

UNIVERSITY OF
BRITISH COLUMBIA

***Transit
Service
Plan***

*Discussion
Paper #8*

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June 2000

**Transit
Service
Plan**

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Summary

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This discussion paper provides an overview of improvements required to transit services at UBC, in order to accommodate the increased demand for transit as a result of the planned U-TREK card. Planning regarding expanded transit services at UBC has been on-going since 1997, and continues today. The first draft of this discussion paper (prepared in October 1999) documented transit plans at that time. With additional and more detailed analysis, these plans have been updated, and are presented in this document.

As of fall 1999, 23,700 trips were made to and from UBC on transit each weekday during the September-to-April academic year. With the planned introduction of the U-TREK card in fall 2001, transit use is forecast to increase to 31,400 trips per weekday — a 32% increase. This increase in transit use will require improved transit service to UBC, and improved transit facilities on campus. Key improvements include:

1. Introduction

The July 1997 Official Community Plan includes a commitment on the part of UBC to reduce SOV travel to and from UBC by 20% over five years — a target which is reiterated in UBC's Strategic Transportation Plan. In order to meet this target reduction in SOV trips, transit ridership to UBC must increase substantially, in addition to increases in other non-SOV modes of travel.

Achieving an increase in transit ridership is complicated by that fact that during much of the day, ridership on most transit routes serving UBC exceeds the seated capacity of the buses. There simply isn't room on existing transit services to accommodate any significant increase in transit ridership.

TransLink plans to increase transit service to UBC on an incremental basis over the next several years. However, to meet UBC's five-year target, transit ridership must increase by more than can be accommodated with incremental service increases. Consequently, UBC and TransLink have jointly prepared a transit service plan identifying the amount of additional service required above the "base level" of service that TransLink would provide. This transit service plan is described in this discussion paper. The results of the service plan will be used as the basis for an agreement between UBC and TransLink regarding implementation of the U-TREK card program.

1.1 U-TREK Program

To meet target reductions in SOV trips, UBC is pursuing a wide range of transportation initiatives. One of the most important is the introduction of a multi-modal "transportation pass," which is referred to at this time as a U-TREK card. The various components of the U-TREK card program are described in this section, as well as current implementation plans.

The U-TREK concept is based on the successful U-Pass program used at more than two dozen post-secondary institutions in the U.S. and Canada, most notably the University of Victoria and Camosun College in Victoria, and the University of Washington in Seattle.

The key feature of the U-TREK card is that it would provide unlimited access to regional transit services. Cardholders would be able to ride any

bus, SkyTrain or Seabus service, anywhere in the region, at any time. No “add fare” would be required for trips through multiple fare zones. The U-TREK card would be valid for the duration of the school year in the case of students, or for a month at a time in the case of staff and faculty.

The U-TREK card would be more than just a transit pass — it would be a multi-modal "transportation pass," providing access to a range of other transportation services and products, as summarized in **Table 1.1.1**.

**Table 1.1.1
U-TREK Program Components**

Program Component	Availability		Comparable Monthly Value
	Students	Staff and Faculty	
Unlimited transit use	✓	✓	\$63–\$120
Campus shuttles	✓	✓	\$10
Secure bicycle parking	✓	✓	\$10
Bike products, services	✓	✓	\$10
Showers, lockers	✓	✓	\$10
Ridematching	✓	✓	-
Vanpool and carpool parking	✓	✓	\$5–\$8
Guaranteed ride home		✓	\$30
Airport shuttle	✓	✓	\$5
Merchant discounts	✓	✓	\$25
Total value			\$168–\$228

Current plans are to implement the U-TREK card program in fall 2001, for the 35,000 full-time and part-time students. One year later in fall 2002, U-TREK cards would be available for voluntary purchase by the 7,000 full-time and part-time staff and faculty.

1.2 Ridership Forecasts

As of fall 1999, there are a total of 23,700 trips made by transit to and from UBC each weekday during the September-to-April academic year.

As indicated in **Table 1.2.1**, this amounts to 21% of all daily person trips to and from UBC.

**Table 1.2.1
Current Transit Ridership
(weekday fall 1999)**

	Transit	All Modes (including transit)
Daily Person Trips		
• AM peak period	6,400	24,600
• Midday	7,000	39,500
• PM peak period	6,500	29,500
• Evening	3,800	19,800
Total Daily Trips	23,700	113,400
Mode Share	21%	100%

Travel surveys and ridership data indicate that at present, there is a significant un-met demand for transit service to UBC. Consequently, as TransLink improves transit services to UBC prior to implementation of the U-TREK card, it is expected that “base level” transit ridership would increase to 28,600 daily trips by fall 2001, equivalent to a 24% transit mode share.

As indicated in **Table 1.2.2**, the Strategic Transportation Plan target is to increase the transit mode share to 26,500 daily transit trips by 2002. Yet by this time, base level ridership is forecast to increase to 31,500 daily trips, as a result of incremental service increases. In fact, the Strategic Transportation Plan target of 26,500 daily trips will likely be achieved in fall 2000.

**Table 1.2.2
Transit Ridership Forecasts
(fall weekday trips to/from UBC)**

	Fall 2001		Fall 2002	
	Daily Trips	Mode Share	Daily Trips	Mode Share
Base level ridership	28,600	24%	31,500	26%
STP target ridership	N/A	N/A	26,500	22%
U-TREK forecast ridership	31,400	26%	32,000	26%
Difference between U-TREK and base level ridership	2,800		500	

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With implementation of the U-TREK card program, it is expected that transit ridership will far exceed the Strategic Transportation Plan target. In fall 2001, when the U-TREK card is implemented for students, it is anticipated that transit ridership will reach 31,400 daily trips. The following year, when the U-TREK card program is expanded to include staff and faculty, transit ridership is forecast to reach 32,000 daily trips.

In subsequent years after 2002, transit use is forecast to increase at 5% per year. This forecast annual ridership increase represents a 2% enrolment growth plus an average of 175 new dwelling units per year on campus, as well as a latent response to the U-TREK card program. By 2006, transit use would be approximately 40,000 daily trips, which would be equivalent to a transit mode share of approximately 30%.

As noted earlier, during peak and midday periods, buses to and from UBC are full or almost full. This means that additional buses are required to accommodate ridership demand in excess of base level ridership. For fall 2001, the U-TREK card program will create a transit demand which exceeds the base level ridership by 2,800 daily trips. In fall 2002, this difference will decrease to only 500 daily trips, and by fall 2003 base level ridership will have reached U-TREK card program ridership levels.

2. Transit Services To UBC

Currently, UBC is served by eleven transit routes, with a total of 1,100 buses per weekday arriving and departing UBC. Consistent with the ridership forecasts discussed in Section 1.2, it is anticipated that the number of buses will need to be increased to approximately 1,450 per day by fall 2001. These buses would be added to existing routes as well as to new routes. This section describes how service would be increased to UBC to accommodate increased transit ridership.

2.1 Existing Transit Services

This section describes existing transit services at UBC. These services are provided by TransLink, and provide direct service to UBC from Vancouver, Burnaby, Richmond and the North Shore, as well as connections to transit services throughout the region.

2.1.1 Ridership

Currently, there are approximately 23,700 person trips on transit to and from UBC on a typical weekday during the school year (September through April), as summarized in **Table 2.1.1**.

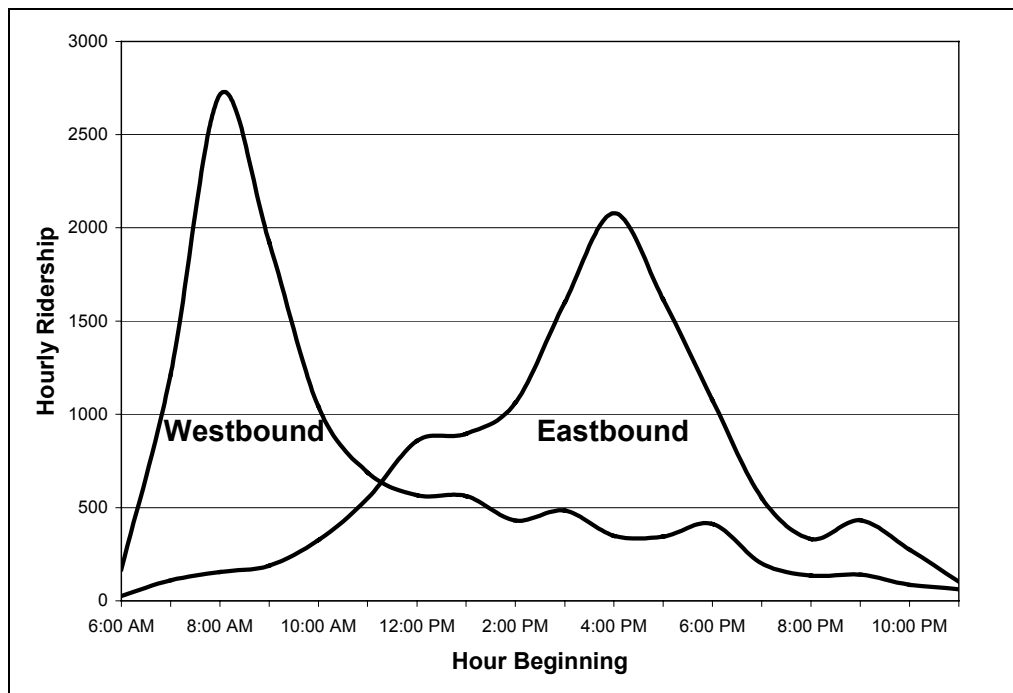
Table 2.1.1
Weekday Transit Ridership
(fall 1999, both directions across UBC screenline)

Routes	Daily Trips				Weekday Total
	AM (6-10)	Midday (10-3)	PM (3-6)	Evening (6-12)	
University Blvd.					
- Rt. 4	406	765	582	521	2,274
- Rt. 9	242	0	186	45	473
- Rt. 10	857	1,290	976	755	3,878
- Rt. 44	378	66	371	0	815
- Rt. 99B	<u>1,949</u>	<u>2,801</u>	<u>2,427</u>	<u>1,490</u>	<u>8,667</u>
	3,832	4,922	4,542	2,811	16,107
16th Ave.					
- Rt. 25	912	795	766	419	2,892
SW Marine Dr.					
- Rt. 41	1,040	1,107	754	508	3,409
- Rt. 49	510	115	412	35	1,072
- Rt. 480	<u>126</u>	<u>40</u>	<u>76</u>	<u>0</u>	<u>242</u>
	1,676	1,262	1,242	543	4,723
Totals	6,420	6,979	6,550	3,773	23,722
Trips/Hour	1,605/hr	1,396/hr	2,183/hr	628/hr	1,317/hr

Since 1997, when UBC began collecting comprehensive transit ridership data, ridership has increased over 4,000 trips per day. Most of the increase has occurred on Route 99B, with corresponding reductions in ridership on Routes 9 and 10, which also operate in the Broadway corridor.

Although transit ridership is highest during the PM peak period from 3 to 6 PM, when there are an average of almost 2,200 trips per hour, hourly transit ridership is highest during the morning peak period. Between 8:00 and 9:00 a.m., 2,715 persons travel westbound on transit to UBC. **Figure 2.1.1** illustrates transit ridership patterns throughout the day.

Figure 2.1.1
Weekday Transit Ridership
(Fall 1999, across UBC screenline)



During summer months, transit ridership to and from UBC decreases to approximately 60% of ridership levels at other times of the year, as indicated in **Table 2.1.2**.

**Table 2.1.2
Summer Weekday Transit Ridership
(1998, both directions across UEL/Vancouver screenline)**

Routes	Daily Trips				
	AM (6-9)	Midday (9-3)	PM (3-6)	Evening (6-12)	Weekday Total
University Blvd.					
- Rt. 4	122	667	487	711	1,987
- Rt. 9	0	0	0	0	0
- Rt. 10	597	1,136	1,086	869	3,688
- Rt. 44	131	47	138	0	316
- Rt. 99B	<u>879</u>	<u>1,729</u>	<u>1,297</u>	<u>377</u>	<u>4,282</u>
	1,729	3,579	3,008	1,957	10,273
16th Ave.					
- Rt. 25	275	573	389	340	1,577
SW Marine Dr.					
- Rt. 41	610	810	649	359	2,428
- Rt. 49	0	0	0	0	0
- Rt. 480	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	610	810	649	359	2,428
Totals	2,366	4,962	4,046	2,656	14,278
Trips/Hour	789/hr	827/hr	1,349/hr	443/hr	793/hr

During the September-to-April academic year, transit ridership on most routes reaches (and sometimes exceeds) seated capacity during peak hours, in the peak direction. **Tables 2.1.3 and 2.1.4** provide a summary of average vehicle loads on selected routes, at selected times. These average loads should be compared with seated capacities as follows:

- Vehicle capacity of 38 seats on all routes except Route 99B. Trolley buses and low-floor diesel buses operate on these routes — both types of vehicles have 38 seats.
- Vehicle capacity of 58 seats on Route 99B. Articulated low-floor diesel buses operate on this route.

Passenger loads which exceed seated capacities are indicated in grey in **Tables 2.1.3 and 2.1.4**. It is important to note that the indicated passenger loads are hourly averages, which means that during the hour, some passenger loads would be higher than the indicated average load.

Table 2.1.3
Weekday Transit Loads
(Fall 1999, westbound at UBC screenline)

Hour Beginning	Average Ridership per Vehicle				
	Rt. 4	Rt. 10	Rt. 25	Rt. 41	Rt. 99
7:00 AM	21	17	41	44	46
8:00 AM	34	33	40	39	63
9:00 AM	25	30	40	40	54
11:00 AM	21	27	23	35	34
12:00 PM	17	18	18	25	29
1:00 PM	19	22	14	24	28
3:00 PM	11	13	13	7	20
4:00 PM	10	11	7	6	12
5:00 PM	8	9	8	9	11
6:00 PM	11	15	8	15	24
8:00 PM	6	10	2	7	16
9:00 PM	11	16	3	5	15
10:00 PM	3	10	2	6	17

Shading indicates average hourly passenger loads exceeding seated capacity

Table 2.1.4
Weekday Transit Loads
(Fall 1999, eastbound at UEL/Vancouver screenline)

Hour Beginning	Average Ridership per Vehicle				
	Rt. 4	Rt. 10	Rt. 25	Rt. 41	Rt. 99
7:00 AM	1	3	4	5	6
8:00 AM	2	3	5	3	7
9:00 AM	6	7	5	5	6
11:00 AM	9	21	13	28	26
12:00 PM	11	32	21	44	47
1:00 PM	27	27	23	43	42
3:00 PM	29	30	30	28	62
4:00 PM	39	36	43	36	61
5:00 PM	35	34	41	45	54
6:00 PM	37	37	31	44	63
8:00 PM	13	27	20	27	30
9:00 PM	25	19	22	33	48
10:00 PM	18	22	15	29	35

Shading indicates average hourly passenger loads exceeding seated capacity

Key observations regarding current transit ridership include:

- The highest ridership occurs on Route 99B, which accounts for 37% of daily transit ridership.
- Other high ridership routes include Routes 10, 41 and 25, which account for 43% of daily transit ridership.
- On average, only 14.3% of persons who board routes serving UBC are travelling to or from UBC.
- The highest hourly ridership occurs during the AM peak hour, prior to the first class in the morning at 8:30 a.m. During the academic year AM peak hour, peak direction ridership is 2,715 trips. In comparison, peak direction ridership during the PM peak hour is 2,080 trips.
- The highest average vehicle loads in fall 1999 occurred on Route 41, during the AM peak, midday and PM peak periods. Average vehicle loads exceeded seated capacities during all three of these time periods.
- Average vehicle loads also exceeded seated capacity on Routes 4, 25 and 99B.
- There is considerable excess capacity in the off-peak direction on all routes during peak periods. In comparison, average vehicle loads during the midday are similar in each direction, and there is less excess capacity.
- Average vehicle loads remain relatively constant until 10:00 p.m.

2.1.2 Target Markets

In order to provide a basis for developing a transit service plan for UBC, data from UBC's January 1998 travel survey were analyzed with respect to potential markets for transit service. The travel survey reflects the travel characteristics of 35,000 students and 7,000 staff and faculty at UBC. The key conclusions of this analysis include:

- The major market for transit is Vancouver. As indicated in **Table 2.1.5**, 57% of students and 64% of faculty and staff who live outside UBC/UEL live in the City of Vancouver. Two-thirds of students, staff and faculty who live in Vancouver live on the West Side, where the transit trip to UBC is less than 30 minutes.

**Table 2.1.5
Place of Residence of UBC Commuters**

	Students		Staff & Faculty	
UBC/UEL	5,000	14%	340	5%
Vancouver:				
• West Side	11,000	31%	3,220	46%
• West End	1,000	3%	310	4%
• East Side	5,200	15%	750	11%
Richmond	4,700	13%	680	10%
North Shore	2,300	7%	400	6%
Burnaby/New Westminster	2,800	8%	370	5%
South of Fraser River	2,300	7%	780	11%
NE Sector	700	2%	140	2%
Maple Meadows	10	-	10	-
Totals	35,000	100%	7,000	100%

- Another important market for transit is Richmond. Thirteen percent of students and 10% of staff and faculty live in Richmond. In comparison, however, only 7% of students, staff and faculty who live in Richmond take transit to UBC, as indicated in **Table 2.1.6**. This indicates significant potential to increase transit use among Richmond residents.

**Table 2.1.6
Transit Trips To/From UBC**
(total weekday trips, both directions, September–April)

	Transit Trips		All Trips	Transit Mode Share
Vancouver:				
• West Side	11,700	49%	48,500	24%
• West End	1,300	5%	3,800	34%
• East Side	4,500	19%	17,600	26%
Richmond	1,100	5%	15,500	7%
North Shore	1,300	6%	7,400	18%
Burnaby/New Westminster	1,700	7%	9,200	18%
South of Fraser River	1,400	6%	9,100	15%
NE Sector	700	3%	2,300	3%
Maple Meadows	-	-	-	-
Totals	23,700	100%	113,400	21%

- The North Shore is a secondary market for transit. Seven percent of students and 6% of staff and faculty live on the North Shore. Although the population is smaller than in Vancouver and Richmond, direct connections to downtown Vancouver provide an opportunity to increase transit ridership among North Shore residents.
- UBC commuters living in the north-east sector and south of the Fraser River are not an important market for transit. Only 10% of students, staff and faculty live in these areas. Travel distances are long, and consequently it is not cost-effective to serve these areas with direct transit services to UBC.
- Commuters who currently carpool and vanpool to UBC are slightly more willing to consider travelling by transit than SOV commuters. As **Table 2.1.7** indicates, commuters who live in the north-east sector and Vancouver are most willing to use transit. Commuters in Richmond are least willing, which suggests that although they might appear to be significant potential to increase transit ridership to UBC from Richmond, service improvements should be planned and marketed carefully to ensure that they meet Richmond commuters' needs.

**Table 2.1.7
Willingness to Use Transit**

	SOV Commuters		Rideshare Commuters	
	Would consider for most trips	Would consider for some trips	Would consider for most trips	Would consider for some trips
Vancouver:				
• West Side	37%	53%	47%	46%
• West End	42%	49%	53%	45%
• East Side	41%	50%	42%	53%
Richmond	14%	69%	19%	68%
North Shore	35%	55%	34%	59%
Burnaby/New Westminister	33%	49%	40%	54%
South of Fraser River	31%	58%	35%	52%
NE Sector	61%	35%	67%	33%
Maple Meadows	-	-	-	-
Overall	34%	54%	41%	52%

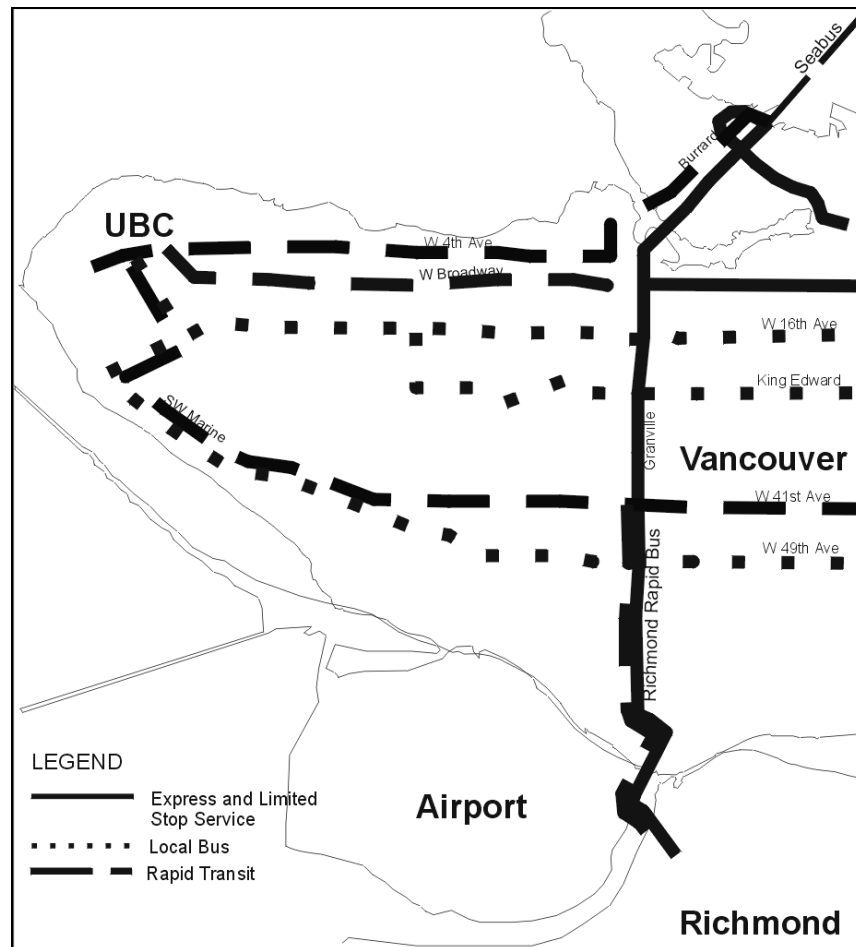
2.2 Future Transit Services

This section describes options for improving transit services to UBC, in order to accommodate the forecast 31,400 daily trips in fall 2001, and additional ridership increases in subsequent years. Although TransLink has already committed to implementing some of these options, it should be noted that other options are still subject to change. These options will be considered as part of the Vancouver/UBC area transit plan, which is planned to be initiated in fall 2000, and completed in 2001.

2.2.1 Transit Options

Options for improving transit services to UBC are illustrated in **Figure 2.2.1** and are discussed below.

Figure 2.2.1
Options for Improving Transit Services To UBC



TransLink plans to implement the following improvements to transit routes serving UBC:

- **Broadway.** Increased peak period, midday, evening and weekend service on the Route 99 B-Line Rapid Bus service. These improvements will be implemented incrementally over the next several years. During peak periods, buses currently operate as often as every five minutes. TransLink staff indicate that frequencies better than every four minutes are difficult to maintain in urban traffic, and consequently there is only limited opportunity to increase service frequencies during peak periods.
- **Richmond.** All-day service between Richmond Centre and UBC on Route 480, via SW Marine Drive. Currently, there are 240 trips per day between Richmond and UBC on the direct Route 480 service. Because there are only three buses in the morning on Route 480 and three in the afternoon, most transit users from Richmond travel to UBC via other transit routes, which require at least one transfer and involve longer travel times than on Route 480.

To better serve commuters from Richmond, TransLink plans to implement all-day service on Route 480 in September 2000. Buses will operate every 30 minutes in both directions during the morning peak, midday and afternoon peak periods. Buses will depart from the Richmond Centre transit exchange, and travel to UBC via Granville Street and 41st Avenue, with limited stops along the route at key transfer locations.

- **41st Avenue.** At present, passenger loads on Route 41 exceed seated capacity during peak periods, and even exceed seated capacity during the midday. Transit users report that westbound Route 41 buses frequently pass up passengers waiting at bus stops west of West Boulevard. This indicates a significant latent transit demand in the 41st Avenue corridor. In response to this latent demand, TransLink plans to implement a limited-stop bus service on 41st Avenue between UBC and the Joyce SkyTrain station. This service is planned for implementation in 2001. Buses would operate during peak hours only — all-day service would be provided through the implementation of a B-Line service as described below.

- **Downtown.** Route 44 currently provides limited express service to UBC in the morning, and from UBC in the afternoon. To improve service for UBC commuters who live on the North Shore, TransLink's Strategic Transportation Plan identifies a new B-Line service between UBC and the Waterfront SkyTrain/SeaBus Station in downtown Vancouver, via 4th Avenue. This service is planned for implementation in 2003.

Other options for improving transit services to UBC include:

- **Broadway.** TransLink has identified a need for a new non-stop express service between the Broadway/Commercial SkyTrain station and UBC, during peak periods. This service would accommodate additional transit demand which could not be accommodated on the Route 99B service due to limits on service frequencies. Buses would operate express between UBC and the Commercial SkyTrain station, with a possible at Granville Street for transfers to and from the Richmond 98B Rapid Bus. If the new SkyTrain line is eventually extended west to Granville Street as proposed, express buses from UBC would terminate at Granville Street.
- **41st Avenue.** TransLink's Strategic Transportation Plan identifies a B-Line limited-stop service on 41st Avenue, operating between the Joyce SkyTrain station and UBC. This service would operate all day, rather than just during peak periods as for the planned limited-stop service described above. No timing is identified for implementation of this B-Line service, however.
- **Other routes.** In addition to the limited-stop services described above, other options for improving transit services to UBC include increases in service frequencies on local bus routes serving UBC, particularly Routes 25 49, extending Route 49 service to UBC during the midday rather than terminating buses at Crown Street as at present, a new transit route on 16th Avenue, and a community bus service linking UBC with the West Point Grey and Dunbar neighbourhoods.

2.2.2 Additional Service Requirements

As discussed in Section 1.2, TransLink plans to increase transit service to UBC each year. Although these increases would eventually provide sufficient service to accommodate increased ridership as a result of the U-TREK program, this would not occur until fall 2003 at the earliest.

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Because implementation of the U-TREK card is planned for fall 2001, there will be a period of at least two years during which time transit demand will exceed the capacity of transit services. This means that additional transit service will be needed during these two or more years, above and beyond the “base level” of transit service which TransLink would provide.

Currently, TransLink provides approximately 250,000 annual hours of service on routes which serve UBC. Based on information provided by TransLink, it is estimated that service hours will increase by an average of 10.5% per year, so that by fall 2001, TransLink would provide approximately 305,000 annual hours of service. However, as indicated in **Table 2.2.1**, approximately 340,000 hours of service would be required to accommodate U-TREK transit ridership. This would increase to approximately 360,000 hours in 2002, as a result of expanding the program to include staff and faculty, and as a result of additional student ridership. In subsequent years, it is assumed that the transit demand at UBC would increase at approximately 5% per year.

**Table 2.2.1
Annual Hours of Service
(bus routes serving UBC)**

Year	TransLink Service Expansion	U-TREK Transit Demand
1999	250,000 hours/year	-
2000	275,000	-
2001	305,000	340,000
2002	335,000	360,000
2003	370,000	375,000
2004	410,000	390,000

To accommodate U-TREK transit ridership in fall 2001 would require 35,000 annual of service in addition to service which TransLink plans to provide. The costs of this additional service are summarized in **Table 2.2.2**, as well as costs of additional service in subsequent years. These costs are based on estimates prepared by TransLink of numbers of buses required as well as annual operating and debt service costs.

**Table 2.2.2
Estimated Costs of Additional Transit Service
(8:30 a.m. class start time)**

Year	Additional Annual Service Hours	Additional Buses (including spares)	Annual Cost of Additional Service (operating and debt costs)
2001	35,000	26	\$3,900,000
2002	25,000	18	\$2,800,000
2003	5,000	4	600,000
2004	0	0	-
Total cost of additional service			\$7,300,000

During the process of estimating the costs of additional transit service, it became apparent that a significant component of the cost was due to morning peak period service. As illustrated in **Figure 2.1.1**, existing transit demand is highest from 8:00 to 9:00 a.m., coinciding with the start of classes at 8:30 a.m. Transit demand during the morning peak hour is 30% higher than during the afternoon peak hour. This means that 30% more buses are needed during the morning than during the afternoon or at any other time of the day.

The same demand pattern applies to U-TREK transit demand. A total of 26 additional buses (including spare buses) would be required to provide additional service during the morning peak period. During the afternoon peak period, only 13 additional buses would be required, and during the midday only 2 additional buses would be required. It was recognized that reducing the peak number of buses to approximately 13 would significantly reduce the costs of additional transit service.

The most effective way to achieve this reduction in buses and service hours would be to change class start times in the morning. Currently, almost all students begin at 8:30 a.m., with the result that transit ridership peaks just prior to 8:30 a.m. Changing start times so that one third of students begin at 8:00 a.m. and two-thirds begin at 9:00 a.m. would spread the demand over a longer period, reducing the peak transit demand. **Table 2.2.3** provides a comparison of the effects of changing class start times. **Table 2.2.4** provides a summary of the costs of additional transit service with the change to 8:00/9:00 a.m. class start times. Changing the class start times to 8:00 and 9:00 a.m. saves \$3.4 million over three years.

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**Table 2.2.3
Class Start Time Options
(fall 2001 estimates)**

	8:30 Start	8:00/9:00 Start
Number of transit passengers arriving at UBC		
• Peak 15 minutes	1,100	950
• Peak hour	4,000	3,450
Additional buses required		
• AM peak	26	12
• Middy	2	2
• PM peak	13	13
Annual Costs		
• Operating	\$3,100,000	\$2,100,000
• Debt service	\$800,000	\$400,000

**Table 2.2.4
Estimated Costs of Additional Transit Service
(8:00/9:00 a.m. class start times)**

Year	Additional Annual Service Hours	Additional Buses (including spares)	Annual Cost of Additional Service (operating and debt costs)
2001	25,000	13	\$2,500,000
2002	15,000	7	\$1,400,000
2003	0	0	-
2004	0	0	-
Total cost of additional service			\$3,900,000

Prior to fall 2001, TransLink and UBC will negotiate an agreement regarding funding of the costs of additional transit service. With an agreement in place, and through the Vancouver/UBC area transit plan, TransLink will identify the preferred means of providing additional transit service to UBC in fall 2001. By that time, UBC will also implement the change to class start times to 8:00 and 9:00 a.m.

3. Transit Services Within UBC

This section describes opportunities to enhance transit services at UBC, and future transit facility needs.

3.1 Transit Facilities

Currently, transit services at UBC are focused on the Bus Loop on University Boulevard at East Mall. Although this location is central and convenient to much of the academic buildings on campus, it is a significant distance from many residential areas. As the campus expands to the south, there will be an increased need to provide additional transit facilities and services on campus, so that the entire campus is within a convenient walk of transit service.

This discussion paper describes several options for future transit facilities and transit services on the UBC campus, and highlights the advantages and disadvantages of each option. This discussion paper is intended to provide a basis for reviewing transit options in detail with TransLink staff, ideally as part of the upcoming Vancouver Area Transit Plan.


3.1.1 Existing Facilities and Services

TransLink currently operates eleven transit routes on the UBC campus, as summarized in **Table 3.1.1**. There is a total of approximately 550 bus trips to the UBC campus each weekday during the September-to-April academic year, with approximately 60 to 70 bus trips during the morning peak hour.

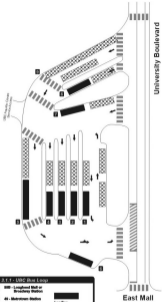
Ten of the eleven routes terminate at the transit exchange on University Boulevard at East Mall, which is commonly referred to as the “Bus Loop.” **Figure 3.1.1** provides a schematic illustration of the Bus Loop, identifying the numbers and allocation of bus platforms and layover bays.

Roughly trapezoidal in shape, the Bus Loop is approximately 70 m long on the north side, 110 m long on the south side, and 50 m wide; with a total area of approximately 17,000 m². Buses enter the Bus Loop from westbound University Boulevard via one of three entrances, and all buses leave via one exit, turning onto eastbound University Boulevard.

Figure 2.1.1 - MBG Bus Loop

1 - Boundary Loop of Boundary Loop	2 - Longwood Mall or Brudley Station	
2 - Joyce Station	3 - Main Street Station	
3 - Powell	4 - Commons 400 - Stoverson	
4 - Hastings	5 - Brudley Mall	
	6 - Unloading Only	

Legend:
 Loading
 Loading/Unloading
 Loading/Unloading
 Loading/Unloading



University Boulevard

East Mall

**Table 3.1.1
Existing Transit Services to UBC**

Route	Notes	Terminus	Frequency of Service (minutes)			
			Peak	M-day	Eve	W-end
4	<ul style="list-style-type: none"> Via University Blvd. 	Bus Loop	5 – 10	15	20	15 – 20
9	<ul style="list-style-type: none"> Via University Blvd. Terminates at Alma St. outside weekday peak 	Bus Loop	10	n/a	n/a	n/a
10	<ul style="list-style-type: none"> Via University Blvd. 	Bus Loop	5 – 8	11 – 13	15 – 20	10 – 15
25	<ul style="list-style-type: none"> Via 16th Ave. & Wesbrook Mall Wheelchair accessible service 	Bus Loop	6 – 10	15	20 – 30	15 – 30
41	<ul style="list-style-type: none"> Via SW Marine Dr., 16th Ave. & Wesbrook Mall Evening route via Thunderbird Blvd. Wheelchair accessible service 	Bus Loop	2 – 10	15	25 – 30	30
42	<ul style="list-style-type: none"> Via Marine Dr. & Chancellor Blvd. Evening and Sunday service not available 	Botanical Gardens	60	60	n/a	60 (Sat.)
44	<ul style="list-style-type: none"> Via University Blvd. Express service, Westbound - AM only, Eastbound - PM only Wheelchair accessible service 	Bus Loop	15 – 30	n/a	n/a	n/a
49	<ul style="list-style-type: none"> Via SW Marine Dr., 16th Ave. & Wesbrook Mall Terminates at Dunbar Loop outside weekday peak Wheelchair accessible service 	Bus Loop	5 – 10	n/a	n/a	n/a
99	<ul style="list-style-type: none"> Via University Blvd. Limited stop service Articulated buses Wheelchair accessible & bike rack service 	Bus Loop	2 – 5	7 – 8	15	15
258	<ul style="list-style-type: none"> Via University Blvd. Express service, Westbound - AM only, Eastbound - PM only 	Bus Loop	60	n/a	n/a	n/a
480	<ul style="list-style-type: none"> Via SW Marine Dr., 16th Ave. & Wesbrook Mall Limited stop service, Westbound - AM only, Eastbound - PM only 	Bus Loop	60	n/a	n/a	n/a

The Bus Loop incorporates eight platforms for passenger boarding, as well as one platform dedicated for unloading 99B buses. All platforms are wheelchair accessible. Only platforms 1 to 5 can accommodate electric trolley buses, and have shelters.

The Bus Loop incorporates layover space for up to 12 buses, as illustrated in **Figure 3.1.1**. The bus loop is also used by TransLink maintenance and supervisory staff, who frequently park their vehicles within the Loop. UBC service vehicles also travel through the bus loop to access the Aquatic Centre.

In addition to the Bus Loop, there are 32 bus stops on campus, plus additional bus stops on the UEL, as illustrated in **Figure 3.1.2**. Of the bus stops on campus, fourteen are wheelchair accessible and five have shelters. Four bus stops — those located on West Mall and on Thunderbird Boulevard — are used only in evenings, by Route 41 buses, which operate a different evening route than during the daytime.

3.1.2 Future Services

TransLink will be increasing transit service to UBC each year for the next several years, particularly in Fall 2001 when the U-TREK card program is planned for implementation. Some of the increased service will be on existing routes, and some will be on new routes, as described below.

- **Existing routes.** Service on existing routes will be increased by improving frequencies. This would not likely require additional facilities on campus, as buses would use the existing allocated platforms and layover space at the Bus Loop, and would use existing bus stops on campus.
- **New routes.** TransLink has identified several new regional routes that would be desirable to provide additional service to UBC, as illustrated in **Figure 3.1.3**. As summarized in **Table 3.1.2**, all four of these proposed new regional services would be express or limited-stop services intended to reduce travel times to and from UBC. In addition to these regional services, stakeholders at UBC and in Vancouver have suggested that TransLink consider a community bus service operating between UBC and west side neighbourhoods such as West Point Grey and Dunbar.

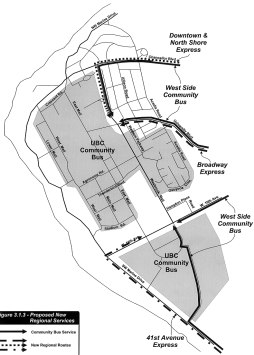


Figure 3.1.3 - Proposed New Regional Services



**Table 3.1.2
Potential Future Transit Services at UBC**

Route	Routing on Campus	Service Description	Notes
Broadway Express	University Blvd.	<ul style="list-style-type: none"> Express service Articulated buses 	
41 st Avenue Express	SW Marine Dr., 16 th Ave. & Wesbrook Mall	<ul style="list-style-type: none"> Limited stop service Standard 40-ft buses 	
Downtown Express	University Blvd. <i>or</i> Chancellor Blvd. & Wesbrook Mall	<ul style="list-style-type: none"> Limited stop service Standard 40-ft buses 	Would replace existing Rt. 44
North Shore Express	University Blvd. <i>or</i> Chancellor Blvd. & Wesbrook Mall	<ul style="list-style-type: none"> Limited stop service Standard 40-ft buses 	Would replace existing Rt. 258
West Side Community Bus	Various	<ul style="list-style-type: none"> Fixed route and schedule Mini-buses 	Could replace existing Rt. 42
UBC Community Bus	Various	<ul style="list-style-type: none"> Variable route and schedule <i>and/or</i> demand-responsive Mini-buses 	Could replace existing Security Bus

Currently, the only transit service operating within the campus is the Security Bus operated by UBC to provide an alternative to walking through the campus at night. Stakeholders on campus have identified a need for an expanded transit service within the campus. In the future, it is anticipated that a community bus service would be operated on campus at all times, in academic and residential areas, as illustrated in **Figure 3.1.3**.

These proposed new transit services would require new facilities on campus. Depending on how transit services operate through campus, additional transit exchange facilities might be required to provide boarding platforms for new routes, as well as additional layover space. New bus stops would be needed where new routes would operate along roads currently not served by transit, and shelters and other passenger amenities would likely also be required. It might also be necessary to remove or relocate existing bus stops.

3.1.3 Options for Transit Facilities

With respect to new transit facilities on campus, a key issue is how transit services would operate through the campus, and what transit exchange facilities would be required for these services. Three options for providing transit exchange facilities are described below — retaining

the existing single transit exchange, adding a second transit exchange, or eliminating the transit exchange.

- 1. One transit exchange.** Unless UBC requests otherwise, TransLink would likely continue to terminate all transit services at the existing Bus Loop on University Boulevard. As illustrated in **Figure 3.1.4**, this means that existing bus routings would be retained, and all buses — including the proposed West Side Community Bus — would be routed through the University Boulevard/Wesbrook Mall intersection. Some buses travelling via SW Marine Drive could use the proposed new collector road through South Campus.

The major difficulty with Option 1 is that there is no additional space in the existing Bus Loop to accommodate new routes. Five new regional routes (including the West Side Community Bus) would require up to five new boarding platforms, as well as three or four layover spaces. One or more boarding platforms might also be required for UBC Community Bus services.

Expansion of the existing Bus Loop would be difficult, as there is little unused land in the area, and what unused land there is has been identified for commercial development as part of UBC's Comprehensive Community Plan. In fact, development plans are based on the assumption that in the longer-term, the area occupied by the Bus Loop would be reduced from the existing size.

The other difficulty with Option 1 is that there would be no direct transit connection between the southern part of the campus and transit services operating via University Boulevard and Chancellor Boulevard. This means, for example, that someone travelling from the South Campus to downtown Vancouver would have to take a regional bus or a UBC Community Bus to the Bus Loop, and then transfer to another bus to travel downtown.

- 2. Two transit exchanges.** This option is currently identified in UBC's Comprehensive Community Plan as the preferred future option. As illustrated in **Figure 3.1.5**, the existing Bus Loop would be retained, and a new transit exchange would be implemented in the vicinity of the 16th Avenue/Wesbrook Mall intersection. Buses routed through the southern part of the campus via 16th Avenue and SW Marine Drive would stop at the new transit exchange, where some bus routes would terminate. Other buses would continue via Wesbrook Mall and/or East Mall to the existing Bus Loop, where

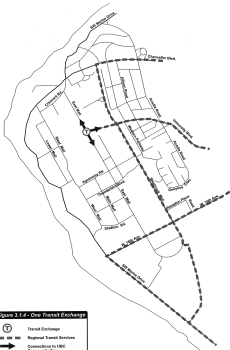


Figure 3.1.4 - One Transit Exchange

	Transit Exchange
	Regional Transit Services
	Connections to UBC Community Buses

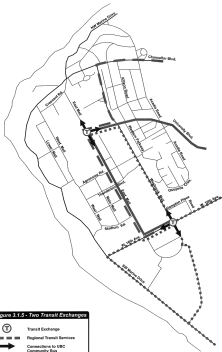


Figure 1.1.3 - Two Transit Exchanges

	Transit Exchange
	Regional Transit Services
	Connections to MRC Community Buses

these routes would terminate. Buses routed via University Boulevard and Chancellor Boulevard would stop at the existing Bus Loop, where some bus routes would terminate. Other buses would continue via East Mall to the new transit exchange, where these bus routes would terminate. The result would be that some bus routes would serve both transit exchanges.

Creating a second transit exchange in the South Campus would provide an opportunity to reduce the size of the existing Bus Loop, consistent with UBC's development plans. The total number of boarding platforms at both transit exchanges would be the same or greater than if there was a single transit exchange, as some bus routes might require a platform at each exchange. The total number of layover spaces would be the same as with a single exchange.

Option 2 also provides a direct transit connection between south campus and destinations served by routes on University Boulevard and Chancellor Boulevard. This means that it would be possible to travel from the South Campus to downtown Vancouver, for example, on the same bus, without transferring at the Bus Loop.

- 3. No transit exchange.** This option was presented in the first draft of UBC's Comprehensive Community Plan. As illustrated in **Figure 3.1.6**, all regional buses would circulate around a loop in the central part of campus, via Wesbrook Mall, University Boulevard, East Mall, and a new roadway in South Campus south of 16th Avenue. Buses would travel in one direction only — likely clockwise so that the number of left turns for buses would be minimized. Buses would begin the loop at one of four locations, and would end the loop at the location where they began the loop. UBC Community Bus services would intersect the loop at various locations, providing multiple opportunities to transfer to and from regional bus services.

As with Option 2, Option 3 would provide a direct transit connection from the South Campus to destinations served by routes along University Boulevard and Chancellor Boulevard. Option 3 would also eliminate the existing Bus Loop, thereby making this land available for development.

The significant disadvantage of Option 3 is that it would present operational difficulties associated with a change in the way buses are scheduled and layover is accommodated. Currently, buses layover at

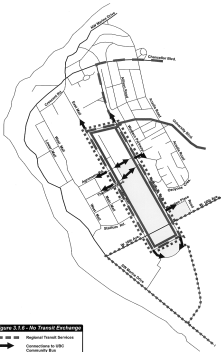


Figure 3.1.6 - No Transit Exchanges



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the Bus Loop. Because the Bus Loop is at the end of each route, buses layover without any passengers on board. With Option 3, layovers would occur at one or more designated locations around the loop. At any location, there would still be passengers on the bus who had not yet alighted because the bus had not yet reached their stop on the loop, and there would be passengers on the bus who had boarded at a previous stop on the loop. These passengers would have to sit on the bus during the layover period. To minimize annoyance and frustration for passengers would require considerable “fine-tuning” of bus schedules, which TransLink and Coast Mountain Bus Company would likely resist. Layover at points around the loop would also mean that the bus operator would not be able to leave the bus unattended with passengers on board, or would have to ask passengers to leave during the layover period so that the operator could use the washroom and other amenities.

The advantages and disadvantages of each option are summarized in **Table 3.1.3**. Overall, Option 2 provides the greatest advantages for UBC with minimum disadvantages for UBC, TransLink and others. Consequently, Option 2 is the preferred transit facility option, illustrated in **Figure 3.1.7**.

**Table 3.1.3
Transit Facility Options**

Option	Advantages	Disadvantages
1 One transit exchange		<ul style="list-style-type: none"> • No direct connection from South Campus to University Blvd. transit services. • Existing Bus Loop would be expanded in size.
2 Two transit exchanges	<ul style="list-style-type: none"> • Increased coverage of campus with bus service on East Mall. • Direct connection from South Campus to University Blvd. transit services. • Existing Bus Loop could be reduced in size, consistent with UBC development plans. 	
3 No transit exchanges	<ul style="list-style-type: none"> • Existing Bus Loop would be eliminated. • Increased coverage of campus with bus service on East Mall. • Direct connection from South Campus to University Blvd. transit services. 	<ul style="list-style-type: none"> • Passengers remain on bus during layover. • Scheduling of buses to minimize or eliminate layover would be difficult. • Operators could not leave buses unattended with passengers on board.



Figure 3.1.7 - Transit Facilities



Primary Transit Exchange



Primary Transit Road



Other Transit Road



Secondary Transit Exchange

The transit facilities illustrated in **Figure 3.1.7** would support increased transit use, and would ensure that all areas of campus are within 400-m walking distance of transit. As well, this infrastructure would allow for possible extension of rail rapid transit to UBC, as either or both transit exchanges could become rapid transit stations. Key features of the transit facilities illustrated in **Figure 3.1.7** include:

- **The primary transit exchange** is located on the northeast corner of the University Boulevard/East Mall intersection. In the short term, the primary transit exchange will remain a surface facility in the existing location. In the longer-term, it is possible that the exchange could be incorporated within a new development. Within five to ten years, the number of platforms and layover bays required at the primary transit exchange would be minimized by developing a secondary transit exchange, as described below.
- **A secondary transit exchange** would be developed in the vicinity of the Wesbrook Mall/16th Avenue intersection. When this exchange is developed, some of the routes that currently terminate at the primary transit exchange would be extended to a new terminus at the secondary exchange. This would increase coverage of the southern part of the campus, and reduce the number of platforms and layover bays required at the primary exchange.

It is expected that the secondary transit exchange would not be developed until there is a significant population in the South Campus, which would generate sufficient ridership to justify the cost of extending services to the secondary exchange. This is expected to occur within a 5-year to 10-year time horizon, sometime between 2005 and 2010.

- **Primary transit roads** are those roads which regional transit services currently use and would continue to use. These are arterial and collector roads with sufficient pavement width to accommodate transit vehicles. The only road currently not used by transit buses is East Mall. It is anticipated that East Mall would only be used by trolley buses and alternative fuel vehicles, all of which would be significantly quieter than diesel buses. Although East Mall is narrower than other roads on which transit buses operate, the 7.0m to 7.5m width is sufficient to accommodate buses, bicycle and forecast future volumes of traffic (up to 300 vehicles per hour).

- **Other transit roads** are those roads that could be used by some regional transit services, and by local community bus services. These other roads include new roads within the South Campus, such as the collector road connecting SW Marine Drive and the South Campus collector road, which could be used by some regional transit services as an alternative to routing via the 16th Avenue/SW Marine Drive intersection. This would improve coverage of the South Campus, and reduce walking distances to transit for employees and residents. Consistent with UBC's road network plans, through travel on this collector road would be restricted to buses, cyclists and pedestrians at the greenway crossing.

3.2 Campus Transit Services

The majority of trips on campus are made by walking. For some people, however, walking is not an attractive nor feasible option. These people include persons with disabilities, persons concerned about personal security at night, and persons who have to travel a long distance on campus in a short amount of time. These people need alternatives to walking — alternatives other than the automobile — for trips within UBC. With future development on campus, particularly in the South Campus area, alternatives to walking will become even more important in the future.

This section provides a review of transit options for travel within UBC. All are feasible options, provided that they are used at the right time and to serve the right markets.

3.2.1 Markets for Transit Services

In establishing transit services within UBC, it is important to consider market needs. Specific markets at UBC which could be served by on-campus transit services include:

- **Persons concerned about personal security**, particularly during evenings, at night and on weekends when there are not many other people walking about on campus. Persons travelling alone, particularly women, are most likely to be discouraged from walking in these circumstances.

This market could be served by an enhanced security bus or campus shuttle service operating on a fixed schedule at a 15-minute

frequency, with direct service to as many key destinations on campus as possible. Travel time is a secondary concern as compared with walking distance, but waiting time is critical (hence the 15 minute frequency, which would lead to average waits of only 5 to 10 minutes between shuttles). This market could also be served with a demand-responsive shuttle service (e.g. in partnership with Safewalk), which would operate on a door-to-door basis to minimize walking distances.

- **Persons travelling longer-distances.** Trips from one end of the campus to the other may involve distances of up to 3 km. On foot, a trip of this length would take most people 30 minute or more, and consequently most people would be discouraged from walking longer distances, particularly if time is constrained.

To serve this market, a fixed-route/fixed-schedule shuttle service should provide direct service from one end of the campus to the other, without the need to transfer and without circuitous routings, so as to minimize travel times. As well, service should be reasonably frequent (i.e. 30 minutes or less) or, if not, able to adhere closely to published schedules, so as to reduce waiting times. Walking distances to and from the shuttle service of up to 400m would be acceptable to users, provided that waiting time and travel times are minimized.

- **Persons with disabilities** typically cannot travel long distances on their own, and may not be able to access some parts of the campus on their own. For these persons, some sort of personal vehicle or shuttle service is a necessity. The majority of persons with permanent physical disabilities arrive at campus with their own vehicle and/or wheelchair. These persons have special parking permits to access their destinations directly without need of a campus shuttle. The primary focus is those persons with temporary physical disabilities, those without personal vehicles, and those in wheelchairs but having to travel long distances. To serve this market, a shuttle service must be able to operate on any roadway on campus, rather than operating on a fixed route. Service could be provided on a fixed schedule or on a demand-responsive basis (where shuttle vehicles are dispatched in response to a request for service), and could be integrated with or operate independently of other shuttle services. Walking distance and accessibility are the primary concerns of persons with disabilities — travel time and waiting time are secondary concerns.

- **Persons transporting goods.** Persons on campus sometimes need to transport heavy or bulky goods, which makes a trip on foot unattractive. Because this is not a frequent nor regular occurrence, to serve this market a shuttle service should operate on a demand-responsive basis, and provide door-to-door service. Alternative vehicles could be used as well, including bicycles.

3.2.2 Shuttle Options

To serve all four markets, the following transit services would be required:

- **A fixed-route, fixed schedule shuttle bus** operating throughout the entire campus during the daytime and early evening. This service would be designed to accommodate longer-distance trips, and at the same time discourage short-distance trips which might result in overloading. Routes would be oriented primarily in a north-south direction, bus stops would be spaced at least 300m apart, and walking distances to bus stops would be up to 400m. Desirably, service would be provided every 15 minutes or better. At least half of these vehicles should be wheelchair accessible, to provide a minimum 30 minute frequency.
- **A nighttime shuttle service** similar to the existing Security Bus, designed primarily to accommodate persons concerned about personal security. Vehicles should be wheelchair accessible, and should deviate from their route on demand to pick up and drop off persons with disabilities. Service need only be provided every 30 minutes.
- **Demand-responsive shuttle services**, using a range of vehicles which may or may not be wheelchair accessible. These services would be designed to serve persons transporting goods, persons with disabilities and persons concerned about personal security.

Nine transit options are summarized in **Table 3.2.1**, and are described below. These options range from conventional city bus service to public bicycles. Together, these options would provide all of the shuttle services describe above, and would serve all of the target markets identified above.

**Table 3.2.1
Transit Options Within UBC**

Shuttle Option	Fixed Route Fixed Schedule Campus Shuttle	Nighttime Security Bus	Demand Responsive Service
City bus	X		
Community bus	X		
UBC shuttle bus	X	X	
Vanpool vans	X		X
UBC fleet vehicles		X	X
Neighborhood electric cars			X
Pedal-powered taxis			X
Public bicycles			X
Bicycle carts			X

- **City bus.** Currently, four of TransLink's city bus routes operate from 16th Avenue to the transit exchange on University Boulevard (#25, 41, 49, 480). For persons wishing to travel within this part of the campus, these city bus routes provide a fixed-route, fixed-schedule shuttle service, at reasonably attractive frequencies of service during most of the day.

In future, as the South Campus develops, a new transit exchange will be developed at 16th Avenue/Wesbrook Mall. Some city bus routes which operate via University Boulevard would be extended from the existing transit exchange on University Boulevard to a new terminus at the new transit exchange on 16th Avenue, likely via East Mall. Existing routes which enter the campus via 16th Avenue would not terminate at the new exchange, but rather would continue to operate to the existing transit exchange on University Boulevard. The result would be additional city bus routes operating between University Boulevard and 16th Avenue, providing additional shuttle services for persons travelling in this area of the campus.

Some city bus routes might also travel through the South Campus via a new north-south collector road connecting 16th Avenue at Wesbrook Mall with Southwest Marine Drive in the vicinity of the

Triumpf facility. These City Bus routes would likely not be designed to serve the Acadia neighborhood due to the existing narrow and curvilinear streets. As a result, these city bus routes could be used as shuttle services for all trips on campus south of Thunderbird Boulevard.

- **Community bus** describes a service operated by TransLink using minibuses rather than standard size or articulated buses. Because of their smaller size, these minibuses can operate along roadways which would not be suitable for larger city buses. Community bus services at UBC could be used to provide fixed-route, fixed-schedule services to areas beyond 400m walking distance of city bus services, particularly along West Mall, along the north end of East Mall, and along Acadia Road and Osoyoos Crescent.

Because city bus routes would provide fixed-route shuttle services between University Boulevard and the very south end of the campus, it would not be necessary to extend community bus services to 16th Avenue. Rather, the community bus services should be focused on the areas identified above, and should connect to city bus routes at the existing transit exchange at University Boulevard/East Mall, and at locations along Wesbrook Mall and East Mall.

As noted earlier, the community bus services would be intended to accommodate longer-distance trips and trips by persons with disabilities, yet discourage short-distance trips which might result in overcrowding. Consequently, routes should be direct to minimize travel times, and bus stops should be located at least 300m apart and should all be accessible to persons in wheelchairs.

- **UBC shuttle bus.** UBC currently operates a Security Bus service at nighttime, from 5:30 p.m. to 1:00 a.m. The purpose of the Security Bus is to provide an alternative to walking for persons concerned about personal security at night. The fixed route encompasses the academic areas of the campus and student residences (except Acadia), and includes a total of 14 stops. The bus takes 30 minutes to complete the route, and consequently the frequency of service is every 30 minutes.

Until such time as TransLink implements community bus service on campus, UBC may wish to operate shuttle buses to supplement the shuttle function provided by city buses. Based on information provided by UBC's parking department, the cost of the existing

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Security Bus operation is approximately \$25 per vehicle hour. If a shuttle service were provided from 7:00 a.m. until 1:00 a.m., using two shuttle buses on weekdays and one on weekends, the annual cost for 12 months of operation would be approximately \$300,000. Minibus vehicles cost approximately \$80,000, and have a lifespan of five to ten years, depending on the intensity of use.

- **Vanpool vans** are used in the morning and afternoon peak periods, but typically sit idle during the day. These vans could be used to provide fixed-route/fixed-schedule shuttle bus service during the daytime, as well as demand-responsive service for persons with disabilities who do not use wheelchairs. The cost to UBC would be approximately \$8/hour for vehicle use, plus \$15 to \$20/hour for drivers. In partnership with TransLink and the Jack Bell Foundation, UBC has proposed a shared vehicle program, with AMS Safewalk volunteers as drivers.
- **UBC fleet vehicles** could be used to provide additional nighttime security shuttle service to areas of the campus not served by the Security Shuttle, either on a fixed-schedule basis or a demand-responsive basis. Fleet vehicles could also be used to provide demand-responsive service during the daytime for persons transporting goods and persons with disabilities who do not use wheelchairs. The cost would be similar to the cost of using vanpool vans, and would include the cost for drivers (\$15 to \$20/hour) and the cost of fuel and maintenance (approximately \$8/hour).
- **Neighborhood electric cars** could be used either in new staff/faculty housing as shared vehicles, and/or at transit nodes as station cars. Cars could be leased by the hour, day, or month (at a cost of approximately \$300/month), or purchased (at a cost of approximately \$10,000 to \$15,000). Issues related to compounds, security, theft, and parking would need to be resolved.
- **Pedal-powered taxis** include rickshaws and tandem bicycles. They could be used to provide demand-responsive service for persons transporting goods, persons with disabilities who do not use wheelchairs, and persons concerned about personal security. Pedal-powered taxis can also incorporate supplementary electric power for uphill grades and heavy loads.

The costs of implementing a pedal-powered taxi service include the cost of vehicles and the cost for drivers. Tandem bicycles of sufficient quality and durability cost a minimum of \$1,000. Pedal-powered rickshaws cost at least \$3,000, but can also be fabricated on campus. As with motorized vehicles, the cost for drivers might be as much as \$15 to \$20/hour, unless this is run by or in partnership with the AMS Safewalk Program volunteers

- **Public bicycles** offer a form of demand-responsive shuttle service for anyone who can ride a bicycle. Successful public bicycle programs deter theft and vandalism by using bicycles of a unique design, with components that do not fit on conventional bicycles, and requiring a deposit or other means of identifying the user. Bicycles would be available throughout the UBC campus, and could be picked up in one location and returned to another location on campus.

The primary cost of a public bicycle program is the cost of bicycles, which would be in the range of \$200 per bicycle if purchased in quantity. Other costs include on-going maintenance and optional special bicycle racks for locking bicycles when not in use. The AMS Bike Co-Op, in partnership with UBC TREK Program Centre, have established and maintain a fleet of public bikes. They can be accessed via a \$10 per year membership, and \$5 key deposit. Bikes are obtained at no cost, via bikes left behind at student residences by UBC Housing & Conferences.

- **Bicycle carts** provide an alternative to motor vehicles for transporting bulky or heavy loads. UBC has initiated a partnership with the AMS Bike Co-Op, to provide carts that can be attached to conventional bicycles, and which can carry various size loads depending on the size of cart. Carts could be fabricated on or near campus. Students, staff, and faculty could use carts for on and off-campus trips.

3.2.3 Implementation

Transit options incorporating public bicycles, bicycle carts, pedal-powered taxis, UBC fleet vehicles, neighborhood electric cars and daytime use of vanpool vans can be implemented immediately, and could be sustained indefinitely. Options involving transit services and shuttle buses should be staged, as described in **Table 3.2.2**.

**Table 3.2.2
Implementation of Transit Options Within UBC**

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Shuttle Option	Immediate	Long-Term	Estimated Annual Cost to UBC
City bus		X	0
Community bus		X	0
UBC shuttle bus	X		\$300,000
Vanpool vans	X	X	\$10,000
UBC fleet vehicles	X	X	\$25,000
Neighborhood electric cars	X	X	0
Pedal-powered taxis	X	X	\$5,000
Public bicycles	X	X	\$5,000
Bicycle carts	X	X	\$5,000
Total			\$350,000

In the short-term, TransLink's efforts at expanding transit services to UBC will focus exclusively on increasing capacity on regional city bus and rapid bus routes serving the campus. There will not be any additional resources available to expand transit services within the campus. Consequently, in the short-term, UBC should consider expanding the Security Bus service to provide a daytime shuttle bus service.

Eventually, TransLink will have sufficient resources to implement community bus service at UBC. When community bus service is implemented, UBC's daytime shuttle bus service would be discontinued, and replaced with a community bus service which serves the areas identified previously. It may also be possible to modify or eliminate the Security Shuttle service, depending on the routing and hours of service of the community bus service.

When campus development reaches a stage where there is sufficient demand for transit in the South Campus, it would then be cost-effective to extend some city bus routes from the transit exchange at University Boulevard/East Mall to a new transit exchange at 16th Avenue/Wesbrook Mall. As described previously, city bus routes operating between these two transit exchanges would provide a high-frequency shuttle service between the north and south parts of the campus.

**Transit
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Plan**

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As summarized above, it is estimated that the annual cost to UBC of providing the identified “immediate” shuttle options would be approximately \$350,000. In the long-term, when community bus services are implemented by TransLink, the annual cost for remaining shuttle services could decrease to as little as \$150,000.