Panoramic photo showing the current Transit Hub and High Street
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Overview of the Study

The Burnaby Mountain Transit Hub Urban Design and Transit Planning Study was prepared in close consultation with the three clients who collaborated on this project: SFU Community Trust (UniverCity), Simon Fraser University (SFU), and the South Coast British Columbia Transportation Authority (TransLink).

Study Vision and Objectives

The adopted vision statement is that: “The SFU Town Centre will be an exceptional urban environment and will incorporate an attractive, safe, and functional transit hub to meet the current and long-term capacity needs of the Burnaby Mountain community.” From an urban design perspective, the objectives are: to complete the urban form of the SFU campus with an exceptional, new public open space that becomes the front door to the campus, to resolve the urban form transition between the campus and the UniverCity community while integrating transit functions into the urban fabric, while enhancing the High Street as the social heart of the UniverCity community.

The result is a framework for the development of an integrated transit hub with an engaging and attractive urban character that balances the needs of all users. With the success of U-Pass and other Transportation Demand Management measures, transit use on Burnaby Mountain has increased significantly since 2002. Looking forward, transit demand is expected to rise further with associated ongoing development of UniverCity, continued growth in academic enrollment, ongoing implementation of TDM strategies, and improved transit capacity. As a result infrastructure investment is required to support transit service expansion, transit operation including bus arrival, departure and layover, and to improve the passenger experience through the university’s urban form objectives.

The design problem was to identify a transit hub model that could integrate and enhance the urban design objectives of:
- animating the town centre
- creating a gateway and a new front door to the university
- accommodating the very large bus layover facility out of sight but within access to the bus stops.

Process

The study process involved inventory and assessment of current conditions and adopted plans and policies for urban design, land use and development, and traffic and transportation as well as extensive research into potential precedents world-wide for the function and design of effective transit hubs.

A series of committee meetings, workshops and open houses were held over the course of the study to communicate the research, design options and preferred option as per the adjacent timeline.

Arriving at the preferred option involved applying the program, the urban design principles and the transit hub typologies from the Global Best Practices Review to the site. The resulting options from the process were analyzed during the workshops and a preferred option was selected.
The Recommended Concept

The preferred option evolved from explorations of many conceptual ideas and was tested through reviews with the three clients, the City of Burnaby, and public and stakeholder consultation.

The recommended concept has bus loading and unloading occurring on-street with both East Campus Road and High Street redeveloped with new amenities including wider sidewalks and weather protection. The Transit Hub is integrated into one side of a new quadrangle for Simon Fraser University that will be edged by new and existing buildings and landscape. This space becomes a welcoming arrival place to Simon Fraser University for transit users that is seamlessly integrated with the neighbourhood heart of UniverCity.

Key Features

The recommended concept includes many urban design features as follows:

- A new university plaza and future quadrangle where bus users will arrive on campus; trees and other landscape elements will strengthen and support the edges of the new quadrangle leaving the central area open to be programmed and used for a wide variety of activities
- A colonnade that provides a weather-protected walking route that extends from the corridor within Blusson Hall to connect to the north side of High Street that creates a generously scaled public space that accommodates both movement and waiting space for bus users as well as retail frontage
- Weather protection for bus stops with glass canopies that extend outside the colonnade at bus stops
- Removal of buses from the street during layover times so that buses do not stop any longer than needed to load and unload and incorporating a bus layover facility within a building that can be developed by UniverCity with built edges that will enhance and animate the adjacent streets and fit with the urban design plans for UniverCity and its High Street
- Massing of new buildings to define and animate the public realm
- A design concept for East Campus Road that uses rows of trees and planters to create a strong sense of entry and place and to control pedestrian movement and enhance safety by directing pedestrians to two marked and signalized locations preventing jaywalking
- Pedestrians are encouraged to move along the two major east-west spines where pedestrian crossings of East Campus Road will be located with pedestrian-activated signals. Movement through Town and Gown Square is also integrated into the movement pattern.

The transit and transportation features of the recommended concept include:

- 6 loading, 3 unloading stops, and 12 layover spaces with potential for adapting loading and unloading locations to changed bus routing and new road use patterns
- Flexibility to adapt to lower levels of bus use in the future if an alternative new mode of transit is introduced.
- Cars and buses share East Campus Road and the High Street and add to the energy and activity of the commercial heart.
- 9.0 metre commercial loading zone on the east side of East Campus Road for Lot 24 commercial tenant use.
1.0 BACKGROUND AND INTRODUCTION

The Burnaby Mountain Transit Hub Urban Design and Transit Planning Study was jointly initiated by Simon Fraser University, UniverCity and TransLink to address their shared interest in redevelopment of the transit hub on Burnaby Mountain. The city of Burnaby and CMBC were also included on the Project and Technical Committees. The current exchange is operating over its designed capacity and is not adequate for projected increases in bus ridership.

The site, once at the edge of the university, is now central to the area where the academic campus meets the heart of the developing community of UniverCity. Its bus-oriented, functional layout is no longer appropriate to the importance of the site and a more urban, pedestrian-friendly design that engages the community and responds to current and planned urban design intentions for the development of both SFU and UniverCity is now desired.

The mandate of the study is to integrate planning for transit operations with a conceptual urban design plan that offers a welcoming and engaging environment for both transit users and members of the Burnaby Mountain community. The consultant team for the project combines expertise in transit and transportation planning from Bunt & Associates Engineering and Kittleson & Associates Inc. with urban design, architecture, planning, and landscape architecture from Hughes Condon Marler Architects, Endall Elliot Associates, and Phillips Farevaag Smallenberg.

Panoramic photo showing Blusson Hall and the current Transit Hub

Photo showing the current Transit Hub

Panoramic photo showing Blusson Hall and the current Transit Hub
2.0 OVERVIEW OF THE PROCESS

Section 2.0 provides an overview of the client and public consultation process and the steps taken to develop options and select a preferred direction for more detailed study.

2.1 Technical and Project Committee Consultation

Regular progress reviews during the Burnaby Mountain Transit Hub Urban Design and Transit Planning Study were provided through meetings with two committees: the Technical Committee with representatives of the three clients, SFU, UniverCity, and TransLink, with a mandate to discuss technical and process issues and the Project Committee with an expanded membership from the three clients, including key decision makers, to consider and confirm key directions of the study. On several occasions, the Technical / Project Committee met in longer workshop sessions to consider options in detail.

2.2 Public Open Houses

Two public open houses were held during the study process: on November 28, 2008 and February 18, 2009. Both were widely publicized and held in conveniently located venues near the study site on Burnaby Mountain. Display panels summarized the progress and information from the study and a comment form was available to collect written input. Consultants and representatives of SFU, UniverCity, TransLink, CMBC and the City of Burnaby were on hand to answer questions and receive verbal comments. The display materials and comment forms were also posted to the web to be available to a wider number of community members. The materials from both open houses are included in the appendix to this report.

The first open house provided background, inventory, and assessment information that would form the basis for planning and siting decisions for public information and review. Topics covered included transit, vehicular circulation, growth projections, land use, urban design, and future development plans. A Draft Vision Statement and Planning Criteria that were prepared to inform the evaluation of options were presented with a request for comments and additions. A set of options that had been considered to have merit for further study were illustrated and described for public comment.

The verbal and written comments expressed strong support for the Vision and draft criteria. Among the frequent concerns expressed about the options were centrality of location to minimize walking distances, safety concerns regarding movements of buses, other vehicles, and pedestrians, security at night, and potential congestion and negative impact of buses along the High Street.

The second open house provided an update on the progress of the study and presented the option preferred by the reviews of the Project and Technical Committees for public consideration and comment. A majority of attendees of the open house supported the concept as proposed.

2.3 Consideration of Options and Selection of Preferred Option

A wide range of initial preliminary options was refined to a shortlist from which the preferred option was identified. This process involved input from the Project and Technical Committees at a series of facilitated workshops. Between workshops, options that were identified as remaining under consideration were refined to incorporate ideas for improvements and to prove out feasibility. A matrix of key evaluation criteria was used to ensure that the needs and expectations of all types of stakeholders were taken into consideration during the evaluations. The options and the evaluation matrices are included in the appendix materials.
3.0 TECHNICAL AND SITE ASSESSMENT

The technical assessment of transit and transportation requirements and the urban design and planning review of the campus are summarized in Section 3.0. The Global Best Practices Review of Transit/Town Square Facilities is a key part of the technical assessment and is also designed to be used as a stand-alone report.

3.1 Summary Review of Existing Documents

A number of documents have been reviewed by the Project Team and have provided useful contextual information upon which to base operation and design considerations for the Transit Hub. A list of the materials reviewed to date includes:

1. SFU CAMPUS TRANSIT PLAN (July 2005) prepared by IBI Group – review and assess the design targets for the future transit exchange
2. SIMON FRASER UNIVERSITY TRAVEL COUNT PROGRAM (September 2007) prepared by MMM Group – assess the performance of the transit exchange in terms of passenger and bus volumes and compared them with the projections presented in the 2005 Campus Transit Plan
3. UNIVERCITY RESIDENT SURVEY (June 2007) prepared by Mustel Group – highlights residents’ attitudes, opinions, expectations, and needs regarding the community
4. COAST MOUNTAIN BUS COMPANY FALL 2008 BUS SCHEDULE FOR SFU - assess current peak demand of the existing transit facility; forming the basis in projecting for future demand
5. COAST MOUNTAIN BUS COMPANY PASSENGER / BUS COUNT DATA (Fall 2007) - assess current peak demand of the existing transit facility; forming the basis in projecting for future demand
6. BURNABY MOUNTAIN GONDOLA TRANSIT FEASIBILITY STUDY (DRAFT - September 1, 2008) prepared by Bryce Tupper for SFUCT – recognize its implication on the future bus transit demand in the Burnaby Mountain area should the gondola be materialized
7. GONDOLA RAPID TRANSIT FOR BURNABY MOUNTAIN (April 23 2008) prepared by David Godlin for SFUCT – initial review of the feasibility of the gondola system
8. ENROLLMENT REPORTS AND DASHBOARD (http://www.sfu.ca/sp/enrollment/EnrollmentDashboard/index.html) – historical data of enrolment at SFU in the Burnaby campus and the university as a whole
9. UNIVERCity DEVELOPMENT STATISTICS supplied by SFUCT – review and assess the design targets for the future transit exchange. For the near and medium term periods, the Transit Plan recommended that the Transit Hub continue to be located in its present location and transit routing on Burnaby Mountain be maintained as is (Note: The 2005 Transit Plan refers to the Transit Hub as the “Transit Exchange”). For the longer term, there was no clear consensus on where best to locate the bus layover/storage facility; however, changes to the transit routing were identified that would take advantage of long range plans to convert existing one-way traffic routes on Burnaby Mountain to two-way roadways.

Based on our review of this material, the key considerations affecting the conceptual design development of the SFU Transit Hub are outlined in the following sections:

(i) FUTURE TRANSIT PASSENGER PROJECTIONS

The Simon Fraser University (SFU) Transit Plan prepared in 2005 identified an existing (2003/04) daily transit ridership of approximately 14,000 passengers, or about 7,000 inbound trips and 7,000 outbound trips each day. The Transit Plan concluded that peak period, peak direction transit ridership could potentially increase by 60% to 80%, yielding a daily ridership of between 22,400 to 25,200 passengers by the 2025 planning horizon year. This estimate was premised on the following assumptions:

- An increase in 10,000 Full Time Equivalent (FTE) students at SFU’s Burnaby Mountain Campus, from 15,000 to 25,000;
- An increase of students in residence on Burnaby Mountain from 1,000 to 5,000;
- Build out of the UniverCity community to 10,000 residents;
- Parking supply on Burnaby Mountain for staff and students to be maintained at existing levels (approximately 5,800 stalls) as per SFU’s transportation demand strategy; and
- Continuation of the U-Pass transit pass for students and Community Pass for UniverCity residents,

In September 2007, SFU retained the MMM Group to conduct a comprehensive travel survey program to document the daily travel patterns of all persons travelling to/from the Burnaby Mountain Campus including transit passengers. Based on automatic passenger count (APC) data provided by Coast Mountain Bus Company (TransLink’s bus transit subsidiary), the daily transit passenger volume in September 2007 for SFU and the UniverCity community on Burnaby Mountain was 22,690 trips (11,460 inbound and 11,230 outbound). This volume represents 42% of all daily person trips to/from Burnaby Mountain. Over the relatively short period from 2003/04 to 2007, transit ridership to/from Burnaby Mountain has increased remarkably by over 60%, and has already reached the long-term projections of the SFU Transit Plan. As there remains considerable growth potential for transit use at SFU, with anticipated increases in student enrollment and staffing, and at least another 8,000 residents anticipated to reside in the UniverCity community, clearly a revised analysis of future transit passenger volume is warranted.

(ii) STREET NETWORK AND TRANSIT ROUTE PLAN

The 2005 Transit Plan included an evaluation of the various transit route options and transit exchange locations were considered. For the near and medium term periods, the Transit Plan recommended that the Transit Hub continue to be located in its present location and transit routing on Burnaby Mountain be maintained as is (Note: The 2005 Transit Plan refers to the Transit Hub as the “Transit Exchange”). For the longer term, there was no clear consensus on where best to locate the bus layover/storage facility; however, changes to the transit routing were identified that would take advantage of long range plans to convert existing one-way traffic routes on Burnaby Mountain to two-way roadways.
The 2005 Transit Plan states that the conversion of existing one-way roads to two-way operations would require the construction of an additional climbing lane on Gaglardi Way in order to maintain the capacity of the road network. In our view, this may not be an absolute requirement and should be further analyzed. Conversion of both Gaglardi Way and University Drive West from one-way to two-way traffic operation may well be a measure that can be implemented in the near future, without substantial road reconstruction efforts. A series of demonstration trials with these revised traffic patterns could be conducted to assess the impact to transit, automobile, and cyclist traffic operation. For instance, a trial closure of one of the two uphill lanes on Gaglardi Way would provide an opportunity to assess how suitable a single lane uphill configuration would operate in a mixed traffic (transit, automobile, bicycles) context.

A complete two-way street network on Burnaby Mountain would provide more flexibility for future transit routing; however, for the near term there is no clear and compelling reason to modify the existing “figure of eight” transit route pattern at SFU. All transit routes should pass through the central Transportation Centre facility both for inbound (arriving) passengers and for outbound (departing) passengers.

Future two-way transit operation on Gaglardi Way may be best suited for a future peak period only service connecting between the Transportation Centre and either the Production Way – University SkyTrain Station, or possibly the Lougheed Town Centre SkyTrain Station (for transfer to contemplated future Highway 1 BRT (Bus Rapid Transit) service. SFU is planning to convert the section of University Drive West between the Visitor Parkade and the west residences access road from one-way westbound to two-way traffic operation in the near future. This measure will enable possible future “Community Shuttle Bus” public transit service between the student residence buildings on the western portion of Burnaby Mountain and the UniverCity community on the eastern portion of Burnaby Mountain. The contemplated future Burnaby Mountain Sport and Medicine development on the western portion of the campus would also benefit from this community shuttle service.

### (III) TRANSIT HUB LOCATION AND OPERATIONAL REQUIREMENTS

As reported above, for short and medium term periods, the 2005 SFU Transit Plan recommended that the Transit Hub continue to be located in its present location on East Campus Road and transit routing on Burnaby Mountain be maintained as is.

The Consultant Team shares this view that the present location of the Transit Hub is the preferred location going forward. This easterly location at the interface between the SFU campus and the UniverCity community best services the overlapping transit requirements of both SFU and UniverCity. As well, the Transit Hub in this location is situated in a “developing” area of both the campus and UniverCity, with remaining opportunities to integrate the facility into or around new development as opposed to having to “force fit” the facility in/around existing buildings and infrastructure. From an urban design standpoint, a transit hub at this location has the capability to be an important activity area focal point for a new “east side” front door to the SFU campus, as is in fact the case with the existing transit hub operation.

The 2005 Transit Plan outlined anticipated future transit operations programming requirements for the SFU Transit Hub based on the future transit passenger projections. The projected future transit service requirements for SFU including weekday peak period bus arrivals/departures and transit Exchange programming were identified in the 2005 Transit Plan seen in Table 3.1.

As reported previously, transit passenger volumes at SFU have already reached the long term (Year 2025) levels listed in the 2005 Transit Plan. Transit service levels (bus volumes) have increased accordingly and the operational programming requirements for the hub facility.

### Table 3.1: 2005 SFU Transit Master Plan – Project Transit Service Requirements

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak Hour</td>
<td>32</td>
<td>43</td>
<td>59</td>
</tr>
<tr>
<td>Mid Day</td>
<td>17</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>25</td>
<td>33</td>
<td>45-50</td>
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<table>
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<tr>
<th>Peak Period Terminal Requirements</th>
<th>Unloading Bays</th>
<th>Loading Bays</th>
<th>Storage (Layover) Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-5</td>
<td>6-8</td>
</tr>
</tbody>
</table>

Table 3.1: 2005 SFU Transit Master Plan – Project Transit Service Requirements
3.2 Assessment of Existing Transit Operations

To document current transit usage patterns for SFU and UniverCity on Burnaby Mountain, Bunt & Associates conducted a survey of transit bus and transit passenger activity on Wednesday, September 17/08 from 7:00am to 5:00pm.

Count stations were established at the five existing transit stop locations on the campus including the Transportation Centre, the Transit Hub, the bus stop on Tower Road (presently used as the primary boarding location for UniverCity residents), the bus stop on South Campus Road, and the bus stop on University Drive West near the student residences. The number of buses stopping/passing by each location and the number of passengers boarding and unboarding were recorded. In addition, video logs of transit stop activity at both the Transportation Centre and the Transit Hub were recorded over the entire 10 hour survey period for visual reference.

Figure 3.1 provides a comparison of the observed September 2008 arriving passenger volumes to the September 2007 measurements. The overall transit arrival profile observed on Wednesday, September 17/08 is similar to the September 2007 measurements, though the 2008 volumes are higher. For instance, for daytime period from 7am to 5pm, the observed arrivals in 2008 are 13% higher than recorded in 2007, and for the morning peak period from 7am to 10am, the 2008 numbers are 24% greater than in 2007. This difference may be explained in part to the data collection method in 2007 where APC data 2007 measurements, though the 2008 volumes are higher. For instance, for daytime period from 7am to 5pm, the observed

Table 3.2 and Figure 3.2 below illustrate the split between transit passenger arrivals in September 2008 to the Transportation Centre (TC), which is the first stop opportunity for all four bus routes serving Burnaby Mountain for unloading students/staff, and passenger arrivals to the Transit Hub (TH), the next stop on four routes.

<table>
<thead>
<tr>
<th>Time</th>
<th>Arrivals</th>
<th>Split</th>
<th># of Buses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TC</td>
<td>TH</td>
<td>TC TT</td>
</tr>
<tr>
<td>08:00-08:30</td>
<td>926</td>
<td>638</td>
<td>1,564 59% 41% 20</td>
</tr>
<tr>
<td>08:30-09:00</td>
<td>705</td>
<td>417</td>
<td>1,122 63% 37% 20</td>
</tr>
<tr>
<td>09:00-09:30</td>
<td>1,115</td>
<td>666</td>
<td>1,781 63% 37% 26</td>
</tr>
<tr>
<td>09:30-10:00</td>
<td>466</td>
<td>223</td>
<td>689 68% 32% 21</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>642</td>
<td>356</td>
<td>998 64% 36% 18</td>
</tr>
<tr>
<td>10:30-11:00</td>
<td>306</td>
<td>124</td>
<td>430 71% 29% 15</td>
</tr>
<tr>
<td>11:00-11:30</td>
<td>360</td>
<td>166</td>
<td>526 68% 32% 10</td>
</tr>
<tr>
<td>11:30-12:00</td>
<td>205</td>
<td>82</td>
<td>287 71% 29% 11</td>
</tr>
<tr>
<td>12:00-12:30</td>
<td>250</td>
<td>97</td>
<td>347 72% 28% 9</td>
</tr>
<tr>
<td>12:30-13:00</td>
<td>225</td>
<td>156</td>
<td>381 59% 41% 11</td>
</tr>
<tr>
<td>13:00-13:30</td>
<td>296</td>
<td>202</td>
<td>498 59% 41% 10</td>
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<td>222</td>
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<td>14:30-15:00</td>
<td>141</td>
<td>75</td>
<td>216 65% 35% 11</td>
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<td>15:00-15:30</td>
<td>160</td>
<td>136</td>
<td>296 54% 46% 12</td>
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<td>15:30-16:00</td>
<td>64</td>
<td>101</td>
<td>165 39% 61% 10</td>
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<tr>
<td>16:00-16:30</td>
<td>173</td>
<td>127</td>
<td>300 58% 42% 13</td>
</tr>
<tr>
<td>16:30-17:00</td>
<td>106</td>
<td>111</td>
<td>217 49% 51% 15</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>6,514</strong></td>
<td><strong>3,939</strong></td>
<td><strong>10,453</strong></td>
</tr>
</tbody>
</table>

Table 3.2: 2008 Weekday Transit Passenger Arrivals

Figure 3.1 Weekday Transit Passenger Arrivals to Burnaby Mountain

Figure 3.2 Transit Passenger Unloading Points
Through the weekday daytime period from 8am to 5pm, nearly two-thirds of all arriving transit passengers to Burnaby Mountain get off the buses at the Transportation Centre, and slightly over one-third carry on to the Transit Hub. At peak times over 70% of passengers exit at the Transportation Centre. The centrally located Transportation Centre is clearly the preferred stop for most students/staff arriving to the campus and this is likely to remain the case over the foreseeable future.

The pattern for departing transit passengers from Burnaby Mountain is considerably different and more complex. The passenger loading volumes from the five different count stations as observed in September 2008 is summarized in Figure 3.3, for data collected over 30 minute intervals on the hour and half hour (i.e., 11:00am and 11:30am).

Figure 3.3 shows the role of the Transit Hub is clearly evident as it accounts for the majority of transit passenger loadings on the departure from Burnaby Mountain. This exit profile for UniverCity residents is evident in Figures 3.3 and 3.4 for the Tower Road stop, particularly during the weekday morning period with commuter trips away from Burnaby Mountain. South Campus Road is presently only lightly used for loading, mainly in the afternoon period.

To further assess the operational characteristics of the SFU Transit Hub, route schedule information supplied by Coast Mountain Bus as programmed for September 2008 was analyzed in detail. Bus arrival and departure profiles leading into and pulling away from the Hub were developed in addition to a time profile through the day of the number of buses requiring layover space. The bus arrival and departure profiles are summarized in Figure 3.5, reporting the number of buses arrival and departing the Transit Hub on half hour intervals throughout the day. As indicated, the weekday morning period is the busiest period at the Hub in terms of bus vehicle volume, with up to 22 “in service” buses arriving to the Transit Hub in the half hour period from 9:30am- 10:00am, and between 10-15 “in service” buses departing the Hub each half hour (note: the departing bus volume is lower during the morning period as several buses leave the Hub “out of service”, i.e., without passengers. Overall levels of bus volumes in the weekday afternoon period are lower than the morning period; however, passenger activity in the Transit Hub is significantly more pressured in the afternoon on account of the preferred nature of the Transit Hub for afternoon peak period loadings under the current route configuration on Burnaby Mountain.

The pattern for departing transit passengers from Burnaby Mountain is considerably different and more complex. The passenger loading volumes from the five different count stations as observed in September 2008 is summarized in Figure 3.3, for data collected over 30 minute intervals on the hour and half hour (i.e., 11:00am and 11:30am).
The profile of bus layover requirements at the Transit Hub based on the existing bus schedule for the Hub is provided in Figure 3.6, during the weekday morning period up to 9 layover positions are required at the very most concentrated activity period. More generally through the morning and afternoon peak periods between 6-7 layover positions are required, and 5 spaces are needed through the midday period. With only 3 layover positions presently at the Transit Hub, buses are required to use the two existing unloading bays for layover, and occasionally the four loading bays. This shortage of layover space at the existing Transit Hub is the primary source of the congested peak period operation of the facility, compounded by the high number of pedestrian movements between loading platforms particularly during the afternoon period.

The key assumptions underpinning the future transit passenger projections are outlined below:

- An existing student FTE count of 18,200 at the SFU Burnaby Mountain campus with a target future enrollment of 25,000 FTE. The existing student enrollment is based on SFU Institutional Research and Planning Fingertip Statistics for 2007/08 for all three campuses (Burnaby, Surrey, and Vancouver) and an assumed 85% allocation to the Burnaby Mountain campus.
- An increase of the on-campus student residence population from 1,768 presently to a future target of between 3,061 to 5,600 persons.
- A diminishing supply of available daytime parking on the campus for students which presently offers fewer than 600 spaces available during the weekday mid-day period, i.e., 85% peak period utilization of the approximately 4,000 spaces available for student use. Control of the future parking supply is a key aspect of the SFU Parking Management Plan and a prime Transportation Demand Management (TDM) measure to encourage trips by alternative travel modes to the single occupant private vehicle.
- An additional 8,000 more residents at UniverCity, up from approximately 2,000 presently, with a future transit mode split of approximately 35%.

**SFU STUDENT & STAFF/FACULTY TRANSIT DEMAND GROWTH FACTOR**

Based on the future enrollment target of 25,000 FTE students, there is potential for an increase of 6,800 students at the SFU Burnaby campus. However, not all of this growth will be in the form of commuter students as SFU is planning to increase the number of on-campus student residences from 1,768 persons presently to between 3,061 and 5,600 persons in the future. For the purposes of this analysis, the lower figure of 3,061 residences is conservatively assumed for a net increase of 1,293 over today. In addition, with completion of the UniverCity development, more students and staff/faculty are anticipated to reside in this community. Survey of UniverCity residents in 2007 revealed that approximately one-third of the 2,000 residents, or approximately 650 persons had some affiliation with SFU, mainly as students. In the future as UniverCity
grows from 2,000 residents to 10,000 residents, the proportion of SFU affiliated residents is expected to decrease to an assumed 20%, or 1,360 more than today. Taken together the increase is on-campus resident students (student residences and residing at UniverCity) is anticipated to be approximately 2,645 more than today. As such, in effect the anticipated net increase in students that will be commuting to/from SFU is 4,155 students.

Another key consideration is the limited supply of remaining available parking for students on the campus site. The 2007 SFU Parking Management Plan reports that approximately 4,000 parking spaces are presently available for students (not including reserved staff/faculty parking, visitor parking, residence parking, and parking beneath the Cornerstone building at UniverCity). This parking is presently 80% occupied during the weekday mid-day period based on surveys conducted by SFU in September 2007, leaving approximately 800 surplus spaces. Based on an average automobile occupancy of 1.3 persons per vehicle, 100% full utilization of this remaining available parking supply would account for only 1,040 of the anticipated 4,240 future new commuter students. The majority of future new commuter student trips to SFU will necessarily require trips by travel modes other than the private automobile and public transit is likely to be the prime choice. As such the analysis assumes 4,155 less 1,040 or 3,115 future new students arriving to SFU by transit.

The September 2007 travel survey indicated up to 53% of inbound person trips to Burnaby Mountain over a 24 hour period were made by transit. Applying this 53% transit mode split figure to the existing 18,200 student FTE enrollment (less 1,768 plus 650 resident students) provides a baseline measure of approximately 8,365 student trips by transit today. With a projected increase of 3,115 student transit trips to SFU in the future as outlined above, the transit demand growth factor for SFU is estimated at approximately 35%.

**UNIVERCITY TRANSIT GROWTH FACTOR**

As reported in section 3.1, the existing average daily one-way transit passenger trips to SFU and the UniverCity community as measured in September 2007 (Simon Fraser UniverCityTravel Count Program) is 11,460 inbound trips and 11,230 outbound trips. The UniverCity component is estimated at 265 daily one-way transit passenger trips based on observation this past September by Bunt & Associates of morning peak period outbound trips (139 between 7am-10am) factored up to represent an entire day.

The future projected average daily one-way transit passenger trip total for SFU is 15,100, approximately a 35% increase over the existing condition based on the assumptions outlined in the preceding paragraph. The future projected average daily transit passenger trip total for UniverCity is 2,650, a ten times increase over the existing condition, again based on assumptions outlined in the discussion above.

A tabulated summary of the existing and projected future average daily one-way transit passenger trips generated on Burnaby Mountain by SFU and UniverCity is provided below:

<table>
<thead>
<tr>
<th>User Group</th>
<th>Existing Daily One-Way</th>
<th>Future Projected Daily One-Way Transit Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFU</td>
<td>11,195 (98%)</td>
<td>15,100 (85%)</td>
</tr>
<tr>
<td>UniverCity</td>
<td>265 (2%)</td>
<td>2,650 (15%)</td>
</tr>
<tr>
<td>Total</td>
<td>11,460</td>
<td>17,750</td>
</tr>
</tbody>
</table>

**III FUTURE TRANSIT HUB PROGRAMMING REQUIREMENTS**

Programming for the Transit Hub assumes a 35% bus volume increase over existing transit hub requirements and the following shows the projected future bus demand for the AM and PM peak periods:

There are essentially two options going forward to service future transit demand on Burnaby Mountain. Option 1 maintains the existing operation where all service flows through the Transportation Centre and terminates at the Transit Hub. Option 2 is premised on a change of transit routing that provides select bus service exclusively to the Transportation Centre during the weekday morning and afternoon peak activity periods, to reduce the concentration of buses and passengers at the Transit Hub.

<table>
<thead>
<tr>
<th>Route</th>
<th>Current AM peak frequency (bus/h)</th>
<th># of AM peak buses that layover at SFU</th>
<th>Future AM peak frequency (bus/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td>12</td>
<td>3</td>
<td>12 (Hastings BRT)</td>
</tr>
<tr>
<td>143</td>
<td>6</td>
<td>4</td>
<td>8 (135 Hastings)</td>
</tr>
<tr>
<td>144</td>
<td>6</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>145</td>
<td>16</td>
<td>11</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route</th>
<th>Current PM peak frequency (bus/h)</th>
<th># of PM peak buses that layover at SFU</th>
<th>Future PM peak frequency (bus/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>135</td>
<td>8</td>
<td>8</td>
<td>8 (Hastings BRT)</td>
</tr>
<tr>
<td>143</td>
<td>3</td>
<td>3</td>
<td>4 (135 Hastings)</td>
</tr>
<tr>
<td>144</td>
<td>5</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>145</td>
<td>8</td>
<td>7</td>
<td>11</td>
</tr>
</tbody>
</table>
OPTION 1 – MAINTAIN EXISTING TRANSIT OPERATIONS

The existing Transit Hub at SFU is presently configured with 4 loading platforms, one for each of the four existing bus routes serving the campus, 2 unloading platforms, and 3 bus layover positions. Additional bus layover spaces are provided on Highland Court though on-site transit supervisors report that these are rarely used.

The Option 1 programming for the Transit Hub is as follows: Based on the assessment above, Option 1 would require the following:

**UNLOADING: 3 UNLOADING BAYS REQUIRED**

**LOADING: 6 LOADING BAYS REQUIRED**

**LAYOVER: 11 TO 12 LAYOVER SPACES REQUIRED**

Option #1: Maintain existing transit operations (AM Peak)

<table>
<thead>
<tr>
<th>Route</th>
<th>Future headway (min)</th>
<th>Current avg AM peak recovery time (min)</th>
<th>Max. layover berths required*</th>
<th>Berth allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-BRT</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>1 loading, 3 layover</td>
</tr>
<tr>
<td>135</td>
<td>15</td>
<td>10</td>
<td>1</td>
<td>1 loading</td>
</tr>
<tr>
<td>143</td>
<td>7.5</td>
<td>11</td>
<td>2</td>
<td>1 loading, 2 layover</td>
</tr>
<tr>
<td>144</td>
<td>7.5</td>
<td>10</td>
<td>2</td>
<td>1 loading, 2 layover</td>
</tr>
<tr>
<td>145</td>
<td>2-3</td>
<td>7</td>
<td>4</td>
<td>2 loading, 4 layover</td>
</tr>
</tbody>
</table>

*Calculated as 1.2*(recovery time/headway), rounded up

Unloading berths: 2-3 (with 2 berths, there would be a 5% chance that an arriving bus would have to wait to unload, with 3 berths, there would be a <1% chance that an arriving bus would have to wait)

Loading berths: 6 (1 per route, plus one extra for Route 145 because of the very short headways)

Layover berths: 9-11 (11 accommodates all routes arriving bunched simultaneously, 9 is less conservative, Route 135 lays over in its loading berth and is not included).

Option #1: Maintain existing transit operations (PM Peak)

<table>
<thead>
<tr>
<th>Route</th>
<th>Future headway (min)</th>
<th>Current avg PM peak recovery time (min)</th>
<th>Max. layover berths required*</th>
<th>Berth allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-BRT</td>
<td>7.5</td>
<td>7</td>
<td>2</td>
<td>1 loading, 1 layover</td>
</tr>
<tr>
<td>135</td>
<td>15</td>
<td>7</td>
<td>1</td>
<td>1 loading</td>
</tr>
<tr>
<td>143</td>
<td>15</td>
<td>16</td>
<td>2</td>
<td>1 loading, 1 layover</td>
</tr>
<tr>
<td>144</td>
<td>8-9</td>
<td>14</td>
<td>2</td>
<td>1 loading, 2 layover</td>
</tr>
<tr>
<td>145</td>
<td>5-6</td>
<td>8</td>
<td>2</td>
<td>1 loading, 2 layover</td>
</tr>
</tbody>
</table>

*Calculated as 1.2*(recovery time/headway), rounded up

Unloading berths: 2 (provides a <1% chance that an arriving bus would have to wait)

Loading berths: 5 (1 per route)

Layover berths: 6 (Route 135 lays over in its loading berth. Routes 95 and 143 would normally layover in their loading berth but 1 layover berth each is provided in case the following bus arrives early).

OPTION 2 – OFF-LOAD PEAK PERIOD DEMAND TO THE TRANSPORTATION CENTRE

Assumes that potentially 50-60% of morning and afternoon peak period transit passengers could be accommodated with special peak period service running between the Production Way – University Station and the Transportation Centre (without having to run buses through to the Transit Hub).

This approach enables a downsizing of the Transit Hub facility to service UniverCity components and also that component of SFU staff/students not using the Transportation Centre special peak period service. Assuming a 50% reduction in the programming requirements outlined above for Option 1, the Option 2 programming for the Transit Hub is as follows:

Based on the assessment above, Option 2 would require the following:

**UNLOADING: 2 UNLOADING BAYS REQUIRED**

**LOADING: 5 LOADING BAYS REQUIRED (ONE PER ROUTE)**

**LAYOVER: 8 TO 9 LAYOVER SPACES REQUIRED**
3.4 Global Best Practices Review of Transit / Town Square Facilities

Extensive research was undertaken into potential precedents world-wide for the function and design of effective transit hubs. It proved difficult to find relevant examples that combined both the desired scale and efficiency of transit operations and the role of an engaging and well-programmed public open space. The research identified a set of typologies for transit hubs that proved useful in categorizing and assessing all of the transit facilities that were studied. These typologies were then available for use in producing the wide range of initial options to ensure that all potential approaches were investigated.

Please see Appendix A.1 for full report.
3.5 Aerial Gondola Concept

Simon Fraser University Community Trust (SFU Community Trust) has recently completed a feasibility assessment of a possible aerial gondola system to provide a direct connection between the Millennium SkyTrain rapid transit line and existing SFU transit loop. While some component of bus transit service to Burnaby Mountain would necessarily remain, the gondola would potentially reduce significantly the reliance on buses for transit passenger access to SFU and residents of the UniverCity residential community, reduce travel times for trips on and off the mountain, and provide greater transport reliability during adverse winter weather conditions.

SFU Community Trust retained Mr. Bryce Tupper, P. Eng. in 2008 to conduct a comprehensive study of a number of considerations fundamental to the success of an aerial gondola transport system for SFU. The resulting report, “Burnaby Mountain Gondola Transit Feasibility Study” completed in March 2009 includes an assessment of the future transit ridership potential for Burnaby Mountain, reviews the leading aerial passenger ropeway technologies in operation around the world, provides a detailed technical evaluation of a gondola transit system on Burnaby Mountain, identifies potential impacts, and detailed financial analysis of a gondola system as compared to the bus transit operation it would replace in part.

KEY FINDINGS OF THE AERIAL GONDOLA FEASIBILITY STUDY

The key findings of the Burnaby Mountain Gondola Transit Feasibility Study include:

- One potential alignment would see the gondola extend 2.6 kilometres between the Production Way – University Station on the Millennium SkyTrain system and the Town Square area located just south of the existing SFU Transit Hub atop Burnaby Mountain. The system, operating at a speed of approximately 7 metres per second, would result in a 6 minute travel time between the lower and upper terminal stations or less than half the 14 minute average travel time for the #145 bus route;

- The gondola system could reduce the need for the 145 Production Way Station bus service, which accounts for 52% of the transit passenger ridership for trips to/from Burnaby Mountain, and for which TransLink presently allocates 10 articulated buses, and potentially the 143 Coquitlam Station service (12% of the Burnaby Mountain transit ridership and presently serviced by 6 buses) if the planned future Evergreen rapid transit line is implemented;

- A gondola system with capacity of 2,000 passengers per hour initially with capability to increase to 2,800 passengers per hour would be sufficient to accommodate anticipated peak period demand levels. A tricable (3S) gondola system with cabin capacity of up to 30 persons would provide more than sufficient capacity to accommodate the future peak demand and sufficient reliability to perform in strong wind conditions;

- The estimated capital cost of the gondola system is approximately $70 million with an annual operating cost of roughly $3 million, assuming operation at 20.5 hours per day and 7 days per week to match the existing bus operation. Weighing in the cost savings with reduced bus operating hours, the gondola system is predicted to have an annual cost savings of $2.8 million. With the elimination of the #143 and #145 bus routes and resulting reduction in bus operating hours, an estimated 1,870 tonnes of greenhouse gas emissions would be realized.

IMPLICATIONS TO THE SFU TRANSIT HUB

Implementation of the Burnaby Mountain Aerial Gondola system would have no bearing on the preferred location of the SFU Transit Hub. The present location of the Transit Hub is well suited to provide convenient access for bus transit to both the future SFU population and UniverCity residential community and this would continue to be the case if the gondola system was implemented.

Since the SFU Transit Hub functions primarily as a terminal point for bus services rather than a exchange point for passengers between services, it is not critical that the upper terminal for the gondola be positioned directly at the transit hub location. However, with the prospect of a possible future local transit shuttle service to better service more localized trips atop Burnaby Mountain, i.e., between the SFU residences on the west part of the campus and the future shops and services at UniverCity on the east part of the mountain, it would be desirable that the upper terminal for the gondola be located near to the transit hub where the local shuttle would provide service.

As outlined in Section 3.2, based on the future transit ridership projections the operational programming requirements of the SFU Transit Hub consist of 3 unloading bays for buses, 6 loading bays, and 12 storage/layover positions. If the aerial gondola system as described above were to be implemented and eliminate the requirement for the #143 and #145 bus service to Burnaby Mountain, the number of future unloading bays required could be reduced from 3 to 2, the number of loading bays reduced from 6 to 4, and the number of bus storage/layover positions reduced from 12 to 8. The summary information presented here regarding the March 2009 Burnaby Mountain Gondola Transit Feasibility Study is intended only to provide context for an overview assessment of the implications of the gondola option to the SFU Transit Hub conceptual design. As a separate exercise for SFU Community Trust, Burt & Associates and Kittelson & Associates did provide a peer review of the March 2009 study with regard to the future potential passenger estimates and gondola operational assumptions. Several items relating to the operational assumptions were forward to SFU Community Trust to be considered by Mr. Tupper.
3.6 Urban Design and Planning Assessment

An assessment of the existing campus and of available documents on future expansion plans provides the background for an urban design and planning understanding of the constraints and opportunities around the transit hub. The urban design and planning assessment is summarized in a series of plans and diagrams on the next pages including observations on key design principles and considerations for the conceptual planning of the new transit hub.
**Form of Development Typologies**

**OBSERVATIONS**
- Primarily academic / institutional uses.
- Characterized by hierarchical ‘mega-structure’ building forms organized along a central formal axis and punctuated with open courtyard spaces.
- A lineal, spatial experience punctuated by a series of compressed, defined, and open spaces.

**CONSIDERATIONS**
- Potential to create a formal ‘Front Door’ to SFU.
- Consider impact of new Transit Hub on future academic building development capability.
- Potential impacts of the Transit Hub on the spatial form and character along the central campus axis.

**Pedestrian Circulation**

**OBSERVATIONS**
- Urban mixed use and residential neighbourhood with a concentration of street oriented commercial retail along University High Street.
- Characterized by more urban, non hierarchical street fronting buildings fronting on street grid arrangement.
- Pedestrian oriented High Street animated and defined by street level commercial retail uses and street-wall building form.

**CONSIDERATIONS**
- Potential to enhance the Village ‘Town Centre’ form and character of University High Street... to ‘concentrate the energy’.
- Consider impact of new transit Hub on future development capability.
- Potential for Transit Hub to increase the pedestrian animation and retail activity on High Street.

**OBSERVATIONS**
- Predominantly ‘fair weather’ outdoor formal, lineal pedestrian route along central campus axis.
- A pedestrian only zone.
- North and South indoor pedestrian concourses accommodate the larger volumes of day to day pedestrian circulation to and from Transit Hub, UniverCity and parking areas.

**CONSIDERATIONS**
- Potential conflicts between grade level Transit Hub and pedestrian activity.
- Potential to tie Transit Hub connections to north and/or south indoor pedestrian concourses.
3.0 Technical and Site Assessment

Vehicular Access

**Observations**
- No public vehicular circulation within pedestrian only areas of campus.
- Vehicular access to Transit Hub area from the north via East Campus Road (limited access also possible from the south via Cornerstone Mews).

**Observations**
- Traditional urban street grid affords more flexibility for handling of bus traffic.
- Vehicular access to Transit Hub area from the east via UniverCity street grid / High Street.

**Considerations**
- Grade level transit operations create potential conflicts with public pedestrian activity.
- Potential to provide "V.I.P." drop off for SFU in area of current bus loop.

**Observations**
- Existing "Town and Gown" stepped plaza to the south of current bus loop, adjacent to Cornerstone Building.
- Natural grade rises in the northeast quadrant of UniverCity Town Centre development area.

**Considerations**
- Potential impact of new Transit Hub on current configuration of existing Town and Gown stepped plaza.
- Potential of northeast quadrant of UniverCity Town Centre development parcel to accommodate grade separated or "enclosed" transit operations.

Topography / Orientation

**Observations**
- East west central campus axis follows the essentially flat crown of Burnaby Mountain with grade falling off fairly steeply to the north and south.

**Observations**
- Existing 'Town and Gown' stepped plaza to the south of current bus loop, adjacent to Cornerstone Building.
- Natural grade rises in the northeast quadrant of UniverCity Town Centre development area.

**Considerations**
- Potential to take advantage of existing topography to grade separate transit operations and optimize the pedestrian realm (southerly exposure to views and sun).

**Considerations**
- Potential impact of new Transit Hub on current configuration of existing Town and Gown stepped plaza.
- Potential of northeast quadrant of UniverCity Town Centre development parcel to accommodate grade separated or "enclosed" transit operations.
Site Sections

North - south section looking west

North - south section looking east
3.0 Technical and Site Assessment
4.0 VISION STATEMENT AND PLANNING AND URBAN DESIGN PRINCIPLES

During the study, a Vision Statement and planning and urban design principles were developed to provide guidance to the option selection process. The principles were adapted to be used as evaluation criteria to ensure that all client and public requirements were part of the assessment of each potential option. Each option was developed to consider the full range of conceptual typologies identified in the Global Best Practice Review and to meet the agreed program and technical requirements for transit growth. As well each option was compared using the evaluation criteria (refer to the appendix for details of the option and evaluation steps.)

4.1 Vision Statement

“The SFU Town Centre* will be an exceptional urban environment and will incorporate an attractive, safe, and functional transit hub to meet current and long-term capacity needs for the Burnaby Mountain community”

* The term “SFU Town Centre” was taken from a workshop, and refers not only to the Transit Hub and adjacent commercial buildings in the UniverCity commercial centre but also to the open space between Strand Hall and East Campus Road as well as Town Square.

4.2 Planning and Selection Criteria

A number of aspects of transit hub and public plaza planning and design have been identified to create a set of criteria with which projects and proposed options can be evaluated.

HUMAN COMFORT
- Walking distances to key destinations
- Availability and extent of weather protection
- Availability and effectiveness of universal access
- Extent of user safety and security during both day and night
- Comfort and aesthetics of the waiting experience
- Availability and quality of passenger information
- Legibility of wayfinding system
- Availability and quality of food services
- Availability and quality of washrooms
- Extent of conflicts among vehicles, pedestrians and cyclists

OPERATIONAL FUNCTIONALITY
- Integration with traffic circulation
- Adequate number of loading/unloading and layover spaces
- Number, distance traveled, and time efficiency of bus movements
- Ability to showcase and promote transit usage
- Independence of operation of different routes
- Driver access to facilities during layovers
- Ability to provide efficient and effective supervision of transit operations
- Effective integration of modes
- Extent of conflicts among vehicles, pedestrians and cyclists
- Extent of pedestrian and queuing conflicts
- Reliability in different weather conditions
- Provisions for storage and transfer to buses of bicycles
- Integration of sustainable best practices
- Level and ease of maintenance
- Integration of vehicular drop-off and pick-up

COST IMPLICATIONS
- Cost of land base required
- Impact on development potential of site and surrounding properties
- Development and infrastructure costs
- Cost implications for transit operations
- Implications for commercial and mixed use viability

FLEXIBILITY AND ROBUSTNESS
- Potential for and independence of phasing
- Flexibility in response to changing and intensified surrounding land uses
- Adaptability to changes of mode
- Adaptability to changes of routing
- Adaptability to changes of technology
- Adaptability to expansion and contraction of service levels

URBAN DESIGN FIT
- Integration with and enhancement of architectural and urban design context
- Contribution to place making and identity
- Integration with sustainable best practices
- Integration into pedestrian and cycling circulation networks
- Integration into vehicular circulation and parking
- Quality, durability and aesthetics of materials
- Recognition of the needs of the diverse mix of users including students, workers, residents, tourists, families with children
- Visibility and legibility of wayfinding/ orientation
4.3 Conceptual Options

A number of preliminary options were prepared for consideration that represented all the potential configurations based on:

- Considering locations for bus loading and unloading in the vicinity of the existing Transit Hub for the convenience of users and to minimize walking distances to key destinations
- Considering locations for the transit layover facility in close proximity to loading and unloading stops to minimize time and distance of bus travel
- Looking at opportunities at grade, below grade and hybrids of above and below grade
- Assessing the impacts of options on the development potential of the sites affected
- Applying the evaluation criteria as presented on the previous open house panel.
- Including the typologies of bus facilities that were studied in the Global Best Practice Review

Typology Diagrams

- Street Layout Diagram
- Concourse Layout Diagram
- Perimeter Layout Diagram
- Island Layout Diagram

Street Oriented Options

- Option 1A v2
- Option 3A v2
Urban Design and Planning Study

Burnaby Mountain Transit Hub

- Reviews with the three clients: SFU, UniverCity, and TransLink and with staff of the City of Burnaby

The range of options was narrowed down and refined in design through:

- Applying the evaluation criteria as presented on the previous open house panel.
- Assessing the impacts of options on the development potential of the sites affected.
- Considering locations for the bus layover facility in close proximity to loading and unloading stops to minimize walking distances to key destinations.
- Considering locations for bus loading and unloading in the vicinity of the existing Transit Hub for the convenience of users and to minimize time and distance of bus travel.

Consideration of Options

Range of Options

Client and Public Review

The following are sample diagrams of some of the options considered under three categories:

- Looking at opportunities at grade, below grade and hybrids of above and below grade.

A number of preliminary options were prepared for consideration that represented all the potential configurations based on:

- Designing the streetscape of East Campus Road as a bosque of trees to direct pedestrian movement system of the campus including the new internal corridor in Blusson Hall.
- Providing adequate and continuous weather protection for pedestrians and for people waiting for buses.
- Incorporating the bus layover facility within a building that can be developed by UniverCity with the option to lease it back to TransLink.
- Ensuring that the two main pedestrian routes along High Street connect directly into the plans for the community and for High Street.
- Having buses unload on the west side of East Campus Road at a new plaza in order to remove the need to cross streets for people arriving at the university by bus.
- Moving the bus layover facility from the north side of the Transit Hub to the south side to improve pedestrian safety and convenience.
- Designing the layout of the bus and taxi layover facilities to ensure they do not obstruct pedestrian movement or streetscape.
- Incorporating solar arrays at the bus layover facility to reduce energy consumption.
- Ensuring that all pedestrian routes are clearly marked and that there are accessible elevators to the Transit Hub.
- Designing the waiting area with comfortable seating and sheltered waiting areas.
- Incorporating public art and landscaping to make the area more attractive.
- Designing the layout to be wheelchair accessible.
- Incorporating bike racks and storage to encourage cycling.
- Designing the layout to minimize noise and vibration from buses.
- Designing the layout to be visually appealing and to enhance the university grounds.

A preferred option has been selected by the committees representing SFU, UniverCity, and TransLink and the City of Burnaby. This option has been explored and refined to address the concerns of all parties.

Dedicated Site Options

- OPTION 1B
- OPTION 2C v3

Below Grade Options

- OPTION 4C
- OPTION 4D v2
4.4 Program & Technical Requirements

**PROGRAM REQUIREMENTS**

At the target future student enrollment of 25,000, transit ridership for SFU students and staff / faculty is expected to increase by 35% over existing levels. Adding to this, the transit ridership for UniverCity residents travelling to/from Burnaby Mountain is expected to increase over existing levels by a factor of 10 times. To service this additional ridership, up to a 30% increase in morning and afternoon peak period bus volume will be required.

The existing Transit Hub has 2 unloading bays, 4 loading bays (one for each bus route servicing Burnaby Mountain), and 3 storage or layover positions for buses (well short of the 8 layover buses required presently to service existing bus volumes).

Section 3.3 of the report outlined in detail the future transit demand projections for the SFU Transit Hub and a tabulated analysis of the existing and future transit hub programming requirements for two different operational scenarios (Option 1 involving a continuation of the existing model with all bus service through the Transit Hub, and Option 2 involving a reassignment of some routes during peak periods to service only the SFU Transportation Centre). While both are presented in the report for comparison purposes, the Technical Steering Committee directed that the Option 1 scenario be adopted for the transit hub conceptual design exercise. As described in Section 3.3, with a projected 30% increase in peak period bus volume and an increase in the number of bus routes servicing Burnaby Mountain from four presently to six in the future (i.e., the addition of the planned Hastings BRT project on Hastings Street, and a future local shuttle service for Burnaby Mountain), the future program requirement for the SFU Transit Hub becomes 3 unloading bays, 6 loading bays, and 12 bus storage positions.

**EXISTING CONDITION**

- **Loading Berths**: 4
- **Unloading Berths**: 2
- **Layover Space**: 3

**EXISTING REQUIREMENT**

- **Loading Berths**: 4
- **Unloading Berths**: 2
- **Layover Space**: 8

**FUTURE REQUIREMENT**

- **Loading Berths**: 6
- **Unloading Berths**: 3
- **Layover Space**: 12

**TECHNICAL REQUIREMENTS**

For the purpose of establishing the feasibility of the conceptual design options for the Transit Hub, TransLink’s “Transit Infrastructure Design Guidelines” manual has been referenced. A more detailed design process will be necessary to advance the conceptual design. A listing of the key assumptions regarding the technical requirements of the Transit Hub are listed below:

**CURBSIDE UNLOADING BAYS**

- Tandem bus bay operation assumed for unloading buses that would arrive and depart in platoon fashion, i.e., arrivals and departures dependent on the actions of the bus ahead. This is considered a reasonable assumption as unloading buses will have relatively short dwell times (<30 seconds typically);
- Minimum 6.0 metre separation from a stop bar to the front of a bus bay for sight distance reasons;
- Minimum of 13.7 metres separation between the rear of a bus bay and intersecting streets from which buses either turn right or left to access the bus bay;
- 18.3 metre bus bays (articulated service) plus a minimum of 2.8 metres between buses to allow access to bus mounted bicycle racks;
- 21 metres of “pull-in” space behind an articulated bus unloading bay, 18 metres for a convention bus;

**CURBSIDE LOADING BAYS**

- Fully independent bus bay operation assumed for loading buses with variable dwell times by time of day and route depending on passenger volume;
- Minimum 6.0 metre separation from a stop bar to the front of a bus bay for sight distance reasons;
- Minimum of 13.7 metres separation between the rear of a bus bay and intersecting streets from which buses either turn right or left to access the bus bay;
- For articulated buses a loading bay length of 18.3 metres, and for conventional buses a loading bay length of 12.3 metres;
- 21 metres of “pull-in” space behind an articulated bus unloading bay, 18 metres for a convention bus;

**TRANSIT LAYOVER FACILITY**

- Storage bay length of 40 metres,
- Storage bay width of 3.5 metres,
- By-pass lane provided at far (west) end of the storage lanes to provide flow-through capability through facility;
4.0 Vision Statement and Planning / Urban Design Principles

STREET DESIGN

- For unloading and loading bus zones, a minimum bus bay/lane width of 3.0 metres; (3.0 metres on the south side of High St. for future loading or unloading)
- For unloading bus zones, where independent access in/out of curbside bays is not required; an adjacent traffic lane minimum width of 3.6 metres;
- For loading bus zones, where independent access in/out of curbside bays is required, an adjacent traffic lane width of 4.0 metres minimum to 5.5 metres maximum depending on bus turning geometry at the entry point onto the street sections that have loading bays. While the narrower lane width is preferable to minimize pedestrian crossing distances across High Street, the 5.5 metre width provides added flexibility for possible future raised and planted median (1.5 metres wide) treatment to discourage midblock “jay walking” activity by pedestrians;
- For unloading bus zones, a minimum sidewalk width of preferably 6.0 metres though 5.0 metres is acceptable in cases where existing building and curb construction is a constraint. Passenger wait times are not a factor at the unloading bays and therefore no passenger queue development for the unloading bus positions. The 6.0 metre width is considered sufficient to enable the efficient flow of moving platoons of relatively high volume pedestrian traffic away from the bus stops.
- For loading bus zones, a minimum sidewalk width of between 5.0 to 9.0 metres depending on the anticipated future passenger loads at those particular zones. In either case, a minimum 2-3 metre wide passenger circulation space is recommended at the back of the queueing space to enable pedestrians to travel freely along the block without interference from the bus passenger queues.

PASSenger QUEUE AREAS

For the anticipated higher volume bus loading bays, a minimum 9.0 metre depth is recommended from the curb to the building face which allows a 6.0 metre passenger queue area and 3.0 metres for pedestrian circulation space at the back of the queue next to the building. For an articulated bus, assuming loading through all three doors as is presently the case at SFU, the 6.0 metre queue depth provides for approximately 6.0 x 3.0-4.0 metres = 20 square metres of queue space per door, or 60 square metres per loading space.

Based on TransLink’s Transit Service Guideline Technical Report from June 2004, for articulated buses the target maximum occupancy is 87 passengers. With 60 square metres of queue space per loading bay and 87 passengers, the calculated queue density very closely matches the 0.70 square metre per passenger guideline set out in TransLink’s Transit Infrastructure Design Guidelines manual.

The allocation of pedestrian pads to each door opening will be further studied at the detail design stage.
4.5 The Recommended Concept

Arriving at the recommended concept involved three workshops, two open houses and the consideration of as many as 29 schematic option plans. The first step was to present transit hub precedents from around the world and distill the typologies that apply to the Burnaby Mountain context. The first workshop also involved listing the design criteria for the transit hub. The general categories for the criteria were: human comfort, operational functionality, cost implications, flexibility and robustness, and urban design fit.

Feedback from the first public open house and the initial stakeholder workshops enabled the design team to develop 29 options for consideration by the Technical / Project Committee. The options were grouped into 3 categories: street oriented, dedicated site and below grade options.

At workshop 2 after considerable debate the street oriented approach, option 3D, became the consensus for the recommended concept.

The selection of this option was based primarily on the following:

• The street oriented option provided the best integration of transit with the UniverCity town centre giving the commercial High Street more pedestrian traffic.
• The street oriented option was the most economic option
• The street oriented option allowed for a strong entry plaza to SFU to be developed while leaving the university’s options open for future development of the site.
• The street oriented option with the layover at the same level allowed the easiest operation and construction of the layover area.
• The street oriented option worked well from the point of view of Translink’s operational requirements and was a predictable known model.

The design of the recommended concept has the following features:

• Having buses unload on the west side of East Campus Road at a new plaza in order to remove the need to cross streets for people arriving at the university by bus.
• Designing the streetscape of East Campus Road as a bosque of trees and planters to direct pedestrian crossings to two marked and signalized locations and to prevent jaywalking
• Incorporating the bus layover facility within a building that can be developed by UniverCity built edges that will enhance and animate the adjacent streets and fit with the urban design plans for the community and for High Street
• Providing adequate and continuous weather protection for pedestrians and for people for buses
• Ensuring that the two main pedestrian routes along High Street connect directly into the movement system of the campus including the new internal corridor in Blusson Hall.
• Capability to include a 9.0m commercial loading zone on the east side of East Campus Road for Lot 24 commercial tenant use.
Plan of Recommended Concept

- Bus Loading
- Bus Unloading
- Bus Layover
- Loading Zone

Key Points:
- Blusson Hall
- Cornerstone Building
- Strand Hall
- Site of Existing Transit Hub
- Town Square
- Transit Layover Facility

Scale:
- 0 10 20 40 80m

Legend:
- Red: Bus Loading
- Green: Bus Unloading
- Orange: Bus Layover
- Yellow: Loading Zone
4.0 Vision Statement and Planning / Urban Design Principles

SECTION A - NORTH/SOUTH

SECTION B - EAST/WEST
4.6 Interim Strategy for Additional Bus Layover Space

As described in Section 3.2, existing peak period operation at the SFU Transit Hub is already significantly constrained by insufficient bus storage positions and inadequate space for passenger loading and unloading activity. Increasing transit passenger activity will exacerbate the existing problems. Even though there is an immediate need for improvements, in reality the implementation of the preferred option for the Transit Hub will likely take a number of years to complete.

The primary deficiency with the existing Transit Hub that most urgently needs to be addressed in the near term is the insufficient number of bus layover positions. Several options exist for improving the accommodation of buses requiring layover positions. This may include the use of temporary street layover positions on Highland Court between East Campus Road and University Crescent. This matter will require further consultation between the City of Burnaby, SFU, SFU Community Trust and TransLink with consideration of a number of factors including future development timelines for vacant land parcels, as well as street traffic, transit operations, and adjacent land use compatibility for possible on-street bus layover options.

4.7 Traffic Assessment of the Preferred Option

Future traffic forecasts have been prepared by Bunt & Associates for all of the roadways on Burnaby Mountain, assuming full development of the UniverCity Community and SFU student enrolment reaching the 25,000 horizon. The future automobile traffic volumes anticipated on East Campus Road south of Highland Court and University High Street between East Campus and University Crescent are in the range of 100 to 150 vehicles per hour in either direction during the weekday morning and afternoon peak travel periods, or on average between 2 to 3 vehicles per minute in either direction.

Adding to this moderate level of street traffic, the preferred option of the Transit Hub would in the future potentially have a total of between 55-60 bus movements on East Campus Road and University High Street (west of University Crescent) during the weekday afternoon peak hour period, and between 75-80 bus movements during the weekday morning peak period.

The interaction of the projected future automobile and bus traffic with the projected volumes of future pedestrian traffic crossing these streets for access to the bus stops has been evaluated thoroughly using a Vissim traffic simulation model prepared specifically for the SFU Transit Hub preferred option. The simulation included evaluation of possible pedestrian signal control to regulate vehicle and high volume pedestrian traffic through the intersection of East Campus Road and University High Street, and a planned mid-block pedestrian crosswalk on East Campus Road south of the Highland Court intersection.

The Vissim simulation model clearly demonstrated the feasibility of the anticipated future mix of automobile, bus, and pedestrian traffic. The Vissim model also confirmed that future traffic operation at other key intersections in the area including University High Street / University Crescent, and the University High Street / Tower Road, would be very acceptable. The Vissim traffic simulation model developed “outside the scope” of the project terms of reference was prepared simply to convey a real time, animated and graphic representation of the anticipated future volume of transit vehicle, automobile, and pedestrian traffic travelling through the Transit Hub during peak activity periods. The model was developed using the “car following” simulation parameters embedded with the model without any calibration effort. A more detailed simulation model of the area may be appropriate at a subsequent detailed design development stage.
4.0 Vision Statement and Planning / Urban Design Principles

4.8 SFU Transportation Centre

While not directly within the scope of the Transit Hub conceptual design study, SFU did request some consideration of the Transportation Centre as the Preferred Concept may result in some change to the bus route patterns through the Transportation Centre. Outlined below are some very preliminary considerations regarding future transit operation at the Transportation Centre. No costing has been undertaken at this stage for any of the alternative future bus route patterns through the Transportation Centre. As described previously in Section 3.2, the existing Transportation Centre at Simon Fraser University is a significant transit stop for all routes accessing Burnaby Mountain, most notably primarily for arriving passengers during the morning period. The split driveway configuration with both routes providing one-way northbound traffic flow through the Transportation Centre for both transit and general purpose traffic is capable of accommodating existing volume throughput; however, there are some existing operational problems that should be addressed, including:

- At the north end of the Transportation Centre where the split driveways intersect with University Drive West, there is frequently a confusing and potentially unsafe cross-over of buses and other vehicles turning right from the western drive lane through the path of vehicles turning left from the eastern drive aisle. Better channelization and signage is required to discourage this “crossover” traffic pattern from occurring.

- During the weekday afternoon period, many of the buses arriving from to the Transportation Centre having departed from the Transit Hub are full of passengers and as a result do not stop to pick up new passengers at the Transportation Centre. Apart from providing less than desired customer service, this activity is also potentially hazardous as many passengers dart back and forth across the east driveway between buses either loaded with passengers on exit from campus (using the west driveway) and newly arriving buses with space available on route to the Transit Hub (i.e., a guaranteed seat for the eventual departure from the Mountain).

- The mixed traffic (bus and general purpose traffic) on both driveways through the Transportation Centre, particularly traffic turning to/from the parkade access driveways on both the west and east sides of the facility interfere with bus transit operations. This effect is compounded by the limited overhead lighting and narrow roadway widths through the Transportation Centre.

Some upgrading to the Transportation Centre, including improved lighting, signage, and pavement markings would largely address the existing operational concerns. Over and above these modifications, the preferred option for the SFU Transit Hub as set out in Section 4.5 will require that the existing transit bus routing on Burnaby Mountain be adjusted to accommodate the routes that would exit the Transit Hub via northbound East Campus Road and westbound University Drive East toward the Transportation Centre. This change in route pattern for departing buses will require some modification to the bus circulation pattern through the SFU Transportation Centre.

As shown in Figure 4.8a, presently all “in-service” buses arriving to Burnaby Mountain first pass through the Transportation Centre, unloading some passengers, then proceed to the Transit Hub. All departing “in-service” buses exit the Transit Hub via Tower Road and South Campus Road, then pass through the Transportation Centre, loading some passengers at this point, then exit from Burnaby Mountain via University Drive West.

![Figure 4.8a, existing operation](image)

![Figure 4.8b, future operation - option B](image)

![Figure 4.8b, future operation - option C (with two-way traffic flow on Gaglardi)](image)

![Figure 4.8b, future operation - option A](image)
4.9 Costing

The assumptions the following estimates are based on include:

- The estimated costs are in 2009 dollars
- The escalation is for one year only
- The cost of the transit layover facility includes the cost of additional excavation, premium for the slab to accommodate axle loading, the long span structure which forms the roof of the facility and support landscape over, and walls, finishes, and services currently envisioned at the conceptual design level
- The estimate includes an allowance for the bus departure bays and associated equipment as well as a portion of the two storey arcade structure adjacent the departure bays.
- Additional roadwork includes widening High St. and creating a boulevard on East Campus Road adjacent the SFU entry plaza
- The new plaza budget is nominal and could vary according to the scope of work.

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<th>UNIT COST ($ / M²)</th>
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5.0 TOWN SQUARE AND TRANSIT HUB DESIGN CONCEPT

The recommended concept is integrated into an urban design concept that ensures that it will fit within the current and future urban design context for both the development of a new public open space and ‘front door’ for Simon Fraser University and the implementation of High Street as the shopping and social heart of UniverCity. Pre-architectural planning work has envisioned how the functional concept will be expressed in the architecture and public realm design of High Street, East Campus Road, and the future development of a building that will include the transit layover facility within it. The desired urban design implications of the recommended concept for future development in its surroundings are expressed as urban and landscape design directions.

5.1 Urban Design Concept Plan

**KEY FEATURES**

The recommended concept includes many urban design features as illustrated in these 3D models including:

- A new university plaza and future quadrangle where transit riders will arrive on campus
- A colonnade along the north side of High Street to create a generous scale and weather protected pedestrian realm
- Weather protection for bus stops with glass canopies
- Removal of buses from the street during layover times so that buses do not stop any longer than needed to load and unload
- Massing of new buildings to define and animate the public realm
- A design concept for East Campus Road that uses rows of trees to create a strong sense of place and to structure pedestrian movement to enhance safety.
- Capability to include a 9.0 metre commercial loading zone on the east side of East Campus Road for Lot 24 commercial tenant use.
5.0 Town Square and Transit Hub Design Concept

**UNIVERSITY SQUARE**
The Transit Hub is integrated into one edge of a new quadrangle for the University that will be edged by new and existing buildings and landscape. This becomes the front door to Simon Fraser University and a welcoming arrival place for transit users.

**VEHICULAR CIRCULATION**
Cars and buses share East Campus Road and the High Street and add to the energy and activity of the commercial heart.

**EDGES**
The built edges are intended to be transparent and have many entry points. A new façade for the administration building is encouraged with more public uses. And the new building on the undeveloped site on the east side of East Campus Road is envisioned as an active and public destination in its lower floors.

**LANDSCAPE**
Trees and other landscape elements will strengthen and support the edges of the new quadrangle leaving the central area open to be programmed and used for a wide variety of activities.

**ZONES**
Three distinct zones are created: the quadrangle defined by built edges of important university buildings (purple), the East Campus Road streetscape structured by rows of trees and integrated with Town and Gown Square (turquoise), and the main pedestrian spine with a visual landmark on East Campus Road (pink).

**PEDESTRIAN CIRCULATION**
Pedestrians are encouraged to move along the two major east-west spines where pedestrian crossings of East Campus Road will be located with pedestrian-activated signals. Movement through Town and Gown Square is also integrated into the movement pattern.
5.0 Town Square and Transit Hub Design Concept

Conceptual Rendering of proposed University Plaza / Quadrangle SE Overview
1 Blusson Hall 2 Strand Hall 3 Cornerstone Building 4 Proposed Academic Building 5 Lot 24 6 University Square

Conceptual Rendering at corner of East Campus Road and High St.

Conceptual Rendering over Town Square
5.2 Landscape and Urban Design Directions

During the Burnaby Mountain Transit Hub Urban Design and Transit Planning Study, the conceptual design process included consideration of urban design and landscape to achieve effective integration of the transit hub into its context. A consensus emerged around a number of urban design and landscape directions that are described in this section of the report intended to provide guidance for more detailed design work in the future.

The Concept Plan indicates the locations of seven illustrative cross-sections at key places within the study area. Key design principles of the Concept Plan are:

- The internal and external pedestrian circulation routes along the south side of Blusson Hall should be clearly and effectively extended to occur across East Campus Road and into the future building that wraps around the transit layover facility.
- A hard-surfaced arrival plaza, or perhaps a reflecting pool with landscape elements and/or public art, should be provided at the east end of Strand Hall to provide a ceremonial entrance to the President’s offices in place of the current parking lot.
- A new quadrangle should be developed east of Strand Hall with strong containing walls to define it that are created by Blusson Hall, Strand Hall, and a proposed new academic building across the pedestrian spine on its south side. The design of this new campus open space should invite use by the entire university population, accommodate a range of special events, and facilitate criss-crossing movement among the multiple destinations that surround it as well as the bus unloading function on the Arrival Plaza on East Campus Road along its east edge.
- Town Square should be retained and integrated into the design language of the new quadrangle. In particular, the universal access route along the west edge should be retained and improved when a new building is designed to the west.
- Bus loading should be provided with ample sidewalk space and weather protection along both High Street and East Campus Road through the design of both a colonnade and glass canopies into the facades of the new development on Parcel 24.
A. APPROACH FROM THE EAST ALONG HIGH STREET

Design directions include:

- The Cornerstone Building and its sidewalk and adjacent on-street parking are retained but the dimensions of High Street are widened to accommodate the operating design guidelines for bus service used by TransLink / CMBC and wide sidewalks on the north side for both pedestrian movement and people waiting for their bus to arrive and load.
- The colonnade and canopies integrated into the new building on Lot 24 should be dimensioned to provide both weather protection and sunlight access.
5.0 Town Square and Transit Hub Design Concept

5.0.1 Town Square and Transit Hub Design Concept

5.0.1.1 Design Concept

The design concept for Town Square and Transit Hub is centered around enhancing accessibility, safety, and urban design legibility. Key design directions include:

- **The development on Parcel 24 should provide weather protection for pedestrians with a colonnade over a generously dimensioned sidewalk and for people waiting to get on buses with glass canopies mounted on the building façade.**
- **A clearly marked crosswalk should provide a direct route from Blusson Hall on axis with its popular internal corridor.**
- **A planted median should be used to prevent jaywalking outside of marked crosswalks for both pedestrian and bus movement safety.** A bosque of trees is suggested to integrate the median planting with the Arrival Plaza landscape.
- **Capability to include a 9.0m commercial loading zone on the east side of East Campus Road for Lot 24 commercial tenant use.**

5.0.1.2 Approach from South Across Town and Gown Square

Design directions include:

- **The potential new academic building along the west side of Town Square should provide upgraded universal access in keeping with the requirements of the City of Burnaby and the Official Plan and should explore the possibility of weather protection from an architectural feature of the new building as well as consider the relationship between the eastern edge of Blusson Hall and the eastern edge of the new academic building.**
- **The transit hub should be marked by vertical elements that are readily visible from the base of the stairs in Town and Gown Square for urban design legibility; the proposed tree bosque and the colonnade around Parcel 24 would fulfill this role.**

5.0.1.3 Approach from East Campus Road

Design directions include:

- **The development on Parcel 24 should provide weather protection for pedestrians with a colonnade over a generously dimensioned sidewalk and for people waiting to get on buses with glass canopies mounted on the building façade.**
- **A clearly marked crosswalk should provide a direct route from Blusson Hall on axis with its popular internal corridor.**
- **A planted median should be used to prevent jaywalking outside of marked crosswalks for both pedestrian and bus movement safety.** A bosque of trees is suggested to integrate the median planting with the Arrival Plaza landscape.
- **Capability to include a 9.0m commercial loading zone on the east side of East Campus Road for Lot 24 commercial tenant use.**
D. STRAND HALL FORECOURT

The east side of Strand Hall is a redevelopment opportunity with potential to provide a strong and engaging edge to the new quadrangle open space or University Commons to its east. Potential design ideas include an expansion of the building to create a new facade with internal spaces that take advantage of a new hard surfaced plaza designed both for daily access and for ceremonial arrival at the President’s office and other important functions within Strand Hall. Landscape and public art could be readily combined to provide an appropriate and distinctive sense of place. Existing trees along the central campus axis and a new double row of trees parallel to Blusson Hall will emphasize the formal presence of the Strand Hall Forecourt.

E. ARRIVAL PLAZA

A hard surfaced Arrival Plaza on the west side of East Campus Road is envisioned for bus unloading. Since passengers leave after unloading, weather protection is not required. Instead, a bosque of trees is illustrated to provide shade and greening and to reinforce the human scale. The row of trees in the central median should be set within a dense low planting that provides a barrier to pedestrian movement except at marked crosswalks and hides fence elements. Limited VIP access for vehicles dropping off or picking up passengers attending Strand Hall can also be accommodated within the Arrival Plaza.
5.0 Town Square and Transit Hub Design Concept

5.0.5 Town Square and Transit Hub Design Concept

The most important east–west pedestrian spine of the campus is located along the south edge of the proposed Arrival Plaza and University Commons open space within a stand of existing trees. The suggested new academic building to the south of this axis offers many opportunities to reinforce and improve on the urban design of this route including provision of a containing and animating built edge.

6.0.6 Looking West Along the Central Campus Axis

The recently completed Blusson Hall provides both an interior and exterior pedestrian link on the north side of the proposed Commons. Implementation of the Arrivals Plaza and the Commons will provide opportunities to build on the architectural and landscape design features of Blusson Hall and reinforce the geometry of the campus with landscape, especially new trees.
BURNABY MOUNTAIN TRANSIT HUB STUDY PARTICIPANTS

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BTY Group
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Eldon Lau
A.1 Global Best Practices Review Of Transit / Town Square Facilities

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1.0 INTRODUCTION

A Global Best Practices Review is part of the scope of work for the SFU Transit Hub and Town Square Study. The intent is to research leading-edge examples of integrated facilities combining transit and public open space functions. A stand-alone report with illustrations and supporting technical information was requested in order for the report to be suited to distribution and discussion early in the study process and to be applicable to future studies in Metro Vancouver.

Valuable insights have been gained from investigation of facilities elsewhere in the world. Early in the process of trying to identify candidates for best practice case studies, it became clear that there were no “perfect fit” examples directly applicable to Metro Vancouver generally, or to SFU more particularly. Nevertheless, there is much to draw from the design and operation of other facilities that can be applied in the local context.

A number of facilities, especially from Europe, offered well resolved transit operations with many lessons to be learned for possible application in Metro Vancouver. It proved difficult to find highly functional transit hubs that also excelled in their urban design, social engagement, and placemaking characteristics. In fact, the SFU Transit Hub and other local facilities currently in planning processes will likely be considered best practices when completed due to their attention to urban design considerations as well as transit operational needs.
2.0 PURPOSES OF THE BEST PRACTICES REVIEW

PURPOSES OF THE BEST PRACTICES REVIEW

• Identify main typologies of bus station facilities
• Establish design criteria
• Provide a “kit of parts” for application to SFU
• Resource information to TransLink toward development of a Metro Vancouver Region transit station facility design reference guidebook

Through discussions with the client representatives of SFU, TransLink, and UniverCity, changes to the content and structure of the Best Practices Review have been made in order to provide a document that will be useful both for the SFU project and for other future projects in Metro Vancouver.

From research into best practices, five main typologies of bus station facilities are identified and described to provide a comprehensive context for case studies. Under each typology, examples from among many that were considered for selection as best practices are categorized. In some cases, examples are effectively a hybrid of two typologies. One or more case studies are presented in detail under each typology.

From the many examples reviewed during the selection process and from the detailed case studies, two types of information have been extracted that support best practices: a set of design criteria that can be used to evaluate conceptual options through a planning and design process and a “kit of parts” of good ideas for components of a transit facility and public space at a variety of scales with general value but also informed by their potential for current application to SFU.

This resource information is structured to assist TransLink in its ongoing development of a Metro Vancouver Region transit station facility design reference guidebook.
3.0 REVIEW AND SELECTION PROCESS

The review and selection of Global Best Practice (GBP) Review candidates for the purposes of the SFU Transit Hub study has involved a sequence of activities as outlined below:

(i) Consultant team identification of candidate facilities: Members of the Consultant Team, based on individual experiences and review of transportation industry website sources, identified a number of potential cities / transit station facilities around the world for consideration as part of the GBP Review. Because of the unique characteristics of the site, it is not possible to come up with exact matches for what SFU has planned. Sites were selected based on the following criteria:

- Significant bus volumes
- Adjacent public park, plaza, high street, or integrated mixed-use development
- Successful from a bus operations standpoint
- Route terminals preferred

From this exercise, eleven sites in nine cities were identified as candidates for the GBP review, including:

UNDERGROUND BUS STATIONS
- Market Street Station, Denver, Colorado, USA
- Civic Centre Station, Denver, Colorado, USA
- Harvard Square Station, Cambridge, Massachusetts, USA
- King George Square Station, Brisbane, Australia
- Queen Street Station, Brisbane, Australia

BUS STATIONS WITHIN STRUCTURES
- Bethesda Station, Bethesda, Maryland, USA
- Downtown Bus Exchange, Christchurch, New Zealand
- Commerce Street Transit Centre, Tacoma, Washington, USA

SURFACE BUS STATIONS NEAR PUBLIC PARKS AND PLAZAS
- Walthamstow Central Bus Station, London, UK
- Portland State University Urban Plaza, Portland, Oregon, USA
- Capital Square, Madison, Wisconsin, USA

Not all of the sites can be considered exceptional from the standpoints of urban design or passenger environment (but still provide useful lessons), and some also have rail transit functions which in most cases significant passenger transfer activity which is not the case at the SFU Transit Hub.

(ii) Consultation with Project Technical Steering Committee (TSC) on August 6/08: Candidate locations and information reporting template discussed with the TSC. The primary feedback from this exercise was that a more international representation was required (less emphasis on North American examples, and that the case study analyses need also include a quantitative assessment (transit operational parameters).

(iii) Consultation with Other Individuals: Mr. Gordon Price, Director of the City Program at Simon Fraser University, and an instructor and consultant on urban development and planning issues, was contacted and asked to list, based on his extensive travels, global examples of highly efficient and well integrated bus station facilities. While no specific “best practise” examples could be identified, Mr. Price did identify a number of planning and design criteria that should be incorporated into a bus station facility with particular application to SFU. Mr. Price also offered the name of another contact person, Ms. Adriana McMullen, who is employed at the City of Victoria, but has spent considerable time studying transit systems in South America, including in particular the TransMilenio public transit system in Bogota, Columbia. Ms. McMullen was contacted and provided useful technical information and photographs from this system.

(iv) Consulting Team Member Station Site Visits: Roger Hughes on a visit to England and France in August, visited a number of bus station facilities in the City of London and elsewhere. Discussions with transit officials at these facilities and photographs of the transit operation and integration with adjacent neighbourhoods have added to the database available to the Consulting Team.

(v) Identification of Bus Station Typologies and Case Study Examples: Flowing from the search process outlined above, several basic bus transit configuration typologies were identified by the Consulting Team to form the framework for the GBP review and report document. These basic typologies are reviewed in Section 4.0

4.0 OVERVIEW OF TYPOLOGIES

The GBP review process has led to the identification of several basic design typologies for urban bus transit stations. The basic typologies are shown below:

At their most basic level, these different station configurations handle bus circulation, passenger circulation loading/unloading, and bus storage (layover) in a uniquely characteristic fashion.
4.1 ISLANDS
- Purpose-built, transit facility typically operating in an exclusive transit vehicle only environment (not mixed with private vehicle traffic);
- Multiple, individual platforms for passenger loading/unloading, most often with a specific transit route assigned to a specific platform;
- Transit vehicles pull through drive aisles between passenger platforms;
- Pedestrian access to platforms most often involves at-grade crossing of bus travel paths with increased potential for vehicle/pedestrian conflict, though grade separated access to platforms is an option;
- Bus layover space located either nearby or off-site;
- Metro Vancouver examples include most notably the existing SFU Transit Hub.

4.2 CONCOURSE
- Purpose-built, transit facility typically operating in an exclusive transit vehicle only environment (not mixed with private vehicle traffic);
- Central passenger concourse serviced by a number of loading/unloading bays, most often with specific bays assigned to specific routes, though dynamic assignment of bus routes to loading bays is an option;
- Loading/unloading bays can be configured either in a linear or sawtooth arrangement, depending on bus dwell times (linear better suited to short duration stops) and whether bus movements need to be independent of other vehicles;
- Transit vehicles circulate in a clock-wise flow around the central concourse;
- Pedestrian access to concourse can either be at-grade at designated crossing points, or grade separated to minimize/avoid vehicle/pedestrian conflict;
- Bus layover space often located around the perimeter of the bus circulation area, or off-site; Central passenger concourse may or may not be weather protected;
- Passenger services including bus schedule information displays, information kiosks, and commercial shops/services often concentrated within concourse area;
- Metro Vancouver examples include most of the TransLink transit exchanges (i.e., Lonsdale Quay, Surrey Central Station, Production Way – University Station, Coquitlam Station).
4.3 PERIMETER

- Purpose-built, transit facility typically operating in an exclusive transit vehicle only environment (not mixed with private vehicle traffic);

- Loading/unloading bays positioned around the perimeter of the station area, most often with specific bays assigned to specific routes, though dynamic assignment of bus routes to loading bays is an option;

- Unloading/loading bays can be configured either in a linear or sawtooth arrangement, depending on bus dwell times (linear better suited to short duration stops) and whether bus movements need to be independent of other vehicles;

- Transit vehicles circulate in a counter clock-wise flow around the facility to access the perimeter loading/unloading bays;

- Key feature is that pedestrian/transit vehicle interaction is minimized if not fully eliminated.

- Bus layover space often located within the central interior portion of the station area though may be located off-site;

- Metro Vancouver example is the bus exchange at the 29th Avenue SkyTrain Station on the Expo line.

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4.4 REVERSE

- Purpose-built, transit facility typically operating in an exclusive transit vehicle only environment (not mixed with private vehicle traffic);

- Transit vehicles pull forward into and reverse out of a set of parallel passenger loading/unloading bays, typically configured on an angle for ease of bus access/egress.

- Passenger access to the buses at the front end of the unloading/loading bays. Pedestrian/transit vehicle interaction is minimized if not fully eliminated.

- Relatively compact operation in space constrained environments;

- Reversing maneuver for buses creates additional noise impacts for adjacent uses (back-up beepers activated for reversing vehicles);

- Typically best suited for longer dwell time, inter-city highway coach bus stations;

- No present examples for the TransLink public transit system. Metro Vancouver examples for highway coach service include the Pacific Central Station in Vancouver, and the Greyhound Bus Depot in Coquitlam.
4.5 STREET
- Loading/unloading bays located along the curbside of streets operating in mixed traffic (private vehicle and transit vehicle) conditions;
- Can be configured either in a linear arrangement along one street, at the intersection of two or more streets, or in a rectilinear pattern around a city block or park/plaza feature;
- Loading/Unloading bays configured either in a linear arrangement (not sawtooth) to provide an even curb edge for pedestrian and mixed-traffic flow;
- Metro Vancouver examples include the Burrard Station in downtown Vancouver, with bus stop locations located around the Burrard Street and Dunsmuir Street edges of the Burrard Station entry plaza/park, and the White Rock Centre bus exchange in South Surrey/White Rock, at the intersection of 152nd Street and 16th Avenue.

4.6 HYBRID
- The configuration of a bus transit station, while primarily of one of the basic typologies outlined above, may also feature elements of one or more other station types.
- This type of arrangement is referred to as a hybrid design. For instance, a purpose-built perimeter style bus transit station may also feature along one side a street edge with bus loading/unloading bays operating in a mixed-traffic condition.
5.0 CASE STUDIES

The GBP Review includes a detailed case study for one or two examples of each of the different bus station typologies outlined in Section 4, with the exception of the Reverse configuration which was considered by the Project Consultant Team to be unsuitable for the SFU Transit Hub application.

The Case Study examples reviewed for the different bus station typologies are listed below:

ISLANDS:
1. Copenhagen Central Station, Copenhagen, Denmark
2. St. Pauls Bus Station, Walsall, England

CONCOURSE:
3. Walthamstow Central Bus Station, London, UK
4. Hammersmith Upper Station, London, UK
5. Downtown Bus Exchange, Christchurch, New Zealand

PERIMETER:
6. Stratford Station, London, UK
7. North Greenwich, London, UK

STREET:
8. Portland State University, Portland, Oregon, USA
9. Harvard Square, Cambridge, Massachusetts, USA
RÅDHUSPLADSEN (CITY HALL SQUARE)

Location
Copenhagen, Denmark

Completed
1996 (Information Building only, the bus exchange may have been completed earlier)

Transit Agency
Movia (http://www.moviatrafik.dk)

Area
Centre Section (including Information Building) – 0.78 Acres; Western Section – 0.30 Acres; Eastern Section – Not Available

Project Cost
Not Available

Daily Bus Volume
2,500 buses

Peak Hour Bus Arrival
156 buses

Number of Routes
24

Number of Berths
10

Number of Layover Spaces
4

Daily Passenger Volume
Not Available

OVERVIEW

The Rådhuspladsen bus exchange is located next to the main square in front of Copenhagen’s City Hall and consists of three main sections.

The largest section, referred to as the “centre” section (circle) is a central island style bus exchange located at the west end of the square. Access to the square, however, is largely cut off by a building that houses the information centre for Movia (the transit agency for eastern Denmark), the City Hall, as well as a small television studio.

It is located within a right-of-way reserved for buses and bicycles that contains four block-long loading islands as well as loading zones on the two curbs.

A second portion of the exchange is located one block west (oval), within a street right-of-way. This western section consists of six small islands and one curbside loading area.

Finally, an eastern section of the exchange (rectangles) consists of curbside bus stops on the south side of the square, across the street, and a curbside stop on the north side of the square.

HUMAN COMFORT

The bus boarding locations on the islands within the centre section have two bus shelters each, the islands in the western section has one bus shelter each, and a shelter at one of the on-street stops in the eastern section.

A display mounted on the side of the information building displays real-time bus arrival times for all routes using the exchange. Stops used by routes with 5-minute peak frequencies also have a digital display integrated into the bus stop sign that shows the number of minutes until the next bus on that route. The building also contains public restrooms. Passengers cross the bus lanes to access boarding islands and must watch out for both buses and bicycles using the designated bicycle lanes through different portions of the exchange.

OPERATIONAL FUNCTIONALITY

Bus lanes are provided on the major streets accessing the bus exchange. Special traffic signal phases and turn lanes are used to control bus movements in and out of the central section of the exchange. The centre section operates similar to on-street stops, in that buses pull up to a stop, load and unload passengers, and proceed on their way. The centre section is used by higher-frequency routes that pass through the station.

The islands in the western section of the exchange serve as both loading and layover areas; the 15-minute route is assigned to two islands, while the 10-minute route is assigned to one island with an overflow layover space available two blocks away on the north side of the square. The eastern section consists of on-street stops.

FLEXIBILITY AND ROBUSTNESS

The exchange is in use 24 hours a day. During the day and evening, buses from 14 routes use the exchange: six routes in the centre section, four routes in the western section, and four routes (plus one layover area) in the eastern section. All buses accessing the exchange are powered by diesel engines.
In the early morning hours, the centre section is used by six “night bus” routes (5 through and one terminating), the eastern section is used by three routes (1 through and 2 terminating), and the western section is used by three routes (1 through and 2 terminating).

The eastern section of the exchange consists of curbside bus stops on the south side of the square and across the street (used by through buses), and a curbside stop on the north side of the square (used for loading by a night bus route and as a layover area by one daytime route). This section of the bus exchange is also used to serve some bus routes that cannot be accommodated at the central exchange.

Fares are paid on the bus, using cash, clip card, or monthly (or longer) pass. A smart-card fare payment system is planned to be implemented in 2010. Bicycles are directed into and through the bus exchange via designated lanes painted in blue.

**URBAN DESIGN AND INTEGRATION**

The information building, which was constructed in 1996 (when Copenhagen was the European City of Culture), was controversial at the time and continues to appear on bottom-10 lists of worst Copenhagen architecture. The primary objection to the building is that it is a modern looking, low-rise glass building plopped down into a square surrounded by heritage buildings dating from the late 1800s—in other words, the building is inappropriate for its context. The building also serves to cut off the bus exchange from the rest of the square, which could be seen as either a positive or a negative; one opening in the building does allow for direct pedestrian travel between the bus exchange and the middle of the square.

**APPLICABILITY TO SFU**

The Rådhuspladsen bus exchange is a high-volume urban facility with bus stops adjacent to an active plaza area. Real-time bus arrival information helps to better inform passengers waiting in the bus exchange. The Rådhuspladsen bus exchange however, is not located in a campus location, and handles much higher bus volumes that what are envisioned for SFU. Furthermore, some of the bus routes accessing the Rådhuspladsen bus exchange are through routes where all routes accessing SFU will be terminating at the future transit terminal.
ST. PAUL’S BUS STATION

Location
Walsall, West Midlands, UK

Completed
September 2000

Transit Agency
West Midlands Passenger Transport Executive and Authority, CENTRO (http://www.centro.org.uk)

Area
2.3 Acres

Project Cost
£6.5 million

Daily Bus Volume
Not Available

Peak Hour Bus Arrival
Not Available

Number of Routes
86

Number of Berths
14

Number of Layover Spaces
Not Available

Daily Passenger Volume
Not Available

OVERVIEW

St Paul’s bus station is located adjacent to a public square located at the main shopping precinct in the centre of Walsall. It is one of two bus stations located in the town of Walsall, England, and is a major transport hub where bus routes from a wide catchment area interchange with each other.

The station is a purpose-built facility with one vehicular entry point where buses are channelled into a series of island bus stops positioned diagonally to the street network. The station is managed by Network West Midlands (Centre)

HUMAN COMFORT

The bus station is two-storey tall and has a weather-protected elliptical roof covering the entire facility. Hardwood benches are set within a low concrete wall at each of the bus stands. The benches were designed to be vandal-proof with glass screens (2.4 metres tall) sheltering pedestrians from bus fumes and provides information on bus routes.

The Walsall Information Centre is also located in St Paul’s bus station, which provides general information for people visiting the town.

OPERATIONAL FUNCTIONALITY

No specific bus lane is provided on streets accessing the bus exchange. A marked crosswalk is provided as a designated crossing point for pedestrian traffic accessing the bus station from the adjacent shopping High Street.

Buses access the bus station through one designated vehicular entry, then channelized into a series of diagonal islands to pick-up / drop-off passengers. Limited layover space is available at the station.

FLEXIBILITY AND ROBUSTNESS

The exchange is used at least 20 hours per day on the weekdays with the earliest service starting at 4:30 a.m. and ending at 12:30 a.m. the next day. There are 14 bus stops at the station with 53 routes serving this station; with all but one route terminating at the station. These 53 bus routes are operated by 10 different bus operating companies, all buses using diesel engines. Fares are paid on the bus.

Although St Paul’s bus station is highly praised for its architectural and urban design, there have been calls for it to be demolished even though it has only been operated for 8 years. In particular, the complexity of the station’s layout has caused confusions to passengers at times (with 53 different routes at 14 stations). Furthermore, there are too many bend sections in the bus station, which makes it inefficient for buses accessing the station and as a result the station becomes quickly overcrowded with buses, which may have contributed to two serious incidents at the bus station.

URBAN DESIGN AND INTEGRATION

St Paul’s bus station is bordered by a church, the back of a large department store, a number of smaller retail buildings, and offices. The bus station and its surrounding uses have formed a new place where local people and passengers can arrive and leave, meet and wait. The large canopy and the public square at the station adjacent to it has become a strong part of the identity to this area. It is also within walking distance to the high street (Park Street) where it connects to a railway station to the west (approx. 200 metres).
APPLICABILITY TO SFU

St Paul's bus station is a purpose-built, high-volume urban facility integrated in a mixed-use, town centre environment. Bus schedule and routing information is posted at the passenger waiting area of each bus stop to inform the waiting passengers of the arrival of next bus. St Paul's bus station however, handles much higher bus volumes than what are envisioned for SFU. Furthermore, the high interchanging activities among different bus routes at St Paul's bus station are not expected at SFU.
Hammersmith is one of the key transport hubs and commercial/employment centres in west London. The Broadway Shopping Centre is the focal point of Hammersmith, which houses a shopping centre, a bus station, a subway station, and an office complex. The bus station is located at the podium level of the Broadway Shopping Centre, where passengers can access it from the shopping level of the building.

The Hammersmith bus station is a purpose-built facility where buses access it through one of the two vehicular ramps that connect to the street level. There is also a temporary extension to the Hammersmith bus station on street level at the northeast corner of the Broadway Shopping Centre. The station is managed by Transport for London (TFL).

Human comfort

The bus station is integrated at the podium level of a shopping centre/office complex. It is weather protected for passengers waiting at a concourse area for their bus. The configuration of the bus station will eliminate interactions between pedestrian and bus movements as passengers will access the Hammersmith Bus Station via escalators or elevators from the ground level to the bus station level.

There are cash machines within the waiting concourse. There is also a retail kiosk for cold drinks, snacks, newspapers, etc. Public washrooms are available within the Broadway Shopping Centre at a cost (approximately 40 cents per use). There are a few restaurants and deli places within the shopping centre that is within reach from the bus station. The bus station itself also has a café.

Operational functionality

Buses could access the bus station via one of two sets of ramps that connect to the podium level of the Broadway Shopping Centre. Vehicular access within the bus station is restricted to transit vehicles only. Buses will be travelling at the direction opposite to the general traffic (as for all the bus stations with a ‘concoursé’ configuration). The layover spaces are located at the perimeter of the bus station.

Flexibility and robustness

The Hammersmith bus station is in use 24 hours per day. There are 9 bus stops with 14 routes terminating at the main station. Most of Transport for London’s (TFL) bus fleet is diesel-operated with some hybrid electric-diesel buses although TFL is in process of purchasing hydrogen powered buses. Bus fares are still collected on the bus, however TFL is working toward a solely ‘cashless’ system using roadside ticket machines and ‘Oyster’ (prepaid) travel cards.

Planning permission was granted in 2004 to construct the temporary extension to the Hammersmith bus station that is currently in use. The extension provided overflow capacity for the main bus station, allowing service expansion and modification of some of the routes serving the area. The aim was to have this temporary station operating with its eventual replacement within 5-7 years (2009 – 2011) by a permanent upper-level extension to the main bus station.
Central concourse layouts

For restricted sites which are unsuited to perimeter layouts, the central concourse layout has emerged as a successful alternative to the narrow island layout. Buses drop off and pick up passengers around the perimeter of a single island. Buses move away from the island to the edge of the bus station site to stand. The station can be organised in such a way that the stop where the bus eventually picks up passengers is reached in a straightforward move from the standing position, thereby reducing bus mileage and congestion.

The single central island facilitates bus to bus interchange for passengers.

Accommodating passengers in a single area gives the opportunity to provide higher standards of enclosures and facilities than for an equivalent area of enclosure spread out on separate islands, or along the fingers of a perimeter layout.

The island need only be large enough for a bus to be able to turn around its ends and line up at stop lengths along its sides. This arrangement makes optimum use of the manoeuvrability of buses, and is therefore highly space efficient.

There are three configurations of the basic concourse arrangement:

- Single pedestrian route to/from the bus station direct to the concourse, by means of steps/lifts/escalator, e.g. Hammersmith bus station illustrated below.
- Concourse situated centrally within a site, accessed by one or more pedestrian crossings from adjacent pedestrian routes, e.g. Edgware (illustrated overleaf).
- Where the concourse is situated adjacent to the roadside and is accessible directly from the pavement, e.g. West Croydon (illustrated overleaf).

**URBAN DESIGN AND INTEGRATION**

Hammersmith is surrounded by several key arterial and collector roads connecting to central London. Stretching about 750m westwards from the bus station is King Street, Hammersmith’s main shopping street, which contains a variety of retail and entertainment facilities. There is also a large municipal park called Ravenscourt Park located nearby. Employment uses such as offices of international corporations and hospitals (2 in total) are also located in Hammersmith.

**APPLICABILITY TO SFU**

Hammersmith bus station is a purpose-built, high-volume urban facility integrated at the podium level of a shopping centre / office complex. There are kiosks, cash machines, public washrooms, and other facilities within or nearby the station to enhance passenger waiting experience at the station. A ‘phasing’ component is integrated in the planning process of the facility, which might be applicable at SFU. Hammersmith bus station however, handles a much higher bus volumes than what is envisioned for SFU. Furthermore, there are many interchanging activities among various bus routes (as well as the subway station below) which is not expected at SFU.
Walthamstow is in the Northeast section of London. As part of the town centre revitalization project, the Walthamstow Central Bus Station is now the third busiest bus station in London. The bus station accommodates all routes serving the area and has improved the interchange with railway and subway services.

The Walthamstow Central Bus Station is a purpose-built facility incorporated with an underground link to subway stations and is located within walking distance to a high street. The station is managed by Transport for London (TFL).

OVERVIEW

Walthamstow is in the Northeast section of London. As part of the town centre revitalization project, the Walthamstow Central Bus Station is now the third busiest bus station in London. The bus station accommodates all routes serving the area and has improved the interchange with railway and subway services.

The Walthamstow Central Bus Station is a purpose-built facility incorporated with an underground link to subway stations and is located within walking distance to a high street. The station is managed by Transport for London (TFL).

CONSTRAINTS:

- Daily Bus Volume: Not Available
- Peak Hour Bus Arrival: 83 buses
- Number of Routes: 16
- Number of Berths: 6
- Number of Layover Spaces: 19
- Daily Passenger Volume: 55,470
- Project Cost: £6 million (CAD$11 million)
- Completed: June 2005
- Location: Walthamstow, London, UK
- Area: 1.3 Acres
- Lighting, paving, and signage have also improved Walthamstow for residents, visitors, and shoppers in addition to improving community safety.

PASSENGERS CAN ACCESS THE STATION FROM VARIOUS DESIGNATED CROSSINGS STREET LEVEL WITH FENCES AND RAILINGS AT THE PERIMETER TO GUIDE PEDESTRIANS TO ENTER THROUGH DESIGNATED CROSSINGS ONLY. THE FENCES AND RAILINGS CAN BE VIEWED EITHER AS A SAFETY FEATURE OR AN UNPLEASANT BARRIER FOR PASSENGERS ENTERING THE STATION. ALTERNATIVELY, THERE IS AN UNDERGROUND LINK CONNECTING THE BUS STATION TO THE ADJACENT WALTHAMSTOW CENTRAL UNDERGROUND AND RAILWAY STATIONS WHEN TRANSFERRING FROM THE SUBWAY OR THE RAILWAY SYSTEMS. THE STATION IS ALSO WITHIN WALKING DISTANCE TO A HIGH STREET AND A SHOPPING CENTRE.

OPERATIONAL FUNCTIONALITY

Buses access the bus station via a designated ‘bus-only’ vehicle access on street level. Buses travel at the direction opposite to the general traffic (as for all the bus stations with a ‘concourse’ configuration). The layover spaces are located at the perimeter of the bus station.

FLEXIBILITY AND ROBUSTNESS

The Walthamstow Central bus station is used 24 hours per day. There are 6 bus stops with 16 routes serving the station. Most of Transport for London’s (TFL) bus fleet is diesel-operated with some hybrid electric-diesel buses although TFL is in the process of purchasing hydrogen-powered buses. Bus fares are still collected on the bus, however TFL is working toward a solely ‘cashless’ system using roadside ticket machines and ‘Oyster’ (prepaid) travel cards.

URBAN DESIGN AND INTEGRATION

The Waltham Forest Council implemented a revitalization scheme for the Walthamstow Town Centre in 2003. The objective of the scheme was to improve the quality of the local public realm and to create a vibrant focal point for Walthamstow. This objective led to the re-creation of the town square and gardens, together with the newly improved public transport interchange with the retail hub. Lighting, paving and signage have also improved Walthamstow for residents, visitors and shoppers in addition to improving community safety.

Adjacent to the bus station is the High Street, which is dominated by the Walthamstow Market. The market is

The Walthamstow Central Bus Station is a purpose-built facility incorporated with an underground link to subway stations and is located within walking distance to a high street. The station is managed by Transport for London (TFL).
open six days a week, and there is currently a Sunday Only farmers market nearby. The High Street also has many independent small shops specializing in food, fabrics, household goods, etc., as well as cafes. The Selborne Walk Shopping Centre is also within walking distance from the bus station.

**APPLICABILITY TO SFU**

Walthamstow Central bus station is a purpose-built, high-volume urban facility located in a town centre area. There are refreshment kiosks, public washrooms and other facilities within the station to enhance passenger waiting experience at the station. The facility was designed with an objective in creating a vibrant town centre environment alongside with other uses nearby that are similar to what are envisioned at SFU. Walthamstow Central bus station however, handles much higher bus volumes than what is envisioned for SFU. Furthermore, there are many interchanging activities among different bus routes (as well as the subway and railway station), which are not expected at SFU.
Christchurch is the largest city on New Zealand’s South Island, with an urban area population of approximately 365,000. The city’s public transit network has a radial structure, with nearly all routes converging on the city centre. In 2000, the transit exchange was relocated from Cathedral Square (rectangle) to a few blocks south where a large retail redevelopment project was proposed. The City worked with the project developer to incorporate a new, larger bus exchange (circle) into the ground floor of a building containing a shopping centre and food court. Due to space limitations, some bus routes stop at on-street locations on an adjacent street (oval). Nearly every bus route in Christchurch passes through the City Bus Exchange, located in the City’s Central Business District.

The exchange consists of three parts: (1) an indoor exchange, providing three loading platforms with three loading areas each, (2) a pair of on-street bus stops on Colombo Street, also providing three loading areas each, and (3) a stop for the airport bus on Lichfield Street. The station is managed by the Christchurch City Council, while the MetroInfo team administered all the bus scheduling and routing information.

### CITY BUS EXCHANGE

- **Location**: Christchurch, New Zealand
- **Completed**: 2000
- **Transit Agency**: MetroInfo (http://www.metroinfo.org.nz/)
- **Area**: 0.74 Acres
- **Project Cost**: NZ$10 million plus an additional NZ$10 million for the retail portion of the development. (CAD$13 million)
- **Daily Bus Volume**: 2,200 buses (1,073 indoors / 915 on Colombo St / 32 on Lichfield St)
- **Peak Hour Bus Arrival**: 205 buses (102 indoors / 80 on Colombo St / 3 on Lichfield St)
- **Number of Routes**: 33 (16 indoors / 16 on Colombo St / 1 on Lichfield St)
- **Number of Berths**: 6
- **Number of Layover Spaces**: None
- **Daily Passenger Volume**: 19,000

### OVERVIEW

The indoor facility provides real-time arrival information, “airport-style lounges,” convenient access to the retail centre and food court. The Colombo Street stops are viewed as less successful, with waiting passengers crowding the sidewalk and the bus traffic creating noise and exhaust fumes. The City Council is currently considering adding a fourth pair of loading areas on Colombo Street as a short-term measure to deal with increased patronage. The Colombo Street stops are provided with overhead protection from the elements.

### HUMAN COMFORT

Passengers can access to the indoor facility from two street-level entries, one on Colombo Street and the other on Litchfield Street. An access point is also available at the retail centre where the facility is located. Although Colombo Street was intended to be the primary exterior access point, the entrance is not particularly visible from the street. A large number of users access the facility via the secondary access point from Litchfield Street. The large number of bus movements across the Litchfield Street sidewalk (spread over 3 wide driveways), combined with car movements in and out of the retail centre parkade entrance farther east on the block face (2 driveways) creates multiple opportunities for vehicle pedestrian interactions.

### OPERATIONAL FUNCTIONALITY

Bus routes that approach the exchange from the north / south direction generally use the on-street stops on Colombo Street. Bus routes that approach the exchange from the east / west direction do not terminate at the exchange rather they stop at the indoor facility when they pass by. A special contra-flow lane was installed on Litchfield Street between Colombo Street and the exchange to accommodate the outbound manoeuvre of buses. The contra-flow has created some issues with cyclists, and has also caused some pedestrian confusion. No layovers occur at the bus exchange, which was a deliberate decision to minimize the space required for the facility.

### FLEXIBILITY AND ROBUSTNESS

The Christchurch City Bus Exchange is served by 33 routes: 16 at the indoor exchange, 16 on Colombo Street, and 1 on Lichfield Street. Peak hour bus route frequencies range...
from 6 to 60 minutes. There are no layover facilities in the exchange as all the bus routes accessing it are through routes only. Fares are paid on the buses using cash or a smart card.

The facility is considered to be operating at capacity today even though it has only been in operation for eight years. This is due to unexpectedly high ridership growth. Plans are underway to build a new bus exchange in the block south and west of the current exchange. Negotiations with the property owners are underway. If constructed as planned, the entire block (18,500 square metre) would be converted into a new exchange capable of handling 45,000 passenger trips daily. Litchfield Street would be converted to two-way operation to facilitate bus access and the existing facility would be retained under the current plan. Designs have not yet been developed for the new facility, although a cost estimate has been made at approximately NZ$60 million (CAD$40 million). This new facility is planned to open in 2012.

URBAN DESIGN AND INTEGRATION

The existing bus exchange and retail centre was designed to retain the historical building façades and is considered to be successful on that score. The integration of the bus exchange with the retail centre is also considered to be successful. The bus exchange is situated at the Central Business District of Christchurch where high pedestrian activities are expected.

APPLICABILITY TO SFU

The City Bus Exchange is an example of a bus exchange that is integrated into a building. The real-time bus arrival information and “airport” style waiting area has proven to enhance passenger waiting experience at the station. The retail component of the building is also considered beneficial in spreading the concentration of passengers waiting at the exchange. The City Bus Exchange handles much higher bus volumes than what are envisioned for SFU although the passenger volumes served are similar than what is projected for SFU in the future. Unlike the facility SFU, the City Bus Exchange is not located on a campus and is not a terminus.
The North Greenwich Bus Station is at the northern end of the Greenwich peninsula in southeast London on the south bank of the River Thames. Completed in 1999, the bus station is a purpose-built, perimeter loading facility incorporated with a national rail station and the North Greenwich Underground Station. It is adjacent to the O2, which was formerly known as the Millennium Dome (2000 – 2005). The station is managed by Transport for London (TFL).

The Millennium Dome was originally opened to house the Millennium Experience, a major exhibition celebrating the beginning of the third millennium. The exhibition opened to the public in January and ran to the end of December, 2000. Since the closure of the original exhibition, several possible reuse ideas for Dome's shell were explored. On May 31, 2005, the Millennium Dome was officially renamed to the O2, which signalled its transition into an Entertainment District including an indoor arena, a music club, a cinema, an exhibition space, bars and restaurants. With these transitions underway, public transport is expected to continue to play an important role in the area.

**Human Comfort**

The bus station is integrated with the North Greenwich Underground Station, which provide seamless transfers between the bus and the subway systems. The station is weather protected with glass panels surrounding the bus station, which provides great visibility for passengers waiting in the bus station. Passengers can also access the bus station from designated on street crossings. There is a vehicle pick-up / drop-off facility at one side of the station as well. There are public washrooms, information booth, benches, and refreshments kiosks located throughout the station.

**Operational Functionality**

Buses access the station through a designated vehicle entry. Within the bus station, buses are travelling in the same direction as the general traffic (as for all the ‘perimeter’ style bus stations). There are 5 bus stops within the facility while 2 other bus stops are located on street at Millennium Way, which is a block away from the station. The layover spaces are located at a designated area adjacent to the station. Pedestrian access between the bus station and the O2 is through a covered walkway connecting the two facilities while designated crossing points are located at several locations for pedestrian access the station from other areas.

**Flexibility and Robustness**

The North Greenwich bus station is in use 24 hours per day. There are 7 bus stops with 7 routes serving the station. Most of Transport for London’s (TFL) bus fleet is diesel-operated with some hybrid electric-diesel buses although TFL is in process of purchasing hydrogen powered buses. Bus fares are still collected on the bus, however TFL is working toward a solely ‘cashless’ system using roadside ticket machines and ‘Oyster’ (prepaid) travel cards.

**Urban Design and Integration**

In December, 2001, the government chose a developer to redevelop the Millennium Dome (now officially known as the O2) and its surrounding areas into a sports and entertainment centre, and to develop housing, shops and offices on 150 acres (0.6 km²) of surrounding land. It is...
also planned to relocate some of London’s post secondary education establishments to this area.

The interior of the Dome’s shell was completely cleared prior to the development and construction of the new facilities. The Dome’s shell itself remained in situ while its interior and the area around North Greenwich Station, the Q2 pier and the main entrance area was completely redeveloped. The O2 is planned to host the 2009 World Gymnastics Championships, plus the artistic gymnastics and basketball events of the 2012 Summer Olympic Games, as well as other major sports events.

APPLICABILITY TO SFU

NorthGreenwich bus station is a purpose-built, high-volume urban facility located next to an upcoming Entertainment District. There are public washrooms, information booth, benches, and refreshments kiosks located throughout the station to enhance passenger waiting experience at the station. Glass panels surrounding the bus station which provides great visibility for passengers while waiting for their buses. North Greenwich bus station currently handles similar bus and passenger volumes that are envisioned for SFU. However, there are many transferring activities between buses and rail transit which are not expected at SFU.
Stratford is located in east London. It will be a major location for the 2012 Summer Olympics. Completed in 1994, the Stratford bus station was one of the first few stations in London where local authorities attempted to turn a purely functional-oriented transport terminal into a pleasant and desirable place for passengers to wait for a bus. It is also a design objective to keep passengers protected from the rain, hence encouraging more people to use public transit. With these design objectives in mind, the Stratford bus station features distinctive inverted canopies. Special lighting treatments were also incorporated within the overall design, making this a landmark feature in the area.

The bus station is a purpose-built perimeter loading facility located adjacent to the Stratford (Regional) rail station, which provides rail services to many destinations within the UK. In addition, in light of the upcoming Olympics in 2012, an additional rail station (known as Stratford International Station), which is 400 metres away from the Stratford (Regional) rail station, is also under construction and is due to open in 2010. The bus station is also adjacent to the subway system and the Docklands Light Railway.

HUMAN COMFORT

The bus station is situated in an open area but with canopies above to protect passengers from weather elements. The featured canopies eventually become part of a wider scheme in refreshing the looks of other bus stations in London in general. Passengers can access the bus station from on-street crossings outside of the bus station or through the walkway connecting to the railway and subway stations adjacent to the bus station without crossing any vehicular traffic. Fences and railings are located around the bus station to guide pedestrians to access the bus station through designated crossings and walkways only. There are public washrooms, information booths, benches with glass screens, and refreshment kiosks located at the waiting area.

OPERATIONAL FUNCTIONALITY

Depending on the bus routes, some buses access the bus station along the street-edge (i.e. they are not terminating at the bus station) while others would access the station through a designated vehicle entry. Within the bus station, buses are travelling in the same direction as the general traffic (as for all the ‘perimeter’ style bus station). There are 4 bus stops plus 5 unloading berths at the station. The layover spaces are located in the middle of the station. Pedestrian access the bus station either through an open, uncovered walkway if coming from the rail / subway or light rail station, or through the designated crossing points located on street.

FLEXIBILITY AND ROBUSTNESS

The Stratford bus station is in use 24 hours per day. There are 4 bus stops with 15 routes serving the station. Most of Transport for London’s (TFL) bus fleet is diesel-operated with some hybrid electric-diesel busses although TFL is in the process of purchasing hydrogen powered buses. Bus fares are still collected on the bus, however TFL is working toward a solely ‘cashless’ system using roadside ticket machines and ‘Oyster’ (prepaid) travel cards.

URBAN DESIGN AND INTEGRATION

The Stratford Station is a major transport interchange with entertainment venues including the Stratford Circus, Theatre Royal Stratford, Stratford Picture House, as well as the Stratford Theatre Royal. The Stratford International Station is also under construction and is due to open in 2010. The bus station is also adjacent to the subway system and the Docklands Light Railway.

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as local shopping centres located within walking distance. Furthermore, a major new mixed use urban centre known as the Stratford City is also underway on a former railway goods yard site at Stratford. The project will cost £4 billion funded from both public and private sources. Work started in 2007 and the entire project is expected to be finished in 2020. The development includes 5 million ft² of offices, 1.6 million ft² of retail, and 4,850 new homes. The retail element will be anchored by three department stores and it is hoped that it will become the third most important retail centre in London after the West End and Knightsbridge shopping districts in the city centre.

APPLICABILITY TO SFU

The Stratford bus station is a purpose-built, high-volume urban facility located in an area with high intensity of uses nearby. There are public washrooms, information booth, benches, and refreshment kiosks located throughout the station to enhance passenger waiting experience at the station. The Stratford bus station, however, functions as a major transport interchange handling much higher bus and passenger volumes and is very different from what is envisioned for SFU. In particular, there are many transferring activities between buses and other modes (i.e. rail, subway, light rail) which are not expected at SFU.
Portland State University (PSU) is an urban campus spanning approximately 40 city blocks. The university’s enrolment is 24,000 students (55% of them are full-time), of which 75% of the total enrolment are undergraduates. The Urban Plaza is a relatively new addition to the campus, opening in 2000. The site consists of a single city block (0.7 acres) occupied by two multi-story academic buildings with ground-floor retail (mostly food-related, but also includes the campus bookstore that ends one floor below grade), and a multi-level plaza area.

Tracks for the northbound Portland Streetcar trains run diagonally through the site beneath a sky-bridge connecting the two buildings. Southbound streetcars run in the street along the north and east sides of the block, with a station located across the street from the plaza (small ovals). The site is located between SW 5th and 6th Avenues, which serve as downtown Portland’s transit mall. The mall is currently under construction to install light-rail tracks, and bus service has been temporarily moved to other streets. Two bus stops (large ovals) in each direction, spread over two blocks, serve the site, with each stop providing two bus loading areas.

### HUMAN COMFORT

The bus stops have oversized bus shelters with a roof only, while passengers wait at the sidewalk for their bus. TV monitors within the shelter display scheduled bus arrival times; these are planned to be replaced with real-time information displays as part of the light rail project. The streetcar stop within the plaza consists of a raised curb and streetcar-stop pole; a display showing real-time arrival information is mounted in the window of a nearby restaurant. Pedestrians cross 5th and 6th Avenues at signalized intersections, with no restrictions on pedestrian crossings of the streetcar line within the Urban Plaza.

### OPERATIONAL FUNCTIONALITY

Prior to light rail, buses operated in exclusive curb-side bus lanes on SW 5th and 6th Avenues, with the ability to move into the adjacent lane as needed to bypass stopped buses. The transit mall operated (and will continue to operate in the future) with a “skip stop” pattern, with individual bus routes assigned to specific stops on the mall. Starting in 2009, one former bus stop in each direction will be converted to light rail use and all bus activity will be concentrated at the remaining bus stop. New operating rules will put in place to manage bus and light rail interactions, as light rail will normally operate in the centre lane and it will transition to the curb lane prior to stations where buses will need to yield to trains. No routes terminate at the Urban Plaza therefore, no buses layover there.

### FLEXIBILITY AND ROBUSTNESS

Prior to the light rail construction work, 54 buses per hour from 10 routes served the site in the peak direction (SW 6th Avenue in the morning, SW 5th Avenue in the afternoon) during the peak hour. There were 949 scheduled daily bus arrivals, along with 152 streetcar arrivals. Post-construction bus service levels are expected to be somewhat lower, as some bus routes will remain off the mall to accommodate light rail. Peak-period light rail headways are planned to be approximately 5 minutes. The streetcar operates at 12-14 minute headways. There is no significant transfer activity between bus routes or between bus and streetcar. Most TriMet’s bus fleet is diesel-operated with a small number of hybrid electric-diesel buses. The Portland Streetcar receives electrical power from overhead wires, as will the light rail.

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**PSU URBAN CENTER PLAZA**

**Location**
Portland, Oregon, USA

**Completed**
2000 (Light Rail will be completed in 2009)

**Transit Agency**
TriMet (http://www.trimet.org/)

**Area**
Urban Plaza Square Footprint – 0.7 Acres

**Project Cost**
Not Available

**Daily Bus Volume**
345 buses (plus 152 street cars)

**Peak Hour Bus Arrival**
54 buses

**Number of Routes**
10

**Number of Berths**
2

**Number of Layover Spaces**
None

**Daily Passenger Volume**
4,900 (from buses only)

**PSU square in the overall area context**

**Light rail running diagonally across the square**
Bus fares are paid on the bus. Though not mandatory, students may choose to purchase a discounted bus pass through the university. The streetcar and light rail operate on a proof-of-payment system, with passengers purchasing their fares on the platform prior to boarding. The Urban Plaza lies close to the south end of the downtown “Fareless Square”, with a number of northbound riders staying downtown not required to pay fares (passenger activity at the northbound stops is about 1/3 higher than the activity at the southbound stops).

**URBAN DESIGN AND INTEGRATION**

The plaza serves as the campus’ primary bus node, although much of its activity occurs along the edges of the plaza, or on adjacent block faces. The plaza also serves as a pedestrian route between different portions of the campus and is a destination in itself given the academic and retail uses located adjacent to it. The buildings on the site are oriented to maximize the plaza’s sun exposure. The plaza is rarely used for events, unlike other public spaces in Portland, such as Pioneer Courthouse Square. When originally designed, it was thought that a farmer’s market might move to the plaza from a site a few blocks away in the South Park Blocks; however, the market did not relocate as planned.

Blocks west and southwest of the plaza are academic buildings, while the block south of the plaza is being converted from classrooms to a new student recreation centre. The university also owns part of a block southeast of the plaza, which is used for carpool parking. Other private uses in surrounding blocks include office, a private school, a church, a motel, an apartment building, and privately owned surface parking lots.

**APPLICABILITY TO SFU**

The PSU Urban Centre Plaza consists of high-volume urban bus stops along the edge of an active public plaza. It is located in a campus setting with nearby non-campus land uses. It utilizes relatively small space for buses despite high bus volumes. Real-time bus and train arrival information are planned in the future. The PSU Urban Centre Plaza however, is not a route terminus. Furthermore, it has rail transit activity that SFU will not have.
Harvard University is located at the centre of Cambridge, Massachusetts. The university’s enrolment is about 19,000 students per year, of which about 50% are undergraduates. The university’s status attracts many visitors year-round, who tend to use transit due to its urban location. Harvard Square is the city’s central public plaza and serves as a commercial centre, primary gathering place, and tourist attraction in its own right. Harvard Square is a triangular plaza at the intersection of Brattle Street, John F. Kennedy Street, and Massachusetts Avenue, and is directly adjacent to Harvard University.

The Harvard Square Station is an underground subway and bus station (circular), located at a transition point between Harvard University and the surrounding community. Some motorbuses and all trolleybuses (“trackless trolleys”) enter a former streetcar tunnel at two access points (triangles) to serve the station. Most of the surface routes and all tunnel routes layover in dedicated bus lanes on the surface (rectangle). Surface bus routes serve stops (oval) near the passenger entrance to the underground station. The transit agency serving the area is the Massachusetts Bay Transportation Authority (MBTA).

**HUMAN COMFORT**

Harvard Square has three access locations to the subway station and the bus tunnel. Access to the underground Harvard Square Station is available in the plaza via stairs and an elevator. Other access points also exist one block to the north and one block to the west. The underground station locates subway platforms on one end of the station and bus waiting areas on the other end. Subway platforms are on two different levels for north- and southbound trains. Boarding platforms are well lit and have benches in several locations. Buses pick up passengers in a tunnel, and many of the buses use overhead wires for power while in the station.

**OPERATIONAL FUNCTIONALITY**

Four bus routes use surface stops full-time, one bus route uses surface stops in one direction and the Harvard Busway in the other direction, and the remaining routes use the Harvard Busway in both directions. All but one of the bus routes terminate at Harvard Square and all but one of the terminating routes use an on-street layover facility near the western busway entrance. About 70% of the underground bus departures are made by electric trolley buses. Because the lower level of the busway was originally designed for left-side streetcar loading, only specially designed trolleybuses with left-side doors can use that level. Bus routes are assigned to specified curbside berths spaced along the perimeter of the tunnel, with one or two routes assigned to each berth. Arriving buses continue past the station and exit the tunnel to reach an on-street layover area located on the other end of the underground section of the station.

The subway station accommodates the third-highest average number of weekday entrances (19,460) of the Massachusetts Bay Transportation Authority (MBTA) subway stations in the Boston area. The station serves 427 trains on an average weekday. During the week, peak-period subway system headways are approximately 9 minutes for the Red Line, while off-peak times and weekend headways range from 12-16 minutes.
There are currently 13 bus routes (including four electric trolleybus routes) and one subway line serving the Harvard Square Station. Surface bus stops are located on the western edge of the plaza for northbound travel and across the street for southbound travel. Most buses serving the station use the Harvard Busway, a bi-level tunnel originally built to facilitate transfers between streetcars and the subway. While the buses are not stored at the station, it occasionally will serve as hold over location for buses waiting to begin the route since a large number of bus routes begin at Harvard Square Station. The bus tunnel is wide enough for buses to pass one another and allows for buses to wait for longer periods at the stop.

Bus fares in general are paid upon entering the bus except when passengers boarding buses on the lower level of the underground station pay their fare upon exiting, as they do not pass by a fare box when entering the bus through the lower level of the station. Fares can be paid with cash, stored-value ticket, or smart card. Riders of the subway system swipe pre-purchased subway cards at turnstiles to access the subway platforms. Subway riders may transfer between buses and the Red Line subway within the underground station. While a transfer from subway to local bus is free, local bus transfers to subway requires an additional fare.

Harvard Square serves as the primary transit node for the Harvard University neighbourhood and a main location for transit in Cambridge. A high level of pedestrian activity occurs in the blocks around the square, with a number of restaurants and shops located at the nearby streets. The square also serves as a pedestrian route between the Harvard University campus and surrounding neighbourhood.
6.0 PLANNING AND DESIGN CRITERIA

Based on the review of typologies and case studies from around the globe, a number of aspects of transit hub and public plaza planning and design have been identified to create a set of criteria with which projects and proposed options can be evaluated.

HUMAN COMFORT

- Walking distances to key destinations
- Availability and extent of weather protection
- Availability and effectiveness of universal access
- Extent of user safety and security during both day and night
- Comfort and aesthetics of the waiting experience
- Legibility of wayfinding system
- Availability and quality of food services
- Availability and quality of washrooms
- Extent of conflicts among vehicles, pedestrians and cyclists

OPERATIONAL FUNCTIONALITY

- Integration with traffic circulation
- Adequate loading/unloading and layover spaces
- Efficiency of bus movements in terms of time and distance
- Ability to showcase and promote transit usage
- Independence of different routes
- Driver access to facilities during layovers
- Ability to provide efficient and effective supervision of transit operations
- Effective integration of modes
- Conflicts among vehicles, pedestrians and cyclists minimized
- Pedestrian and queueing conflicts minimized
- Reliability in different weather conditions
- Provisions for storage and transfer to buses of bicycles
- Integration of sustainable best practices
- Level and ease of maintenance
- Integration of vehicular drop-off and pick-up
FLEXIBILITY AND ROBUSTNESS

- Potential for and independence of phasing
- Flexibility in response to changing and intensified surrounding land uses
- Adaptability to changes of mode
- Adaptability to changes of routing
- Adaptability to changes of technology
- Adaptability to expansion and contraction of service levels

URBAN DESIGN FIT

- Integration with and enhancement of architectural and urban design context
- Contribution to place making and identity
- Integration with sustainable best practices
- Integration into pedestrian and cycling circulation networks
- Integration into vehicular circulation and parking
- Quality, durability and aesthetics of materials
- Recognition of the needs of the diverse mix of users including students, workers, residents, tourists, families with children
- Visibility and legibility of wayfinding / orientation

COST IMPLICATIONS

- Cost of land base required
- Impact on development potential of site and surrounding properties
- Development and infrastructure costs
- Cost implications for transit operations
- Implications for commercial and mixed use viability
Technical Committee Meeting Minutes

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Wednesday, August 8, 2008
Time: 1:30pm – 3:30pm
Location: Hughes Condon Marler office, #300 - 1508 W. 2nd Ave, Vancouver

Present
Technical Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Bowker, Project Manager, TransLink

Consultants
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Marta Farevaag, Phillips Farevaag Smallegen
Peter Joyce, Bunt & Associates
Chris Cheng, Bunt & Associates
Alan Weinberger, Bunt & Associates
Peter Kuntz, Kittelson & Associates

1. Approval of Agenda
Item 3(b) Transportation Study Update was added to the agenda.

2. Workplan Review
Progress against the workplan schedule was reviewed. Work on the global best practices review is behind schedule and will be presented at the next Technical Committee meeting approximately September 18. The traffic count will be done the second week of September to ensure typical campus activity. Interim Draft Report #1 will be completed by October 2.

3. Work to Date
   a. Confirmation of Site Location
      The consultant team reported on their assessment of the proposed location and confirmation that the proposed location is the preferred location based on the criteria discussed at Workshop #1.
   b. Transportation Study Update
      Peter Kuntz presented a preliminary report on their assessment of the transportation issues affecting planning of the transit hub. Their report included an assessment of the location, layover issues and a brief comment on the potential for aerial ropeway technology for Burnaby Mountain.

4. Global Best Practices
Roger Hughes presented several potential candidate sites for inclusion in the Global Best Practices review. The Committee suggested that the consultants attempt to include those sites that most closely resemble the Burnaby Mountain situation and that involve bus transit service.

5. Other Business
   a. Project Progress Reports
      It was proposed and agreed that twice monthly conference calls be set up for the consultant team to provide progress updates to the representatives from SFU, the Trust and Translink.

6. Next Meeting
   The next meeting will be set for approximately September 17 or 18.

7. Adjournment
   The meeting was adjourned at 3:30pm.
A.2.2 TECHNICAL COMMITTEE MEETING 2  
- SEPT 18, 2008 - AGENDA

AGENDA

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Thursday, September 18, 2008
Time: 1:00pm – 3:00pm
Location: Simon Fraser University, Strand Hall Room 3171

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Bowker, Project Manager, TransLink
Kamala Rao, Project Planner, TransLink

1. Approval of Agenda
2. Minutes August 8, 2008 (attached)
3. Work Plan Review (attached)
4. Global Best Practices Report (to be distributed)
5. Aerial Tram Study (attached)
6. Interim Draft Report #1 (to be distributed)
7. Workshop #2 Agenda
8. Other Business
9. Next Meeting
10. Adjournment

A.2.2 TECHNICAL COMMITTEE MEETING 2  
- SEPT 18, 2008 - MINUTES

Minutes

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Thursday, September 18, 2008
Time: 1:00pm – 3:00pm
Location: Simon Fraser University, Strand Hall Room 3171

Present:
Elizabeth Bowker, Project Manager, TransLink
Pura Noriega, Coast Mountain Bus Company
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Regrets:
Tamim Raad, TransLink Project Planning

Consultants:
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Marta Farevaag, Phillips Farevaag Smallenberg
Peter Joyee, Bunt & Associates
Chris Cheng, Bunt & Associates
Alon Weinberger, Bunt & Associates

1. Approval of Agenda
   The agenda was approved as circulated.
2. Minutes August 8, 2008
   The minutes were approved as circulated.
3. Work Plan Review
   The consultant team distributed a progress report showing the status of work on each task of
   the project. They reported that they have completed a “first cut” at the Best Practices report
   and the draft Interim Report #1 which they will hand out today. The information will be
formally presented at Workshop #2. Concern was raised about the projected number of students and staff being used for the study. SFU will confirm which numbers should be used. Concern was also raised about the need to confirm the functional program requirements of the hub before Workshop #2. Bunt will distribute their technical report prior to Workshop #2. Bunt completed traffic counts on September 17 and time lapse recordings of activity at the Transit Hub and Transportation Centre.

**Action:** SFU to confirm student and staff projections.

**Action:** Bunt to distribute technical paper with estimate of functional program requirements for transit hub.


The draft Best Practices report was submitted to the Committee and a brief report was provided. No example has been found that exactly resembles the Burnaby Mountain situation. A final draft will be prepared in time for Workshop #2.

**Action:** Roger Hughes to complete final draft Best Practices report.

5. Aerial Tram Study

The first draft of the Aerial Tram study was presented. It appears that there is merit in looking at an aerial tram in more detail, but the report conclusions do not impact on the need to continue with plans for the Transit Hub as an aerial tram solution is likely many years away.

6. Interim Draft Report #1

The “draft of the draft” report #1 was distributed for review. The document provides mostly an outline of how the report will be organized and what it will contain. Information will be added to a binder for each Committee member as each part of the report is completed. A more complete report will be prepared in time for Workshop #2.

**Action:** Consultant Team

7. Workshop #2 Agenda

The draft agenda for Workshop #2 was reviewed. Changes were suggested to reduce the amount of time devoted to welcome/introduction and background review and to add more time to the review of design principles and evaluation criteria.

8. Other Business

a. Project Costs

Jonathan Tinney was asked to submit invoice to SFU and Translink for their portions of the costs to date.

**Action:** Jonathan Tinney

9. Next Meeting

The next meeting of the Committee will be arranged after the completion of Workshop #2.

10. Adjournment

The meeting was adjourned at 2:55pm.

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**AGENDA**

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study

Technical Committee

**Date:** Thursday, November 6, 2008

**Time:** 9:00am-10:30am

**Location:** SFU Community Trust Board Room

**Committee:**

- Pura Noriega, Coast Mountain Bus Company
- Tamim Raad, TransLink Project Planning
- Robert Renger, City of Burnaby
- Elizabeth Starr, Development Planner, SFU
- Jonathan Tinney, SFU Community Trust, Director Community Development
- Larry Waddell, Director Facilities Development, SFU

**Support Staff:**

- Elizabeth Bowker, Project Manager, TransLink
- Kamala Rao, Project Planner, TransLink

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1. Approval of Agenda

2. Minutes September 18, 2008(attached)

3. Aerial Tram Study Update

   Dale Mikkelsen

4. Transit Hub Design Options

   Roger Hughes

5. Workshop #3 Agenda

   Roger Hughes

6. Open House

   Roger Hughes

7. Work Plan Review (attached)

   Roger Hughes

8. Conference Call Updates

   Larry Waddell

9. Other Business

10. Next Meeting

11. Adjournment
A.2.3 TECHNICAL COMMITTEE MEETING 3 - NOV 06, 2008
- MINUTES

Minutes

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Thursday, November 6, 2008
Time: 9:00am-10:30am
Location: SFU Community Trust Board Room

Present:
Elizabeth Bowker, Project Manager, TransLink
Pura Noriega, Coast Mountain Bus Company
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Larry Waddell, Director Facilities Development, SFU
Dale Mikkelson, SFU Community Trust
Colleen Sondermann, Community Relations Coordinator, Translink

Regrets:
Tamim Raad, TransLink Project Planning
Jonathan Tinney, SFU Community Trust, Director Community Development

Consultants
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Marta Farevaag, Phillips Farevaag Smallenberg
Peter Joyce, Bunt & Associates

1. Approval of Agenda
The agenda was approved with the addition of completion of Interim Report under item 7.0.

2. Minutes September 18, 2008(attached)
The minutes were approved as circulated.

3. Aerial Tram Study Update
Dale Mikkelson reported that the study they have undertaken is complete. It is currently undergoing a third party review by Bunt and Kittelson which will be completed shortly.

4. Transit Hub Design Options
The consultant team reported that they had tested numerous options for location of the transit hub facilities. They have explored locations on both SFU and Trust lands, above grade and underground using various typologies including street, perimeter and concourse. The large area needed for bus layover is significant. Generally the analysis has assumed that buses will need to arrive and depart in two directions and that eventually Burnaby Mountain will have a complete two way road system. Bus layover locations work best on Trust Lots 25 and the combined lots 23 and 24. Lot E on SFU land is too small at grade and below grade poses problems with access by the buses. Lot C was not considered as a location for bus layover as it would require significant extra bus travel time.

Several specific transit hub layouts were presented and reviewed. The consultants were asked to include existing road edges and building footprints on future drawings. The drawings will be revised based on comments received from the Committee and presented at Workshop #3.

5. Workshop #3 Agenda
The agenda for Workshop #3 was discussed. The objective of the workshop is to try and select the best transit hub layouts for more detailed review and to confirm the arrangements for Open House #1. The consultants were asked to provide photographs of similar layouts, bus cycle times and to summarize how well each option meets the evaluation criteria established at Workshop #2.

6. Open House
A summary of the content of the ‘story boards’ to be displayed at the Open House was presented and reviewed. Draft copies of the story boards will be presented for review at Workshop #3.

7. Work Plan Review (attached)
This item was deferred.

8. Conference Call Updates
The Committee was reminded that the conference call updates that have been scheduled will continue to take place unless they are cancelled.

9. Other Business
There was no other business.

10. Next Meeting
The next meeting will be arranged to take place following the Open House.

11. Adjournment
The meeting was adjourned at 10:30 AM.
A.2.4 TECHNICAL COMMITTEE MEETING 4  
- DEC 05, 2008 - AGENDA

AGENDA

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Friday, December 5, 2008
Time: 9:00am-11:00am
Location: Translink Office, Metrotown II, Anmore Room, 15th floor

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, Translink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Bowker, Project Manager, TransLink
Kamala Rao, Project Planner, TransLink

1. Approval of Agenda
2. Minutes November 6, 2008 (attached)
3. Aerial Tram Study Update
   Jonathan Tinney
4. Open House #1 Review (attached)
   Roger Hughes
5. Transit Hub Design Options
   Roger Hughes
6. Work Plan Review (attached)
   a. Project Committee Meeting
   b. Open House #2
   Roger Hughes
7. Conference Call Updates
   Larry Waddell
8. Other Business
9. Next Meeting
10. Adjournment

A.2.4 TECHNICAL COMMITTEE MEETING 4  
- DEC 05, 2008 - MINUTES

Minutes (DRAFT)

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Friday, December 5, 2008
Time: 9:00am-11:00am
Location: Translink Office, Metrotown II, Anmore Room, 15th floor

Present:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, Translink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU
Elizabeth Bowker, Project Manager, TransLink
Peter Klitz, Translink, Transit Planning

Consultants
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Marta Farevaag, Phillips Farevaag Smallenberg
Peter Joyce, Bunt & Associates

1. Approval of Agenda
   The agenda was approved as circulated.

2. Minutes November 6, 2008
   The minutes of November 6, 2008 were approved as circulated.

3. Aerial Tram Study Update
   Jonathan Tinney reported that the study commissioned by the Trust is substantially complete. Copies will be distributed next week. The draft report prepared by Bryce Tupper has been peer reviewed by Bunt and Kittelson. The report concludes that the capital cost of developing
a gondola system would be approximately $50,000,000 not including land acquisition costs. Operating costs are estimated at $3,500,000 annually which is estimated to be a savings of $2,900,000 per year in reduced bus costs. The study assumes that a gondola would reduce the requirements for the Burnaby Mountain Transit Hub by 25%.

4. Open House #1 Review

The consultants reported that they thought the open house went well. Most participants were SFU students and employees with only a few UniverCity residents. Feedback indicated general agreement with objectives and vision of the project. Most respondents preferred a dedicated option as opposed to a street option. Concerns were raised about congestion on sidewalk and road, safety, weather protection and pedestrian movement.

Suggestions to get more response from UniverCity residents included email to residents advising them of project website to solicit comments, presentation at next monthly strata council meeting and a story in next UniverCity newsletter. Consideration should be given to hold next open house in several locations throughout the day to get better response from students and UniverCity residents.

5. Transit Hub Design Options

The remaining design options were reviewed. The Committee needs to decide which option or options to take forward to the Project Committee and to the next open house. It was agreed that the grade separated options are problematic. The consultant team pointed out that they believe that all of the issues identified at the open house can be addressed in the street options with the exception of bus volume and associated noise. Tamim Raad pointed out that the new diesel electric buses Translink is acquiring are much quieter, produce less fumes and have the lower floor platform and large windows making them less intrusive and disruptive. The change in bus traffic for each of the preferred street options along each road link compared with current volumes needs to be measured. An option at grade on lot E needs to be prepared and assessed for due diligence.

Action: Consultant Team to measure change in bus traffic along each road link comparing existing volumes and projected volumes for each of the remaining options.

Consultant Team to prepare report summarizing the evaluation of each of the principle options including magnitude of cost estimates.

6. Work Plan Review

a. Project Committee Meeting

It was agreed that a Project Committee meeting will be arranged to report progress and to recommend that option 3D version 2 is the Technical Committee’s preferred option. The meeting will be arranged for as soon as possible and will need to take place before Open House #2.

b. Open House #2

Open House #2 is tentatively scheduled for the week of January 26. The purpose of this open house is to present and get feedback on the results of the transit hub study including the recommended transit hub design and location.

7. Conference Call Updates

The December 31 conference call is cancelled. The December 17 call will take place as scheduled. Dates for 2009 will be arranged and announced.

8. Other Business

There was no new business to discuss.

9. Next Meeting

The next meeting will be arranged to review materials and plans for Open House #2. The date and time will be announced.

10. Adjournment

The meeting was adjourned at 11:00am.
A.2.5 TECHNICAL COMMITTEE MEETING 5
- JAN 07, 2009 - AGENDA

AGENDA

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Wednesday, January 7, 2009
Time: 9:00am-11:00am
Location: Translink Office, Metrotown II, Anmore Room, 15th floor (Report to 16th floor reception)

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Bowker, Project Manager, TransLink
Kamala Rao, Project Planner, TransLink

1. Approval of Agenda
2. Minutes December 5, 2008 (attached)
3. Transit Hub Design Options
   Roger Hughes
4. Work Plan Review
   Roger Hughes
   a. Project Committee Meeting
   b. Open House #2
   c. Urban Design Guidelines
5. Conference Call Updates
   Larry Waddell
6. Other Business
7. Next Meeting
8. Adjournment

A.2.5 TECHNICAL COMMITTEE MEETING 5
- JAN 07, 2009 - MINUTES

MINUTES

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Wednesday, January 7, 2009
Time: 9:00am-11:00am
Location: Translink Office, Metrotown II, Anmore Room, 15th floor (Report to 16th floor reception)

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Bowker, Project Manager, TransLink
Peter Klerx, Translink, Transit Planning
Dale Mikkelsen, SFU Community Trust

Consultants
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Marta Farevaag, Phillips Farevaag Smallenberg
Peter Joyce, Bunt & Associates

Regrets
Elizabeth Starr, Development Planner, SFU

1. Approval of Agenda
   The agenda was approved as circulated.
2. Minutes December 5, 2008 (attached)
   The minutes of December 5, 2008 were approved as circulated.
3. Transit Hub Design Options

Jonathan Tinney explained that on reflection the Trust felt that locating the proposed transit layover facility on lots 23/24 would work better than a location on lot 25. The Trust intends to proceed in the short term with development of lot 25.

Roger Hughes presented a plan for the layover facility as part of the development of lots 23/24. Lots 23/24 are shorter than lot 25, but there is sufficient space to provide the necessary layover spaces and turning distances. Access would be off of University Crescent which is the same as the lot 25 plan. Roger also presented building sections to show how the development of lots 23/24 might look.

Roger explained that the proposed option would have unloading on the west side of East Campus Road and loading along the north side of High Street and the east side of East Campus Road around the perimeter of lots 23/24.

Peter Joyce indicated that a video model of the traffic activity is being developed that will show the movement of buses, cars and pedestrians. There is concern about the conflict of bus and car traffic with pedestrians crossing High Street at the connection with East Campus Road. Consideration of diagonal crosswalk and signal control will be required.

Roger indicated that only preliminary costing of the options have been done. The development on lots 23/24 appear to be less than on lot 25. The cost of the bus layover facility is the only difference in the options as all other factors in terms of loading, unloading and bus movements are the same.

It was indicated that consideration still needs to be given to the changes that will be required in the Transportation Centre to allow two way traffic.

Translink indicated that they would need to review the plan and involve Hansel Wang. Issues to assessed are the acceptability of a 2% slope in the layover facility, locating 2 bus positions along the south side of the layover facility, relocation of one arrival location north on East Campus Road or on High Street.

Robert Renger requested that additional architectural detail be provided for review by the City.

The Committee agreed to go forward to the Project Committee meeting reporting on the process that has led to the preferred location for the transit hub being a street oriented loading and unloading design with bus layover on lots 23/24. Further review of details still required to confirm final acceptance by all parties.

Action: The consultant team will update the preferred option to include the items discussed at today’s meeting.

Peter Joyce to submit video model of future traffic on High Street and East Campus Road.

Roger Hughes to provide additional Architectural details requested by Robert Renger.

Translink to review detail design issues discussed during meeting.

4. Work Plan Review

a. Project Committee Meeting

It was agreed that the January 30 Project Committee meeting will focus on the process undertaken to date leading to a determination of a preferred location for the transit hub. This will include a discussion of the consideration of the layover facility on lot 25 and on lots 23/24. Other agenda items will include cost comparison of options, interim plans, implications on the transportation centre and the gondola study.

b. Open House #2

It was agreed that the target date for Open House #2 will be the week of February 7. Colleen Sonderman from Translink will be involved to assist with advertising and logistics. The Open House will present the results of the assessment of location options and the urban design guidelines.

c. Urban Design Guidelines

Action is still pending by the consultant team on the urban design guidelines.

Action: The consultant team will prepare draft urban design guidelines for presentation at the next Technical Committee meeting.

5. Conference Call Updates

Action is still pending to arrange conference call updates with the consultants.

Action: Larry Waddell to arrange conference call updates.

6. Other Business

There was no other business.

7. Next Meeting

The next meeting will be scheduled after the Project Committee meeting in order to review the urban design guidelines and materials for Open House #2.

8. Adjournment

The meeting was adjourned at 11:00am.
## A.2.6 Technical Committee Meeting 6
### February 11, 2009 - Agenda

**Burnaby Mountain Transit Hub Urban Design & Transit Planning Study**

**Technical Committee**

- **Date:** Wednesday, February 11, 2009
- **Time:** 10:30 am - 12:00 pm
- **Location:** Translink Office, Metrotown II (16th floor reception)

**Committee:**
- Pura Noriega, Coast Mountain Bus Company
- Tamim Raad, TransLink Project Planning
- Robert Renger, City of Burnaby
- Elizabeth Starr, Development Planner, SFU
- Jonathan Timney, SFU Community Trust, Director Community Development
- Larry Waddell, Director Facilities Development, SFU

**Support Staff:**
- Elizabeth Bowker, Project Manager, TransLink
- Kamala Rao, Project Planner, TransLink

### Agenda

1. Approval of Agenda
2. Minutes January 7, 2009 (attached)
3. Urban Design Guidelines (to be presented at meeting) - Roger Hughes
4. Open House #2
   a. Presentation Materials (to be presented at meeting) - Roger Hughes
   b. Schedule/Location/Logistics
5. Work Plan Review - Roger Hughes
6. Other Business
7. Next Meeting
8. Adjournment

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## A.2.6 Technical Committee Meeting 6
### February 11, 2009 - Minutes

**Burnaby Mountain Transit Hub Urban Design & Transit Planning Study**

**Technical Committee**

- **Date:** Wednesday, February 11, 2009
- **Time:** 10:30 am - 12:00 pm
- **Location:** Translink Office, Metrotown II

**Committee:**
- Pura Noriega, Coast Mountain Bus Company
- Tamim Raad, TransLink Project Planning
- Robert Renger, City of Burnaby
- Elizabeth Starr, Development Planner, SFU
- Jonathan Timney, SFU Community Trust, Director Community Development
- Larry Waddell, Director Facilities Development, SFU

**Support Staff:**
- Elizabeth Bowker, Project Manager, TransLink
- Ian Fisher, Project Manager, TransLink

**Consultants**
- Roger Hughes, Hughes Condon Marler
- Alan Endall, Endall Elliott
- Marta Farevaag, Phillips Farevaag Smulenberg
- Peter Joyce, Bunt & Associates
- EB Wolpin, Hughes Condon Marler

### Minutes

1. **Approval of Agenda**
   - The agenda was approved as circulated.
2. **Minutes January 7, 2009 (attached)**
   - The minutes of January 7, 2009 were approved as circulated.
3. **Urban Design Guidelines**
   - Alan Endall reviewed the major contextual issues affecting the urban design concept development. The concept itself is to create a spacious university square where parking lot E and the Transit Hub are currently located. This would be bordered by the existing SFU building to the north and west, a new SFU building to the south and new Trust development to the east. Arrival plazas into the square would come from the north via East Campus Road and...
from Town Square to the south. A sidewalk/colonnade would run along the south side of Blusson hall to a crosswalk across East Campus Road that would connect to the Trust development on lot 24. The plan allows for the potential VIP drop off location in the university square and for expansion of Strand Hall to the east.

Comments received were as follows:
- Curb bulges could be considered to protect users of crosswalks, but should not make movement of buses more difficult;
- The queing space for bus passengers needs to be sufficient so that general sidewalk passage is not obstructed;
- The canopy protection at the bus loading locations should extend sufficient distance to provide weather protection and should be high enough to allow buses to pass underneath;
- The setback for the faces of the residential units on lot 24 facing west and south should be looked at closely;
- The crosswalk at the intersection of East Campus Road and High Street should operate as a ‘scramble’ system with signal controls;
- Details on road widths, curbs, crosswalks, etc. needs to be developed and assessed.

The consultants will update the Urban Design plan based on the comments received at this meeting and feedback from Open House #2.

4. Open House #2
   a. Presentation Materials
      The proposed presentation materials were reviewed. Changes will be made to reduce the amount of wording and to use graphs and statistics to describe current and projected activity levels. The potential bus routing options need to be described in the materials. The video of the Visio model showing future bus traffic will be at the Open House. The Gondola will not be mentioned in the materials. The consultants will circulate the final draft materials on Friday for review and comment by the Committee.
   b. Schedule/Location/Logistics
      The Open House is confirmed for February 18 from 9am to 4pm in the ASSC 1 atrium and from 6:30pm to 8pm at the Cornerstone building. Advertising is complete. Details on times and locations will be emailed to the Committee.

5. Work Plan Review
   A review of the remaining actions in the Project Workplan in sequence include:
   - Open House #2
   - Draft Final Report
   - Technical Committee Review of Draft Final Report
   - Distribution of Final Report
   - Project Committee Approval of Final Report
   
   • Open House #2       February 18
   • Draft Final Report   First week March
   • Technical Committee Review of Draft Final Report   Mid March
   • Distribution of Final Report   End March
   • Project Committee Approval of Final Report   End March/Early April

6. Other Business
   There was no other business to discuss.

7. Next Meeting
   To be arranged following Open House #2 and completion of Draft Final Report.

8. Adjournment
   The meeting was adjourned at 12:15pm.
A.2.7 TECHNICAL COMMITTEE MEETING 7
- APR 2, 2009 - AGENDA

Agenda

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Thursday, April 2, 2009
Time: 12:00pm-1:30pm
Location: Translink Office, Metrotown II. (Report to 16th floor reception)

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Ian Fisher, Project Manager, TransLink
Kamala Rao, Project Planner, TransLink

1. Approval of Agenda
2. Minutes February 11, 2009 (attached)
3. Open House #2 (attached)Roger Hughes
4. Draft Report (accessible from ftp site as per email instructions) Roger Hughes
5. Next Steps
6. Other Business
7. Next Meeting
8. Adjournment

A.2.7 TECHNICAL COMMITTEE MEETING 7
- APR 2, 2009 - MINUTES

Minutes

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Date: Thursday, April 2, 2009
Time: 12:00pm-1:30pm
Location: Translink Office, Metrotown II. (Report to 16th floor reception)

Committee:
Pura Noriega, Coast Mountain Bus Company
Tamim Raad, TransLink Project Planning
Robert Renger, City of Burnaby
Jonathan Tinney, SFU Community Trust, Director Community Development
Larry Waddell, Director Facilities Development, SFU

Support Staff:
Elizabeth Starr, Development Planner, SFU
Ian Fisher, Project Planner, TransLink
Rachel Jamieson, Transportation Engineer, TransLink

Consultants
Roger Hughes, Hughes Condon Marler
Marta Farevaq, Phillips Farevaq Smallenberg
Peter Joyce, Bunt & Associates

1. Approval of Agenda
The agenda was approved with the addition of items 6.1 Gondola Update by Jonathan Tinney
and 6.2 Transit Hub Implementation by Larry Waddell.

2. Minutes February 11, 2009
The minutes of February 11, 2209 were approved as circulated.

3. Open House #2
Roger Hughes reported on the feedback from Open House #2. 705 of the written comments
received were considered positive, 10% were negative and 20% were neutral or expressed
some concern. The concerns had to do with existing problems at the Transportation Centre
and the concern that these wouldn’t be addressed in long term planning or that the
Transportation Centre would be abandoned. A description of the issues that need to be
addressed at the Transportation Centre will be included in the final report.
The Committee discussed the effectiveness of the public consultation. Attendance at the two Open Houses was not as high as had been hoped. It was felt that sufficient advertising had been done both within SFU and within the Trust community to make people aware of the project. The Committee agreed to post a copy of a summary of the final report on line and provide the SFU and Trust communities the opportunity for final review and comments.

Action: Larry Waddell to make arrangements to post summary of final report on line.

4. Draft Report
Roger Hughes reported on the status of the draft report. Comments and suggested changes were raised as follows:

- The new SFU building west of the Town Square should be moved back from the Town Square path.
- The report should include a cross section of High Street with sidewalk and road widths.
- The interim solution in section 4.6 needs to be replaced with text that describes the need to address the potential requirements of an interim solution for layover.
- Translink needs to assess detail dimensions of layover space.

Actions: Consultant team to revise report based on feedback for final distribution to Project Committee;
Peter Joyce to submit Autocad drawing of layover space to Rachel Jamieson;
Peter Joyce will draft new wording for section on interim solution.

5. Next Steps
The Committee agreed that the report could be finalized by way of email review and that pending resolution of these final edits, the Committee would support submission of a recommendation to accept the report to the Project Committee. The following schedule was agreed to be followed:

- April 8: Revised draft available from Consultant team.
- April 22: Deadline for Committee comments on revised draft (to be submitted by email to Consultant team and Committee members.)
- May 19: Project Committee meeting target date.

6. Other Business
6.1. Gondola Update
Jonathan Tinney reported that the final feasibility study report is complete. Copies can be provided by contacting Jonathan’s office. The Trust is pursuing discussions with potential stakeholders and are pursuing Federal government funding opportunities. They also hope to get Translink to include the project on their strategic plan. Public opinion surveys of transit riders and residents are being undertaken. The surveys can be made available on request.

6.2. Transit Hub Implementation
Larry Waddell reported that discussions between Translink, SFU and the Trust have begun to determine strategy to acquire funding and approvals to implement the Transit Hub solution recommended in the report. The agencies have agreed to work together on this initiative which is expected to take several years.

7. Next Meeting
No further meetings are planned. The Chair thanked the Technical Committee members for their work on this project.

8. Adjournment
The meeting was adjourned at 1:20PM.
A.2.8 TECHNICAL COMMITTEE MEETING 8
- SEPT 2, 2009 - AGENDA

AGENDA  DRAFT

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Meeting to be held on Wednesday, September 2nd, 2009 from 3:00PM to 4:30PM at
Translink Offices, Metrotown II, Pattullo Room (Report to 16th Floor Reception)

Committee:
Larry Waddell, Director Facilities Development, SFU (Administrative Chair)
Jonathan Tinney, Director Community Planning, SFU-CT
Tamim Raad, TransLink Project Planning
Pura Nortega, Coast Mountain Bus Company
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU

Support Staff:
Ian Fisher, TransLink Project Planning
Ken Chow, Coast Mountain Bus Company

Consultants:
Roger Hughes, Hughes Condon Marler
Alan Endall, Endall Elliott
Martine Farevaag, Philip Farevaag Smallenberg
Peter Joyce, Bunt & Associates

1. Approval of Agenda
   Roger Hughes

2. Review of Final Report
   Committee

3. Acceptance of Final Report
   Committee

4. Review and Confirm acceptance of the Report Recommendation -
   Letter (attached)
   Committee

5. Project Committee Agenda (attached)
   Committee

6. Other Business

7. Adjournment

A.2.8 TECHNICAL COMMITTEE MEETING 8
- SEPT 2, 2009 - MINUTES

Minutes

Burnaby Mountain Transit Hub Urban Design & Transit Planning Study
Technical Committee

Held on Wednesday, September 2nd, 2009 from 3:00PM to 4:30PM at Translink Offices,
Metrotown II, Pattullo Room

Present:
Larry Waddell, Director Facilities Development, SFU (Administrative Chair)
Jonathan Tinney, Director Community Planning, SFU-CT
Robert Renger, City of Burnaby
Elizabeth Starr, Development Planner, SFU
Ian Fisher, TransLink Project Planning
Ken Chow, Coast Mountain Bus Company
Moreno Rossi, TransLink Project Planning

Consultants:
Roger Hughes, Hughes Condon Marler
Marta Farevaag, Philip Farevaag Smallenberg
Peter Joyce, Bunt & Associates

Regrets:
Tamim Raad, TransLink Project Planning
Pura Nortega, Coast Mountain Bus Company

1. Approval of Agenda
   The agenda was approved as circulated.

2. Review of Final Report
   Larry Waddell reported that the effort to try and finalize the report via email after the
   April 2, 2009 Technical Committee meeting had proven too difficult due to the
   significance of some of the recommended revisions. The May 19 Project Committee
   meeting was postponed to September 9 in order to provide time to finalize the report.
   Roger Hughes reported that most of the proposed revisions had been addressed and
   changes to the previous report are highlighted in yellow in the latest version. The
significant revisions were reviewed by the Committee and additional revisions were approved. The consultants will make the approved changes and submit the new version to SFU staff who will review the report before it is circulated to the Project Committee.

3. Acceptance of Final Report
The Committee agreed to accept the report including the revisions approved at this meeting and to recommend its acceptance to the Project Committee.

4. Review and Confirm acceptance of the Report Recommendation
The Committee agreed to the proposed Report Recommendation Letter with revisions to include expanding the next steps to include publicizing the report and moving forward on project development, business case analysis and implementation strategy.

5. Project Committee Agenda
The Committee approved the agenda for the Project Committee as circulated.

6. Other Business
6.1 Aerial Tram Study
Jonathan Tinney reported that the Trust and TransLink are in the process of completing a Memorandum of Understanding to pursue further exploration and planning for an aerial tram service to Burnaby Mountain. The Trust has submitted a funding request for $25,000,000 to the Federal infrastructure program and is also seeking interest from potential developer/operators for the proposed system.

7. Adjournment
The Chair again thanked the Committee members for their participation and efforts on the project. The meeting was adjourned at 4:20PM.
A.3.1 WORKSHOP 1 - JUL 15, 2008 - AGENDA
Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
First Workshop, July 15, 2008, 8:30 to 1:00, HCMA Offices

Agenda
8:30 – 8:45 Welcome and Introductions
8:45 – 9:00 Overview of the Study Process and Approach (R. Hughes)
9:00 – 9:10 Overview of the Workshop Agenda and Objectives (M. Farevaag)
9:30 – 9:45 Overview of the Transportation Context (P. Bunt, P. Joyce, P. Ryus)
9:45 – 10:00 Coffee Break
10:00 – 10:30 Transit Objectives and Precedents (T. Raad)
10:30 – 10:45 SFU Objectives and Background (L. Gavel)
10:45 – 11:00 UniverCity Objectives and Background (J. Tinney)
11:00 – 11:45 Roundtable #1: Sharing Current Good Ideas and Concerns
   “What are the important known opportunities and constraints?”
11:45 – 12:00 Break for a Working Lunch
12:00 – 12:45 Roundtable #2: Key Criteria for Success
   “What are the criteria that should be used to evaluate options and that will
   identify the preferred solution?”
12:45 – 1:00 Wrap Up

Participants
Jim Prokop – Director of Service Planning, Coast Mountain Bus Company
Larry Waddell – Director, SFU Facilities Development
Lee Gavel – Chief Facilities Officer/University Architect, SFU
Pura Noriega – Manager, Service Planning, Coast Mountain Bus Company
Tamim Raad – Project Planning Manager, Translink
Jonathan Tinney – Director Community Development, SFU Community Trust
Elizabeth Bowker – Project Manager, Translink
Elizabeth Starr – Development Planner, SFU
Peter Joyce – Bunt & Associates

A.3.1 WORKSHOP 1 - JUL 15, 2008 - MEETING
Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
First Workshop, July 15, 2008, 8:30 to 1:00, HCMA Offices

Workshop Notes
Participants
Larry Waddell – Director, SFU Facilities Development
Lee Gavel – Chief Facilities Officer/University Architect, SFU
Jim Prokop – Director of Service Planning, Coast Mountain Bus Company
Pura Noriega – Manager, Service Planning, Coast Mountain Bus Company
Sheri Plewes, Translink
Tamim Raad – Project Planning Manager, Translink
Elizabeth Bowker – Project Manager, Translink
Hansel Wang, Translink
Ian Fisher – Translink
Jonathan Tinney – Director Community Development, SFU Community Trust
Elizabeth Starr – Development Planner, SFU
Roger Hughes – Hughes Condon Marler
Alan Endall – Endall Elliott
Chris Phillips – Phillips Farevaag Smallenberg
Marta Farevaag – Phillips Farevaag Smallenberg
Peter Joyce – Bunt & Associates
Chris Cheng – Bunt & Associates
Alon Weinberger – Bunt & Associates

Topics
Overview of the Study Process and Approach
Roger Hughes provided an overview of the process and methodology.

Overview of the Workshop Agenda and Objectives
M. Farevaag described the approach to the workshop.

Overview of the Urban Design Context
A. Endall and C. Phillips reviewed key urban design issues to be addressed:
   • Integration of two built form typologies
   • Interface of Town and Gown
   • Location at top of ridge and along main campus axis
   • Topographic influence on walking distances
   • View opportunities
   • Patterning of built form and open spaces

Overview of the Transportation Context
P. Joyce discussed transportation and transit issues:
   • Existing and projected traffic volumes
   • Plans to change Gaglardi Way into a two-way route and introduce new local roads
   • Potential traffic and transit impacts of proposed Burnaby Mountain Sports Complex
Transit Objectives and Precedents

T. Raad reviewed four transit facilities that are in the planning process within Metro Vancouver as case studies with key objective of balancing urban design goals with transit operation needs:

- Surrey Central
  - Intention to transform area into a more urban downtown and reduce the impacts of space hungry transit use
  - Plan reduces the size of current megablocks with new east-west and north-south roads
  - Transit moves on a one-way couplet with a Town Square for transfer movements
  - Location has high number of transfers so facilitation of transfers was a key objective

- Metrotown
  - Surface facility with long linear configuration due to constrained site
  - Relationship between transit hub and adjacent BC Parkway bicycle traffic has been a challenge

- Semiahmoo
  - Goal of an urban service with buses dropping off and picking up along major streets to keep pedestrian activity on the streets
  - Phased with future expansion in a later phase and some surface bus storage in first phase
  - Buses layover primarily underground and do not dwell on the street

- UBC
  - 80 to 100 buses per hour makes it twice as large as SFU’s requirements
  - Buses load /unload and layover underground
  - Passengers alerted to bus arrivals by signage; may have signage above ground and even at other remote places on campus
  - Passengers wait in enclosed waiting lounge that is a fare-paid zone so all buses board at all doors
  - Like SFU, it is an end-of-line facility with low transfers between buses
  - Buses turnover as fast as possible to achieve capacity

SFU Objectives and Background

L. Gavel presented an overview of SFU’s objectives and plans:

- Current transit loop is at capacity; layover function makes loop unfriendly for users
- Need to place SFU in context of Burnaby transit routes and changing services including the implications of the Evergreen Line on transit
- Majority of SFU students come from east of campus where transit connections are poor; Evergreen service will likely result in higher enrollment from Coquitlam when it is more feasible to live at home and commute
- All roads will eventually be converted to two-way; Gaglardi Way will require two uphill lanes
- The scale of the transit loop area is similar to the footprint of the Academic Quadrangle and along the key axis; axis is expressed as a series of openings and compressions
- Two urban design approaches: a new building paired with Strand Hall or open spaces alternating sides along the axis

- The façade facing the academic campus should be urban in character with public uses in the ground floor
- All surface parking lots should be considered as future building sites; will need to build parking in structures in future
- Underground bus layover facility may require ‘guessing’ at the future building that will be built above it
- Currently wayfinding is easier on campus for those arriving by transit than by vehicle
- Now are two ‘doors’ to SFU; need to create multiple entry points; new transit hub should be a new entrance
- Need to determine how buses will move around the top of the mountain and where they will stop; should it be like UBC with one central place or a series of stops around the mountain
- Consider the idea of a tunnel through the ridge to take advantage of the topography and separate buses from people
- Look at manipulating the ground floors of buildings to suit the topography; many buildings at SFU have two ground floors
- Future plans for SFU Burnaby moving from a 10 / 90% graduate / undergraduate split to 25 / 75% with more undergraduate at SFU Surrey; graduate students require four times the space of an undergraduate
- Links among campuses including SFU Downtown becoming increasingly important as students need to move quickly among facilities; tramway is considered a way to speed up connections as well as to provide access in bad weather

UniverCity Objectives and Background

J. Tinney presented an overview of UniverCity and its plans:

- Goal to be a model sustainable community; ‘sustainable urbanity’; transit is a key tool in building value
- Success of community transit pass is dependent on quality of transit experience
- Current loop is a jog in the campus axis; noisy; not user-friendly
- Existing bus location is well sited for community
- Desire to minimize the impacts of buses on the community
- Future University Slopes Neighbourhood is a challenge to serve by transit since residents would move uphill to reach the transit hub; area will likely be more family oriented with mixed use
- UniverCity is starting an OCP Amendment process with revisions around the Discovery Park area and the intention to move density to east of Naheeno Park and reconfigure the park boundaries

Roundtable #1: Sharing Current Good Ideas and Concerns

“What are the important known opportunities and constraints?”

Big Ideas:

- Gondola will rate well in green assessment
- Integrate residential with academic at transit hub
- Separation of layover and exchange functions
- Tunnel road below transit site
- Land use mix
- Entry point that reinforces the image and character of SFU
- Reduce peakiness or transit use through academic scheduling and other tools
- Realistic physical simulation
- Look at “musical” buses where drivers get off for breaks but the bus keeps going
Higher ridership – market to car users with high expectations of the travel experience
Local circulating service to address challenge of walking up slopes
Use travel time not distance to draw access gradients to address impact of
topography on walking times
Gondola to Evergreen Line
Cycling facilitated by racks on buses
Look at changing the existing campus plan if necessary to optimize the transit hub
Include driver facilities within a permanent campus building rather than a small
stand-alone structure
Be objective driven (not solution driven)

Concerns:
Driver layover experience
So much “flux” in transit planning and university plans
Compatibility of buses with public realm
Movement across areas – shuttles might be needed
Bus numbers and sizes
Rate of ridership may grow faster than previously projected due to factors like gas
prices
Affordability
Impacts of Evergreen Line are hard to anticipate but could be substantial
Transit at both ends of Gondola must be provided to meet capacity
Topography is a challenge
Moving forward with implementation

Roundtable #2: Key Criteria for Success
“What are the criteria that should be used to evaluate options and that will
identify the preferred solution?”

The Signs of Success:
Public destination where campus thrives; not just a transit centre
Transit is not physically dominant feature
SFU becomes part of Burnaby
Meets demand
Wins a Sustainability Award, a Governor General Award and Transit Award
Convenient, easy to understand by user
Secure
Accessible
Acceptable operating costs
Respect that operators are human and need amenities
Inspiring as a public place
Ridership increases sustainability
Funding agencies support with money
Reduced parking requirements
Culture of lower vehicular use
Accessibility of campus is enhanced
Works during a snowstorm
Learn from other places especially Europe
Promotes walking
Dignity to transit use
Looks at Downtown Portland, Denver and Portland State University as models

Adaptable to changing conditions
Preserves authenticity of place
Open and operating in under 5 years
Inspired and committed
Place for non-transit users to enjoy as well
Fits with surroundings
Clear vision
Strong sense of place
Enhancement to campus
Reinforces axial plan
Others want one too
No protests of the plan

Wrap Up
Final comments:
Loading and unloading of passengers is preferred above ground
Do not mix transit with other services such as garbage collection
Avoid mixing bicycles in the vicinity of buses, especially around turning movements
Create a place that is safe for passengers
Need to confirm that the site is the best choice of location within a short time
A.2.2 WORKSHOP 2 - OCT 09, 2008 - AGENDA

Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
Second Workshop, October 9, 2008, 8:30 to 1:00, HCMA Offices

Agenda
8:30 – 8:45 Welcome and Overview of the Workshop Agenda and Objectives (R. Hughes and M. Farevaag)
8:45 – 9:15 Planning and Urban Design Requirements and Program (A. Endall, C. Phillips, R. Hughes)
9:15 – 10:00 Overview of Transportation and Transit -- Application of the Global Best Practices Review to SFU (R. Hughes)
10:00 – 10:15 Coffee Break
11:45 – 12:00 Break for a Working Lunch
12:00 – 1:00 Preferences and Directions for Refining the Program and Preliminary Conceptual Options

A.2.2 WORKSHOP 2 - OCT 09, 2008 - AGENDA

Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
Second Workshop, October 9, 2008, 8:30 to 1:00, HCMA Offices

Workshop Notes

Participants
Larry Waddell – Director, SFU Facilities Development
Pura Noriega – Manager, Service Planning, Coast Mountain Bus Company
Sheri Plewes, Translink
Tamin Raad – Project Planning Manager, TransLink
Elizabeth Bowker – Project Manager, TransLink
Hansel Wang, TransLink
Ian Fisher – TransLink
Peter Kitz – TransLink
Jonathan Tinney – Director Community Development, SFU Community Trust
Elizabeth Starr – Development Planner, SFU
Roger Hughes – Hughes Condon Marler
Alan Endall – Endall Elliott
Chris Phillips – Phillips Farevaag Smallenberg
Marta Farevaag – Phillips Farevaag Smallenberg
Peter Joyce – Bunt & Associates
Chris Cheng – Bunt & Associates
Alon Weinberger – Bunt & Associates

Topics
Overview of the Workshop Agenda and Objectives
M. Farevaag described the approach to the workshop.

Planning and Urban Design Requirements and Program
A. Endall reviewed key urban design issues from the standpoints of SFU, Transit, and UniverCity and introduced a range of conceptual approaches. The urban design considerations seek to integrate two distinct typologies: SFU with pedestrian-oriented circulation and UniverCity with mixed vehicular and pedestrian routes.

Overview of the Transportation and Transit -- Application of the Global Best Practices Review to SFU
R. Hughes presented an overview of the five transit facility typologies from the Global Best Practices review with examples.

Implications of the Gondola Study for the Transit Hub
P. Joyce discussed the implications of the gondola study as:
- Not directly affecting the transit hub design since it is an independent end-of-line facility
- Having the potential to replace a significant number of buses (2/3 of current numbers during peak morning and afternoon hours) implies need for flexibility of transit hub
- Preferred location is at base of existing Town and Gown Square
- There is a concern about the capacity at the lower terminal for connecting buses to Production Way station.
Quality, durability and aesthetics of materials
- Recognition of the needs of the diverse mix of users including students, workers, residents, tourists, families with children
- Visibility and legibility of wayfinding / orientation

Preferences and Directions for Refining the Program and Preliminary Conceptual Options
M. Farevaag asked for a roundtable of comments on the directions for next work by the project team. Directions received included:
- Options should look at the implications of changes of road operations from one to two-way
- Routing options should consider the community shuttle’s role
- Recognize that options have two parts: the number of buses at the hub and how they are routed to and around campus
- Agreement that Option #1 should be treated as the baseline option and that there may be several other options; urban design should begin with Option #1 for program assumptions
- Options that reduce level of service are not preferred however some reduction in service levels may be acceptable since headways are already meeting criteria for good service
- Options should be reviewed with respect to what is in the OCP and other policy documents.

In summary, it was agreed that two streams of work will proceed concurrently:
1. Urban design explorations of the functional program in Option #1
2. Work on service options that will be initiated by TranLink staff and then brought to a workshop with the consultants.
A.3.3 WORKSHOP 3 - OCT 20, 2008 - AGENDA

Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
Third Workshop, October 20, 2008, 8:30 to 1:00, HCMA Offices

Draft Agenda

8:30 – 8:45 Welcome and Overview of the Workshop Agenda and Objectives
(R. Hughes and M. Farevaag)
  • Review, evaluate, and refine range of Schematic Options
  • Confirm directions for the Public Open House

8:45 – 10:00 Overview Presentation of the Revised Schematic Options
(A. Endall, R. Hughes)

10:00 – 10:15 Coffee Break

10:15 – 11:45 Evaluation and Assessment of the Options with the Draft Criteria

11:45 – 12:00 Break for a Working Lunch

12:00 – 1:00 Preferences and Directions among Schematic Options and
Implications for the Public Open House Presentation on
November 26, 2008

Materials to be circulated prior to Workshop #3:

  • Updated final draft of the Global Best Practices report as a section
    of the draft Burnaby Mountain Transit Hub Urban Design and
    Transit Planning Study Report
  • Updated set of option diagrams and supporting sections
  • Draft evaluation matrix

Note: The next interim draft of the Burnaby Mountain Transit Hub Urban
Design and Transit Planning Study report is proposed to be issued
after the Public Open House to document the selection of the
preferred option and the consultation process.

A.3.3 WORKSHOP 3 - OCT 20, 2008 - MINUTES

Burnaby Mountain Transit Hub Urban Design and Transit Planning Study
Third Workshop, November 20, 2008, 8:30 to 1:00, HCMA Offices

Workshop Notes

Participants
Larry Waddell – Director, SFU Facilities Development
Lee Gavel – Chief Facilities Officer/University Architect, SFU
Jim Prokop – Director of Service Planning, Coast Mountain Bus Company
Pura Noriega – Manager, Service Planning, Coast Mountain Bus Company
Elizabeth Bowker – Project Manager, TransLink
Moore Rossi – Urban Designer, TransLink
Peter Klitz – TransLink
Gordon Harris – President and CEO, SFU Community Trust
Jonathan Tinney – Director Community Development, SFU Community Trust
Elizabeth Starr – Development Planner, SFU
Robert Ranger – Planner, City of Burnaby
Roger Hughes – Hughes Condon Marlier Architects
Alan Endall – Endall Elliott
Marta Farevaag – Phillips Farevaag Smallenberg
Peter Joyce – Burn & Associates
Eli Wolpin – Hughes Condon Marlier Architects

Topics
Overview of the Workshop Agenda and Objectives
M. Farevaag described the objectives and approach to the workshop.

Overview Presentation of the Revised Schematic Options
R. Hughes reviewed the options that had been circulated for review.

Comments:
  • Option 4C requires removal of Town and Gown Square
  • Underground options are expensive and have no operational benefit for TransLink
  • Underground options segregates pedestrian activity from grade
  • South exit from underground facility would impact building sites south of Cornerstone
    building; would need study
  • Options need to be assessed with regard to impact on development potential and open
    space opportunities
  • Options without sawtooth edge are preferred as more urban
  • Inclusion of layover in Parcel 25 affects development timing
  • Need to have a place that functions as a transit hub while new one is under construction
  • SFU is not supportive of a surface facility on SFU site; issues include urban design,
    ceremonial function, proximity to President's office, not an appropriate front door to the
    campus
  • May be some urban design value in realigning spine at Cornerstone with wider sidewalks
Evaluation and Assessment of the Options with the Draft Criteria
An option by option discussion was held including comments by both SFU and Burnaby to add to those already received and noted from UniverCity and TransLink.

1Av2
- OK for SFU
- OK / workable for Burnaby
- TransLink has concerns regarding legibility and wayfinding to loading places and excessive bus looping required
- UniverCity does not prefer option since it encumbers both 23/24 and 25
- Works with either unloading on East Campus Road or High Street
- Retained as an option

1B
- Not supported by UniverCity and Burnaby
- Removed as an option

1Bv2
- Impacts pedestrian environment and view corridor along University Crescent
- Pedestrian / bus conflicts
- OK for SFU

1Bv3
- Acceptable to Burnaby if a street rather than a building
- OK for SFU

1Cv2
- Legibility concerns for TransLink
- OK for SFU and Burnaby

2Av2
- Similar issues to 1Bv2 and 1Bv3

2B
- Removed as an option

2Cv2
- Unacceptable to SFU

2Cv3
- SFU’s intention is for a public amenity space; needs a compelling urban design

3Av3
- SFU and Burnaby like it
- UniverCity supports except for impact on Lot 25 and buses on Highland Court
- Seen as congested by TransLink

3Cv2
- Has merit for SFU, Burnaby and UniverCity
- Seen as chaotic by TransLink

3D
- Should investigate shifting layover to Lots 23/24, Lot 25 could be temporary layover
- Mover the departing stop area
- Look at removing sawtooth edges
- Should explore both one way and low way versions
- Requires East Campus Road to move
- Considered to be very promising

4C
- Major concern is cost

Approach for the Public Open House Display on November 26, 2008
M. Farevaag reviewed the draft boards for the public open house and asked for comments on the approach and proposed contents:
- Include a schedule of what happens next and when the next open house will be held.
- Do not focus on the underground options but combine them with the above ground in the vicinity of the transit hub.
- Two sets of options: on street within UniverCity and at existing transit hub site
- Provide a larger version of the aerial plan and use more recent version from September 2008

Summary – Options for Further Work:
1Av2
1Bv2
1Bv3
1Cv2
2Av2
2Cv2
2Cv3
3Av2
3Cv2
3D
4C
4Dv2
Burnaby Mountain Transit Hub Urban Design and Transit Planning Study

Public Open House Notes

Clients
- SFU Community Trust (UniverCity)
- Simon Fraser University (SFU)
- South Coast British Columbia Transportation Authority (TransLink)

Project Team
- Hughes Condon Marler Architects and Endall Elliot Associates – architecture and urban design
- Phillips Farevaag Smallenberg – planning and landscape architecture
- Bunt & Associates and Kittelson & Associates – transit and transportation planning

Steering Committee
- UniverCity
- SFU
- TransLink
- City of Burnaby

Purpose of the Study
- Transit services and levels of use have been growing on Burnaby Mountain and the current transit hub is no longer adequate to keep up with demand.
- Intention to redevelop the SFU Town Centre as an exceptional urban environment and to incorporate an attractive, safe, and functional transit hub

Urban Design and Land Use
- Project team has reviewed current conditions on campus and approved plans for future development
- The transit hub is located at the interface between SFU and at the end of High Street within UniverCity – making its site a focal point and a potential front door to both campus and community
- The transit hub occupies the high point of the ridge along the main spine of the campus
- The transit hub is well located near both future academic buildings and future residential and commercial buildings that will generate increasing activity as development progresses
- Opportunity to enhance the main spine and the important parallel routes to the north and south

Transit and Transportation
- Existing Transit Hub is undersized and unable to accommodate greater volume
- Main problems include inadequate space for passengers to queue on the loading platforms, unsafe pedestrian movement across the path of arriving/departing buses, and too few spaces for bus layover
- Presently more than 22,000 daily transit trips to and from Burnaby Mountain
- Daily transit ridership is predicted to increase by over 30%
- Future bus routes expected to continue using the same roads as they do with some one-way streets converted to two-way flow.

Options
The options that are preferred can be understood as falling into one of two overall approaches:

1. **Street Oriented within UniverCity**
   - Options where passengers unload and load from buses along the streets of UniverCity.
   - Buses would go to a facility inside a building for layover between unloading and loading. Two possible locations for bus layover within a building are under consideration.

2. **Dedicated Site on the Current Transit Hub**
   - Options where passengers unload and load generally at a dedicated facility either at or below grade.
   - Below grade options are challenging due to high cost and the complexity of phasing of their construction.
   - Options would be planned to minimize conflicts between buses and pedestrians.
   - The underground options would allow passengers to arrive and leave from loading areas by stairs and elevators.

Next Steps in the Planning Process
1. Review the results of this open house
2. Report the results to the steering committee and refine the evaluation criteria and the preferences among options.
3. Undertake more design exploration and prepare cost estimates for the preferred options.
4. Meet with the steering committee to review updated options and decide on the options and other information to be presented at the next open house.
6. Review the results of the second open house and prepare recommendations and the draft report.
Welcome and Introduction

The SFU Community Trust (UniverCity), Simon Fraser University (SFU), and the South Coast British Columbia Transportation Authority (TransLink) and their Consultant Team welcome you to this Public Open House on progress towards a Plan for redevelopment of the Burnaby Mountain Transit Hub. Transit services and levels of use have been growing on Burnaby Mountain and the current Transit Hub has reached capacity. It is the intention to redevelop the SFU Town Centre as an exceptional urban environment and to incorporate an attractive, safe, and functional Transit Hub to meet current and long-term capacity needs for the Burnaby Mountain community. Consultation with the public is essential to achieving this Plan.

Please take and complete a Comment Form to provide your input into the planning process.

Purpose of the Open House

The display at this Open House is intended to:

- Provide background information, inventory and assessment information as the basis for planning decisions – for public information and review
- Present a Draft Vision Statement and Planning Criteria that will inform the evaluation of options and ask for comments on them
- Ask interested members of the public to provide their opinions and ideas based on the range of options and work to date.

Thank you for your participation.

Scope of the Study

The scope of the Burnaby Mountain Transit Hub Urban Design and Transit Planning Study was established by the SFU Community Trust (UniverCity), together with Simon Fraser University (SFU) and the South Coast British Columbia Transportation Authority (TransLink), in their Request for Proposals to engage a consultant team. The intention is to design a new Transit Hub and develop a long-term urban design plan for the central town square area at Simon Fraser University’s Burnaby campus.

This plan will provide the framework for the development of an integrated Transit Hub with an engaging and attractive urban character that balances the needs of all users. With the success of U-Pass and other Transportation Demand Management (TDM) measures, transit use has increased significantly since 2002. Looking forward, transit demand is expected to rise further with associated ongoing development of UniverCity, continued growth in academic enrollment, ongoing implementation of TDM strategies, and improved transit capacity. As a result, investment is required to support transit needs, to accommodate bus arrivals and departures, and to improve the transit experience and urban form of the area currently occupied by the transit loop. Requirements for end of route facilities including bus layover, on or off site, will also be considered.

Accessible transit, incorporated as a highly visible activity in an animated public space at the core of the community, will support the community’s commitment to sustainable planning and encourage all commuters to choose transit as the preferred mode of travel. The solution for the transit hub will respect the inherent character of the university campus and the urban context of its locale.

Project Team

The consultant team includes expertise in architecture and urban design – Hughes Condon Marler, Architects and Endall Elliot Associates, in planning and landscape architecture – Phillips Farevaag Smallenberg, and in transit and transportation planning – Bunt & Associates and Kittelson & Associates. The consultants are working closely with a Steering Committee with representation from UniverCity, SFU, TransLink, and the City of Burnaby.
Urban Design and Land Use Assessment

The project team has reviewed current conditions on campus and approved plans for future development in order to understand the urban design and land use intentions as the context for redevelopment of the Transit Hub.

The current Transit Hub is located at the interface between SFU and at the end of High Street within UniverCity - making its site a focal point and a potential front door to both campus and community.

The Transit Hub also occupies the high point of the ridge along the main spine of the campus.

The transit hub area is crossed by the main campus spine – the primary pedestrian route of campus leading to the High Street of UniverCity. Redevelopment is an opportunity to animate and enrich the pedestrian realm. The site should also be designed to enhance the important parallel routes to the North and South.

The transit hub is well located near both future academic buildings and future residential and commercial buildings that will generate increasing activity as development progresses.
Public transit has become the number one mode of travel for trips to/from SFU and this pattern is expected to continue to increase in the future.

Existing transit patterns at SFU differ considerably through the day. These patterns will change in the future as UniverCity develops, with increasing outbound commuter trips in the morning and inbound trips in the afternoon period.

The primary points of activity for transit passengers are the Transportation Centre and the Transit Exchange.

Transit and Transportation Assessment

Increasing transit passenger volumes require more buses and the existing Transit Hub is unable to accommodate greater volume. The main problems include inadequate space for passengers to queue on the loading platforms, unsafe pedestrian movement across the path of arriving/departing buses, and too few spaces for bus layover.

Undersized
- 2 unloading bays and 3 layover spaces are not sufficient to efficiently service existing bus volumes
- Tight geometrics - difficult for buses maneuvering between loading islands and layover spaces
- Passenger crowding on loading island platforms and sidewalk space approaching the Transit Hub

Inefficient Operation
- Buses moving from unloading bays to layover spaces must first circulate through loading islands

Pedestrian / Bus Interaction
- Little control over pedestrian routes within the Transit Hub - safety issues and conflict with bus movements

Insufficient layover area
- Insufficient layover area
- Traffic mode conflict

Burnaby Mountain Transit Hub
Urban Design and Planning Study

Burnaby Mountain Transit Hub
Urban Design and Planning Study
Future bus routes on Burnaby Mountain are expected to continue using the same roads as they do today, though some changes may occur if some one-way streets are converted to two-way flow.

Future transit route options

A number of aspects of transit hub and public place planning and design have been identified to create a set of criteria with which projects and proposed options can be evaluated.

**Vision Statement**

The SFU Town Centre will be an exceptional urban environment and will incorporate an attractive, safe, and functional transit hub to meet current and long-term capacity needs for the Burnaby Mountain community.

The Steering Committee and the Consultant Team have prepared, in draft, both a Vision Statement and a set of Evaluation Criteria for use in assessing the options under consideration from the standpoints of different stakeholders including students, staff and faculty, residents of the Burnaby Mountain community, and Translink and the bus operators.

Please review the draft Vision and Criteria and make your suggestions about them on the Comment Form.

**Planning and Design Criteria**

A number of aspects of transit hub and public place planning and design have been identified to create a set of criteria with which projects and proposed options can be evaluated.

**Human Comfort**
- Well-being in terms of key destinations
- Availability and extend of payment/transfer
- Accessibility and effectiveness of urban services
- Visibility and legibility of wayfinding / orientation
- Comfort and aesthetics of the waiting experience
- Accessibility and quality of public information
- Legibility of architectural system
- Accessibility and quality of food services
- Accessibility and quality of washrooms
- Comfort and aesthetics of waiting experience, accessibility and design

**Operational Functionality**
- Integration with traffic circulation
- Integration into parking and layover spaces
- Efficiency of bus movements in terms of time and distance
- Ability to minimize or overcome lack of access
- Accessibility of different routes
- Accessibility of different modes
- Ability to provide efficient and effective support of transit operations
- Effective integration of modes
- Coordination among various pedestrian and cycling environments
- Preservation and opening of pedestrian environments
- Integration with different pedestrian conditions
- Flexibility and robustness in response to changing and intensified functional and aesthetic requirements
- Flexibility in response to changing and intensified functional and aesthetic requirements
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**Cost Implications**
- Cost of land lease required
- Impact on development potential of site and surrounding properties
- Cost implications for service design, implementation, and maintenance
- Cost implications for service design, implementation, and maintenance
- Cost implications for service design, implementation, and maintenance

**Flexibility and Robustness**
- Adaptability to expansion and contraction of service levels
- Adaptability to increase of technology
- Adaptability to change of weather conditions
- Adaptability to change of weather conditions
- Adaptability to change of weather conditions

**Urban Design Fit**
- Integration into urban design of buildings, streets, and spaces
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The study is beginning to consider a range of options for the structure, function, and urban design of the new transit hub for the Burnaby Mountain community. A number of concepts have been sketched in an effort to look at all potential solutions. The evaluation criteria are being used to look at the advantages and disadvantages of each scheme.

The options that are preferred can be understood as falling into one of two overall approaches:

1. Street Oriented within UniverCity
   Options where passengers unload and load from buses along the streets of UniverCity.

2. Dedicated Site on the Current Transit Hub
   Options where passengers unload and load generally at a dedicated facility either at or below grade. Below grade options are challenging due to high cost and the complexity of phasing of their construction.

**1. Street Oriented Options**

The diagram shows places where buses might unload and load – not all places are used in each of the various options under consideration. Two possible locations for bus layover within a building are under consideration.

- **All of the Street Oriented Options are located on the streets of UniverCity where the activity of people getting on or off of buses would add to the activity and commercial success of the High Street.
- **Some options would use only East Campus Road and High Street for loading and unloading while other options consider some bus loading on the local street to the north of High Street.
- **In all cases, buses would go or be facilitated inside a building to separate them from pedestrians. This means that buses and not passengers will stop and wait on the street for as long as is needed for passengers to get on or off.

**2. Dedicated Site Options**

The area of the existing transit hub is being considered for redevelopment to handle the projected increase in the number of buses on Burnaby Mountain. It could be either at grade or underground. If underground, bus layover could be integrated with loading and unloading functions. If above ground, bus layover would be contained within a building as in the Street Oriented Options.

- **All options are intended to reinforce the pedestrian movement routes along the main spine of campus and through the corridor within Blusson Hall.
- **Some locations are chosen to leverage the existing ride from the residents of UniverCity.
- **Options would be chosen to minimize conflicts between buses and pedestrians. The underground options would allow passengers to enter and leave from loading areas by stairs and elevators.
- **Bus layover functions would be separated from pedestrian areas.

**Consideration of Options**

The area of the existing transit hub is being considered for redevelopment to handle the projected increase in the number of buses on Burnaby Mountain. It could be either at grade or underground. If underground, bus layover would be contained within a building as in the Street Oriented Options.

- **All options are intended to reinforce the pedestrian movement routes along the main spine of campus and through the corridor within Blusson Hall.
- **Some locations are chosen to leverage the existing ride from the residents of UniverCity.
- **Options would be chosen to minimize conflicts between buses and pedestrians. The underground options would allow passengers to enter and leave from loading areas by stairs and elevators.
- **Bus layover functions would be separated from pedestrian areas.
- **Weather protection would be provided by a structure that is integral to the design of the facility. It could be either part of a building or a roof specific to the bus facility.
- **Platforms and shelters would be strategically located to accommodate large numbers of both bus users and pedestrians.
- **Weather protection would be provided by a structure that is integral to the design of the facility. It could be either part of a building or a roof specific to the bus facility.
- **Security of the at-grade options would benefit from being overlooked from Blusson Hall and key campus pedestrian routes. An underground option would be designed to have its loading areas visible from above as well as use security design features.
Next Steps in the Planning Process

This is the first open house for the Burnaby Mountain Transit Hub Urban Design and Transit Planning Study. The next steps are:

1. Review the results of this open house from the collected comment forms and the questions and conversations that attendees had with members of the consultant team and staff of SFU, UniverCity, and TransLink during the open house.
2. Report the results to the steering committee and refine the evaluation criteria and the preferences among options.
3. Undertake more design exploration and prepare cost estimates for the preferred options.
4. Meet with the steering committee to review updated options and decide on the options and other information to be presented at the next open house.
6. Review the results of the second open house and prepare recommendations and the draft report.

Please complete a Comment Form before you leave. Thank you.
A.4.2 PUBLIC OPEN HOUSE 1 COMMENT FORMS

Public Open House
Burnaby Mountain Transit Hub Urban Design and Planning Study
November 26, 2008 in Blusson Hall, 9:00 to 4:00 and 6:30 to 8:30

Comment Form
Welcome and thank you for joining us.
Please complete this questionnaire and leave it in the box at the entrance as you leave. If you prefer, you may return this form by mail, fax, or email to the addresses at the bottom of the last page.

Scope and Assessment
Do you have any additions or corrections to the information presented about the scope of the study and the assessment of urban design, land use, transit, and transportation issues?

Draft Vision and Evaluation Criteria
Do you generally agree with the Draft Vision and Evaluation Criteria on the panel with that title that have been drafted to inform the planning process? Yes ☐ No ☐
Which of the criteria are priorities for you? Please indicate priority order from 1 (Highest) to 5 (Lowest):

- Human Comfort
- Operational Functionality
- Cost Implementation
- Flexibility and Robustness
- Urban Design Fit

Consideration of Options
Two panels address the range of options under study. We would appreciate your input on your preferences and comments on the two locations and types of facilities under consideration:

1. Street Oriented within UniverCity
   Options where passengers unload and load from buses along the streets of UniverCity.
   Please comment:

Do you have any comments or suggested changes or additions to the Vision and Criteria?
Please comment:

Page 1 of 4
2. Dedicated Site on the Current Transit Hub

Options where passengers unload and load generally at a dedicated facility either at or below grade. Below grade options are challenging due to high cost and the complexity of phasing of their construction.

Please comment:

Do you have a preference for one of these two approaches?

Street Oriented □ Dedicated Site □

Please give the reasons for your preference:

Do you live on Burnaby Mountain? Yes □ No □

Do you work on Burnaby Mountain? Yes □ No □

Are you a student, faculty, or staff of SFU? Yes □ No □

Do you use transit to get on and off Burnaby Mountain? Yes □ No □

- Daily □ Weekly □ Monthly □ More than 4 times a year □

What would encourage you to use transit more frequently?

Please comment:

Thank you for taking the time to complete this questionnaire.

If you choose to take your Comment Form with you, please send it, when completed, to:

Colleen Sondernann
Community Relations Coordinator | Public Consultation
TransLink (South Coast British Columbia Transportation Authority)
1600 - 4720 Kingsway | Burnaby, BC | V5H 4N2 | Canada
Telephone: 604-453-6687 Fax: 604-453-6632

You can also send comments via this web address:

http://www.translink.bc.ca/Plans/Public_Consultation/BurnabyMtn_Transit_Hub_temp.asp
A.4.3 PUBLIC OPEN HOUSE 1 COMMENT RESPONSE

Burnaby Mountain Transit Hub Urban Design and Planning Study
Public Open House Comment Form

Scope and Assessment

Do you have any additions or corrections to the information presented about the scope of the study and the assessment of urban design, land use, transit, and transportation issues?

- Need to make sure that the south side area has ready access to transit too.
- I believe it is very accurate but may be limited to the ability to improve it's infrastructure in the future beyond the proposed future demands. What happens in 30, 40 years? Not answering this? In the 60's left us with the challenges that we face today.
- With the current economic trends in mind, expect dramatically more transit usage than planned in the future requirement scenario.
- Make plans more known to the rest of public as it affects everybody, not just current SFU transitters.
- Voted to see an identified need for expansion of the current transit exchanges. Pedestrian safety and passenger overcrowding on waiting platforms is a particular issue to me, and I'm glad to see that these problems were addressed in the study.
- I like how the designs keep transit at the core of the development. Push the cars out, take over Strand Hall parking if needed!
- Service to Discovery Park Multi-tenant area (Xantrex & FIC) needs improvement. Currently, staff and students have to walk from the hub down steep inclines/stairs to reach the park. This is not safe during the winter months. In addition, there are the occasional encounters with black bears and coyotes!
- Additional consideration of cyclists is necessary. Burnaby Mountain is a popular recreational area for mountain biking and many students, faculty and residents would benefit from improved cycle facilities. Specifically secured bike storage should be considered with this new transit hub.
- Wonder about route as opportunity for SFU destination, tourism = more traffic in the summer. Effect pedestrian-transit grid.
- One of the key reasons why the transportation loop at UniverCity is used far more than the one crossing the immediate vicinity of the Transportation Centre. 60% of riders disembark at this stop as well, future plans for an on-campus parking lot may have a significant impact on how many people get off at the Transportation Centre.
- I believe that the current vision for the direction of handling buses is on the correct track but the long-term concern for transportation to Burnaby Mountain is the connectivity and efficiency. The connections up and down the mountain are not adequate. Moreover, the buses are not weather-proof (subject to road conditions) and the frequency are not focused on demand times. It may be wise to explore the possibility of a gondola system linking Production Way University SkyTrain Station with SFU. But generally, the transit hub vision for buses is on the right track.

Draft Vision and Evaluation Criteria

1) Do you generally agree with the Draft Vision and Evaluation Criteria on the panel with that title that have been drafted to inform the planning process?

Yes: 16
No: 0

2) Which of the criteria are priorities for you? Please indicate priority from 1 (highest) to 5 (lowest):

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3) Do you have any comments or suggested changes or additions to the Vision and Criteria? Please comment:

- On-campus commuting NEEDS to be more seriously considered. I think increasing infrastructure for on-campus cycling is a realistic solution that has worked great at UBC. It also is better for the environment than having a local (many local) commuter buses doing a cross-campus milk run.
- If a structure is to be built over the loop (dedicated option) it should have an open component, like an atrium, over the main passenger staging area, for passenger safety. See comment form A - drawing In terms of transport mode: consideration of articulated trolleys (scalable to light rail over time)?
- New bus route connecting Lougheed Town Centre to SFU - 145 should be non-stop from Production Station to SFU - Bus loop expansion should allow for more bus routes - Sub-ground (like UBC)
- If UBC gets an underground loop, so should SFU!
- Get a spur of the Evergreen Line up to campus!
- See comments on cyclist considerations.
- My only suggestion is that no matter which approach route is chosen, the route should incorporate a stop in the immediate vicinity of the Transportation Centre. 60% of riders disembark at this stop as well, future plans for an SFU Student Union Building place the building the MBC and AQ buildings (which might promote even more people to get off at the Transportation Centre).
- "FRONT DOOR" as a vision to inform robust travel hub and community centre. I wonder if a design concept could be more evocative to give life to the nature of the community – to inform a beautiful urban design.
- Specific food services at transportation areas is unnecessary I feel. As the bus departure times continue to be frequent, and transit riders know when they plan to depart, the facilities available within the main SFU buildings suffice. Although there is no doubt that it is a convenience and thus an attraction, any such facilities specific to transit areas appear to be costly.
- The current vision lacks on the quality of service aspect. The focus is on the waiting aspect and not on the overall transit experience for passengers. The scope of the consultation should be enlarged.
- If UBC gets an underground loop, so should SFU!
  - Furthermore, an underground loop will allow for a traditional town square to be developed, surrounded by both academic and commercial uses.
  - We need a Tim Hortons up here…
- In all this, the STUDENT residences are ignored. A service needs to be considered which runs from Residence to the Transportation Centre. A community shuttle could link student residence, the centre hub, and the outer parts of UniverCity.
- Would like to know more (design-wise) how cycling circulation will be incorporated.
- I don’t really have an opinion. The High Street one is least attractive. Maybe the underground one is best, especially because it could make the cornerstone square quieter and more human people centred.
- Focus on central development. Work to bring students and users of transit to one location.

Consideration of Options:
Two panels address the range of options under study. We would appreciate your input on your preferences and comments on the two locations and types of facilities under consideration:

1) Street Oriented within UniverCity: Options where passengers unload and load from buses along the streets of UniverCity. Please comment:
- I like the idea but think that security may be an issue. Stops are so spread out that safety in numbers does not apply.
- I believe this is more functional as buses can operate over a large area. This would result in a larger number of campus businesses and services being more successful and give a more even exposure to students. Students aren’t flooding the McDonald’s right beside the central bus hub. This will also increase the community feel of SFU as you will have more community ride with the same people. This may create an improved sense of safety. This also may reduce congestion in central areas like the line up to the AQ for the 145. That line could be moved to a lower pedestrian traffic area like by the science buildings or behind RBH.
- This option is favourable if car traffic can be entirely removed from University High St., west of Tower Rd. and E. of Campus Rd. in front of the current bus loop. Of the two possible layover spaces, the eastern option is preferable in the interest of preserving some of the trees in the High St. precinct.
- Safety issues must be immediately addressed as I have had several close calls in which I have almost been struck by busses that are circulating through the bus loop. It is hard to see around busses
- Not a good option in my opinion. This would locate stops further from academic buildings and as well likely cause more confusion and queue jumping. Furthermore, shelters at these street-loading zones were not addressed.
- I worry about the congestion that this arrangement would cause, both on the street and on the sidewalks. Buses pulling in/out of stops, cars pulling in/out of parking spaces, cars double-parking, pedestrians walking on the sidewalks and crossing the street (both at crosswalks and jaywalking), all of this seems too crowded and even dangerous). Either dedicated site option is preferable to this one.
- Not in favour of this option – the street needs to be pedestrian/use friendly and adding congestion, traffic, and idling buses would be counter to this aim. Would not support any on-street option within UniverCity.
- Dangerous! Masses of students will be crossing in front of buses. Operations will be slowed, buses delayed. Puts the exchange farther from campus, not as integrated.
- I am concerned that this option will be awkward and crowded for both pedestrians and transit users. It could put the massive volume of transit users directly in conflict with the primary ‘spine’ pedestrian route through campus. Also, the noise and emissions from buses could discourage street activity. Is there enough space? How about further expansion?
- Cost effective BUT making a bus trip less easy. Imagine, would travelers be less likely to use the bus? Good for flexibility and cost efficiency. Where is the ‘WOW’?
- My only concern is space. The platform at Production Way sometimes cannot hold all transit users. I like the idea that it would improve the actual use of the area – as SFU facilities expand away from the convocation mall, the ‘outsskirts’ become very quiet and alien. Increasing human traffic outdoors would make outdoors in general seem more move friendly. I would feel uncomfortable to some degree, as a resident, the foundation of my home was being used as a bus shelter. I understand it is within the hill there, but the fact remains that there is something going on. I would like to see proposed buildings or more graphical representation of below-grade sites.
- The concern with this option would be the desirability to use the facility during the winter months. Students prefer a weather-proof connection to the academic buildings. But this option (street-oriented) assists to generate select activity on University High Street. But for comfort reasons, this option would not be personally preferred.
- Sufficient cover from the elements must be provided.
- Perhaps a single unloading bay, with multiple separate loading areas.
- Seems as though it would needlessly snarl vehicle traffic, forces people to walk farther to board a bus and could lead to long, overlapping lines on sidewalks.
2) Dedicated Site on the Current Transit Hub: Options where passengers unload and load generally at a dedicated facility either at or below grade. Below grade options are challenging due to high cost and the complexity of phasing of their construction. Please comment.

- Would prefer at-grade option. Again security may be an issue with at grade option
- A sub-grade option is not preferable to a dedicated surface option.
- Perhaps worth the cost. Sub-grade bus activity eliminates traffic that are not just crossing through, like now. If one wants to go from Blusson Hall to the Cornerstone Building they must either pass thru or go around the loop, either way interfering with bus traffic or passengers waiting at the bays
- Weather factor, below grade structure would provide protection during rain, snow, etc. but also make it easier for bus arrivers to see pedestrians

- Better than street-oriented proposal. Provides a common area where students can get to their bus easily. By having a designated transit location, queues can be better managed. A covered area could also more easily be implemented in a transit hub location.
- Would be better to put passenger zone and bus storage area on the same side of East Campus Rd. Otherwise buses will be constantly blocking the road when passing between the two areas. So, the grade-separated option would be best (and most expensive, of course). Any possibility of putting the passenger zone on the east of the road (same side as bus storage area)?
- Most favoured – at grade, but with better weather protection on existing site.
- I like the below grade, it provides a larger waiting area out of the elements. Both rain and generally an enclosed space should be warmer in the winter
- A dedicated transit hub could be expanded into the adjacent parking lot at grade. This could be done tastefully with human comfort and aesthetic appeal in mind. This transit hub should additionally include secure bike storage. The below grade option is probably too costly and provides an unpleasant user experience – likely to only save one small parking lot.
- As long as a weather protection structure exists, I don’t think it matters whether it’s at below grade. It’s possible a below grade structure would be limiting on a long-term basis as it may struggle to accommodate future community growth and transit demand.
- I would like to see this brave option considered seriously. Opportunity: design, safe access for riders. Above-ground opportunity for other functions – increased area of use = increased value.

- I would like to see proposed buildings or more graphical representations of below grade sites.
- The dedicated site option should be able to provide shelter from bad weather conditions and encourage more riders. Also, a dedicated complex would allow for increased connectivity with nearby academic buildings in a weather-free form.
- Build it underground, but route traffic through university. This way it can all be constructed at once. If the underground option provides direct sheltered links to academic buildings, it would be fantastic.
- A dedicated at-grade site seems to be the best option. Build us something like UBC’s War Memorial Loop but covered and with retail. Below grade is likely too costly and somewhat less secure.
- At-grade needs to have extensive protection from weather but below grade you get problems with fumes building up (which gives me headaches). I like the at-grade dedicated option best.
- Below grade sounds like a major disruption in terms of construction and time.
- Smooth flow of traffic, buses and pedestrians and safety should be main concern – get the extra money for extra costs from other measures i.e. increase the u-pass price, other gov/VSFU planning/building funds.
- Below grade option is not for SFU. The bus rotation is ok. Below grade is too costly for SFU. We must save our money for more important matters (i.e. research, etc.). The below grade option is too sophisticated and costly. Keep it simple and above ground eh?

Do you have a preference for one of these two approaches?

1) Street Oriented: 3
2) Dedicated Site: 15
3) Other: Comment – "whichever is safer and more efficient".

Please give the reasons for your preference:

- For security reasons
- Easier to find bus bay needed
- A street-oriented option would be the easiest to establish, would more actively discourage car usage in the High St. precinct, probably cost least of the options, and generate (once finished) more business for area businesses
- Easier to make connections
- Central location, not scattered as would be in street oriented approach
- Safety – more bodies in same area, security could keep an eye on a site rather than rotating around through the several sites in the street oriented approach
- Less congestion on the street.
- Reduces sprawl into living spaces and concentrates services.
- Shows commitment to transit, that mode shift is a priority. You have less impact of traffic on bus operations.
More buses, less crowding at bays at SFU, more routes (proposed 95-B line along Hastings St., new bus route connecting Lougheed Centre to SFU), reduction in cost of U-Pass so that it is at par with that of other U-pass using institutions.

- Designated line-up areas.
- Nothing, it’s already my primary mode of transportation
- Bus stops outside Discovery Park
- Improved cyclist end of trip facilities. Specifically secure bike storage.
- A better connection going to SFU at the junction of Como and Clarke (last stop for 143). This junction suffers from poor connections and frequent pass-ups during peak periods.
- Bus route B-Line. My partner avoids bus due to poor experience at travel through Hastings.
- Nothing. It’s the only way for me to get around.
- I already take more than 20 separate trips by transit a week. Free Donuts?
- B-Line like service on the 135 through Burnaby or run a 195 in rush hour which is non-stop between SFU and Kootenay Loop
- Community Shuttle
- N45 SFU – New West Station. Night service connecting the N35, N9, and N19 lines
- I love the community pass. I wish the Coquitlam bus ran on weekends, though. Some buses stop running at 11PM when my classes end at 10:20 – my students can’t get home!
- If bike racks accommodated more than two bikes.
- A bus within 1KM of my home in Langley and SkyTrain/Lightrail to Langley City or Walnut Grove park & ride.
- Transit is good at SFU. I use it very frequently.

**Please tell us about yourself and your use of transit on Burnaby Mountain:**

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<th>Question</th>
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What would encourage you to use transit more frequently? Please comment:

- Nothing in your control. Thought it would be nice if the 135 started a little further west.
- Increase in bus frequency
- More buses (artics)? Lower, standardized fares

**Additional Comment Form information:**

1) Total number of comment forms received: 22

2) Additional comments

- Thanks for your time - I am interested in getting involved. My contact information is:
  - Justin Long
  - University RPO 101490
  - #88602 - Burnaby
  - Phone: 775-722-4565
3) Registration/Sign-in

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<th>Name</th>
<th>Email Address</th>
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<td>Andrew Natale</td>
<td><a href="mailto:anatale@shaw.ca">anatale@shaw.ca</a></td>
<td>UniverCity Resident</td>
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<tr>
<td>Mathew Schwarz</td>
<td><a href="mailto:mcs15@sfu.ca">mcs15@sfu.ca</a></td>
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<td>Steve Chan</td>
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<td><a href="mailto:livienvanei@yahoo.ca">livienvanei@yahoo.ca</a></td>
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<td>Michelle Nieken</td>
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Burnaby Mountain Transit Hub – Email Comments

From: KC Bell [mailto:kbell@sfu.ca]
Sent: Thu 11/27/2008 8:53 AM
To: Sondermann, Colleen
Subject: Burnaby Mtn transit centre

I am responding here to the Bby Mtn bus loop survey.

I prefer conversion of the current bus loop to a drop-off/storage area, which will keep building of additional concrete and asphalt to a minimum and greatly reduce costs of construction and maintenance. Students will continue to enter the University via the primary "main street" and Busson Hall corridors. Excellent security, good in bad weather, which is common.

Pickup locations should be along a widened sidewalk fronting the Cornerstone/Hub buildings. This location also offers excellent security and will generate significant additional business in adjacent businesses, leading to a more sustainable community and business environment.

I work on Burnaby Mtn, live on the Coquitlam/Burnaby/New West border and use transit only when commuting to other SFU campuses during work hours or when traveling downtown during off hours. I haven’t driven downtown since the introduction of the Millennium Line and am impatiently awaiting the construction of the Evergreen Line.

Two conditions would increase my use of transit: the improvement in service to Burnaby Mtn that would allow the introduction of an employee pass program, and the improvement of transit services near my own neighbourhood. As things are now, using transit would exchange a 10 minute drive with a long walk, followed by a bus, the Skytrain and another bus, taking a minimum of 50 minutes.

Thanks for the opportunity to comment.

KC Bell (Co-Chair, SFU Sustainability Advisory Committee)
272 Dunlop Street
Coquitlam, BC V3K 3X1
Welcome and Introduction

The SFU Community Trust (UniverCity), Simon Fraser University (SFU), and the South Coast British Columbia Transportation Authority (TransLink) and their Consultant Team welcome you to this Public Open House to show you our progress towards the redevelopment of the Burnaby Mountain Transit Hub.

Please take and complete a Comment Form to provide your input into this planning process.

Purpose of the Open House

The display at this Open House is intended to:

- Provide an overview of the steps taken to date during the Study
- Present the Vision Statement and Planning Criteria that have been endorsed during the Study
- Review the process of developing and evaluating options
- Present the preferred option with details of its functional and urban design features
- Ask interested members of the public to provide their comments on the work to date and, especially, the preferred option.

Thank you for your participation.

Overview of the Study to Date

Scope of the Study

The intents of the study are to:

- Provide an expanded and functional transit hub to address transit needs and take the opportunity to simultaneously develop a long-term urban design plan for the central town square area and High Street of UniverCity.
- Create a new ‘front door’ for Simon Fraser University.
- Provide the framework for the development of an integrated transit hub with an engaging and attractive urban character that balances the needs of all users.
- Incorporate end of route transit facilities including bus layover into the conceptual plan.
- Support the community’s commitment to sustainable planning and encourage commuters to choose transit as the preferred mode of travel.

Project Timeline

Inventory and Assessment

Global Best Practices Review

Development of Options

Option Review and Refinement

Selection of Preferred Option

Project Team

The consultant team includes expertise in:

- architecture and urban design – Hughes Condon Marler: Architects and Endall Elliott Associates
- planning and landscape architecture – Phillips Farevaag Smallenberg
- transit and transportation planning – Bunt & Associates and Kittelson & Associates
- cost – BTY Group

The consultants are working closely with a Steering Committee and a Technical Committee with representation from:

- UniverCity
- SFU (Simon Fraser University)
- TransLink
- City of Burnaby
- South Coast British Columbia Transportation Authority (including Coast Mountain Bus Company (CMBC))
Vision and Evaluation Criteria

The Vision and Evaluation Criteria were presented in draft at the first Public Open House. All 18 Comment Form responses were unanimous in supporting them.

Vision Statement

The SFU Town Centre will be an exceptional urban environment and will incorporate an attractive, safe, and functional transit hub to meet current and long-term capacity needs for the Burnaby Mountain community.

Planning and Design Criteria

A number of aspects of transit hub and public plaza planning and design have been identified to create a set of criteria with which projects and proposed options have been evaluated.

Human Comfort
- Walking distances to key destinations
- Availability and extent of weather protection
- Availability and effectiveness of personal use access and egress
- Visibility and legibility of wayfinding
- Comfort and aesthetics of the waiting experience

Operational Functionality
- Integration with public transit circulation
- Adequate loading/unloading and barrier spaces
- Efficiency of bus movements in terms of time and distance
- Flexibility in response to changing and intensified user needs
- Adequacy in terms of technology

Flexibility and Robustness
- Potential for and independence of phasing
- Flexibility in response to changes in bus loadings
- Adaptability to changes of technology

Cost Implications
- Cost of land base required
- Impact on development potential of site and surrounding land
- Impact on transit operations
- Cost implications for land use
- Implications for environmental and social sustainability

Urban Design Fit
- Integration with public transit circulation
- Adequate loading/unloading and barrier spaces
- Efficiency of bus movements in terms of time and distance
- Flexibility in response to changing and intensified user needs
- Adaptability to changes of technology

Urban Design and Planning Study

Burnaby Mountain Transit Hub
Urban Design and Planning Study

Range of Options

Consideration of Options

A number of preliminary options were prepared for consideration that represented all the potential configurations based on:

- Considering locations for bus loading and unloading in the vicinity of the existing Transit Hub for the convenience of users and to minimize walking distances to key destinations
- Considering locations for the bus layover facility in close proximity to loading and unloading stops to minimize time and distance of bus travel
- Looking at opportunities at grade, below grade and hybrids of above and below grade
- Assessing the impacts of options on the development potential of the sites affected
- Applying the evaluation criteria as presented on the previous open house panel.
- Including the typologies of bus facilities that were studied in the Global Best Practice Review.

The following are sample diagrams of some of the options considered under three categories:

Client and Public Review

The range of options was narrowed down and refined in design through:

- Reviews with the three clients: SFU, UniverCity, and TransLink and with staff of the City of Burnaby
- Input from community members who attended the first open house.

Burnaby Mountain Transit Hub
Urban Design and Planning Study
Increasing transit passenger volumes require more buses than the existing Transit Hub is able to accommodate. The main problems include inadequate space for passengers to queue on the loading platforms, unsafe pedestrian movement across the path of arriving/departing buses, and too few spaces for bus layover.

- **Undersized**: 2 unloading bays and 3 layover spaces are not sufficient to efficiently service existing bus volumes.
- **Tight geometrics**: difficult for buses maneuvering between loading islands and layover spaces.
- **Passenger crowding**: on loading island platforms and sidewalk space approaching the Transit Hub.

**Diagram of Existing Bus Operations**

**Diagram of Existing Bus Operations**

**The Preferred Option - Transit and Transportation Features**

Projected future traffic volumes (including buses and pedestrians) have been analyzed with a traffic simulation model to demonstrate the improvement over the existing operation.

**Existing**

- **Existing Condition**: Loading Berths: 4, Unloading Berths: 2, Layover Space: 3
- **Existing Requirement**: Loading Berths: 4, Unloading Berths: 2, Layover Space: 8

**Future**

- **Future Requirement**: Loading Berths: 6, Unloading Berths: 3, Layover Space: 12

Existing bus routes can be adjusted to maximize efficiency of bus circulation on Burnaby Mountain.
The Preferred Option - Overview

A preferred option has been selected by the committees representing SFU, UniverCity, and TransLink and the City of Burnaby. This option has been explored and refined to address improvements suggested during the review process including:

- Having buses unload on the west side of East Campus Road at a new plaza in order to remove the need to cross streets for people arriving at the university by bus.
- Designing the streetscape of East Campus Road as a bosque of trees to direct pedestrian crossings to two marked and signalized locations and to prevent jaywalking.
- Incorporating the bus layover facility within a building that can be developed by UniverCity with built edges that will enhance and animate the adjacent streets and fit with the urban design plans for the community and for High Street.
- Providing adequate and continuous weather protection for pedestrians and for people waiting for buses.
- Ensuring that the two main pedestrian routes along High Street connect directly into the movement system of the campus including the new internal corridor in Blusson Hall.

The Preferred Option – Urban Design Features

Key Features

The preferred option includes many urban design features as illustrated in these 3D models including:

- A new university plaza and future quadrangle where transit riders will arrive on campus.
- A colonnade along the north side of High Street to create a generous scale and weather protected pedestrian realm.
- Weather protection for bus stops with glass canopies.
- Removal of buses from the street during layover times so that buses do not stop any longer than needed to load and unload.
- Massing of new buildings to define and animate the public realm.
- A design concept for East Campus Road that uses rows of trees to create a strong sense of place and to structure pedestrian movement to enhance safety.
The Preferred Option – Urban Design Directions

Design Directions
The next step, already in progress, is the preparation of design directions as guidelines for SFU and UniverCity to integrate the new Transit Hub into the urban design fabric of the campus and community. Some of the urban design principles that are being addressed are illustrated in the following diagrams:

University Square
The Transit Hub is integrated into one edge of a new quadrangle for the University that will be edged by new and existing buildings and landscape. This becomes the front door to Simon Fraser University and a welcoming arrival place for transit users.

Vehicular Circulation
Cars and buses share East Campus Road and the High Street and add to the energy and activity of the commercial heart.

Pedestrian Circulation
Pedestrians are encouraged to move along the two major east-west spines of pedestrian crossings of East Campus Road will be located with pedestrian-activated signals. Movement through Town and Gown Square is also integrated into the movement pattern.

Zones
Three distinct zones are created: the quadrangle defined by built edges of important university buildings/parks; the East Campus Road streetscape structured by rows of trees and integrated with Town and Gown Square; and the new development on the undeveloped site on the east side of East Campus Road is envisioned as an active and public destination in its lower floors.

Edges
These edges are intended to be transparent and have many entry points. A new façade for the administration building is encouraged with more public uses. The new building on the undeveloped site on the east side of East Campus Road is envisioned as an active and public destination in the lower floors.

Landscape
Trees and other landscape elements will strengthen and support the edges of the new quadrangle and leave the central area open to be programmed and used for a wide variety of activities.

Next Steps

Approvals and Reporting
The next steps will include:

• Review of the results of this open house
• Completion of the urban design directions in support of the Transit Hub concept
• Presentations to the clients for approval of the conceptual preferred approach
• Draft and final reports of the Study.
• Phased implementation by UniverCity, SFU, and TransLink.

Please complete a Comment Form before you leave. Thank you.
Public Open House Comment Form, February 18, 2009

Please provide your comments on the preferred concept for the new Transit Hub to serve the Burnaby Mountain community:


Thank you for taking the time to complete this questionnaire.

If you choose to take your Comment Form with you, please send it, when completed, to:

Colleen Sondermann
Community Relations Coordinator | Public Consultation
TransLink (South Coast British Columbia Transportation Authority)
1600 - 4720 Kingsway | Burnaby, BC | V5H 4N2 | Canada
Telephone: 604-453-4687 Fax: 604-453-4632

You can also send comments via this web address:

http://www.translink.bc.ca/Plans/Public_Consultation/BurnabyMtn_Transit_Hub_temp.asp
A.4.7 PUBLIC OPEN HOUSE 2 COMMENT RESPONSE

Burnaby Mountain Transit Hub Urban Design and Planning Study
Public Open House Comment Form, February 18, 2009

Please provide your comments on the preferred concept for the new Transit Hub to serve the Burnaby Mountain community:

1) Looks great. Can’t wait to see the finished product.

2) Far superior to existing situation. Current bus loop not a pleasant area. Underground bus layover requires a building over it. Is that likely?

3) The preferred option looks good. Needs connection to SkyTrains

4) Like it in principle. Underground option should also be considered. How does the gondola integrate in the preferred option?

5) I like it. Please make sure the green space (where E-lot is now) remains as a green space.

6) From a purely selfish perspective, I would have preferred the underground warm and dry option. But I can appreciate that it’s not practical. I hope that the open green space doesn’t get lost due to cutbacks.

7) I think that it’s nice, with lots of green space. I wonder what kind of gas fumes problems exist with an underground facility for motorized vehicles. Will those problems be significant?

8) I don’t have confidence in the process. Data displayed in November shows most passengers preferring to use the transportation centre, but you continue to bring them here. The campus as a whole should be considered, not just the hub. I’m not convinced that any additional space is needed. The process seems to serve the pocketbook of the planners. It ought to be a total transportation plan for the campus.

9) I think the plans are great. I don’t think we need a ton of stops for now. I think just the transport centre and the exchange – lets skip the High St. and other stops along “Route C”. As SFU expands we can add them back in if we need. Also improve lanes in transport centre – cars are often in wrong lane and screw up loading and unloading.

10) Dedicated site option is the best presented. Crowding from the street design will be undesirable and conversely a dedicated site will also be best for visitors to the mountain.
11) Concerned about entry and exit to/from east campus road – currently always traffic congestion.

12) This looks like an excellent design. There is a lot of attention paid to shelter and dispersal of crowds. I like the crosswalk layouts also. It would be useful to include a diagram/map at the main pedestrian corner when this plan is implemented so we can locate the appropriate bus. It appears as if the trees included will block views of the buses.

13) No to parking buses at Cornerstone. Out of way – next to car-driving yuppie renters in yuppie slums. Best solution is a loop off Barnet instead and 7-minute turn arounds to there.

Buses now pass riders daily. 60% buses get off at Transport Centre as many work west of there. Cornerstone with its failing stores, poor rain design is a failure. Depts. were forced to go out there. Everyone avoids it.

14) Looks good. Makes sense. Would like to see thoughts as to how the gondola facilities would interfere with this. I suspect the building with the layover under it probably wouldn’t be suitable for residential apartments above. Concern regarding routing and provision for the transportation hub at what is known as the tunnel. If the new Student Union Building could be incorporated as the new building on the east side of the Quadrangle it would be ideal.

15) The concept is quite nice and interacts with the street quite well, creating an aesthetically pleasing urban environment. Is there any provision for a future gondola serving SFU to alleviate the snow/bus issue?

16) Looks great, seems well-thought out.

17) The bus lay-over is a good idea as it’s too congested where it is now. More buses would be good, too many crowded buses now.

18) I’m concerned that the preferred concept cannot easily be expanded further, should in the future, beyond the current projections, requirements expand further. Perhaps the inside space could be used for this or perhaps some underground facilities could be built on the same site. Perhaps these issues have been discussed but I would like the promotional materials to discuss how the place can be economically expanded in the future.

19) Design of the Hub looks good, presuming that space under the colonnade is wide enough to accommodate people waiting to load. There needs to be direct service from SFU to Phibbs Exchange. I strongly support the idea of having the 135 end there.

20) Great option – include of mixed users street orient. Needs more services to make more complete community – don’t need any more coffee shops!!

Hiding layover facility is great – more like a pleasant urban environment than an ugly bus loop facility. Good job!!

21) Excellent idea. Just please improve the road network. Snow jams are killing us!! Gracious!

22) After speaking with staff on hand at the open house I understand that the ___ of trees in the median may incorporate a “hidden” barrier to prevent jaywalkers. Knowing the student body, this needs to be an important consideration to prevent them from avoiding the crosswalks (i.e. gardens alone won’t be enough – they’ll just run through them and this will be unsafe and disruptive to traffic.

A gondola from the main drop off stop and Blusson Hall and maybe even to the south side of Town & Gown Square would be nice touches.

23) Build road divider to block crossing in front of moving buses by pedestrians and include additional controlled pedestrian crossings so buses of people take turns.

Re-plan current transportation stop under MBC/Library/Business (WMC) buildings so that already full buses don’t miss picking up passengers waiting to leave. Current wait time for most buses at 4:30PM rush is 3-5 buses or up to 40 minutes as buses often don’t run at 5-6 minute intervals due to traffic. This is a problem if people need to make connections at another transit hub (i.e. Surrey Central) to catch an express bus that only runs to 5:30PM. All transit traffic will likely increase from Surrey/Langley and beyond once toll bridge is put in – what about plans for transit connections then?

24) The plan looks great! Everyone was very helpful and informative. Hopefully it will proceed.

25) Preferred option looks good. Be sure to ad oil/water separators to catch spills from the buses.

26) Not sure how pedestrians will co-exist with bus traffic but is currently a problem anyway. Like the idea of plenty of shelter for waiting passengers.

27) I wholly endorse it. I hope that geothermal heat pump systems are installed before the excavation is built on. This pre-planning is better than having a future source for the final building above is added.

28) Looks great. Is the bus layover station underneath the proposed building? If yes, will this impact parking available in the new building? I thought the original plan was to build a parkade on this site?! Parking is desperately needed for UniverCity residents such as myself.

29) I’m curious about the green roofs that are present in the conceptual sketch. Are they planned? If so, awesome.
30) Regarding the transit route options, seeing as I work near S. Campus road, I would like to see buses continue using this road as part of their route. This would be option C (of A, B, & C). Many students and staff take the bus from the stops along this road and it would be a shame to lose it.

31) Like the park. My concern is that traffic gets congested if buses are stopping frequently on the street (much like West Broadway). Another concern is the congestion of fumes around the building and the safety underneath the building (gathering place for addicts, etc.)

32) Consider the effectiveness of removing service from TC in favour of walking/major (non-campus) road networks. Minimize on-hill layovers, fast turn out of SFU, layover at terminus of hill. Lowers expectation demand of buses in recovery. Consider ‘crossings’ of ___ to and from stops and set/load points. The more ___ traffic crossing drive lanes and bays, greater delay.

33) It’s farther from campus. The majority of transit users will be from SFU not UniverCity. The new loop should be on the existing administration parking lot beside the current loop. There will be conflicts from all the students crossing in front of buses to outbound buses.

34) Diagram of preferred option looks good – this maybe just a case of maximizing space, however ___ other layout can work. More importantly roads (potholes) should be fixed. I presume that buses are constantly damaged by the outrageously bad road system, cost estimates to fix this are probably ridiculously high. Cold asphalt fill up the holes.

35) Transit route options on campus: In the projected transit route options in the future, options A/B/C – option B & C are still the best (similar to the existing routes). These two routes are very accessible to the employees of buildings in that area; most important during the winter months.
A.5.1 TRANSIT HUB OPTIONS NOV 5, 2008
A.5 Internal Team Design Charrette Results

OPTION 3A
STREET DOUBLE LOADED

OPTION 3B
STREET DOUBLE LOADED

OPTION 3C
STREET DOUBLE LOADED

OPTION 4A
PERIMETER/ PARTIAL BELOW GRADE

OPTION 4B
PERIMETER/ PARTIAL BELOW GRADE

OPTION 4C
BELOW GRADE/ CONCOURSE
### High Level Evaluation Matrix

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<th>Option 1B</th>
<th>Option 1C</th>
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<th>Option 2C</th>
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<td>Yes</td>
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<td>Partial</td>
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<td>Yes</td>
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<td>Animated streetscape edges</td>
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</table>
A.5 Internal Team Design Charrette Results

**OPTION 1A v2**

STREET CIRCUIT

MODIFICATIONS:
- Larger buildable footprint on Lot 24
- Unloading moved to High St. in front of Cornerstone building
- Straight loading and unloading reduces street width requirements
- Lot 23, 24 lengthened due to straight loading requirements

**OPTION 1B v2**

STREET CIRCUIT

**OPTION 1C v2**

STREET CIRCUIT

MODIFICATIONS:
- Larger buildable footprint on Lot 24
- Unloading moved to High St. in front of Cornerstone building
- Straight loading and unloading reduces street width requirements
- Lot 23, 24 lengthened due to straight loading requirements

**OPTION 2A v2**

PERIMETER / STREET

**OPTION 2B**

PERIMETER NARROW

MODIFICATIONS:
- Larger buildable footprint on Lot 24
- Straight loading and unloading reduces street width requirements
- Lot 23, 24 lengthened due to straight loading requirements
MODIFICATIONS:
- increased leasable depth along perimeter of Lot 23/24
- unloading moved to High St. in front of Cornerstone building
- concourse loading
- one way bus storage system

OPTION 2C
PERIMETER / STREET

OPTION 2C v2
CONCOURSE

OPTION 2C v3
PERIMETER / STREET

MODIFICATIONS:
- straight loading and unloading reduces street width requirements
- Lot 23,24 lengthened due to straight loading requirements
- bus tunnel through lot 24
- mews between lot 23, 24

OPTION 3A
STREET DOUBLE LOADED

OPTION 3A v2
STREET DOUBLE LOADED

MODIFICATIONS:
- straight loading and unloading reduces street width requirements
- Lot 23,24 lengthened due to straight loading requirements
- bus tunnel through lot 24
- mews between lot 23, 24

OPTION 3B
STREET DOUBLE LOADED

OPTION 3B v2
STREET DOUBLE LOADED

OPTION 3C
STREET DOUBLE LOADED

OPTION 3C v2
STREET DOUBLE LOADED

MODIFICATIONS:
- straight loading and unloading reduces street width requirements
- Lot 23,24 lengthened due to straight loading requirements
- bus tunnel through lot 24
- bus storage on lot 23
- leasable frontage on Highland Court

OPTION 3D
STREET ORIENTED

OPTION 3E
STREET ORIENTED
A.5 Internal Team Design Charrette Results

OPTION 3E STREET ORIENTED

OPTION 3E STREET ORIENTED

OPTION 4A PERIMETER/PARTIAL BELOW GRADE

OPTION 4B PERIMETER/PARTIAL BELOW GRADE

OPTION 4C BELOW GRADE/CONCOURSE

OPTION 4B PERIMETER/PARTIAL BELOW GRADE

OPTION 4D BELOW GRADE/CONCOURSE

OPTION 4D BELOW GRADE/CONCOURSE

OPTION 4D V2 BELOW GRADE

endall elliot associates

bunt associates
### A.5.3 TRANSIT HUB OPTIONS JAN 8, 2008

**Project Committee Workshop, January 15, 2009**

**SFU Transit Hub Study**

#### High Level Evaluation Matrix

<table>
<thead>
<tr>
<th>Option 1A</th>
<th>Option 1B</th>
<th>Option 1C</th>
<th>Option 2A</th>
<th>Option 2B</th>
<th>Option 2C</th>
<th>Option 3A</th>
<th>Option 3B</th>
<th>Option 3C</th>
<th>Option 3D</th>
<th>Option 3E</th>
<th>Option 4A</th>
<th>Option 4B</th>
<th>Option 4C</th>
<th>Option 4D</th>
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<td>Not preferred</td>
<td>Preferred</td>
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<tr>
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<td>City of Burnaby</td>
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<td>OK</td>
<td>OK</td>
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**Client Feedback:**

- **SFU:**
  - Preferred: OK
  - Some merit: Not preferred
  - Not preferred: Not preferred

- **UniverCity:**
  - Preferred: Some merit
  - Not preferred: Not preferred

- **CMBC & TransLink:**
  - Preferred: Not preferred
  - Support: Support

- **City of Burnaby:**
  - OK: OK

#### Revisions after Technical Reviews

**Current Version:**

- V2
- V1
- V4 and V5

**Evaluation Criteria:**

**Human Comfort**

<table>
<thead>
<tr>
<th>Location near destinations</th>
<th>Weather protection</th>
<th>Grade level / access</th>
<th>Scale of vehicular conflicts</th>
<th>Security at night</th>
<th>Pedestrian / vehicular conflicts</th>
<th>Encouragesjaywalking</th>
<th>Bus movement efficiency</th>
<th>Relative Cost Implications</th>
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<tbody>
<tr>
<td>Central/east</td>
<td>Central/east</td>
<td>Al-grade</td>
<td>Central/east</td>
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**Operational Functionality**

<table>
<thead>
<tr>
<th>Direct route to layover</th>
<th>Routes in both directions</th>
<th>Bus movement efficiency</th>
<th>Encouragesjaywalking</th>
<th>Relative Cost Implications</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Fair</td>
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**Flexibility and Robustness**

<table>
<thead>
<tr>
<th>Adaptive reuse potential</th>
<th>Expansion potential</th>
<th>Urban Design Fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Good</td>
<td>As planned</td>
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</table>

**Urban Design Fit**

<table>
<thead>
<tr>
<th>Continuity of High Street</th>
<th>Continuity of main spine</th>
<th>Continuity with Blossom route</th>
<th>Buses off minor streets/mews</th>
<th>Animated streetscape edges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Current Version:**

- V2
- V1
- V4 and V5

**Evaluation Criteria:**

- **Human Comfort:**
  - Location near destinations
  - Weather protection
  - Grade level / access
  - Scale of vehicular conflicts
  - Security at night
  - Pedestrian / vehicular conflicts
  - Encouragesjaywalking
  - Bus movement efficiency
  - Relative Cost Implications

- **Operational Functionality:**
  - Direct route to layover
  - Routes in both directions
  - Bus movement efficiency
  - Encouragesjaywalking
  - Relative Cost Implications

- **Flexibility and Robustness:**
  - Adaptive reuse potential
  - Expansion potential
  - Urban Design Fit

- **Urban Design Fit:**
  - Continuity of High Street
  - Continuity of main spine
  - Continuity with Blossom route
  - Buses off minor streets/mews
  - Animated streetscape edges
A.5 Internal Team Design Charrette Results

OPTION 1A v2
STREET CIRCUIT / CONCOURSE MAX

OPTION 2C v3
PERIMETER / STREET

OPTION 3A v2
STREET DOUBLE LOADED

OPTION 3D v4
STREET CIRCUIT

OPTION 3D v5
STREET CIRCUIT

endall elliot associates
bunt associates
&
A.5 Internal Team Design Charrette Results
A.5.4 AM / PM PEAK TRAFFIC MOVIES

A.5.6 TRANSIT FACILITY AUTORUN SIMULATIONS