

CITY OF NEW WESTMINSTER



BRUNETTE CREEK

NEIGHBOURHOOD STUDY

TRANSPORTATION COMPONENT

**Engineering and
Planning Consultants**



BRUNETTE CREEK
NEIGHBOURHOOD STUDY
TRANSPORTATION COMPONENT

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This Study consists of three reports under separate covers

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EXECUTIVE SUMMARY

The City of New Westminster is seeking options and opportunities for the development of the Brunette Creek Neighbourhood. The City of New Westminster has adopted an Official Community Plan (OCP - June 1998), which sets out a number of goals for the environment, industrial development and transportation. These goals reflect the vision for the City as a whole, as well as for the Brunette Creek neighbourhood. Some of the transportation goals outlined in the Official Community Plan are:

- Balance opportunities for development with the preservation of environmentally sensitive areas;
- Create a positive environment that promotes the orderly growth of employment opportunities in the industrial sector;
- Provide a variety of transportation choices that give priority to walking, cycling and transit; and,
- Facilitate the safe and efficient movement of people and goods in a cost-effective manner.

In order to help achieve these goals, the City commissioned Hamilton Associates, Gartner Lee Ltd. and Ian Chang to prepare three background studies (on transportation, environment and industrial land, respectively) for the Brunette Creek Neighbourhood (the study area). This report deals with the Transportation component.

The purpose of the three studies is to identify options and make recommendations for achieving the environmental, industrial land and transportation goals for the Brunette Creek Neighbourhood. This Transportation component provides a high-level overview of transportation facilities required to support land development options and environmental goals in the Brunette Creek Neighbourhood.

The study process consisted of four phases, as follows:

- Phase 1 Set up and information gathering;
- Phase 2 Identification and analysis of options;

- Phase 3 Preparation of draft report; and,
- Phase 4 Finalization and presentation of report.

This final report incorporates staff, Council and Brunette Creek Study Advisory Group comments on the draft report completed at the end of Phase 3.

Barriers to development, existing issues and future conditions were assessed for the following modes, and are summarized below:

- Pedestrians and bicycles;
- Passenger cars and trucks;
- Transit; and,
- Railway.

Pedestrians and Bicycles

The review of reports, site visit and consultation with stakeholders identified the following issues in the study area for pedestrians and bicycles:

- Lack of bicycle facilities;
- Missing sidewalks in the study area; and,
- Long crossing distance at the intersection of Brunette Avenue and Braid Street.

The following improvements are planned to pedestrian and bicycle facilities in the study area:

- Bicycle path along Fader and Sherbrooke Streets to Hume Park;
- Greater Vancouver Regional District Brunette Fraser Greenway along Brunette Creek;
- The proposed Waterfront Greenway along the Fraser River;
- Pedestrian-activated crosswalks at the intersection of Cumberland Street and Columbia Street and at the North Road entrance to Hume Park;

- The new Millennium Line SkyTrain stations at Brunette Avenue and at Keary Street will provide opportunities for end-of-trip facilities for bicycles and pedestrians; and,
- Improved pedestrian facilities at the intersection of Brunette Avenue and Braid Street.

Passenger Vehicles and Trucks

The review of previous reports, site visit and stakeholder consultations identified the following issues for passenger vehicles and trucks:

- Long delays at the intersection of Brunette Avenue and Braid Street result in poor access to the eastern portion of the site. Train delays of 5 to 10 minutes occur once per hour;
- Stakeholders indicated poor road network connectivity to the west;
- High truck volumes (up to 18% of total volume), while important for goods movement, reduce capacity for passenger vehicles;
- One-lane bridge on Braid Street over Brunette Creek has limited two-way capacity. This may restrict potential for future growth;
- Bottleneck for eastbound traffic on Columbia Street East, just west of Brunette Avenue;
- Delays for the southbound left turn at the intersection of Brunette Avenue and Columbia Street East; and,
- The City's objective to minimize truck traffic through the Sapperton residential neighbourhood.

The following modifications have been proposed for the truck and passenger vehicle network in the study area:

- The removal of Braid Street from the Truck Network;
- A High Occupancy Vehicle corridor along Brunette Avenue in the long term;
- A traffic signal at the intersection of Keary Street and Columbia Street to accommodate SkyTrain traffic;

- A right-in/right-out channelization island at the intersection of Keary Street and Brunette Avenue to reduce collisions;
- A limited access arterial connection between United Boulevard in Coquitlam and Brunette Avenue;
- An underpass from southbound Columbia Street to southbound Front Street;
- A second free-flow right-turn lane from northbound Columbia Street East to northbound Brunette Avenue; and,
- A possible connection between Columbia Street East with Edworthy Way and Capilano Way.

Transit

While several regional routes travel along Brunette Avenue, bus stops are not provided along Brunette Avenue. Therefore, most of the properties east of Brunette Avenue are not within walking distance of a bus stop.

Transit service in the area will be enhanced with the construction of the Millennium SkyTrain Line, currently under way and planned for completion in 2001. Two stations are planned for the study area, Braid Station and Sapperton Station (at Keary Street).

The following issues were identified with respect to the proposed future transit network:

- The Sapperton Station has been designed to provide access to the west side of Brunette Avenue only. The station will be located at a height equivalent to three stories above Spruce Street; and,
- No bus service is planned to the area east of Brunette Avenue.

Railways

The railway tracks for the Canadian National Railway (CNR) and the Burlington Northern and Sante Fe Railway (Burlington Northern) run parallel to Brunette Avenue at a distance of approximately 30 metres east of the intersection of Brunette Avenue and Braid Street. Railway crossing gates and warning lights are provided where the railway tracks intersect the east leg of the intersection. Two switching yards are provided in the study area. Railway-delays of 5 to 10 minutes occur once per hour, and delays of up to 20 minutes have been attributed to railway operations at the intersection of Brunette Avenue and Braid Street by at least one stakeholder.

No information was available regarding future plans for railway operations in this area. Both CPR and Burlington Northern staff indicated that the future of the rail transportation industry is strong. All railroads are striving to grow their business.

Study Area Access Options

Based on the review of existing conditions, existing policies and stakeholder input, the following objectives are required to support the land use options outlined in the Industrial Land Report:

- Maintain or improve access to Highway 1;
- Reduce the delays to passenger vehicles and trucks caused by railway operations;
- Provide a long-range plan for better connection to the regional network;
- Enhance the opportunities for walking, cycling, transit and goods movement; and,
- Mitigate the negative impact of truck and other vehicular traffic.

The Industrial Land Report defines four main land use options. These options, and the trip generation rates for each of the land use types, are summarized in TABLE ES-1. Trip generation rates are based on the Trip Generation Manual, (Institute of Transportation Engineers, 1997). The office land use in the preferred option, Option 3, could generate up to 10 times as many trips as the existing heavy industry uses. As the main access to the Brunette Creek Neighbourhood is currently experiencing capacity and train-related delays, capacity improvements will be required to accommodate development. Additionally, the reduction or elimination of train delays must be addressed.

TABLE ES-1 LAND USE OPTIONS

OPTIONS	PRINCIPAL LAND USE OPPORTUNITIES	VEHICLE TRIP GENERATION RATES (Trips per Acre)	
		AM peak hour	PM peak hour
1 (Status quo)	Light industry	7.5	7.3
	Heavy industry	1.98	2.16
2 (Light industry emphasis)	Light industry	7.5	7.3
3 (Mix of light industry and offices)	Light industry	7.5	7.3
	Offices	25.65	28.28
4 (Office emphasis)	Offices	25.65	28.28
	Light industry	7.5	7.3

Taking the above objectives into consideration several options were developed to improve the access for passenger vehicles and goods movements to the study area, and thereby support land development. These options are described below:

Do Minimum – This option includes improving pedestrian linkages to SkyTrain, and providing better signage to the Spruce Street access. Minor improvements such as turn restrictions or signal-timing changes at the intersection of Brunette Avenue and Braid Street should also be included. This option provides little additional capacity.

Improve Existing Accesses – This option would include all of the improvements described under the do-minimum option, as well as an improved, signalized intersection at Spruce Street. A local road connecting to the right-in, right-out entrance at Cumberland Street could provide access to properties in the Lower Brunette Industrial Area.

United Boulevard Extension – This option is defined by a limited access arterial linking the United Boulevard in Coquitlam with an interchange at Brunette Avenue. The intersection of Brunette Avenue and Braid Street would become a T-intersection, with the east leg closed off, resulting in some reductions in delay for traffic on the remaining legs. Access to the United Boulevard Extension for the lower Brunette Industrial Area would be provided at a signalized intersection with Canfor Avenue.

Provide Full Intersection at Cumberland Street – This option was developed as part of a previous study, and involved Cumberland Street being connected to Edworthy Way and Capilano Way. However, since completion of that report, the construction of SkyTrain and Sapperton Landing has likely made this option infeasible. Therefore this option was not further evaluated.

Improvements for Pedestrians, Bicycles and Transit

Numerous initiatives are underway to significantly improve pedestrian, transit and bicycle facilities in the Study Area. The City should ensure that the following key points are addressed when implementing the preferred road network plan:

- The land use plan should allow for higher density land use types within 800 metres walking distance of SkyTrain stations. This is more likely to be accomplished with Industrial Land Options 3 and 4;
- New Westminster should continue to support the implementation of the Brunette Fraser Greenway;
- Good pedestrian links to the Brunette Fraser Greenway and the proposed Waterfront Greenways should be provided via sidewalks on at least one side of all new streets;

- If the United Boulevard Extension is constructed, bicycle and pedestrian facilities should be provided from the intersection with Canfor Avenue to the Coquitlam border. For the section from Canfor Avenue to Brunette Avenue, pedestrians and bicycles can be directed to existing at-grade facilities along Braid Street, and along the Brunette Fraser Greenway;
- Good pedestrian linkages should be provided between SkyTrain stations and Brunette Creek developments. This could include a crosswalk, stairway or elevator for the Sapperton station, and improved facilities at the intersection of Braid Street and Brunette Avenue; and,
- End-of-trip facilities should be provided for cyclists at the new SkyTrain stations.

Evaluation of Options

The Industrial Land Use option that is selected will have a significant impact on the transportation requirements of the Brunette Creek Neighbourhood. A preliminary evaluation was conducted of the three viable road network options developed above, and the results are summarized in TABLE ES-2. The land use option that could occur, and relative cost, was also assessed.

The intersection of Braid Street and Brunette Street currently experiences significant delays due to the volume of vehicular traffic, and to train operations. These delays may be a deterrent to businesses that would otherwise choose to locate in the Brunette Creek Neighbourhood. Even without any additional development in the Brunette Creek Neighbourhood, delays are likely to increase at the intersection of Braid Street and Brunette Avenue due to the growth in background traffic.

The United Boulevard Extension option provides additional capacity, reduces train delays and improves access to the Brunette Creek Neighbourhood better than the other options. It is the only option that is likely to accommodate the additional traffic generated by Land Use Options 3 or 4. It also is the most expensive of the options. The United Boulevard Extension provides significant additional capacity, and consequently additional through traffic, as well as improved access to the Pacific Reach and Maillardville areas of Coquitlam.

TABLE ES-2 EVALUATION OF ROAD NETWORK OPTIONS

ROAD NETWORK	POSSIBLE LAND USE OPTIONS	COST	ADVANTAGES	DISADVANTAGES
Do Minimum	1 (Status Quo)	Low	<ul style="list-style-type: none"> - Low infrastructure requirements mean low impact on the physical environment. 	<ul style="list-style-type: none"> - Railway operations will continue to delay trucks and cars. - Does not improve connections to regional network.
Improve Existing Accesses	1 or 2	Medium	<ul style="list-style-type: none"> - Some reduction in delay at Braid Ave./Brunette Street. - Improved access to area east of Brunette Ave. 	<ul style="list-style-type: none"> - Railway operations will continue to delay trucks and cars. - Does not improve connections to regional network.
United Boulevard Extension	1,2,3 or 4	High	<ul style="list-style-type: none"> - Improved connections to regional network. - Reduction in delay at Braid Ave./Brunette St. - Elimination of railway delays. 	<ul style="list-style-type: none"> - Reduced access to west. - Increased through traffic in the area east of Brunette Avenue. - Possibly increased through traffic in Sapperton residential area. - Significant land acquisition, including Burlington-Northern offices.

With this option, care must be taken to discourage through traffic in adjacent residential neighbourhoods. Residents of the Sapperton Area have also indicated their concern that the United Boulevard Extension be designed to have minimal visual impact on their neighbourhood.

The other two options, Do Minimum, and Improve Existing Accesses, are much lower cost. As these two options provide little additional capacity, they can only support Land Use Options that have lower trip generation rates, such as Option 1 or 2. In particular, it will be difficult to significantly improve operations at the intersection of Braid Street and Brunette Avenue. Without mitigating existing delays at this intersection, it will be difficult to accommodate the additional traffic that would be generated by the development of the Beutel-Goodman site located in the northwest corner of the intersection of Brunette Avenue and Braid Street. If the City decides to pursue the construction of the United Boulevard Extension, the Do Minimum Option could be considered as interim measures to improve access until the Extension is constructed.

Implementation Strategy

The Land Use Plan and the preferred transportation option are inextricably linked, and therefore the City must determine what level of infrastructure it wishes to support to allow for development of the industrial lands in the Brunette Creek Neighbourhood. Once the preferred Land Use Option is determined, the following steps should be included in the implementation strategy for the preferred Transportation Option:

- Develop Functional Plan of Required Road Network;
- Develop Traffic Calming Plan for the Lower Sapperton Neighbourhood;
- Develop Internal Road Network for the Brunette Creek Industrial Area; and,
- Traffic Impact Study for the Beutel-Goodman Site.

1.0 INTRODUCTION

1.1 Background

The City of New Westminster is seeking options and opportunities for the development of the Brunette Creek Neighbourhood, shown in FIGURE 1.1. The City of New Westminster has adopted an Official Community Plan (OCP - June 1998), which sets out a number of goals for the environment, industrial development and transportation. These goals reflect the vision for the City as a whole, as well as for the Brunette Creek neighbourhood. Some of the transportation goals outlined in the Official Community Plan are:

- Balance opportunities for development with the preservation of environmentally sensitive areas;
- Create a positive environment that promotes the orderly growth of employment opportunities in the industrial sector;
- Provide a variety of transportation choices that give priority to walking, cycling and transit; and,
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In order to help achieve these goals, the City commissioned Hamilton Associates, Gartner Lee Ltd. and Ian Chang to prepare three background studies (on transportation, environment and industrial land, respectively) for the Brunette Creek Neighbourhood (the study area). This report deals with the Transportation component.

1.2 Study Purpose

The purpose of the three studies is to identify options and make recommendations for achieving the environmental, industrial land and transportation goals for the Brunette Creek Neighbourhood. This Transportation component provides a high-level overview of transportation facilities required to support land development options and environmental goals in the Brunette Creek Neighbourhood.

The Transportation objectives addressed in this report include:

- Enhancing the opportunities for walking, cycling, transit and goods movement;
- Improving, for the interim period, road access over the railway tracks parallel to Brunette Avenue; and,
- Mitigating the negative impact of truck and other vehicular traffic.

1.3 Study Approach and Method

The study process consisted of four phases, as follows:

- Phase 1 Set up and information gathering;
- Phase 2 Identification and analysis of options;
- Phase 3 Preparation of draft report; and,
- Phase 4 Finalization and presentation of report,

A Technical memorandum summarizing findings, conclusions and preliminary recommendations was circulated to the City, the Brunette Creek Study Advisory Group and the Brunette Creek Study Information Group at the end of Phase 2. The draft report incorporates all comments made on the Technical Memorandum. This final report incorporates staff, Council and Brunette Creek Study Advisory Group comments on the draft report completed at the end of Phase 3. Input from the Brunette Creek Study Advisory Group is summarized in APPENDIX A.

Initial information was obtained through a site visit and Brunette Creek Study Advisory Group workshop in October 2000.

For the purposes of this study, Braid Street is considered to be an east-west road, while Brunette Avenue is considered to be a north-south road.

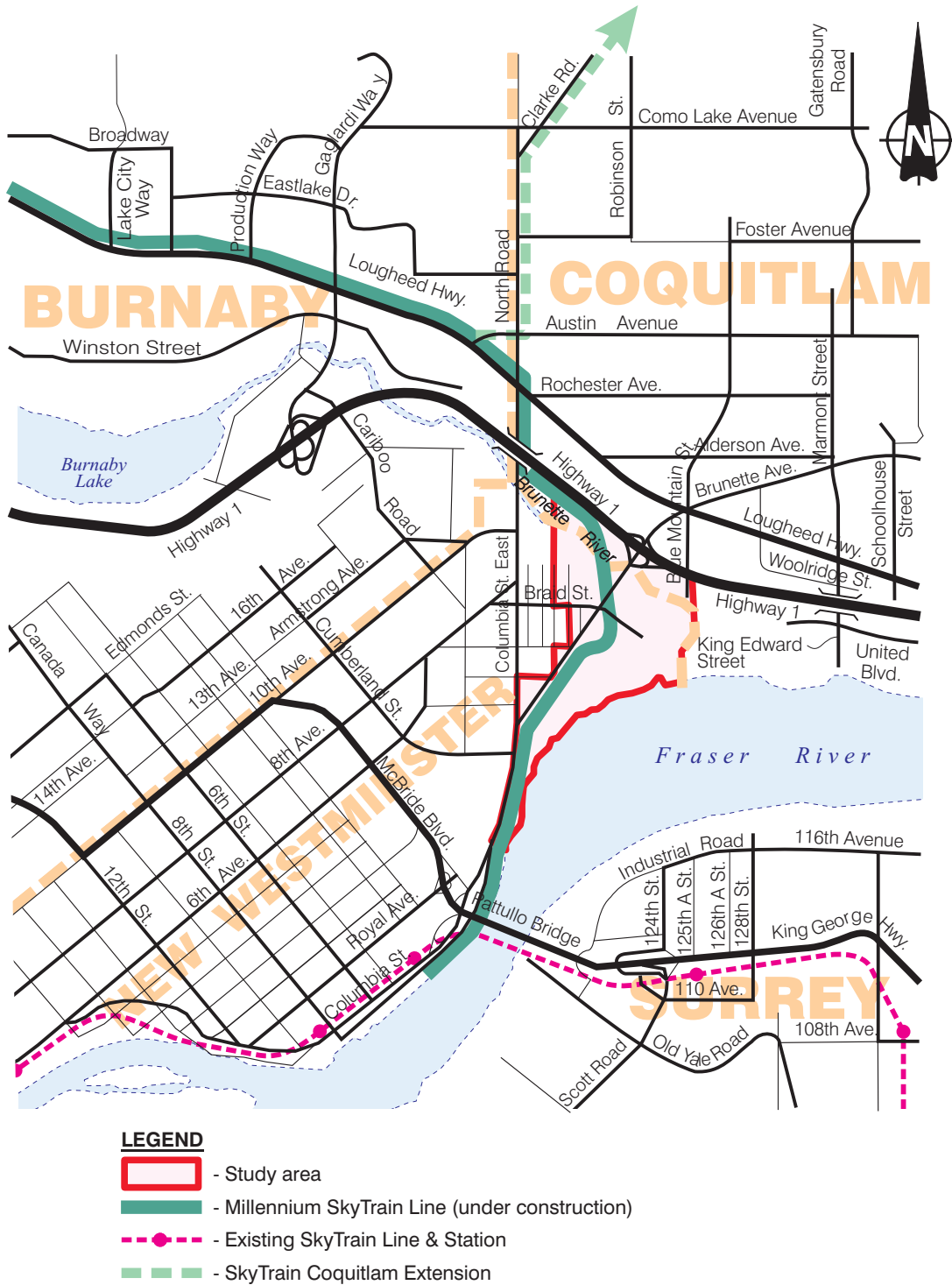


FIGURE 1.1 BRUNETTE CREEK NEIGHBOURHOOD STUDY AREA

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2.0 NETWORK CHARACTERISTICS

2.1 Pedestrians and Bicycles

A. *Existing Characteristics*

Pedestrians

The existing pedestrian facilities are shown in FIGURE 2.1. Most of the streets in the Sapperton area west of Brunette Avenue have sidewalks. On Brunette Avenue, sidewalks are provided on the west side only. Sidewalks are absent on many streets in the industrial area east of Brunette Avenue, as shown in FIGURE 2.2.

Where sidewalks are provided, they are generally of standard width (1.2 metres) and well maintained. No marked crosswalk is provided on the north leg of the intersection of Brunette Avenue and Braid Street. Pedestrian signal heads were generally provided at signalized intersections in the study area. Features such as street furniture, landscaping, boulevards and canopies, which can improve the walking environment, were generally absent.

Streetlights contribute to a feeling of security for pedestrians travelling after dark. The provision of streetlights is sporadic throughout the study area. Streetlights are generally provided at intersections, and along the newer sections of road in the industrial area, such as Canfor Avenue, Capilano Way and Edworthy Way. However streetlights were generally absent on Rousseau Street, Spruce Street and the portion of Braid Street east of Brunette Avenue.

The review of reports, site visit and consultation with stakeholders identified the following issues in the study area:

- Lack of sidewalks in the study area;
- Long crossing distance at the intersection of Brunette Avenue and Braid Street.

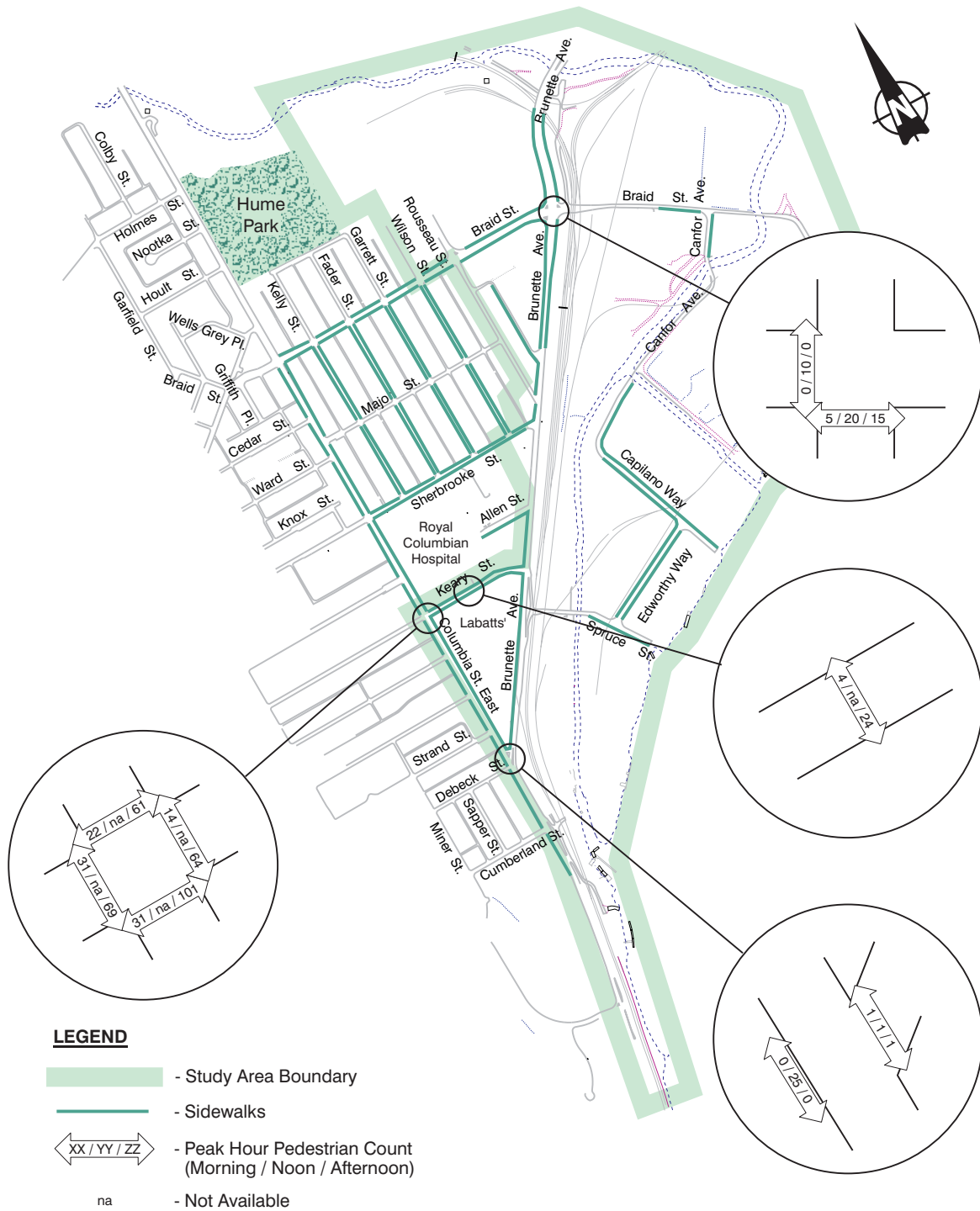


FIGURE 2.1 EXISTING PEDESTRIAN AND BICYCLE NETWORK



FIGURE 2.2 LACK OF PEDESTRIAN FACILITIES ON SPRUCE STREET

Pedestrian volumes are summarized in FIGURE 2.1. Pedestrian volumes are relatively low on Brunette Avenue, and higher in the vicinity of Royal Columbian Hospital on Keary Street.

The City of New Westminster Official Community Plan (Reference 13 in APPENDIX B) establishes the policy of striving to provide pedestrian access along all roadways. Sidewalks adjacent to all roadway corridors would significantly improve safety, personal security and comfort. Other policies that apply to the study area include:

- Facilitate safe pedestrian movement around the City by establishing a system of linear greenways and attractive streetscapes;
- Require that pedestrian movement and infrastructure be addressed in all development and redevelopment proposals;

- Enhance personal security through improvements to the design and quality of the street environment; and,
- Encourage a clear separation between moving vehicles and pedestrians along major routes using landscaping and parking lanes.

Bicycles

No dedicated bicycle facilities are currently provided in the study area. In fact, the New Westminster, Long-Range Transportation Study*, (1998, Reference 6) identifies Brunette Avenue as a major road that is currently not bike friendly. The combination of lanes that are narrower than typical for arterial roadways (3.5 metres or less) and a high proportion of heavy vehicles make this route less desirable for cyclists. No information was available on bicycle volumes.

New Westminster policies that relate to bicycle facilities in the study area include the following:

- Continue to implement and maintain a network of bicycle routes throughout the city;
- Provide connections to bicycle routes in other municipalities; and,
- Integrate different modes of transportation whenever possible by combining different travel modes for different portions of a trip. For example, bicycle facilities should be provided at SkyTrain stations.

* The Long-Range Transportation Study has not been approved by New Westminster City Council

B. Future Pedestrian and Bicycle Network

According to several references, including the Burrard Peninsula/ Richmond Sector Recreational Greenway Plan, the New Westminster Bicycle Plan, and the City of New Westminster Trail and Greenway Master Plan (References 8, 10 and 20 respectively), the following improvements, illustrated in FIGURE 2.3 are planned for the pedestrian and bicycle network in the study area:

- Bicycle path along Fader and Sherbrooke Streets to Hume Park;
- Greater Vancouver Regional District Brunette Fraser Greenway along Brunette Creek;
- The proposed Waterfront Greenway along the Fraser River;
- Pedestrian-activated crosswalks at the intersection of Cumberland Street and Columbia Street and at the North Road entrance to Hume Park;
- The new Millennium Line SkyTrain stations at Brunette Avenue and at Keary Street will provide opportunities for end-of-trip facilities for bicycles and pedestrians; and,
- Improved pedestrian facilities at the intersection of Brunette Avenue and Braid Street.

In 1999, the City adopted the Brunette Fraser Greenway (BFG) Plan and subsequently signed a Memorandum of Understanding with the GVRD that outlined the respective roles and responsibilities related to land acquisition, development and site management of the Brunette Fraser Greenway within New Westminster. The Brunette Fraser Greenway is an integral part of the City's Official Community Plan. Policy # 4 of Section 2.4 (Parks and Open Space) says, 'Incorporate existing and planned parks and open spaces into an extensive City wide greenway system which provides safe, non-motorized access to all parts of the City, including the waterfront.'

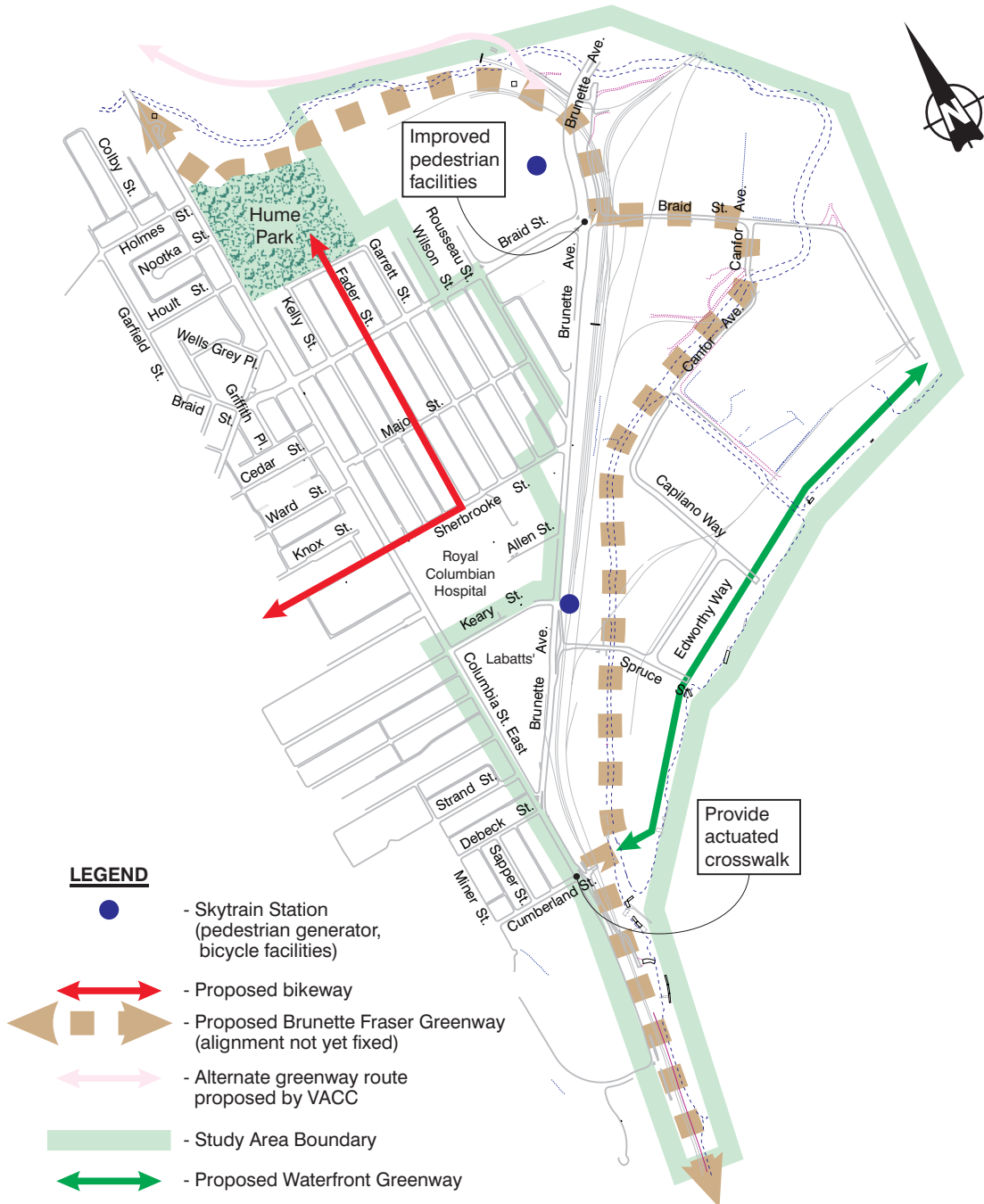


FIGURE 2.3 PLANNED IMPROVEMENTS TO THE PEDESTRIAN AND BICYCLE NETWORK

Details of the Brunette Fraser Greenway are contained in the Burrard Peninsula/Richmond Sector Recreational Greenway Plan, June 2000, prepared by Greater Vancouver Regional District Parks. Although the alignment is not yet confirmed, the general route of the Brunette Fraser Greenway is shown on the map in FIGURE 2.3

Approximately 50 percent of the Brunette Fraser Greenway is in place (primarily the northern section, from Burnaby to Hume Park). Other segments are more informal and/or require upgrades, land acquisition, and formal development in cooperation with Burnaby and New Westminster and other relevant agencies (e.g., segments through the City's industrial area and the Fraser foreshore). Construction began in September 2000 on the Fraser Waterfront Park (Sapperton Landing). This park is part of the overall greenway system.

The Brunette Fraser Greenway will:

- Connect and enhance linear recreation opportunities;
- Provide a key route for alternative transportation choices (e.g., pedestrian and cycling access);
- Protect ecologically sensitive areas and habitat;
- Utilize GVRD right of way corridors for multi-use where feasible;
- Develop an off-road parkway through New Westminster's industrial area to connect to the Fraser foreshore;
- Create a destination waterfront park at the mouth of the Brunette River and develop foreshore greenway along the Fraserview area with observation pier.

A destination park and staging area, known as Sapperton Landing is being constructed at the mouth of the Brunette River in partnership with SkyTrain project.

In the study area the proposed Brunette Fraser Greenway alignment begins in Hume Park, follows the top of the Brunette River ravine to the Brunette Avenue interchange, where it passes through a working industrial area along Braid Street and Canfor Avenue sidewalks. It rejoins the Brunette River and meanders along the south bank taking advantage of existing easements to its outflow into the Fraser River, connecting to the New Westminster foreshore lands and the Millennium SkyTrain lands. This alignment has not been confirmed yet. Some land acquisition, upgrades and formal development are required to implement this plan.

If it is not feasible to locate the greenway alignment adjacent to the Brunette River, it will be accommodated along Canfor Avenue, Capilano Way, Edworthy Way and Spruce Street through widening to the sidewalks (or providing wide sidewalks where they are absent). Access to the Brunette Fraser Greenway will be provided at two locations: at Westminster Quay (existing) and at the mouth of the Brunette River, in the new destination park (Reference 8).

The Vancouver Area Cycling Coalition has proposed an alternate alignment for the Brunette Fraser Greenway to cross the Brunette River, as indicated in FIGURE 2.3. The alternate alignment has the advantage of having a relatively flat vertical alignment. However concerns have been raised by the Sapperton Fish and Game Club that opening public access to the streamside could negatively impact salmon habitat. To prevent Greenway users from leaving the trail and accessing the streamside, a thick barrier of vegetation should be provided between the trail and the River. City staff has indicated that this alignment could be considered but only in addition to the GVRD's alignment.

In December 2000, the City of New Westminster Parks Department came out with the Trail and Greenway Master Plan, Reference 20. In addition to the Brunette-Fraser Greenway, this report identifies the proposed Waterfront Greenway that would be located along the foreshore of the Fraser River, as shown in FIGURE 2.3. This could connect with a proposed multi-use trail along the Fraser River in Coquitlam.

The implementation of the portion of the proposed Waterfront Greenway in the Brunette Creek Study Area is identified as a medium-term or longer-term priority. The plan defines medium term projects as those that could go ahead when funds become available or in conjunction with other capital projects. Longer-term greenways are defined as those that, because of current land use or property ownership, will be more difficult to implement in either the short or medium term.

Another issue noted in the study area is that pedestrian access to Sapperton SkyTrain Station is proposed on the west side of Brunette Avenue only. Access to the station is provided by a pedestrian overpass crossing over Brunette Avenue. It is proposed to terminate on the west side of Brunette Avenue into an above-grade plaza. At this point, pedestrians have the option of taking a stairway down to the street level or continuing further west along a sidewalk, which will intersect the existing Keary Street sidewalk immediately west of the existing Royal Columbian Hospital (Reference 2). However, those wishing to access the station from the industrial area east of Brunette Avenue must first cross to the west side of Brunette Avenue. The City is currently investigating the potential for improved access to be provided through a public-private partnership. The estimated cost, at \$3 million for a fully accessible elevator, may be prohibitive.

City staff has indicated that upgrades to pedestrian facilities at the intersection of Brunette Avenue and Braid Street are planned. This will include removing the right-turn channelization islands, and providing some sidewalk on Braid Street, east of Brunette Avenue.

SkyTrain stations should include bicycle facilities, and should provide signage orienting pedestrians towards nearby greenways.

2.2 Passenger Vehicles and Trucks

A. *Existing Characteristics*

The existing road classification and traffic volumes are summarized in FIGURE 2.4. The truck network is illustrated in FIGURE 2.5. Two road access points are provided to the Brunette Creek Industrial area – at the intersections of Brunette Avenue with Braid Street and with Spruce Street. Both of these accesses cross an at-grade railway line. The impact of the railway on the intersection of Brunette Avenue and Braid Street is discussed in Section 2.4. Stakeholders did not indicate any significant impacts of the railway on the Spruce Street access.

The entrance at Spruce Street is located at a sharp change in elevation. The elevation drops from approximately 11.8 metres to 6.8 metres over a distance of approximately 15 metres. Therefore the only permitted movements at the T-intersection of Spruce Street and Brunette Avenue are right-turn movements, which are accommodated on short ramps. A restricted route along the unpaved right-of-way of the United Boulevard Extension provides access to Coquitlam.

Both East Columbia Avenue and Brunette Avenue are part of the Major Road Network. The Major Roads Network is a system of roads that provide access to regional land uses, and that carry significant volumes of automobiles, buses and trucks. A co-ordinated approach to funding planning and developing the network is achieved through the Major Roads Technical Advisory Committee, which consists of municipal representatives.

Brunette Avenue is defined as a regional arterial street in the Official Community Plan, providing a direct connection to Highway 1 just north of the study area. It connects to Columbia Street East at a Y-shaped intersection to provide a continuous corridor from downtown New Westminster to the highway. Based on 1994 data, traffic volumes are generally consistent throughout the day.

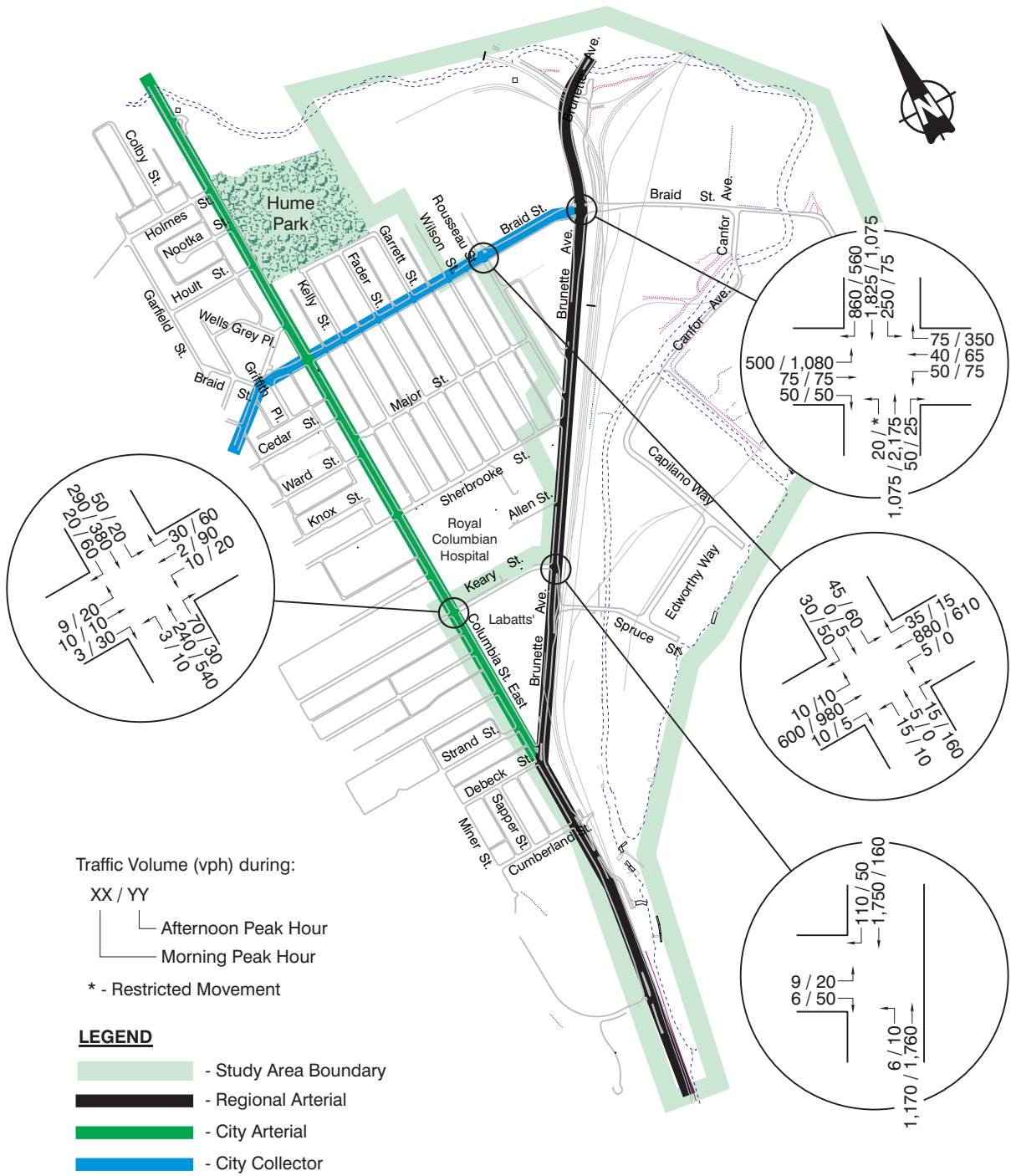


FIGURE 2.4 EXISTING PASSENGER VEHICLE NETWORK

Braid Street, Columbia Street and Brunette Avenue are all designated truck routes in the City of New Westminster. Brunette Avenue provides access between the highway and the industrial areas along the Fraser River. The 1999 Lower Mainland Truck Freight Study (Reference 18) indicated that trucks comprise between 6 and 18 percent of the traffic volume along Brunette Avenue during the day. This is typical for a well-used truck route. Braid Street is a major access road to the City of New Westminster, and connects with Eighth Avenue to the northwest.

Two through lanes are provided on Brunette Avenue. Separate turn lanes are provided at some intersections. The geometry of Brunette Avenue contains two sequential horizontal curves: a curve to the left followed by a curve to the right. A vertical crest curve is located approximately 200 metres north of the intersection, with an elevation approximately 10 metres above the intersection at Braid Street. The intersection of Brunette Avenue and Braid Street has downhill grades of approximately four percent for the southbound approach and two percent for the eastbound approach.

Collision data was available for two locations in the study area. The intersection of Brunette Avenue and Braid Street had over 70 collisions over the period from 1993 to the end of 1995. The intersection of Brunette Avenue with Columbia Street East had approximately 60 collisions over that same 3-year period (Reference 6**). Safety-related improvements have occurred at both intersections since 1995. The Safety Planning Review for the New Westminster Corridors (Reference 16) identified the Brunette Avenue on-ramps and off-ramps to Highway 1 as a high collision location.

Parking is restricted on Brunette Avenue in the study area. Parking is permitted on some of the streets in the Brunette Industrial Area.

The review of previous reports, site visit and stakeholder consultations identified the following issues for passenger vehicles and trucks:

* This reference, The Long-Range Transportation Study has not been approved by City Council

- Long delays at the intersection of Brunette Avenue and Braid Street result in poor access to the eastern portion of the site. Train delays of 5 to 10 minutes occur once per hour (Reference 4);
- Stakeholders indicated poor road network connectivity to the west;
- High truck volumes (up to 18% of total volume), while important for goods movement, reduce capacity for passenger vehicles;
- One-lane bridge on Braid Street over Brunette Creek has limited two-way capacity. This may restrict potential for future growth;
- Bottleneck for eastbound traffic on Columbia Street East, just west of Brunette Avenue;
- Delays for the southbound left turn at the intersection of Brunette Avenue and Columbia Street East; and,
- The City's objective to minimize truck traffic through the Sapperton residential neighbourhood.

Traffic calming has recently been implemented in the Sapperton neighbourhood. Temporary measures include traffic circles at the intersection of Fader Street with Major Street. Three-way stop control would be implemented at the intersections of Major Street with Rousseau Street and Fader Street with Sherbrooke Street (Reference 7).

The capacity performance of the signalized intersections in the study area was analyzed in several of the references. The performance of each intersection is described in terms of a level of service. The levels of service range from A, with little or no delays, to F, which represents congested conditions with considerable delays. A summary of movements encountering significant delays (levels of service E or worse) is provided in TABLE 2.1.

The longest delays in the study area occur at the intersection of Brunette Avenue and Braid Street. These delays are due to volume, trucks and geometric constraints. The calculated level of service does not include the intermittent train delays.

TABLE 2.1 SUMMARY OF INTERSECTION LEVEL OF SERVICE

INTERSECTION	OVERALL LEVEL OF SERVICE		CRITICAL MOVEMENTS (LEVEL OF SERVICE)	
	AM	PM	AM	PM
Brunette Ave./ Braid Street ¹	D	E	Eastbound Left (E) Northbound Left Right and Through (E) Southbound Left (E)	Southbound Left (E) Eastbound Left (E) Westbound Left (E) Westbound Through (E) Westbound Right (E) Northbound Through and Right (E) Southbound Left (F)
Keary Street/ Brunette Avenue ²	A	F	Eastbound Left (F)*	Eastbound Left (F)*
Brunette Avenue/ Columbia Street E. ³	F	C	Westbound Left (F)	Westbound Right (F)

1 Reference 2

2 Reference 3

3 Reference 15

* Prohibited movement.

B. Future Network

The review of the background reports summarized in APPENDIX B indicates that the following modifications have been proposed for the truck and passenger vehicle network in the study area:

- The removal of Braid Street from the Truck Network;
- A High Occupancy Vehicle corridor along Brunette Avenue in the long term;
- A traffic signal at the intersection of Keary Street and Columbia Street to accommodate SkyTrain traffic (Reference 2);
- A right-in/right-out channelization island at the intersection of Keary Street and Brunette Avenue to reduce collisions (Reference 2);
- A limited access arterial connection between United Boulevard in Coquitlam and Brunette Avenue;
- An underpass from southbound Columbia Street to southbound Front Street;

- a second free-flow right-turn lane from northbound Columbia Street East to northbound Brunette Avenue; and,
- a possible connection between Columbia Street East with Edworthy Way and Capilano Way.

The following issues were also identified were identified in the references and by stakeholders:

- SkyTrain patrons may reduce the supply of on-street parking spaces in residential areas; and,
- Additional development in the area will impact intersections which are already experiencing congestion.

While the South Fraser Perimeter Road, between Highway 15 and Highway 99 along the south side of the Fraser River, may reduce traffic along Brunette Avenue, the Long Range Transportation analysis also indicated a need for the North Fraser Perimeter Road (Reference 1). The North Fraser Perimeter Road describes an east-west corridor within New Westminister and Coquitlam formed by a series of arterial roads. It consists primarily of parts of Marine Way, Stewardson Way, Front Street, Columbia Street, Brunette Avenue and United Boulevard. The section connecting to United Boulevard is currently missing.

An alignment from United Boulevard that connected directly to Braid Street was previously considered, but was determined to be undesirable due to the at-grade crossing of the railway tracks and the proximity to the Highway 1 interchange. A connection directly to Braid Street might also encourage through traffic to use Eighth Avenue in New Westminister (Reference 1). It is City policy to avoid the addition of net capacity within the City for through traffic and to prevent the use of local streets for regional traffic (Reference 9).

The City of New Westminister has established the following requirements for the Extension (Reference 14):

- The Extension must be grade separated from the railway tracks;

- Access to Brunette Avenue must be provided via ramps;
- The Extension should provide access to the Braid Industrial area;
- The Extension shall not permit access to or from Braid Street or local streets.

An alignment of the United Boulevard Extension that terminates approximately 300 metres south of the intersection of Brunette Avenue and Braid Street has been proposed and meets the City's requirements listed above. This alignment is illustrated in FIGURE 2.6. Reference 1 indicates that this alternative will have a limited negative impact on local New Westminster network, reduce delay at the intersection of Brunette Avenue and Braid Street and provide benefits at the Highway 1 interchange with Brunette Avenue. However, more recent information provided by City staff indicates the impact may be more substantial. Staff has indicated that the United Boulevard Extension would result in a significant increase in traffic on Brunette Avenue and East Columbia Street, and that it would also require relocation of the Burlington-Northern Switching Yards.

In TransLink's application for the Canada-British Columbia Infrastructure Program, it is estimated that the following approximate costs may be associated with the North Fraser Perimeter Road:

United Boulevard Extension	\$45 million
Second Eastbound Lane on East Columbia Street	\$5 million
Front Street/East Columbia Street Tunnel	\$8 million
Total	approximately \$58 million

Projected traffic volumes on the United Boulevard Extension are 1,600 vehicles per hour eastbound and 1,200 vehicles per hour westbound in the afternoon peak period. The Extension may consist of two through lanes and two lanes for High Priority Vehicles. High Priority Vehicles are designated as transit vehicles and trucks.

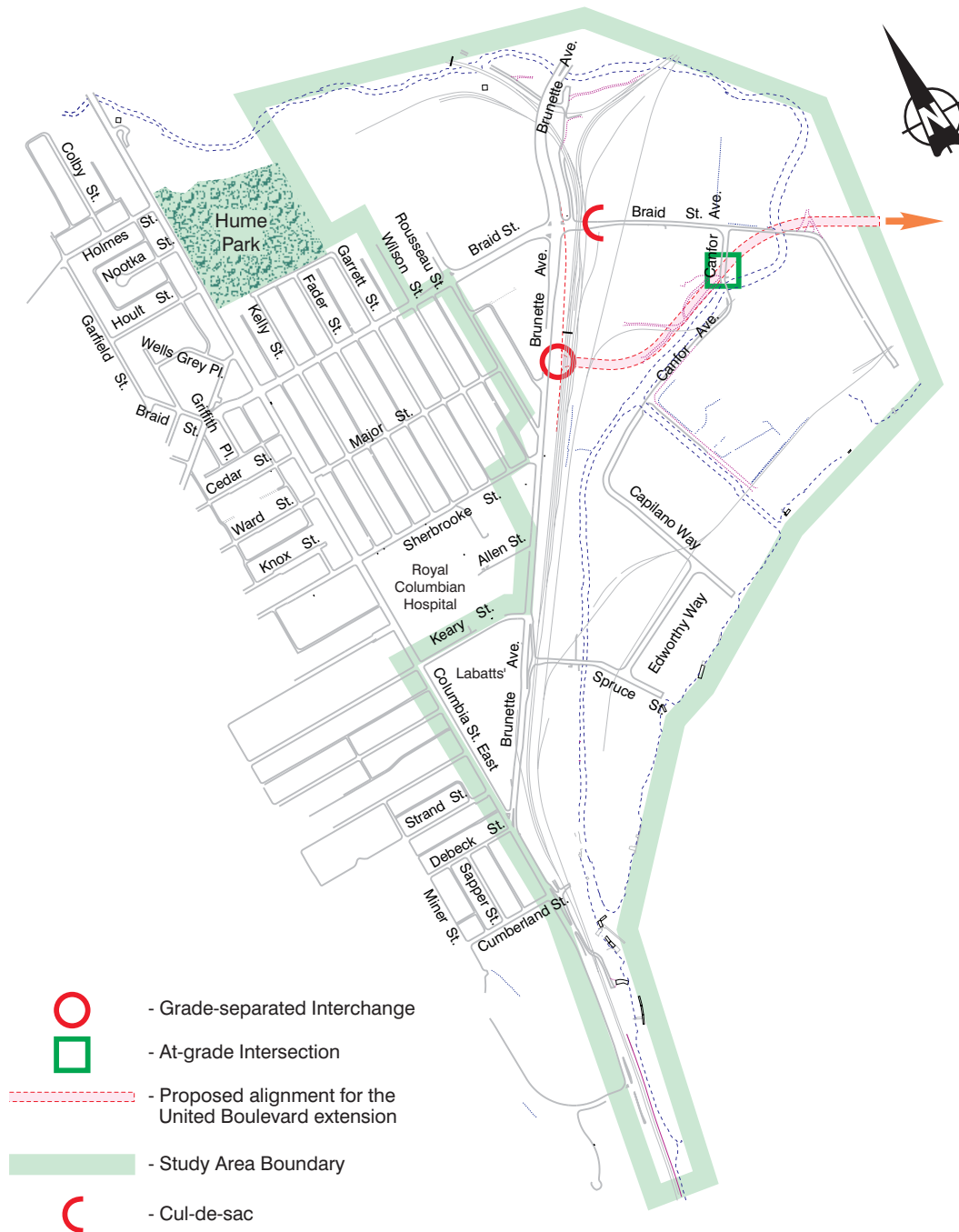


FIGURE 2.6 PROPOSED ALIGNMENT FOR THE UNITED BOULEVARD EXTENSION

The City of Coquitlam has sought and received a \$2.6 million British Columbia/Canada Infrastructure Grant to construct the portion of the United Boulevard Extension in Coquitlam as well as a permanent replacement for the bridge crossing of the Brunette River. As the grant expires on March 30, 2002, this work is underway. This portion will provide a continuous link to the east end of Braid Street in New Westminster. It will provide access to adjacent properties only. There is no proposal for cost sharing by the City of New Westminster for this project. It is intended that all funding be provided by the grant, from TransLink and from Coquitlam.

The City of New Westminster Long-Range Transportation Study* (Reference 6) identifies Brunette Avenue as a long-term High Occupancy Vehicle corridor. In order to accommodate an additional lane for HOV traffic, the existing Spruce Street access to the Brunette Creek Industrial land would have to be closed. To compensate for the loss of the Spruce Street access, the report indicated that an intersection could be provided at Cumberland Street.

A preliminary routing concept connects Columbia Street East with Edworthy Way and Capilano Way. This routing requires relocation of the rail tracks, structures to clear the rail tracks and the Brunette River, and has impacts on existing buildings. However, since completion of that report, infrastructure changes have occurred which will likely make the provision of a full intersection at Cumberland infeasible.

The construction of the Millennium SkyTrain line has begun. The raised alignment of the SkyTrain would likely make it difficult to provide a structure to clear the rail tracks. Additionally, the Cumberland entrance would bring truck traffic into the main entrance of the new Sapperton Park. GVRD staff has indicated that safety, noise and turning requirements would severely impact the park land base.

* The Long-Range Transportation Study has not been approved by City Council

2.3 Transit

A. *Existing Transit Facilities*

The existing transit routes are shown in FIGURE 2.7. While several regional routes travel along Brunette Avenue, bus stops are not provided along Brunette Avenue. Within the study area, only those properties on Braid Street, Keary Street and Columbia Street East are within 400 metres of a transit stop. Typically transit riders will walk up to 400 metres to catch a bus. Most businesses east of Brunette Avenue are outside of this range.

B. *Future Transit Facilities*

Transit service in the area will be enhanced with the construction of the Millennium SkyTrain Line, currently under way and planned for completion in 2001. The planned transit facilities in the area are illustrated in FIGURE 2.7. Two stations are planned for the study area, Braid Station and Sapperton Station.

The Sapperton SkyTrain Station is to be located opposite Keary Street east of Brunette Avenue. The purpose of the station is to provide local access to the SkyTrain system, from the Sapperton residential area, the Royal Columbian Hospital and the employees at the Labatt's Brewery. (Reference 2)

Braid Station will be located in the northwest corner of the intersection of Braid Street and Brunette Avenue. This station is expected to act as bus terminus for the suburban lines currently running along Brunette Avenue and terminating at Columbia Station.

TABLE 2.2 summarizes the expected number of passengers getting on and off at these stations. TABLE 2.3 breaks the Braid station passengers down by mode. It appears that the SkyTrain stations will be the centres of a significant increase in pedestrian activity in the area.

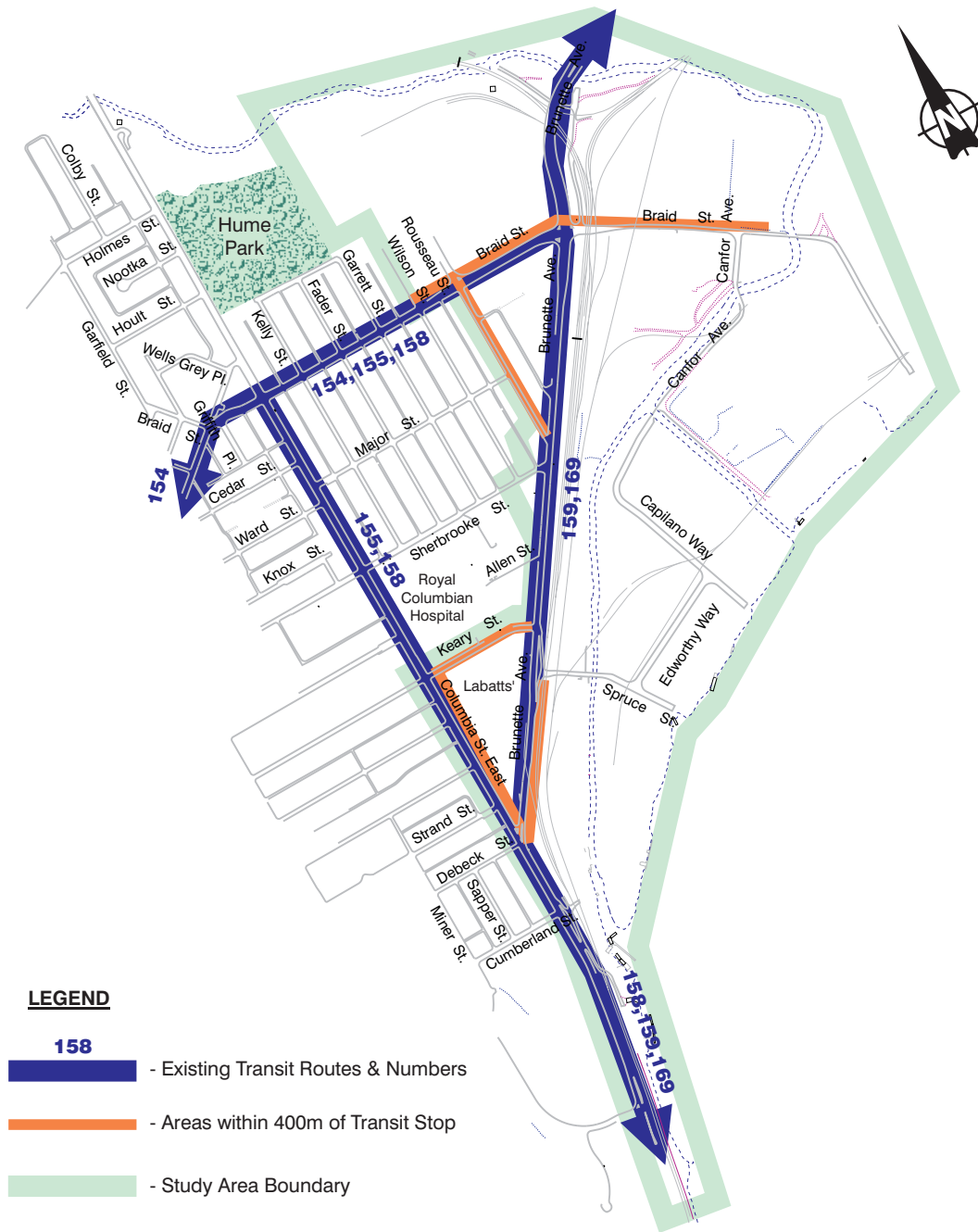


FIGURE 2.7 EXISTING TRANSIT NETWORK

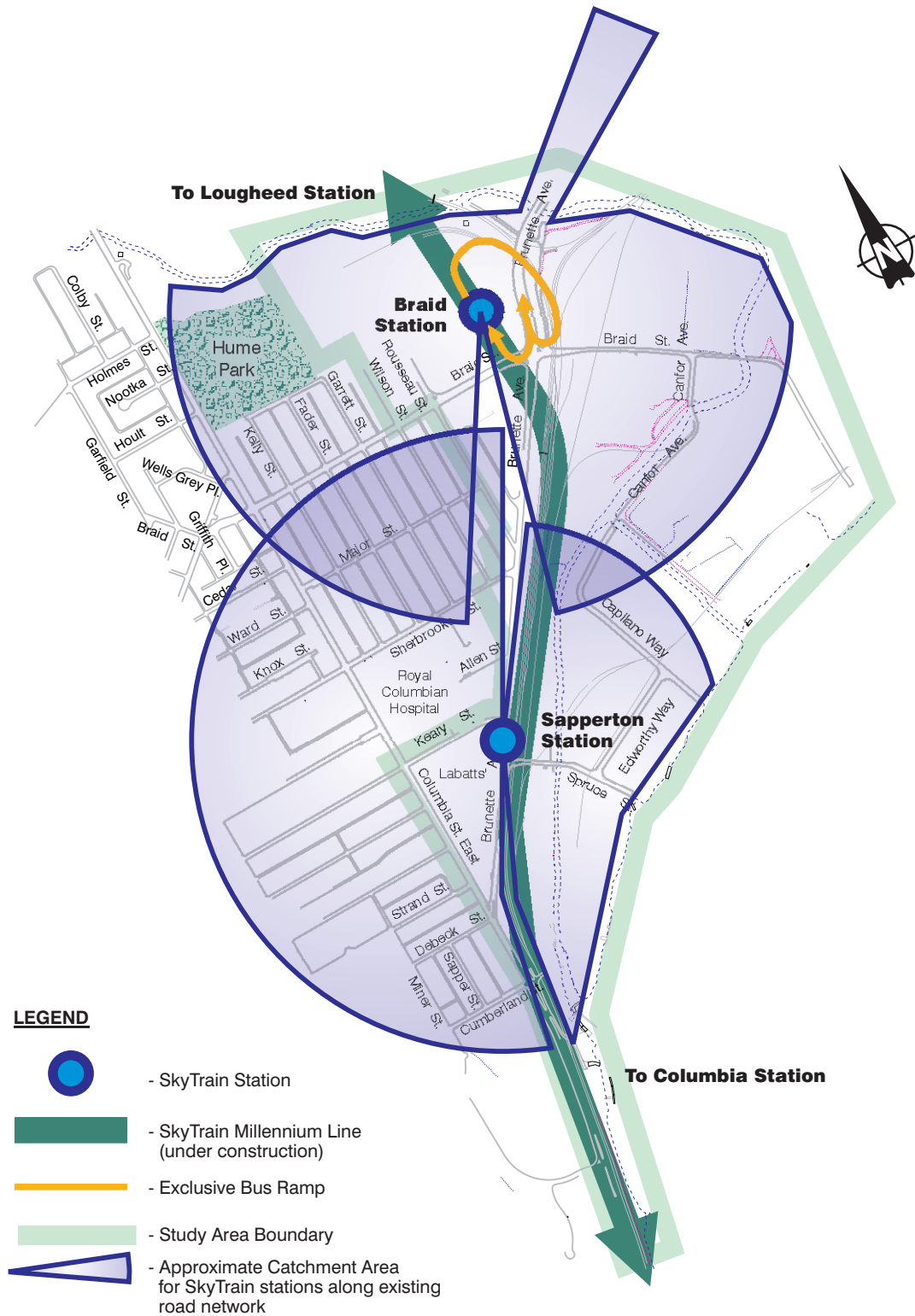


FIGURE 2.8 PROPOSED MODIFICATIONS TO TRANSIT NETWORK

TABLE 2.2 MORNING PEAK HOUR RIDERSHIP (2006)

STATION	ON	OFF
Sapperton ¹	201	50
Braid ²	503	326

1 Reference 3

2 Reference 2

**TABLE 2.3 FORECAST PASSENGER MOVEMENTS AT BRAID STATION
BY ACCESS MODE**

Year	Peak Hour	On (boarding train)			Off			TOTAL
		PPUDO*	BUS	Walk	PPUDO*	BUS	WALK	
2002	AM	65	160	253	12	119	153	762
	PM	33	118	177	33	118	177	656
2012	AM	79	150	298	14	168	218	927
	PM	39	132	223	40	131	223	788

*PPUDO = Passenger pick up and drop off

Source: Reference 2

No bus service will be provided on Brunette Avenue once the SkyTrain is in place. However, as indicated in FIGURE 2.8, most of the study area will be within the 800 metres walking distance of a SkyTrain station. Studies indicate that transit passengers are willing to walk up to 800 metres to access a rapid transit station. Note that the catchment area for the Sapperton Station east of Brunette Avenue is smaller than the area west of Brunette.

According to the Sapperton SkyTrain Station Traffic Study (Reference 3), buses on routes 158, 159 and 169 (each with six buses per hour in each direction in the peak hours), which presently terminate at the New Westminster Station, will terminate at Braid Station once the Millennium Line is operational. Buses on routes 154 and 155 (4 buses per hour in each direction in the peaks) terminate at 22nd Avenue Station, and will continue to follow much the same route as at present, but will divert from it to make a brief stop at the Braid Station to pick up and drop off passengers.

The station will be circled at ground level by a bus loop serving local buses. Provision is made for up to nine buses to stop in the loop. Access for buses coming along Brunette Avenue from Coquitlam will be via an exclusive off-ramp for buses north of the intersection of Brunette Avenue and Braid Street.

Buses departing towards Coquitlam on Brunette Avenue will be routed under Brunette Avenue on an alignment to be built partially along and on top of a rail siding, which is expected to remain operational in the short to medium term. This routing will enable buses to enter Brunette Avenue northbound near Braid Street by way of a right turn, avoiding the lengthy alternative via Rousseau Street, which would involve two left turn movements. It is understood that rail deliveries using the siding will be scheduled at night so as not to conflict with bus movements. This underpass might also accommodate the Brunette Fraser Greenway along an expanded sidewalk. Numerous design considerations were identified in the Braid Station SkyTrain Integration Traffic Engineering and Functional Design (Reference 2). This reference recommended a review at the design stage to confirm that the vertical and horizontal alignments are feasible. The reference also identified that the safety of the merge should be reviewed.

A major pedestrian way is proposed between the intersection of Braid Street and Brunette Avenue and the station. This would probably link with a boulevard along the planned access road linking the station with Rousseau Street.

The following issues were identified with respect to the proposed future transit network:

- As discussed previously, the Sapperton Station has been designed to provide access to the west side of Brunette Avenue only. The station will be located at a height equivalent to three stories above Spruce Street;
- No bus service is planned to the area east of Brunette Avenue; and,
- The issue of timing of use of the rail siding should be finalized as soon as possible, prior to construction of the bus loop at Braid Station.

2.4 Railway

A. Existing Railway Network

The locations of the railway tracks in the study area are indicated in FIGURE 2.5. Two switching yards are located in the study area, and their approximate locations are also located on FIGURE 2.5. Conversations with the Section Foreman for the Burlington Northern and Santa Fe Railway (BNSFR) and Canadian Pacific provided information on railway operations as summarized in TABLE 2.4.

TABLE 2.4 TRAIN FREQUENCY IN THE BRUNETTE CREEK AREA

RAILWAY OPERATOR	THROUGH TRAINS PER DAY
Burlington Northern	5
Amtrak	2
CN	15 to 30
CP	4
Via*	2
Rocky Mountaineer*	2
TOTAL	26 to 45

*Via and Rocky Mountaineer operate 3 days per week only

The time that it takes a through train to cross Braid Street is approximately five minutes.

The Traffic Operations Review for the Braid Street and Brunette Avenue Intersection (Reference 4) indicates that the railway tracks for the Canadian National Railway (CNR) and the Burlington Northern and Sante Fe Railway (Burlington Northern) run parallel to Brunette Avenue at a distance of approximately 30 metres east of the intersection of Brunette Avenue and Braid Street. Railway crossing gates and warning lights are provided where the railway tracks intersect the east leg of the intersection. The duration of the closure of the railway crossing was observed to be approximately five to ten minutes depending on the length of the train.

One business in the area uses the tracks in the vicinity of the intersection of Braid Street and Brunette Avenue as a switching yard. Switches occur once per day, at approximately 1000 hours. The duration of the switch is approximately 15 minutes. An employee is responsible for monitoring the gate during this time, and will halt operations if the traffic backs up too much. Additionally Burlington-Northern uses its switching yard 20 to 30 times per day, with gate closures of up to 10 minutes per switch. When combined with traffic signal delay, this may explain the delays of up to 20 minutes to make a westbound left turn at the intersection of Brunette Avenue and Braid Street observed by one stakeholder.

CPR staff noted that train operations are necessary 24 hours per day, seven days a week. At the Sapperton interchange, east of Brunette Avenue, CPR deliver trains of grain, potash and sulphur for CN to deliver to North Vancouver, then returns the empty trains to CPR, again at Sapperton.

B. Future Railway Operations

No information was available regarding future plans for railway operations in this area. Both CPR and Burlington Northern staff indicated that the future of the rail transportation industry is strong. All railroads are striving to grow their business. Service to customers from the Sapperton yard will continue, according to the customers' current and future requirements. Burlington Northern indicated that other suitable locations for their operations exist in the Greater Vancouver area, and they are not opposed to moving their site if adequate compensation is provided.

3.0 STUDY AREA TRANSPORTATION NETWORK OPTIONS

3.1 Development of Options

Based on the review of existing conditions, existing policies and stakeholder input, the following objectives are required to support the land use options outlined in the Industrial Land Report:

- Maintain or improve access to Highway 1;
- Reduce the delays to passenger vehicles and trucks caused by railway operations;
- Provide a long-range plan for better connection to the regional network;
- Enhance the opportunities for walking, cycling, transit and goods movement; and,
- Mitigate the negative impact of truck and other vehicular traffic.

The Industrial Land Report defines four main land use options. These options, and the trip generation rates for each of the land use types, are summarized in TABLE 3.1. Trip generation rates are based on the Trip Generation Manual, (Institute of Transportation Engineers, 1997).

TABLE 3.1 LAND USE OPTIONS

OPTIONS	PRINCIPAL LAND USE OPPORTUNITIES	VEHICLE TRIP GENERATION RATES (Trips per Acre)	
		AM peak hour	PM peak hour
1 (Status quo)	Light industry	7.5	7.3
	Heavy industry	1.98	2.16
2 (Light industry emphasis)	Light industry	7.5	7.3
3 (Mix of light industry and offices)	Light industry	7.5	7.3
	Offices	25.65	28.28
4 (Office emphasis)	Offices	25.65	28.28
	Light industry	7.5	7.3

A review of the trip generation rates indicates that the office land use in the preferred option, Option 3, could generate up to 10 times as many trips as the existing heavy industry uses. As the main access to the Brunette Creek Neighbourhood is currently experiencing capacity and train-related delays, capacity improvements will be required to accommodate development. Additionally, the reduction or elimination of train delays must be addressed.

A. Options for Passenger Vehicles and Trucks

Taking the above objectives into consideration several options were developed to improve the access for passenger vehicles and goods movements to the study area, and thereby support land development. These options are described below:

Do Minimum – This option includes improving pedestrian linkages to SkyTrain, and providing better signage to the Spruce Street access. Minor improvements such as turn restrictions or signal-timing changes at the intersection of Brunette Avenue and Braid Street should also be included. This option provides little additional capacity.

Improve Existing Accesses - This option would include all of the improvements described under the do-minimum option, as well as an improved, signalized intersection at Spruce Street. A local road connecting to the right-in, right-out entrance at Cumberland Street could provide access to properties in the Lower Brunette Industrial Area.

United Boulevard Extension – This option is defined by a limited access arterial linking the United Boulevard in Coquitlam with an interchange at Brunette Avenue, as described in Section 2.2. The intersection of Brunette Avenue and Braid Street would become a T-intersection, with the east leg closed off, resulting in some reductions in delay for traffic on the remaining legs. Access to the United Boulevard Extension for the lower Brunette Industrial Area would be provided at a signalized intersection with Canfor Avenue. A schematic of this option was provided in FIGURE 2.6.

Provide Full Intersection at Cumberland Street – This option was developed as part of the City of New Westminster Long-Range Transportation Study* which indicated that an intersection could be provided at Cumberland Street, and then connected to Edworthy Way and Capilano Way. This routing requires relocation of the rail tracks, structures to clear the rail tracks and the Brunette River, and has impacts on existing buildings. However, since completion of that report, the construction of SkyTrain and Sapperton Landing has likely made this option infeasible. Such an intersection would also be constructed on a steep grade, and could possibly interfere with the operation of the intersection of East Columbia Street and Brunette Avenue. Therefore this option was not further evaluated.

B. Improvements for Pedestrians, Bicycles and Transit

Numerous initiatives are underway to significantly improve pedestrian, transit and bicycle facilities in the Study Area. Major components were shown in FIGURES 2.3 and 2.8. The City should ensure that the following key points are addressed when implementing the preferred road network plan:

- The land use plan should allow for higher density land use types within 800 metres walking distance of SkyTrain stations. This is more likely to be accomplished with Industrial Land Options 3 and 4;
- New Westminster should continue to support the implementation of the Brunette Fraser Greenway;
- Good pedestrian links to the Brunette Fraser Greenway and the proposed Waterfront Greenways should be provided via sidewalks on at least one side of all new streets;
- If the United Boulevard Extension is constructed, bicycle and pedestrian facilities should be provided from the intersection with Canfor Avenue to the Coquitlam border. For the section from Canfor Avenue to Brunette Avenue, pedestrians and bicycles can be directed to existing at-grade facilities along Braid Street, and along the Brunette Fraser Greenway;

* The Long-Range Transportation Study has not been approved by New Westminster City Council

- Good pedestrian linkages should be provided between SkyTrain stations and Brunette Creek developments. This could include a crosswalk, stairway or elevator for the Sapperton station, and improved facilities at the intersection of Braid Street and Brunette Avenue; and,
- End-of-trip facilities should be provided for cyclists at the new SkyTrain stations.

3.2 Synergies and Conflicts with Land Use and Environmental Components

In consultation with the other team members, the synergies and conflicts with the Land Use and Environmental components were identified. These synergies and conflicts are discussed in greater detail in the Industrial Lands Report.

Synergies:

- The industrial land use plan should allow for higher density within 800 metres walking distance of SkyTrain stations to increase potential ridership. This is more likely to be accomplished with Industrial Land Options 3 and 4;
- Measures to reduce delay at the intersection of Brunette Avenue and Braid Street or to provide alternatives to this intersection must be implemented before additional development can occur;
- The Brunette Fraser Greenway, Waterfront Greenway and SkyTrain stations, when completed, will be amenities that improve access to the Brunette Creek neighbourhood.

Conflicts:

- The proposed alignment of the Brunette Fraser Greenway may cross the proposed signalized intersection of the United Boulevard extension with Canfor Avenue. Adjustments to the alignment of this Greenway may be necessary;

- The proposed alignment of the Brunette Fraser Greenway, bus underpass and railway may be competing for the same right-of-way;
- Waterway setbacks are discussed in detail in the [Environmental Report](#). Based on these guidelines the Brunette Fraser Greenway should be constructed outside of the riparian zone of Brunette Creek. However, if the Greenway is constructed of a permeable material, and if the provision of a Greenway provides an improved aquatic environment over the status quo, then it may be possible to construct the Greenway within the riparian zone;
- Geotechnical and environmental concerns along the proposed alignment of the United Boulevard Extension may impact route design and may increase the overall construction cost.

3.3 Evaluation of Options

The Industrial Land Use option that is selected will have a significant impact on the transportation requirements of the Brunette Creek Neighbourhood. A preliminary evaluation was conducted of the three viable road network options developed above, and the results are summarized in TABLE 3.2. The levels of development that could occur with each option, and relative cost, were also assessed.

The intersection of Braid Street and Brunette Street currently experiences significant delays due to the volume of vehicular traffic, and to train operations. These delays may be a deterrent to businesses that would otherwise choose to locate in the Brunette Creek Neighbourhood. Even without any additional development in the Brunette Creek Neighbourhood, delays are likely to increase at the intersection of Braid Street and Brunette Avenue due to the growth in background traffic. As delays increase, so does the impact on existing businesses due to lost time, resulting in increased transportation costs.

TABLE 3.2 EVALUATION OF ROAD NETWORK OPTIONS

ROAD NETWORK	POSSIBLE LAND USE OPTIONS	COST	ADVANTAGES	DISADVANTAGES
Do Minimum	1 (Status Quo)	Low	<ul style="list-style-type: none"> - Low infrastructure requirements mean low impact on the physical environment. 	<ul style="list-style-type: none"> - Railway operations will continue to delay trucks and cars. - Does not improve connections to regional network.
Improve Existing Accesses	1 or 2	Medium	<ul style="list-style-type: none"> - Some reduction in delay at Braid Ave./Brunette Street. - Improved access to area east of Brunette Ave. 	<ul style="list-style-type: none"> - Railway operations will continue to delay trucks and cars. - Does not improve connections to regional network.
United Boulevard Extension	1,2,3 or 4	High	<ul style="list-style-type: none"> - Improved connections to regional network. - Reduction in delay at Braid Ave./Brunette St. - Elimination of railway delays. 	<ul style="list-style-type: none"> - Reduced access to west. - Increased through traffic in the area east of Brunette Avenue. - Possibly increased through traffic in Sapperton residential area. - Significant land acquisition, including Burlington-Northern offices.

The United Boulevard Extension provides additional capacity, reduces train delays and improves access to the Brunette Creek Neighbourhood better than the other options. It is the only option that is likely to accommodate the additional traffic generated by Land Use Options 3 or 4. It also is the most expensive of the options. The United Boulevard Extension provides significant additional capacity, and consequently additional through traffic as well as improved access to the Pacific Reach and Maillardville areas of Coquitlam. With this option, care must be taken to discourage through traffic in adjacent residential neighbourhoods.

Residents of the Sapperton Area have also indicated their concern that the United Boulevard Extension be designed to have minimal visual impact on their neighbourhood.

The other two options, Do Minimum, and Improve Existing Accesses, are much lower cost. As these two options provide little additional capacity, they can only support Land Use Options that have lower trip generation rates, such as Option 1 or 2. In particular, it will be difficult to significantly improve operations at the intersection of Braid Street and Brunette Avenue. Without mitigating existing delays at this intersection, it will be difficult to accommodate the additional traffic that would be generated by the development of the Beutel-Goodman site located in the northwest corner of the intersection of Brunette Avenue and Braid Street. If the City decides to pursue the construction of the United Boulevard Extension, the Do Minimum Option could be considered as interim measures to improve access until the Extension is constructed.

3.4 Implementation Strategy

The following steps should be included in the implementation strategy for the preferred Transportation Option:

Develop Functional Plan of Required Road Network

Once the preferred Industrial Land Option is confirmed, the City should develop a functional Plan of the Required Road Network. This should confirm the enhancements to the existing accesses as well of the modifications to the street network. Impact on other transportation modes, such as the railway operations and access, transit operations, pedestrians and cyclists should be confirmed.

Develop Traffic Calming Plan for the Lower Sapperton Neighbourhood

With development of the Beutel-Goodman site, southbound traffic exiting at Rousseau Street may wish to avoid delays at the intersection of Brunette Avenue and Braid Street by diverting through the Lower Sapperton Neighbourhood.

If the United Boulevard Extension is constructed, traffic from the Brunette Industrial Neighbourhood will no longer be able to proceed westbound on Braid Street. Traffic from the Neighbourhood, and even from the United Boulevard extension may divert at the intersection with Canfor Avenue, through to Spruce Street, and then through the Sapperton Neighbourhood to proceed westbound.

The implementation strategy should include further identification of shortcutting that may occur, and should identify mitigation measures such as diverters, street closures, a network of one-way streets, turn restrictions, or truck restrictions.

Internal Road Network for the Brunette Creek Industrial Area

The internal road network for the Brunette Creek Industrial area should be determined in conjunction with the confirmation of the land use and parcel sizes. Two areas require additional access most: the area south of Spruce Street, and the Canfor Parcel. Two internal network styles are possible, either grid-style, or sub-division style (with cul-de-sacs). Some of the advantages and disadvantages of the two styles are summarized in TABLE 3.3. The compatibility of the styles with the land use options outlined in TABLE 3.1 is also discussed.

As the internal road network is determined, other issues that should be addressed are summarized below:

- Older roadway sections should be rebuilt to urban cross-section; and,

- Integration of the existing network with United Boulevard Extension (if constructed) will require attention to intersection design, and intersection spacing. This project may be a candidate for a safety audit.

TABLE 3.3 COMPARISON OF FUTURE STREET NETWORK STYLES FOR THE BRUNETTE CREEK AREA

	INTERNAL ROAD NETWORK STYLE	
	GRID	SUB-DIVISION
Advantages	-Provides smaller, more pedestrian-friendly blocks	-Less costly -Allows for larger land parcels
Disadvantages	-Structures required to cross Brunette River, Brunette Creek Diversion -More land devoted to infrastructure	-Supplemental pedestrian network would be required to improve access to SkyTrain, the Greenways and the Fraser River -Results in higher vehicle-kilometres traveled
Land Use Options	-Mix of Light Industry and Offices (3) -Office emphasis (4)	-Status Quo (1) -Light Industry (2) -Mix of Light Industry and Offices (3)

An urban cross-section includes sidewalks, curb and gutter, and adequate streetlighting. If redevelopment of the Brunette Creek Neighbourhood is expected to occur in the short term (less than 10 years), the roads should be upgraded to an urban cross-section as a requirement of rezoning and financed through Development Cost Charges.

If the redevelopment is expected to occur in the longer term, the City may wish to quantify pedestrian and bicycle demand once the Millennium SkyTrain is operational. This information could then be used to undertake a sidewalk/urban standard prioritization program. The program could follow a method that considers up to nine separate characteristics of a section of roadway to estimate the likelihood of walking. It also assigns a deficiency index, which measures the exposure of pedestrians to risk or inconvenience due to the lack of adequate pedestrian facilities. The priority of upgrading the road network in the Brunette Creek Neighbourhood could then be quantitatively compared to other areas of the City of New Westminster.

A sample of a sidewalk prioritization evaluation conducted by Hamilton Associates for the City of Kelowna is provided in APPENDIX C.

Traffic Impact Study for the Beutel-Goodman Site

A traffic impact study would be required for any major new development on the Beutel-Goodman site. The impact study should address access requirements, changes to layout and control of adjacent intersections, and, as discussed above, impact on and mitigating measures for the Sapperton neighbourhood.

APPENDIX A

INPUT FROM THE BRUNETTE CREEK STUDY ADVISORY GROUP

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APPENDIX A

INPUT FROM THE BRUNETTE CREEK STUDY ADVISORY GROUP

Transportation

Question 1:

What improvements would you like to see to transportation in this area to enhance the neighbourhood?

Brunette Creek Study Advisory Group responses:

- Access/egress (neighbourhood and City, especially from the west);
- Transit does not help movement of goods (e.g., from New Westminster to Coquitlam, Surrey, etc.);
- Poor access at rush hours, blocks exits;
- Poor emergency services;
- Integrate with the rest of the GVRD network;
- Lack of SFPR;
- No sidewalks. However, depends on future use. Not necessary if industrial base?
- Sidewalks, bikes won't replace capacity for vehicles.;
- Long range plan-uncertainty?
- Can the rail lines be moved?
- Pedestrian and cycling access will be safer with redevelopment because of people presence.
- Better motor vehicle access, especially with respect to railway related delays.
- Signalling issues: requirement for horn at a level crossing.
- Brunette Avenue /Columbia Street bottleneck
- No access to Brewery station and industrial area (and to hospital).

Question 2:

What are the current problems with transportation (e.g., roads, transit, sidewalks, and truck access) in the neighbourhood? Why?

Brunette Creek Study Advisory Group responses:

- Too few crosswalks
- No access for bikes/pedestrians
- 23 minutes to turn left onto Braid Street
- Access into area (because of rail line)

APPENDIX B

REFERENCES

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APPENDIX B - REFERENCES

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**APPENDIX C PEDESTRIAN PRIORITIZATION METHOD FROM THE CITY
OF KELOWNA**

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APPENDIX C PEDESTRIAN PRIORITIZATION METHOD FROM THE CITY OF KELOWNA

Sidewalk Priority Index

The Sidewalk Priority Index was used to prioritize sidewalk needs along all arterial and collector roads in Kelowna on a block-by-block basis. Only blocks that currently have sidewalks on both sides were excluded. A total of 782 blocks were evaluated.

The results were ranked to determine the order in which the sidewalk should be provided.

A sample of the form used to collect the Sidewalk Priority Index data is shown in FIGURE C.1.

The Sidewalk Priority Index represents the sum of two sub-indices:

- The Pedestrian Potential Index; and
- The Deficiency Index.

Pedestrian Potential Index

The Pedestrian Potential Index measures the potential for pedestrian trips to occur on the block. It is a function of nine separate characteristics of the block, all of which have been shown to increase the likelihood of walking.

Higher points (indicating an increased likelihood of walking) are assigned in each category as follows:

- Urban centres and commercial areas;
- Routes currently used for walking (for example, as shown by a footpath);
- Proximity to schools;
- Proximity to other destinations and to bus stops;
- A balanced mix of residential and commercial land use;

- Employment within walking distance; and
- Interesting features such that walking is more enjoyable (such as a beach).

The number of points (weighting) allocated to each characteristic was based on the weighting developed through extensive research done by the City of Portland, and customized using staff and stakeholder input to suit Kelowna.

A maximum of 29 Pedestrian Potential Index points can be allocated to each block.

Deficiency Index

The Deficiency Index measures the exposure of pedestrians to risk or inconvenience due to the lack of adequate pedestrian facilities.

Deficiency scores are a function of seven separate block characteristics, primarily related to the physical and traffic attributes. Higher points are assigned (indicating a greater barrier to walking) in each category as follows:

- Lack of sidewalk;
- High risk of a crash between an automobile and a pedestrian;
- High vehicle speed on the roadway;
- High traffic volumes on the roadway;
- Wide road, as measured by the number of lanes;
- Long block or road segment length; and
- Recorded public concern.

For example, more points are assigned when the traffic speed is high, the traffic volume is high, the road is wide, the street segment is long, and the risk of crashes is high. A block that already has a sidewalk along one side is assigned fewer points than a block that currently has no sidewalk on either side. As well, points are awarded when public concerns have been expressed about the lack of adequate pedestrian facilities within the block.

A maximum of 46 Deficiency Index points can be allocated to each block, for a maximum Sidewalk Priority Index score of 75 points.

CITY OF KELOWNA PEDESTRIAN FACILITY INVENTORY

Street: ABBOTT ST.
 From Street: BIRCH AVE. NSE N To Street: FRANCIS AVE. NSEW S
 Road Class: COLL. Segment No: 13
 Length: 100 metre Unit Cost: \$80.00 per metre Cost Estimate: \$4,000.00
 Description of Roadway: ROAD CURVES

Input For Potential Index:

		Maximum
Commercial Land Use:	<u>0</u> 7 = City Centre, 6 = Town Centre, or 5 = Other Commercial, otherwise 0	7
Transit:	<u>0</u> 2 = Transit Route, otherwise 0	2
Existing Walkway:	<u>0</u> 2 = Existing walkway (for example a foot path), otherwise 0	2
Elementary School Proximity:	<u>3</u> 4 =< 0.5km, 3 = 0.5km to 0.9km, 2 = 1.0km to 1.4km, 1 = 1.5km to 2.0km	4
Middle/Senior School Proximity:	<u>2</u> 4 =< 0.5km, 3 = 0.5km to 0.9km, 2 = 1.0km to 1.4km, 1 = 1.5km to 2.0km	4
Other Destinations within 0.5km:	<u>2</u> 2 = Pedestrian Friendly Commf <u>0</u> +2=Bus Stop <u>0</u> +2=Park <u>2</u>	6
Residential / Employment Mix:	<u>1</u> 2 = 50/50, 1 = Either Residential or Employment Dominant within 0.5km Radius	2
Employment in Walking Distance:	<u>1</u> 2 = Employment < 0.5km, 1 = Employment is 0.5km to 1.0km , otherwise 0	2
Local Interest:	<u>2</u> 2 = High Interest/Scenic (ie. a beach), 1 = Medium Interest/ Pleasant Environment	2
Pedestrian Potential Index	<u>12</u>	29

Input For Deficiency Index:

		Maximum
% of Sidewalk in Place:	<u>2</u> 5 =None, 4 =1-24%, 3 =25-49%, 2 =50-74%, 1 =75-99% 0=100 (% of Both Sides)	5
Vehicle/Pedestrian Crash Risk:	<u>7</u> Proportion (E+P) by multiplying by (10/6) Exposure, 1-3: <u>0</u> +Probability, 1-3: <u>0</u> 10	10
Posted Traffic Speed:	<u>2</u> 5 => 80kph, 4 = 70-79kph, 3 = 60-69kph, 2 = 50-59kph, 1 = 40-49kph	5
Daily Traffic Volume, 2 - Way:	<u>1</u> 5 => 20,000, 4 =15,000-19,999, 3 =10,000-14,999, 2 =5,000-9,999, 1 =2,000-4,999	5
Road Width:	<u>2</u> Number of Through Lanes, Both Directions, including Parking. Use 6 for > 6 lanes	6
Street Segment Length:	<u>1</u> 5 => 300m, 4 = 240m-299m, 3 = 180m-239m, 2 = 120m-179m, 1 = 60m-119m	5
Public Concerns:	<u>5</u> 5 = Formal Request <u>5</u> + 5 = High Proportion of Vulnerable Users <u>0</u>	10
Deficiency Index	<u>20</u>	46

Comment: _____
 Office Data Input By: T.Y.
 Field Data By: _____
 Ranking:
 Total Points 32
 Maximum Total Points: 75

FIGURE C-1 SIDEWALK PRIORITY INDEX DATA CAPTURE FORM