# BEYOND THE B-LINE:
## BROADWAY/LOUGHEED RAPID TRANSIT LINE
## PHASE II - COMMERCIAL DRIVE WEST

# *Executive Summary*

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BROADWAY/LOUGHEED RAPID TRANSIT STUDY PHASE II

## Introduction

Between May and December, 1999, three partner agencies—the City of Vancouver, TransLink and Rapid Transit Project 2000 Ltd. (a Provincial company)—jointly funded and directed a $200,000 rapid transit study.

Assisted by transportation and land use professionals, the consultant team examined how public transit could be upgraded along part of the "Broadway corridor". Currently, a combination of the #99 B-Line (articulated limited stop) plus #9 (regular local) buses serve the corridor.

## Corridor of Interest

Today a new SkyTrain line (called "Phase I") is being built by the Province through New Westminster and Burnaby. This new line (Figure 1) will follow the Lougheed Highway before entering Vancouver by following the Burlington Northern Santa Fe rail right of way into the Grandview Cut.

The new line passes underneath the existing SkyTrain line at Commercial Drive and Broadway, site of the existing Broadway SkyTrain station and a major transit interchange. As proposed, the SkyTrain extension would continue in a tunnel west along Broadway. The western end point has not been determined.

This Phase II study focuses on that portion of the corridor from Commercial Drive to the University of British Columbia (UBC), a distance of 13.4 km. (Figure 2).

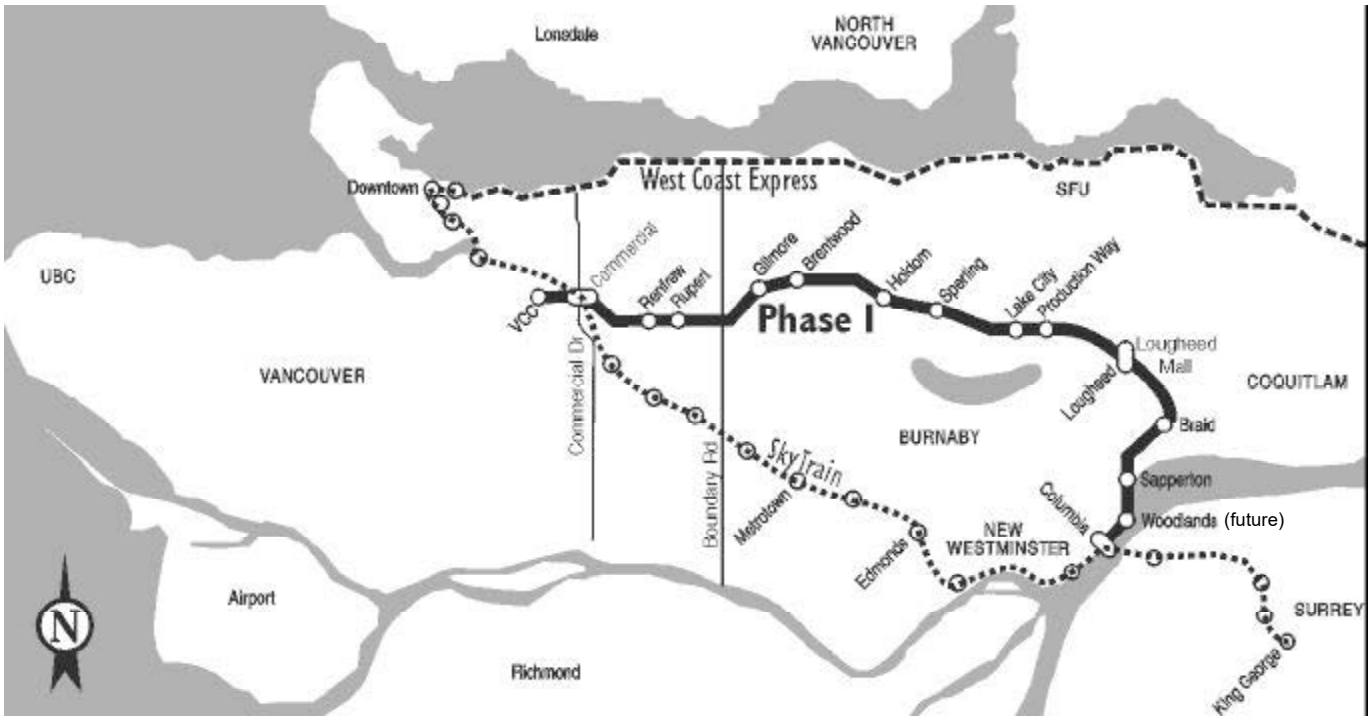
The corridor features local retail and commercial buildings, single family and multi-family dwellings, recreational facilities such as the University Golf Club, and major regional destinations such as UBC and the Vancouver General Hospital. Broadway is also the main street of Greater Vancouver's second largest business district. Accordingly, a wide variety of users must be served, whether they are travelling locally or making long journeys from other parts of the City and Region.

## Questions Addressed by the Study

For this corridor, the study looks ahead 20 years and answers the following questions:

- **What combination of technologies should be considered?** Consider that different technologies could work best in different parts of the corridor, and recognize that causing passengers to transfer between transit vehicles will deter some of them.
- **How do these alternatives compare?** Alternatives are compared for customer service, system operation, cost and cost effectiveness, environmental and community impacts, and urban design and land use.
- **What is the contribution each alternative makes to the urban environment and land use in the corridor?**

**Figure 1**



## Rapid Transit Technologies

The three technologies have different characteristics. The following is a description of the concept for each technology used in the study, for comparative purposes.

**Rapid Bus** is an enhanced version of the current #99 B-Line, operating on-street, using articulated, low-floor, multiple-door vehicles for fast loading. Either diesel or electric trolley buses could be used.

- As for LRT and SkyTrain below, fares are paid off-vehicle (e.g. via curbside ticket machines).
- Service is every 2 minutes or less in peak periods, 5 to 7 minutes midday and on Saturdays, and 10 minutes evenings and on Sundays.
- Designated bus lanes allow top speeds of 50 km/hour and average speeds of 25 km/hour.
- Rapid Bus has limited stops, and is supplemented by local bus.
- "Queue jumpers" lead the bus to the head of the traffic queue for green signals.
- Stations have distinctive shelters, improved signing and information, increased lighting, and other amenities attractive to riders.

**Light Rail Transit (LRT)** systems range from slower streetcars (trams) moving in mixed traffic to faster, tunnelled or elevated versions. In this study, the LRT concept uses electric rail vehicles, operated in two-car trains on the surface of the street.

- Tracks lie mainly in the centre of the current roadway, on a raised median separate from other traffic with trains given preferential treatment at signalized intersections.
- Pedestrian activated signals are converted to full traffic signals; minor unsignalized streets and mid-block access driveways become right-in/right-out only, to prevent uncontrolled crossing of tracks.
- For other traffic, two continuous through travel lanes are available each way east of Trafalgar. West of Trafalgar, a single travel lane is open each way. Left turn lanes are provided at major intersections.
- At all stations, on-street parking is removed. In many sections parking would be eliminated or reduced to one side of the street, but is retained on both sides between Trafalgar and Alma. Sidewalks, parking, traffic lanes, track beds, and station platforms, are squeezed to a minimum width.
- Acquisition of property is needed for at least two station locations along the alignment (Cambie and Main/Kingsway).
- Service is every 3 minutes in peak hours, 5 - 10 minutes midday, evenings, and Saturdays;10 - 15 minutes for late nights and on Sundays.
- Maximum speed of the system would be 50 km/hour, average 25 km/hour.
- Stations are every 2 to 3 blocks east of Arbutus and 6 to 8 blocks to the west.

**SkyTrain**, totally automated, is separated from other traffic.

- In this study, SkyTrain is almost entirely underground.
- It operates as an extension of the Phase I Lougheed/ Broadway line now under construction, i.e. from the planned end of Phase I at Vancouver Community College.
- SkyTrain continues to function as a line-haul regional system with quite widely spaced stations, and therefore is complemented by local parallel bus service.
- Service can be as frequent as 90 seconds apart, but service will be less frequent than this in practice and would be determined by the passenger volumes on the Lougheed section of the line.
- Average speed is 35 km/hour. Maximum speed of the system would be 80 km/hour.

## Combinations Considered

The study considered six alternative combinations of the three technologies, shown graphically in Figure 2.

The Steering Committee chose these 6 combinations as the ones that were most practical for the transit rider (i.e. fewer transfers along the route) and the transit provider (i.e. cost effective). For example:

A - SkyTrain from Commercial to UBC is theoretically possible, but, for cost reasons, not likely to be constructed further west than Arbutus.

B - If we change technologies in the corridor (e.g. from SkyTrain to LRT), it is preferable to do so only once; three technologies (ie multiple transfers) in one corridor is very inconvenient; for that reason, the LRT concept assumes LRT covers the full length of the corridor from Commercial to UBC.

Alternative 1 (i.e. Rapid Bus) and Alternative 2 (LRT) follow the same route for the length of the corridor. These are single-mode options that do not require a transfer for trips traveling the length of the study corridor. The route follows Broadway from Commercial Drive to Alma Street, Alma Street from Broadway to 10th Avenue, 10th Avenue from Alma to Blanca Street, and University Boulevard to the UBC transit loop.

Alternatives 3, 4, 5, and 6 (SkyTrain plus Rapid Bus) differ by their terminus point for SkyTrain and the transfer point to Rapid Bus.

# Evaluation, Findings and Conclusions

The study offers findings and conclusions, without a recommendation. The public's input will be solicited before Vancouver City Council advises TransLink and the Province of its preferred technology combination and therefore the end point for SkyTrain in the corridor.

The performance and costs of the six alternative combinations are shown on the charts on page 6.

**Costs and Ridership**

LRT from Commercial to UBC (Alternative 2) has the highest capital cost and annual operating cost. It is also by far the most expensive way of attracting new riders to transit. Rapid Bus (Alternative 1) has the lowest capital cost and is the cheapest way to attract new transit riders. SkyTrain to Arbutus (plus Rapid Bus to UBC; Alternative 6) has an intermediate capital cost and an operating cost comparable to Rapid Bus. It has the highest number of new riders and is between Rapid Bus and LRT in terms of cost per new rider. SkyTrain alone is the most expensive technology on a per km basis; however, when combined with Rapid Bus to UBC, the combination costs less than LRT.

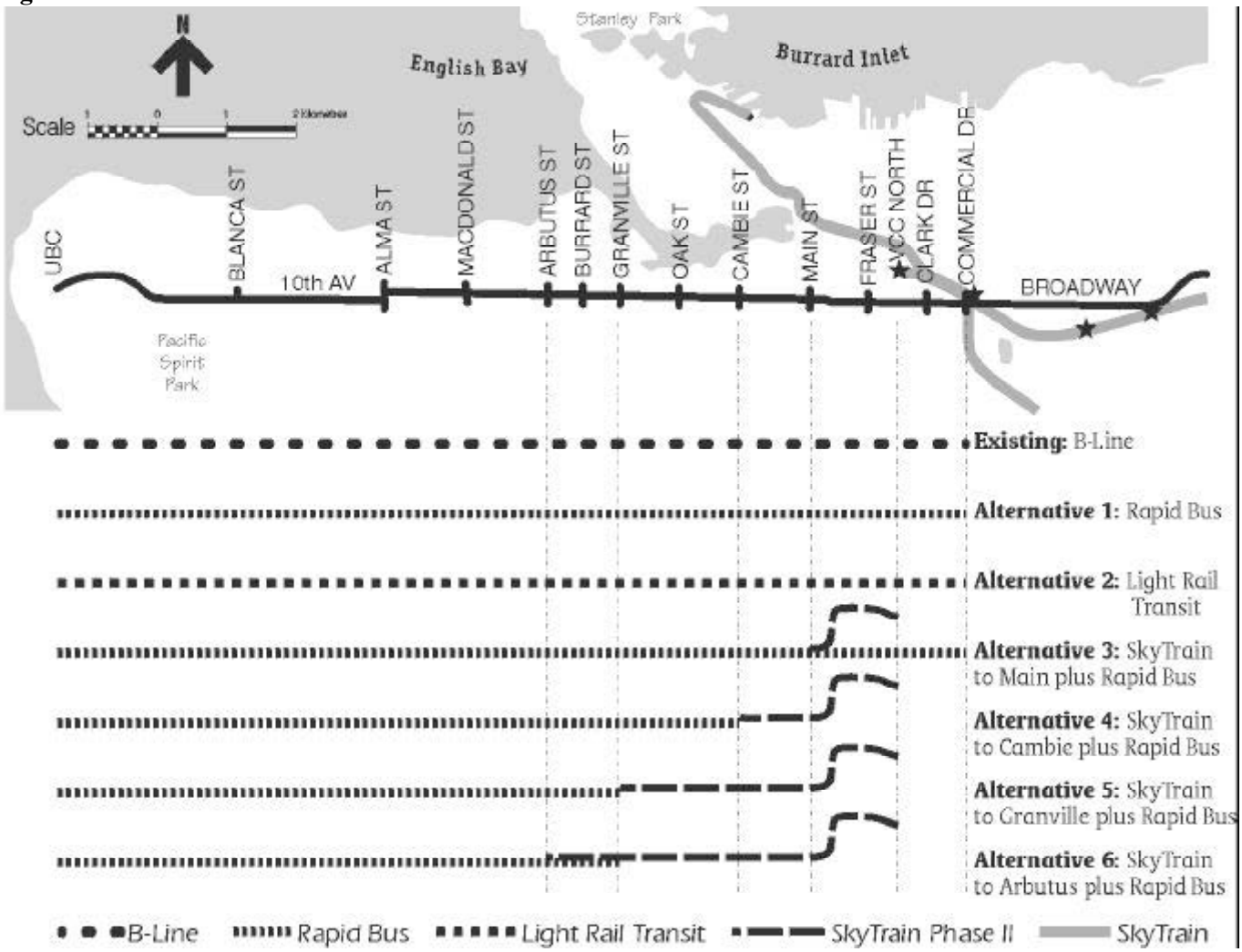
**Community Impacts and Ridership**

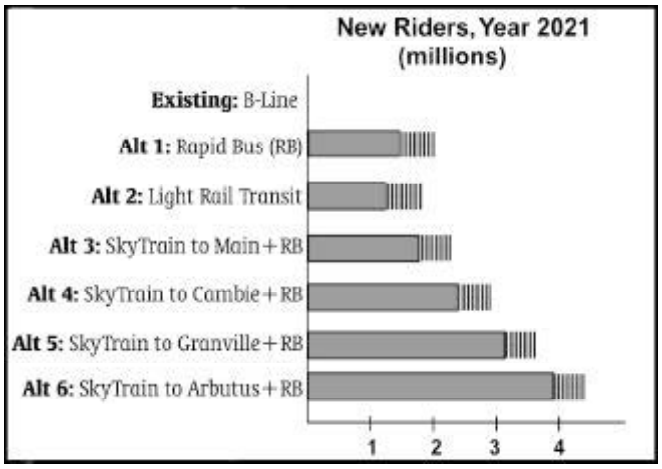
Overall, the study finds that while LRT is high in ridership, if it is designed for competitive operating speed it introduces the greatest impacts by displacing traffic, parking, access and pedestrians. LRT also has the greatest construction impact. Close station spacing in Central Broadway gives easy access for many people and produces high ridership.

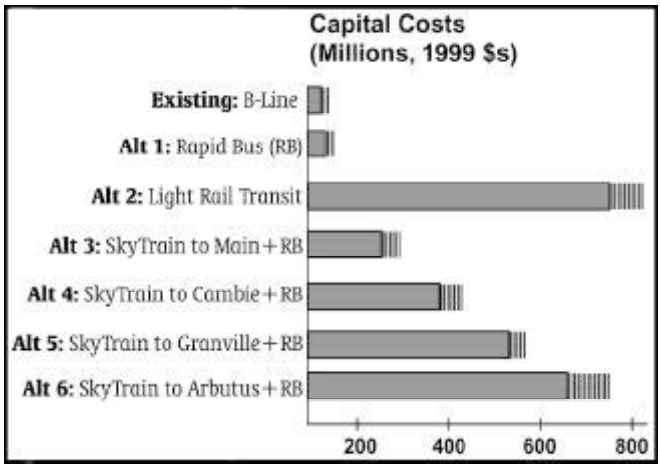
The alternatives involving SkyTrain (numbered 3 through 6) produce high ridership while having the least impact on the current transportation system. To deliver its maximum benefit, SkyTrain would have to extend west of Cambie to either Granville or Arbutus.

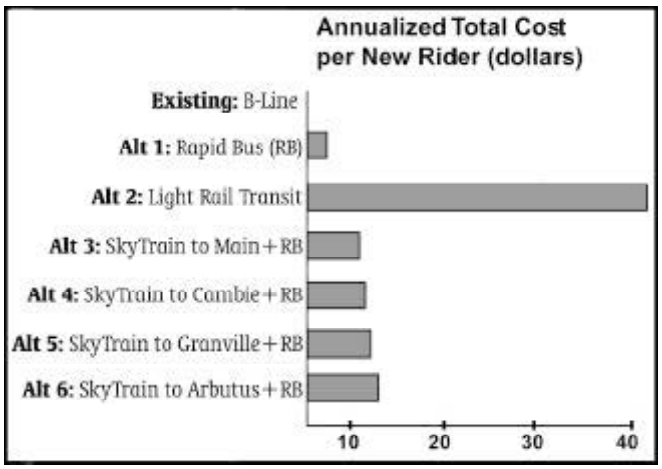
Rapid Bus may be viewed as an effective interim solution; however, over time it could evolve to a more "separated" operation and resemble LRT in terms of its impact on traffic, parking and other uses of the corridor. Further, its capacity will be tested in 15-20 years.

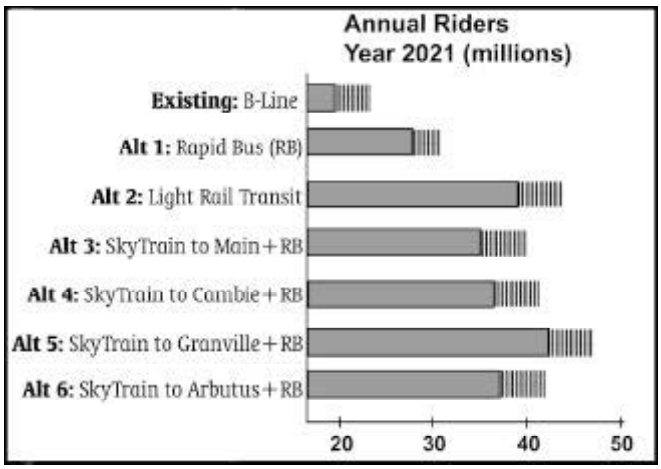
**Figure 2**

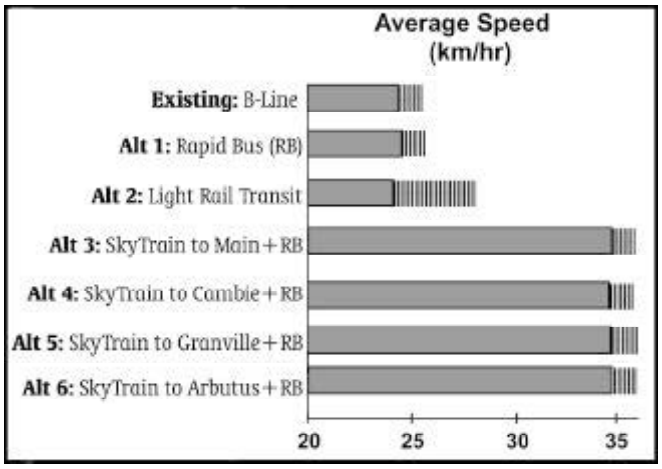


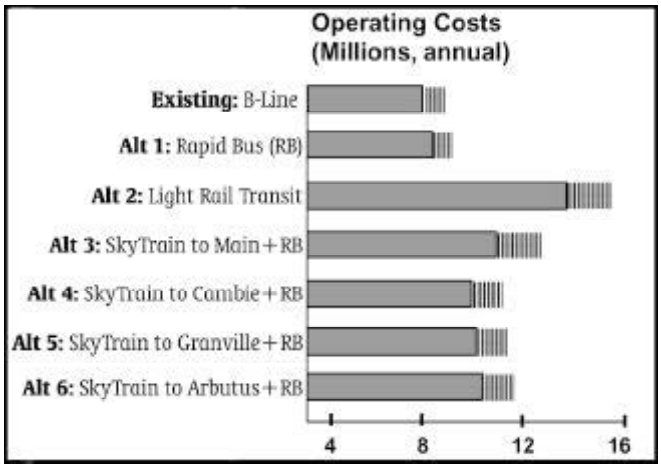



* Alternatives 3~6: Average speed is for the SkyTrain portion of the alternative only.

The **future implementation of Travel Demand Management (TDM)** is an unknown in this study. TDM comprises a variety of techniques to encourage transit use and discourage solo-commuting in cars (e.g. by higher gas taxes and parking fees). Local government policy in Greater Vancouver calls for these measures, but they are yet to be implemented. The study assumes that this will happen within the study timeframe; projected (higher) transit ridership reflects this assumption.

**Consistency with City and Regional Plans and Policies**

The study concludes that the further west SkyTrain is extended, the greater the probability of influence on meeting land use, transportation and livability goals and policies. Though Rapid Bus is not inconsistent with land use and livability goals, the study views this technology as least effective in supporting and achieving them.

The SkyTrain Alternative 3 (Main) should be dropped from further consideration as it involves considerable expense yet provides few additional benefits that are not otherwise available through implementation of the Rapid Bus alternative.

**Uncertainty of a Richmond to Downtown Rapid Transit Corridor and Technology**

Before doing much more work on the east-west Broadway corridor, it is important to better define the north-south **Vancouver-Richmond rapid transit corridor.** So far no long-term decisions have been made on such a north-south link, i.e. as to technology, routing (e.g. Cambie, Granville, Arbutus) or timing.

The north-south intersection with Broadway would create an important transit interchange. The study acknowledges that the north-south intersection is uncertain. As far as possible, it **tests the Broadway alternatives irrespective of the exact location of the north-south intersection**. However, since the computer simulations used to predict transit ridership require a specific assumption, this study assumes a north-south link on Cambie with SkyTrain-type performance.

## Cost Sharing

The study does not **address financing, or who would pay** for any upgrades of transit. It does estimate the total costs of the alternatives for comparison, irrespective of who pays for them. The study notes, however, that the Province has agreed to pay 67% (TransLink will pay the remaining 33%) of the cost of extending Phase 1 SkyTrain west along the Broadway corridor, as far as Granville. The Province has not agreed to pay for any other technology – in other words, the Province has not agreed to contribute to the cost of the Rapid Bus or LRT alternatives.

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This executive summary was prepared with the assistance of Martin Crilly, an independent advisory member of the study's Steering Committee.

The complete report, as well as conceptual illustrations of the rapid transit technologies, are available from the Community Services Group - Planning Reception - Maps & Publications, City of Vancouver, East Wing, 2675 Yukon Street 3rd Floor.