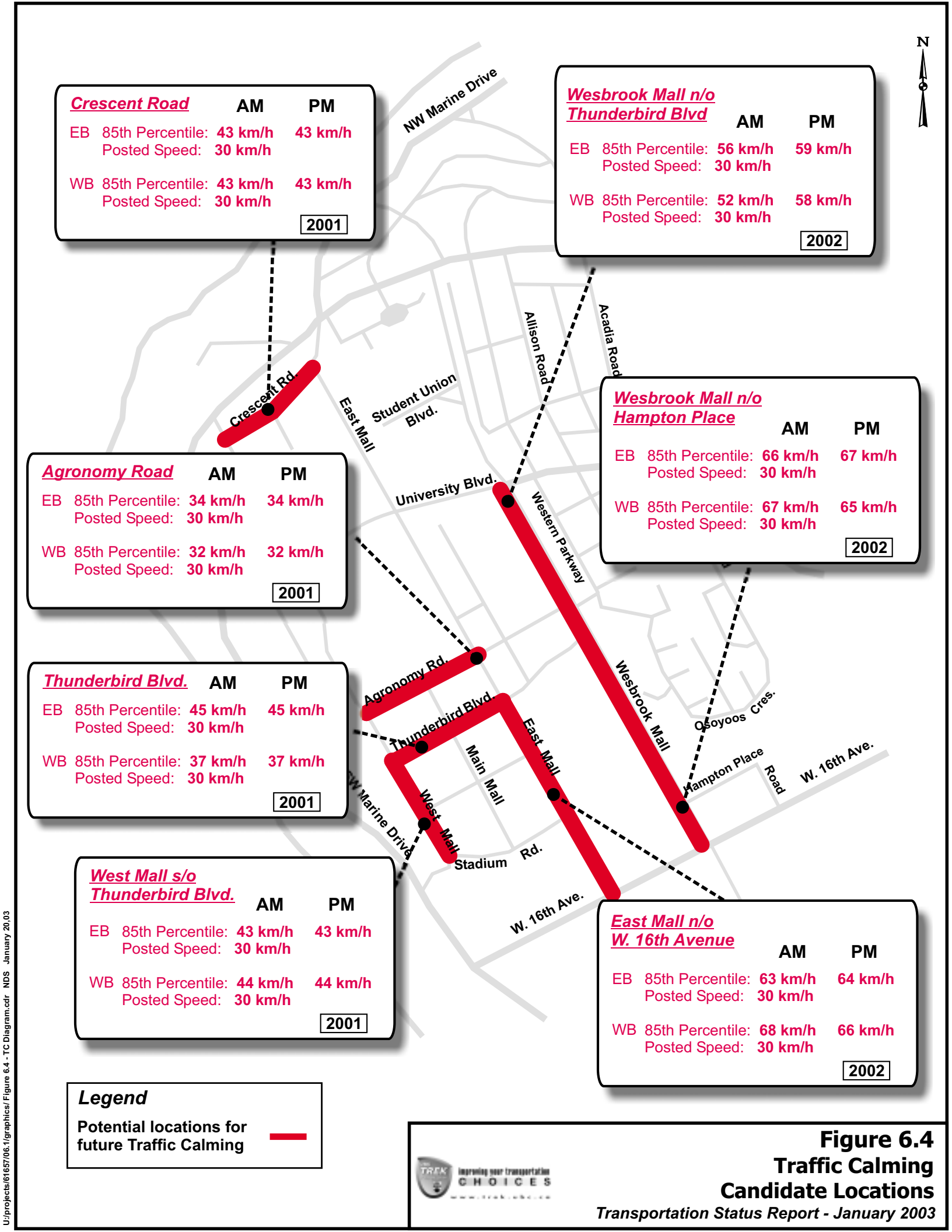
N
Crescent Road
AM PM
EB 85th Percentile: 43 km/h 43 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 43 km/h 43 km/h
Posted Speed: 30 km/h
2001
Wesbrook Mall n/o Thunderbird Blvd
AM PM
EB 85th Percentile: 56 km/h 59 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 52 km/h 58 km/h
Posted Speed: 30 km/h
2002
Agronomy Road
AM PM
EB 85th Percentile: 34 km/h 34 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 32 km/h 32 km/h
Posted Speed: 30 km/h
2001
Wesbrook Mall n/o Hampton Place
AM PM
EB 85th Percentile: 66 km/h 67 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 67 km/h 65 km/h
Posted Speed: 30 km/h
2002
Thunderbird Blvd.
AM PM
EB 85th Percentile: 45 km/h 45 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 37 km/h 37 km/h
Posted Speed: 30 km/h
2001
West Mall s/o Thunderbird Blvd.
AM PM
EB 85th Percentile: 43 km/h 43 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 44 km/h 44 km/h
Posted Speed: 30 km/h
2001
East Mall n/o W. 16th Avenue
AM PM
EB 85th Percentile: 63 km/h 64 km/h
Posted Speed: 30 km/h
WB 85th Percentile: 68 km/h 66 km/h
Posted Speed: 30 km/h
2002
NW Marine Drive
Crescent Rd.
East Mall
Student Union Blvd.
Allison Road
Acadia Road
University Blvd.
Western Parkway
Wesbrook Mall
Agronomy Rd.
Thunderbird Blvd.
Main Mall
East Mall
West Mall
Stadium Rd.
W. Marine Drive
W. 16th Ave.
Osoyoos Cres.
Hampton Place
Road
W. 16th Ave.
Legend
Potential locations for future Traffic Calming
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Figure 6.4
Traffic Calming Candidate Locations
Transportation Status Report - January 2003
U:/projects/61657/06.1/graphics/Figure 6.4 - TC Diagram.cdr NDS January 20,03

6.3 Intersection Performance

Traffic planners and engineers use *capacity analysis* to measure the relative performance of signalized and unsignalized intersections. Results are presented in terms of *Level of Service*, which indicates on a scale of LOS A through F, how well a particular intersection is operating. LOS A would indicate an intersection that is operating well below its capacity and where vehicles are experiencing little or no delay. On the other hand, LOS F would indicate an intersection that has reached its operational capacity and vehicle delays are at a maximum. In general, an intersection that operates at LOS A through D is considered to be operating at an acceptable level. Levels of service can be determined for each approach of an intersection or for the entire intersection, giving planners and engineers an indication of any operational problems at a particular intersection.

Figures 6.5 and **6.6** illustrate the intersection configurations and calculated levels of service for all major intersections on campus during both the AM and PM peak hours, respectively. During the PM peak hour, all intersections analyzed continue to operate at acceptable levels, varying from LOS A through LOS C. On roads throughout the Lower Mainland, the PM peak hour is typically the most congested time of day, but for the UBC Campus, poorer levels of service are observed at some intersections during the AM peak hour.

On **Figure 6.5**, LOS D was calculated for the intersection of 16th Avenue and East Mall and also for the WB movements from Fairview Avenue at Wesbrook Mall. These results are not unusual however, when you consider the volumes observed during each of these periods. During the AM peak hour through and turning volumes from both directions are significantly higher at 16th Avenue and East Mall than during the PM peak hour. These volumes are indicative of students and employees coming to the University in the morning. At Fairview Avenue, the lower LOS is most likely due to the higher left-turn volume from Fairview Avenue onto southbound Wesbrook Mall. This higher volume is most likely due to residents leaving home in the morning from Fairview Residences, Acadia Park and other multi-family dwellings located east of Wesbrook Mall and south of University Boulevard.

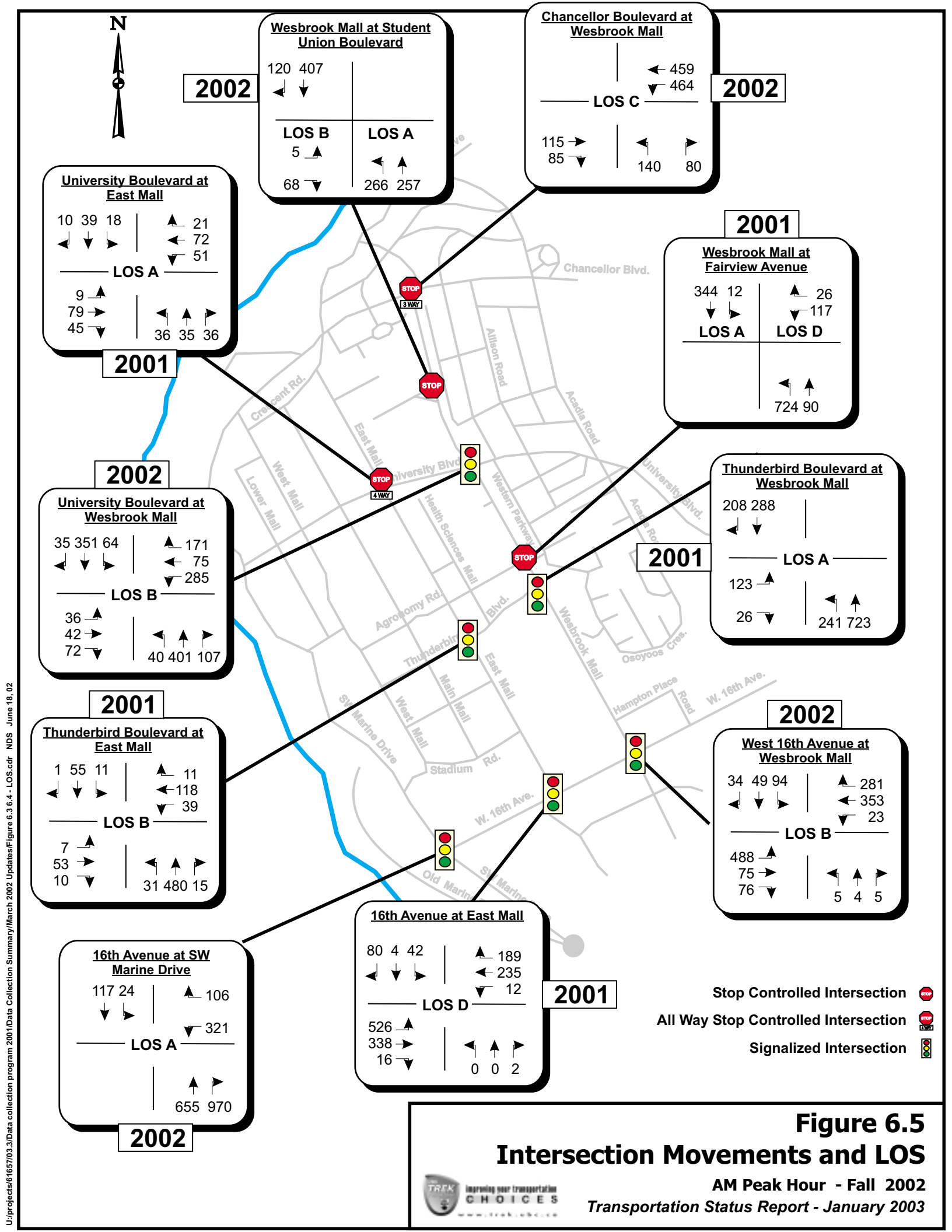

Figure 6.5
Intersection Movements and LOS

AM Peak Hour - Fall 2002

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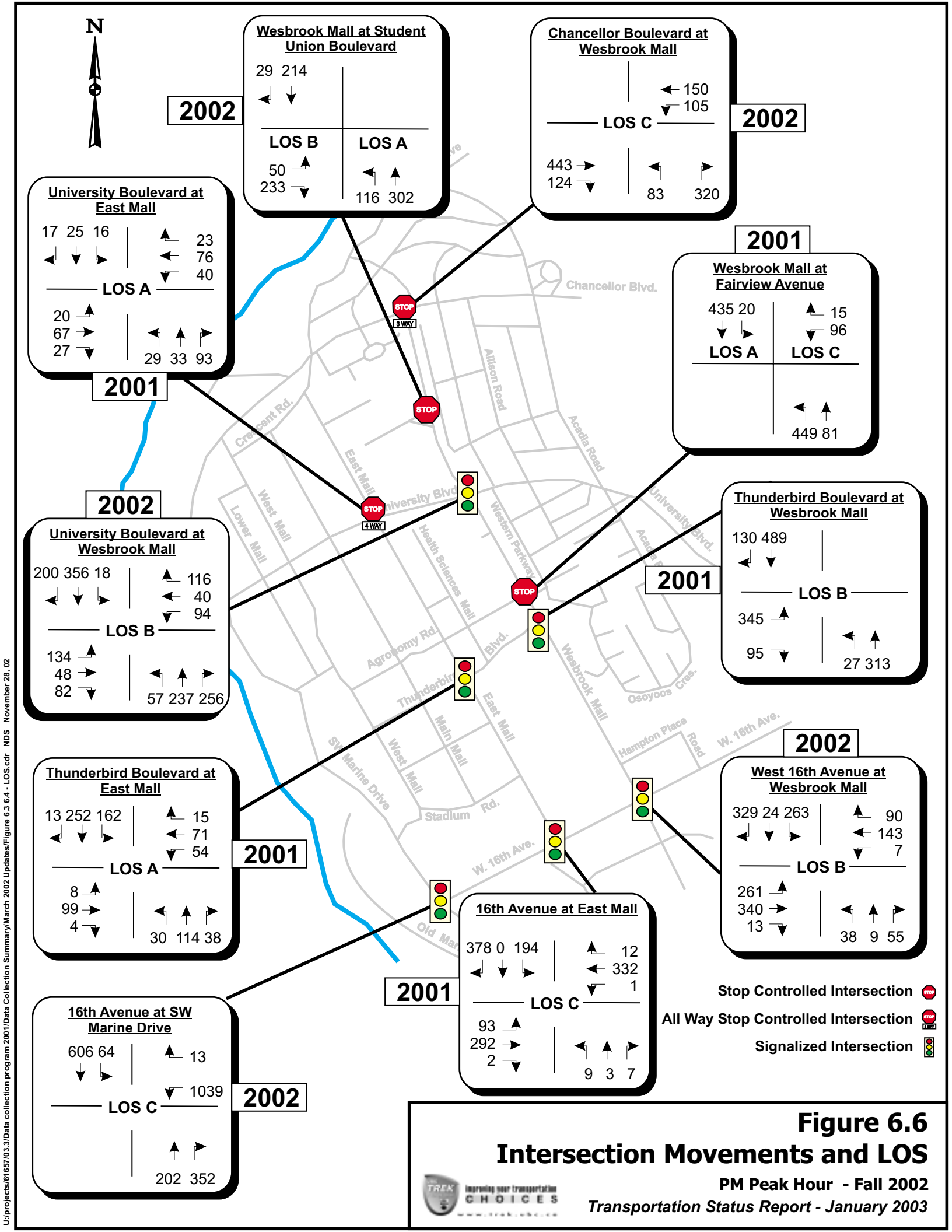

Figure 6.6
Intersection Movements and LOS

PM Peak Hour - Fall 2002

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7.0 Parking at UBC

This section of the report presents collected information regarding the commuter parking environment at UBC. To provide an indication of how UBC's commuter parking environment compares to other schools, information regarding other post-secondary institutions throughout BC, Canada and Washington is also presented. Parking management strategies can play an important role in encouraging the use of other modes and discouraging SOV trips. Therefore, the information presented in this section is an important part of understanding the commuting behaviour of UBC students, staff and faculty and is set up to become a regular part of the annual transportation monitoring program.

7.1 Commuter Parking at UBC

Currently UBC has 10,500 parking stalls on campus that are available to commuters. These stalls are spread throughout several different types of parking facilities. There are five parkades that provide convenient short- and long-term parking for persons accessing specific areas of campus. Daily surface lots provide less expensive long-term parking, primarily for visitors and commuting students. Permit surface lots provide convenient access to buildings for faculty and staff as well as preferential parking for people who carpool. UBC also maintains metered parking stalls throughout campus that is available for visitors' short-term parking.

While some of these parking facilities are restricted for residents, carpools or staff and faculty only, general commuter parking is allowed in most of the parking facilities on campus. In addition, there is currently unregulated on-street parking along portions of SW Marine Drive and West 16th Avenue that is also heavily used by UBC commuters wishing to park for free.

Table 7.1 below highlights the existing parking facilities and supply at UBC.

Table 7.1 – Existing Parking Supply at UBC, Fall 2002

Type of Facility	Number of Stalls
Parkades	4,900
Staff/Faculty Lots	1,320
Surface 'B' Lots	2,781
Surface 'C' Lot	169
Surface Transient Lots	973
Meters	328
Total	10,471

Source: UBC Parking and Access Control Services

On-campus parking spaces are regulated by UBC Parking and Access Control Services with a system that includes "pay and display" hourly rates, flat daily rates and parking permit rates for specific periods of time. **Table 7.2** briefly highlights Fall 2002 parking prices at UBC for those facilities that facilitate commuter parking (i.e. resident-only lots have not been included).

Table 7.2 – Existing Commuter Parking Pricing at UBC, Fall 2002

Type of Parking	Price (GST and PST Included)
Staff/Faculty Monthly Permit	$59.00
Parkade Monthly Permit	$75.00
Motorcycle Permit (12 months)	$136.80
B-4 Carpool Lot Permit (8 months)	$383.04
Special Needs Parking (monthly)	$37.62
B-Lot Daily Rate	$3.50
Parkade Hourly Rate	$2.50 to maximum of $12.50
Metered Hourly Rate	$2.50

Source: UBC Parking and Access Control Services

It should be noted that the UBC Strategic Transportation Plan recommends that daily parking prices at UBC should be indexed to transit fares. In other words, it is recommended that the daily cost of parking in one of the UBC B-Lot facilities be equivalent to the price of a round trip, single-zone adult bus fare. Once the U-TREK card is implemented at UBC, it is intended that this change in parking pricing would be introduced.

7.2 Parking Supply – Comparison with Other Institutions

Table 7.3 highlights parking supply information from 18 post-secondary institutions throughout BC, Canada and Washington in comparison with UBC's existing parking environment. The total full-time student, staff and faculty population is also included in this table for the calculation of parking supply to population ratios. Total full-time populations are based on full-time student enrolment and full time faculty and staff rosters. **Figure 7.1** illustrates these results graphically.

Table 7.3 – Comparison of Post-Secondary Parking Supply

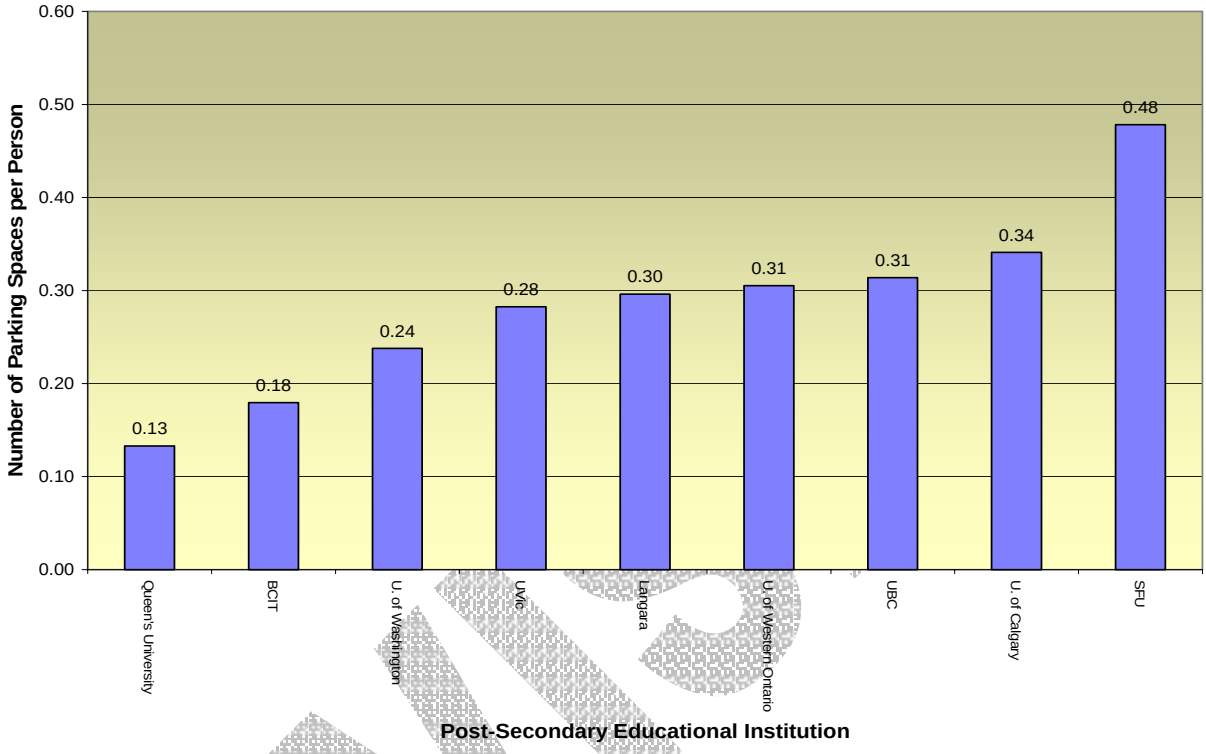
Educational Institution	Total Number of Parking Stalls	Total Full Time Population	Parking Supply to Population Ratio
Queen's University	2,340	17,613	0.13
BCIT	4,001	22,282	0.18
University of Washington	11,715	49,246	0.24
University of Victoria	4,432	15,693	0.28
Langara College	1,260	4,257	0.30
University of Western Ontario	7,370	24,146	0.31
University of BC	**10,471**	**33,367**	**0.31**
University of Calgary	9,201	26,986	0.34
Simon Fraser University	6,650	13,903	0.48
Kwantlen College	Data not available at time of revision		
Douglas College	Data not available at time of revision		
University of Waterloo	Data not available at time of revision		
University of Toronto	Data not available at time of revision		
Average	**6,380**	**23,050**	**0.29**

Source: Institutional Parking Services and Registrars

The following key observations are made with regards to UBC's parking supply in comparison to other post-secondary institutions in Canada and Washington:

- UBC has a relatively high number of parking stalls in comparison to other institutions reviewed. At 10,471 stalls total, only the University of Washington has a greater parking supply.
- In terms of parking supply to population ratios however, UBC has a ratio of 0.31 stalls per person and falls slightly higher than the average ratio of 0.28 stalls per person.

Figure 7.1 – Comparison of Post-Secondary Parking Supply



7.3 Parking Pricing – Comparison with Other Institutions

With regards to parking pricing, it is also important to compare UBC's practises with those of post-secondary institutions elsewhere. The following tables present parking pricing information for UBC in comparison with 18 other post-secondary schools. **Tables 7.4** and **7.5** present the pricing information in two different ways - according to the maximum 'pay as you go' daily rates and according to maximum permit rates, respectively.

Table 7.4 – Comparison of Maximum Daily 'Pay as you go' Rates, Fall 2002

Educational Institution	Maximum Daily 'Pay as you go' Rate including Taxes ($CDN per day)	Type of Parking
University of New Brunswick	$2.00	
Kwantlen University College	$2.00	General parking rate
Douglas College	$4.00	Student rate
Trent University	$5.00	
University of Calgary	$6.50	Paylot
York University	$7.00	
University of Alberta	$8.00	Timms Centre Parkade
Queens University	$8.00	Main Campus
British Columbia Institute of Technology	$9.00	Student & Visitor Daily Rate
Simon Fraser University	$9.00	Maximum Daily Rate
Carleton University	$10.00	Surface Lot
University of Victoria	$10.00	General Reserve & Commercial Lot
University of Waterloo	$10.00	
University of Western Ontario	$10.00	
Langara College	$12.00	Visitors
McMaster University	$12.00	Undergraduate Rate
University of Washington	$12.00	
University of British Columbia	**$12.50**	**Parkade**
University of Toronto	$14.00	Reserved Space
Average Price	**$8.58**	

Source: Institutional Parking Services

Table 7.5 – Comparison of Maximum Monthly Permit Rates, Fall 2002

Educational Institution	Maximum Monthly Permit Rate including Taxes ($CDN per day)	Type of Parking
University of New Brunswick	$15.00	General student, staff and faculty
Langara College	$20.00	Student lot
Douglas College	$22.50	Student parking
University of Waterloo	$23.94	
Trent University	$30.00	Full time faculty and staff
Kwantlen University College	$33.75	Reserved stall
Carleton University	$36.39	Full time Student surface lot
British Columbia Institute of Technology	$38.50	Student Parking
McMaster University	$43.00	Faculty, staff and graduate
Queens University	$49.00	Main Campus
Simon Fraser University	$62.25	Parkades
University of Calgary	$66.80	Art Parkade
University of Alberta	$75.00	Jubilee Auditorium
University of British Columbia	**$75.00**	**Commuter Student Parkade**
University of Western Ontario	$80.10	'Green' Reserved Lot
York University	$95.00	Parkade
University of Washington	$98.15	SOV Permit
University of Toronto	$135.15	Reserved stall
Average Price	**$55.53**	

Source: Institutional Parking Services

When comparing UBC's parking price practises to other post-secondary institutions both locally and across the country, the following observations are made:

- When comparing maximum daily pricing UBC's maximum daily parking rate can be considered 'high' relative to most other institutions reviewed. At UBC, the maximum daily parking rate on campus is $12.50 for 'pay as you go' parking in any of the five parkades on campus. This maximum daily parking rate is only less than one other institution, the University of Toronto, where the maximum daily parking rate is $14.00 for both surface and garage parking, reserved or unreserved stalls.
- When considering permitted parking rates, UBC can also be considered to have relatively 'high' prices compared to those institutions reviewed. At $75.00 per month for commuting student parking in any of the five campus parkades, UBC is only out-priced by three other schools, the University of Western Ontario, York University, and the University of Washington.

In general pricing terms, UBC also rates relatively 'high' compared to other schools. **Table 7.6** presents an overall summary of all commuter parking at UBC and highlights both the minimum and maximum daily and monthly parking prices. The prices shown in **Table 7.6** are a combination of daily or monthly rates as set by each institution's Parking Services, as well as the 'equivalent' daily or monthly price and include visitor, student, staff, and faculty parking rates. The 'equivalent' daily or monthly price is based upon 8 hours in a day and 20 commuting days in a month. This comparison serves to compare the entire range of parking price options at each of these Universities.

Table 7.6 – Parking Price Summary

Educational Institution	Monthly or Equivalent Monthly* Price ($)		Daily or Equivalent Daily* Price ($)		Type of Parking	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Langara College	$13.30*	$30.00*	$0.66*	$1.50	Annual Student Pass (12 months)	Daily Student Rate
Trent University	$3.59*	$30.00*	$0.18*	$1.50	Student 'Green' Permit	F/T Staff/Faculty Monthly Permit
Kwantlen University College	$21.25*	$40.00*	$1.06*	$2.00	4 month Student Permit Unreserved	Daily Rate
BCIT	$2.29	$40.00*	$0.11*	$2.00	Faculty/Staff Monthly Permit	Daily Student Rate
University of New Brunswick	$7.50*	$40.00*	$0.38*	$2.00	8 Month Permit	Daily Rate
Douglas College	$22.50*	$80.00*	$1.13*	$4.00	4 Month Permit	Hourly Rate
University of Western Ontario	$22.80	$80.10*	$1.14*	$4.01*	Unreserved Permit Perimeter Lot	'Green' Reserved Permit Undergraduate
University of Washington	$17.51	$98.16	$0.88	$4.91	U-Pass Permit	SOV Permit
University of Calgary	$12.84*	$130.00*	$0.64*	$6.50	4 Month McMahon Stadium Permit	Daily Pay Lot Rate
York University	$44.28*	$140.00*	$2.21*	$7.00	Unreserved Monthly Permit	Unreserved Daily Rate
University of Alberta	$40.00	$160.00*	$2.00*	$8.00	Jubilee Auditorium Monthly Permit	Timms Centre Parkade Daily Rate
Queen's University	$29.41	$165.40*	$1.47*	$8.27	West Campus Monthly Permit	Main Campus Daily Rate
SFU	$23.75*	$180.00*	$1.19*	$9.00	B Lot 4 Month Permit	B/C Lot Daily Rate
Carleton University	$25.00*	$200.00*	$1.25*	$10.00	F/T Student Annual Permit (12 months)	F/T Student Daily Rate
University of Waterloo	$23.94	$200.00*	$1.20*	$10.00	Faculty/Staff and Student Monthly Permit	Visitor Lot Daily Rate
University of Victoria	$12.57*	$200.00*	$0.64*	$10.00	General Parking Staff and Students	Reserved General and Commercial Parking
McMaster University	$18.00	$240.00*	$0.90*	$12.00	Faculty/Staff Monthly Permit (Zone 6 & 7)	Visitor or Undergraduate Daily Rate
UBC	**$59.00**	**$250.00***	**$2.95***	**$12.50**	**Faculty/Staff Permit**	**Parkade Daily Rate**

University of Toronto	$80.90	$280.00	$5.41	$14.00	Garage Block Reserved 4 month Permit	Daily Rate

With regards to commuter parking at UBC in general, the following observations are made:

- In comparison to maximum daily 'pay as you go' parking rates at other Universities in Canada and Washington, UBC prices remain relatively 'high'. The daily maximum 'pay as you go' rate at UBC is $12.50 for hourly parking at any of the five parkades on campus. Only the University of Toronto has a higher maximum daily rate than UBC.

- In comparison to maximum monthly permit rates, UBC also remains relatively 'high' at $75.00 per month for a commuting student permit for any of the five parkades on campus. Only three other Universities have maximum monthly permit rates that are higher than this.

8.0 COMPARISON WITH STP TARGETS

The UBC Strategic Transportation Plan recommended a comprehensive and integrated transportation demand management (TDM) strategy for the University in support of the TREK 2000 Vision and Principles for Physical Planning. Part of the policies recommended to help UBC achieve this strategy includes a set of TDM goals that the UBC TREK Program Centre has committed itself to pursue. These goals include the following:

- Reduce 24-hour SOV travel by 20%
- Increase 24-hour transit ridership to UBC by 20%
- Be the lead agency in creating a U-PASS for UBC in conjunction with the City of Vancouver, TransLink and other UBC neighbours
- Reduce the impact of heavy truck traffic and maintain or reduce the number of heavy trucks

Annually, the UBC TREK Program Centre has been monitoring and reporting progress with respect to achieving these goals. In addition to reducing SOV trips and increasing transit ridership, the TREK Program Centre has also committed itself to pursuing increases for other modes of travel, including carpooling and vanpooling trips, bicycle and pedestrian trips.

8.1 Comparison with STP Targets

As mentioned, as part of the Strategic Transportation Plan, UBC committed itself to pursuing a number of TDM goals. With respect to the work of the UBC TREK Program Centre, these goals translate to a set of specific targets for Fall 2002 as summarized above.

The targets for Fall 2002 identified in the STP were determined by extrapolating 1997 benchmark transportation conditions to a forecast of 2002 trend conditions, assuming the same mode shares as in 1997, and an increase in trips due to enrolment growth and additional on-campus housing at UBC. Targets for 2002 were established by calculating a 20% reduction in the trend forecast number of single-occupant vehicle trips, and a 20% increase in transit trips. Targets for other modes were established by determining appropriate mode shares such that the total number of person trips equalled the forecast trend number of trips.

The main objective of the Annual Data Collection Program that began in 1997, is to monitor the travel patterns and UBC and determine how the TREK Program Centre is progressing towards achieving those goals. The data that were presented in previous sections of this report document the changes that have been observed at the University with regards to travel patterns, mode splits, and trip rates from year to year. However, while these are significant results, the overall comparison of Fall 2002 conditions to the Fall 2002 target conditions is perhaps of most significance.

Table 8.1 summarizes the actual travel patterns observed in Fall 2002 versus the Fall 2002 targets as established in the UBC Strategic Transportation Plan.

Table 8.1 - Fall 2002 Conditions vs. Fall 2002 Targets

Mode	Fall 2002 Actual		Fall 2002 Targets	
	Trips	Mode %	Trips	Mode %
Single occupant vehicles	48,400	42.6%	42,800	34.8%
Carpools and vanpools	29,100	25.6%	46,200	37.6%
Transit	29,700	26.2%	26,500	21.5%
Bicycles	3,300	2.9%	4,900	4.0%
Pedestrians	1,600	1.4%	1,800	1.5%
Heavy trucks	400	0.4%	300 max.	0.2%
Motorcycle, other	1000	0.9%	500	0.4%
Total Person Trips	**113,500**	**100%**	**123,000**	**100%**
Total Vehicles	**64,900**		**62900***	
**Estimated based on target SOV and HOV trips*				

The results summarized in **Table 8.1** are important because they indicate where UBC is in relation to the targets that were set for this fall and they provide important information as to what changes, if any, may be necessary to ensure that travel patterns at UBC are as close to the targets as possible.

The significant differences between actual and target conditions include:

- **Transit.** Current transit ridership to and from UBC is 3,200 trips per day more than the Fall 2002 target. Ridership has exceeded the target by 12%.
- **Single-occupant vehicles.** The current number of single-occupant vehicle trips is 5,600 higher than the target number of trips, equivalent to 13% more trips than the target.
- **Carpools and vanpools.** The number of carpool and vanpool trips is 17,100 less than the target, equivalent to 37% less than the target number of trips.

- **Bicycles.** The number of recorded bicycle trips has fluctuated each year, and has remained relatively constant. The number of bicycle trips is 3,300 trips or 33% less than the target number of trips.

- **Heavy trucks.** In all traffic counts conducted since Fall 1997, the number of heavy trucks travelling to and from UBC each day has not exceeded 300 — until Fall 2002 when slightly more than 400 trucks were observed travelling to and from UBC. This increase in truck traffic is due to several construction projects on campus during Fall 2002, including a new Life Sciences building.

- **Daily trips.** The number of daily trips in Fall 2002 is almost 10,000 trips less than anticipated, equivalent to 7.8% fewer trips.

- **Daily traffic.** Because single-occupant vehicle trips are higher than forecast, daily traffic volumes are 2,000 vehicles higher than the traffic associated volumes with the Fall 2002 targets.

APPENDIX

- **Technical Memo A – Fall 2000 Vs. Spring 2001**
- **UBC Data Summary Table – Fall 1997 to Fall 2002**
- **Technical Memo B – Calculations and Assumptions**
- **Technical Memo C – Contacts and References**

Technical Memo A
UBC Transportation Data Collection Comparison

Fall 2000 (Transit) vs. Spring 2001 (No Transit)
April 2001

Urban Systems Ltd.

This report summarizes the results of recent transportation data collection activities undertaken at the University of British Columbia, on behalf of the UBC Trek Program Centre. In addition to the annual comprehensive data collection effort undertaken each fall by the Trek Program Centre (October/November 2000 for the most recent effort), a second data collection exercise was completed during the first week of April 2001 to determine the effects of the current transit strike on travel patterns at UBC.

The results of the comparison indicate that the transit strike did not result in an increase in single occupant vehicle (SOV) trips to and from UBC. In fact, SOV numbers actually decreased. Trips that were previously made on transit shifted to carpooling, cycling and walking. Although vehicle traffic to and from UBC increased (5,000 additional vehicles per day in each direction), all of this increase in vehicle traffic is the result of increased carpooling.

Methodology

As with previous comprehensive data collection efforts, transportation activity was surveyed via both manual and automatic means for both the Fall 2000 and Spring 2001 exercises.

- 24-hour automatic vehicle counts – Collected via automatic tube counters from TransTech Data Services Ltd. The counts were collected at 15-minute intervals and summarized for various peak hours and periods throughout a typical day.
- Manual occupancy counts – Collected via manual count personnel from TransTech Data Services and/or student traffic counters. Occupancy classifications included 1, 2, 3 and 4 or more persons per vehicle.
- Manual vehicle classification counts – Collected via manual count personnel from TransTech Data Services and/or student traffic counters. Passenger cars, trucks, bicycles, pedestrians, motorcycles and buses are identified by counters.

It is important to note that bus passenger counts – which are typically undertaken each fall – have not been included in this summary, as the April 2001 data collection effort did not include any bus passenger data, due to the transit strike.

Counts were undertaken along all of the five access routes to and from UBC at specific cordon locations at the border of UBC and the University Endowment Lands. These routes include:

- SW Marine Drive
- West 16th Avenue
- University Boulevard
- Chancellor Boulevard
- NW Marine Drive

Results

The results discussed below illustrate the impacts of having no public transit service to or from UBC. Fall 2000 trip data (when transit services were operating) are compared directly with April 2001 trip data (when the transit strike was in effect), with key travel pattern changes identified in the discussion.

C. Total Person Trips

- For the past four years (1997 to 2000), the total number of person trips to and from UBC on a typical weekday has ranged between 106,000 to 112,000 trips. During the first week of April 2001, a total of 108,500 trips were made in one weekday. This result indicates that no significant number of trip makers were deterred from travelling to or from UBC, despite the transit strike.

- No significant differences in numbers of person trips to and from UBC were observed for specific time periods throughout the day.

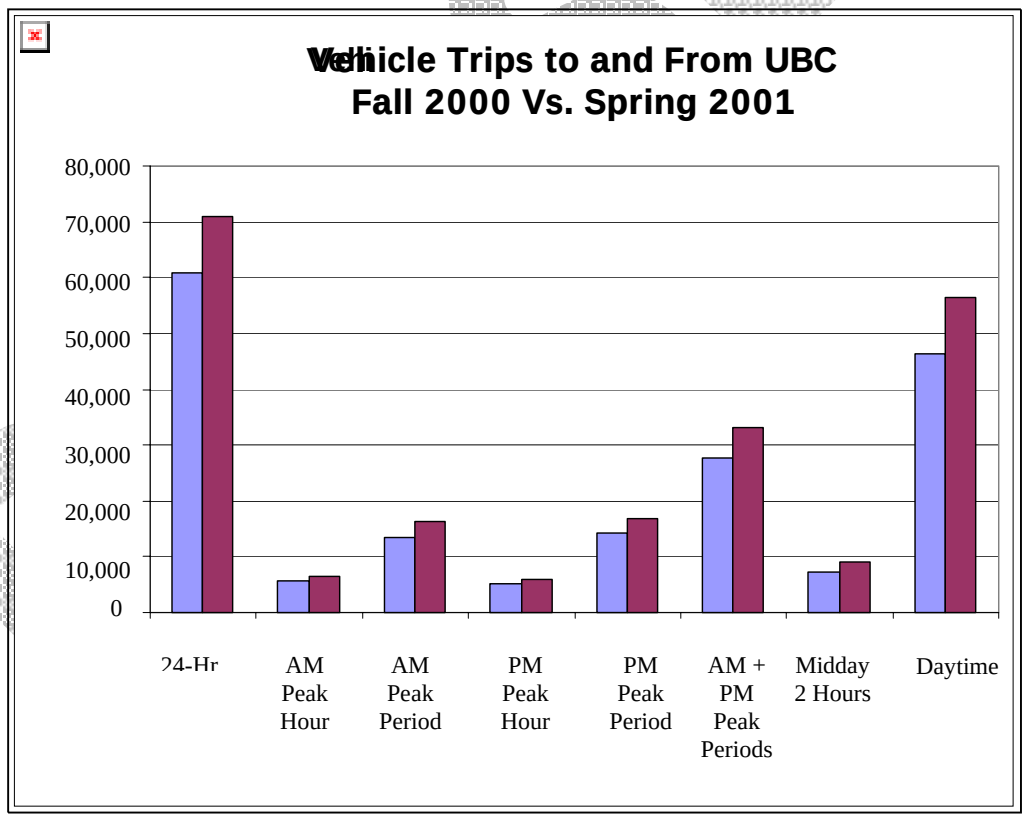
B. Total Vehicle Trips

- Vehicle volumes, summarized in **Table 1**, indicate that approximately 10,000 more vehicles travelled to UBC on a typical weekday during the first week of April 2001, as compared with fall 2000. This increased vehicle volume occurred in relatively equal proportions during all time periods of the day.

Table 1: Total Vehicle Volumes (both directions) – Fall 2000 vs. April 2001

Vehicle Trips	Fall 2000	April 2001 – Transit Strike
24-Hour	60896	70901
AM Peak Hour	5583	6491
AM Peak Period	13364	16379
PM Peak Hour	5065	5986
PM Peak Period	14287	16706
AM + PM Peak Periods	27651	33085
Midday 2 Hours	7351	9056
Daytime	46374	56399

Figure 1 – Comparison of Vehicle Trips to and from UBC



C. Trips by Mode

- There was no significant increase in single-occupant vehicle travel to UBC during the transit strike. In fact, SOV use declined slightly — approximately 1,860 fewer SOVs

were used for travel to and from UBC during the transit strike, as summarized in **Table 2**.

- The increased vehicle volumes to UBC during the transit strike were entirely multiple-occupant vehicles. During the first week of April 2001, an additional 16,000 persons travelled via two-person carpools, 6,000 more people travelled via three-person carpools, and 3,000 more people travelled in carpools and vanpools with four or more passengers.

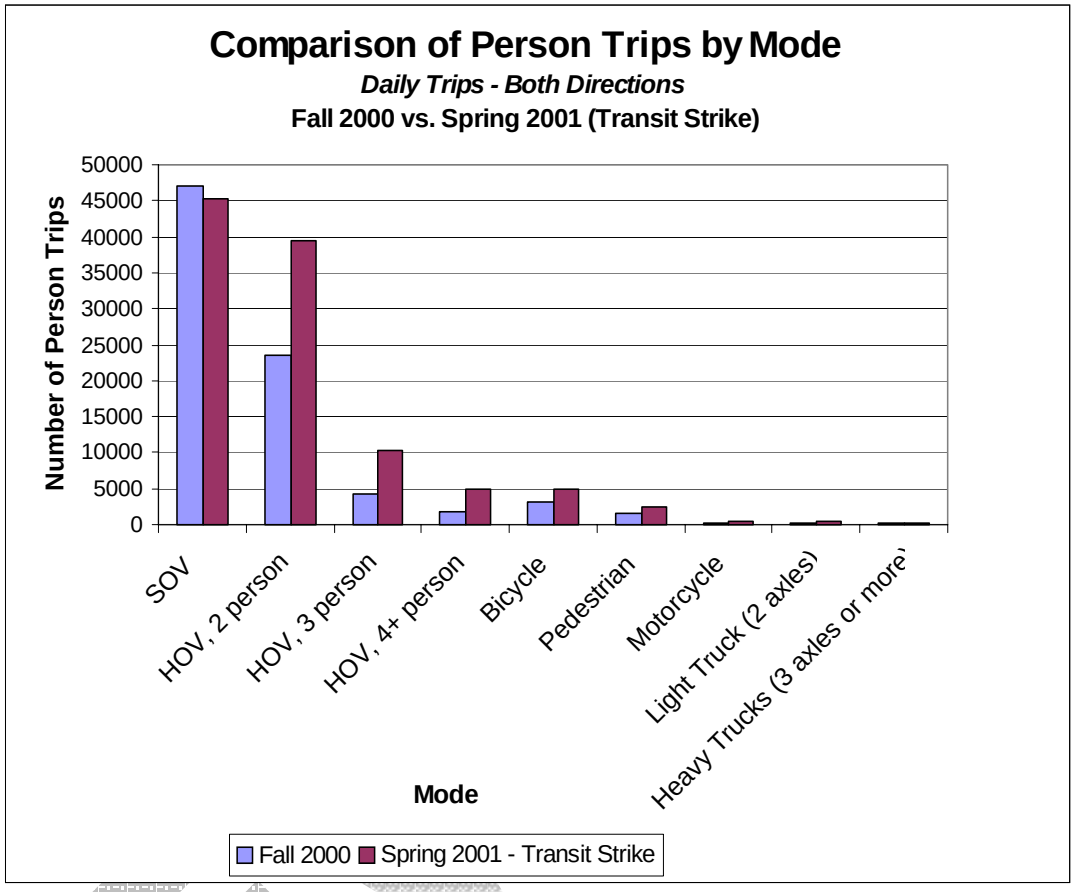
- An additional 2,600 persons either cycled, walked or in-line skated to and from UBC during the first week of April 2001, as compared with fall 2000.

- Motorcycle use also increased during the transit strike, with an additional 160 persons travelling by motorcycle, scooter or moped.

Table 2 – Comparison of Daily Person Trips by Mode (both directions)
Fall 2000 vs. April 2001

Mode	Fall 2000	April 2001 Transit Strike
SOV	47165	45308
HOV, 2 person	23478	39494
HOV, 3 person	4304	10382
HOV, 4+ person	1822	4878
Bicycle	3198	4843
Pedestrian	1565	2528
Motorcycle	283	448
Light Truck (2 axles)	331	469
Heavy Trucks (3 axles or more)	254	209

Figure 2 – Comparison of Daily Person Trips by Mode (both directions)



Characteristics of Travel To/From the University of British Columbia

Last Updated: November 8, 2002

			1997 - UBC Screenlines				1998 - UBC Screenlines				1999 - UBC Screenlines			
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
Person Trips	***24-Hour (estimated)***		52061	54036	106097	100.0%	53594	52701	106295	100.0%	59538	53834	113372	100.0%
	AM Peak Hour	8:00-9:00 AM	1,796	9362	11157	10.5%	1860	8455	10315	9.7%	2550	8170	10720	9.5%
	AM Peak Period	7:00-10:00 AM	4226	20478	24704	23.3%	4755	19127	23882	22.5%	4234	20353	24587	21.7%
	PM Peak Hour	4:00-5:00 PM	6681	2403	9085	8.6%	7200	2794	9994	9.4%	6900	2704	9604	8.5%
	PM Peak Period	3:00-6:00 PM	18186	6869	25055	23.6%	18132	8355	26487	24.9%	21239	8220	29459	26.0%
	AM + PM Peak Periods		22412	27347	49760	46.9%	22887	27482	50369	47.4%	25473	28573	54046	47.7%
	Midday 2 Hours	11:30 AM-1:30 PM	6602	5455	12058	11.4%	6795	5899	12694	11.9%	6853	5905	12758	11.3%
	Daytime (estimated)	7:00 AM-6:00 PM	42210	45339	87548	82.5%	43358	44295	87653	82.5%	48183	45414	93597	82.6%
Person Trips	***24-Hour (estimated)***	SOV	22491	23509	46000	43.4%	25016	24300	49316	46.4%	24872	23127	47999	42.3%
		HOV, 2 person	13357	14589	27947	26.3%	11967	12750	24717	23.3%	14651	12944	27596	24.3%
		HOV, 3 person	2628	3062	5690	5.4%	2251	2186	4437	4.2%	2673	2120	4792	4.2%
		HOV, 4+ person	1230	1256	2485	2.3%	1530	874	2405	2.3%	1887	1413	3300	2.9%
		Transit	9597	9403	19000	17.9%	9701	9668	19369	18.2%	12131	11536	23667	20.9%
		Bicycle	1453	1247	2700	2.5%	1997	1850	3847	3.6%	1497	1589	3085	2.7%
		Pedestrian	774	626	1400	1.3%	837	755	1592	1.5%	1274	694	1968	1.7%
		Motorcycle	110	71	181	0.2%	165	179	345	0.3%	211	171	381	0.3%
		Light Truck (2 axles)	243	152	395	0.4%	74	111	185	0.2%	196	147	343	0.3%
		Heavy Trucks (3 axles or more)	178	121	298	0.3%	54	29	83	0.1%	146	94	240	0.2%
	AM Peak Period	SOV	2315	8244	10559	42.7%	2622	8257	10879	45.6%	2449	7961	10410	42.3%
		HOV, 2 person	926	5403	6329	25.6%	860	4200	5060	21.2%	854	4360	5214	21.2%
		HOV, 3 person	180	1066	1246	5.0%	195	720	915	3.8%	201	714	915	3.7%
		HOV, 4+ person	69	411	480	1.9%	224	288	512	2.1%	56	476	532	2.2%
		Transit	533	4489	5022	20.3%	658	4679	5337	22.3%	455	5852	6307	25.7%
		Bicycle	38	557	594	2.4%	62	712	774	3.2%	38	668	706	2.9%
		Pedestrian	70	163	233	0.9%	79	146	225	0.9%	110	183	293	1.2%
		Motorcycle	2	31	33	0.1%	6	50	56	0.2%	6	49	55	0.2%
		Light Truck (2 axles)	51	64	114	0.5%	38	61	99	0.4%	30	51	81	0.3%
		Heavy Trucks (3 axles or more)	43	52	94	0.4%	11	14	25	0.1%	35	39	74	0.3%
	PM Peak Period	SOV	7108	3208	10317	41.2%	7512	3815	11327	42.8%	7937	3700	11637	39.5%
		HOV, 2 person	4671	1704	6375	25.4%	3988	2216	6204	23.4%	5264	2160	7424	25.2%
		HOV, 3 person	921	426	1347	5.4%	717	489	1206	4.6%	915	465	1380	4.7%
		HOV, 4+ person	447	201	647	2.6%	396	272	668	2.5%	732	332	1064	3.6%
		Transit	4066	1086	5152	20.6%	4404	1053	5457	20.6%	5222	1180	6402	21.7%
		Bicycle	575	47	623	2.5%	747	207	954	3.6%	587	133	720	2.4%
		Pedestrian	257	152	408	1.6%	260	229	489	1.8%	422	167	589	2.0%
		Motorcycle	45	3	48	0.2%	61	39	100	0.4%	82	37	119	0.4%
		Light Truck (2 axles)	59	24	83	0.3%	36	33	69	0.3%	52	32	84	0.3%
		Heavy Trucks (3 axles or more)	37	18	55	0.2%	11	2	13	0.0%	26	14	40	0.1%
	AM + PM Peak Periods	SOV	9424	11452	20876	42.0%	10134	12072	22206	44.1%	10386	11661	22047	40.8%
		HOV, 2 person	5597	7107	12704	25.5%	4848	6416	11264	22.4%	6118	6520	12638	23.4%
		HOV, 3 person	1101	1492	2593	5.2%	912	1209	2121	4.2%	1116	1179	2295	4.2%
		HOV, 4+ person	515	612	1127	2.3%	620	560	1180	2.3%	788	808	1596	3.0%
		Transit	4599	5575	10174	20.4%	5062	5732	10794	21.4%	5677	7032	12709	23.5%
		Bicycle	613	604	1217	2.4%	809	919	1728	3.4%	625	801	1426	2.6%
		Pedestrian	326	315	641	1.3%	339	375	714	1.4%	532	350	882	1.6%
		Motorcycle	47	34	81	0.2%	67	89	156	0.3%	88	86	174	0.3%
		Light Truck (2 axles)	110	88	197	0.4%	30	62	92	0.2%	82	83	165	0.3%
		Heavy Trucks (3 axles or more)	80	69	149	0.3%	22	16	38	0.1%	61	53	114	0.2%
	Midday 2 Hours	SOV	2833	2498	5331	44.2%	3230	2679	5909	46.5%	2924	2640	5564	43.6%
		HOV, 2 person	1665	1195	2860	23.7%	1520	1282	2802	22.1%	1448	1380	2828	22.2%
		HOV, 3 person	373	190	563	4.7%	264	318	582	4.6%	288	240	528	4.1%
		HOV, 4+ person	191	72	264	2.2%	188	116	304	2.4%	216	100	316	2.5%
		Transit	1219	1202	2421	20.1%	1185	1106	2291	18.0%	1645	1194	2839	22.3%
		Bicycle	94	123	217	1.8%	148	199	347	2.7%	93	134	227	1.8%
		Pedestrian	105	85	190	1.6%	164	85	249	2.0%	146	108	254	2.0%
		Motorcycle	12	8	20	0.2%	23	30	53	0.4%	16	24	40	0.3%
		Light Truck (2 axles)	48	41	89	0.7%	53	75	128	1.0%	50	59	109	0.9%
		Heavy Trucks (3 axles or more)	61	41	102	0.8%	20	9	29	0.2%	27	26	53	0.4%
Traffic Volumes	***24-Hour***		31915	31748	63663	100.0%	32466	31937	64403	100.0%	31563	31221	62784	100.0%
Total	***AM Peak Hour***	8:00-9:00 AM	1144	5036	6180	9.7%	1169	4812	5981	9.3%	1352	4738	6090	9.7%
	AM Peak Period	7:00-10:00 AM	2976	11280	14256	22.4%	3017	11152	14169	22.0%	3250	11147	14397	22.9%
	PM Peak Hour	4:00-5:00 PM	3870	1480	5351	8.4%	3801	1580	5381	8.4%	3658	1568	5226	8.3%
	PM Peak Period	3:00-6:00 PM	10405	4229	14634	23.0%	10135	4714	14849	23.1%	9930	4595	14525	23.1%
	AM + PM Peak Periods		13373	15466	28838	45.3%	13152	15866	29018	45.1%	13180	15742	28922	46.1%
	Midday 2 Hours	11:30 AM to 1:30 PM	4418	3746	8163	12.8%	4103	3633	7736	12.0%	3945	3562	7507	12.0%
	Daytime	7:00 AM to 6:00 PM	26928	27150	54077	84.9%	25551	27147	52698	81.8%	22823	25008	47831	76.2%
Traffic Volumes	***24-Hour***	NW Marine Dr.	1005	1035	2041	3.2%	1079	1111	2190	3.4%	905	1067	1972	3.1%
By Route		Chancellor Blvd.	6006	5654	11660	18.3%	5802	5540	11342	17.6%	6224	5540	11764	18.7%
		University Blvd.	7860	6750	14610	22.9%	7058	6314	13372	20.8%	6593	5900	12493	19.9%
		16th Avenue	6486	6388	12875	20.2%	6867	6526	13393	20.8%	6657	6350	13007	20.7%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	11196	12216	23412	36.8%	11660	12446	24106	37.4%	11184	12364	23548	37.5%
	AM Peak Hour	NW Marine Dr.	36	133	169	2.7%	36	91	127	2.1%	32	97	129	2.1%
		Chancellor Blvd.	196	891	1088	17.6%	213	896	1109	18.5%	357	896	1253	20.6%
		University Blvd.	319	795	1113	18.0%	282	700	982	16.4%	294	626	920	15.1%
		16th Avenue	254	1165	1419	23.0%	279	1156	1435	24.0%	283	1154	1437	23.6%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	392	1973	2365	38.3%	359	1969	2328	38.9%	386	1965	2351	38.6%
	AM Peak Period	NW Marine Dr.	94	223	316	2.2%	85	186	271	1.9%	79	199	278	1.9%
		Chancellor Blvd.	466	1993	2459	17.2%	465	2016	2481	17.5%	708	2016	2724	18.9%
		University Blvd.	855	1776	2632	18.5%	770	1633	2403	17.0%	742	1513	2255	15.7%
		16th Avenue	683	2471	3153	22.1%	720	2419	3139	22.2%	725	2475	3200	22.2%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	946	4839	5785	40.6%	977	4898	5875	41.5%	996	4944	5940	41.3%
	PM Peak Hour	NW Marine Dr.	105	65	170	3.2%	112	89	201	3.7%	72	91	163	3.1%
		Chancellor Blvd.	827	221	1048	19.6%	733	253	986	18.3%	740	253	993	19.0%
		University Blvd.	778	367	1145	21.4%	696	359	1055	19.6%	678	347	1025	19.6%
		16th Avenue	771	317	1088	20.3%	823	332	1155	21.5%	828	310	1138	21.8%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1363	509	1873	35.0%	1437	547	1984	36.9%	1340	567	1907	36.5%
	PM Peak Period	NW Marine Dr.	288	185	473	3.2%	317	275	592	4.0%	252	240	492	3.4%
		Chancellor Blvd.	2122	656	2778	19.0%	1951	751	2702	18.2%	1948	751	2699	18.6%
		University Blvd.	2139	1046	3185	21.8%	1891	1084	2975	20.0%	1802	1054	2856	19.7%
		16th Avenue	2049	876	2925	20.0%	2171	950	3121	21.0%	2247	918	3165	21.8%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	3796	1606	5402	36.9%	3805	1654	5459	36.8%	3681	1632	5313	36.6%
	AM + PM Peak Periods	NW Marine Dr.	378	417	795	2.8%	401	461	862	3.0%	331	439	770	2.7%
		Chancellor Blvd.	2581	2646	5228	18.1%	2415	2767	5182	17.9%	2656	2767	5423	18.8%
		University Blvd.	2993	2820	5813	20.2%	2660	2717	5377	18.5%	2544	2567	5111	17.7%
		16th Avenue	2729	3338	6067	21.0%	2890	3368	6258	21.6%	2972	3393	6365	22.0%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	4738	6441	11178	38.8%	4782	6552	11334	39.1%	4677	6576	11253	38.9%
	Midday 2 Hours	NW Marine Dr.	161	144	305	3.7%	176	169	345	4.5%	150	159	309	4.1%
		Chancellor Blvd.	736	667	1403	17.2%	703	639	1342	17.3%	784	639	1423	19.0%
		University Blvd.	1135	964	2098	25.7%	928	788	1716	22.2%	871	738	1609	21.4%
		16th Avenue	916	703	1619	19.8%	807	726	1533	19.8%	799	713	1512	20.1%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1261	1360	2622	32.1%	1489	1311	2800	36.2%	1341	1313	2654	35.4%
	Daytime	NW Marine Dr.	858	888	1745	3.2%	911	947	1858	3.5%	684	820	1504	3.1%
	(7AM to 6PM)	Chancellor Blvd.	5071	4863	9934	18.4%	4584	4781	9365	17.8%	4572	4463	9035	18.9%
		University Blvd.	6280	5623	11903	22.0%	5359	5102	10461	19.9%	4584	4404	8988	18.8%
		16th Avenue	5377	5520	10897	20.2%	5375	5579	10954	20.8%	4943	5223	10166	21.3%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	8892	10554	19446	36.0%	9322	10738	20060	38.1%	8040	10098	18138	37.9%
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
			1997 - UBC Screenlines				1998 - UBC Screenlines				1999 - UBC Screenlines			

ESTIMATION RELIABILITY SCALE

Actual Data Collected in field — Lower Degree of Factoring ⟷ Higher Degree of Factoring

Characteristics of Travel To/From the Unive

Last Updated: November 8, 2002

			2000 - UBC Screenlines				Spring 2001 - UBC Screenlines - Transit Strike				Fall 2001 - UBC Screenlines			
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
Person Trips	***24-Hour (estimated)***		53389	53327	106716	100.0%	53884	54674	108558	100.0%	54007	56893	110900	100.0%
	AM Peak Hour	8:00-9:00 AM	2097	7756	9853	9.2%	2429	7621	10050	9.3%	3155	6593	9748	8.8%
	AM Peak Period	7:00-10:00 AM	4624	20000	24624	23.1%	4987	18104	23091	21.3%	6734	19217	25951	23.4%
	PM Peak Hour	4:00-5:00 PM	6240	2592	8832	8.3%	6044	3055	9099	8.4%	5483	3777	9260	8.4%
	PM Peak Period	3:00-6:00 PM	18241	8362	26602	24.9%	18181	8217	26398	24.3%	17112	9179	26291	23.7%
	AM + PM Peak Periods		22865	28361	51227	48.0%	23168	26321	49489	45.6%	23846	28396	52242	47.1%
	Midday 2 Hours	11:30 AM-1:30 PM	6636	5823	12459	11.7%	6178	6137	12315	11.3%	6854	6550	13404	12.1%
	Daytime (estimated)	7:00 AM-6:00 PM	43215	45005	88220	82.7%	43646	45223	88869	81.9%	43953	47394	91347	82.4%
Person Trips	***24-Hour (estimated)***	SOV	23223	23942	47165	44.2%	23025	22282	45308	41.7%	25937	26637	52574	47.4%
		HOV, 2 person	12136	11342	23478	22.0%	19365	20129	39494	36.4%	11331	10135	21466	19.4%
		HOV, 3 person	2500	1804	4304	4.0%	4514	5868	10382	9.6%	1302	1166	2468	2.2%
		HOV, 4+ person	1169	654	1822	1.7%	2437	2440	4878	4.5%	934	1100	2034	1.8%
		Transit	11318	12998	24316	22.8%				0.0%	12277	15422	27700	25.0%
		Bicycle	1624	1575	3198	3.0%	2523	2320	4843	4.5%	1255	1647	2902	2.6%
		Pedestrian	922	643	1565	1.5%	1293	1235	2528	2.3%	612	575	1187	1.1%
		Motorcycle	151	132	283	0.3%	214	234	448	0.4%	143	130	273	0.2%
		Light Truck (2 axles)	206	125	331	0.3%	349	120	469	0.4%	110	52	161	0.1%
		Heavy Trucks (3 axles or more	141	112	254	0.2%	163	46	209	0.2%	108	27	136	0.1%
	AM Peak Period	SOV	2571	8018	10589	43.0%	3105	7402	10507	45.5%	4298	8523	12821	49.4%
		HOV, 2 person	1090	3678	4768	19.4%	1228	6566	7794	33.8%	1310	2596	3906	15.1%
		HOV, 3 person	183	585	768	3.1%	219	1914	2133	9.2%	151	299	451	1.7%
		HOV, 4+ person	68	212	280	1.1%	84	796	880	3.8%	208	413	621	2.4%
		Transit	424	6594	7018	28.5%			0	0.0%	569	6448	7017	27.0%
		Bicycle	60	596	656	2.7%	156	871	1027	4.4%	52	709	761	2.9%
		Pedestrian	141	179	320	1.3%	119	432	551	2.4%	69	164	233	0.9%
		Motorcycle	12	44	56	0.2%	9	58	67	0.3%	12	44	56	0.2%
		Light Truck (2 axles)	39	44	83	0.3%	50	48	98	0.4%	27	14	41	0.2%
		Heavy Trucks (3 axles or more	36	50	86	0.3%	17	17	34	0.1%	37	7	44	0.2%
	PM Peak Period	SOV	7127	3749	10876	40.9%	6795	3837	10632	40.3%	7154	4770	11924	45.4%
		HOV, 2 person	3978	2164	6142	23.1%	7098	2954	10052	38.1%	3693	2462	6155	23.4%
		HOV, 3 person	861	486	1347	5.1%	1722	531	2253	8.5%	424	283	706	2.7%
		HOV, 4+ person	420	260	680	2.6%	964	316	1280	4.8%	204	136	340	1.3%
		Transit	4872	1330	6201	23.3%			0	0.0%	4852	1248	6100	23.2%
		Bicycle	618	178	796	3.0%	929	299	1228	4.7%	502	113	615	2.3%
		Pedestrian	244	137	381	1.4%	437	191	628	2.4%	201	123	324	1.2%
		Motorcycle	51	21	72	0.3%	83	60	143	0.5%	51	21	72	0.3%
		Light Truck (2 axles)	47	25	72	0.3%	100	20	120	0.5%	21	15	36	0.1%
		Heavy Trucks (3 axles or more	23	12	35	0.1%	53	9	62	0.2%	11	8	19	0.1%
	AM + PM Peak Periods	SOV	9698	11767	21465	41.9%	9900	11239	21139	42.7%	11452	13293	24745	47.4%
		HOV, 2 person	5068	5842	10910	21.3%	8326	9520	17846	36.1%	5003	5058	10061	19.3%
		HOV, 3 person	1044	1071	2115	4.1%	1941	2445	4386	8.9%	575	582	1157	2.2%
		HOV, 4+ person	488	472	960	1.9%	1048	1112	2160	4.4%	412	549	961	1.8%
		Transit	5296	7923	13220	25.8%			0	0.0%	5421	7696	13117	25.1%
		Bicycle	678	774	1452	2.8%	1085	1170	2255	4.6%	554	822	1376	2.6%
		Pedestrian	385	316	701	1.4%	556	623	1179	2.4%	270	287	557	1.1%
		Motorcycle	63	65	128	0.2%	92	118	210	0.4%	63	65	128	0.2%
		Light Truck (2 axles)	86	69	155	0.3%	150	68	218	0.4%	48	29	77	0.1%
		Heavy Trucks (3 axles or more	59	62	121	0.2%	70	26	96	0.2%	48	15	63	0.1%
	Midday 2 Hours	SOV	2895	2523	5418	43.5%	3239	3001	6240	50.7%	3412	3193	6605	49.3%
		HOV, 2 person	1438	1186	2624	21.1%	2000	2046	4046	32.9%	1548	1448	2996	22.3%
		HOV, 3 person	324	252	576	4.6%	387	342	729	5.9%	196	183	379	2.8%
		HOV, 4+ person	136	160	296	2.4%	132	132	264	2.1%	156	146	301	2.2%
		Transit	1535	1345	2880	23.1%			0	0.0%	1292	1263	2555	19.1%
		Bicycle	110	152	262	2.1%	208	298	506	4.1%	80	126	206	1.5%
		Pedestrian	109	104	213	1.7%	127	197	324	2.6%	110	137	247	1.8%
		Motorcycle	18	18	36	0.3%	23	27	50	0.4%	18	18	36	0.3%
		Light Truck (2 axles)	44	54	98	0.8%	40	62	102	0.8%	24	21	46	0.3%
		Heavy Trucks (3 axles or more	27	29	56	0.4%	22	32	54	0.4%	18	16	34	0.3%
Traffic Volumes	***24-Hour***		30836	30060	60896	100.0%	35964	34937	70901	100.0%	32335	32595	64930	100.0%
Total	***AM Peak Hour***	8:00-9:00 AM	1211	4372	5583	9.2%	1621	4870	6491	9.2%	1889	3777	5666	8.7%
	AM Peak Period	7:00-10:00 AM	3031	10333	13364	21.9%	4299	12080	16379	23.1%	5128	10162	15290	23.5%
	PM Peak Hour	4:00-5:00 PM	3604	1461	5065	8.3%	4034	1952	5986	8.4%	3283	2164	5447	8.4%
	PM Peak Period	3:00-6:00 PM	9846	4441	14287	23.5%	11164	5542	16706	23.6%	9149	6104	15253	23.5%
	AM + PM Peak Periods		12877	14774	27651	45.4%	15463	17622	33085	46.7%	14277	16266	30543	47.0%
	Midday 2 Hours	11:30 AM to 1:30 PM	3817	3534	7351	12.1%	4770	4286	9056	12.8%	4410	4123	8533	13.1%
	Daytime	7:00 AM to 6:00 PM	22390	23984	46374	76.2%	27716	28683	56399	79.5%	24159	25694	49853	76.8%
Traffic Volumes	***24-Hour***	NW Marine Dr.	737	881	1618	2.7%	1275	1284	2559	3.6%	786	885	1671	2.6%
By Route		Chancellor Blvd.	5466	5181	10647	17.5%	6883	5961	12844	18.1%	5398	5767	11165	17.2%
		University Blvd.	6619	5998	12617	20.7%	7291	6348	13639	19.2%	7459	6900	14359	22.1%
		16th Avenue	6568	6174	12742	20.9%	7740	7546	15286	21.6%	6914	6474	13388	20.6%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	11446	11826	23272	38.2%	12775	13798	26573	37.5%	11778	12569	24347	37.5%
	AM Peak Hour	NW Marine Dr.	30	87	117	2.1%	50	89	139	2.1%	41	87	128	2.3%
		Chancellor Blvd.	225	825	1050	18.8%	432	922	1354	20.9%	874	229	1103	19.5%
		University Blvd.	291	578	869	15.6%	356	644	1000	15.4%	254	540	794	14.0%
		16th Avenue	282	1049	1331	23.8%	346	1246	1592	24.5%	309	1012	1321	23.3%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	383	1833	2216	39.7%	437	1969	2406	37.1%	411	1909	2320	40.9%
	AM Peak Period	NW Marine Dr.	72	177	249	1.9%	131	220	351	2.1%	112	191	303	2.0%
		Chancellor Blvd.	499	1911	2410	18.0%	1043	2256	3299	20.1%	2117	515	2632	17.2%
		University Blvd.	751	1468	2219	16.6%	1093	1693	2786	17.0%	1056	1819	2875	18.8%
		16th Avenue	731	2211	2942	22.0%	867	2801	3668	22.4%	788	2437	3225	21.1%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	978	4566	5544	41.5%	1165	5110	6275	38.3%	1055	5200	6255	40.9%
	PM Peak Hour	NW Marine Dr.	73	60	133	2.6%	113	96	209	3.5%	83	69	152	2.8%
		Chancellor Blvd.	684	236	920	18.2%	775	331	1106	18.5%	235	741	976	17.9%
		University Blvd.	673	355	1028	20.3%	710	454	1164	19.4%	688	425	1113	20.4%
		16th Avenue	815	307	1122	22.2%	951	413	1364	22.8%	853	346	1199	22.0%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1359	503	1862	36.8%	1485	658	2143	35.8%	1424	583	2007	36.8%
	PM Peak Period	NW Marine Dr.	201	188	389	2.7%	337	297	634	3.8%	210	186	396	2.6%
		Chancellor Blvd.	1824	708	2532	17.7%	2176	945	3121	18.7%	728	2017	2745	18.0%
		University Blvd.	1816	1055	2871	20.1%	2013	1326	3339	20.0%	1984	1268	3252	21.3%
		16th Avenue	2174	931	3105	21.7%	2465	1158	3623	21.7%	2166	965	3131	20.5%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	3831	1559	5390	37.7%	4173	1816	5989	35.8%	4061	1668	5729	37.6%
	AM + PM Peak Periods	NW Marine Dr.	273	365	638	2.3%	468	517	985	3.0%	322	377	699	2.3%
		Chancellor Blvd.	2323	2619	4942	17.9%	3219	3201	6420	19.4%	2845	2532	5377	17.6%
		University Blvd.	2567	2523	5090	18.4%	3106	3019	6125	18.5%	3040	3087	6127	20.1%
		16th Avenue	2905	3142	6047	21.9%	3332	3959	7291	22.0%	2954	3402	6356	20.8%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	4809	6125	10934	39.5%	5338	6926	12264	37.1%	5116	6868	11984	39.2%
	Midday 2 Hours	NW Marine Dr.	123	132	255	3.5%	191	190	381	4.2%	140	148	288	3.4%
		Chancellor Blvd.	706	621	1327	18.1%	951	748	1699	18.8%	731	817	1548	18.1%
		University Blvd.	796	783	1579	21.5%	1056	864	1920	21.2%	977	858	1835	21.5%
		16th Avenue	798	697	1495	20.3%	1003	858	1861	20.6%	932	815	1747	20.5%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1394	1301	2695	36.7%	1569	1626	3195	35.3%	1630	1485	3115	36.5%
	Daytime	NW Marine Dr.	565	691	1256	2.7%	966	984	1950	3.5%	631	740	1371	2.8%
	(7AM to 6PM)	Chancellor Blvd.	3991	4259	8250	17.8%	5802	5167	10969	19.4%	4509	4245	8754	17.6%
		University Blvd.	4593	4430	9023	19.5%	5817	5099	10916	19.4%	5366	5173	10539	21.1%
		16th Avenue	4782	4933	9715	20.9%	5648	6149	11797	20.9%	4994	5141	10135	20.3%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	8459	9671	18130	39.1%	9483	11284	20767	36.8%	8659	10395	19054	38.2%
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
			2000 - UBC Screenlines				Spring 2001 - UBC Screenlines - Transit Strike				Fall 2001 - UBC Screenlines			

Characteristics of Travel To/From the Unive

Last Updated: November 8, 2002

			Spring 2002 - UBC Screenlines				Fall 2002 - UBC Screenlines			
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
Person Trips	***24-Hour (estimated)***		52241	55346	107586	100.0%	56416	57046	113462	100.0%
	AM Peak Hour	8:00-9:00 AM	2616	6951	9567	8.9%	2255	7904	10160	9.0%
	AM Peak Period	7:00-10:00 AM	5097	21051	26148	24.3%	4292	22875	27167	23.9%
	PM Peak Hour	4:00-5:00 PM	5738	3205	8943	8.3%	6593	2689	9282	8.2%
	PM Peak Period	3:00-6:00 PM	18326	8444	26770	24.9%	21052	6562	27614	24.3%
	AM + PM Peak Periods		23423	29495	52918	49.2%	25344	29437	54781	48.3%
	Midday 2 Hours	11:30 AM-1:30 PM	4819	4401	9220	8.6%	7157	6517	13674	12.1%
	Daytime (estimated)	7:00 AM-6:00 PM	42635	46729	89364	83.1%	46059	47843	93902	82.8%
Person Trips	***24-Hour (estimated)***	SOV	23754	23838	47593	44.2%	24371	23991	48363	42.6%
		HOV, 2 person	11085	12263	23348	21.7%	12343	12716	25059	22.1%
		HOV, 3 person	1332	1309	2641	2.5%	956	1420	2375	2.1%
		HOV, 4+ person	770	640	1410	1.3%	701	936	1637	1.4%
		Transit	12995	14645	27640	25.7%	14957	14708	29665	26.1%
		Bicycle	1076	1346	2422	2.3%	1403	1912	3316	2.9%
		Pedestrian	611	812	1422	1.3%	754	806	1560	1.4%
		Motorcycle	215	241	456	0.4%	199	204	403	0.4%
		Light Truck (2 axles)	239	127	366	0.3%	453	188	641	0.6%
		Heavy Trucks (3 axles or more	164	125	289	0.3%	279	164	443	0.4%
	AM Peak Period	SOV	3054	7718	10772	41.2%	2503	8814	11317	41.7%
		HOV, 2 person	980	3930	4910	18.8%	882	4563	5445	20.0%
		HOV, 3 person	126	417	543	2.1%	64	451	515	1.9%
		HOV, 4+ person	59	176	235	0.9%	29	313	342	1.3%
		Transit	579	7979	8558	32.7%	518	7587	8105	29.8%
		Bicycle	65	498	563	2.2%	50	675	725	2.7%
		Pedestrian	145	195	340	1.3%	49	237	286	1.1%
		Motorcycle	2	41	43	0.2%	7	70	77	0.3%
		Light Truck (2 axles)	42	50	92	0.4%	82	88	170	0.6%
		Heavy Trucks (3 axles or more	45	47	92	0.4%	108	77	185	0.7%
	PM Peak Period	SOV	7097	3973	11070	41.4%	7899	3304	11203	40.6%
		HOV, 2 person	3757	2084	5841	21.8%	4386	1860	6246	22.6%
		HOV, 3 person	443	225	668	2.5%	344	266	610	2.2%
		HOV, 4+ person	270	138	408	1.5%	270	160	430	1.6%
		Transit	6118	1597	7715	28.8%	7015	433	7448	27.0%
		Bicycle	395	162	557	2.1%	549	291	840	3.0%
		Pedestrian	116	203	319	1.2%	273	170	443	1.6%
		Motorcycle	45	20	65	0.2%	78	33	111	0.4%
		Light Truck (2 axles)	60	20	80	0.3%	183	31	214	0.8%
		Heavy Trucks (3 axles or more	25	22	47	0.2%	55	14	69	0.2%
	AM + PM Peak Periods	SOV	10151	11691	21842	41.3%	10402	12118	22520	41.1%
		HOV, 2 person	4737	6014	10751	20.3%	5268	6423	11691	21.3%
		HOV, 3 person	569	642	1211	2.3%	408	717	1125	2.1%
		HOV, 4+ person	329	314	643	1.2%	299	473	772	1.4%
		Transit	6697	9576	16273	30.8%	7533	8020	15553	28.4%
		Bicycle	460	660	1120	2.1%	599	966	1565	2.9%
		Pedestrian	261	398	659	1.2%	322	407	729	1.3%
		Motorcycle	92	118	210	0.4%	85	103	188	0.3%
		Light Truck (2 axles)	102	70	172	0.3%	265	119	384	0.7%
		Heavy Trucks (3 axles or more	70	69	139	0.3%	163	91	254	0.5%
	Midday 2 Hours	SOV	1791	1843	3634	39.4%	3028	2820	5848	42.8%
		HOV, 2 person	921	749	1670	18.1%	1628	1204	2832	20.7%
		HOV, 3 person	112	74	186	2.0%	154	207	361	2.6%
		HOV, 4+ person	66	31	97	1.1%	83	147	230	1.7%
		Transit	1691	1450	3141	34.1%	1826	1695	3521	25.8%
		Bicycle	109	100	209	2.3%	124	144	268	2.0%
		Pedestrian	69	93	162	1.8%	107	167	274	2.0%
		Motorcycle	7	8	15	0.2%	35	19	54	0.4%
		Light Truck (2 axles)	29	25	54	0.6%	56	41	97	0.7%
		Heavy Trucks (3 axles or more	24	28	52	0.6%	116	73	189	1.4%
Traffic Volumes	***24-Hour***		30737	31656	62393	100.0%	32970	32267	65237	100.0%
Total	***AM Peak Hour***	8:00-9:00 AM	1539	3976	5515	8.8%	1318	4471	5789	8.9%
	AM Peak Period	7:00-10:00 AM	3686	10142	13828	22.2%	3326	11734	15060	23.1%
	PM Peak Hour	4:00-5:00 PM	3376	1833	5209	8.3%	3853	1521	5374	8.2%
	PM Peak Period	3:00-6:00 PM	9449	5383	14832	23.8%	10746	4564	15310	23.5%
	AM + PM Peak Periods		13135	15525	28660	45.9%	14072	16298	30370	46.6%
	Midday 2 Hours	11:30 AM to 1:30 PM	2394	2347	4741	7.6%	4180	3733	7913	12.1%
	Daytime	7:00 AM to 6:00 PM	22870	25312	48182	77.2%	24043	25791	49834	76.4%
Traffic Volumes	***24-Hour***	NW Marine Dr.	783	937	1720	2.8%	842	771	1613	2.5%
By Route		Chancellor Blvd.	5830	5457	11287	18.1%	5993	5461	11454	17.6%
		University Blvd.	5882	6571	12453	20.0%	7040	6359	13399	20.5%
		16th Avenue	6632	6305	12937	20.7%	7003	6527	13530	20.7%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	11610	12386	23996	38.5%	12092	13149	25241	38.7%
	AM Peak Hour	NW Marine Dr.	21	88	109	2.0%	36	69	105	1.8%
		Chancellor Blvd.	233	815	1048	19.0%	231	850	1081	18.7%
		University Blvd.	584	287	871	15.8%	317	643	960	16.6%
		16th Avenue	297	983	1280	23.2%	306	1020	1326	22.9%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	404	1803	2207	40.0%	428	1889	2317	40.0%
	AM Peak Period	NW Marine Dr.	75	201	276	2.0%	93	156	249	1.7%
		Chancellor Blvd.	311	2057	2368	17.1%	511	2106	2617	17.4%
		University Blvd.	1492	749	2241	16.2%	831	1700	2531	16.8%
		16th Avenue	748	2271	3019	21.8%	765	2478	3243	21.5%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1060	4864	5924	42.8%	1126	5294	6420	42.6%
	PM Peak Hour	NW Marine Dr.	78	67	145	2.8%	80	52	132	2.5%
		Chancellor Blvd.	736	251	987	18.9%	757	238	995	18.5%
		University Blvd.	352	652	1004	19.3%	706	385	1091	20.3%
		16th Avenue	792	314	1106	21.2%	883	300	1183	22.0%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	1418	549	1967	37.8%	1427	546	1973	36.7%
	PM Peak Period	NW Marine Dr.	214	198	412	2.8%	218	161	379	2.5%
		Chancellor Blvd.	1981	766	2747	18.5%	2048	731	2779	18.2%
		University Blvd.	1067	1826	2893	19.5%	1963	1101	3064	20.0%
		16th Avenue	2187	963	3150	21.2%	2424	938	3362	22.0%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	4000	1630	5630	38.0%	4093	1633	5726	37.4%
	AM + PM Peak Periods	NW Marine Dr.	289	399	688	2.4%	311	317	628	2.1%
		Chancellor Blvd.	2292	2823	5115	17.8%	2559	2837	5396	17.8%
		University Blvd.	2559	2575	5134	17.9%	2794	2801	5595	18.4%
		16th Avenue	2935	3234	6169	21.5%	3189	3416	6605	21.7%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	5060	6494	11554	40.3%	5219	6927	12146	40.0%
	Midday 2 Hours	NW Marine Dr.	89	95	184	3.9%	127	145	272	3.4%
		Chancellor Blvd.	456	394	850	17.9%	785	648	1433	18.1%
		University Blvd.	478	554	1032	21.8%	886	788	1674	21.2%
		16th Avenue	528	443	971	20.5%	851	716	1567	19.8%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	843	861	1704	35.9%	1531	1436	2967	37.5%
	Daytime	NW Marine Dr.	612	753	1365	2.8%	624	589	1213	2.4%
	(7AM to 6PM)	Chancellor Blvd.	4265	4533	8798	18.3%	4404	4531	8935	17.9%
		University Blvd.	4436	4666	9102	18.9%	4910	4752	9662	19.4%
		16th Avenue	4894	5135	10029	20.8%	5175	5224	10399	20.9%
		41st Avenue	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		SW Marine Dr.	8663	10225	18888	39.2%	8930	10695	19625	39.4%
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
			Spring 2002 - UBC Screenlines				Fall 2002 - UBC Screenlines			

Technical Memo B
Calculations and Assumptions

1997 and 1998
UBC Transportation Data

Because the UBC TREK Program Centre does not have the resources to undertake intensive manual transportation data collection efforts 7-days per week, 24-hours per day, some of the data presented in Tables B-3 and B-4 in the Appendices had to be estimated based on 24-hour automatic traffic data. Provided below is a summary of the key assumptions and calculations made to calculate total person trips by mode and time period at UBC.

Traffic Volumes

Actual traffic volumes were collected for 24-hour periods over 7-days using automatic counting equipment from TransTech Data Services Ltd. (hose counters), the Ministry of Transportation and Highways (in-pavement loop counters) and the City of Vancouver (hose counters). Estimates for traffic volumes were only required for the 1997 UBC screenline, since no counting equipment was placed at this screenline at this time. The 1997 UBC screenline volumes were calculated as follows:

1997 UBC vols. = 1997 Vancouver vols. * (1998 UBC vols./1998 Vancouver vols.)

The traffic volume data plays a significant role in estimating 24-hour person trips by mode, with the exception of transit rider- ship data, because only peak period data was collected for individual modes.

Person Trips by Individual Modes

Person trip data for individual modes (i.e. SOV, HOV, bicycle pedestrian, motorcycle and truck) was manually collected for only the peak periods of the day as follows:

- AM Peak Period – 7:00am to 10:00am
- Midday Peak Period – 11:30am to 1:30pm
- PM Peak Period – 3:00pm to 6:00pm

The cost of undertaking these counts also limited manual data collection to only one screenline per year. For example, in 1997 these manual counts were undertaken at the Vancouver screenline. In 1998, however, the counts were undertaken at the UBC

screenline to more accurately monitor travel to and from the UBC campus. Thus, the number of person trips for the 1997 UBC screenline and the 1998 Vancouver screenline had to be estimated in order to provide a full picture for both screenlines in 1997 and 1998.

For both the 1997 UBC screenline and the 1998 Vancouver screenline data, volumes were calculated using ratios derived from automatic traffic volumes. For example, the 1998 Vancouver screenline data for Single Occupant Vehicles (SOVs) was calculated as follows:

1998 Vancouver (SOVs) = 1998 UBC (SOVs) * (1998 Vancouver vols./1998 UBC vols.)

Similarly, 1997 UBC screenline data by mode was calculated by comparing 1997 UBC screenline traffic volumes with 1997 Vancouver screenline traffic volumes. However, a greater degree of estimation was used in this case because 1997 UBC screenline traffic volumes were originally derived by estimation. It is also important to note that some direction totals for individual modes were factored up to achieved a balance between inbound and outbound totals. The imbalance in directional totals, particularly for trucks and HOVs, is likely the result of surveying inbound and outbound traffic on different days.

For person trips by transit, automatic traffic volumes were not used to calculate estimates. Similar to all other mode data, transit data was collected manually by BC Transit employees at the Vancouver screenline in 1997 and the UBC screenline in 1998. However, transit load data was collected for 18-hour periods, rather than only peak periods, between 6:00am and 12 midnight. In order to determine person trips by transit for the screenlines that were not manually surveyed, a degree of estimation was required.

For the 1997 UBC screenline, it was estimated that only 5% of transit trips (1,000 trips) made to and from UBC and the University Endowment Lands (UEL) were actually UEL based transit trips. Thus, it was assumed that 19,000 transit trips were UBC based. Directional trip values were calculated using the proportions obtained from the manually collected 1997 Vancouver screenline transit load counts. Using the newly calculated 1997 UBC screenline load data, 1998 Vancouver screenline transit loads were estimated as follows:

1998 Vancouver loads = 1998 UBC loads * (1997 Vancouver loads/1998 UBC loads)

With the exception of transit trips, all 24-hour person trip estimates by mode were calculated for all screenlines as follows:

24-hr. SOV = AM+PM Peak Period SOV * (24-hr. Traffic Volume/AM+PM Peak Period Traffic Volume)

Total Person Trips – Modes Combined

Total person trips for both screenlines and both years were calculated in the same manner. For all of the time periods – with the exception of the 24-hour period and the daytime period – total trips were calculated by adding up person trips for individual modes by time period. For motorcycle and truck trips, only one person per vehicle was assumed.

Total trips for the daytime period (7:00am to 6:00pm) were estimated as follows:

- It was assumed that the 6-hours of non-peak period traffic between the AM and PM peak periods (10:00am and 3:00pm) comprises two-thirds of the total non-peak period traffic.
- To calculate total non-peak period traffic (18 hours), total peak period traffic (AM+PM peak periods) was subtracted from 24-hour traffic.
- Two-thirds of total non-peak period traffic was then added to total peak period traffic to yield a value for the daytime period between 7:00am and 6:00pm.

For 24-hour trip totals for both screenlines in both years, 24-hour person trip totals for individual modes were added together.

TO:	File	**DATE:**	February 5, 2003
FROM:	Nikki Scott	**FILE #:**	6165706.1
SUBJECT:	**TECHNICAL MEMO C - CONTACTS AND REFERENCES FOR TRANSPORTATION STATUS REPORT**		

This document contains a list of all contacts and references that were used to gather information for the UBC Transportation Status Report – Fall 1997 to Fall 2002.

Contacts

Name and Position	***Agency***	***Contact Info***	***Email or Website***
Basse Clement	TransLink	(604) 453-4557	Basse_clement@translink.bc.ca
Carleton Parking Services	Carleton Univ.	(613) 520-3623	www.carleton.ca/parking/rates.htm parking@carleton.ca
Clark Lim, Strategic Planning Department	TransLink	(604) 453-4500	clark_lim@translink.bc.ca
Elaine Carpenter, Parking Services Waterloo	Waterloo	(519) 888-4567 ext. 3100	www.adm.uwaterloo.ca/infopark/permit.html eacarpen@uwaterloo.ca
Ellen Keating, BCIT Parking Services	BCIT	(604) 432-8719	Ellen_Keating@bcit.ca
Elmer Morishita, Senior Analyst	UBC PAIR Office	(604) 822-6423	elmer.morishita@ubc.ca.
Gordon Dash, UVIC Parking Services	UVIC		http://web.uvic.ca/security/rates.htm parka lot@uvic.ca
Kwantlen College Parking Services	Kwantlen College		http://plaza.kwantlen.bc.ca/sites/facilities.nsf/pages/Parking
Langara Campus Security and Parking (managed by Imperial Parking)	Langara College	(604) 681-7311	www.langara.bc.ca/security/parking.html
McMaster Parking and Transit Services	McMaster	(905) 525-9140 ext. 24323	http://parking.mcmaster.ca parking@mcmail.cis.mcmaster.ca
Queens Parking Services	Queens		http://www.queensu.ca/pps/parking/parking.html parking@post.queensu.ca
SFU Parking and Security Services	SFU		www.sfu.ca/security/Parking/raterefund.htm
Sham Pendleton, Associate Director	UBC PAIR Office	(604) 822-8972	sham.pendleton@ubc.ca
Trent Parking and	Trent		www.trentu.ca/security/fees.html

Security	University		
U Toronto Parking Services	U. Toronto		http://www.facilities.utoronto.ca/admin/PARKING/PARKrate.HTM
UBC Parking and Access Services Department	UBC		www.parking.ubc.ca
UBC Statistical Consulting and Research Laboratory (SCARL)	UBC		consult@stat.ubc.ca
UNB Security and Traffic Services	Univ. New Brunswick	(506) 453-4830	http://www.unbf.ca/security/parking.html
Univ. Alberta Parking Services	University Alberta	(780) 492-7275	www.ualberta.ca/~parking/general/fees.html parking.services@ualberta.ca
Univ. Calgary Parking Services	University Calgary	(403) 220-6771	www.ucalgary.ca/parking/index.html parking@ucalgary.ca
Univ. Washington Parking Services	University Washington		www.washington.edu/admin/parking/2002fees.html
Univ. Western Ontario Parking Services	Univ. Western Ontario	(519) 661-2111 Ext: 86995	www.uwo.ca/parking/rates.html parking@uwo.ca
York Univ. Parking Services	York Univ.		http://www.csbo.yorku.ca/ParkingServices/ParkingDecal.htm

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TREK 2000: UBC's Vision	UBC	http://www.trek2000.ubc.ca/index.html
TREK Program Centre		http://www.trek.ubc.ca
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UBC Parking Strategy Plan, Aug 2002	Bunt & Associates Engineering Ltd.	Hard copy.
UBC Planning and Institutional Research Office (PAIR)	UBC PAIR	http://www.pair.ubc.ca
UBC Strategic Transportation Plan, Oct 1999	UBC TREK Program Centre	Hard copy. Also available on www.trek.ubc.ca
UBC Transportation Report Card, Dec 2002	Urban Systems Ltd.	Hard copy. Also available on www.trek.ubc.ca

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