1997 UBC 'Benchmark' Transportation Data Summary

Discussion Paper #4

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CONTENTS

1. SUMMARY

As one of the commitments made in the *UBC Official Community Plan* and *GVRD/UBC Memorandum of Understanding*, UBC has undertaken a comprehensive annual transportation data collection and monitoring program. The data collected from this program are used to assess the effectiveness of the UBC TREK Program Centre in achieving the following goals:

- **Reduce single occupant vehicle (SOV) travel** to/from UBC by 20% over the next five years, as compared with 1997 levels.
- **Increase transit ridership** to/from UBC by 20% or more over the next five years, as compared with 1997 levels.
- **Reduce heavy truck travel** to/from UBC.
- **Lead the way in implementing a U-Pass (U-TREK) program** at UBC, in collaboration with the GVRD, City of Vancouver, and BC Transit (GVTA).

The first comprehensive data collection program – the benchmark – was undertaken in November 1997 at all major road screenline locations on the periphery of the University Endowment Lands (UEL), at the border of the City of Vancouver. This program was coordinated with data collection efforts undertaken by both the City of Vancouver (traffic volumes and classification counts) and BC Transit (transit ridership counts). A detailed description of the methodology and results of the data collection program are provided in the Appendices.

The initial screenline locations for the autumn 1997 data collection program were situated on the boundary between the University Endowment Lands (UEL) and the City of Vancouver. However, there was no way to distinguish between UBC traffic versus UEL traffic. Thus, the 1997 count locations were then adjusted in 1998 to the actual UBC screenline at the border between UBC and UEL. The City of Vancouver continued their data collection efforts in 1998 at the boundary between the University Endowment Lands and the City, providing a means of differentiating between travel to/from UBC and travel to/from UEL. The two 1998 screenlines also allowed for the calculation of a factor that can be applied to 1997 UEL benchmark counts to determine volumes for a 1997 UBC screenline. **Maps D-1 and D-2** in the Appendices illustrate the screenline locations applied in both 1997 and 1998, respectively.

The 1997 benchmark counts indicated that during a weekday in autumn 1997, an average of 105,400 persons crossed the UBC screenline, as summarized in the table on the following page.

Mode	Fall 1997 Weekday Person Trips Across UBC Screenline*	
	Total Number of Person Trips – Both Directions	Percentage of Total Trips
Single Occupant Vehicles (SOVs)	46,000	43.6%
Carpools/Vanpools (HOVs)/Motorcycles	36,300	34.5%
Transit	19,000	18.0%
Bicycles/Pedestrians	4,100	3.9%
Total	**105,400**	**100%**

* *Note:* These numbers do not include trips made by on-campus residents. In addition, 300 heavy truck trips were made to and from UBC.

Other key benchmark values include:

- Average automobile occupancy in 1997 was 1.30 persons per vehicle or roughly two people in every third car.
- Peak arrival time for all modes was 8:15 am and peak departure time was 4:30 pm.
- Parking demand peaks at 10:00 am.
- Heavy truck trips are made to/from UBC a total of 300 times daily on average.
- There were roughly 17,000 person trips made internally each day by 8,500 students/residents living on-campus. If this figure were included in the total for commute trips, it would increase the pedestrian/bicycle mode split from 4% of the 105,400 person trips to/from campus, to 17% of the 122,700 person trips to, from and within campus.

Five-year targets for SOV trip reduction and increases in transit ridership and other modes have been set as indicated in the table on the following page. The base year is 1997 because comprehensive 1996 transportation data are not available, and because the transit capacity required for U-TREK implementation is not expected until 2000 at the earliest.

Mode	Daily Trips to/from UBC (autumn weekday person trips, both directions across UBC screenline)					
	1997 Person Trips	**2002** Current Trends	**2002** STP Target	**2002** Change from Trend	**2002** U-TREK Results	**2002** Change from Trend
Single-occupant vehicles	46,000	53,500	42,800	-20%	36,800	-30.1%
Carpools and vanpools	36,300	42,100	46,400	10%	48,200	15%
Transit	19,000	22,100	26,500	20%	30,000	36%
Bicycle	2,700	3,100	4,900	58%	5,400	74%
Pedestrian	1,400	1,600	1,800	13%	2,000	25%
Totals	105,400	122,400	122,400		122,400	

2. PURPOSE

This reference document has been prepared in order to provide the following information:

- A description of the annual transportation data collection and monitoring programs.
- Daily arrival and departure patterns for each UBC mode.
- Daily cumulative on-campus commuter parking patterns.
- Daily traffic volumes to and from UBC for each mode.
- Targets for UBC SOV trip reduction and transit ridership increases.

3. BACKGROUND

In a *Memorandum of Understanding* with the GVRD prepared in the summer of 1997, UBC committed to follow requirements set out in the GVRD OCP Bylaw for UBC. Those commitments include, among other things:

➢ Transportation Demand Management (TDM)

- The reduction of single occupant vehicle (SOV) trips by 20% within 5 years.
- An increase in transit ridership by 20% within 5 years.
- Assuming the responsibility as the lead agency in creating a U-Pass system (i.e. UBC U-TREK Card).
- Development of an integrated TDM strategy (i.e. UBC TREK Program Centre).

➢ **Trucking**

- Ensure that trucks travelling to and from UBC follow the City of Vancouver's designated truck routes.
- A reduction in total truck trips to and from UBC.

Specific requirements identified in the *Memorandum of Understanding* related to these commitments include *(MoU* clause noted):

- Identify and quantify travel requirements of students and personnel. *(1.1.a)*
- Share transportation databases with the City of Vancouver, GVRD and BC Transit (GVTA). *(1.1.b)*
- Work with BC Transit to design U-Pass (U-TREK) system. *(1.1.c)*
- Establish benchmarks for goal of 20% reduction in SOV trips. *(1.1.k)*
- Establish benchmarks for goal of 20% increase in BC Transit ridership. *(1.1.k)*
- Develop methodology and undertake traffic surveys to attain goals. *(1.1.k)*

Consistent with clauses *1.1a* and *1.1k* noted above, a comprehensive data collection program was initiated. The program methodology and results are described below, and include measurement of both traffic and transit ridership volumes, and electronic surveys of commuter travel patterns and preferences. As discussions continue on the UBC Strategic Transportation Plan and resulting trip reduction programs, the results of the transportation data collection program are currently being used by UBC and its partners – City of Vancouver, TransLink, and the GVRD – to design and eventually implement a U-TREK Card program. Through the U-TREK Card program, the University and its partners will implement individual TDM measures directed at ultimately reducing UBC SOV trips by 20%.

Discussion of commuter travel patterns and preferences, including data collection methodology is described briefly below, and illustrated in more detail in the **Appendices**.

4. METHODOLOGY

A. Transportation Planning Surveys

A census-type transportation planning survey was performed in January 1998 using 34,000 e-mail addresses of UBC students, staff, and faculty. Permission to undertake a mass Internet mailing to students, staff and faculty was granted by the VP – Student and Academic Services. The next survey of this type is planned for the Year 2000 and every two years thereafter upon implementation of the U-TREK Card. Objectives of the survey were to determine:

- Current travel patterns for UBC students, staff and faculty
- Market response to a possible UBC U-TREK Card among students, staff and faculty

Campbell, Goodell & Traynor consultants were engaged jointly by UBC, with assistance from BC Transit, to design and administer a scientific, statistically significant survey of UBC commuters. The 34,000 e-mails (plus approximately 500 faxes on request) cover over 80% of all UBC students, staff and faculty. The response rate was relatively high (over 3,600 and >10%), but lower than expected. Possible causes of the low response rates have been speculated as follows:

- Incompatibility of e-mail software for some accounts, resulting in significant effort on the part of the respondents to complete the questionnaire.
- Differing levels of computer literacy among respondents may have influenced a person's ability to participate in the survey.
- The indirect nature of the survey process. The survey was not directly sent to respondents. Only a covering letter was sent asking respondents to complete the actual questionnaire at a web site.

Focus groups were used in design of the survey. A copy of the survey is provided in the **Appendices**.

B. Annual Transportation Data Collection

UBC has been collecting data regarding traffic volumes and travel characteristics for trips to and from UBC on an informal basis for some time. Beginning in 1997, corresponding with the creation of the UBC TREK Program Centre, data collection activities were formalized to provide a consistent basis for comparing travel from year-to-year. Screenline traffic counts for all transit, truck, SOV, HOV, bicycle and pedestrian modes were carried out at five locations in November 1997. Because some errors and equipment malfunctions were detected in the original data set, three re-counts were performed the first week of February 1998. Count location, duration and type are given in the Appendices. Results for both 1997 and 1998 are contained in **Tables B-3 and B-4** in the Appendices and provide both person trips and vehicle trips to / from the campus. The details regarding the calculations and assumptions applied to the 1997 and 1998 data summary tables are documented in **Technical Memo A-3** in the Appendices.

To improve the usefulness of the data and to provide additional information to assess the effectiveness of the UBC TREK Program Centre, the 1998 screenline count program was adjusted somewhat from the 1997 program as follows:

- BC Transit conducted ridership counts for an 18-hour period, rather than for the 14-hour and 16-hour periods used in 1997.
- Additional count locations were used, located at or close to the UBC/UEL boundary, so that UEL, VSB and GVRD Park traffic could be isolated from UBC traffic.
- Manual intersection counts were conducted at a number of signalized and unsignalized intersections on campus to record vehicle, bicycle and pedestrian volumes.
- Major internal roads on the UBC campus were counted automatically with 24 hour, seven-day hose counts.

It should also be noted that summer 1999 transit counts are planned to assist in U-TREK base revenue calculations. Additional bicycle volume counts are planned in 1999 to account for any increases in bicycle volumes as temperatures increase and weather conditions improve.

A future data collection consideration could be a license plate survey that would determine how many of the two person car pools are simply kiss and ride patterns, not parkers – a potential future target market to reduce SOVs.

Table 1 provides a summary of the current annual data collection program as conducted in autumn 1998.

Table 1: *UBC Annual Data Collection Program*

Data		Timing			Time Periods	Screenline
		Oct.	April	July		
Traffic Volumes	1a	✓			• 7 consecutive days • 24 hours/day	UBC/UEL
	1b	✓			• 4 consecutive weekdays • 24 hours/day	UEL/Van
Vehicle Occupancy	2	✓			• 6-9 AM, 11:30 AM – 1:30 PM, 3-6 PM (8hrs) • One 8-hour day per location	1 - 5
Vehicle Classification	3a	✓			• 6-9 AM, 11:30 AM – 1:30 PM, 3-6 PM (8hrs) • One 8-hour day per location	1 - 5
	3b	✓			• 4 consecutive weekdays • 24 hours/day	6 - 11
Transit Ridership	4	✓		✓	• 6 AM to 12:00 AM inbound (18 hrs) • 6 AM to 12:00 AM outbound (18 hrs) • Two 9-hour shifts per 18-hour day • Two 18-hour days per direction per location	12 - 14
Bicycle Volumes	5a	✓			• 6-9 AM, 11:30 AM – 1:30 PM, 3-6 PM (8hrs) • One 8-hour day per location	1 - 5

	5b		✓		• 6 AM to 6 PM (12 hours) • Two 6-hour shifts per 12-hour day • One 12-hour day per location	1 - 5
Pedestrian Volumes	6	✓			• 6-9 AM, 11:30 AM – 1:30 PM, 3-6 PM (8hrs) • One 8-hour day per location	1 - 5

5. RESULTS

A. Transportation Planning Survey

The key results of the transportation planning survey are summarized in the tables below. Response biases have been removed via adjustments for UBC population, mode, sex and technology – comparisons with ground counts are within 3%. The response rate of persons using HOV/SOV was lower than expected, but still statistically significant. On the other hand, transit and bicyclists were over-represented and have been weighted accordingly. Ken Denike, from the UBC Department of Geography, has worked with BC Transit and the consultants to generate statistical conclusions that have been agreed upon by all partners. Note that the focus is primarily on AM and PM peak period commuters as opposed to 24-hour travel. However, on-campus residents have also been analyzed in this section.

Table 2 provides a breakdown of population figures for the total number of full-time students, staff and faculty at UBC on an average day during the autumn and winter sessions. Over 70% of the UBC population – 25,000 students, staff and faculty – commute to and from the campus during the peak periods.

Table 2: *Population Breakdown at UBC*

UBC Population Categories	Total Peak Period / 24-Hour	Living at UBC	Commuting to UBC in Peak Period
Students (FTE)	27,000 / 33,182	8,000	19,000
Staff (excl. student)	6,200 / 6,200	1,700	4,500
Faculty	1,800 / 1,935	300	1,500
Totals:	35,000 / 41,300	10,000	25,000

Table 3 summarizes the mode split for UBC commuters, determined through both in-field traffic data collection and the electronic survey distributed to students, staff and faculty. Mode split results derived from both the field counts and the electronic survey yield relatively similar proportions.

Table 3: *UBC Mode Split - excluding UBC residents*

Mode	24 hour	Peak Periods	Survey	Field Counts - 24 hour -
SOV	46,000 (2-way)	20,900	42%	44%
HOV	8,830 vehs (1-way) or 36,000 people (2-way)	16,420 people in 8,180 veh's.	33%	34%
Transit	19,000 (2-way, riders) in 950 buses	10,170 riders in 496 buses	21%	18%
Bicycle	2,700 (2-way)	1,220	3%	2.5%
Pedestrian	1,400 (2-way)	640	1%	1.3%

Tables 4 and **5** provide an indication of the geographical distribution of UBC commuters, as determined through the electronic survey. The majority of commuters (62%) originate from areas within the City of Vancouver and the University Endowment lands. As one-way commuting distances increase beyond 20 to 30 kilometres, the proportion of UBC commuters significantly declines.

Table 4: *Origins of UBC Commuters - Peak Periods only*

Proportion of Total Trips	Place of Residence	Students	Staff	Faculty	Total
53%	Vancouver	10,686 (38.8%)	2,854 (10.4%)	975 (3.5%)	14,515 (53.0%)
13%	Richmond	3,056 (11.1%)	470 (0.6%)	163 (0.6%)	3,689 (13.4%)
9%	UEL	2,143 (7.8%)	131 (0.5%)	118 (0.4%)	2,392 (8.7%)
7%	Burnaby	1,658 (6.0%)	229 (0.8%)	37 (0.1%)	1,924 (7.0%)
7%	North and West Vancouver	1,457 (5.3%)	260 (0.9%)	87 (0.3%)	1,804 (6.6%)

4%	Surrey, W.R., Langley	923 (3.3%)	203 (0.7%)	76 (0.3%)	1,202 (4.4%)
4%	Delta, Ladner	599 (2.2%)	355 (1.3%)	62 (0.2%)	1,016 (3.7%)
3%	Coquitlam, E & NW	640 (2.3%)	157 (0.6%)	41 (0.1%)	838 (3.0%)
100%	Total	21,162 (76.8%)	4,659 (16.9%)	1,559 (5.7%)	27,380 (100%)

Table 5: *One-Way Commuting Distance*

Distance to/from UBC	Students	Faculty	Staff	Total
On-Campus/UEL	2,245 (12%)	146 (9%)	152 (4%)	2,543 (10%)
Less than 10km	4,503 (24%)	705 (45%)	1,191 (29%)	6,399 (26%)
11km to 20km	5,714 (30%)	384 (25%)	1,379 (34%)	7,477 (31%)
21km to 30km	3,862 (20%)	164 (10%)	702 (17%)	4,728 (19%)
31km to 40km	1,235 (7%)	57 (4%)	365 (9%)	1,657 (7%)
41km to 50km	676 (4%)	79 (5%)	186 (4%)	941 (4%)
50km or more	531 (3%)	37 (2%)	129 (3%)	697 (3%)
Total	18,766	1,572	4,104	24,443

B. Traffic Data Collection

Table 3 provides a summary of 24-hour and peak-period mode split and volumes. More detailed information on mode split and distribution of trips are provided in **Tables B-3** and **B-4** in the Appendices. However, key indicators of the data collection are provided below in **Table 6**.

Table 6: *Key Transportation Indicators for 1997 Benchmark Data*

Indicator/Mode	Characteristics (Fall 1997 Data)
SOVs	• 46,000 two-way 24-hour total.
HOVs	• 36,100 people for two-way trips over 24-hour period. • 8,245 vehicles used for these two-way trips. • Average vehicle occupancy of 2.2 persons per vehicle for HOVs • Excludes the contribution of transit.
Transit	• 19,000 riders for two-way trips over 24-hour period. • Roughly 300,000 transit service hour per year to UBC based on figures provided by BC Transit staff. This figure needs to be further refined since it is still unclear as to where UBC service actually "begins" and "ends" (i.e. many UBC riders also use Skytrain). • UBC's 18% transit mode split ranks second in the region only to Downtown Vancouver.
Trucks	• 300 heavy truck (3 axles or more) trips daily • 395 light trucks (large trucks with only 2 axles) trips daily
Trips by On-Campus Residents	• The data provided in Table B-1 in the Appendix does not include trips made by 25% of UBC students (7,500) and a number of UBC faculty and staff (750) that live on campus. • Most, if not all, of these persons walk or bike to destinations on campus. • Factoring in these trips, the bicycle and pedestrian mode split for UBC would increase from 4% to 17%.
Bicycles / Pedestrians	• UBC's 4% walk bicycle mode split ranks second in the region only to Vancouver's West End. If on-campus bicycle and pedestrian trips were included, the mode split would be 11% – the highest in the region.
Parking	• Peak parking demand occurs at 10:00 am with approximately 10,500 stalls occupied.
Travel Demand	• Peak arrival time for all modes is 8:15 am. • Peak departure time for all modes is 4:30 pm.

Arrival and departure patterns, and the resulting estimated parking demand are described in **Section C** of the Appendices. It is interesting to note that of 8,250 carpools, roughly 7,000 (or 85%) are two person, a further 950 (or 11%) are three person, and only 300 (4%) are four or more persons.

A summary of transit ridership by time of day is provided in **Table 7** for the 1997 benchmark year. Individual transit routes are identified along University Boulevard, West 16th Avenue and S.W. Marine Drive. A graphic illustration of the distribution of inbound and outbound UBC transit trips for both 1997 and 1998 are provided in the Appendices in **Figures C-4** and **C-8**, respectively.

Table 7: *1997 Autumn Weekday Transit Ridership*
(both directions across UEL/Vancouver screenline)

Routes	Passengers (both directions across Vancouver screenline)				
	AM (6-9)	Midday (9-3)	PM (3-6)	Evening (6-12)	Weekday Total
University Blvd.					
• Rt. 4					
• Rt. 9	317	817	503	427	2,064
• Rt. 10	167	63	252	43	525
• Rt. 44	749	1,614	1,001	1,257	4,639
• Rt. 99B	126	74	182	18	400
	917	2,621	1,596	401	5,535
	2,276	5,189	3,534	2,164	13,163
W. 16th Ave.					
• Rt. 25	489	926	671	445	2,531
SW Marine Dr.					
• Rt. 41	584	1,413	715	474	3,186
• Rt. 49	295	328	403	20	1,046
• Rt. 480	48	32	71	0	151
	927	1,773	1,189	494	4,383
Totals	**3,692**	**7,888**	**5,394**	**3,103**	**20,077**
Percent	18%	39%	27%	16%	100%
Trips/Hour	1,230	1,314	1,798	517	1,115

6. TARGETS

A. Travel Patterns

For the purposes of quantifying five-year targets, 24-hour 2-way total observed person trips are used – rather than a mode split percentage – for the following reasons:

- An absolute number target is a higher standard and less susceptible to criticism.
- It eliminates any possibility of misinterpretation (i.e. easier to understand a number than a formula).
- It avoids "drift" in cases where total traffic volume rises (i.e. SOV volume could rise, but mode split based on percentage would give false impression that SOV volumes were the same).
- 24-hour volume counts will 'catch' and preclude any shift of peak hour SOVs into non-peak periods, thus working to ensure that SOVs are truly being reduced and not just shifted to other periods of the day.

Table 8 provides a summary of the transportation targets which UBC has committed to achieve over a five-year period from 1997 to 2002. The following discussion describes how these targets were developed, and compares these targets with experience at other post-secondary institutions.

Table 8: *UBC Transportation Targets*

Mode	Daily Trips to/from UBC (autumn weekday person trips, both directions across UBC screenline)					
	1997 Person Trips	**2002** Current Trends	**2002** STP Target	**2002** Change STP Target vs. Trend	**2002** U-TREK Results	**2002** Change U-TREK vs. Trend
Single-occupant vehicles	46,000	53,500	42,800	-20%	36,800	-31%
Carpools, vanpools and motorcycles	36,300	42,100	46,400	+10%	48,200	+15%
Transit	19,000	22,100	26,500	+20%	30,000	+36%
Bicycle	2,700	3,100	4,900	+58%	5,400	+74%
Pedestrian	1,400	1,600	1,800	+13%	2,000	+25%
Totals	**105,400**	**122,400**	**122,400**		**122,400**	

In 1997, there were 105,400 person trips to and from UBC during a 24-hour weekday period. With increased enrolment and additional development on campus, it is expected that by 2002, the number of daily person trips to and from UBC will increase to 122,400. This additional 17,000 daily person trip is equivalent to a 16% increase in person trips.

If current trends were to continue, additional person trips to and from UBC would result in an estimate 7,500 additional single occupant vehicle (SOV) trips. Ridesharing, transit use, cycling and walking would also increase a proportional amount.

How The Targets Were Developed

UBC has committed to reducing SOV traffic by 20%, and to increasing transit use by 20%. The *STP Target* in Table 8 is based on a 20% reduction in SOV traffic relative to trend levels. This means that daily SOV trips would be reduced to 42,800 trips, which is equivalent to a reduction of 10,700 trips from trend levels, and a reduction of 3,200 trips from 1997 levels.

The 10,700 SOV trips eliminated under the *STP Target* are reallocated to other modes as indicated in Table 8. Transit use is increased 20% from trend levels, in accordance with UBC's commitment. The remaining trips are allocated primarily to ridesharing (carpools, vanpools and motorcycles).

It is expected that when the proposed U-TREK card program is implemented, further reductions in SOV trips can be achieved. Estimates are identified in Table 8 as *U-TREK Results*. The estimated number of daily SOV trips reflects a 20% reduction from 1997 levels, which is equivalent to a 31% reduction from 2002 trend levels. The 16,700 SOV trips eliminated under the *U-TREK Results* are reallocated to other modes as indicated in Table 8. Transit use is increased 36% from trend levels, ridesharing is increased 15% and cycling is increased 74%.

How The Targets Compare

Table 9 compares the anticipated results of the U-TREK card program at UBC with the results achieved at the University of Washington in Seattle as a result of the U-Pass program. The reduction in the SOV mode share from 43% to 33% achieved at the University of Washington is comparable to the reduction from 44% to 30% anticipated at UBC. This provides confirmation that UBC's transportation targets are reasonable.

Table 9: *Mode Shares at UBC and U. of Washington*

	UBC			U. of Washington		
	1997 and 2002 Trend	2002 U-TREK	Change	Before (1989)	After (1996)	Change
SOV	44%	30%	-31%	43%	33%	-24%
Rideshare	34%	39%	+15%	10%	12%	+20%
Transit	18%	25%	+36%	21%	32%	+53%

Bicycle	3%	5%	+74%	8%	8%	0
Walk	1%	1%	+25%	23%	21%	-9%

It should be noted that the increase in the transit mode share achieved at U. of W. exceeds the increase anticipated at UBC. The reason for this is that most of the eliminated SOV trips at U. of W. were shifted to transit. At UBC, it is expected that eliminated SOV trips will be shifted to ridesharing as well as transit.

It should also be noted that at U. of W., the bicycle mode split has remained at an impressive 8%. Although it is conservatively estimated that the bicycle mode split at UBC will increase to 5%, it is recognized that a higher mode split is likely.

Table 10 provides a summary of changes to automobile and transit travel patterns at other post-secondary institutions, as the result of TDM programs similar to the proposed U-TREK program at UBC. Generally, the experience at these institutions is consistent with UBC's targets.

Table 10: *Travel Pattern Changes at Post-Secondary Institutions*

Mode	Institution	Experience
Vehicles	Cornell University	Reduction from 8,850 to 6,473 vehicles/day (27% reduction) in 1 year
Transit	U of Georgia	Increase from 328,000 to 567,000 student trips/year (73% increase) in 1 year
	UC Santa Barbara	Increase from 480,000 to 584,000 student trips/year (22% increase) in 7 years
	U of Victoria	Increase from 11% to 15% mode share forecast (36% increase)

Are Commuters Willing To Switch?

As described above, it is anticipated that 16,700 SOV trips per day can be shifted from SOV travel to other modes, as a result of the U-TREK card program and other on-campus initiatives such as improved transit services, bicycle facilities and changes to parking prices. This represents a 31% reduction in SOV trips as compared with the trend forecast for 2002.

Surveys of UBC commuters indicate that this target is reasonable. One-third of SOV commuters would consider using transit for most trips to UBC, and a further 54% of SOV commuters would consider using transit for some trips. Only 11% would not consider transit.

Focus group sessions with UBC commuters also indicate a willingness among SOV commuters to switch to transit for some trips. Most commuters indicated that they would use transit part of the time, provided that they could continue to drive half to three-quarters of the time.

In all cases, feedback from commuters indicates that the majority are willing to use non-SOV modes for many trips to and from UBC, provided that alternatives are attractive. This means frequent, direct transit service, ridematching assistance, preferred parking for carpools and vanpools, a comprehensive network of bicycle routes and bicycle parking, and supporting measures such as a guaranteed ride home and a campus shuttle service. In response to this feedback, these and other programs and facilities have been incorporated into the proposed U-TREK program.

B. U-TREK Card – Market and Target

From the Transportation Planning survey analysis, it is known that:

- Of 5,170 daily transit users, 3,300 buy a 1-zone fare card, 225 buy 2-zone card and 185 buy 3-zone cards. Thus, approximately 72% of daily UBC transit users buy monthly fare cards.
- Occasional SOV/HOV/bus users are our target segment – referred to as the "flippers."
- Reduced transit passes alone will attract people out of HOVs, and may actually result in increased SOVs trips. However, attracting "flippers" to use the U-TREK card will require both improved transit service and increased flexibility in daily commute mode choice.
- In the survey, the product was differentiated via Great TREK, Park TREK and Flex TREK cards. The Great TREK Card would primarily cover transit services with limited access to parking facilities. The Park TREK card would replace existing parking passes and offer a limited number of transit rides. The Flex TREK card would provide a mix of transit services and parking facilities.

Tables 11 and **12** provide a summary of the market response to the U-TREK card proposal, identifying the percentage of commuters and on-campus residents who would be most likely to purchase the U-TREK card, given their current transportation mode.

Table 11: *U-TREK Market Response*
(AM & PM period commuters only, excluding pedestrians and cyclists*)

Market Segment	Would Definitely/Probably Buy	Total Segment Size

Transit	90%	4,400 out of	5,000
SOV	56%	3,700 out of	6,300
"Flippers"	74%	9,400 out of	12,200
Totals:	71%	17,500 out of	23,500*

Table 12: *U-TREK Market Response*
(On-Campus Residents)

Market Segment	Would Definitely/Probably Purchase U-TREK Card
Transit	60%
SOV	64%
HOV	58%
"Flippers"	57%

7. APPENDICES

A. Technical Memos

A-1: *Transportation Planning Survey Analysis* by Ken Denike, UBC Geography Dept.
A-2: *Survey Questions* from Campbell Goodell Traynor
A-3: *Calculations and Assumptions – 1997 and 1998 Data Collection Summary Tables* by Urban Systems Ltd.

B. Tables

B-1: 1997 UBC Traffic Count Program - Summary Methodology
B-2: 1998 UBC Traffic Count Program - Summary Methodology
B-3: 1997 UBC Traffic Count Program - Summary Results with Adjustments
B-4: 1998 UBC Traffic Count Program - Summary Results with Adjustments

C. Figures

C-1: SOV/HOV Hourly Arrivals – Autumn 1997
C-2: SOV/HOV Hourly Departures – Autumn 1997
C-3: SOV/HOV Accumulation (Parking Demand) – Autumn 1997
C-4: Transit Hourly Arrival and Departures – Autumn 1997
C-5: SOV/HOV Hourly Arrivals – Autumn 1998
C-6: SOV/HOV Hourly Departures – Autumn 1998
C-7: SOV/HOV Accumulation (Parking Demand) – Autumn 1998
C-8: Transit Hourly Arrival and Departures – Autumn 1998

D. Maps

D-1: 1997 Data Collection Locations
D-2: 1998 Data Collection Locations
D-3: 1998 On-Campus Data Collection Locations

Travel Patterns to and from UBC and Response of Market Segments Collected via an Internet Web-based Scenario.

Dr. Ken Denike, Department of Geography, UBC
August 31st, 1998.

Objective

The Transportation Advisory Committee is a multi-stakeholder committee with a general mandate to improve transportation services to and from the UBC campus and to reduce reliance on single occupancy automobile use. To assist the Committee, in anticipation of recommending changes in transportation policy, an electronic survey of members of the campus community was conducted in January 1998. The objective of the survey was to estimate current travel behavior and likely response of different market segments to the initiation of improved transit service and flexible pass options among faculty, students and staff at UBC.

Methods

It was anticipated that the campus community could be divided into faculty, staff, students in much the same way that lifestyle segmentation is used in retail analysis to establish target markets. The assumption was that each segment would be somewhat homogeneous in terms of their travel characteristics and would form an obvious target for promoting new transportation products. Individuals were selected from each segment to meet as focus groups and identify issues. Then a conventional approach to constructing a questionnaire was followed.

The actual questionnaire was embedded in a fairly sophisticated Internet web-based scenario. The request to complete the questionnaire was circulated in January 1998 by means of an e-mail solicitation of 34,000 accounts. Response rates differed dramatically by sex, department, and job classification. To some extent this differential response resulted from a survey response format that required access to a high level account capable of hosting an interactive dialogue for automatic tabulation. Since many accounts, especially student accounts, are low level script based, respondents were required to go to some effort to comply with the request.

With this survey being the first large scale Internet exercise, there was no appropriate precedent to follow in evaluating responses but it was evident that the picture of travel activity to and from campus was not consistent with earlier survey results. The methods in the post survey component of the exercise involved adjusting for obvious bias associated with the respondent’s experience and facility with web-browsers and electronic mail. After processing the responses and accounting for Internet experiential bias it became clear that there was a further error and that respondents in any given segment did not necessarily display similar behavior to others in the same segment. Attitudes about possible transportation products also varied. Obviously a second source of bias was impacting the data set. One cause was traced to the nature of the solicitation, which offered rewards for completion, and in the case of cyclists, prizes of mountain bikes brought an overwhelming response. Self-interest was also a factor in response rates by those habitually using or actively considering transit. An unexpectedly low response rate by SOVers and HOVers was noted.

A second and more detailed assessment of segmentation of the campus community was conducted. A further segmentation was warranted with sub-markets being defined by mode choice. The result was a set of market segments containing individuals clustered according to consistent distributions of travel behavior. Survey results were then calibrated with known on-the-ground traffic counts taken in late November 1997. This calibration exercise required restricting the analysis of behavior to commuters to and from campus during peak morning and/or afternoon periods. Responses by campus residents were set aside for a separate study.

Background

The survey was undertaken through funding by UBC with assistance from BC Transit to provide an authoritative basis for making inferences about travel characteristics of the campus community. In this way, the UBC Transportation Advisory Committee, a multi-stakeholder committee, would gain a good impression of the profile of commuters to campus and be able to better asses the prospects of a proposed universal pass (Trek) card for UBC. At present, BC Transit offers students multi-zone privileges for single zone fare for a few dollars a year. Known as the FasTrax Program it represents a subsidy to multizone transit riders. The proposed universal pass would be provided by UBC as three distinct packages covering various levels of access to a combination of parking facilities and transit services. In one form (Great Trek Card) the pass would primarily cover transit services with limited access to parking facilities. In a different form (Park Trek Card) the pass would replace existing parking passes and offer a limited number of transit rides A third option (Flex Trek Card) would provide a mix of transit services and parking facilities.

Survey Classification

Traditionally university markets are classified as faculty, staff, students, and this classification was retained for reporting purposes as well as to provide a convenient way to identify appropriate representation. However, for analysis and projecting the market for different products, a more refined classification based on travel behaviors was adopted. Market segments were defined as groups of faculty, staff, and students cross-classified by mode of travel.

Analysis

Sample data, normalized to compensate for sources of bias in the results, are used to characterize travel behavior. The statistical practice of treating the resulting refined classification of groups as being essentially comparable is followed. That is, there may be individual eccentricities within a segment, but overall, commuters in a given segment could be expected to behave in a predictable way. Consequently inferences can be made about the attitudes of each group.

A number of techniques were applied including:

- Factor analysis to estimate attitudes towards current levels of service delivery.
- Sensitivity analysis to estimate market for different transportation products.
- Projections of survey responses to establish overall activity patterns of commuters to and from campus.

Results

Characteristics of UBC Commuters (morning/afternoon peak period)

1. Travel mode of commuters

The projected total represents typical number of individuals commuting to UBC during peak periods on a typical weekday with University in regular session. The 25,174 individuals account for about half the daily volume of person trips crossing into and out of the University Endowment Lands over a twenty-four hour weekday. The sum does not include trips made during non-peak periods nor in non-peak directions.

	SOV	HOV	Transit	Bicycle	Sum
Student	7713.25	6407.61	4106.37	633.00	19032.77
Faculty	876.68	294.98	154.52	108.97	1443.10
Staff	1986.73	1507.25	878.13	93.86	4533.58
Not Stated	72.98	54.05	30.95	5.34	165.01
Grand Total	10649.64	8263.89	5169.97	841.17	25174.46
Percentage	42.30	32.83	20.54	3.34	

The single occupant vehicle (SOV), carrying 42.3% of commuters, is the most dominant mode of travel, followed closely by those in high occupancy vehicles with 32.83%. Only one in five commuters use transit.

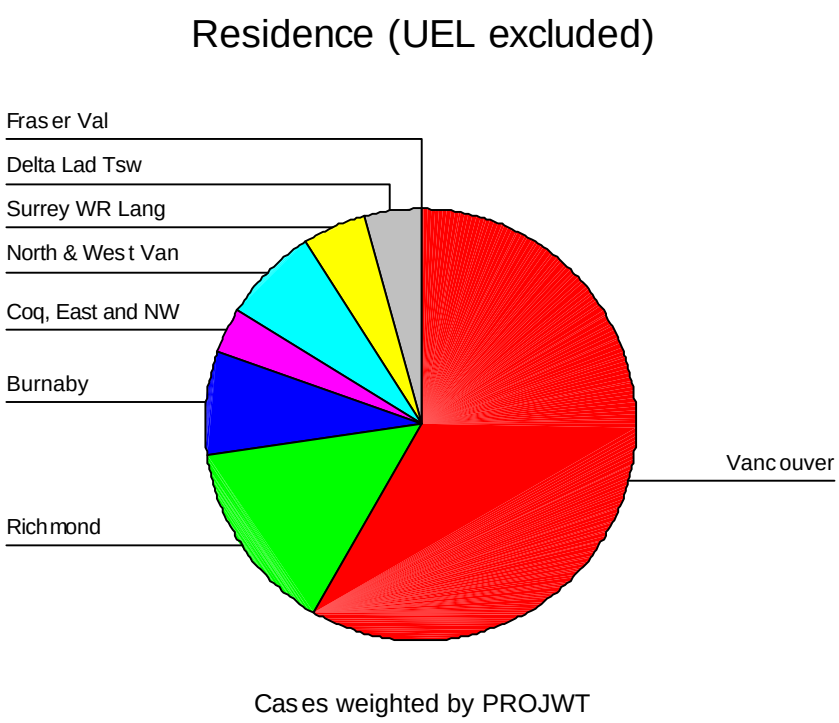
It is quite difficult to identify what portion of counter flow traffic and off-peak trips are associated with UEL residents. They were not part of the survey design frame and further survey work is required to identify this component. Travel patterns of campus residents are largely counter-flow and were excluded from analysis. An on-going study is exploring travel characteristics of campus residents and their potential as a target market for combined transit and parking packages.

2. Geographical distribution of commuters to campus (excluding on-campus residents)

A notable distance decay effect is evident in the catchement area for UBC - the number of commuters to campus declines with distance from campus. Vancouver residents (58.2%) constitute the major source of commuting on a typical weekday during regular Winter Session. The next largest catchement area is Richmond (14.2%), followed by Burnaby (7.6%) and North shore (7.2%). The more distant suburbs account for 12.4% of trips in total.

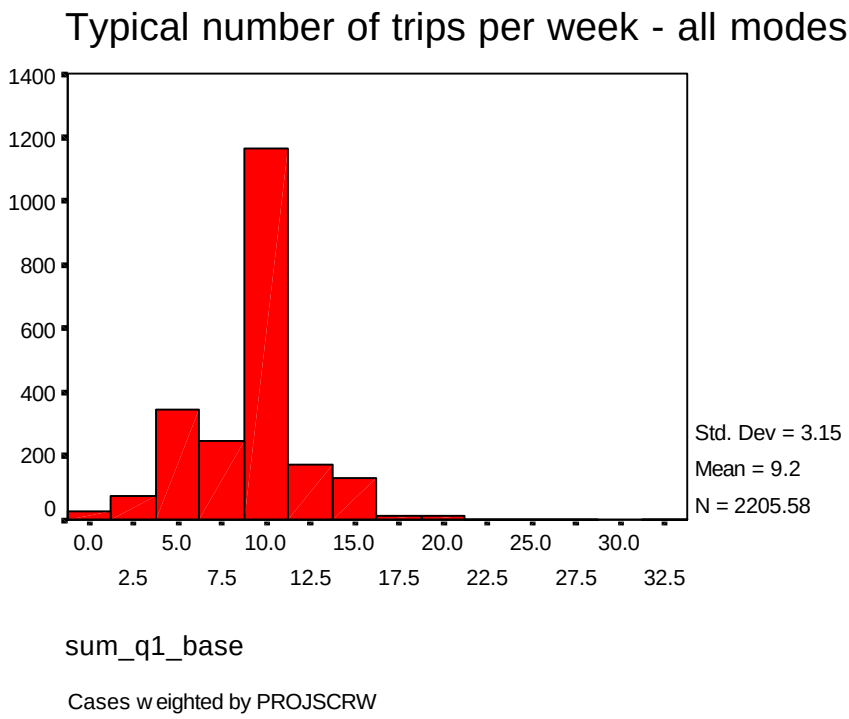
Region

	Frequency	Percent	Cumulative Percent
Vancouver	14651	58.2	58.2
Richmond	3697	14.7	72.9
Burnaby	1924	7.6	80.5
Coq, East and NW	838	3.3	83.9
North & West Van	1804	7.2	91.0
Surrey WR Lang	1209	4.8	95.8
Delta Lad Tsw	1031	4.1	99.9
Fraser Val	19	.1	100.0
Total	25174	100.0	100.0



3. Frequency of trips by commuters

There is significant variation in the number of times individual members of the campus community actually attend. During any weekday a specific member may make from 5 to 15 trips.



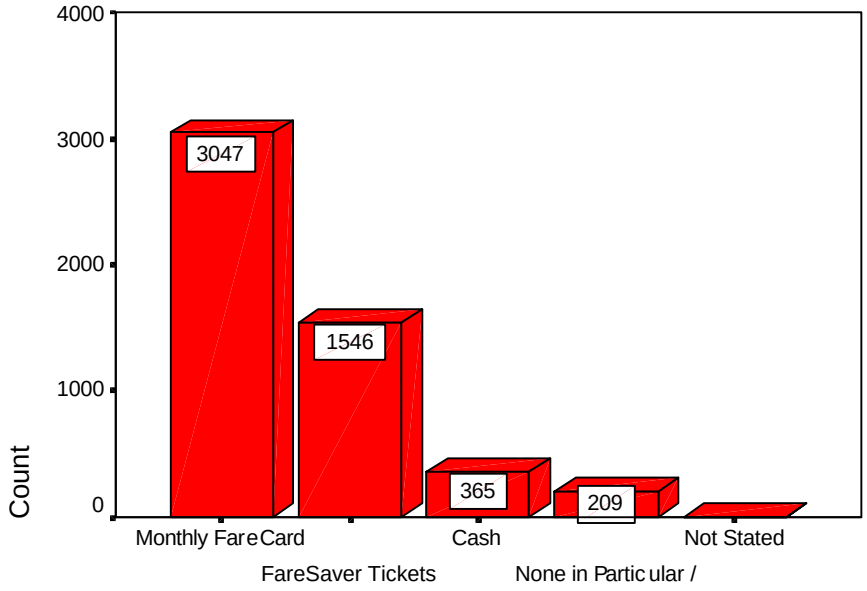
These trips represent 9.2 trips per person for the normalized survey responses. Extrapolating and allowing for variation in frequency of trips per week, the level of traffic observed is being generated by a population of 28,950.53, some of whom make a few trips per week and some who generate two round trips a day.

There is some geographical distortion associated with typical daily trips as evidenced by:

- A tendency for travel behavior of specific members not to be independent of distance or time to campus but with some consistency evident in groups according to mode of travel;
- More frequent trips by those resident closer to campus
- A greater likelihood of using transit if resident closer to campus;
- Wide variation in travel behavior for the campus community as a whole and need to project for segments of the community;
- Vanpools being formed by commuters traveling significant distances.

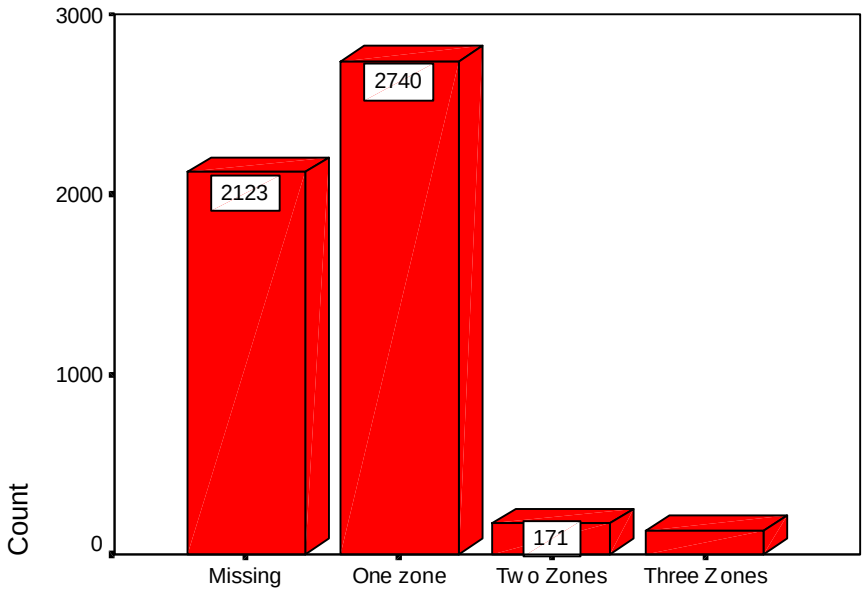
4. Transit Usage

Most regular transit users purchase monthly fare cards – accounting for 59% of the total 5170 commuters during peak periods. Of these, the overwhelming use is for origination and destination within one transit zone.



Method of payment normally used on transit.

Cases weighted by PROJTRAW



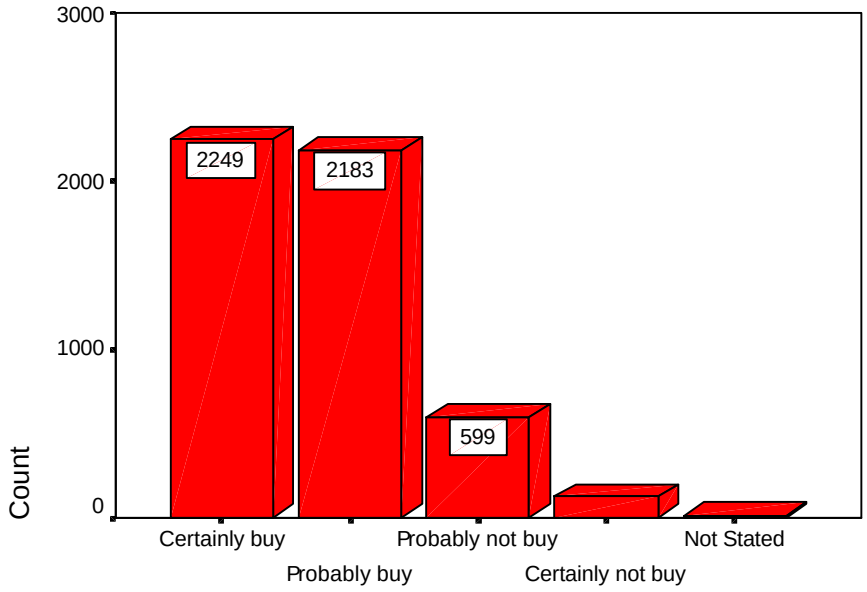
FareCard for transit

Cases weighted by PROJTRAW

Estimates of Demand for new Transportation Products by Market Segment (morning/afternoon peak period)

1. Possible demand for a new product by transit users

Regular transit users responded that they were not particularly price sensitive and that improved transit service was more important to them than fare reductions as an incentive for increased usage. Transit users identified with a new transportation package in much the same way they responded to questions about method of payment and frequency of current use.



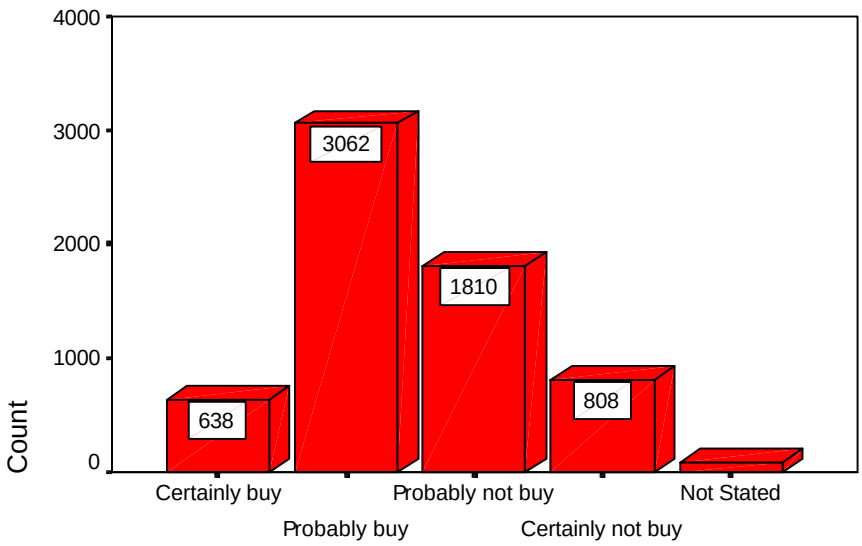
Trek Card priced and with features as expected.

Cases weighted by PROJTRAW

Given the vague appreciation by respondents of what the hypothetical transportation product (universal pass/Trek Card) entailed it was to be expected that transit users would respond according to experience. Sensitivity analysis of respondents travel behavior confirmed this. Consequently the projected numbers define market for a pass primarily covering transit services such as BC Transit's FasTrax Program or the proposed UBC Great Trek package. Albeit the market penetration would not increase much through introduction of a new product and improvements to existing fare card would more reward loyalty than increase usage.

2. Possible demand for a new product by drivers in single occupant vehicles.

Non transit users are not aware of the character, availability, and frequency of transit, as are habitual transit users. This was evident in the differences in responses to questions about acceptability of current transit performance. Those habitually driving alone can be considered as unexposed to transit and would constitute the largest component of the market for a product replacing existing parking passes such as the proposed UBC Park Trek Card.



Trek Card priced and features as expected.

Cases weighted by PROJSOVW

Selected - no transit, no HOV

3. Combined demand for a new product by drivers and passengers.

Commuter response to new products is encouraging. About 71 percent of commuters could be expected to buy or probably buy one of the packages combining transit and parking.

	Frequency	Percent	Cumulative Percent
Certainly buy	5595	22.2	22.2
Probably buy	12219	48.5	70.8
Probably not buy	5513	21.9	92.7
Certainly not buy	1659	6.6	99.2
Not Stated	189	.8	
Total	25174	100.0	100.0

	Student	**Faculty**	**Staff**	**NotStated**	**Total**
Certainly buy	4344	291	862	97	5594
Probably buy	9704	520	1930	65	12219
Probably not buy	3806	375	1332		5513
Certainly not buy	1088	238	329	3	1658
Not Stated	90	19	80		189
Total	19032	1443	4533	165	25173

Demand is a factor of awareness. There are greater possibilities for increasing transit usage by the exposed market segment of members aware or actively considering optional modes than for the unexposed who would appear to favor a parking pass based package.

The greatest gains would appear to be amongst passengers currently in high occupancy vehicles. Increasing their awareness of transit and providing an attractive transit based package could promote a shift. Albeit, this could end up both increasing transit use and if drivers do not also shift, increasing the number of single occupant vehicles.

Conclusions

A broad solicitation by E-mail of members of the campus community to participate in a web-based survey had unanticipated results. Two significant problems emerged:

- differentiation in response caused by technical restrictions and E-mail familiarity; and,
- statistical sampling problems associated with interest based involvement of members could see some benefit to participation.

The approach used to compensate was to identify market segments within which travel behavior was roughly consistent and to gain ground truth through traffic counts. This is the first large-scale survey using E-mail and experience here should provide guidelines if not a blueprint for subsequent surveys.

Specific members responded to questions according to familiarity with the issue and were grouped in the study into segments according to travel behavior. Different segments identified with packages, which closely reflected their attitudes and awareness of mode characteristics. Regular transit users were attracted to a package that provides some opportunity for parking but is fundamentally transit based. Those who habitually drive alone expressed interest in a flexible package that is parking based.

Results support the differentiation of reliance on transit and access to parking in any proposed pass. This is especially so with regards to those commuting by high occupancy vehicle. Incentives to use transit alone would likely have some attraction but would not succeed in significant change in mode split away from SOV. Indeed, it might have the reverse effect of increasing transit amongst the HOV target market while increasing reliance on single occupancy vehicles.

UBC 1998 TRANSPORTATION SURVEY

This survey is being conducted by UBC to produce a "made at UBC" strategic plan that addresses the transportation needs of all members of its community. Please help us by completing this survey. Please be assured that results will be reported in aggregate, and individual responses will be held in strictest confidence.

1. Please enter the number of **one-way trips** that you made to and from UBC in **the past seven days** by each transportation mode. For example, if you came to campus five days last week, you will have a total of 10 one-way trips.

	# of One-Way Trips in the Past Seven Days
A. Drove alone	
B. Took transit	
C. Carpool (two or more people in vehicle)	
D. Vanpool	
E. Walked	
F. Bicycled	
G. Motorcycle, scooter	
H. Other: Specify:	
I. Did not travel to campus at all in the past seven days (enter X in right hand column)	

2a. Please rate the effect that each of the following would have on the attractiveness of public transit as a way to get to and from campus. **(5 = makes transit much more attractive, 3 = makes transit somewhat more attractive 1 = has no effect)**

MARK AN "X" IN ONE COLUMN FOR EACH INCENTIVE

	Has No Effect				**Makes Transit Much More Attractive**
	1	**2**	**3**	**4**	**5**
A. Earlier work/class schedule					
B. Later work/class schedule					
C. Guaranteed ride home in case of emergency					
D. Bus stop/SkyTrain station closer to your home					
E. Bus stop closer to UBC destination					
F. More direct routes with fewer transfers					
G. Daycare at UBC					
H. More frequent transit service					
I. Bus service to and from campus later at night					
J. Bus service to and from campus earlier in the morning					
K. Free shuttle service around campus					
L. More reliable, on-time bus service					
M. Less crowded buses					
N. Bike racks on buses					
O. More limited stop, express bus service for faster trip					
P. Good transit connections with reasonable wait times					
Q. Secure lock-ups for bikes at bus stops					
R. More Park and Ride lots near bus stops					
S. Easier Access to Transit Information					
T. Friendlier bus drivers					
U. More and better shelters at bus stops					

2b. If you took transit, when would you need more frequent transit service?

PLEASE PLACE UP TO THREE "X"S IN THE APPROPRIATE BOXES

	First	Second	Third
Before 6:30 am on weekdays			
6:30 to 8:00 am on weekdays			
8:00 am to 9:30 am weekdays			
9:30 to 3:00 pm weekdays			
3:00 to 6:30 pm weekdays			
After 6:30 pm weekdays			
Weekends			
I have no regular schedule			
I have no need of more frequent transit service at all			

3. How much consideration would you give **to taking transit more often, carpooling or vanpooling** to campus, given acceptable conditions? Would you not consider trying it, consider trying it for some of your trips, or consider trying it for most or all of your trips?

TYPE "X" IN ONE COLUMN FOR EACH MODE OF TRANSPORTATION.

	Would Not Consider	Would Consider Some Trips	Would Consider Most/All Trips	Already Use for 100% of Travel
Transit				
Carpooling				
Vanpooling				

IF YOU WOULD NOT CONSIDER CARPOOLING OR VANPOOLING FOR "SOME" OR "MOST/ALL" TRIPS, SKIP TO QUESTION 5

4. Please rate how attractive each of the following would be to you as an incentive to **carpool or vanpool** to UBC. **(5 is a very strong incentive, 3 is neutral, 1 is a very weak incentive)**

ENTER "X" IN ONE COLUMN FOR EACH INCENTIVE

	Very Weak Incentive 1	2	3	4	**Very Strong Incentive** 5
A. Lower parking rates for carpoolers					
B. Reserved carpool parking close to my building					
C. Higher parking rates for those driving alone					
D. Earlier work/class schedule					
E. Later work/class schedule					
F. Guaranteed ride home in case of emergency					
G. Help in finding carpool/vanpool partners					
H. Car/vanpool use of bus HOV lanes					
I. Flexible carpool/vanpool departure times both to and from campus					
J. Ability to drop my children at school/ daycare					
K. Availability of a vehicle during the day for errands					

5. Do you live close enough that you would consider **walking or bicycling** to campus?

ENTER AN "X" IN THE APPROPRIATE ROW

Yes	
No	

IF YOU ANSWERED "NO", SKIP TO QUESTION 8

6. Please rate how attractive each of the following would be to you as an incentive to **bicycle** to work. **(5 is a very strong incentive, 3 is neutral, 1 is a very weak incentive)**

ENTER "X" IN ONE COLUMN FOR EACH INCENTIVE

	Very Weak Incentive				**Very Strong Incentive**
	1	**2**	**3**	**4**	**5**
A. Secure, convenient bicycle parking					
B. Information on bicycling (e.g. safety, route maps, weather reports, traffic)					
C. Bike "Buddy" to ride route with at least once/week					
D. Change of work/class schedule					
E. Change of work/class schedule					
F. Guaranteed ride home in case of emergency					
G. Buses/SkyTrain cars that carry bikes					
H. More bicycle lanes/routes					
I. Safer bicycle lanes/routes					
J. Shower facilities					
K. Wet weather clothes and equipment for rent					

7. Please rate how attractive each of the following would be to you as an incentive to **walk** to work. **(5 is a very strong incentive, 3 is neutral, 1 is a very weak incentive)**

ENTER "X" IN ONE COLUMN FOR EACH INCENTIVE

	Very Weak Incentive 1	2	3	4	**Very Strong Incentive** 5
A. Earlier work/class schedule					
B. Later work/class schedule					
C. Guaranteed ride home in case of emergency					
D. Walking "Buddy" at least once/week					
E. Covered walkways between buildings					
F. Planning new construction to eliminate campus 'sprawl'					

IF YOU RODE THE BUS TO OR FROM CAMPUS AT LEAST ONCE IN THE PAST WEEK, PLEASE ANSWER QUESTIONS 8 AND 9a THROUGH 9c. OTHERWISE, SKIP TO QUESTION 10.

8. What bus route do you use most frequently to travel to and from campus for most of your trip?

PLACE AN "X" IN THE APPROPRIATE ROW

	To Campus	**From Campus**
A. #4 Powell/UBC/Downtown		
B. #9 Boundary/Alma/UBC		
C. #10 Hastings/UBC		
D. #25 Brentwood/UBC		
E. #41 Joyce Station/UBC		

F. #42 Spanish Banks/Chancellor		
G. #44 Downtown/UBC		
H. #49 Metrotown Station/Dunbar Loop/UBC		
I. #99B - Line (Broadway/Lougheed Mall/ Brentwood Mall)		
J. #258 West Vancouver/UBC		
K. #480 Steveston/UBC		

Q9a. In addition to this bus, do you transfer from other bus routes, the SeaBus, SkyTrain or the West Coast Express when you take public transit to or from campus?

PLACE AN "X" IN THE APPROPRIATE ROWS

Another bus (or buses)	
SeaBus	
SkyTrain	
West Coast Express	
None of These	

9b. What method of payment do you normally use when you take transit?

Monthly FareCard	
FareSaver Tickets	
Cash	
None in Particular/It Depends	

IF YOU USE A FARECARD, PLEASE ANSWER QUESTION 9C

9c. Is your FareCard:

One zone	
Two Zones	
Three Zones	

10. Regardless of the mode that you use, when do you usually arrive at UBC and depart from UBC?

PLEASE PLACE ONE "X" IN EACH COLUMN

	Arrive at UBC	**Depart from UBC**
Before 6:30 am on weekdays		
6:30 to 8:00 am on weekdays		
8:00 am to 9:30 am weekdays		
9:30 to 3:00 pm weekdays		
3:00 to 6:30 pm weekdays		
After 6:30 pm weekdays		
Weekends		
I have no regular schedule		

The following questions ask about a new UBC Trek Card. This card would combine all transportation services (transit, carpool, vanpool and bike lockers) into a single, flexible, integrated transportation program for which you would pay a single fee. The user could switch between the alternate transportation services at will, could get a guaranteed ride home in emergencies, or could park a private vehicle on campus for a reduced charge, on a limited basis.

11. Please indicate how attractive you would find each of the following features of the new UBC Trek Card:

PLACE AN "X" IN EACH ROW

	Not at All Attractive				**Extremely Attractive**
	1	**2**	**3**	**4**	**5**
A. Unlimited public transit use, anywhere, any time					
B. Free shuttle service around campus					
C. Guaranteed ride home in case of emergency					
D. Night security escorts on campus					

E. Access to improved bicycle facilities (secure parking, showers and change rooms, etc.)					
F. Priority carpool/vanpool parking on campus					
G. Improved vanpool service frequency and flexibility of departure times					
H. Subsidies for vanpools and carpools					
I. Access to UBC pool car					
J. Ride matching program					
K. Discounts on goods, services and tickets					
L. Reduced prices for occasional parking of personal vehicle					
M. Customer loyalty rewards					
N. Pre-authorized purchase by monthly deduction from your credit card					
O. Pre-authorized purchase by series of post-dated cheques					
P. BC Transit schedules (timetables) mailed to your home or office on demand					
Q. Dedicated hotline for transit information (no waiting)					
R. Newsletter providing advance notice of service information, either mailed, e-mailed or posted at Trek website					

IF YOU SCORED "DISCOUNTS ON GOODS, SERVICES AND TICKETS" AT 2 OR BETTER, ANSWER Q12. OTHERWISE, SKIP TO Q13.

12. What types of discounts would you prefer the most?

PLACE AN "X" IN THE APPROPRIATE ROWS

A. Campus area restaurants	
B. Fine dining restaurants	
D. Dry cleaning	
E. Clothing stores	
F. Shoe stores	
G. Outdoor/sports equipment	
H. Book stores	
I. Bike stores	
J. Video rentals	
K. Coffee bars	
L. UBC Food services	
M. Music/CD stores	
N. NHL and NBA games	
O. Special events (Indy, PNE, Home Show, etc.)	
P. Movie tickets	
Q. Concert tickets	
R. Theatre tickets	
S. Tourist attractions/entertainment (i.e. Grouse, Cyprus, Aquarium, Science World)	
T. Other **(Specify:_____)**	

13a). Given that a monthly one-zone BC Transit pass costs $54, what would you expect the cost of the one-zone Trek Card to be, per month?

___ Dollars

13b). Given that a monthly two-zone BC Transit pass costs $78, what would you expect the cost of a two-zone Trek Card to be, per month?

___ Dollars

13c). Given that a monthly three-zone BC Transit pass costs $103, what would you expect the cost of a three-zone Trek Card to be, per month?

___ Dollars

14. How many <u>more</u> one-way trips would you take on public transit per week than you do now, if you purchased a UBC Trek Card? Please count all trips, whether they would be to or from campus, or to other destinations. Enter zero if you would make no additional trips on transit.

___ Additional trips per week

15. If UBC were to offer a Trek Card, how do you think it should be paid for?

IF YOU THINK THAT FUNDING SHOULD COME FROM MORE THAN ONE SOURCE, PLACE AN "X" IN MORE THAN ONE BOX

A. Revenues from sale of Trek Card	
B. Provincial transit funding	
C. Regional transit funding	
D. Elimination of free parking on campus	
E. Higher daily parking fees on campus	
F. Higher monthly parking fees on campus	
G. Higher campus parking fines	
H. A toll on single-occupancy vehicles entering campus	
I. A payment by each department out of its own budget	
J. Other UBC sources	
K. Other (specify) _____	

16. Please indicate which, if any, of the following policies you would support. Keep in mind that the more Trek Cards are sold, the cheaper the price.

PLACE AN "X" IN EACH ROW THAT YOU WOULD SUPPORT

A. Make the Trek Card totally optional	
B. Include the Trek Card automatically with (and added to the cost of) the purchase of parking permits	
C. Sell the Trek Card automatically to all students at registration, with a refund available on request	
D. Make the purchase of the Trek Card mandatory for all full-time students, staff and faculty	
E. I support none of these options	

17. Assuming the Trek Card were priced as you expect, and that all the features discussed above were available with it, how likely would you be to purchase it?

PLACE AN "X" IN THE APPROPRIATE ROW

Certainly buy	
Probably buy	
Probably not buy	
Certainly not buy	
Other/Can't Decide at this time	

Everyone please answer the remaining questions. These questions will be used to group respondents for analysis purposes only. Individuals will not be identified by these questions.

18a. Do you live on campus (that is, on the University Endowment Lands)?

___ Yes

___ No

IF QUESTION 18A IS "YES," SKIP TO QUESTION 20

18b. It is important to know where people live for transportation planning. Please enter your home postal code. If you don't know, indicate the main intersection nearest to your home.

_____

19. How many kilometres is it from your home to campus?

___ KM

20. Are you ..

Male	
Female	

21. Do you own:

	Yes	**No**
A Car		
A Bicycle		

22. Are you:

Student		**Continue**
Faculty		**Skip to Question 24**
Staff		**Skip to Question 25**

23. What year are you in?

First	
Second	
Third	
Fourth	
Graduate	
Other	

24. What faculty are you in?

Agricultural Sciences	
Applied Sciences	
Arts	
Commerce and Business Administration	
Dentistry	
Education	
Forestry	
Graduate Studies	
Law	
Medicine	
Pharmaceutical Sciences	
Science	

25. Are you:

Full Time	
Part Time	

ALL STUDENTS AND FACULTY SKIP TO QUESTION 27

26. Are you:

Union Staff	
Management and Professional Staff	

27. The University will be naming a number of volunteer "Go Green" co-ordinators, to consult with Transportation Planning and to encourage people to travel by means other than the private automobile. Would you be interested in being considered for such a position?

Yes (I give my consent to be contacted by UBC Transportation Planning)	
No	

28. Are you interested in finding out more about carpooling or vanpooling to campus?

Yes (I give my consent to be contacted by UBC Transportation Planning)	
No	

29. In order to process your responses, **we need your university identification number (employee or student number)**. Please be assured that this number will be used only to ensure that all respondents are members of the university community and **to conduct the prize draws**. Once this is done your number will be separated from your responses and your responses will be treated with complete confidentiality.

_____ University I.D. Number

THANK YOU FOR TAKING THE TIME TO ANSWER THIS SURVEY.

PLEASE FAX THE SURVEY BACK TO CAMPBELL GOODELL TRAYNOR AT 681-0427 OR MAIL IT TO SUITE 500, 475 HOWE STREET, VANCOUVER, BC, V6C 2B3

Calculations and Assumptions

1997 and 1998
UBC Transportation Data

Summary Tables

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 ridership 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.

Table B-1: *Transportation Data Collection Program*

1997 Program					1996 Program
Data	**Time Period**	**Timing**	**Locations**	**Source**	
Traffic volumes	4 consecutive weekdays (Mon-Thurs) 24 hour periods	November 3-6	• NW Marine Dr. • 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.	Automatic Counts, ***City of Vancouver***	November 4-11 (8 days) • Mon-Fri • Sat-Sun • Stat. Holiday 24-hour periods
	Weekend, stat. holiday & weekdays (7 days) 24 hour periods	November 5-11	• NW Marine Dr. • Chancellor w/o Tasmania • University w/o Blanca • 16th Ave. w/o Blanca • SW Marine e/o 16th Ave.	Automatic Counts, ***TransTech***	
Vehicle Occupancy	3 hours AM 2 hours noon 3 hours PM	First and second weeks of November	• NW Marine Dr. • Chancellor w/o Tasmania • University w/o Blanca • 16th Ave. w/o Blanca • SW Marine e/o 16th Ave.	Manual occupancy checks, ***TransTech***	November 5 & 7 Inbound • 7:30 to 9:30 • 11:30 to 13:30 Outbound • 11:30 to 13:30 • 15:30 to 17:30
Vehicle classification	7 weekdays total 24 hours per location	November 3-7, 12 to 14	• NW Marine • 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.	Automatic classification, ***City of Vancouver***	No automatic classification counts (24 hour) undertaken

1997 Program					1996 Program
Data	**Time Period**	**Timing**	**Locations**	**Source**	
Detailed vehicle classification	3 hours AM 2 hours noon 3 hours PM (Weekdays)	November 3-14, as available	• 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr. • NW Marine	Manual classification, in coordination with vehicle occupancy, ***TransTech***	See vehicle occupancy
Bicycle Counts	3 hours AM 2 hours noon 3 hours PM	First and second weeks of November	• 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.	Manual counts, in coordination with vehicle occupancy, ***TransTech***	See vehicle occupancy
Pedestrian Counts	3 hours AM 2 hours noon 3 hours PM	First and second weeks of November	• 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.	Manual counts, in coordination with vehicle occupancy, ***TransTech***	See vehicle occupancy
Transit Load Counts	Tuesday 06:30 to 20:30 inbound Thursday 06:00 to 22:00 outbound	November 4 November 6 Sept./Oct.	• SW Marine/Camosun • 16th Ave. (Map board) • 10th Ave. (Golf course) • UBC Bus Loop	Manual load counts, ***BC Transit***	November 5 & 7 07:00 to 14:00 inbound 11:00 to 18:00 outbound

Table B-2: *1998 Draft Transportation Data Collection Program*

Source	Data	Time Period	Timing	Locations
TransTech Data Services	**Traffic volumes** (automatic counts)	Weekdays (7 days) 24 hour periods	October 19-25 Same period or following week if resources are limited for on-campus counts	• NW Marine Dr. n/o Chancellor • Chancellor e/o Wesbrook Mall • University e/o Acadia • 16th Ave. e/o Hampton Place Rd. • SW Marine e/o 16th Ave. • East Mall s/o University Blvd. • Agronomy Rd. e/o Main Mall • Crescent Road e/o Main Mall • Thunderbird Blvd. w/o Wesbrook • Wesbrook Mall s/o University Blvd. • Osoyoos Cres. w/o Revelstoke Ct. (include speed data collection for Osoyoos Cres location)
Contact: • Carol Smith P:250-381-3971 F:250-381-3972	**Vehicle occupancy** (manual checks)	3 hours AM (700 to 1000) 2 hours noon (1130 to 1330) 3 hours PM (1500 to 1800)	October 19-30 (weekdays - one day per location - preferably Tuesday and Thursday to coordinate with BC Transit's counts)	• NW Marine Dr. n/o Chancellor • Chancellor e/o Wesbrook Mall • University e/o Acadia • 41st Ave. e/o SW Marine Dr. • 16th Ave. e/o Hampton Place Rd. • SW Marine e/o 41st Ave.
	Detailed vehicle classification (manual survey in coordination with vehicle occupancy)	3 hours AM (700 to 1000) 2 hours noon (1130 to 1330) 3 hours PM (1500 to 1800)	October 19-30 (same as occupancy)	See vehicle occupancy locations
	Bicycle Counts (manual survey in coordination with vehicle occupancy)	3 hours AM (700 to 1000) 2 hours noon (1130 to 1330) 3 hours PM (1500 to 1800)	October 19-30 (same as occupancy)	See vehicle occupancy locations
	Pedestrian Counts (manual survey in coordination with vehicle occupancy)	3 hours AM (700 to 1000) 2 hours noon (1130 to 1330) 3 hours PM (1500 to 1800)	October 19-30 (same as occupancy)	See vehicle occupancy locations

Source	Data	Time Period	Timing	Locations
City of Vancouver *Contact:* • Renate Ehm P: 873-7424 F: 873-7212 E-mail: renate_ehm@city.vancouver.bc.ca	**Vehicle classification** (automatic classifiers)	4 weekdays total 24 hours per location	October 19-31 as resources are available	• NW Marine Dr. • 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.
	Traffic volumes (automatic counts)	4 consecutive 24 hour periods	October 19-23	• NW Marine Dr. • 4th Ave. w/o Blanca • 10th Ave. w/o Blanca • 16th Ave. w/o Blanca • 41st Ave. e/o Camosun • SW Marine e/o Camosun Dr.
BC Transit *Contact:* • Glenn Vernon P: 540-3386 F: 540-3315 E-mail: glenn_vernon@bctransit.com	**Transit load counts** (manual checks) (includes check of bike racks on buses)	• Tuesday – Oct. 20 06:00 to 15:00 in and out • Thursday – Oct. 22 06:00 to 15:00 in and out • Saturday – Oct. 24 10:00 – 18:00 inbound • Sunday – Oct. 25 10:00 to 18:00 inbound • Tuesday – Oct. 27 15:00 to 24:00 in and out • Thursday – Oct. 29 15:00 to 24:00 in and out • Saturday – Oct. 31 10:00 to 18:00 outbound • Sunday – Nov. 1 10:00 to 18:00 outbound	October 20 to November 1	• SW Marine at Camosun • 41st Ave. at S.W. Marine • 16th Ave. at Blanca • University Blvd. at Allison Rd.
Student Traffic Counters	**Manual Intersection Counts**	3 hours AM (700 to 1000) 3 hours PM (1500 to 1800)	October 19-30 (1 weekday per location)	• Chancellor Blvd. at Wesbrook Mall • University Blvd. at Wesbrook Mall • Thunderbird Blvd. at Wesbrook Mall • W.16th Ave. at Wesbrook Mall • W.16th Ave. at SW Marine Drive • University Blvd. at East Mall

Table B-3: *1997 Traffic Count Program - Summary Results*

Last Updated: February 22, 1999

			1997 - UBC Screenlines				1997 - Vancouver Screenlines			
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
Person Trips	24-Hour (estimated)		52061	54036	106097	100.0%	56048	57539	113587	100.0%
	AM Peak Hour	8:00-9:00 AM	1,796	9362	11157	10.5%	1933	9969	11902	10.5%
	AM Peak Period	7:00-10:00 AM	4226	20478	24704	23.3%	4829	21805	26634	23.4%
	PM Peak Hour	4:00-5:00 PM	6681	2403	9085	8.6%	7193	2559	9752	8.6%
	PM Peak Period	3:00-6:00 PM	18186	6869	25055	23.6%	19400	7951	27351	24.1%
	AM + PM Peak Periods		22412	27347	49760	46.9%	24229	29756	53985	47.5%
	Midday 2 Hours	11:30 AM-1:30 PM	6602	5455	12058	11.4%	6884	5861	12745	11.2%
	Daytime (estimated)	7:00 AM-6:00 PM	42210	45339	87548	82.5%	45442	48278	93720	82.5%
Person Trips	24-Hour (estimated)	SOV	22491	23509	46000	43.4%	24506	26171	50677	44.6%
		HOV, 2 person	13357	14589	27947	26.3%	14457	15083	29540	26.0%
		HOV, 3 person	2628	3062	5690	5.4%	2844	2975	5819	5.1%
		HOV, 4+ person	1230	1256	2485	2.3%	1327	1148	2475	2.2%
		Transit	9597	9403	19000	17.9%	10140	9934	20074	17.7%
		Bicycle	1453	1247	2700	2.5%	1541	1322	2863	2.5%
		Pedestrian	774	626	1400	1.3%	664	537	1201	1.1%
		Motorcycle	110	71	181	0.2%	126	83	208	0.2%
		Light Truck (2 axles)	243	152	395	0.4%	256	160	416	0.4%
		Heavy Trucks (3 axles or more)	178	121	298	0.3%	187	127	314	0.3%
	AM Peak Period	SOV	2315	8244	10559	42.7%	2700	8820	11520	43.3%
		HOV, 2 person	926	5403	6329	25.6%	1080	5780	6860	25.8%
		HOV, 3 person	180	1066	1246	5.0%	210	1140	1350	5.1%
		HOV, 4+ person	69	411	480	1.9%	80	440	520	2.0%
		Transit	533	4489	5022	20.3%	563	4743	5306	19.9%
		Bicycle	38	557	594	2.4%	40	590	630	2.4%
		Pedestrian	70	163	233	0.9%	60	140	200	0.8%
		Motorcycle	2	31	33	0.1%	2	36	38	0.1%
		Light Truck (2 axles)	51	64	114	0.5%	51	64	115	0.4%
		Heavy Trucks (3 axles or more)	43	52	94	0.4%	43	52	95	0.4%
	PM Peak Period	SOV	7108	3208	10317	41.2%	7640	3840	11480	42.0%
		HOV, 2 person	4671	1704	6375	25.4%	5020	2040	7060	25.8%
		HOV, 3 person	921	426	1347	5.4%	990	510	1500	5.5%
		HOV, 4+ person	447	201	647	2.6%	480	240	720	2.6%
		Transit	4066	1086	5152	20.6%	4296	1097	5393	19.7%
		Bicycle	575	47	623	2.5%	610	50	660	2.4%
		Pedestrian	257	152	408	1.6%	220	130	350	1.3%
		Motorcycle	45	3	48	0.2%	51	4	55	0.2%
		Light Truck (2 axles)	59	24	83	0.3%	57	23	80	0.3%
		Heavy Trucks (3 axles or more)	37	18	55	0.2%	36	17	53	0.2%
	AM + PM Peak Periods	SOV	9424	11452	20876	42.0%	10340	12670	23010	42.6%
		HOV, 2 person	5597	7107	12704	25.5%	6100	7820	13920	25.8%
		HOV, 3 person	1101	1492	2593	5.2%	1200	1680	2880	5.3%
		HOV, 4+ person	515	612	1127	2.3%	560	680	1240	2.3%
		Transit	4599	5575	10174	20.4%	4859	5840	10699	19.8%
		Bicycle	613	604	1217	2.4%	650	640	1290	2.4%
		Pedestrian	326	315	641	1.3%	280	260	540	1.0%
		Motorcycle	47	34	81	0.2%	53	40	93	0.2%
		Light Truck (2 axles)	110	88	197	0.4%	108	87	195	0.4%
		Heavy Trucks (3 axles or more)	80	69	149	0.3%	79	69	148	0.3%
	Midday 2 Hours	SOV	2833	2498	5331	44.2%	2960	2760	5720	44.9%
		HOV, 2 person	1665	1195	2860	23.7%	1740	1320	3060	24.0%
		HOV, 3 person	373	190	563	4.7%	390	210	600	4.7%
		HOV, 4+ person	191	72	264	2.2%	200	80	280	2.2%
		Transit	1219	1202	2421	20.1%	1288	1204	2492	19.6%
		Bicycle	94	123	217	1.8%	100	130	230	1.8%
		Pedestrian	105	85	190	1.6%	90	70	160	1.3%
		Motorcycle	12	8	20	0.2%	14	9	23	0.2%
		Light Truck (2 axles)	48	41	89	0.7%	45	39	84	0.7%
		Heavy Trucks (3 axles or more)	61	41	102	0.8%	57	39	96	0.8%
Traffic Volumes	24-Hour		31915	31748	63663	100.0%	36326	37011	73337	100.0%
Total	AM Peak Hour	8:00-9:00 AM	1144	5036	6180	9.7%	1450	5506	6956	9.5%
	AM Peak Period	7:00-10:00 AM	2976	11280	14256	22.4%	3630	12623	16253	22.2%
	PM Peak Hour	4:00-5:00 PM	3870	1480	5351	8.4%	4296	1838	6134	8.4%
	PM Peak Period	3:00-6:00 PM	10405	4229	14634	23.0%	11697	5295	16992	23.2%
	AM + PM Peak Periods		13373	15466	28838	45.3%	15327	17918	33245	45.3%
	Midday 2 Hours	11:30 AM to 1:30 PM	4418	3746	8163	12.8%	4828	4328	9156	12.5%
	Daytime	7:00 AM to 6:00 PM	26928	27150	54077	84.9%	27426	29088	56514	77.1%
Traffic Volumes	24-Hour	NW Marine Dr.	1005	1035	2041	3.2%	1062	1329	2391	3.3%
By Route		Chancellor Blvd.	6006	5654	11660	18.3%	6512	6135	12647	17.2%
		University Blvd.	7860	6750	14610	22.9%	9383	8788	18171	24.8%
		16th Avenue	6486	6388	12875	20.2%	6915	7196	14111	19.2%
		41st Avenue	n/a	n/a	n/a	n/a	4128	5389	9517	13.0%
		SW Marine Dr.	11196	12216	23412	36.8%	8326	8174	16500	22.5%
	AM Peak Hour	NW Marine Dr.	36	133	169	2.7%	31	191	222	3.2%
		Chancellor Blvd.	196	891	1088	17.6%	235	935	1170	16.8%
		University Blvd.	319	795	1113	18.0%	453	1084	1537	22.1%
		16th Avenue	254	1165	1419	23.0%	253	1239	1492	21.4%
		41st Avenue	n/a	n/a	n/a	n/a	156	1078	1234	17.7%
		SW Marine Dr.	392	1973	2365	38.3%	322	979	1301	18.7%
	AM Peak Period	NW Marine Dr.	94	223	316	2.2%	86	341	427	2.6%
		Chancellor Blvd.	466	1993	2459	17.2%	581	2151	2732	16.8%
		University Blvd.	855	1776	2632	18.5%	1092	2370	3462	21.3%
		16th Avenue	683	2471	3153	22.1%	674	2674	3348	20.6%
		41st Avenue	n/a	n/a	n/a	n/a	424	2301	2725	16.8%
		SW Marine Dr.	946	4839	5785	40.6%	773	2786	3559	21.9%
	PM Peak Hour	NW Marine Dr.	105	65	170	3.2%	117	83	200	3.3%
		Chancellor Blvd.	827	221	1048	19.6%	844	246	1090	17.8%
		University Blvd.	778	367	1145	21.4%	904	498	1402	22.9%
		16th Avenue	771	317	1088	20.3%	866	376	1242	20.2%
		41st Avenue	n/a	n/a	n/a	n/a	696	282	978	15.9%
		SW Marine Dr.	1363	509	1873	35.0%	869	353	1222	19.9%
	PM Peak Period	NW Marine Dr.	288	185	473	3.2%	328	242	570	3.4%
		Chancellor Blvd.	2122	656	2778	19.0%	2197	741	2938	17.3%
		University Blvd.	2139	1046	3185	21.8%	2577	1421	3998	23.5%
		16th Avenue	2049	876	2925	20.0%	2318	1065	3383	19.9%
		41st Avenue	n/a	n/a	n/a	n/a	1724	683	2407	14.2%
		SW Marine Dr.	3796	1606	5402	36.9%	2553	1143	3696	21.8%
	AM + PM Peak Periods	NW Marine Dr.	378	417	795	2.8%	414	583	997	3.0%
		Chancellor Blvd.	2581	2646	5228	18.1%	2778	2892	5670	17.1%
		University Blvd.	2993	2820	5813	20.2%	3669	3791	7460	22.4%
		16th Avenue	2729	3338	6067	21.0%	2992	3739	6731	20.2%
		41st Avenue	n/a	n/a	n/a	n/a	2148	2984	5132	15.4%
		SW Marine Dr.	4738	6441	11178	38.8%	3326	3929	7255	21.8%
	Midday 2 Hours	NW Marine Dr.	161	144	305	3.7%	171	170	341	3.7%
		Chancellor Blvd.	736	667	1403	17.2%	827	708	1535	16.8%
		University Blvd.	1135	964	2098	25.7%	1269	1190	2459	26.9%
		16th Avenue	916	703	1619	19.8%	928	777	1705	18.6%
		41st Avenue	n/a	n/a	n/a	n/a	709	466	1175	12.8%
		SW Marine Dr.	1261	1360	2622	32.1%	924	1017	1941	21.2%
	Daytime	NW Marine Dr.	858	888	1745	3.2%	835	1081	1916	3.4%
	(7AM to 6PM)	Chancellor Blvd.	5071	4863	9934	18.4%	4969	4876	9845	17.4%
		University Blvd.	6280	5623	11903	22.0%	6764	6644	13408	23.7%
		16th Avenue	5377	5520	10897	20.2%	5186	5728	10914	19.3%
		41st Avenue	n/a	n/a	n/a	n/a	3930	4328	8258	14.6%
		SW Marine Dr.	8892	10554	19446	36.0%	5742	6431	12173	21.5%

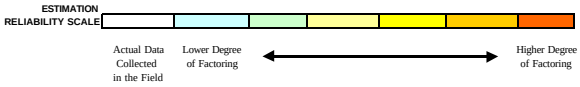


Table B-4: *1998 Traffic Count Program - Summary Results*

Last Updated: February 22, 1999

			1998 - UBC Screenlines				1998 - Vancouver Screenlines			
			Eastbound	Westbound	Total	Percentage	Eastbound	Westbound	Total	Percentage
Person Trips	24-Hour (estimated)		53594	52701	106295	100.0%	59833	60922	120755	100.0%
	AM Peak Hour	8:00-9:00 AM	1860	8455	10315	9.7%	2077	9774	11850	9.8%
	AM Peak Period	7:00-10:00 AM	4755	19127	23882	22.5%	5643	21026	26669	22.1%
	PM Peak Hour	4:00-5:00 PM	7200	2794	9994	9.4%	8038	3230	11268	9.3%
	PM Peak Period	3:00-6:00 PM	18132	8355	26487	24.9%	19893	10025	29918	24.8%
	AM + PM Peak Periods		22887	27482	50369	47.4%	25536	31051	56587	46.9%
	Midday 2 Hours	11:30 AM-1:30 PM	6795	5899	12694	11.9%	7205	6507	13712	11.4%
	Daytime (estimated)	7:00 AM-6:00 PM	43358	44295	87653	82.5%	48406	51205	99611	82.5%
Person Trips	24-Hour (estimated)	SOV	25016	24300	49316	46.4%	28543	28389	56932	47.1%
		HOV, 2 person	11967	12750	24717	23.3%	13562	15139	28701	23.8%
		HOV, 3 person	2251	2186	4437	4.2%	2559	2872	5431	4.5%
		HOV, 4+ person	1530	874	2405	2.3%	1761	1343	3104	2.6%
		Transit	9701	9668	19369	18.2%	10249	10214	20464	16.9%
		Bicycle	1997	1850	3847	3.6%	2117	1961	4078	3.4%
		Pedestrian	837	755	1592	1.5%	718	647	1365	1.1%
		Motorcycle	165	179	345	0.3%	188	209	397	0.3%
		Light Truck (2 axles)	74	111	185	0.2%	78	117	195	0.2%
		Heavy Trucks (3 axles or more)	54	29	83	0.1%	57	30	87	0.1%
	AM Peak Period	SOV	2622	8257	10879	45.6%	3198	9240	12438	46.6%
		HOV, 2 person	860	4200	5060	21.2%	1049	4700	5749	21.6%
		HOV, 3 person	195	720	915	3.8%	238	806	1044	3.9%
		HOV, 4+ person	224	288	512	2.1%	273	322	596	2.2%
		Transit	658	4679	5337	22.3%	695	4943	5639	21.1%
		Bicycle	62	712	774	3.2%	66	755	821	3.1%
		Pedestrian	79	146	225	0.9%	68	125	193	0.7%
		Motorcycle	6	50	56	0.2%	7	58	65	0.2%
		Light Truck (2 axles)	38	61	99	0.4%	38	61	100	0.4%
		Heavy Trucks (3 axles or more)	11	14	25	0.1%	11	14	25	0.1%
	PM Peak Period	SOV	7512	3815	11327	42.8%	8445	4776	13222	44.2%
		HOV, 2 person	3988	2216	6204	23.4%	4483	2774	7258	24.3%
		HOV, 3 person	717	489	1206	4.6%	806	612	1418	4.7%
		HOV, 4+ person	396	272	668	2.5%	445	341	786	2.6%
		Transit	4404	1053	5457	20.6%	4653	1064	5717	19.1%
		Bicycle	747	207	954	3.6%	792	219	1011	3.4%
		Pedestrian	260	229	489	1.8%	223	196	419	1.4%
		Motorcycle	61	39	100	0.4%	69	45	115	0.4%
		Light Truck (2 axles)	36	33	69	0.3%	35	32	66	0.2%
		Heavy Trucks (3 axles or more)	11	2	13	0.0%	11	2	13	0.0%
	AM + PM Peak Periods	SOV	10134	12072	22206	44.1%	11643	14017	25660	45.3%
		HOV, 2 person	4848	6416	11264	22.4%	5532	7475	13007	23.0%
		HOV, 3 person	912	1209	2121	4.2%	1044	1418	2462	4.4%
		HOV, 4+ person	620	560	1180	2.3%	718	663	1381	2.4%
		Transit	5062	5732	10794	21.4%	5348	6007	11355	20.1%
		Bicycle	809	919	1728	3.4%	858	974	1832	3.2%
		Pedestrian	339	375	714	1.4%	291	322	612	1.1%
		Motorcycle	67	89	156	0.3%	76	104	180	0.3%
		Light Truck (2 axles)	30	62	92	0.2%	73	93	166	0.3%
		Heavy Trucks (3 axles or more)	22	16	38	0.1%	22	16	38	0.1%
	Midday 2 Hours	SOV	3230	2679	5909	46.5%	3530	3096	6626	48.3%
		HOV, 2 person	1520	1282	2802	22.1%	1548	1374	2922	21.3%
		HOV, 3 person	264	318	582	4.6%	279	408	687	5.0%
		HOV, 4+ person	188	116	304	2.4%	204	126	330	2.4%
		Transit	1185	1106	2291	18.0%	1252	1108	2360	17.2%
		Bicycle	148	199	347	2.7%	157	211	368	2.7%
		Pedestrian	164	85	249	2.0%	141	70	211	1.5%
		Motorcycle	23	30	53	0.4%	26	35	61	0.4%
		Light Truck (2 axles)	53	75	128	1.0%	50	71	121	0.9%
		Heavy Trucks (3 axles or more)	20	9	29	0.2%	19	9	27	0.2%
Traffic Volumes	24-Hour		32466	31937	64403	100.0%	36953	37231	74184	100.0%
Total	AM Peak Hour	8:00-9:00 AM	1169	4812	5981	9.3%	1482	5261	6743	9.1%
	AM Peak Period	7:00-10:00 AM	3017	11152	14169	22.0%	3680	12480	16160	21.8%
	PM Peak Hour	4:00-5:00 PM	3801	1580	5381	8.4%	4219	1962	6181	8.3%
	PM Peak Period	3:00-6:00 PM	10135	4714	14849	23.1%	11394	5902	17296	23.3%
	AM + PM Peak Periods		13152	15866	29018	45.1%	15074	18382	33456	45.1%
	Midday 2 Hours	11:30 AM to 1:30 PM	4103	3633	7736	12.0%	4484	4198	8682	11.7%
	Daytime	7:00 AM to 6:00 PM	25551	27147	52698	81.8%	26024	29085	55109	74.3%
Traffic Volumes	24-Hour	NW Marine Dr.	1079	1111	2190	3.4%	1140	1426	2566	3.5%
By Route		Chancellor Blvd.	5802	5540	11342	17.6%	6291	6011	12302	16.6%
		University Blvd.	7058	6314	13372	20.8%	8426	8220	16646	22.4%
		16th Avenue	6867	6526	13393	20.8%	7321	7351	14672	19.8%
		41st Avenue	n/a	n/a	n/a	n/a	5104	5895	10999	14.8%
		SW Marine Dr.	11660	12446	24106	37.4%	8671	8328	16999	22.9%
	AM Peak Hour	NW Marine Dr.	36	91	127	2.1%	31	131	162	2.4%
		Chancellor Blvd.	213	896	1109	18.5%	255	940	1195	17.7%
		University Blvd.	282	700	982	16.4%	401	955	1356	20.1%
		16th Avenue	279	1156	1435	24.0%	278	1229	1507	22.3%
		41st Avenue	n/a	n/a	n/a	n/a	222	1029	1251	18.6%
		SW Marine Dr.	359	1969	2328	38.9%	295	977	1272	18.9%
	AM Peak Period	NW Marine Dr.	85	186	271	1.9%	78	285	363	2.2%
		Chancellor Blvd.	465	2016	2481	17.5%	580	2176	2756	17.1%
		University Blvd.	770	1633	2403	17.0%	983	2179	3162	19.6%
		16th Avenue	720	2419	3139	22.2%	711	2618	3329	20.6%
		41st Avenue	n/a	n/a	n/a	n/a	530	2402	2932	18.1%
		SW Marine Dr.	977	4898	5875	41.5%	798	2820	3618	22.4%
	PM Peak Hour	NW Marine Dr.	112	89	201	3.7%	125	113	238	3.9%
		Chancellor Blvd.	733	253	986	18.3%	748	282	1030	16.7%
		University Blvd.	696	359	1055	19.6%	809	487	1296	21.0%
		16th Avenue	823	332	1155	21.5%	924	394	1318	21.3%
		41st Avenue	n/a	n/a	n/a	n/a	697	307	1004	16.2%
		SW Marine Dr.	1437	547	1984	36.9%	916	379	1295	21.0%
	PM Peak Period	NW Marine Dr.	317	275	592	4.0%	361	359	720	4.2%
		Chancellor Blvd.	1951	751	2702	18.2%	2020	848	2868	16.6%
		University Blvd.	1891	1084	2975	20.0%	2278	1473	3751	21.7%
		16th Avenue	2171	950	3121	21.0%	2456	1155	3611	20.9%
		41st Avenue	n/a	n/a	n/a	n/a	1720	890	2610	15.1%
		SW Marine Dr.	3805	1654	5459	36.8%	2559	1177	3736	21.6%
	AM + PM Peak Periods	NW Marine Dr.	401	461	862	3.0%	439	645	1084	3.2%
		Chancellor Blvd.	2415	2767	5182	17.9%	2599	3024	5623	16.8%
		University Blvd.	2660	2717	5377	18.5%	3261	3652	6913	20.7%
		16th Avenue	2890	3368	6258	21.6%	3168	3773	6941	20.7%
		41st Avenue	n/a	n/a	n/a	n/a	2250	3292	5542	16.6%
		SW Marine Dr.	4782	6552	11334	39.1%	3357	3997	7354	22.0%
	Midday 2 Hours	NW Marine Dr.	176	169	345	4.5%	187	200	387	4.5%
		Chancellor Blvd.	703	639	1342	17.3%	790	678	1468	16.9%
		University Blvd.	928	788	1716	22.2%	1038	973	2011	23.2%
		16th Avenue	807	726	1533	19.8%	818	802	1620	18.7%
		41st Avenue	n/a	n/a	n/a	n/a	560	565	1125	13.0%
		SW Marine Dr.	1489	1311	2800	36.2%	1091	980	2071	23.9%
	Daytime	NW Marine Dr.	911	947	1858	3.5%	887	1153	2040	3.7%
	(7AM to 6PM)	Chancellor Blvd.	4584	4781	9365	17.8%	4492	4794	9286	16.9%
		University Blvd.	5359	5102	10461	19.9%	5772	6028	11800	21.4%
		16th Avenue	5375	5579	10954	20.8%	5184	5789	10973	19.9%
		41st Avenue	n/a	n/a	n/a	n/a	3669	4778	8447	15.3%
		SW Marine Dr.	9322	10738	20060	38.1%	6020	6543	12563	22.8%

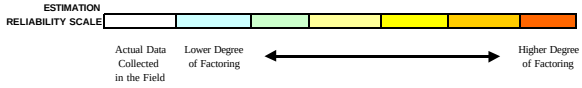


Figure C-1: SOV and HOV Arrivals - Fall 1997

UEL Screenline

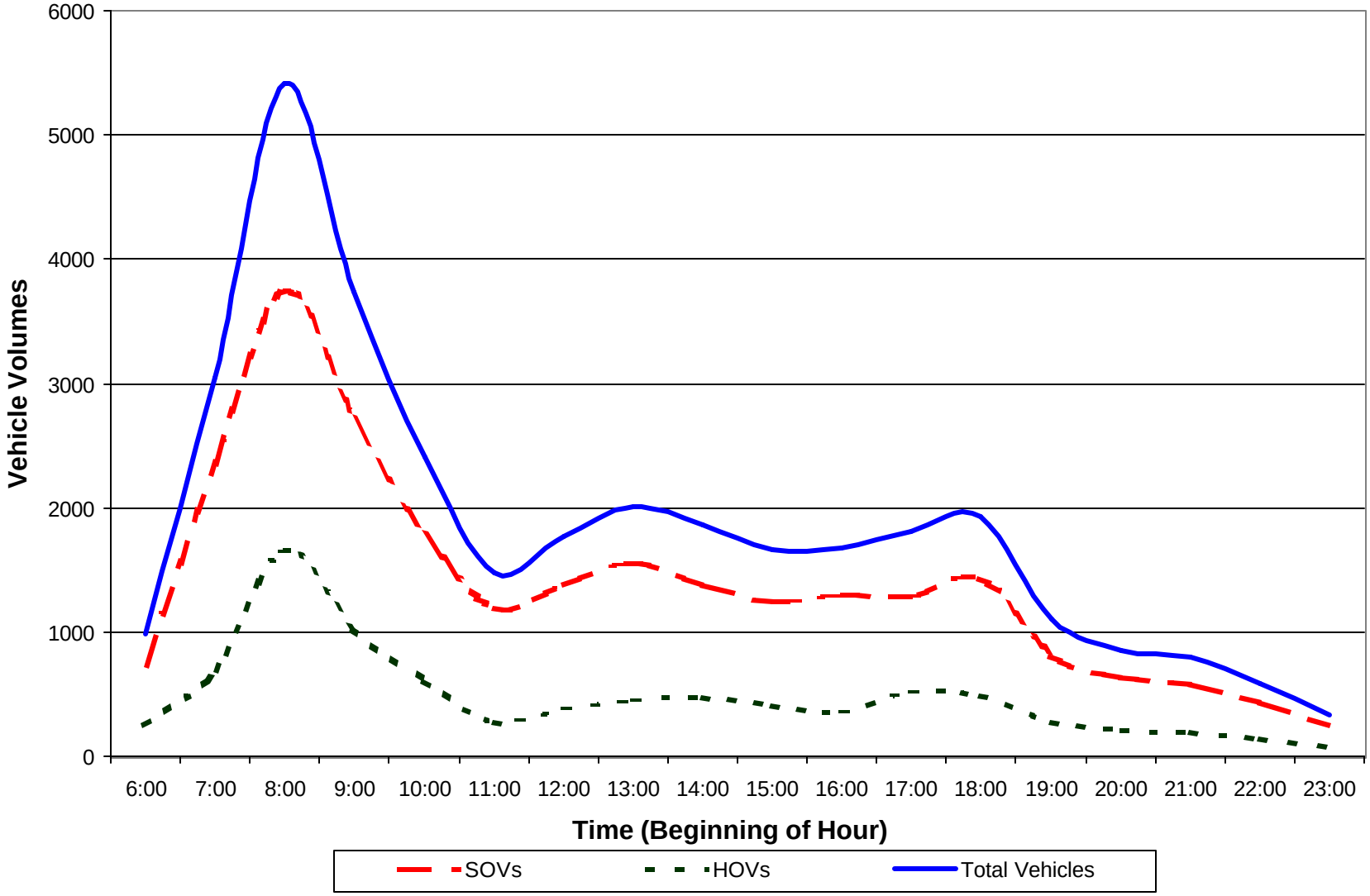


Figure C-2: SOV and HOV Departures - Fall 1997

UEL Screenline

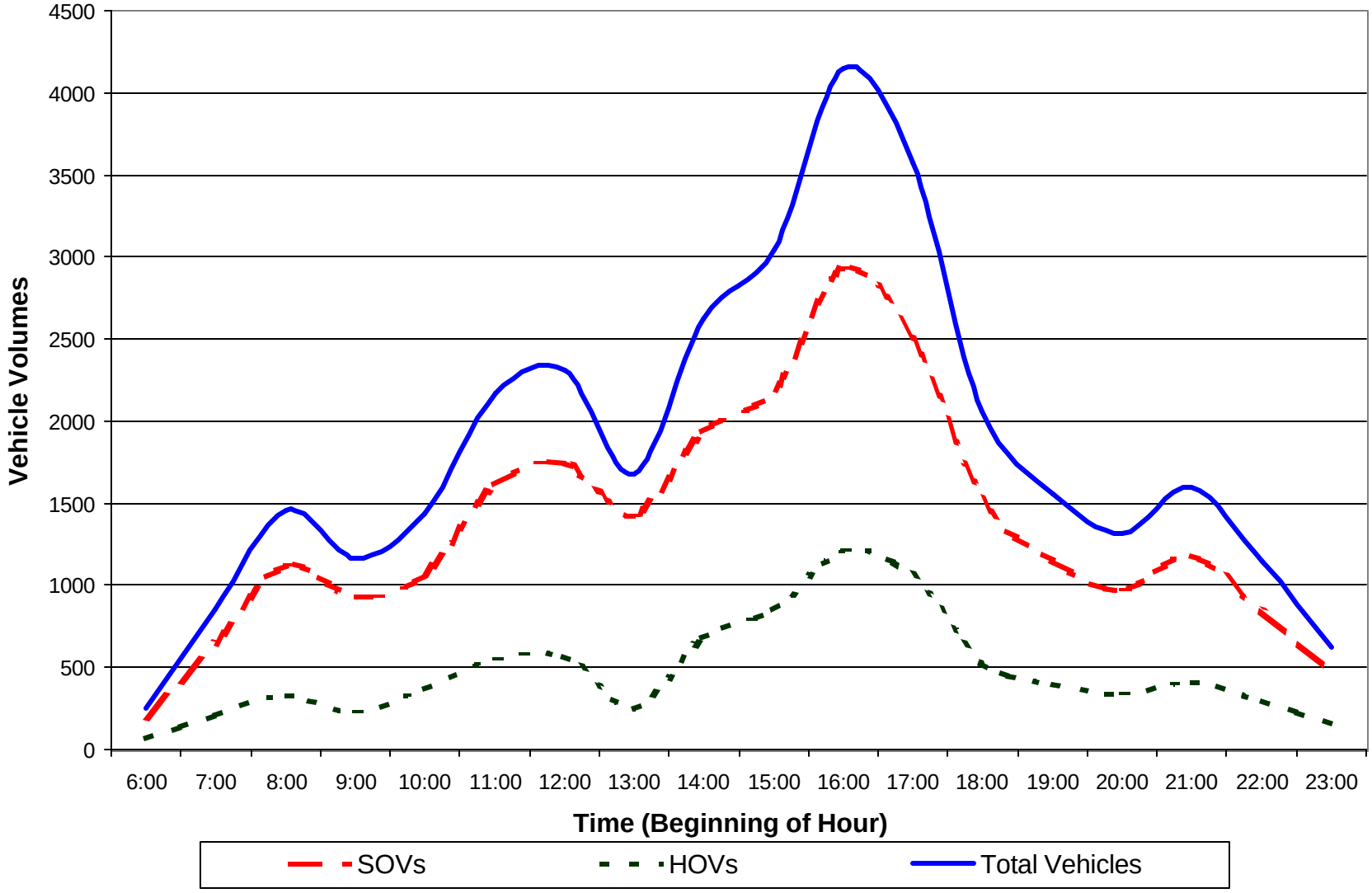


Figure C-3: *SOV and HOV Accumulation - Fall 1997*

(Commuter and Visitor Parking Demand)

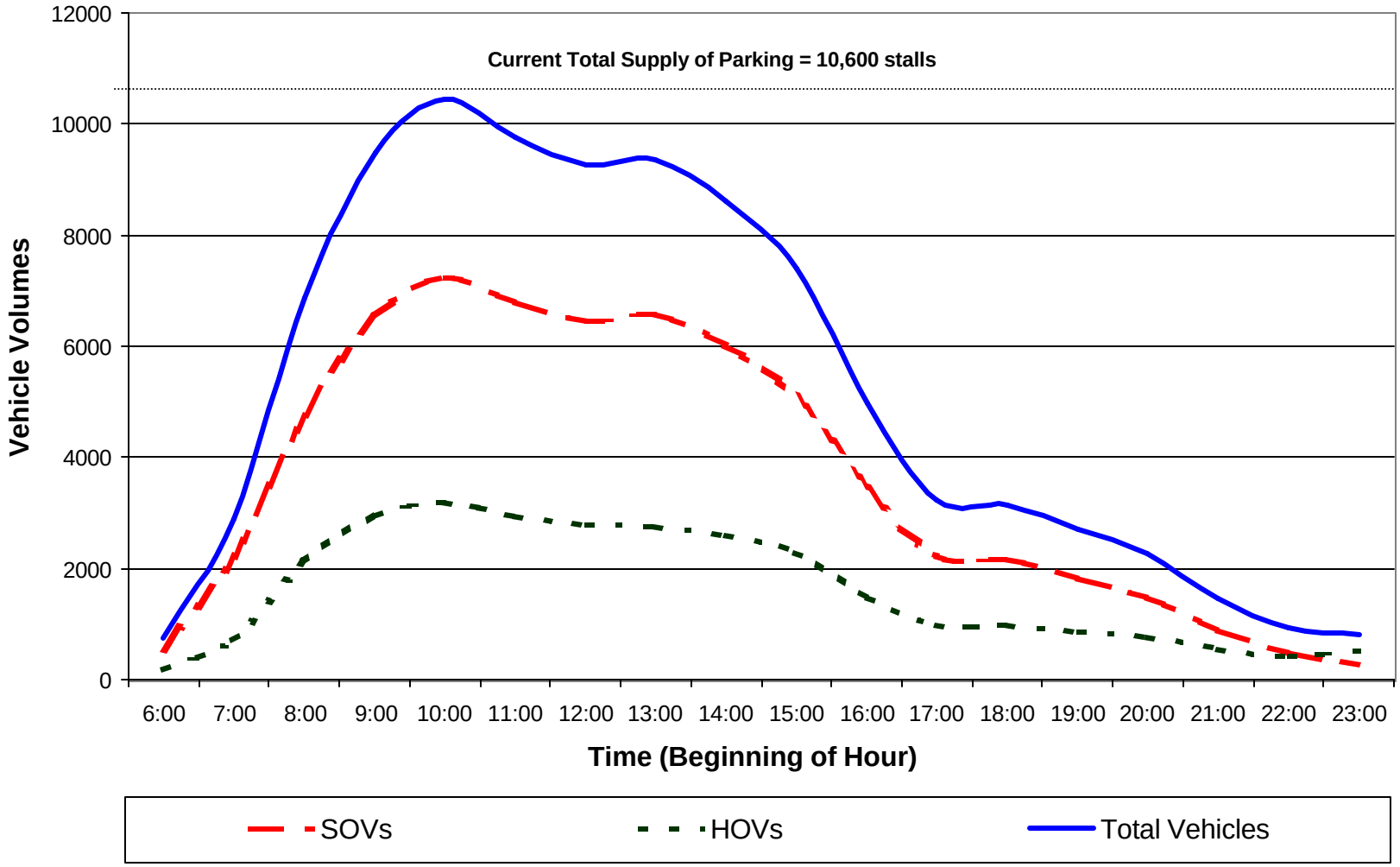


Figure C-4: Transit Passenger Trips - Fall 1997

Arrivals and Departures

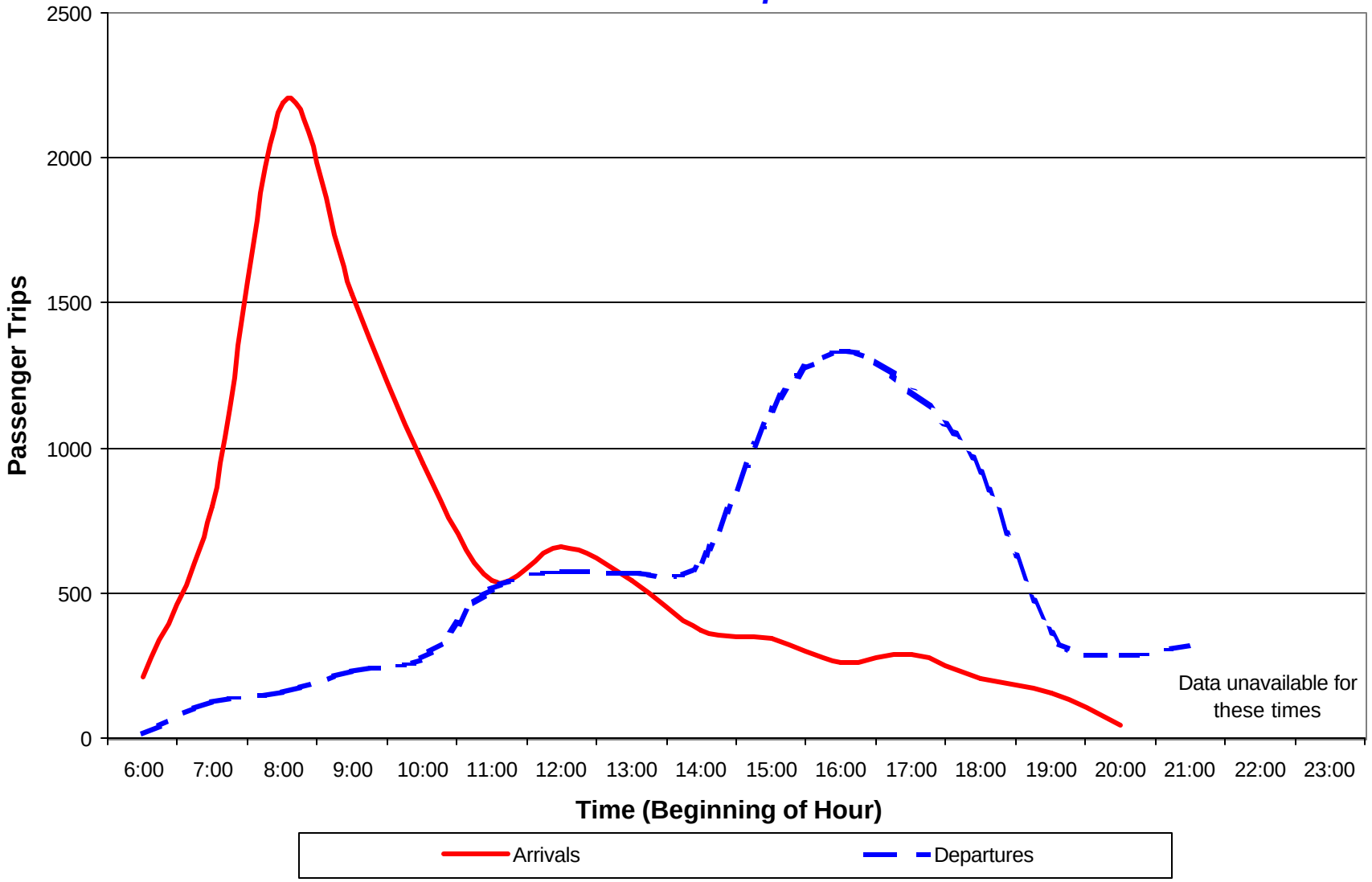


Figure C-5: *SOV and HOV Arrivals - Fall 1998*

UBC Screenline

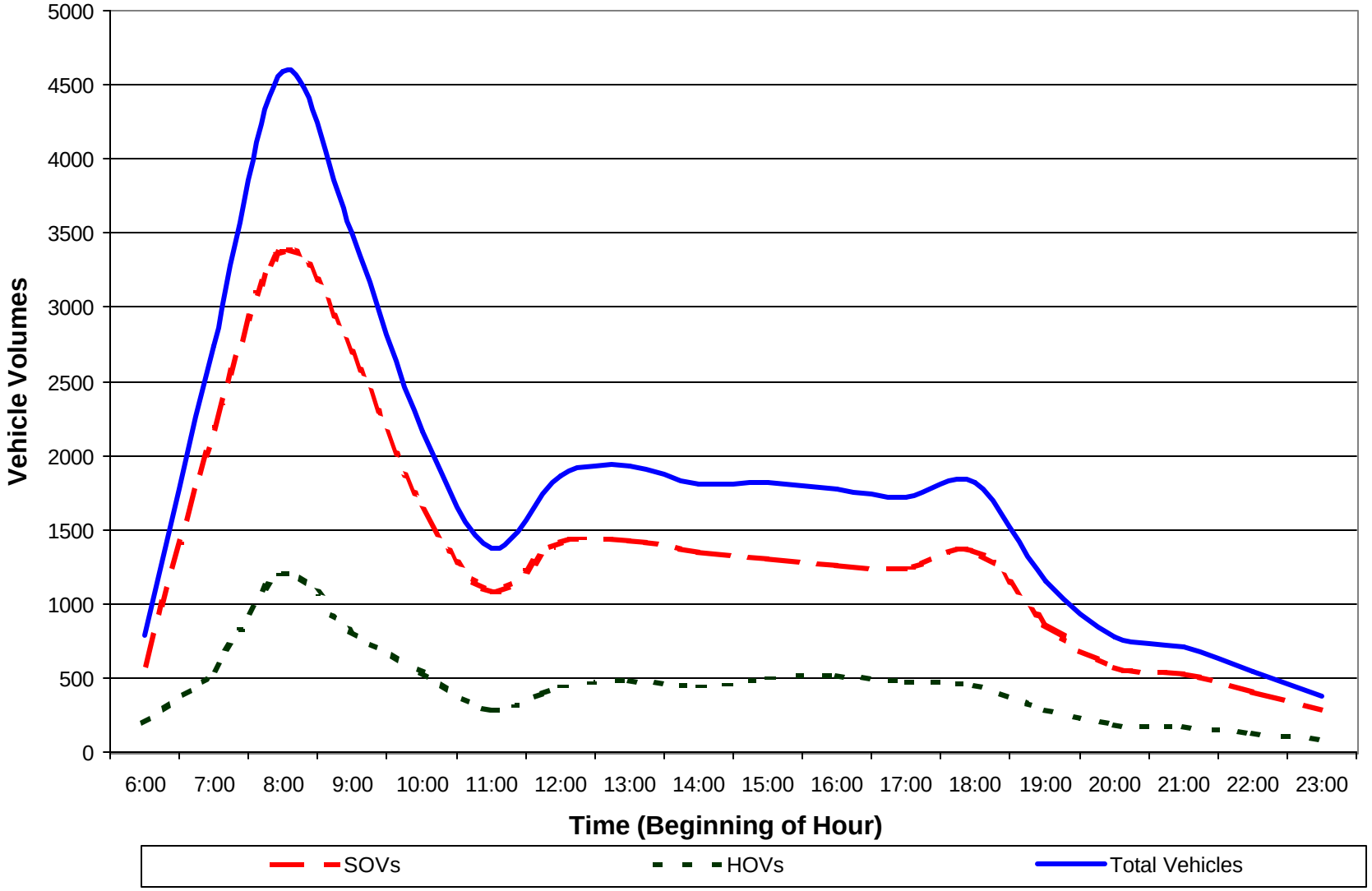


Figure C-6: *SOV and HOV Departures - Fall 1998*

UBC Screenline

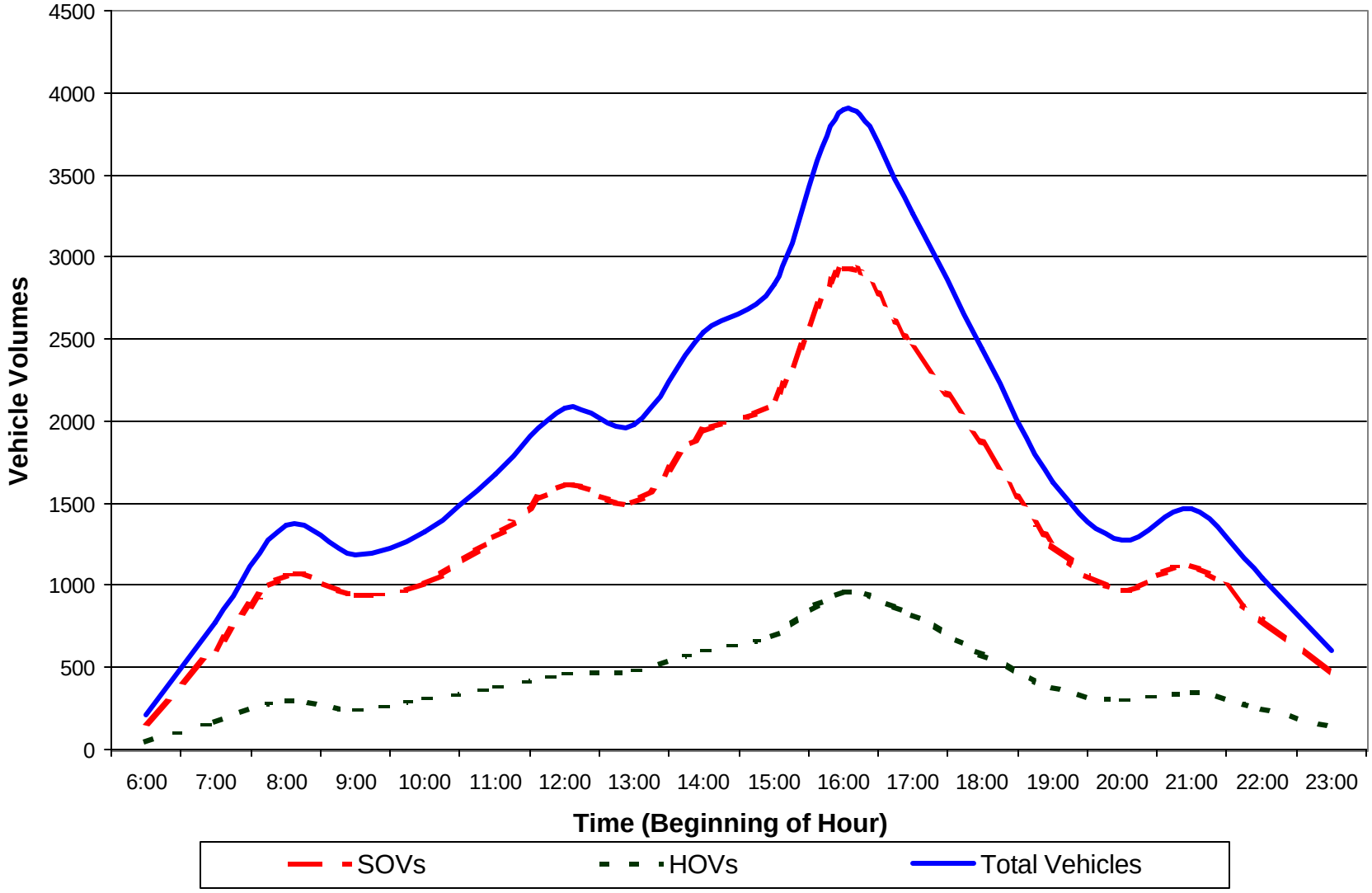


Figure C-7: *SOV and HOV Accumulation - Fall 1998*

(Commuter and Visitor Parking Demand)

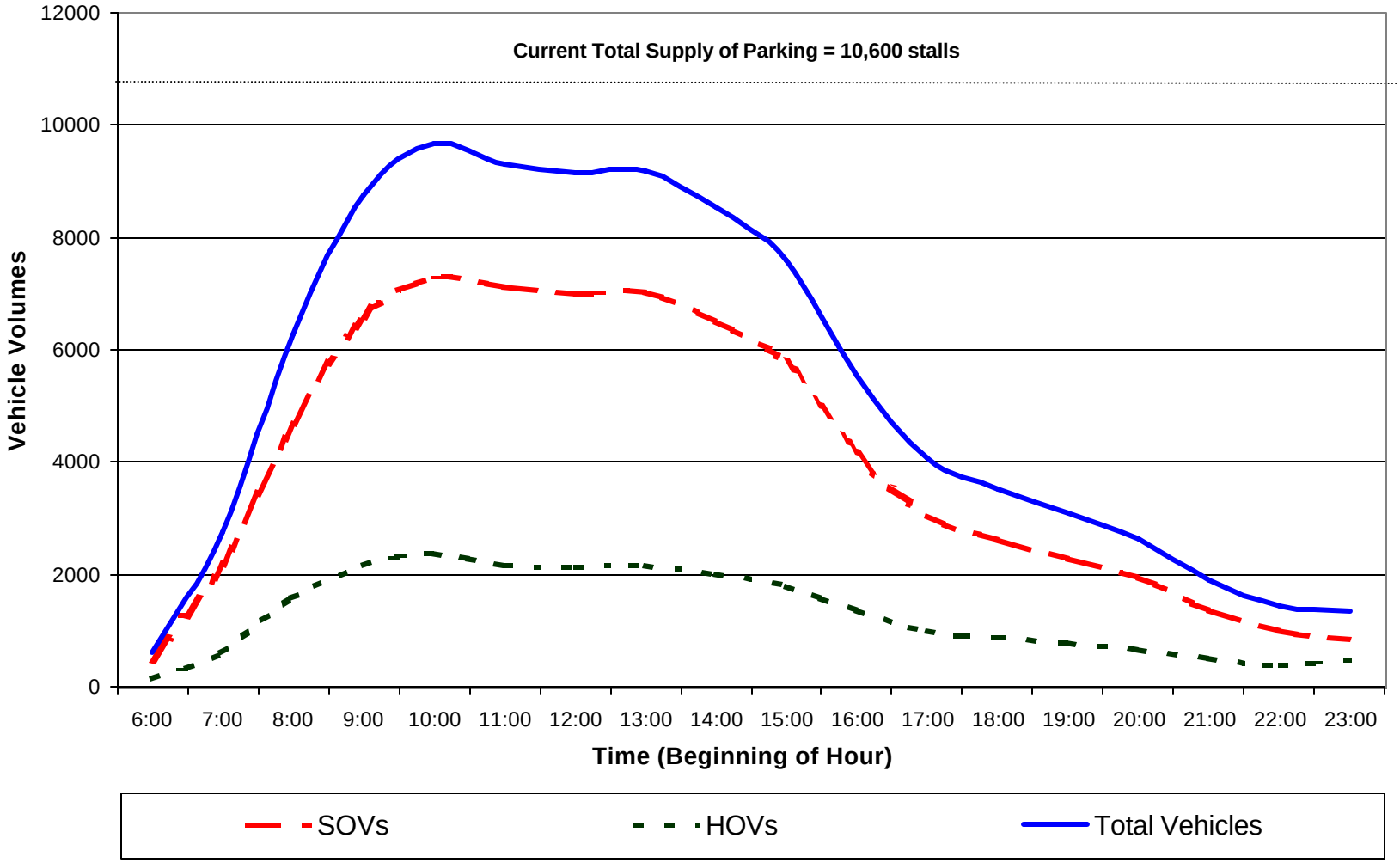
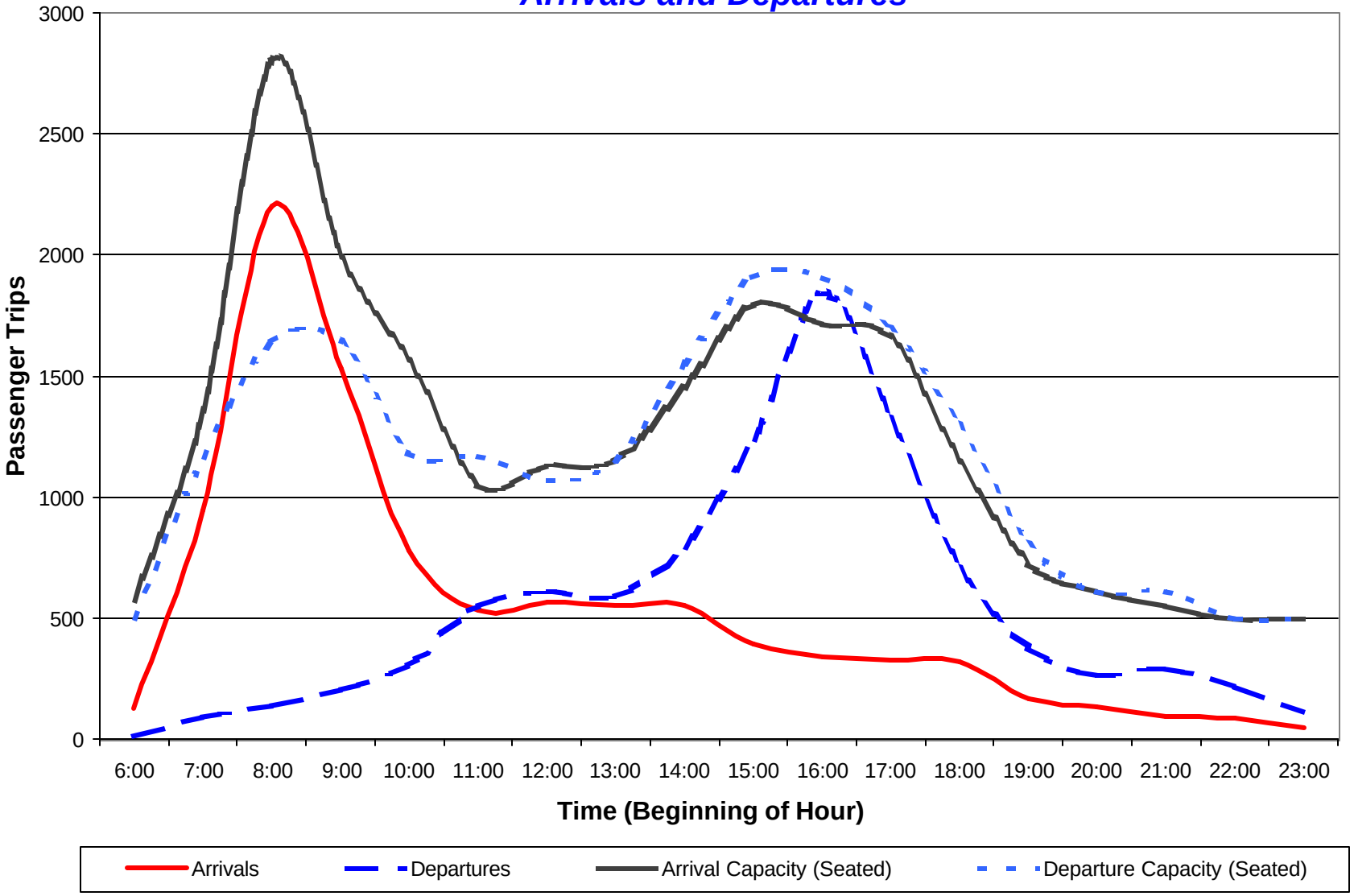
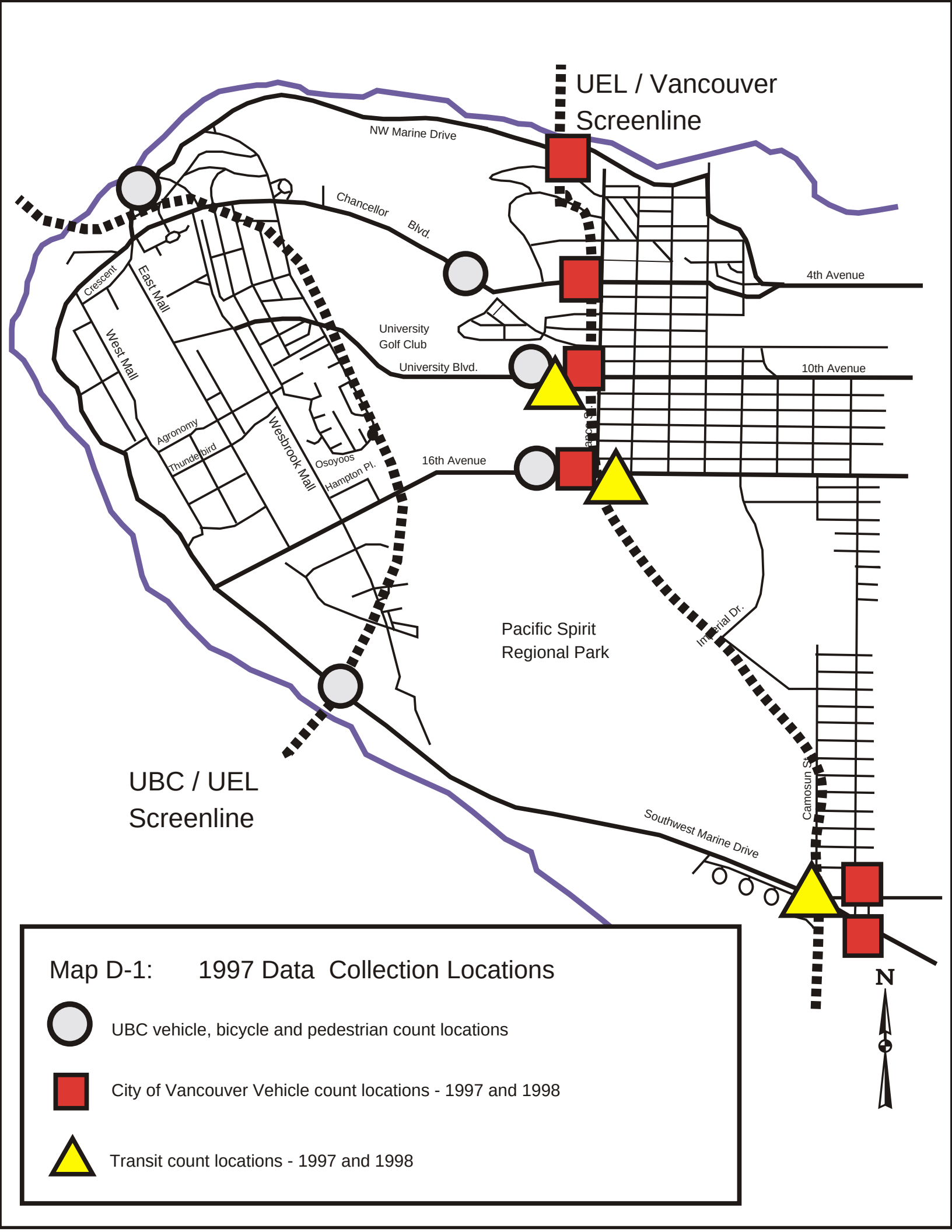
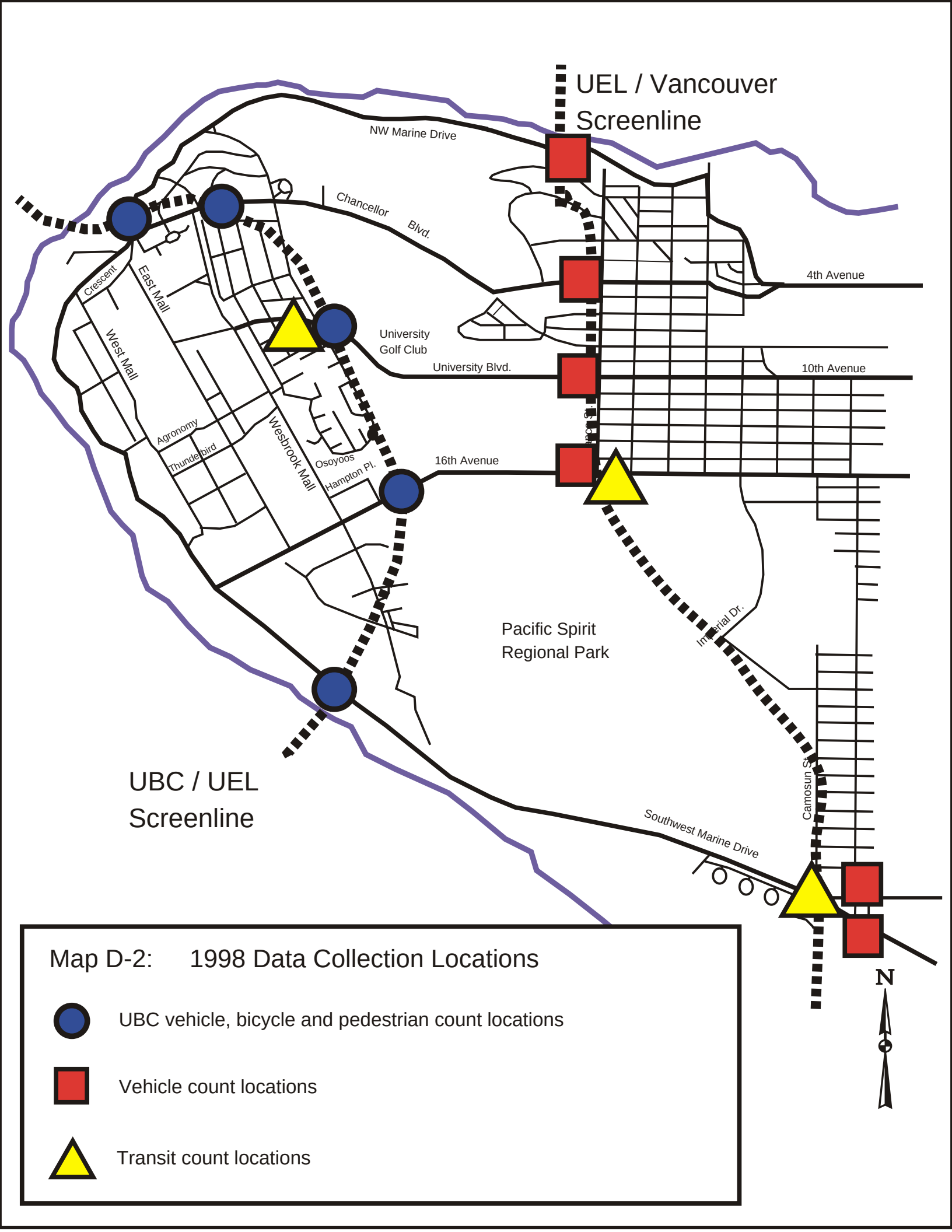


Figure C-8: *Transit Passenger Trips - Fall 1998*

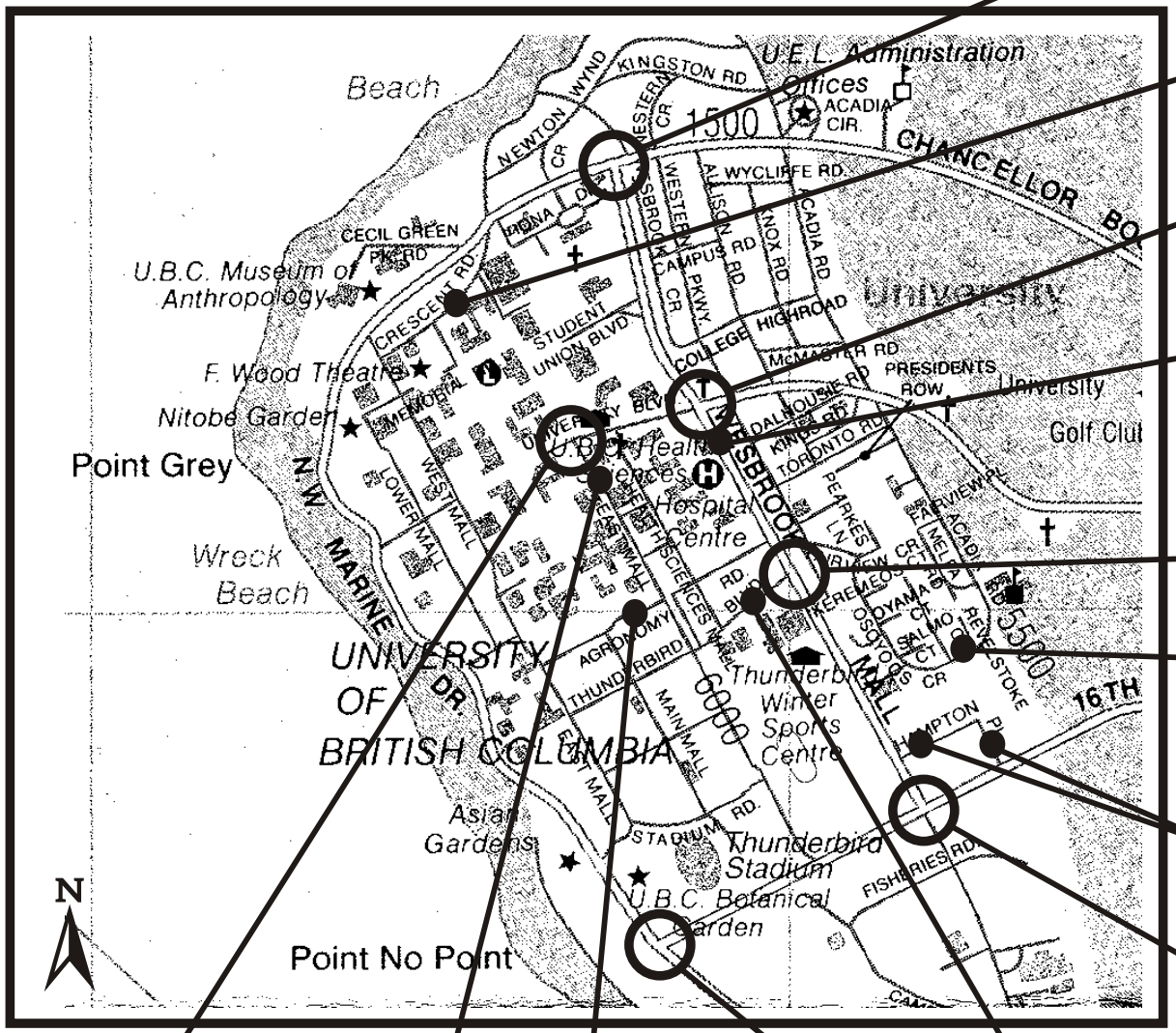
Arrivals and Departures




UEL / Vancouver
Screenline
NW Marine Drive
Chancellor Blvd.
Crescent
East Mall
West Mall
University
Golf Club
University Blvd.
4th Avenue
10th Avenue
16th Avenue
Agronomy
Thunderbird
Wesbrook Mall
Osoyoos
Hampton Pl.
Pacific Spirit
Regional Park
Imperial Dr.
Camosun St.
Southwest Marine Drive
UBC / UEL
Screenline
N
Map D-1: 1997 Data Collection Locations
UBC vehicle, bicycle and pedestrian count locations
City of Vancouver Vehicle count locations - 1997 and 1998
Transit count locations - 1997 and 1998


UEL / Vancouver
Screenline
NW Marine Drive
Chancellor Blvd.
4th Avenue
Crescent
East Mall
West Mall
University
Golg Club
University Blvd.
10th Avenue
Agronomy
Thunderbird
Wesbrook Mall
Osoyoos
Hampton Pl.
16th Avenue
Pacific Spirit
Regional Park
Imperial Dr.
Camosun St.
Southwest Marine Drive
UBC / UEL
Screenline
N
Map D-2: 1998 Data Collection Locations
UBC vehicle, bicycle and pedestrian count locations
Vehicle count locations
Transit count locations

Map D-3: UBC 1998 On-Campus Traffic Data Collection Locations



ManualIntersectionCount
Wesbrook Mall/Chancellor Blvd.

Automatic24-hourTrafficCount
Crescent Rd. e/o Main Mall

ManualIntersectionCount
Wesbrook Mall/University Blvd.

Automatic24-hourTrafficCount
Wesbrook Mall s/o University Blvd.

ManualIntersectionCount
Wesbrook Mall/Thunderbird Blvd.

Automatic24-hourTrafficCount&
SpeedStudy
Osoyoos Cres. w/o Revelstoke Ct.

Automatic24-hourTrafficCounts&
SpeedStudies
Hampton Place Road

ManualIntersectionCount
Wesbrook Mall/W.16th Avenue

ManualIntersectionCount
East Mall/University Blvd.

Automatic24-hourTrafficCount
Thunderbird Blvd. w/o Wesbrook Mall

Automatic 24-hour Traffic Count
EastMalls/oUniversityBlvd.

Automatic24-hourTrafficCount
Agronomy Rd. e/o Main Mall

ManualIntersectionCount
SW Marine/W.16th Avenue