Greater Vancouver Transportation Authority

VANCOUVER/UBC transit plan

July 2005

Acknowledgements

The Vancouver/UBC Area Transit Plan was developed with valuable contributions from the following groups of people:

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Front Line Transit Operators Advisory Committee: Jim Houlihan, Dale Laird (CAW); Andy Ross (COPE); Norm Hill (CUPE).

Steering Committee Members : Geoff Atkins (UBC); Glen Leicester, Chair; Robert Paddon, (TransLink) ; Councillor Fred Bass, Tom Timm, and Pat Wotherspoon (City of Vancouver)

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Section

S Executive Summary

S.1 Background

The Area Transit Planning Program divides the Greater Vancouver Regional District (GVRD) transit service area into seven sub-areas to better involve communities in the development of transit service plans that are responsive to local concerns and objectives. These area transit plans identify service needs and priorities within a five year horizon. TransLink, the City of Vancouver and UBC initiated the Vancouver/UBC Area Transit Plan (VUTP) in April 2004. The VUTP addresses the transit needs of the City of Vancouver, UBC and the University Endowment Lands in recognition of the integrated nature of travel in these independently governed areas.

The VUTP was undertaken by a project team comprised of staff from TransLink, Coast Mountain Bus Company and the City of Vancouver. The team was located at the City of Vancouver premises for the duration of the planning process to foster closer liaison with stakeholders and staff. The project team, headed by TransLink, was directed by a Steering Committee with membership from the City of Vancouver, UBC and TransLink.

The VUTP marks the first such plan developed with the benefit of Automatic Passenger Count (APC) ridership data, which provided solid technical basis for staff analysis. The development of the VUTP also included an extensive consultation component. Outreach included numerous open houses, workshops, an interactive website and broad public opportunities for sharing their comments through written mail, email, and on-line feedback forms. This public process was modelled after similar City of Vancouver public involvement strategies, and was larger than any undertaken for previous Area Transit Plans. The plan recommendations address issues and opportunities identified through both the technical analysis and the input received from the various stakeholders participating in the process.

S.2 Overview

The Vancouver/UBC Area Transit plan process represents the most comprehensive review of existing transit service and future requirements within the City of Vancouver and the University of British Columbia in many years. Implementation of the recommendations contained within this plan, together with the addition of the RAV line in the same time period, will result in a significant improvement in the quality, quantity, and reliability of Transit service in the City. Fully implemented, the plan recommendations will bring transit service within the City fully up to the level of TransLink's Transit Service Guidelines, while accommodating a forecasted 20% growth in ridership.

S.3 Public Consultation

The extensive public process employed in developing the VUTP is summarized in Attachment 4 – Summary of Public Consultation Events. The public involvement and communication strategies were based on the following objectives:

- to communicate the goals and scope of the VUTP to the public to help them participate effectively;
- to allow the public to participate in the plan's development in a fair and credible manner;
- to create a plan that has widespread community support, and;
- to build on and mobilize on-going public interest in improving transit.

The VUTP consultation is categorized into the following groups:

1) Public Advisory Committee (PAC)

2) Special-interest stakeholder groups

3) Transit Operators

4) SkyTrain Attendants

5) General public

1) **The PAC:** TransLink requested that the UEL administration, UBC and the City of Vancouver appoint residents to a Public Advisory Committee to be charged with providing procedural and substantive guidance to Staff in the preparation of the VUTP. Vancouver Council selected 22 members to form the PAC. The UEL appointed one person, and UBC added 2 persons. Vancouver Councillor Dr. Fred Bass was appointed Council Liaison and chaired the PAC. In the course of a year, 14 facilitated meetings were held to discuss specific Plan topics as well as allow for open forums. Technical Report #3: Public Advisory Committee Report provides a summary of PAC input to the plan (Attachment #5).

2) **Stakeholders:** Interspersed between PAC meetings and the larger-scale Community Open Houses and Workshops, were smaller-scale presentations and meetings conducted by Staff for specific stakeholder groups. In some cases, staff piggybacked on scheduled meetings to present information about the VUTP and to receive comments. In other cases, Staff targeted specific groups which may not otherwise have gained sufficient representation at the larger public events.

3) **Transit Operators:** TransLink conducted two focus group meetings with Coast Mountain bus operators to gain a better understanding of customer and operations issues from their perspective, as well as receive their opinions about potential service improvements. The focus group work is published as Technical Report #6.

4) **SkyTrain Attendants:** A focus group of SkyTrain attendants was conducted to gain appreciation of their perspective on issues related to SkyTrain, the integration of SkyTrain with the bus system and overall customer issues. The result of this work is contained in Technical Report #6.

5) **The General Public:** was consulted through market research surveys, ongoing customer satisfaction surveys, web page and email/electronic submissions and the public meetings held specifically for this plan.

In addition to the focus groups held with subsidiary staff, the City of Vancouver formed a “Front Line Transit Operators Advisory Committee (FLTOAC). The FLTOAC comprised four transit operators representing CAW Local 111, COPE 378, and COPE Local 7000, and was Chaired by Councillor Bass. This group met on 7 occasions and provided their comments directly to Vancouver Council.

Public interest in the VUTP public involvement process and plan proposals was very high as indicated by the turnout at the public events, the volume of written and electronic responses, and the comprehensive range of topics represented. Overall, it is estimated that about 5,000 people participated in the public process, reflected varying degrees of satisfaction with the existing transit system, and many suggestions for improvements. An additional 2,800 GVRD residents participated in the market research and provided a rich data set for staff reference. The market research results are available as Technical Report #4: Vancouver UBC Area Transit Plan Research.

The Community Open Houses, Public Workshops, and stakeholder meetings were the main public forums organized to support the objectives and involvement strategy. A Comments Workbook coupled with the display boards at the public events provided the key tools to receive public input. The VUTP website allowed for remote learning and contribution. Written and electronic submissions were also received from the public.

The public events were scheduled at public gathering places throughout the City and UBC (i.e., community centres and shopping malls). A "Comments Workbook" containing 20 pages of illustrations, descriptions and a response sheet with a postage-paid envelope was distributed to 500 individuals and stakeholders. The Workbook could also be completed online. Some of the questions received over 500 responses altogether.

The Open House display boards followed the same format as the Comments Workbook. The public could interactively "vote" their opinions and write their comments on sticky notes. A detailed summary of the public consultation is contained in Technical Report #2: Public Involvement Summary.

S.4 Key Issues, Findings and Recommendations

Overall, the public comments were wide ranging and reflect varying degrees of satisfaction with the existing transit system. The Technical Reports for the Public Advisory Committee and the Public Consultation contain almost 100 pages of comments, ideas, and concerns. There were many passionate comments reflecting the sentiment that transit service is integral among the qualities that make up good urban life. The comments from the open houses, workshops, workbook, and e-mail submittals provide evidence that targeted improvements to bus services could provide

leverage to improving the overall transit-riding experience for existing customers and also help attract new customers.

S.4.1 Capacity

Crowding was raised as an issue especially with respect to the bus system, although issues with SkyTrain were also noted. Overcrowding on buses in the peak periods, evenings and weekends were noted. Some customers also wanted to see more frequent buses during the evenings and weekends.

TransLink's Transit Service Guidelines were employed as evaluation criteria to review the ridership data available from the Automatic Passenger Counters. This data represented a comprehensive source of ridership information on all Vancouver and UBC routes for the period September 2003 to April 2004. As outlined in the VUTP Summary Report, a number of bus routes in Vancouver and UBC exceed the comfort (crowding) guidelines at some point in the day. This finding matches the concerns expressed by some customers. The plan makes high priority recommendations to increase the level of service on all routes that are not compliant with the frequency and the comfort guidelines.

S.4.2 Reliability

A number of route specific and general comments were received about service being unreliable. Reliability seemed to be more of an issue during daytimes on weekdays and weekends when congestion is high and there are fewer parking bans and other traffic management regulations in effect on major transit routes in the City. Customers indicated that unpredictable travel times and connections create stress.

The factors that contribute to travel time and delay include overall traffic conditions, the number of traffic signals, the number of bus stops and time required for boarding and response to traffic incidents. The VUTP makes four main recommendations to alleviate reliability issues:

- That bus stop spacing be reviewed for to balance efficiency and access.
- That all door boarding be permitted in locations with consistent high volumes of passengers and on B-Line routes.

- That Coast Mountain Bus Company pilot new methods of scheduling and service monitoring to better respond to traffic conditions.

- That the City of Vancouver and TransLink implement a range of traffic management and transit priority measures to reduce delays to transit and increase service reliability.

S.4.3 Vehicles & Bus Stop Infrastructure

The comments also revealed that people are sensitive to vehicle noise, bus cleanliness, air circulation, bus shelters, and accessible bus stops. The physical environment that connects the different modes of travel is another factor affecting user satisfaction. Several comments suggested that the modal interface encountered by the pedestrian/cyclist-turn-transit passenger needs to be re-examined in light of an ageing and more active population in the city (and region). The availability of bicycle racks and lockers, connecting bicycle paths, and weather-resistant shelters are examples of what the public desires in infrastructure that supports access to the transit system.

The plan notes the concerns expressed and makes recommendations for improved vehicle procurement, shelter design, the continuation of the bicycle program for better intermodal integration, as well as support for accessibility improvements for those people with disabilities.

S.4.4 Customer Information

The need for relevant and accessible information was also mentioned. To the public, it is unacceptable that route maps, wayfinding signage and schedules are not available at all transit facilities. The automated voice information system was criticized as not user friendly, and specific limitations of customer information on the corporate website were noted. The plan makes recommendations for TransLink to undertake a review and plan for correcting deficiencies in accessibility and signage.

S.4.5 Future Growth and New Service Requirements

Travel patterns in Vancouver have changed over the last few years with the growth of the UBC student population and the introduction of U-Pass, the growth of employment outside the downtown, and the growth of other public and private post secondary institutions. Growth in the downtown population has increased reverse commuting. Future travel patterns forecast to become more dispersed as redevelopment occurs in conjunctions with the RAV opening and major

new development sites such as the Southeast False Creek, Oakridge, Hastings Park and Marine Drive.

The north-south transit network is mostly complete and the plan makes recommendations to accommodate growth in these corridors by increasing service levels to meet demand, and to deploy articulated vehicles when needed. The bus route network across east-west corridors in the City is less developed, and the plan suggests that new routes are needed to accommodate future travel demand.

Specifically, two new routes are recommended:

- # 33 from 29th Ave. SkyTrain station along 33rd Avenue, Cambie and 16th Avenue to UBC; and

- #46 from Millennium Line VCC Station opening in 2006 to UBC along Great Northern Way, 2nd Avenue (connecting to RAV), along 6th Avenue, to 4th Avenue and out Chancellor Boulevard to UBC.

Further the plan recommends changes to existing corridors to accommodate demand growth:

- That the #43 peak-only, limited-stop service on 41st Avenue be replaced by the #91 B-Line to connect key destinations along the City's second busiest east-west bus corridor with a frequent, all-day limited-stop service.

- That the current #135 service be upgraded to B-Line standards (#95 Hastings B-Line) to provide faster, more reliable limited-stop service in the Hastings corridor between downtown Vancouver and SFU's Burnaby Mountain Campus.

There are also some significant route changes recommended to accommodate future growth and make more efficient use of existing resources. The following changes will result in improved service reliability and better access for some residents:

- The #3 Main route be shortened and operate between a terminus in Chinatown and Marine Drive;

- The #44 Downtown/UBC limited-stop route operate on Cornwall/Point Grey Road to Macdonald and west on 4th Avenue to provide additional service on Cornwall/Point Grey Road to downtown and UBC; and

- The #4 Powell and the #16 29th Avenue Station routes be combined, such that the #16 would route via McGill and Powell, adding trolley service on Renfrew between Hastings and McGill opposite Hastings Park.

With the growth in transit ridership anticipated, the plan recommends the following minimum service frequencies be implemented on all City of Vancouver bus routes by 2010.

Exhibit S-1 Minimum Service Frequencies for VUTP routes

Time period	Primary local routes	Secondary local routes
Peak periods	10 minutes or better	12 minutes or better
Midday (weekday and weekend)	10 minutes or better	15 minutes or better
Early evening (until 9:30 p.m.)	15 minutes or better	20 minutes or better
Late evening (after 9:30 p.m.	20 minutes or better	20 minutes or better

(Secondary local routes include the #25 (weekends), #26, #27, #28, #29, #50 and #100.)

S.4.6 New Community Shuttles

Community Shuttles are currently operating in the West End providing a links to Yaletown. The Plan recommends that this route be extended to Main St. SkyTrain station and have longer hours of service due to the demand for evening activity in this area.

New Community Shuttle routes are recommended for UBC to link newly developing neighbourhoods with the main bus services, and to connect with the peripheral destinations such as the Botanical Gardens, and Museum of Anthropology. A new Community Shuttle route is also proposed as part of the RAV integration to serve the Cambie/Oak medical precinct.

S.4.7 Integration with RAV

The VUTP consulted with the public on how bus routes should integrate with RAV and found that many people supported integration of parallel trolley services on Granville, Oak, and Main at the

Marine Drive RAV station. Opinions were less unanimous about terminating routes at the Broadway/City Hall RAV station. The Plan recommends that only the #17 Oak bus terminate at the Broadway/City Hall RAV station rather than continue downtown since the majority of customers are likely to transfer to RAV.

Cambie Street bus (the #15) ridership is predicted to be significantly lower once RAV opens, such that service would be at most every 15 minutes with a trolley bus. The Plan recommends that TransLink consult further with the residents and businesses within walking distance of bus services (450 metres) on the Cambie corridor to review the opportunities for introducing a smaller vehicle type and maintaining a more frequent service on the #15 Cambie/Downtown route. The intent would be to explore the potential of using a low floor, low emission, low noise mid-sized vehicle instead of a less frequent full-size trolley bus service. This outcome of this process would be reported back to the Board by the end of 2006 for a decision regarding vehicle type and the necessity of reinstating trolley overhead on Cambie following RAV construction.

A community shuttle route is proposed to connect the hospital districts and neighbourhoods between the Broadway/City Hall RAV and Oakridge RAV stations. Public consultation on this route was very positive, however, the exact routing of the bus received varied comments. It should also be reviewed along with the Cambie St. service options.

S.4.8 Future Direction

The Vancouver/UBC Area Transit Plan makes recommendations which will affect the use of many streets, require additional trolley overhead, and require a continued involvement with the City. Several recommendations are included in the Plan to ensure consistent attention to the transit network over the next few years. In addition to the consultation for the Cambie Street service, other key issues to be addressed specifically by TransLink are:

The Broadway Corridor: The Broadway corridor handles in excess of 60,000 daily riders on multiple bus routes. While service has been added to keep pace with demand, especially on the #99 B-Line, bus congestion is becoming an issue. This corridor has been identified as a priority for a high capacity transit system, and the plan recommends that TransLink commence planning work on a future West Broadway extension by the end of 2006.

Implementation Plan for All Door Boarding: The plan recommends that TransLink work with Coast Mountain Bus to create a policy for all door boarding and present this to the Board for approval as soon as possible. The highest priority routes are the #98 and #99 B-Lines.

East FraserLands, UBC Developments: Continued monitoring of the phasing of development for these two emerging neighbourhoods will be necessary to ensure that transit planning is synchronized with significant residential growth.

S.5 Conclusion

The recommendations of the Vancouver/UBC Transit Plan are based on a vision for 2010 where travel by transit to and within the area is more viable and competitive than it is today. The existing bus network will be improved with increased frequencies and the addition of new routes that provide more travel choices. The introduction of RAV service will substantially improve travel time and reliability for many regional and local transit trips, in addition there will be noticeable improvements to downtown Vancouver streets where suburban diesel buses currently operate. The City of Vancouver has an opportunity to make choices about the road network to increase the accommodation of transit services.

By the end of 2009, the City of Vancouver and UBC will have high capacity and rapid transit to the most significant destinations including three rail rapid transit lines (Expo, Millennium and RAV Line). Transit trips in an east-west direction will be improved dramatically with the addition of new B-Line rapid bus service on Hastings and 41st Avenue, and new cross-town services along East 33rd and West 16th Avenue and on Great Northern Way, 2nd Avenue and 4th Avenue.

These service changes will result in 99% of Vancouver and UBC residents being within a 450 m walk of 10 minute or better peak bus service, and one-third of the resident population will be within one kilometre of a rail rapid transit station. In addition to bringing the Richmond Airport Vancouver Line into service in late 2009, TransLink will invest over $23 million (17.5% increase over 2004) in new or enhanced bus service for Vancouver and UBC annually.

Hours of service for the bus system will increase by over 19%, adding capacity for at least 20% more riders on the network. Overall, the plan will further increase transit accessibility in the core of the region, supporting municipal and regional goals to improve liveability and protect the environment.

Exhibit S-2 Anticipated results and resource requirements

Measure	2004	2010 Projection	Change
Route Kilometres in City of Vancouver			
Bus & City/Community Shuttle	438	446	+1.8%
Accessible Bus (Wheelchair & Bike Rack)	251 (57%)	446 (100%)	+78%
Rapid Transit	10.9	21.8	+100%
Population with Walk Access (% of Total Population)			
To 10-minute or Better Peak Bus Service	513,000 (88%)	618,000 (99%)	+21%
To a Rapid Transit Station (1 Km)	121,000 (21%)	216,000(35%)	+79%
Peak Vehicles			
Conventional Buses	387	428	+10.6%
City/Community Shuttle	8	26	+325%
Rapid Transit Cars (Full System)	180	246	+37%
Annual Boardings (millions)			
Bus (Inc. B-Line & Community Shuttle)	101.6	121.9	+20%
B-Line	11.8	16.5	+40%
Rail Rapid Transit (SkyTrain & RAV)	34.2	68.4	+100%
Annual Bus Passenger-km (million)	**424.9**	**442.9**	**+4.2%**
Bus Financial & Efficiency Measures			
Annual Bus Service Hours (thousands)	1,707	2,044	+19.7%
Annual Bus Operating Costs (millions)	$133.2	$156.7	+17.6%
Bus Boards/Bus Service Hour	59.5	59.8	+0.5%

Section

1 Introduction

1.1 Background

During public consultation leading to the creation of TransLink and the Program Plan in 1999, a key point raised by municipalities and stakeholder groups was the need for a stronger community and municipal focus for all of TransLink's transit services: bus, West Coast Express, SkyTrain and SeaBus. As well, the issue of developing future transit service changes through a process that incorporated broader community input was raised as an important concern by the municipalities and the general public. TransLink has adopted the development of Area Transit Plans for seven sub-regions of the GVRD and a renewal process for updating these plans every three to four years as a means of addressing community and municipal council priorities.

1.2 Scope

This TransLink Area Transit Plan (ATP) covers the City of Vancouver, the University of British Columbia and University Endowment Lands sub-region of TransLink's transportation service area. The approved Vancouver/UBC Area Transit Plan will guide TransLink's allocation of resources to deliver a package of transit services, related programs, and infrastructure for the 2005-2010 period, including the integration of bus services for the opening of the Richmond-Airport-Vancouver (RAV) rapid transit line in 2009. It will also guide the City of Vancouver's and UBC's commitment of resources to foster and expedite the successful implementation of the plan.

The scope of the Vancouver/UBC Area Transit Plan (VUTP) is weighted toward the future delivery of transit services and related operational and service policies. In addition, the plan also addresses broader transportation issues such as:

1. Transportation demand management (TDM) and social marketing, especially directed to employers, retailers, large institutions, and the sports/entertainment sector;

2. The pedestrian interface with transit services;

3. The bicycle interface with transit services; and,

4. The accommodation of bicycles, wheelchairs, strollers and packages on transit services.

TransLink's 2005-2007 Three Year Plan & Ten-Year Outlook defines the overall financial resources available to the Vancouver/UBC ATP as well as the priorities assigned to other service improvement projects contained outside Vancouver/UBC. The purpose of the area transit plan is to identify transit service needs based on overall demand, and how demand will change in the coming five years.

1.3 Objectives

Area Transit Plans are intended to have a strong community and municipal focus throughout the process including consultation with all major stakeholders. To accomplish this objective for the Vancouver/UBC Plan, active participation and input by the City of Vancouver and UBC/UEL residents was an integral component in the development of the Plan. TransLink wishes to see a strong alignment of the ATP with the Transportation and Land Use Plans developed by the City of Vancouver and UBC.

The main objectives of the Vancouver/UBC ATP are to:

1) **Identify current and future transit opportunities:** Clearly identify existing and longer-term travel and land use/development patterns using data from the Trip Diary study, land use plans, general transportation and traffic data, market research surveys, recent transit ridership data and surveys, and recently completed municipal transportation studies (e.g. City of Vancouver Transportation Plan and Downtown Transportation Plan, specific corridor studies, and UBC Campus Transportation Plan and Official Land Use Plan). This exercise is to identify the transit markets and ridership objectives for focusing future service improvements.

2) **Review existing services:** Automated Passenger Count data as well as customer feedback is used to review and report on the performance of the existing transit services with a view to identifying potential changes to:

   - Services in corridors or segments where demand exceeds capacity (consistent over-crowding and pass-ups), and where demand is changing and ridership is growing rapidly or where under-served markets could be served with new service designs; and

   - Under-performing services where cost effectiveness or productivity could be improved through changes to the route or schedule design (i.e. streamlining

services) or where alternative service types may be appropriate (e.g. Community Shuttle), in order to increase cost-effectiveness.

- Areas which are appropriate for new services in order to reach strong and growing markets.

3) **Identify Opportunities to Improve Reliability and Transit Travel Time:** Abundant market research exists which suggests that travel mode choice is highly influenced by knowledge of alternative modes, the convenience of access, reliability and speed of travel. In order for transit to become a preferred mode choice the service needs to be easily accessible, understood, reliable and fast. The plan recommends measures specific to each corridor that present the greatest opportunity for improving time savings, reliability and ridership.

4) **Develop Recommendations for Service Improvements-** The ATP provides detailed recommendations for implementing service improvements in the short to medium-term (2005-2007), and identifies longer term (2008 to 2010) priorities for further service enhancements. The ATP identifies priorities for improvements, target markets, and develops a staged service improvement strategy within the context of TransLink's 3 Year Transportation and Financial Plans and the Ten Year Outlook.

Specific recommendations address the following areas:

1. **Service Strategy:** Recommendations for the timing, routing, hours of operation, service levels, complementary operational measures for improved reliability of existing and new services. The strategy will also identify the actions to successfully implement and support the recommended transit service improvements including:

   - Suggest transit priority measures to support the recommended service improvements

   - Infrastructure requirements such as new or expanded transit exchange facilities, trolley overhead changes, roadway geometric changes and bus stop changes.

2. **Bus Integration Plan for the RAV line-** Specific plans and recommendations for integration of Vancouver/UBC bus services with the new Richmond/Airport-Vancouver rapid transit line.

3. **Bus Rapid Transit Services (BRT):** Plans and recommendations for changes to the existing B-Line services operating in the City of Vancouver/UBC and introduction of future BRT services, using as background results from TransLink's Rapid Bus Vision and Strategy.

4. **Trolley and Bus Network:** Plans and recommendations for changes to existing Trolley and city bus routes and for the introduction of new city routes as needed to ensure the network operates in an efficient and effective manner.

5. **Community Shuttle Services:** Plans and recommendations for the introduction of Community Shuttle routes in the City of Vancouver and UBC, using the UBC Campus Transit Plan as background for UBC, and appropriate previously completed City of Vancouver and TransLink plans and work. Ensure integration of the Community Shuttles with other bus services.

6. **Streetcar Network:** Incorporate the role of a streetcar line in the City of Vancouver based on the City's Downtown Streetcar Network study, should the Streetcar plans develop further, and identify where existing transit routes may be affected by a Streetcar operation.

7. **Transportation Demand Management:** Identifies measures for TDM that would enhance the effectiveness of transit service and contribute to the achievement of overall ridership objectives, as well as complement City of Vancouver and UBC transportation and land use plans.

1.4 Process

The Vancouver/UBC Area Transit Plan development process was unique among Area Transit Plans completed to date because TransLink invited City of Vancouver and UBC senior staff to form a Steering Committee that jointly guided the plan process and outcomes. In addition, the work to develop this plan was conducted by a team of staff dedicated from TransLink, Coast Mountain Bus Company (CMBC) and the City of Vancouver, and the team was located at City of Vancouver offices for the duration of plan.

Departmental staff from TransLink, the City of Vancouver and UBC also assisted the project team. Consultants provided support in the area of public involvement and communications, as well as creative services. TransLink's Planning Department dedicated a project manager to direct and coordinate the team of staff from the City of Vancouver (2 staff), CMBC (1) and TransLink's Planning Department (2) assigned full time to this project.

1.4.1 Public Advisory Committee

Public Advisory Committees have been used in previous Area Transit Plans to assist with the development of the public consultation program, provide their own input, and explore ideas to

improve the existing transit system. TransLink invited Vancouver Council, UBC and the UEL to appoint members of the public to form a Public Advisory Committee to the ATP project.

The Public Advisory Committee (PAC) was formed in June 2004 and was comprised of 25 residents, with City of Vancouver Councillor Fred Bass as Council Liaison. The PAC met monthly with the planning team to discuss various elements of the plan and to provide their views. TransLink developed its public consultation plan with input from the PAC to ensure that the various interest groups and resident concerns were heard. Technical Report #3 provides a summary of the Public Advisory Committee input to the plan.

Public Advisory Committee meeting

1.4.2 Public Consultation

TransLink structured the public involvement process to be consistent with the City of Vancouver's "Guiding Principles for Public Involvement"[1] (adopted in 1999). The public outreach for the Area Plan is built on the City of Vancouver's strong tradition of public involvement as well as TransLink's own public consultations on the 3-year Plan and 10-year Outlook, and UBC processes.

TransLink's objectives for public consultation were:

- To seek input on existing service performance in order to identify opportunities for improvements and better define user needs;
- To seek comments on proposed or potential changes to service and how well they meet user needs;
- To seek input on service changes that would attract new riders; and
- To identify priorities for introducing service changes over the plan timeline of 2005-2010.

The comprehensive consultation program provided multiple opportunities for the public to meet with staff at the Community Open Houses, Public Workshops, and stakeholder meetings that were the main public forums organised to support the objectives and involvement strategy. The Comments Workbook coupled with the display boards at the public events provided the tools to provide and solicit information. The VUTP website allowed for remote learning and contribution. Between the written and electronic submissions received and the public attendance at over a dozen community open houses and workshops, over 2000 individuals were involved. A further 2,810 individuals participated in the market research studies conducted in November 2004 and

[1] http://www.city.vancouver.bc.ca/publicprocess/gpp.pdf

January 2005. Technical Report #2 provides a summary of the input received from the public during the consultation phases of the work.

1.4.3 Front Line Transit Operators Advisory Committee

The City of Vancouver Council established a front-line transit operators committee to give ongoing comments and suggestions to both the Public Advisory Committee and the ATP Project Team.

Council invited front-line transit operators (including bus-drivers, SkyTrain security and attendants, and, if possible, SeaBus staff) who were willing to volunteer to serve on an advisory committee to Council to offer comment and present ideas in relation to the Vancouver/UBC Area Transit Plan, with the overall goal of improving transit services. The members of the committee were drawn from the relevant unions (CAW, OPIEU, CUPE) and from transit operating centres.

1.4.4 Plan Development Phases

he Vancouver UBC Area Transit Plan was initiated with a few months of Automated Passenger Count data analysis and an evaluation of current transit services, followed by the development of service options. Concurrently, TransLink conducted a GVRD wide market research to obtain travel information and determine the size of the potential transit market for services in Vancouver and UBC. The initial service options were the basis of market research and public consultation. The later phases involved reviewing the public feedback and revising service options into a final draft plan. The table below summarizes the timing of key stages of the plan development.

Period	Stage
Pre – June 2004	Project start-up
June – August 2004	Project initiation
August – November 2004	System performance review
November 2004 – January 2005	Service concepts development
February – March 2005	Public consultation (Phase 1)
March – May 2005	Draft Plan development
Late May – Early June 2005	Public consultation (Phase 2)
Late June 2005	Vancouver City Council Review

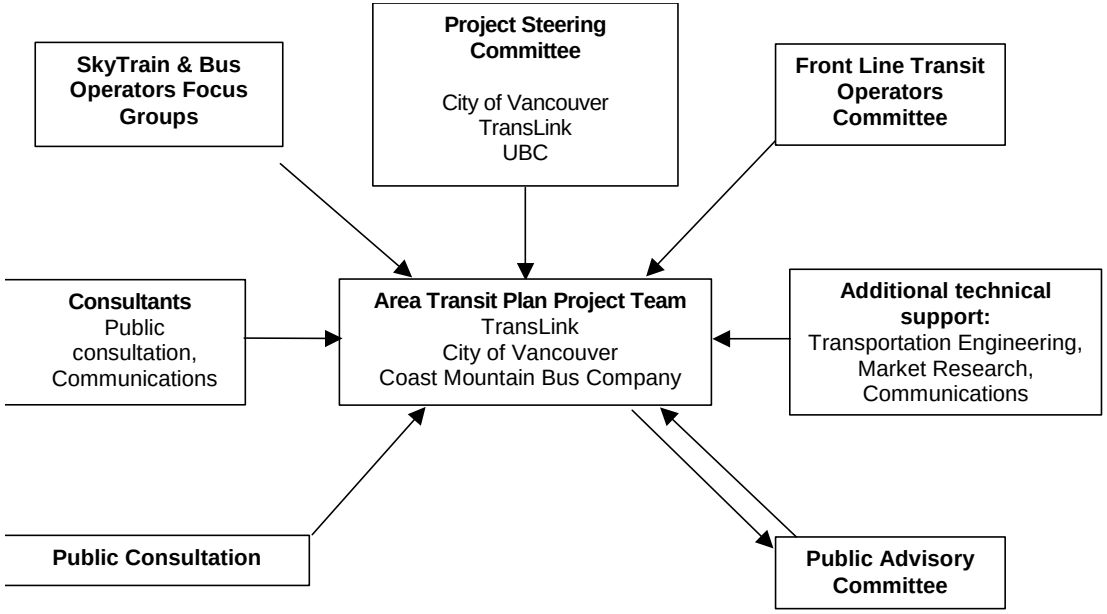
1.4.5 Who was Involved

The major stakeholders involved with the development of the plan are illustrated in Exhibit 1-1 below. The Area Transit Plan Project team coordinated consultation with all the groups involved and organized work to meet the timelines of the plan development.

1.4.6 Decision Making Process

This final report being presented to the GVTA Board is based on a draft that was reviewed by the public in late May and early June, and approved by Vancouver City Council on June 29, 2005.

Exhibit 1-1 Who was Involved with the Vancouver UBC Area Transit Plan



Section

2 Policy Context

2.1 Introduction

The Vancouver/UBC Area Transit Plan (VUTP) was developed within the context of planned significant regional transportation and transit improvements as well as land developments anticipated during this time frame. Direction and guidance to focus the VUTP came from policy and commitments made by the partner agencies (UBC , City of Vancouver) and TransLink itself.

This section captures policies from TransLink, the City of Vancouver, and UBC that are directly applicable to the transit environment. Relevant policy statements are discussed below in chronological order to provide an overview and background to the development of the Vancouver/UBC Area Transit Plan. Detailed information about current travel and transit characteristics of Vancouver and UBC is provided in *Section 3: Transit Market Analysis*.

2.2 TransLink Policy Context

The Regional Policy Context

TransLink derives its policy direction from the GVRD Livable Region Strategic Plan. The *Livable Region Strategic Plan* (LRSP), was adopted by the GVRD Board in January 1996 and set out four key growth management strategies:

- Protecting the green zone;
- Building complete communities;
- Achieving a compact metropolitan area; and,
- Increasing transportation choices.

The specific strategies for achieving the transportation choice component of the LRSP come from the 1993 *Transport 2021 Long Range Transportation Plan.* The latter is based on 3 principles:

- Manage land use;
- Manage transportation demand; and,
- Manage transportation supply.

The plan called for a 17% transit market share of regional rush-hour travel in 2006 (compared to 11% today[1].) While the plans from the early 1990's were well conceived, progress has been mixed. For example, there have been very few measures implemented to influence demand such as bridge tolls and a parking tax has only recently been developed.

The supply side anticipated bus fleet growth from approximately 950 buses in 1993 to around 1,800 in 2006. Neither the bus fleet nor bus service has been on-track to meet that target. Today's fleet consists of approximately 1,200 buses, although there is significant fleet expansion planned as part of TransLink's' *10 Year Outlook*. In parts of the region outside the City of Vancouver and UBC, transit service is not yet at levels to offer residents a real alternative to owning an automobile.

Transport 2021 plans also called for three rapid transit lines to be built by 2006 (Central Broadway to Lougheed Mall, New Westminster to Coquitlam Centre and Richmond to Vancouver). The Province has constructed the Millennium Line, however the critical connections to both Coquitlam Centre, to the east, and the Central Broadway area (connecting to a Richmond-Airport-Vancouver line) to the west, are in the planning stages.

TransLink's Policy Context

The TransLink *Strategic Transportation Plan* (2001) responded to the GVRD objectives for transit, the Major Road Network and the development of Transportation Demand Management programs to provide incentives for transit use. TransLink also identified the need for more bus priority measures and operational improvements. This would increase transit's competitiveness with automobile travel for more people. A truly effective transit system is only possible with significant priority being given to buses on the crowded roads in the region to allow them to bypass traffic congestion, speed the service and make it more reliable, efficient and attractive. This is especially true with the high volumes of transit use and mounting congestion, combined with the significant investment in new trolley buses.

The *Three Year Plan & Ten-Year Outlook* (2004) present specific amendments to the Strategic Plan that are project specific and action oriented. Many of the planned transit capital and service improvements identified will benefit Vancouver. The planned projects include transit service improvements, expanded U-Pass program, replacement of the Trolley Fleet, 34 new SkyTrain

[1] 2004 Trip Diary Survey Report, TransLink, Ministry of Transportation. March 2005.

Mark II vehicles, a Richmond · Airport · Vancouver (RAV) rapid transit line, completion of the Vancouver Community College SkyTrain Station, working with municipalities to implement expansion of transit priority measures, and implementing the Urban Transportation Showcase Program which includes the Main Street Transit Corridor, the Travel Smart Program in Kitsilano and the Broadway Transit Village.

Looking forward, TransLink had already identified the need for new service in Southeast False Creek, improvements to existing trolley and diesel services, new Community Shuttle services, new B-Line services, increases to SkyTrain capacity, expansion of the U-Pass, as well as Employer and Community Pass Programs. These initiatives as well as others are developed in detail in this Vancouver/UBC Area Transit Plan.

TransLink has adopted "Transit Service Guidelines" which are policy guidelines for setting service levels and design of service for transit service in the region. They are used primarily to evaluate the performance of the existing system as summarized in Section 4 of this plan.

2.3 City of Vancouver Policy Context

Overview

The City of Vancouver policy context for the Area Transit Plan begins with CityPlan, which provides a general vision in terms of land use, transportation and other civic services. CityPlan provides the policy framework for development of more detailed community plans. Other plans of interest to the Area Transit Plan include the Vancouver Transportation Plan, which sets an overall transportation direction for the City, especially the area outside the downtown, and the Downtown Transportation Plan, which applies the Vancouver Transportation Plan goals and directions to the downtown core. Additionally, the Vancouver Transit Strategy, which followed the other plans, reiterates some of their directions but also gives some clarity with respect to specific projects, particularly rapid transit.

The City attempts to balance transit priority measures with impacts to adjacent land use and other priority modes such as pedestrians and cyclists.

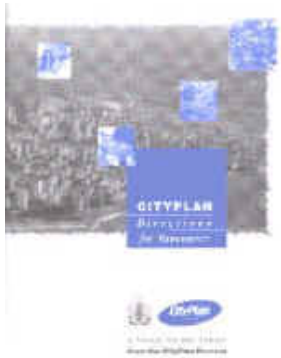
At the neighbourhood scale are the City's Community Visions, local area plans that are developed with extensive community input. These vision statements translate the directions implied by City-wide plans to the local level and deal with a range of subjects including land use, the roles of streets, transit routes and amenities, and community facilities. Visions are complete or underway for all but a few of the City's predominantly single-family neighbourhoods.

Some of the key policy directions that guide the Vancouver/UBC Area Transit Plan include:

- The hierarchy of walking, cycling and transit over single occupant vehicle travel;

- Land use development that promotes neighbourhood centres and job growth in these centres and on industrial lands;
- Improving transit to accommodate growth, particularly in Downtown, Central Broadway, False Creek South, Fraser Lands, the Airport, and UBC;
- Create a city-wide network of limited stop routes such as the 99 B-Line; and
- Provision of transit priority measures as needed to speed up buses.

CityPlan: Directions for Vancouver [2] (1995)



In 1995 City Council adopted CityPlan as its vision for the future of the city. At its core, CityPlan proposes:

- A city of neighbourhoods;
- A sense of community;
- A healthy environment and economy; and
- A city where people have a say in the decisions that affect them.

CityPlan asserts the regional transportation objective of placing a greater emphasis on walking, cycling, and transit, in that order of priority. Other key transportation-related CityPlan policy directions include:

- Making better use of existing streets for bikes, buses, goods movement, and carpools; and,
- Encouraging land use that reduces the demand for travel by creating neighbourhood centres, focusing more jobs in these centres, protecting employment on industrial lands, and continuing to develop new residential neighbourhoods planned for Downtown.

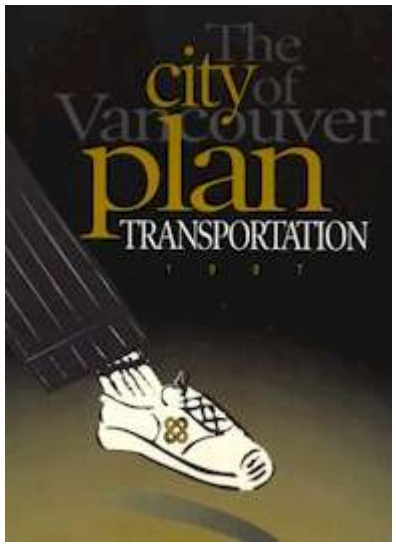
The City supports the actions of other agencies such as: encouraging increased transit use into and within the city by improving transit service, using smaller buses for community services, introducing innovative services, and implementing new rapid transit lines; and discouraging car use

[2] Hhttp://vancouver.ca/commsvcs/planning/cityplan/cityplan.htmH

by charging car users a larger share of their costs through user fees such as bridge tolls, gas taxes, increased parking rates, or commuter levies.

The Community Visions program was subsequently created to implement CityPlan at the neighbourhood level. The Area Transit Plan will work to incorporate Community Vision directions that deal with transportation and transit, as summarized below.

City of Vancouver Transportation Plan[3] (1997)



The City of Vancouver approved its first city-wide transportation plan in 1997, basing it on the directions established in CityPlan. The plan recognizes both the increasing demand for travel that comes with a growing population and the challenges of handling this demand on the City's already constrained transportation network.

The plan seeks to reduce the negative effects of transportation on neighbourhoods and the environment in general. The plan's overall response to these factors is to recommend that the increase in transportation demand be handled largely by transit, walking and cycling, with measures taken to reduce the impact of automobile traffic on residential areas and neighbourhood centres, and to protect transit and goods movement from delays generated by automobile traffic.

Several of the 8 'Overall Principles' of the Transportation Plan have consequences for the development of the Vancouver/UBC Area Transit Plan:

1) Residents of Vancouver and the region are encouraged to help achieve a more sustainable transportation by leaving their cars at home and using alternatives, where these are practical.

2) Continued support for limiting road expansion, and promoting transport demand management measures in the GVRD.

3) The growth in demand for transportation, including trips to the Downtown, will be accommodated by improving alternatives to the car, primarily transit, but also walking and cycling.

4) Overall road capacity will not be increased, with the exception of the extension of the Port Road for trucks and Port related traffic.

The Transportation Plan also identified that:

[3] Hhttp://vancouver.ca/engsvcs/transport/plan/1997report/index.htmH

*"**Improved transit** will be required to accommodate the growth in trips to all areas of the city, especially the Downtown, Central Broadway and UBC. Measures to improve the frequency and quality of the transit system will be essential to encourage people to use transit where it offers a practical alternative."*

In addition, the plan also recognized that increased transit supply needed complementary traffic management measures:

*"**Transit priority measures** to speed up buses will be provided as needed. Measures may include bus bulges, queue jumpers and bus priority at some traffic signals. Bus-only lanes will be provided on selected routes if and when they become warranted by the increase in vehicle traffic."*

The Vancouver/UBC Area Transit plan will recommend specific transit priority measures to be pursued and implemented as part of the service delivery package.

Other highlights of Vancouver Transportation Plan recommendations include:

Transit Service

- More frequent buses (every five minutes peak, every 10 minutes off-peak);
- Community mini-buses;
- A city-wide network of express bus routes (including on 41st Avenue) and LRT in the Broadway-UBC and Richmond-Vancouver corridors;
- Improved service to Downtown South, False Creek North, Fraser Lands and the Airport;
- Downtown loop service;
- Review downtown fare structure; and,
- Adopt U-Pass system for UBC (introduced September 2003) and other major employers and institutions (On-Board program).

Transit Infrastructure

- Bus-only lanes on major transit streets (introduce in 2004-2017 if bus speeds drop due to congestion);
- Measures to give transit priority over cars on streets (e.g. bus bulges, queue jumpers, signal priority);

- Better bus stops, bus shelters in place 2003); and,
- Bike racks at bus stops and on buses.

Modal Share Goals

The plan developed a matrix of modal share targets for trips to major destinations within the City as well as the City as a whole. Targets for trips to UBC were also included given that the only land access to the UBC campus is through the City of Vancouver.

Exhibit 2-1 Vancouver Transportation Plan 24 hour target modal shares

Mode and Year, all trip purposes, 24 hours	Downtown (%)		Central Broadway (%)		UBC (%)		Rest of City (%)	
Year	1992	2021	1992	2021	1992	2021	1992	2021
Auto Driver	49	36	n/a	45	59	41	53	46
Auto Passenger	13	12	n/a	15	18	16	18	16
Transit Passenger	23	34	n/a	25	14	33✓	11	19
Walk and bike	15	18	n/a	15	9	10	18	19
Total (all modes)	100	100	n/a	100	100	100	100	100
Auto Occupancy (2)	1.27	1.33	n/a	1.33	1.31	1.39	1.34	1.35

✓ The 2021 transit mode share goal for UBC was achieved in Fall 2003 with transit modal share of 38.5% all-day. However, the combined auto modal share target also been achieved at 57%. The consequent shortfall in walk/bike trips has been to the benefit of transit trips.

The Vancouver/UBC Area Transit Plan recommendations will contribute to achieving the modal share targets.[4]

Downtown Transportation Plan[5] (2002)

Downtown Vancouver remains the largest generator of travel in the region, with a large share of employment and the focus of re-development. The Vancouver Transportation Plan recommended

[4] The targets for UBC are established by a 'Memoranda of Understanding' between UBC and the GVRD, and the targets for mode share are currently under review as part of the UBC Strategic Plan update.

[5] Hhttp://vancouver.ca/dtp/H

that a “transportation and circulation plan for the Downtown” be developed to implement its directions within the downtown. The resulting Downtown Transportation Plan details a wide range of proposed initiatives for the road network, parking, pedestrian and cycling infrastructure, transit service and goods movement.

The fundamental assumption in the plan is that transit, both bus and rail, will handle the growth in motorized trips to the downtown over the next 20 years, with automobile trips remaining at about the same level as today. Both cycling and walking trips will more than double. This strategy is consistent with the targets set in the Vancouver Transportation Plan. While bus ridership to downtown is expected to increase by about 10%, rapid transit ridership is projected to increase by 120% due to growth on SkyTrain and the opening of the RAV line. With RAV replacing many of the remaining suburban buses entering downtown, ridership on local buses can be expected to increase significantly.

The specific recommendations regarding transit service were to:

- Develop four new downtown bus routes:
  - West End to Downtown (modified existing route);
  - English Bay to Yaletown (modified existing route);
  - West End to Central Broadway (new route); and
  - Downtown South to CBD (new route)
- Use electric trolleybuses wherever it is possible, and low-noise community buses where demand is lower;
- Pursue phased development of the Downtown Streetcar, starting with the Granville Island – Waterfront Station link; and,
- Review downtown fare structure.

Specific recommendations for transit infrastructure and street operations that affect transit routes include:

- Continue development of intermodal transit hubs at Waterfront Station, Granville Mall, Burrard Station and Main Street Station;

- Implement transit priority corridors on Burrard, Georgia, Hastings, Main and Granville streets; and,

- Convert some one-way streets to two-way operation (or bus-only counter-flow lane) to allow two-way transit service (e.g. Cambie from Nelson to Hastings; Richards from Hastings to Cordova).

Vancouver Transit Strategy (2002)

The Vancouver Transit Strategy summarizes the City's major policies regarding transit, as they stood in early 2002. The strategy's key recommendations and priorities include:

- Replacement of the trolley fleet and expanding bus service;

- Create an Area Transit Plan;

- Develop a Downtown Streetcar with a potential extension along the Arbutus rail right-of-way. Waterfront Station to Granville Island to be first route segment;

- Extension of Millennium Line in subway through Central Broadway to Granville; and,

- Rapid transit subway to Richmond and the Airport in the Cambie Corridor.

Community Climate Change Action Plan

In March 2005, the City of Vancouver completed a Community Climate Change Action Plan[6] intended to increase public awareness of the climate change issue and to encourage residents of the City to take actions on a personal level to minimize climate change by reducing greenhouse gas (GHG) emissions. This Plan suggests specific targets GHG emission reductions, and proposes ways to achieve the targets. Passenger vehicles (i.e. cars, mini-vans, light trucks) were identified as the source of about 25% of Vancouver GHG emissions. Actions proposed to reduce vehicle emissions include increasing the use of transportation alternatives and supporting the use of more efficient vehicles and fuels. A 2012 target has been set to reduce passenger vehicle emissions by 10% through increased use of transportation alternatives, including transit, walking, cycling and car-pooling.

Although other alternatives such as walking and cycling will play an important role, an ongoing increase in transit mode share will be needed to meet the City's 2012 GHG emission reduction

[6] The Cool Vancouver Task Force "Draft Community Climate Change Action Plan" 2004.

target. Quantitative surveys found that City residents and concerned about climate change, with 51% survey respondents identifying concerns about transportation and traffic congestion.

The Community Climate Change Action Plan (CCCAP) notes that current transit capacity constraints are a barrier to the further transit mode share growth. The CCCAP supports measures to improve transit service and efficiency including:

- Requesting that TransLink allocate sufficient resources to transit for a continued increase in mode share, including addressing the demand for services such as U-Pass that achieve significant mode shifts from driving;

- Working with TransLink to make transit travel times more competitive through quicker passenger loading and on-street transit priority measures (e.g. express bus routes, reserved lanes, queue jumpers, signal priority, enhanced boarding procedures, etc.);

- Working with TransLink and others to further develop and pilot the use of hybrid electric vehicles; and,

- Requesting TransLink staff review GHG emission impacts/reductions in the Vancouver/UBC Area Transit Plan.

In addition to the work proposed in the Community Climate Change Action Plan, the City is also partnering with TransLink in a number of pilot projects to reduce GHG emissions through the Urban Transportation Showcase program. Transit related initiatives include:

Transit Villages: The Broadway and Commercial Drive station complex will be reviewed to improve safety, circulation and access for pedestrians, passengers and cyclists, and how new development or commercial activity might complement these objectives.

TravelSmart: Households in the Kitsilano neighbourhood will be surveyed, and those expressing interest in reducing their car trips will receive personalized marketing on alternative transportation modes.

Hybrid Bus Demonstration: Existing bus shells will be retrofitted with hybrid electric technology and tested in the field.

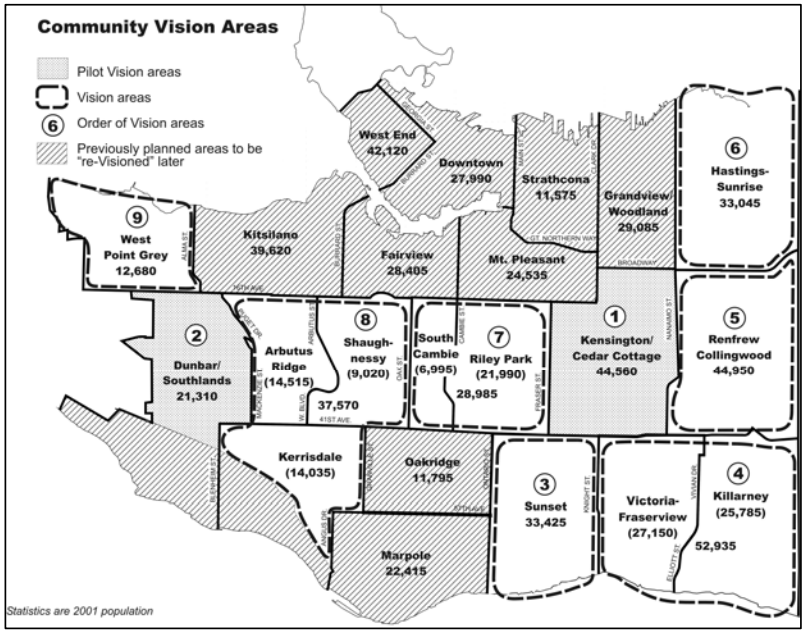
Main Street Transit and Pedestrian Priority: A range of pedestrian and transit improvements will be applied along Main Street, including improved street design, bus traffic signal priority, improved bus stop information displays and more transit capacity.

Community Visions[7]

The map highlights the Vision areas. The Community Visions program has focused to-date on mainly single-family neighbourhoods that have not had comprehensive planning studies in recent decades. Once these areas have been completed, a follow-up program will work on the remaining, more multi-family neighbourhoods (shown in grey on Exhibit 2-2)

The following table highlights the common directions in each Vision that have a direct relationship to transit services. Some specific issues of interest from two Visions are described below the table. For the most part the Community Vision statements reflect the sentiment of the broader public for more frequent, conveniently located and faster transit services.

Exhibit 2-2 Map of Community Vision Areas



[7] Hhttp://vancouver.ca/commsvcs/planning/cityplan/visions/index.htmH

Visions Directions	Dunbar (1998)	Kensington Cedar-Cottage (1998)	Victoria-Fraserview/ Killarney (2002)	Sunset (2002)	Renfrew-Collingwood (2004)	Hastings/Sunrise (2004)
Pedestrian & cycling improvements	▲	▲				▲
Corner bulges	▲			▲		
Bus bulges/sidewalk extensions at bus stops		▲	▲	▲	▲	▲
Improved bus shelters	▲					▲
More frequent service	▲				▲	
Community mini buses	▲		▲	▲		▲
Limited stop express service			▲	▲	▲	▲
Improved comfort, convenience, efficiency			▲	▲	▲	▲
Local involvement in transit decisions			▲		▲	▲
Add more transit priority measures				▲	▲	▲
Improved amenity at SkyTrain stations					▲	
Conduct fare review/ offer lower fares					▲	▲

Renfrew-Collingwood

Residents of Renfrew-Collingwood requested the City to re-classify East 22nd and Clarendon (both bus routes) from secondary arterial status to neighbourhood collector status, with changes to limit traffic volumes and speeds, and to discourage through-trips.TransLink and Coast Mountain Bus Company share concerns over Vision directions that potentially reduce the efficiency of bus service, such as the increased traffic congestion that may result from de-classifying roads from arterials to collectors and reducing the lanes of moving traffic available.

Hastings-Sunrise

Residents requested a bus route on First Avenue to bring the bus closer to more homes/destinations. The VUTP included this route idea in its market research and first round consultation, with the evaluation of this idea following in *Section 6 Service Proposals.*

Other City of Vancouver plans, policies and programs

In addition to the large-scale plans referred to above, the plan team drew from or participated in a range of other plans, policies and programs that influence transit service within the city. Some examples include:

- Transportation Showcase (Main Street & Broadway/Commercial);
- RAV station planning;
- Waterfront Transportation Hub Study;
- Downtown Streetcar Study;
- Granville Street Redesign Project; and,
- Future neighbourhood development plans such as South East False Creek, False Creek Flats and East Fraser Lands.

2.4 UBC Planning Context

Overview

UBC is independent from the City and is governed by its own Board of Governors. Planning at UBC is undertaken by the Campus & Community Planning office of the University of British Columbia. UBC is in the process of developing a more complete community, known as University Town, with a range of housing types and tenures, shops and services in proximity to and accessible from transit at the Point Grey campus to meet the GVRD's Livable Region Strategic Plan and to help sustain the University's academic mission. The 1997 OCP, a GVRD bylaw, is guiding the development of eight predominantly residential neighbourhoods, which will increase the on-campus resident population. Concerns about the traffic consequences of these plans, especially for the City of Vancouver, make transportation a key issue in the GVRD-UBC Memorandum of Understanding (MoU) that describes how the complete community goal will be achieved. The key transit-related requirements set out in the MoU dated December 18, 2000 include:

- A 20% reduction in daily single-occupant vehicle (SOV) trips to and from the campus, relative to Fall 1997;
- A 20% increase in transit ridership to the campus, relative to Fall 1997; and,

- UBC would take the lead in developing and implementing a U-Pass discounted transit pass program, in partnership with TransLink, the City of Vancouver and other partners.

The introduction of U-Pass in September 2003 greatly exceeded the goal of a 20% increase in transit ridership – the increase from 1997 to 2003 was 138%; a 20% increase over 1997 levels had already been achieved by 1999. Accounting for growth in the total number of trips by all modes to campus that resulted from a 22% increase in student enrolment, the increase in transit share from 1997 to 2003 is 115%. The decline in SOV trips has been less dramatic; from 1997 to 2003, SOV trips dropped by only about 2%. This small decline is partly explained by the increasing number of trips overall; the number of SOV trips per person, a measure independent of the overall increase in trips, has dropped 18.5%.

Brief summaries of the key documents that influence the planning of transit services at UBC follow.

Official Community Plan (1997)

The Official Community Plan (OCP) sets the broad objectives for development on the campus and provides a general land use plan for subsequent plans to implement. Some of the key directions affecting transit needs in the OCP include:

- An increase in estimated on-campus residents (including students in residences) from 8,700 residents in 1997 to 12,700 in 2006 and 18,000 by 2021;
- Supports a transit-oriented, automobile-restrained transportation system;
- Encourages transit service growth in conjunction with increasing campus activity and growth;
- Promotes local, on-campus shuttle services for internal trips;
- 50% of resident households where one or more members work or attend university on campus;
- Encourages locating higher density uses near transit;
- Promotes walking and cycling;
- Encourages Transportation Demand Management measures to discourage SOV use;
- Identifies eight local areas for detailed planning for predominantly non-institutional uses;

- Proposes Commercial Centres at the University Boulevard/East Mall intersection and south-west of the 16th Avenue/Wesbrook Mall intersection; and,

- Indicates additional housing in the South Campus Neighbourhood, east of Wesbrook Mall, and south of 16th Avenue.

Strategic Transportation Plan (2005)

In order to identify means of achieving the transportation commitments made in its MoU and OCP, UBC drafted a Strategic Transportation Plan (STP). The STP was developed in 1999 as a living document, designed to be adapted to changes as goals are achieved and other plans for the campus are developed. The 1999 plan, developed over 18 months of consultation, contained 55 strategies for reducing SOV traffic, chief among them being introduction of the U-Pass program already committed to in the MoU. During 2005, UBC engaged in an update to the plan that was approved by the Board of Governors on July 14, 2005. The STP Update (2005) continues to set aggressive targets including a 30% reduction in automobile trips/person from 1997 levels, and implementation of a "Community Pass" for transit service that would be available to all on-campus residents.

Comprehensive Community Plan (2000)

To implement the OCP, UBC developed a Comprehensive Community Plan (CCP) to provide an integrated approach for planning each of the eight local areas identified in the OCP. The CCP interprets the policies and objectives of the OCP, and together with the neighbourhood plans, will serve as a framework for development approval processes.

Neighbourhood Plans

The final and most detailed level of planning at UBC is contained in the Neighbourhood Plans that are being developed for each of the eight neighbourhoods identified for non-institutional uses in the OCP. Exhibit 2-3 identifies theses neighbourhoods.

The neighbourhood plans influence transit service by further clarifying areas of population, employment, or other activity growth. They also confirm the transportation network that will be available in each neighbourhood, including candidate streets for future transit routes. As an example, the South Campus Neighbourhood Plan provides for a transit-only connection between the south end of Wesbrook Mall and SW Marine Drive, to give buses from Marine Drive a shorter route into the campus and allowing them to provide a high-quality service through the centre of the planned South Campus neighbourhood.

UBC Campus Transit Plan (2003)

The UBC Campus Transit Plan describes how transit service and infrastructure will need to be expanded to meet 20 or more years of growth in transit ridership to and within the university campus. The plan assumes a near doubling of transit ridership over 10 years, arising from the introduction of U-Pass as well as the increasing daytime and resident population of the campus.

The campus transit plan is unfolding to meet the timelines of the University Town development initiatives.[8] Improving public transportation to and from campus is a priority for University Town. A well-designed, state-of-the-art transit station below ground as part of the redevelopment is a key component of University Square in the new University Boulevard Neighbourhood. In addition to the highly successful U-Pass, the forthcoming Community Pass for campus residents will improve public transportation to and from the campus and make transit more accessible and affordable to members of the UBC community.

In addition to providing for increased demand for regional bus service to and from the campus, the Campus Transit Plan also proposes the development of a network of Community Shuttle routes within the academic campus and adjacent residential areas. This service would be targeted to addressing mobility and safety concerns. It would not be expected to replace walking as the primary daytime mode of travel on campus. The Community Shuttle network is developed only conceptually in the plan – routes are not specified although resource requirements are estimated. Since the completion of the Campus Transit Plan, the University has operated a shuttle bus service, until TransLink brings in a broader service.

Exhibit 2-3
Neighbourhood Plan areas at UBC

2.5 University Endowment Lands (UEL) Planning Context

The University Endowment Lands (UEL) is a small, predominantly single-family community located between the UBC campus and the City of Vancouver. The community is divided into two parts, the larger of which includes the University Village area around University Boulevard and extends north to NW Marine Drive, between Wesbrook Mall and Pacific Spirit Regional Park. The second part of the community, ("Little Australia") is a finger of land that extends west from Blanca Street in the City of Vancouver, and is bordered by the University Golf Course, Pacific Spirit Regional Park, and West 6th Avenue.

About 2,700 people live in the UEL and there is the ultimate capacity to add about another 2,500, predominantly in the University Village area, according to the UEL Community Plan.

[8] Hhttp://www.universitytown.ubc.ca/archcomp/H

The UEL is an unincorporated area and is therefore administered by the Province. However, the area elects a director to the GVRD board to serve as their regional representative. The UEL is subject to the Regional Growth Strategy (Livable Region Strategic Plan) and its Community Plan has been accepted by the GVRD.

Transit

The UEL's Community Plan requests that, "Scheduled public transit service should include stops on University Boulevard, and stops on Chancellor Boulevard, but should not be extended into the single-detached residential neighbourhoods. Special public transit such as transit for the disabled should continue to be permitted in residential neighbourhoods." Given that UEL's modest transit service requirements are met based on the much larger demand for service at UBC, it did not require significant consideration during the Area Transit Plan process.

2.5 Conclusions

There has been considerable work completed by the participant parties to the VUTP in terms of defining the overall transportation requirements, transit mode share targets, and preferences for specific technology or types of service.

Key Directions from TransLink include :

- TransLink plans for trolley bus replacements 2007-2008;
- TransLink plans for RAV line opening late 2009;
- TransLink plans for bus fleet expansion from 1,225 in 2005 to 1,600 by 2013;
- TransLink continued capital funding of Transit Priority Measures; and,
- Expansion of the U-Pass program to other post-secondary institutions in 2006/07.

Key Directions from the City include:

- 2021 Transit Mode Share (24 Hour) of 19%;

- 2021 Peak Hour Mode Share to Central Broadway of 38%, all day 25%.[9]
- Modal hierarchy policy: Walking, Cycling, Transit, Goods Movement, Auto;
- No increase in road capacity (i.e. no new roads);
- Requests for a city wide network of express bus routes;
- Support for RAV and extension of rapid transit through Central Broadway;
- Requests for more frequent bus services, and service to redeveloping areas;
- Support for selected measures to give transit priority over cars on streets where congestion has reduced bus operating speed; and,
- Support for bus only lanes on major transit streets where congestion has reduced bus speed.

Key Directions from UBC include

- Continued population growth;
- Staff and Faculty inclusion in U-Pass program;
- Resident Community Pass program; and,
- Request for community shuttles on campus.

The Vancouver/UBC Area Transit Plan has developed service recommendations that fit within these policy directions, and TransLink's ability to deliver the resources, as described in Section 6: Service Proposals.

The current travel and transit characteristics of Vancouver and UBC are discussed further in Section 3: Transit Market Analysis.

[9] Current travel data collection is not sufficient to measure mode share to specific destinations such as Central Broadway. Further discussion of travel patterns in Section 4 Identifying Future Transit Markets

Section 3

Transit Market Analysis

3.1 Introduction

This section provides a snapshot of transportation in the Greater Vancouver Regional District with a focus on the Vancouver/UEL (UBC) sub-area. It then identifies the future transit market from:

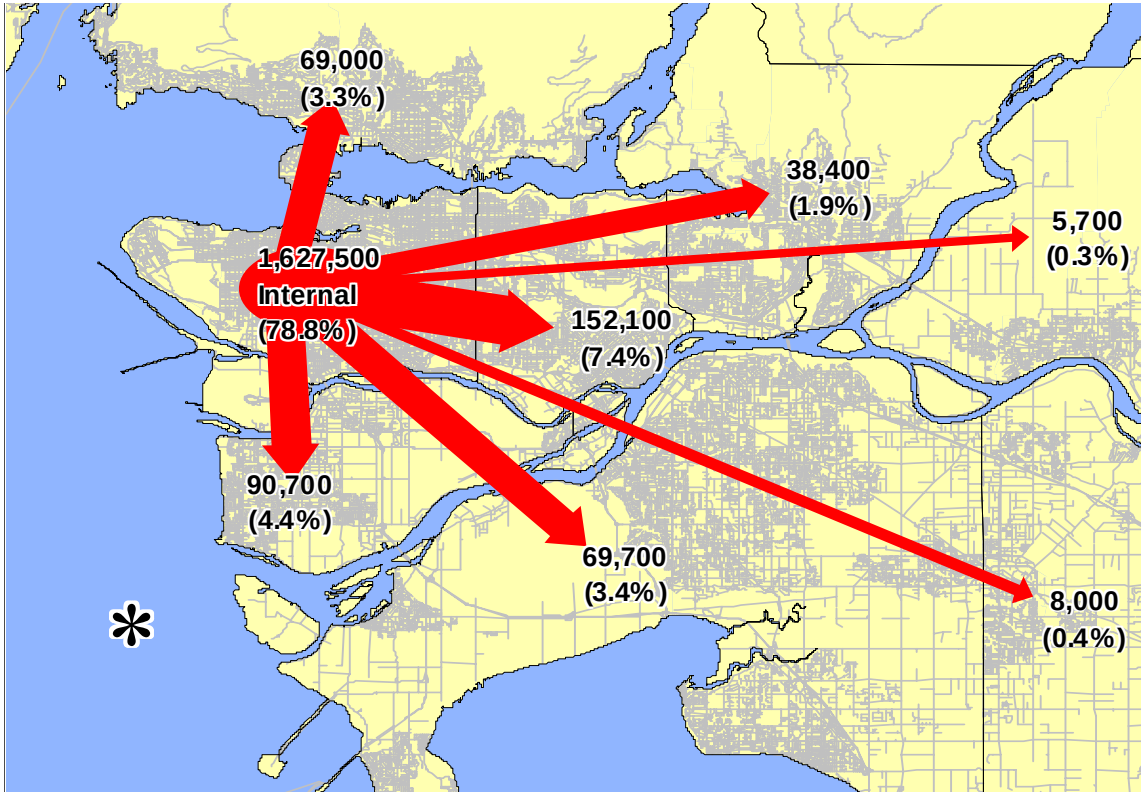
- Analysis of past transit ridership trends in the Vancouver/UBC service area;
- Future trends including service area population and employment growth;
- Land use changes, and,
- The potential to attract additional transit customers.

Vancouver/UBC is the most mature sub-area of the region in terms of population and employment densities and land use patterns, and it has high levels of transit use. The key goal of this plan is to increase transit's share of travel even further. A review of the factors affecting demand suggests that a ridership increase of between 12% (2% per annum) and 24% (5% per annum) could be achieved over the next five years with appropriate service provision. Market research indicates that the additional ridership would be partially generated from about 13-19% of the current residents who indicated an interest in using public transit.

3.2 Vancouver/UBC in the Greater Vancouver Regional District

Transit ridership in Vancouver and UBC is a function of the broader regional transportation situation. Travel patterns and mode use in the region are monitored by TransLink through regional Travel Diaries, National Census, and traffic counts at specific points in the road network. Regional travel patterns are significant to the Vancouver/UBC Area Transit Plan because Vancouver and UBC continue to have the most jobs and account for the largest share of transit in the region.

Exhibit 3-1 Distribution of Daily Trips Leaving Vancouver/UBC



Daily trips starting in Vancouver/UBC Area (2004 Ministry of Transportation Travel Diary Survey)

The Vancouver/UBC sub-area produces the largest number of trips in the region due to it having the largest population and employment base. Vancouver/UBC has the second lowest proportion of trips leaving the sub-area. Most trips leaving Vancouver/UBC are destined for Burnaby, New Westminster or Richmond.

Trip Destination	Trips	Percent of total
Within sub-area	1,627,500	78.8%
Other sub-areas in GVRD	433,600	21.0%
Outside GVRD	4,000	0.2%
Total trips	2,065,100	100%

Exhibit 3.1 shows that the vast majority of Vancouver/UBC trips remain internal to the sub-area, with 7.4% going to Burnaby/New Westminster, 4.4% going to Richmond, and just over 3% going to each of the North Shore and South of the Fraser.[1]

[1] All travel figures for the GVRD are provided by the 2004 Ministry of Transportation Travel Diary data, unless otherwise noted.

Exhibit 3-2 Share of Trips Generated by GVRD Sub-Areas (1999-2004)

	1999		2004	
Sub-area	**Trips**	**Share**	**Trips**	**Share**
North Shore	452,600	8.3%	528,400	8.3%
Vancouver/UBC	**1,741,100**	**31.8%**	**2,002,200**	**31.4%**
Burnaby/New Westminster	711,200	13.0%	815,600	12.8%
Northeast Sector	461,600	8.4%	529,300	8.3%
Richmond	482,100	8.8%	596,000	9.3%
Surrey/Delta/White Rock	1,128,300	20.6%	1,343,800	21.1%
Pitt Meadows/Maple Ridge	173,800	3.2%	194,100	3.0%
Langleys	325,00	5.9%	374,200	5.9%
Total	**5,475,700**	**100%**	**6,383,600**	**100%**

As shown in Exhibit 3-2, the Vancouver/UBC sub-area maintained the greatest number of daily trip starts within the GVRD, and growth has been relatively modest. Its relative share of regional travel decreased over the past five years (from 31.8% to 31.4%) due to significant growth elsewhere, especially given large increases in Richmond (from 8.8% to 9.3%) and Surrey/Delta/White Rock (from 20.6% to 21.1%).

Travel demand is a direct function of the need to travel for specific purposes. The primary trip purposes in the GVRD are:

- Personal trips (business, social, recreational);
- Work trips (includes trips made to and from work and post secondary schools);
- Trips made during work; and
- Grade school trips (elementary and high school).

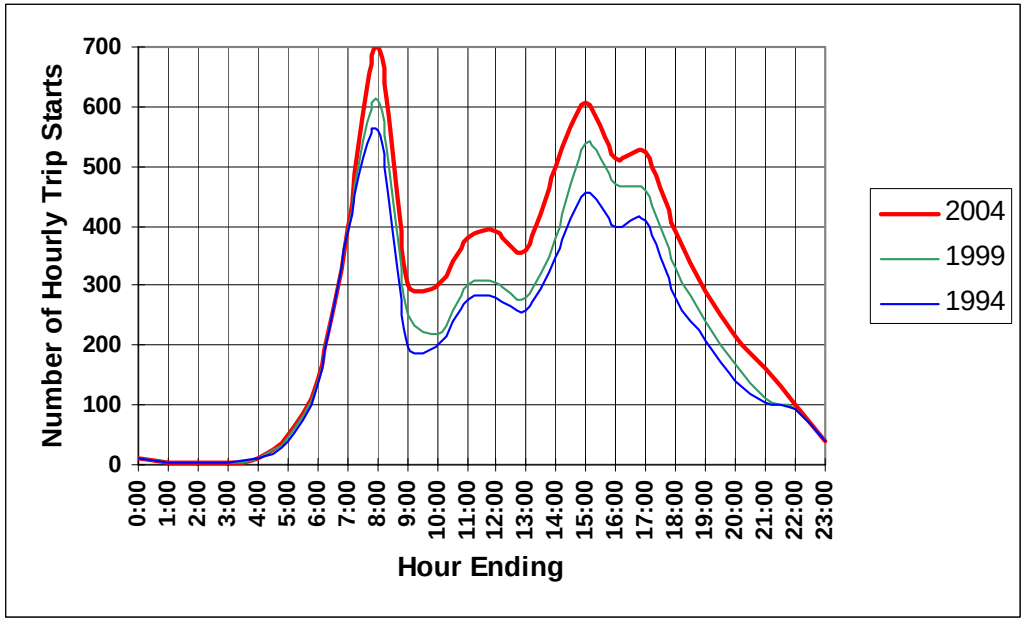
Exhibit 3-3 illustrates the relative change in the number of daily trips for each of these categories between 1999 and 2004. Personal trips have shown the highest relative growth. These trips grew significantly in both the urban core and in the outer municipalities.

Exhibit 3-3 Daily Trip Purpose Totals (1999-2004)

	Work/Post Secondary	During Work	Grade School	Personal Trips
1999	1,918,300	157,900	575,300	2,827,000
2004	1,990,300	174,100	578,200	3,641,000
Change	3.8%	10.3%	0.5%	28.8%

Exhibit 3-4 shows the growth in total travel in the GVRD for a typical weekday. Although the hourly travel distributions show similar relative patterns, trip starts in the midday and PM peak period show more pronounced growth. This reflects the large growth in personal trips, as noted in Exhibit 3-3. The PM peak period has extended by almost an hour over the past 10 years resulting in "rush hour" conditions for a longer part of the day.

Exhibit 3-4 Total GVRD Weekday Trips Starts by Hour (1994-2004)

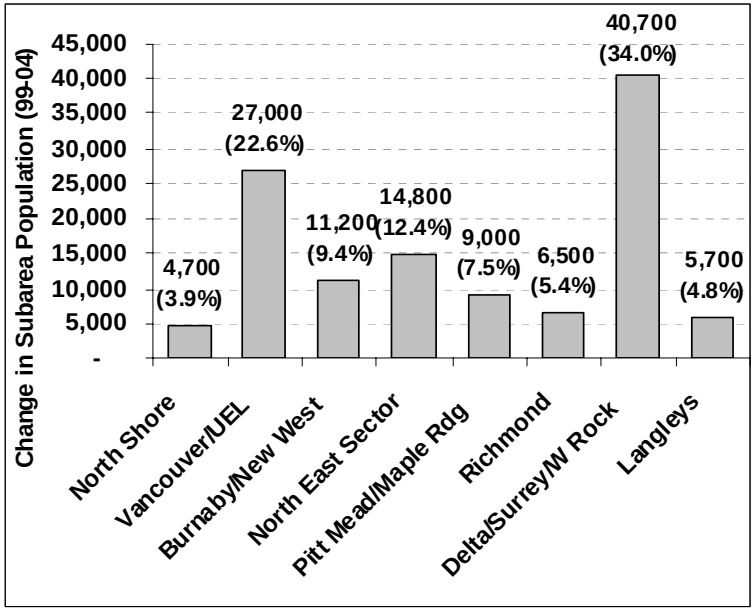


3.2.1 Factors Influencing Travel

Travel demand in a given area is generated by the spatial separation between places of residence and places of work, school, shopping, services and recreation. Trip purpose is the prime influence in

determining time of travel. The quantity and distribution of land uses that produce and attract travel determines the amount of travel generated. Trip length, trip purpose, traveller age and income, as well as modal availability determines traveller mode choice.

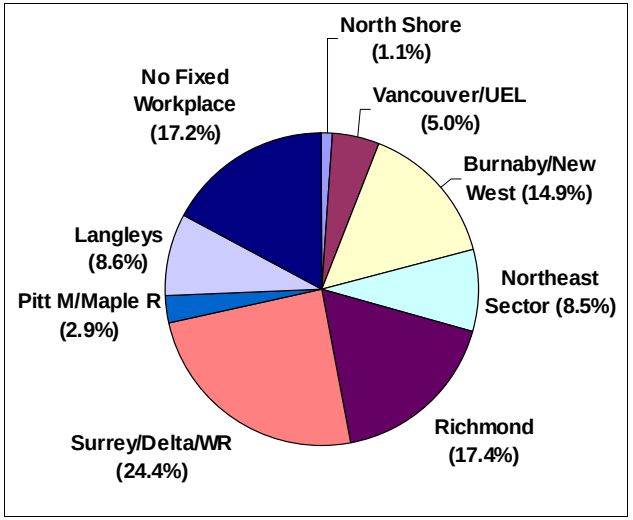
Exhibit 3–5 Population Growth by GVRD Sub-area 1999 – 2004



Note: percentage represents the share of total regional population growth

Further analysis of the trends between 1999 and 2004 indicates that the Vancouver/UBC dominance of regional travel, population and employment is changing. Exhibit 3-5 shows that while the population of Vancouver/UBC grew by over 22%, it was not the fastest growing sub-area of the GVRD. Exhibit 3-6 illustrates the suburbanization of employment growth, with Vancouver/UBC taking only 5% of the employment growth in the 1996-2001 period.

Exhibit 3-6 GVRD Sub-Area Shares of Employment Growth (1996-2001)



The dispersal of employment to outer municipalities is highlighted by the growth in office parks in those municipalities. From 1990 to 2000, 50% of new office jobs[2] have gone into office parks in the outer municipalities, and 43% have located in the core of Downtown and Central Broadway while only 7% have located in regional town centres. Within Vancouver, some areas with future potential job growth that are well served by transit include the Grandview industrial lands adjacent to the Millennium Line.

Other trends in regional travel that are significant for Vancouver/UBC are:

- Trip characteristics;
- Automobile ownership; and,
- Demographic change.

[2] GVRD, The Office Market: Supply, Demand, and Spatial Distribution, December 2001.

Exhibit 3-7 Daily GVRD Sub-Area Walk and Bike Trips

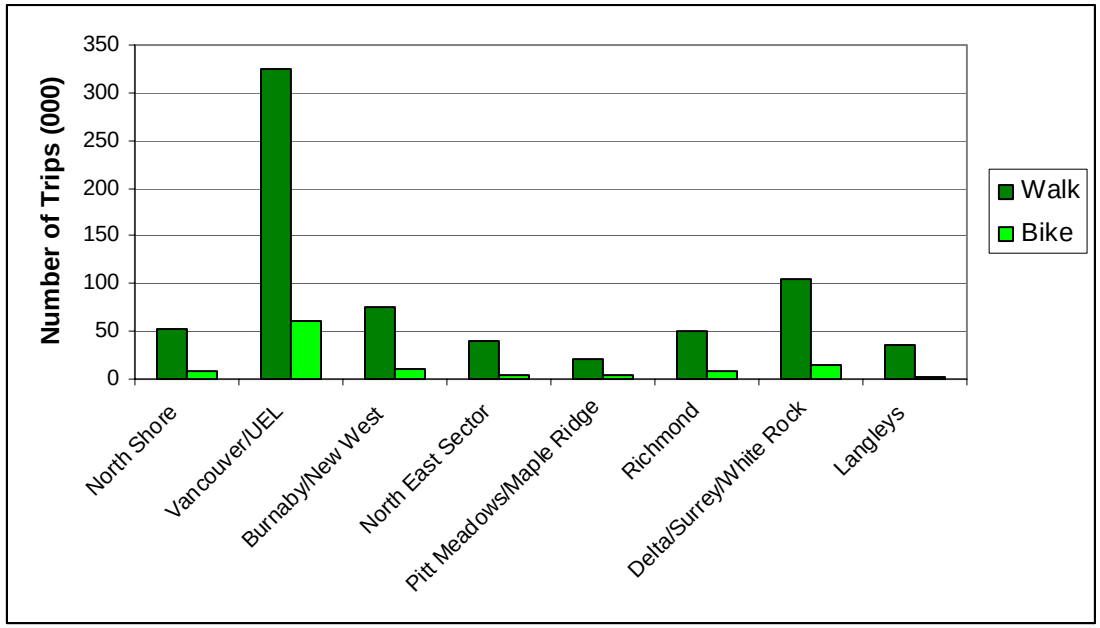
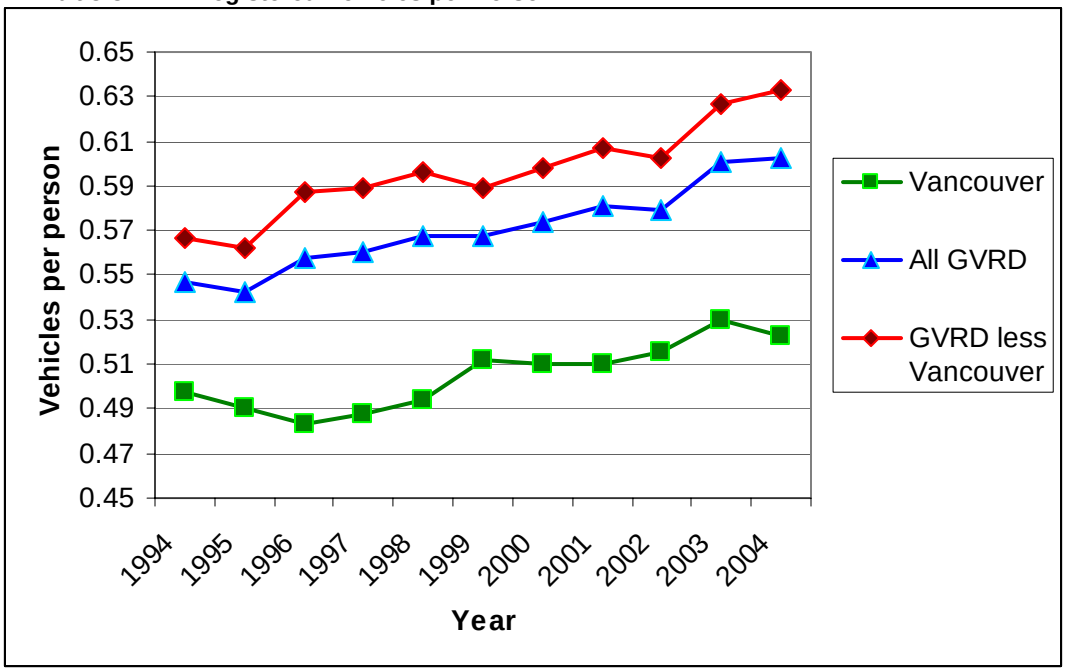


Exhibit 3-7 identifies daily 2004 walk and bike trips by GVRD sub-area. Walk and bike trips respectively represent 11.0% and 1.7% of total daily regional trips. The Vancouver/UBC sub-area has the highest number of walk and bike trips by far. This is reflective of the density of the land use throughout the sub-area. As well, since transit can be seen as an extension of the walk trip, it can be expected there are a larger percentage of walk trips in the Vancouver/UBC sub-area.

Exhibit 3-8 Registered Vehicles per Person



Vehicle ownership has shown a general increasing trend that is much less pronounced in the City of Vancouver than the region as a whole. In fact the City of Vancouver recorded a modest decline in vehicles per resident in 2003-2004, dampening what would have otherwise been a noticeable increase regionally. Vancouver car ownership is lower on average than all other municipalities in the region. However, as the city ages, this difference may change over time given the higher vehicle ownership of older households.

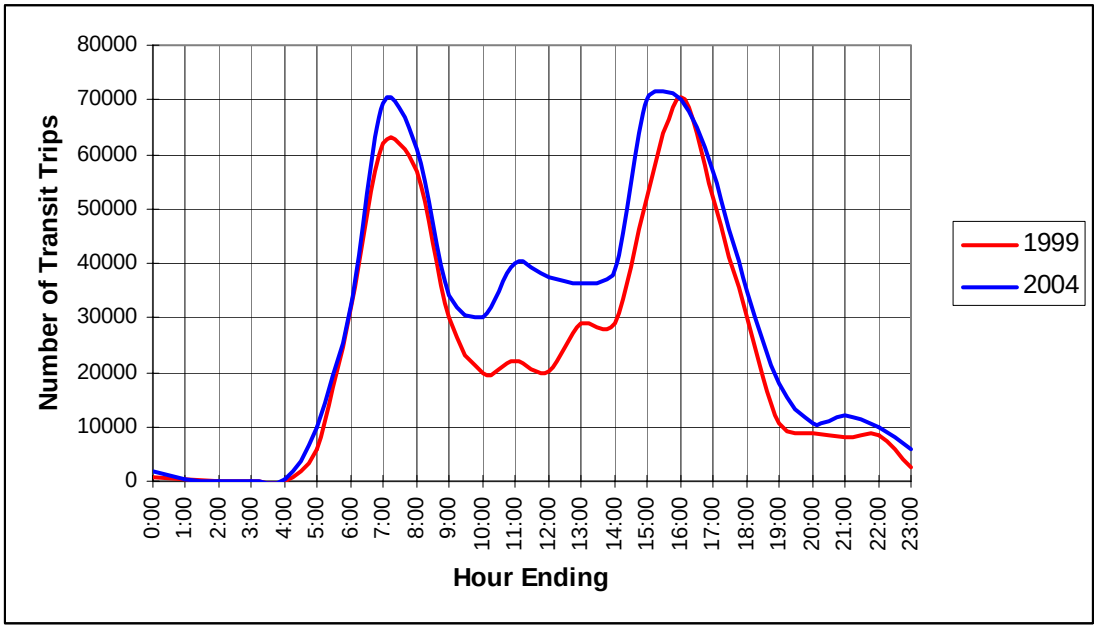
The following regional trends are expected to influence transit ridership in the Vancouver/UBC area:

- More trips during the midday and PM peak;
- More non-work related trips;
- Employment growth outside of Vancouver/UBC; and,
- A high preference for auto use in older age groups, which are the largest and fastest growing segments of the population.

3.3 Vancouver/UBC Transit Market Characteristics

Transit ridership within the overall TransLink service area and the Vancouver-UBC sub area has grown significantly between 1999 and 2004. Transit use during the midday has grown faster than the peak periods, as can be seen in Exhibit 3-9, reflecting the pattern of overall travel in the region. The PM peak periods are broadening into the shoulder hours, and more transit service was added midday. The spreading of the PM peak period to begin an hour earlier is especially worth noting. With the peak periods constrained by capacity (both road space and transit passenger space) midday and early evening growth is expected to continue.

Exhibit 3-9 Transit Trip Starts by Hour (1999-2004)



A significant proportion of job growth in the region is in the "no fixed workplace" category, which includes people who travel for work such as couriers and travelling sales and services. This trend may be a contributing factor to the volume of trips in midday observed in the APC data, and the 2004 Travel Diary study for the growth in the number of trips during work. In addition, the U-Pass Program at UBC has benefited from staggered class times to spread the demand for service across more hours of the day. These trends, combined with travel patterns of older adults and the employment growth in part time work and mobile jobs, will continue to grow travel in the midday.

Combining the increase in transit modal share from 1999 to 2004 with the increase in overall trips indicates a 22% increase in transit ridership over this period. This estimate, derived from travel diary results, corroborates well with TransLink's observed 24% increase in ridership over this period.

Current Vancouver UBC Transit Users

The incidence of using transit at least once per month ranges from an average of 39% of regional residents to 56% for people living in the City of Vancouver and 72% for people living at UBC/UEL. Of the sub-areas tested, residents west of Main Street have slightly lower incidence of transit use at 50%. Within the region as a whole, transit use is highest in the Vancouver/UEL (including UBC) sub-area, as shown in Exhibit 3-10.

The top bus routes used by at least 10% of respondents were the #99 Broadway Station/UBC B-Line by 20% of respondents, the #9 Boundary/Broadway Station/Alma/UBC at 10%, and the #98 Richmond Centre/Burrard Station B-Line also at 10%. The routes with the highest average number of one-way trips per week per rider were the #135 SFU/Burrard Station at 4.9 trips per week, the #8 Fraser Downtown at 4.8 trips per week, the #20 Victoria/Downtown at 4.7 trips per week per rider, and the #49 Metrotown Station/Dunbar Loop/UBC at 4.6 trips per week per rider. In total there were 9 routes that averaged 4 or more trips per rider.

Despite rapid growth in vehicle ownership and population growth in the outer municipalities, the proportion of persons using transit is rising with the regional transit modal share having increased from 10.3% to 10.8% from 1999 to 2004. This increase in transit mode share is significant against the background of an increasing population base, and it is attributable in part to the amount of service increase during this same time to accommodate increased demand. To achieve this continued growth in transit modal share with such significant population growth is unique among most Canadian cities where the transit systems have not kept pace with potential demand.

Exhibit 3-11 describes the daily allocation of transit trips to the various transit modes operating in the Vancouver/UBC area. At the present time bus clearly dominates the travel by transit in Vancouver/UBC area. However, in the future, once the RAV line is operating in 2009, the bus share will decline and rail will increase. Note that many riders will use more than one bus route or more than one mode, so there will be some double-counting in the table.

Exhibit 3-10

Estimated Transit Mode Shares by Sub-area

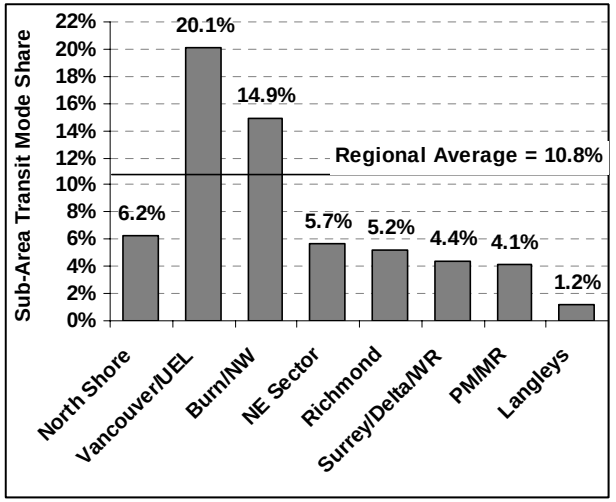


Exhibit 3-11 Vancouver/UBC Daily Transit Trips By Transit Mode[3]

Transit Mode	Daily Weekday Trips	Share of trips
Buses	332,810	74%
SkyTrain	95,103	21%
Sea Bus	13,500	3%
West Coast Express	7,980	2%
Total Trips	**449,393**	**100%**

Exhibit 3-12 Vancouver/UBC Transit Trips by Hour (1999 - 2004)

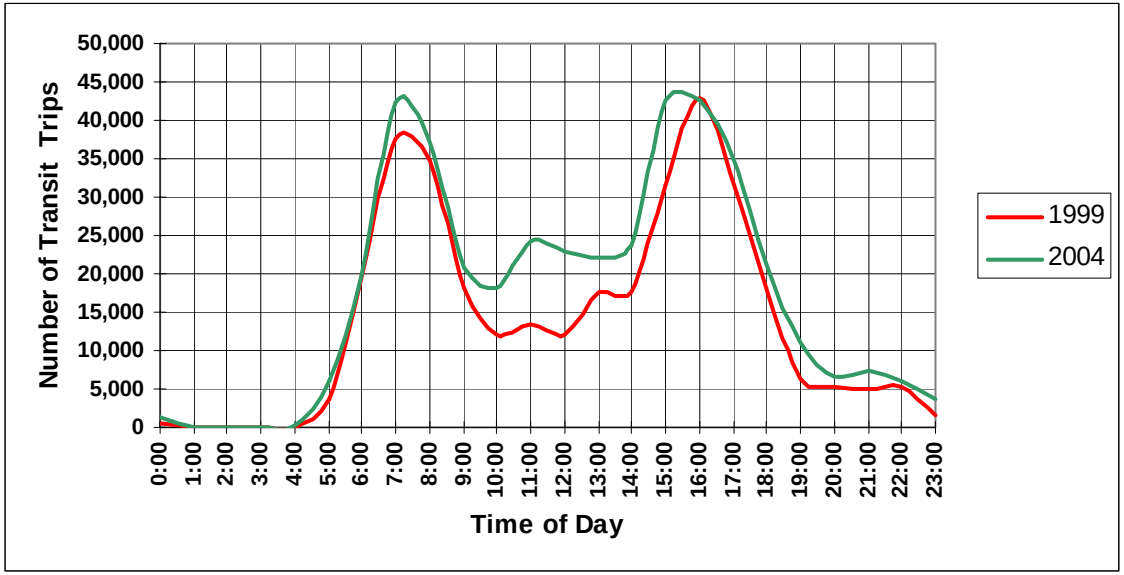


Exhibit 3-12 shows that transit trips in the Vancouver/UBC sub-area have a similar time profile compared to regional transit trips. Daily weekday transit travel in the Vancouver/UBC area grew by 24% mode share from 1999 to 2004 resulting in an overall 20% transit modal share. For growth over the 5 year period, hourly travel distributions show similar relative changes to regional transit trips, with trip starts in the midday and PM peak period showing more pronounced growth. The PM peak period has extended by almost an hour from 1999 to 2004.

The U-Pass, a deeply discounted universal transit pass for students, has had a dramatic effect on travel patterns for UBC. Over 55,000 UBC and SFU students have made their U-Pass programs a

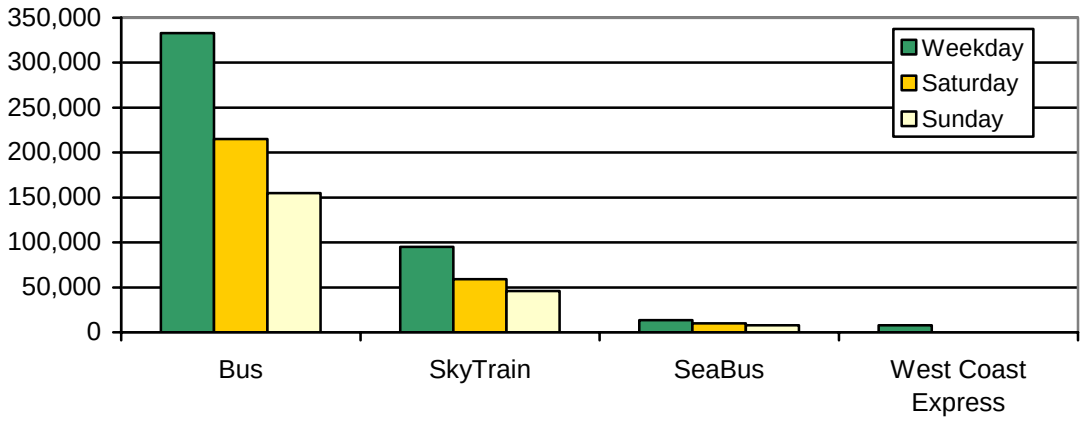
[3] Ministry of Transportation, 2004 Travel Diary and TransLink APC data

phenomenal success since being launched in September 2003. Transit use was up 39% at SFU and 53% at UBC in the first year alone, and another 7% and 10% respectively in the second year. TransLink has added over $4.5 million worth of bus service annually to meet this demand. These programs were developed through extensive negotiations with the school administrations and student governments, and were approved by student referendums at both schools. A large majority of students at both SFU and UBC have recently passed referendums to extend their programs at a fixed price to the end of August 2008.

From the fall of 2002 to the fall of 2003, the total number of daily weekday transit trips at UBC increased by 17,500. The increase in ridership comes from population/enrolment growth (23%) and shift from auto modes (77%). It also noteworthy that that travel in off-peak periods grew at a higher rate than peak period travel.

Below is an exhibit of Weekday, Saturday and Sunday Transit Travel in the Vancouver/UBC area. Saturday and Sunday transit ridership is 66% and 48% respectively of weekday transit ridership. This high level of weekend ridership supports the reported changes in trip purpose, with the highest growth being in the personal trip category.

Exhibit 3-13 Vancouver/UBC Daily Weekday, Saturday, and Sunday Transit Ridership



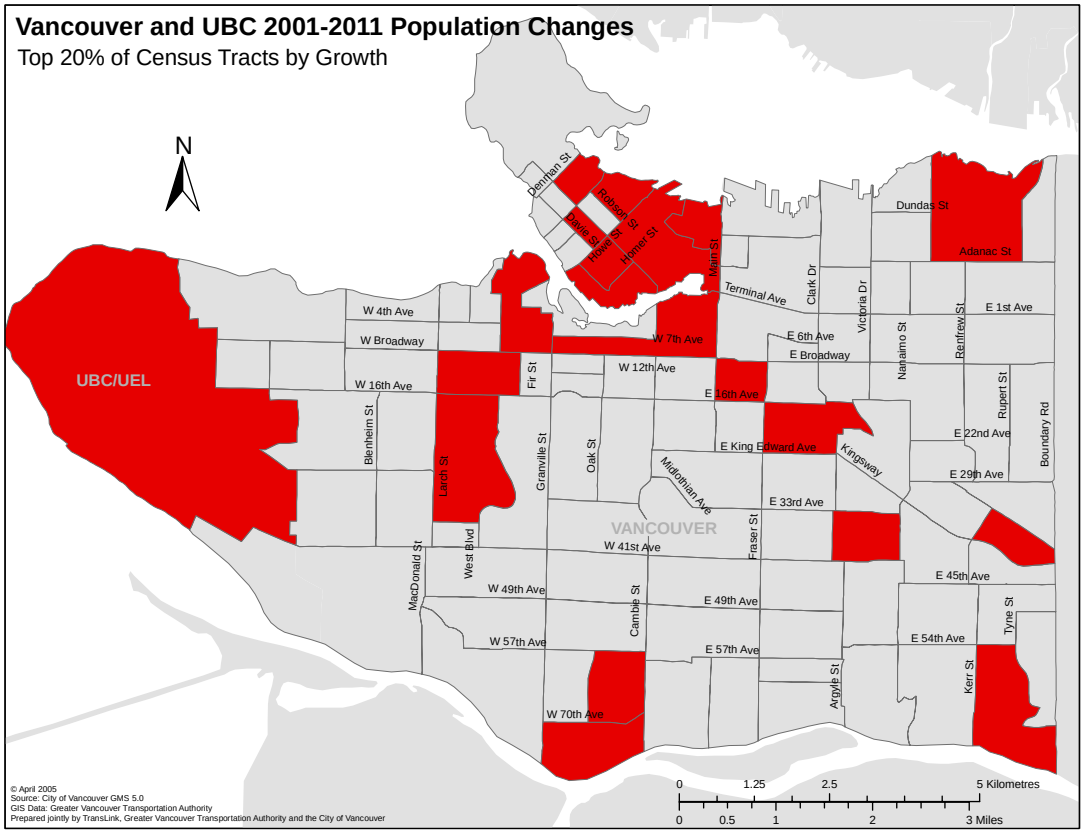
3.4 Vancouver & UBC Forecasts

3.4.1 Population and Employment Change

Between 2005 and 2010, regional and Vancouver/UBC population and employment will continue to grow. The figures below show key changes forecast in Vancouver/UBC population and employment

for the period 2001 to 2011. It should be noted that enrolment changes at post secondary institutions is accounted for in the employment totals.

Exhibit 3-14 Vancouver/UBC Key Areas of Population Change



Areas of significant population growth include:

- Downtown Vancouver, notably Coal Harbour, False Creek, Downtown South, and Chinatown/Gastown;
- UBC, including both market and non-market housing;
- East Fraser Lands, in Southeast Vancouver;
- Southeast False Creek, including the Olympic Village site;

- Broadway corridor;
- Locations along the Expo SkyTrain line;
- Multi-family redevelopment in Marpole and near Hastings Park; and,
- Potential redevelopment along the RAV corridor at Broadway, Oakridge, institutional sites near 33rd Avenue.

Areas of significant employment growth in the Vancouver/UBC sub-area are illustrated in Exhibit 3-15 include:

- Downtown Vancouver;
- UBC;
- False Creek and False Creek Flats;
- Central Broadway corridor;
- Cambie (RAV) corridor;
- Marpole, notably TransLink's new Vancouver Transit Centre; and,
- Grandview/Boundary Industrial area.

As noted in Exhibit 3-5 Population Growth by GVRD Sub-Area (1994-2004) and Exhibit 3-6 Share of Employment Growth (1996-2001) the Vancouver/UBC sub-area has experienced population growth similar to its share of the total GVRD population. However, employment growth has been much lower and future employment growth will predominantly be in current high employment areas. It can be expected that future demand for travel to work from Vancouver/UBC to other sub-areas – the reverse commute – will increase. In particular, Richmond has the second highest employment growth of the sub-areas, with the Airport alone expect to add approximately 5,000 new jobs by 2011. Exhibit 3-16 summarizes the population and employment projections for the Vancouver/UBC area.

Exhibit 3-15 Vancouver/UBC Key Areas of Employment Change

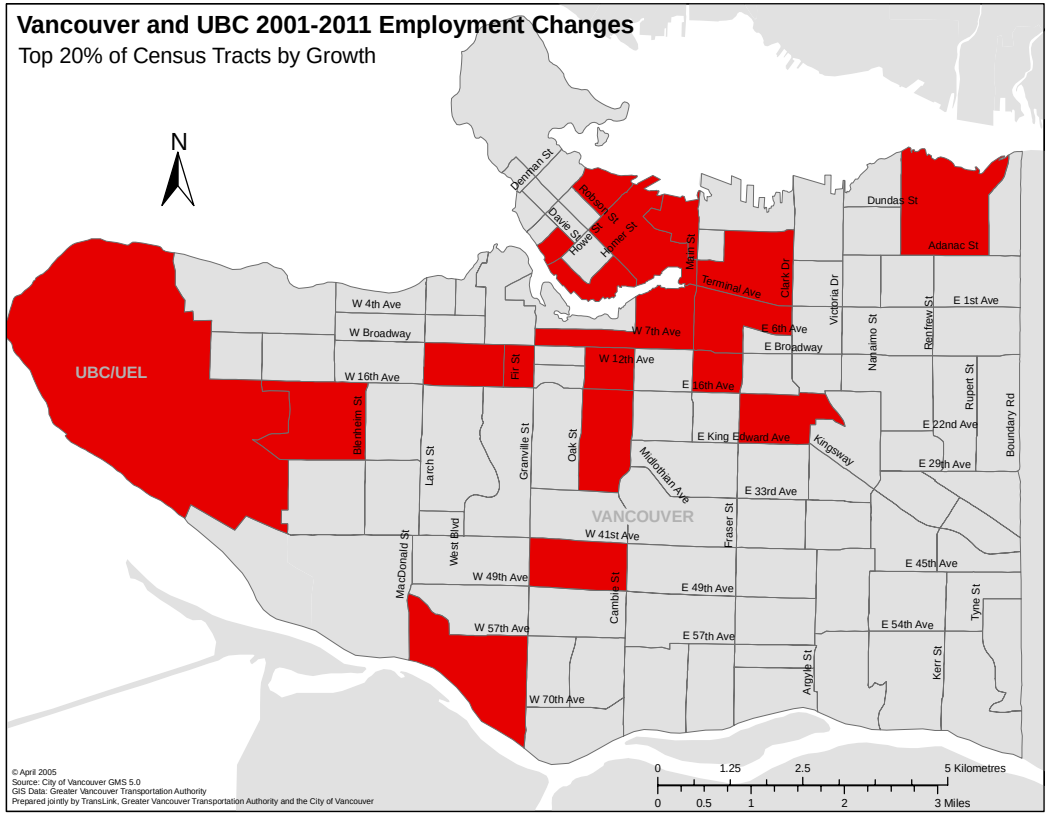
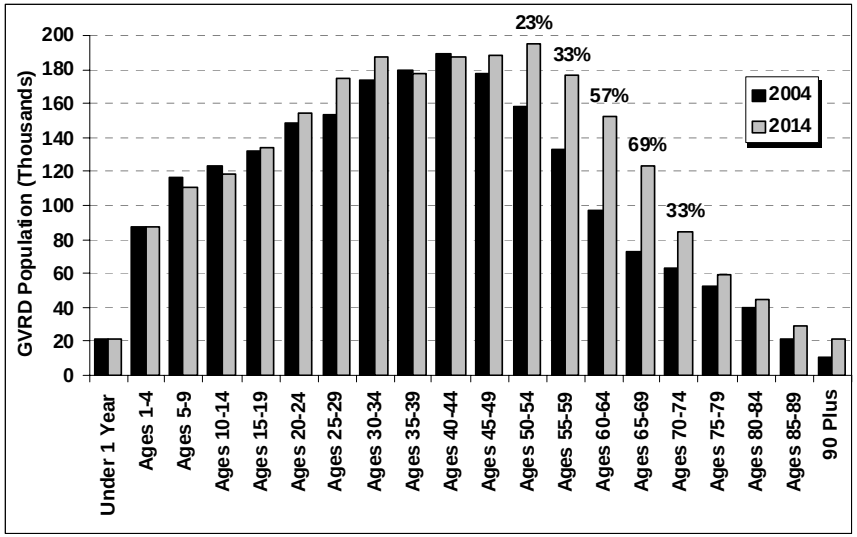


Exhibit 3-16 Vancouver/UBC Population and Employment (2005-2011)

	2001 City / 2004 UBC		2011 City / 2006 UBC	
	Population	**Employment**	**Population**	**Employment**
Vancouver	571,200	367,100	621,900	388,600
UBC	10,400	11,300	14,100	14,200
Total	**581,600**	**378,400**	**636,000**	**402,800**

3.4.2 Demographic Change

Exhibit 3-17 Population Age Distribution (2004 & 2014) [4]

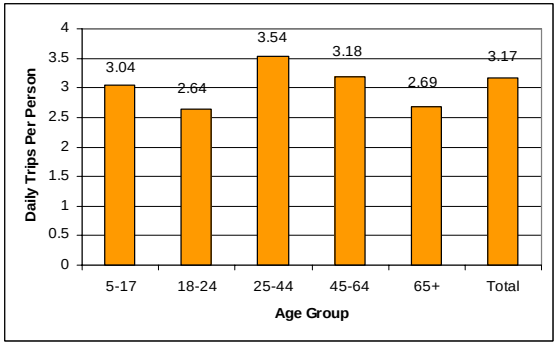


An ageing population in the region affects the travel demand profile. People in older age groups tend to make trips during the midday rather than the peaks, and they tend to make more trips. Supporting this general statement, Travel Diary data suggests on average, people are making more trips, especially during the midday.

The shift of persons entering older age groups over the next 10 years as illustrated in Exhibit 3-17 will have a dramatic effect on regional travel demand. Of particular significance is the increased proportion of persons in age groups 50-54 and older.

The number of daily GVRD trips per person by age group for the year 2004 is shown in Exhibit 3-18. Of significance is the trip rate of persons aged 45 and older, which is second only to younger adults 25-44. This older age group makes almost as many trips, but their mode preference is more distinctly auto.

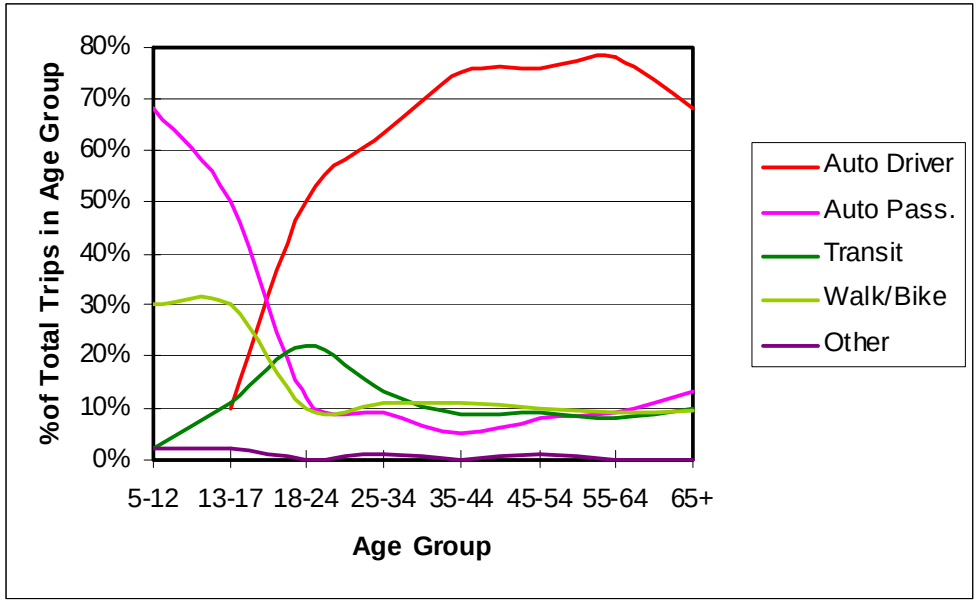
Exhibit 3-18
2004 Daily GVRD Trips per Person by Age Group



[4] 2014 population projections are population section of BC Stats, Ministry of Management Services, Government of British Columbia. The P.E.O.P.L.E. 29 regional population projections account for not only ageing but many other factors such as migration at the intra-provincial, inter-provincial and international levels.

Modal selection by GVRD residents by age group is depicted in Exhibit 3-19 which indicates that auto use for age groups 18 years and over continues to increase significantly up to the 55-64 age group. There is a corresponding drop in non-auto modes as people enter the 18-24 age group and beyond. With older adults preferring the automobile, and that segment of the population growing, road capacity will be strained, and the consequent challenge is to increase the share of trips on transit. Furthermore, more traffic congestion may lead to deteriorating travel times for all vehicles, unless there are specific transit priority measures in place to benefit transit vehicles.

Exhibit 3-19 Mode Choice of GVRD Residents by Age Group



Transit usage currently peaks in the 18-24 age group. The proportion of transit use in this category increased from 22% to 23%.between 1999 and 2004, in part as a result of the U-Pass program at UBC and SFU.

3.5 Future Key Markets

Growth in future transit demand in the Vancouver/UBC area for the period 2005 to 2010 will be influenced by the following factors:

- Federal, Provincial, regional and municipal policies that support transit including TDM and transit priority;

- Increasing fuel costs;
- Changes in regional population and employment including post secondary school enrolment;
- Changes in demographics, notably the ageing population and an increase in non-peak trips;
- New transit services and technology such as the RAV line, bus expansion including a new B-Line, a third SeaBus, and increased accessible and multi-modal integration;
- Kyoto protocol implementation;
- Investment in modes that are in competition with transit; and,
- Special events such as the 2010 Olympics.

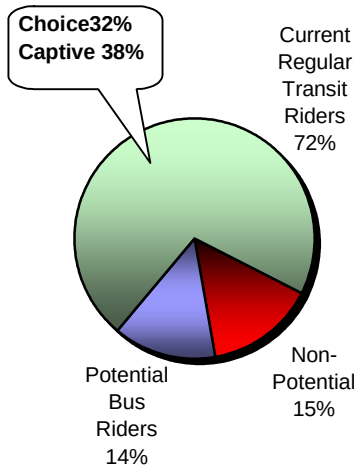
3.5.1 Potential to Attract New Riders

As part of the VUTP planning process, TransLink commissioned market research of current and potential bus riders[5]. The objectives of this research were first, to verify transit travel patterns and mode usage among current and potential transit users, and second, to estimate potential transit trip volume associated with new service concepts.

The research found that the following six destinations of Vancouver/UBC residents have the highest potential to convert the largest number of single-occupant vehicle (SOV) trips to transit:

- Downtown Vancouver;
- Vancouver Central Broadway;
- Kitsilano;
- The West End;
- UBC; and,
- Metrotown

Exhibit 3-20 Propensity of UBC/UEL residents to use transit (n=556)



[5] Vancouver/UBC Area Transit Plan Research, Mustel Group Market Research, April 2005

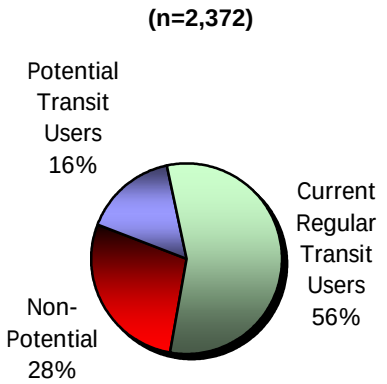
Regular transit use is highest among those residing at UBC (Exhibit 3-20) and those living in the City of Vancouver (Exhibit 3-21). Transit use declines the farther people live from the City and from the higher service level areas.

The market research confirms that there is potential to attract more ridership and new transit customers however, this assumes the ability to provide sufficiently expanded transit services to meet expectations. Financial and fleet constraints may limit the degree of market penetration that is achievable. Based on these factors, transit growth in the region will likely be in the 12 to 24% range for the period 2004-2010.

3.5.2 Growth in Regional Travel 2005 to 2010 trends

Regional population and employment is expected to grow by 5% from 2005 to 2010. Vancouver growth is expected to be in this range as well. Growth in regional travel for the period from 2005 to 2010 will range from 12-15%. Transit ridership, particularly in Vancouver could grow at the twice the total travel rate or 24%. This is based on the assumption that Transportation Demand Management (TDM) programs such as U-Pass and employee pass discount programs continue to be expanded. It also assumes that there is a latent demand for transit that is not currently being matched by supply. There is evidence to support this assumption in that ridership on the Expo SkyTrain line increased very rapidly (by 11%) with the increased capacity provided by the addition of Mark II cars (larger capacity vehicles and higher frequency). As well, the expansion of transit service hours from 1999 to 2004 (13%) was followed by a 23.6% increase in regional transit ridership.

Exhibit 3-21 Potential Market for Improved Bus Service City of Vancouver Residents



3.5.3 New Transit Services

This section discusses the relationship between significant additional service and the opportunities presented for future key markets.

The implementation of the RAV line will address a number of key transit markets. It passes through some of the largest and highest growth employment areas of the region, notably Downtown Vancouver, Central Broadway, the Airport, and Richmond. Employment forecasts for the Airport indicate significant growth, and with 25% of the current employed labour force located at the Airport residing in Vancouver, the RAV line will clearly provide further opportunities to increase mode share to the airport. Another key market served by the RAV line is post-secondary students, with service to Langara College and Vancouver Community College City Centre campus.

Expansion of the transit fleet will serve a number of important destinations, including Downtown, Central Broadway, the False Creek Flats and UBC, and help eliminate service gaps in the existing network. As well, the third SeaBus, expected within the timeframe of this plan, will enhance transit to and from the North Shore.

The final area that will see significant growth is in accessible services and multi-modal integration. The new low-floor trolleys will all be ramp and bicycle rack equipped, providing a major boost within the Vancouver/UBC sub-area. As well, the RAV line will be fully wheelchair and bicycle accessible during all hours of operation, and the new entrance to Granville Station on the Expo line will make this station fully accessible in 2006.

3.6 Transportation Demand Management (TDM)

As previously mentioned, the implementation of various policies in response to Kyoto Accord will influence transit demand. Among these policies is Transportation Demand Management (TDM), which is a general term for strategies that result in more efficient use of transportation resources. These policies are intended to reduce SOV (single occupant vehicle) travel. The policies can be viewed as incentives; such as comfortable bus shelters and convenient information; and disincentives such as tolling or high parking fees. Jurisdictional authority to implement these measures is spread among municipal, provincial, federal and other agencies such as the GVTA. The accuracy of ridership forecasts for the Vancouver/UBC Area is influenced by how fully TDM measures are implemented to complement the new transit services being proposed.

3.6.1 Parking

Parking plays an important role in affecting people's travel behaviour. TDM initiatives for parking include its availability, price, and convenience relative to other modes. TransLink is working on the introduction on a region wide area parking tax as part of the funding package for its 2005-07 Three Year Plan. The City of Vancouver and UBC can influence parking demand through a number of measures, such as: pricing on-street parking, including permit parking, at market rates; reducing the parking requirements for residential and commercial uses close to high quality transit; and de-coupling parking from multi-family residential units, so that when residents purchase a unit the purchase of a parking stall would be optional. The City of Vancouver can also provide incentives for the provision of carpool parking, or co-operative cars and facilitate bicycle parking on-street, at existing developments and important transit nodes to complement its existing standards for new developments, further enhancing the multi-modal opportunities.

Responsibility:
City of Vancouver
UBC

3.6.2 U-Pass, Employee Pass, and Community Pass

U-Pass

TransLink is now working with the administrations and student societies of seven additional publicly funded post-secondary institutions to examine possible new U-Pass Programs, which would be introduced in stages in the fall of 2006, and fall of 2007. If all 7 schools choose to participate, including

Responsibility:
TransLink
UBC
Other public post-secondary institutions

Langara College, Vancouver Community College (VCC), and Emily Carr Institute of Art and Design in Vancouver, the U-Pass Program could add another 45,000 students. It is important to note that the transit mode share to Emily Carr, Langara, and VCC institutions is currently very high – 47%, 49%, and 64% respectively – which means that the potential for major increases in transit use such as occurred at UBC and SFU is limited. However, based on experience at UBC and SFU, it can be expected that current transit users will increase their trips, and new users will be attracted for occasional use, especially in the off-peak periods. All new U-Pass Programs will be accompanied by increased transit service.

Employee Pass

TransLink's Employer Pass Program allows companies to offer cost-reduced annual transit passes to their staff when 25 or more employees are enrolled into the program. These photo ID transit passes are issued to employees through a payroll deduction, at a savings of approximately 15% off the cost of TransLink's regular passes. The pass is valid for travel by bus, SkyTrain and SeaBus. Passes for West Coast Express are also available. There are a number of opportunities to tie in the introduction of new transit services, particularly the RAV line, with an expansion of the Employee Pass Program. The City of Vancouver through its development permitting process can require new developments to include a TDM strategy and the introduction of programs such as this one.

Responsibility:
TransLink
City of Vancouver

Community Pass

The Community Pass will be a deeply discounted annual transit pass tailored to households located in communities which are geographically separate, where there is single representation for the housing, where existing transit service is very good and capacity is available in the non-peak direction. UBC and SFU represent opportunities as they are at the ends of the transit network and resources are underutilized in the reverse peak direction.

Responsibility:
TransLink
UBC

A number of innovative principles guide TransLink's Community Pass Program, including a guaranteed payment to TransLink that is equal to at least 50% of the eligible residents participating. The price of the Community Pass is determined through a combination of methods, recognizing that at UBC there are existing residents whereas SFU's UniverCity is just being built. Innovative sponsorship and marketing opportunities are also being pursued.

TransLink staff has been meeting with representatives of the UBC administration and the University Neighbourhoods Association since the fall of 2004 to discuss the process and work involved in implementing a Community Transit Pass for the 1800 residents of housing on campus today and an estimated 20,000 residents by 2021. A survey of residents has been completed to determine their transit usage in order to establish a key component of the price for the pass. It is hoped that the details of this program can be concluded by the end of 2005 so that it could be implemented in the spring of 2006.

3.6.3 Gas Tax

TransLink currently receives a portion of the Provincial gas tax. The federal government has recently announced their "New Deal for Cities" that will begin to transfer a portion of the federal gas tax to local municipalities. There is consensus within the GVRD that the local share of this money will be directed to TransLink for improvements to the regional transportation network. Gas taxes have a slight TDM effect – when the tax is raised the cost of driving goes up relative to other alternatives such as transit. This has the potential of converting some SOV trips to transit, if there is enough capacity on the transit system.

Responsibility:
Federal
Provincial
TransLink

3.6.4 Road Pricing

Road pricing in the province of BC is currently limited to project tolls, where vehicles are charged a toll to use a facility, and the revenue collected is used to pay for that facility. The provincial policy has been to exact a toll only when there is a 'free' alternative route. TransLink's new Golden Ears Bridge will have tolls to pay for the bridge, consistent with the limited authority granted in the GVTA Act, to collect project tolls.

Responsibility:
Provincial

Transport 2021 anticipated that by 2008 there would be system wide tolls on the major water crossings in the region, thereby discouraging indiscriminate auto use. However, there is no legislation in place at this time that would permit systematic tolling by any regional agency. The Province has indicated that tolls are being investigated to fund highway improvements in the lower mainland through the Gateway Project, including the twinning of the Port Mann Bridge and the widening of Highway 1, but there has been no formal announcement.

A relatively recent concept is the high occupancy toll or HOT lane. HOT lanes allow carpools (2+ or 3+ occupants) for free and single occupancy vehicles to use them for a price.

Another recent application of road pricing is the congestion charge used in London, England. A fee of £5 (CAD10) was introduced to enter the central city in the spring of 2003. The purpose of this charge was to both reduce congestion and fund improvements to transit and other alternatives to the single occupancy vehicle. The systems works with a cordon of cameras taking photos of vehicle license plates as they enter the zone, and people being able to pay their fees on-line, text messaging by cell phone, or by phone. The scheme has been highly successful, with congestion reduced by 30%, transit reliability improved by over 30%, and transit ridership up substantially. Fears that suburban commuters would park outside the zone overwhelming other neighbourhoods and that business would be negatively impacted have not come to pass.

Regional Bridge Ownership:

Arthur Laing = Federal
Oak St. = Provincial
Knight St. = TransLink
Queensborough = Provincial
Alex Fraser = Provincial
Pattullo = TransLink
Port Mann = Provincial
Pitt Meadows = Provincial
Second Narrows = Provincial
Lions Gate = Provincial

The one result not anticipated is that traffic volumes decreased more than expected, resulting in less revenue than forecast. This resulted in approval to raise the charge to £8 (CAD16) on July 1, 2005. A

number of other jurisdictions have congestion based road pricing, including Singapore and individual toll highway projects in North America.

3.6.5 Car Sharing

Car sharing is another TDM strategy that gives people increased transportation choices and encourages responsible use of the automobile. People belong to a co-op where they share ownership of vehicles, which are conveniently parked throughout the city. The city's current car sharing organization, the Co-op Auto Network, offers a wide variety of vehicles that can be booked on-line for short-term use. This allows residents to have access to a vehicle when they need it but use transit or other sustainable alternatives for the majority of their trips, greatly reducing both their use of a private vehicle and their transportation costs.

Responsibility:
Private sector, non-profit

City of Vancouver & TransLink in a supporting role.

The City of Vancouver currently facilitates car sharing through the provision of free parking spaces for co-op cars, and parking by-laws for multi-family residential buildings that encourage the substitution of owner occupied spaces for car sharing spaces at a 3:1 ratio. There may be the opportunity to increase this ratio, to provide an additional incentive for the private sector to facilitate car sharing, as the Co-op Auto Network allocates about one car for every 18 members. One development downtown that facilitated car sharing through its marketing strategy saw approximately 25% of home purchasers sign up for this option, forgoing a personal vehicle and parking space.

City of Vancouver Council has passed a motion to: *call upon the Greater Vancouver Regional District and the Greater Vancouver Transportation Authority to call upon the provincial government to have ICBC introduce distance based car insurance as a method of encouraging people to reduce overall usage of their motor vehicles.*

3.6.6 Distance Based Insurance

Distance based insurance provides drivers who drive less the opportunity to save money, while encouraging more responsible vehicle use. Currently, automobile insurance is paid at a flat rate per year and divisions between pleasure and commuting use, and commuting distance are coarse. There is no incentive to drive less, in fact, the incentive is to drive more, as this makes the per kilometre cost of insurance lower. With distance based insurance, drivers pay a per kilometre charge for their insurance, based on yearly odometer readings. Those who drive less, pay less. Those who drive more, pay more. The average cost of insurance remains the same, but there is a financial incentive to drive less. As total vehicle kilometres decrease and there are fewer collisions over the longer term, there is the opportunity to decrease the total cost of all insurance.

3.6.7 Employment Options

There are a number of flexible work options that employers can offer that have positive TDM effects. These include opportunities to telecommute from home, especially with the high penetration of personal computers in the home, with the opportunity for bulk buying incentives that offer employees a discount on the purchase of a computer. Another option is flex hours, where employees can start work early in the day and leave early, or start work later and leave later, thus missing the peak period travel times. A

compressed work week, where employees work longer hours in exchange for earned days off, can also positively impact the amount of peak period travel.

3.6.8 Implementation

TDM measures, like transit priority measures discussed in Section 6, can be grouped into lower impact short-term and higher impact long-term initiatives. It is expected that the lower impact short-term initiatives – increased parking taxes, discount pass programs, gas taxes, car sharing, distance based insurance, and employment options could be implemented within the timeframe of the Vancouver/UBC Area Transit Plan. Other initiatives such as the various forms of road pricing will require regional dialogue and could take longer to implement.

TDM works to influence future demand where there are viable options, and people can substitute one mode of travel for another. With the implementation of the Vancouver/UBC Area Transit Plan, transit will be a more viable option in the future.

3.7 Conclusions

A key finding from the available travel data in the region and the market research study undertaken for this plan is that Vancouver and UBC continue to dominate transit trip making in the region. On a 24 hour basis, 20% of trips in Vancouver and UBC are by transit – which is the highest mode share in the region.

Regional population and employment is expected to grow by 5% from 2005 to 2010. Vancouver growth is expected to be in this range as well. Growth in regional travel for the period 2005 -2010 will range from 12-15%. Transit ridership, particularly in Vancouver is expected to grow at the twice the total travel rate or 24%.

This is based on the assumption that Transportation Demand Management (TDM) programs such as the U-Pass Program and employee pass discount programs continue to be expanded. It also assumes that there is a latent demand for transit that is not being matched by supply. There is evidence to support this assumption in that ridership on the Expo SkyTrain line increased very rapidly by 11% with the increased capacity provided by the addition of Mark II cars (larger capacity vehicles and higher frequency). As well, the expansion of transit service hours from 1999 to 2004 (13%) was exceeded by a 23.6% increase in regional transit ridership

The recent travel behaviour studies combined with projected population and employment growth indicates that transit service is required in the peak as well as mid-day, evening, weekends and late night periods, to make transit an all day alternative for work, school, shopping, and leisure trips.

Section 4

Performance of Existing Services

4.1 Introduction

This section reviews current data about the performance of Vancouver's bus transit network and summarizes key points from Technical Memo # 1 Vancouver UBC Transit Service Performance Analysis. The evaluation of transit service performance for this plan is greatly enhanced relative to Area Transit Plans for other parts of the GVRD due to the timeliness of data available from the Automatic Passenger Counter (APC) pilot project. Data was collected between October 2003 and April 2004. The resulting data consists of a large sample of passenger counts by location and time on all routes in Vancouver and UBC, thus making it possible to reliably estimate total daily boardings per route, among other statistics. A summary of the basic statistics by route is shown in Appendix A at the end of the section.

4.2 Vancouver's Transit Network – A Description

Most local transit service within the Vancouver and UBC area is provided by a fairly dense network of bus routes. In addition, SkyTrain serves much of the east side of the city as well as the downtown core.

4.2.1 Bus Network

Bus routes in the Vancouver and UBC area carry just over 350,000 daily boardings on a network of 31 diesel and trolley routes. Vancouver has the second largest electric trolleybus system in North America, after San Francisco. The current fleet of trolleybuses are not wheelchair accessible or bike rack equipped, however, the new fleet arriving between 2006 and 2008 will be accessible to both.

The 13 trolleybus routes carry a majority of passenger trips, at 58% of bus boardings, but the diesel routes serve longer average trip distances and so handle the majority (56%) of passenger-kilometres (a passenger-kilometre represents the transporting of one passenger a distance of one kilometre). A summary of weekday bus ridership is provided in Exhibit 4-1 and Exhibit 4-2 and compares weekend with weekday ridership.

Vancouver has North America's second largest electric trolleybus fleet

The bus transit system within the City of Vancouver is designed primarily on the grid principle. High-frequency transit lines run north-south and east-west across the city, so that a trip between any two points can typically be made with at most a single transfer.[1] This L-shaped trip is usually similar to the way a motorist would drive to the same destination.

The grid system ensures that almost all trips are possible with no more than one transfer. It is the foundation for many of the highest-ridership systems in the developed world. Vancouver's road network and land uses make it ideal for operating a modified grid system. The grid is effectively utilized because the two biggest transit destinations in the city are located at edges of the grid: downtown in the north and UBC in the west. Many parallel routes converge to serve either UBC from most of the east-west arterials, or downtown from Dunbar in the west to Renfrew in the east. Due to the grid network of routes, it is fair to conclude that at least 98% of all peak period trips to and from Downtown Vancouver can be made with no more than one transfer, in accordance with the guideline.

The southeast portion of the city developed after the grid street network was established, and reflects the thinking of its time: curvilinear streets and crescents with cul-de-sac forms throughout. This street network, combined with largely residential development, results in more circuitous transit routes with significantly higher usage in the peak than off peak due to the area's "bedroom suburb" nature.

B-Line or and limited stop service has a crucial function in the Vancouver network. They fulfill the requirement for higher capacity transit in high-demand corridors such as Broadway, Granville, and Hastings. These services run faster than local buses, stopping only at transfer points. Two limited stop services with high ridership and frequent service in the city are branded as B-Lines (#98 B-Line along Granville and #99 B-Line along Broadway). In addition, the #135 (Hastings to SFU) has a B-Line-like stopping pattern and frequency within Vancouver, though not within Burnaby. Several other corridors have limited-stop service that runs less frequently (#44 Downtown-UBC) or peak hours only (#43 on 41st Avenue).

Exhibit 4-1 Average Weekday Bus Ridership and Service Provision

	Trolley	Diesel	Total
Passenger Boardings	189,300	139,000	328,300
Passenger-kilometres	604,200	760,200	1,364,400
Revenue Hours	2,329	1,613	3,942
Service Hours	2,751	1,987	4,737
Revenue kilometres	39,198	35,850	75,048

Exhibit 4-2 Bus Boardings by Day of Week

	Average Boardings	% of weekday
Weekday	328,300	100%
Saturday	226,000	69%
Sunday and Holiday	167,200	51%

[1] For example, a trip from Cambie and Broadway to Granville and King Edward could be made either by taking a bus west on Broadway and transferring to a bus south on Granville, or by catching a bus south on Cambie, then a bus west on King Edward.

Rapid Transit and Marine Network

The City of Vancouver is also served by the Millennium Line and Expo Line SkyTrain rapid transit lines, West Coast Express commuter rail, and SeaBus passenger ferry. Additionally, two private operators offer a network of passenger ferry routes in False Creek, independently of TransLink.

SkyTrain

Vancouver is served by 12 SkyTrain stations, nine on the Expo Line and three on the Millennium Line. Exhibit 4-3 shows the weekday boarding volumes at SkyTrain stations within Vancouver, as well as the AM peak hour volumes.

The busiest station within Vancouver is Broadway, next to the busiest bus corridor, where there are high transfer volumes to and from buses as well as between the two SkyTrain lines. As expected, the downtown stations are quite busy. Joyce stands out as the busiest "suburban" station in Vancouver, on account of its bus connections and the adjacent transit-oriented Collingwood Village development.

At the time of writing, TransLink is finalizing an updated ridership report. Preliminary findings from the 2005 SkyTrain Survey suggests the Expo Line experienced increased ridership in a range of 15-20% (based on eight reference stations surveyed) and ridership levels observed on the Millennium Line between 2003 and 2005 represents a healthy 34% increase. During the same period from early 2003 to early 2005, the region's transit system experienced an increase of 19% in total ridership.

West Coast Express

West Coast Express commuter rail from Mission terminates at Waterfront Station in downtown Vancouver. This is the line's only station within Vancouver and is the destination for most of the service's 4,050 daily riders (i.e. West Coast Express has about 8,100 daily boardings).

SeaBus

SeaBus passenger ferry connects Waterfront Station in Vancouver with Lonsdale Quay in North Vancouver using two 400-passenger vessels. SeaBus handles over 16,000 passenger trips on an average weekday, many of whom continue their commute on other transit services to reach destinations such as UBC and Central Broadway.

Exhibit 4-3 SkyTrain Boardings at Vancouver Stations

Line	Station	Weekday Boardings	AM Peak Hour Boardings
Expo	Waterfront	10,400	900
	Burrard	16,100	800
	Granville	16,700	510
	Stadium	7,100	190
	Main Street	9,600	550
	Broadway	20,300	2,200
	Nanaimo	4,200	510
	29th Avenue	4,700	670
	Joyce	10,300	1,500
Millennium	Commercial Drive	9,400	590
	Renfrew	1,500	150
	Rupert	1,400	140
Totals		**111,700**	**8,710**

Routes Covered by this Study

The routes covered in this study are those that are open to customers making trips within the City and UBC/UEL area.[2] Appendix B lists all the routes analyzed and their characteristics. (Note that North Vancouver (240 series routes) and West Vancouver (250 series routes) services provide local service in Vancouver along Georgia Street but are not included in this study due to their minor role within Vancouver and a lack of data. The local service provided during evenings by the #210 in east Vancouver, operating as route #4, is included.)

4.2.2 Service Categories

TransLink divides its services into brands according to mode. All of the services considered in this study fall into two brands, "B-Line" and a general "Bus" category.[3] For Vancouver, it is useful to distinguish between local and limited-stop services, and also between frequent and infrequent ones.

Frequent Locals

Frequent service routes run no less often than every 15 minutes throughout the daytime, and more often during peak periods. Most of these routes come every 10 minutes or more often. As illustrated by Exhibit 4-4, the network of routes consists almost entirely of frequent services.

These routes are often considered by customers as being always available and riding may not require reference to a timetable. The random transfers required by the grid system are supported by the frequent service, minimizing wait times at transfer points. The high frequencies and high ridership on these routes have a symbiotic effect as each helps support the other.

Secondary Local Services (#26-29, #50, #100)

Secondary service runs at headways of 15-30 minutes midday are are shown in Exhibit 4-5. These services supplement the grid in several different ways, and have more differences than similarities among themselves:

The #3 Main typifies a frequent local route

A secondary local service route in southeast Vancouver

[2] One exception is service along Beach Avenue and Pacific Blvd. provided by two new Community Shuttle routes.
[3] Express Coach routes often have one terminus in Vancouver but are not available for intracity use and are therefore not considered in this study. Community Shuttle service is now being introduced in Yaletown and North False Creek, but that service is too new to consider here.

Exhibit 4-4 Frequent Local Routes

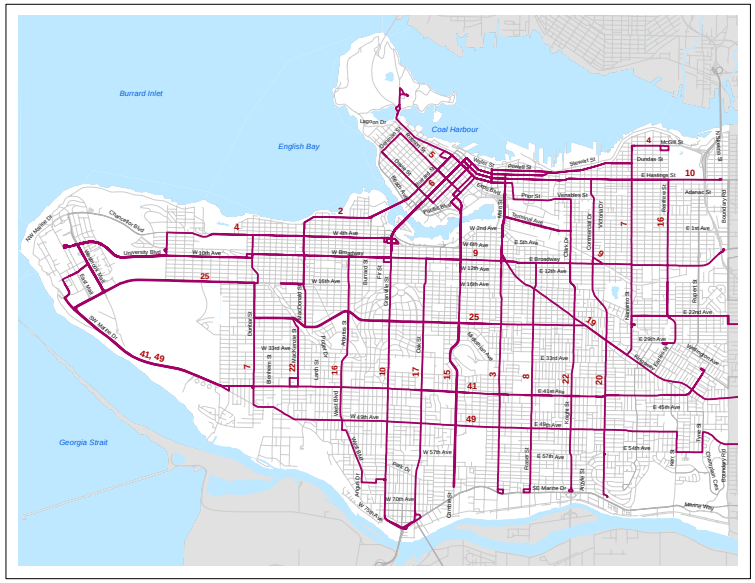


Exhibit 4-5 Secondary Local Routes

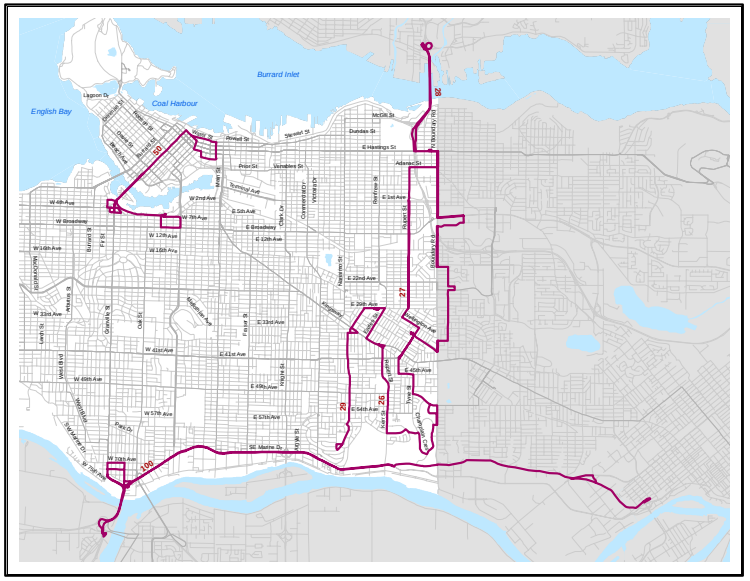


Exhibit 4-6 B-Line Routes

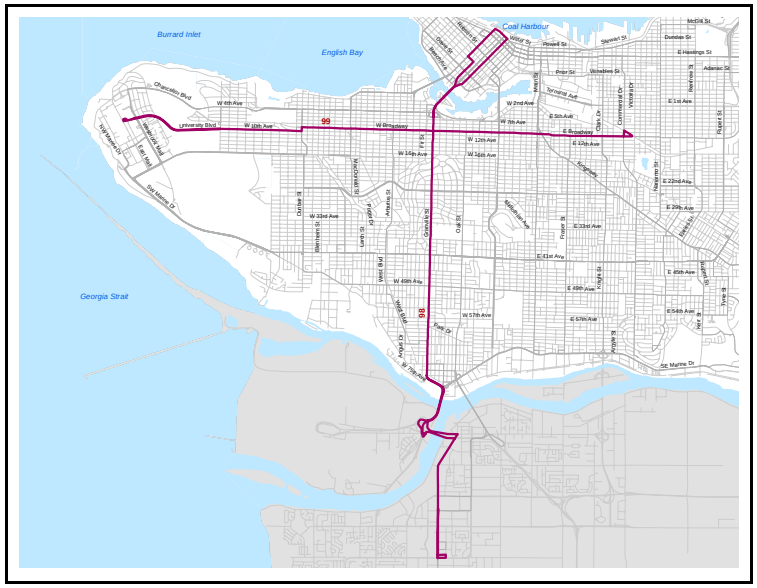
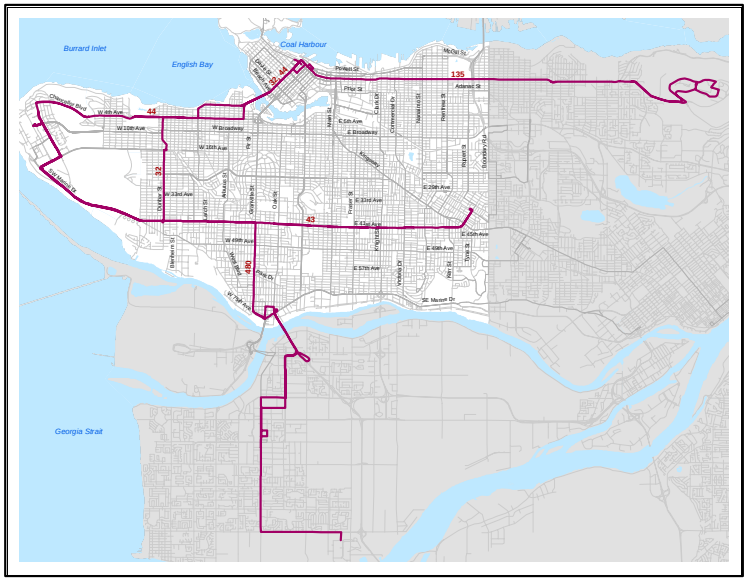


Exhibit 4-7 Limited-Stop Routes



- Service into Pockets: A few areas can't be served by the grid routes because they aren't on the main grid pattern of streets. In the southeast area, Route #26 serves such an area. At False Creek South, Route #50 serves a dense area between the Granville and Cambie bridges, including Granville Island.

- Lowest-Demand Grid Routes: This group includes Route #100 on Marine Drive, Route #27 on Rupert. Some routes, especially east-west routes with high volumes of post-secondary school traffic, such as the #25 and #49, could be considered as Secondary Local Services in the evenings when demand for them is lower.

The #98 B-Line carries over 20,000 riders per day

B-Line and Limited Stop Services

B-Lines (#98 B-Line and #99 B-Line) run frequently and stop only at transfer points or major destinations. These routes are shown in Exhibit 4-6. Whereas local lines are intended to stop every 250 metres or so, B-Line and other limited-stop routes have stops roughly every 1000 to 1500 metres. These routes are overlaid on local routes that make more closely-spaced stops in high-demand corridors where there is demand for longer trips. Where this demand is high all-day, a B-Line service may be provided with a distinct branding treatment (distinctive livery, frequent service all-day). If off-peak demand isn't high enough to justify a B-Line all day, a limited-stop service may be offered during higher demand periods, such as the #43 on 41st Avenue or #44 on 4th Avenue.

The limited-stop services each serve a specific market and are shown in Exhibit 4-7. For example, within Vancouver route #135 is functionally equivalent to a B-Line service, because its stops are widely spaced and its frequency is high all day, but it operates locally in Burnaby and so is not be branded as a B-Line.

The City of Vancouver has relatively little market for peak-only services, because the demand for transit is typically significant all-day. The only peak-only routes are the #32 on Dunbar and the #43 on 41st Avenue. Both are overlays on a frequent local route, (#7 on Dunbar and #41 on 41st) providing faster service when demand is highest. The #32 is the only peak route that operates exclusively in the peak direction with standard length (12-metre) buses. The #32 is also unusual in that it serves all local stops along Dunbar, Alma and Burrard Downtown; the limited-stop portion is between 4th and Alma and the Burrard Bridge.

West 4th Avenue is a major common service corridor for routes #4 and #7

Common Service Corridors

There are several streets where multiple routes run together for a distance in order to provide a higher level of service. These locations are termed Common Service Corridors and are listed in Exhibit 4-8. Shorter overlaps are also common, and reflect the need for routes to converge approaching a major destination or bridgehead.

The most extensive service overlaps occur along Powell/Dundas and Hastings east of downtown, where multiple routes converge to provide service to downtown. Both of these streets have routes that run out to the east edge of the city. In addition, the north-south grid routes on Victoria, Nanaimo, and Renfrew all turn westward when they reach either Hastings or Dundas, to provide direct service into downtown. The Hastings corridor also has limited-stop service, provided by the #135, which stops at all transfer points and more frequently within downtown. The result is a high quantity of service along both Hastings and Powell/Dundas. Since Hastings and Powell/Dundas are mostly within walking distance (200 to 400 metres) of each other, the effect is that five frequent routes overlap each other for a distance of more than 2 km. The significance of this overlap is discussed later in this section.

West of downtown, the overlap on Cornwall/Macdonald is the result of an overlay route – Route #2 – running as additional frequency on the highest demand portion of the longer Route #22. Along West Broadway, local service west of Granville is provided by both Route #9, which runs east-west across the city, and Route #17, which runs to downtown, as well as the #99 B-Line (with fewer stops). Route #17 operates to UBC at all times but #9 only serves UBC in peak hours.

Exhibit 4-8 Major Common Service Corridors

Along	Between…	…and	Routes
Broadway (10th Ave)	Granville	Alma (UBC)	#9, #17, (#99)
Burrard, Cornwall, Macdonald.	Burrard Station	Macdonald at 16th	#2, #22
West 4th Avenue	Downtown	4th/Alma	#4, #7
Powell, Dundas	Downtown	Nanaimo	#4, #7
Hastings	Downtown	Renfrew	#10, #16, (#135)
Hastings	Downtown	Commercial	#10, #16, #20, (#135)
Granville	Davie	Hastings	#3, #4, #6, #7, #8, #10, #16, #17, #20, #50

Limited-stop routes in parentheses ()

4.3 Transit Service Performance Evaluation Framework

Transit service performance is monitored through data collection in the field and customer satisfaction surveys. This analysis uses the Transit Service Guidelines (TSG) to evaluate the service.[4]

The Guidelines are intended to:

1) Ensure that an acceptable level of service quality is provided to customers.

2) Provide a consistent and fair basis for evaluating existing service and proposed changes or new services.

3) Allocate resources efficiently.

The guidelines set expectations in the following categories:

- **Comprehensive:** Transit service should be within walking distance for most residents and provide convenient access to major destinations.

[4] See "Transit Service Guidelines Technical Report, June 2004" TransLink or "Public Summary Report" on-line at www.translink.bc.ca.

- **Frequent:** Service should minimize wait times and be competitive with private auto travel.

- **Convenient:** Transit service should be available for early in the morning to late at night, seven days a week, especially on major routes.

- **Comfortable:** Service should be comfortable and customers should not have to stand for long periods of time.

- **Reliable:** Services should run on time.

- **Efficient:** Levels of service should be appropriate for demand.

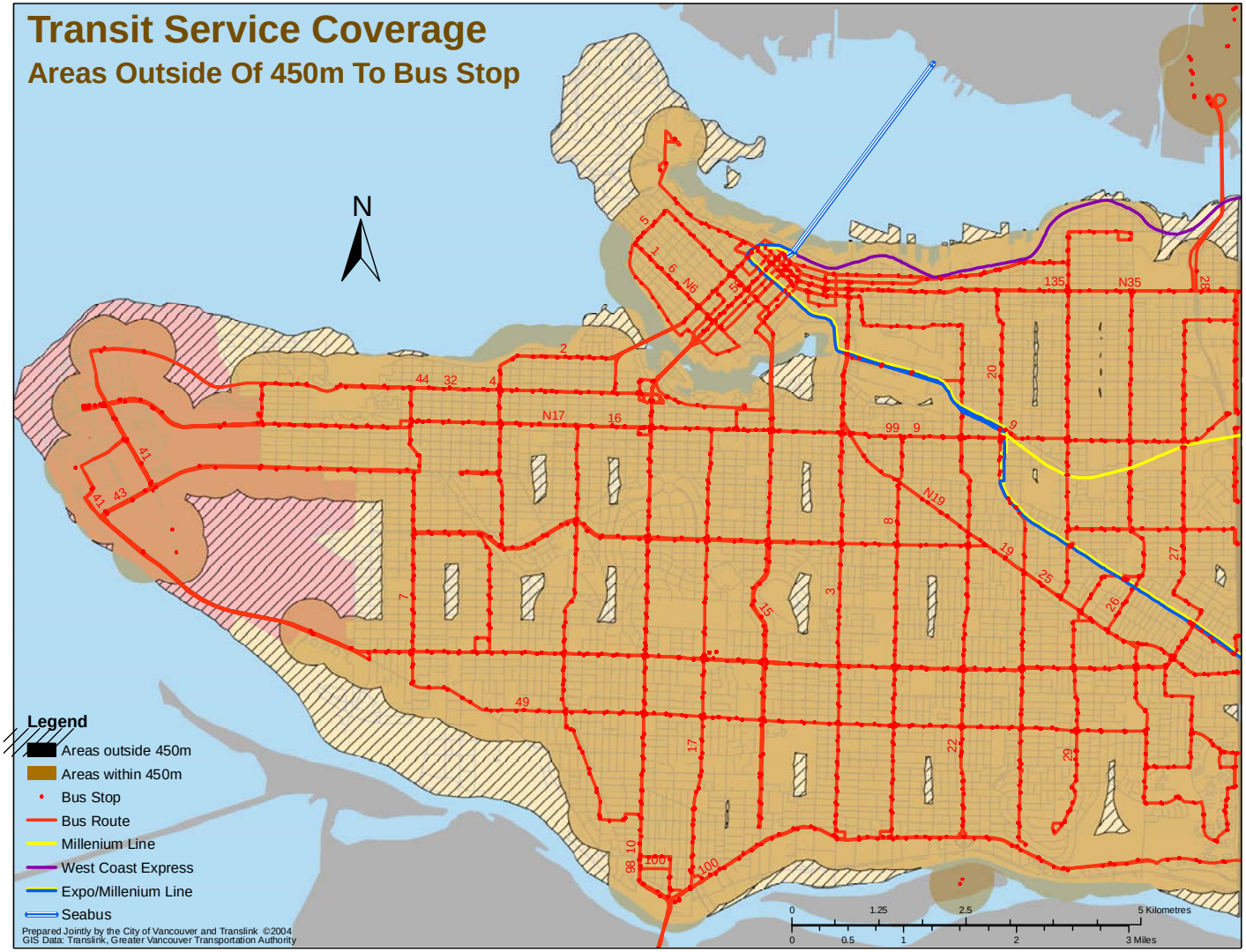
The guidelines were approved in 2004 and it was anticipated that not all services would meet them immediately; rather services would be incrementally upgraded over several years to gain full compliance. This Vancouver UBC Transit Plan identifies routes which do not meet the guidelines and proposes specific measures to be implemented over the next 5 years to address the issues. Following is a brief discussion of how the Vancouver and UBC routes measure up against the guidelines.

4.3.1 Comprehensive

Virtually all of the Vancouver and UBC populated area with 15 or more residents per hectare is within 450 metres of transit service as shown in Exhibit 4-9, which is in accordance with the service guideline. However, there are portions of the city where the gap between routes on the grid is wider, for example between Hastings and Broadway, between King Edward and Broadway, and between King Edward and 41st Avenue. This Plan investigates options for routes that could fill in the larger gaps with significant trip generating potential.

North-south bus routes in the city are typically spaced about 800 metres apart, the distance between the major arterials. With 450 metres being widely accepted as the maximum desirable walking distance to a bus stop, the vast majority of Vancouver residents are within walking distance to a bus stop.

Exhibit 4-9 Transit Service Coverage in the City of Vancouver and UBC



4.3.2 Frequent

Bus services for Vancouver and UBC operate at a range of frequencies corresponding to demand and the time of day. The Transit Service Guidelines state that service should be at

minimum every “15 minutes or better in peak and midday periods, and every 20 minutes or better in the evenings” for routes that offer random, as opposed to timed, transfers. Exhibit 4-10 illustrates which routes do not meet one or more of the frequency guidelines.

The majority of Vancouver routes meet the random transfer guidelines, which is appropriate since the grid network is based on random transfers. Routes not meeting the random standard at all times run every 30 minutes during midday, evenings or weekends, or over a specific route segment, as indicated in Exhibit 4-11 below. Some Vancouver routes make timed connections with other buses at SkyTrain stations in evenings (such as #26, #27, #28, #29, and #49), or with SeaBus (#50) but also make random connections with other routes. Ideally, all routes should meet the random transfer guideline.

Exhibit 4-10 Transit Service Guideline: Frequency Compliance

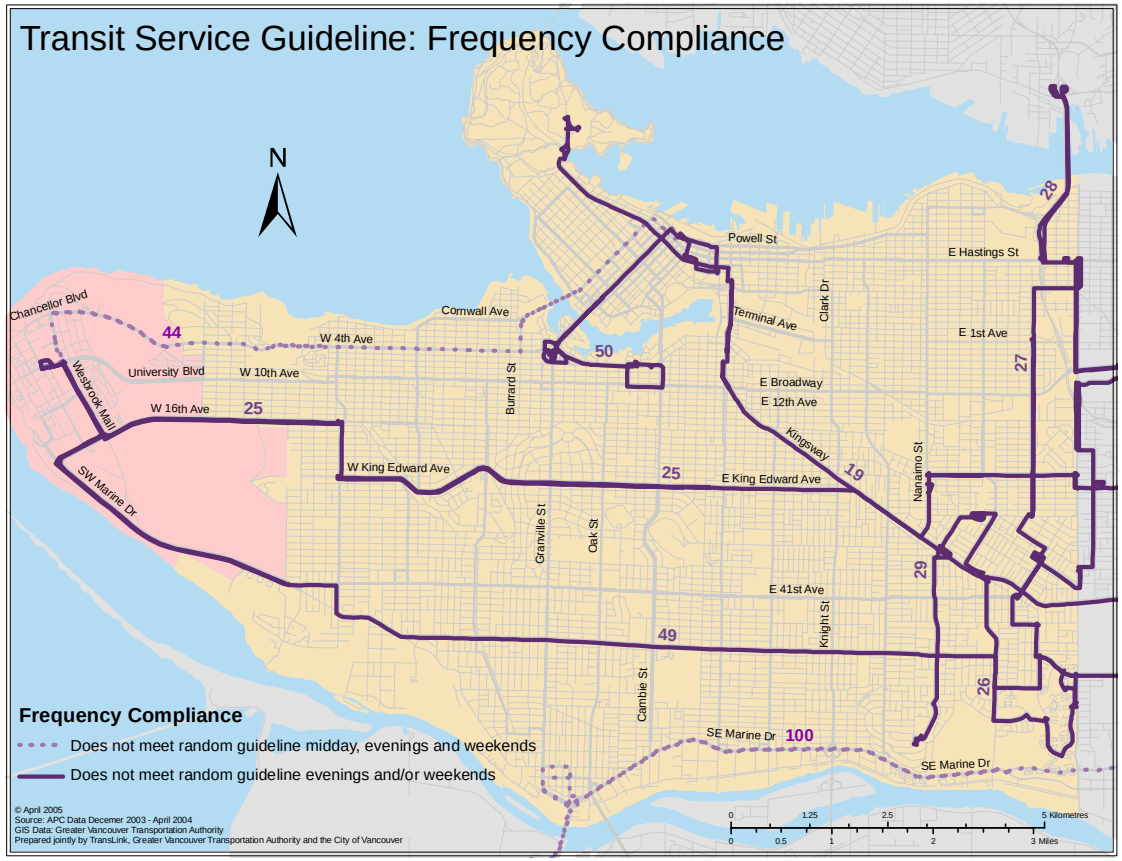


Exhibit 4-11 Routes Not Meeting the Random Transfer Frequency Guideline

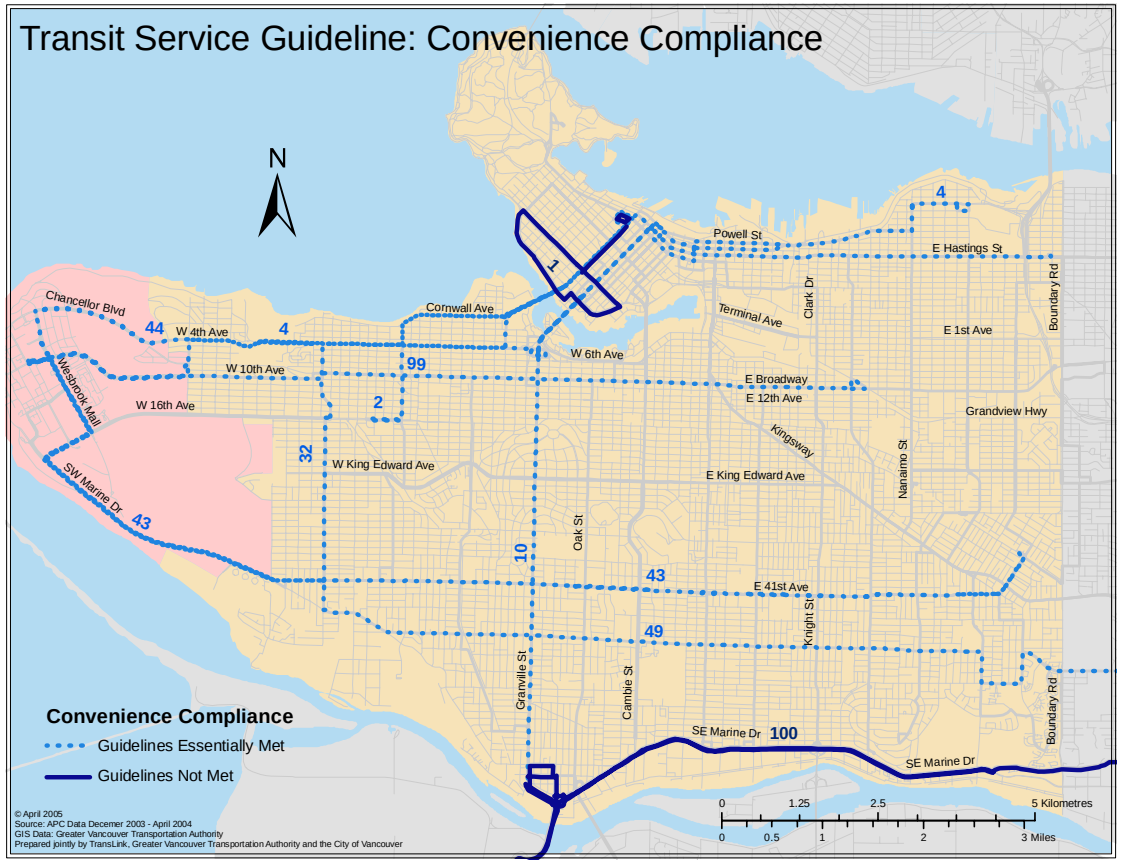
Route(s)	When (Comments)
#4	Eastbound from downtown, evening service after 8 p.m. is every 30 minutes. (Provided by #210 North Vancouver buses operating locally.)
#19	Sunday daytime service is every 20 minutes (15-minute Sunday service will be introduced June 2005)
#25	Evening service is every 30 minutes and Sunday daytime service is every 20 minutes. (Will be partially addressed with additional early evening service in September 2005.)
#26, #27, #28, #29	Evening and Sunday service is every 30 minutes (Timed connections at Joyce and/or 29th Avenue stations).
#32	Late p.m. peak service is 20-25 minutes. (Customers on this peak only route are unlikely to transfer.)
#41	Evening and weekend daytime service between 41st and Crown and UBC is every 30 minutes.
#44	Midday service is every 30 minutes. (Timed for UBC class start/finish times; alternate local service is available.)
#49	Evening service is every 30 minutes. (Will be partially addressed with additional early evening service in September 2005.)
#50	Evening service is every 30 minutes. (Timed transfers with SeaBus.)
#100	Weekday midday, evening and weekend service is every 30 minutes.

4.3.3 Convenient

Most bus routes within the City of Vancouver meet the guidelines for convenient service, operating from early morning to late evening. Some limited-stop services (#32, #43 and #44) may not meet the guidelines themselves, but their underlying local routes (#7, #41 and #4, respectively) operate longer hours and ensure that the guidelines are met. Some routes (#49) just miss the guideline specified hours by a very small margin while others (#4 and #10) have route portions that are served by other routes in evening periods, though the replacement service may not be a perfect match in terms of stop locations.

The least compliant routes for convenience are the #C21 and #C23 Community Shuttle routes. Evening service ends at 7 p.m. and would need to be extended to 9 p.m. on weekdays to meet the guideline as these routes uniquely serve the Beach Avenue and Yaletown areas.

Exhibit 4-12 Transit Service Guideline: Convenience Non- Compliance



4.3.4 Efficient

TransLink assesses efficiency using a minimum occupancy guideline. This guideline looks at the percentage of seats occupied on average across the length of the route by each period of the day, and assesses the result against the guidelines shown in Exhibit 4-13.

Although not part of the Transit Service Guidelines, it is also important to consider productivity, which is ridership per hour of service provided. Compared to loading, productivity comes closer to counting each passenger equally, regardless of their trip distance, and so provides a better sense of the number of person trips served[5] rather than just how full the buses are.

The guidelines relevant within Vancouver are shown in Exhibit 4-13 (all in terms of the average percentage of seats occupied over the entire route in the peak direction):

Both B-Lines easily pass the B-Line efficiency guideline. Two of the three other limited-stop services (#43 and #44) also exceed the B-Line guideline, though they are not held to it. Route #135, which comes closest to resembling a B-Line in all service features except branding, would not meet the B-Line guideline, according to the data provided. Notwithstanding these results, CMBC reports some overcrowding on the #135 during peak periods west of Kootenay Loop.

Exhibit 4-13 Minimum Efficiency Guidelines
(percentage of seats occupied over the length of the route)

Route Type	Weekday		Weekend Daytime	Evenings
	Peak	Midday		
Bus	30%	25%	20%	15%
B-Line	50%	40%	30%	30%
Community Shuttle	25%	15%	15%	10%

Exhibit 4-14 Efficiency of B-Line and limited-stop routes relative to B-Line guideline

Route		Weekday				Saturday Daytime	Sunday Daytime
		AM Peak	PM Peak	Midday	Evening		
B-Line Guideline		*50%*	*50%*	*40%*	*30%*	*30%*	*30%*
B-Lines	#98	72%	70%	65%	66%	82%	75%
	#99	92%	77%	70%	84%	97%	72%
Limited-stop routes	#43	91%	69%	82%	38%	No svc.	No svc.
	#44	52%	68%	42%	58%	No svc.	No svc.
	#135	35%	52%	39%	37%	45%	41%

(Note: Only routes #98 and #99 are subject to the B-Line guideline. Other limited-stop routes are shown for comparison purposes only. Route #98 data is fo the full route, including Richmond.)

On average, the Vancouver local routes also significantly exceed minimum efficiency guidelines, as shown in Exhibit 4-15. Only two services fall short of the regular bus guideline. They are the #27 (Rupert), and #50 (False Creek South). They fall short only in the AM peak, and only by the narrowest of margins.

[5] There is an exception: Because productivity is based on passenger boardings, passengers who transfer show up as boardings on both routes and are double-counted in this sense. Like most agencies, TransLink has no cost-effective way to measure transferring and correct for this. However, productivity still has at least some correlation to boardings, while average load has none.

Exhibit 4-15 Average Efficiency of Local and Limited-Stop Routes Relative to Guideline

Route	Weekday				Saturday Daytime	Sunday Daytime
	AM Peak	PM Peak	Midday	Evening		
Guideline	*30%*	*30%*	*25%*	*15%*	*20%*	*20%*
Local and limited-stop route average	51%	55%	45%	30%	36%	38%

(Note: Averages are based on each route having equal weight. No adjustment has been made for some routes having significantly more service (and demand) than others.)

4.3.5 Productivity

The City of Vancouver has one of the most productive bus networks in North America, measured in terms of boardings per hour of service provided. Even San Francisco, one of the few truly comparable cities in terms of density and extent, does not achieve the 83.9[6] boardings/hour observed in Vancouver.

Here is the current productivity by route, grouped according to the types discussed above:

Exhibit 4-16 Productivity by Route

Service Category	Route Number	Corridor	Anchor 1	Anchor 2	Weekday Boardings/ revenue hour	Rank within City of Vancouver
B-Line	98	Granville	CBD	Richmond Centre	**84.5**	**13**
	99	Broadway	UBC	Broadway Stn	**132.5**	**1**
Frequent Local	2	Cornwall-Macdonald	CBD	UBC	**87.5**	**10**
	3	Main	UBC	Marine/Main	**87.5**	**8**
	4	Powell, W 4th	UBC	McGill/Renfrew	**67.8**	**27**
	5	Robson	CBD	Davie/Denman	**84.9**	**12**
	6	Davie	CBD	Davie/Denman	**94.2**	**6**
	7	Nanaimo, Dunbar	41 Ave/Dunbar	Nanaimo Stn	**70.5**	**24**
	8	Fraser	CBD	Marine/Fraser	**79.4**	**17**
	9	Broadway	UBC	Broadway Stn	**95.9**	**4**
	10	Granville, Hastings	Kootenay/Hastings	Marine/Hudson	**74.5**	**21**
	15	Cambie	CBD	64 Ave/Cambie	**79.1**	**18**
	16	Arbutus, Renfrew	63 Ave/Granville	29 Ave Stn	**73.4**	**22**

[6] Do not compare this number directly with other North American agencies. Most North American transit systems define the revenue hour as "an hour spent by one bus on a route" either in recovery/layover time or in-service. Productivity is usually reported using this definition, which means that revenue hours are higher and productivity therefore lower than TransLink reports. In terms of the common definition, TransLink's Vancouver productivity is 69.7 boardings per revenue hour, slightly better than San Francisco's for bus services.

Service Category	Route Number	Corridor	Anchor 1	Anchor 2	Weekday Boardings/ revenue hour	Rank within City of Vancouver
	17	Oak, West Broadway	UBC	Marine/Hudson	**87.5**	**9**
	19	Kingsway	Stanley Park	Metrotown Stn	**63.2**	**28**
	20	Victoria	CBD	Marine/Victoria	**88.5**	**7**
	22	Knight, Macdonald	41 Ave/Mackenzie	Marine/Knight	**76.8**	**20**
	41	41st Ave Local	UBC	Joyce Stn	**107.4**	**3**
	49	49th Ave	UBC	Metrotown Stn	**95.7**	**5**
Limited Stop	32	Dunbar (peak only)	41 Ave/Dunbar	CBD	**110.0**[7]	**2**
	43	41st Ave (peak only)	UBC	Joyce Stn	**72.5**	**23**
	44	W 4th Limited	UBC	CBD	**83.3**	**15**
	135	Hastings Limited	CBD	SFU	**62.0**	**29**
Secondary	25	King Edward	UBC	Brentwood Stn	**84.5**	**14**
	26	Champlain Heights	Joyce Stn	29 Ave Stn	**82.3**	**16**
	27	Rupert	Kootenay/Hastings	Joyce Stn	**87.0**	**11**
	28	Boundary	Phibbs Exch, NV	Joyce Stn	**69.8**	**25**
	29	Elliott	29 Ave Stn	Fraserview/Nanaimo	**77.5**	**19**
	50	False Cr S	CBD	Broadway/Cambie	**69.8**	**26**
	100	Marine Dr	22 St Stn (NW)	Airport Stn	**56.8**	**30**

This data tells us:

- **Every route in the city is strong.** Only one route performs below 60 boardings/hour – an exceptionally high performance in most comparable systems. The #100 covers low-density areas outside of Vancouver, so their productivity within the study area is probably higher. It also has relatively long passenger trip lengths. Even routes that do not directly serve any major destinations such as the feeder routes in the southeast (#26 and #29) do remarkably well.

- **Broadway and 41st Avenue ridership is significantly high.** Productivity is a good thing, but the 132 boardings per hour on the #99 B-Line, more than two per minute, may indicate overloading and a likelihood of pass-ups. Moreover, there can be issues with providing adequate capacity given the limitations of bus size, frequency, and the

[7] #32 Dunbar route calculations exclude the not in service (deadhead) portion of the route because the route operates in the peak direction only. This significantly increases its calculated productivity.

ability for buses to keep moving in the absence of transit priority measures. The next section probes these issues in more detail.

- **The top performers serve UBC.** Among all-day routes, the top four performers are all east-west lines south of False Creek.[8] All have some service to UBC, though not necessarily on all trips.

  This fact is striking, but not unprecedented. In cities with healthy grid systems plus a strong downtown, the highest productivity often occurs on frequent grid routes that serve dense areas but not downtown.[9] In Vancouver, UBC is second to downtown for transit trip destinations and presents a less complex operating environment with a single loop handling most traffic at UBC, as opposed to the multiple stops along multiple streets in the downtown. Most east-west routes also benefit from more all day bi-directional demand thus raising their productivity.

- **Limited-stop service outperforms Local in the same corridor, especially if it runs all day.** This has proven true in most similar urban systems, such as the Los Angeles Metro Rapid network. Vancouver has three examples and one exception. (One caveat is that the limited-stop services are operated by high capacity, articulated buses while the local service is operated by lower capacity standard length buses. Measuring boards/hour will bias the results to routes with higher capacity vehicles since they require fewer vehicle hours to move the same number of people.)

  - On **Broadway**, Route #99 B-Line outperforms both locals, Routes #9 and #17 (and the rest of the Vancouver network.)

  - On **Granville**, Route #98 B-Line outperforms Route #10. A significant factor may be the lack of density between B-Line stops through sections of Granville Street. limiting ridership on the #10, and that Richmond is a stronger anchor than Marpole, where the #10 terminates.

  - On **West 4th**, Route #44 outperforms Route #4. Here, Route #44's low off-peak service levels help boost its productivity.

  - The exception is the #135 on **Hastings**, where the quantity of local service, with good downtown access, may discourage customers from walking to a #135 stop.

[8] Again setting aside peak-only Route #32, these routes are #99 B-Line on Broadway, #9-Broadway Local, #41-41st Avenue Local, and #49-49th Avenue Local.

[9] The same phenomenon is observed in two cities with notable downtowns and grid service patterns: Portland, Oregon and San Antonio, Texas.

Productivity of the #135 can also be expected to be lower since most of the route length consists of the local service portion in Burnaby.

Weekend Productivity

Weekend productivity deserves special notice and future attention. Many routes are more productive on weekends than on weekdays because service operates at lower frequencies but ridership remains high and peaking is less pronounced. Exhibit 4-17 illustrates this pattern for a major local route, the #3 Main, where weekend ridership, relative to service provision, is higher than weekday ridership. In some instances, relatively low weekend service levels may result in crowding that suppresses ridership.

It is evident that customers in the City of Vancouver use the core transit network extensively on weekends, as shown in Exhibit 4-18. This is a reflection of the 7-day a week commerce activity that is growing, and other demographic variables discussed in Section 3.

Of the 27 routes that run on weekends, 11 post their highest productivity on one of the weekend days. The routes peaking on the weekend are diverse, including UBC-oriented crosstowns, an eastside secondary local (#27 Rupert), and the #100 on Marine Drive. The biggest differential occurs on the #5 (Robson) and #6 (Davie), local services between downtown and the West End; here, the sustained nature of weekend activity in the West End, combined with relatively low Sunday service levels, are the causes.

Extreme productivity differences between weekend and weekday suggest that the weekend needs more service. This data combined with analysis of average and maximum passenger load levels (following section) confirms this.

Exhibit 4-17 **Relative Boardings and Service Levels for #3 Main** (Weekday = 100%)

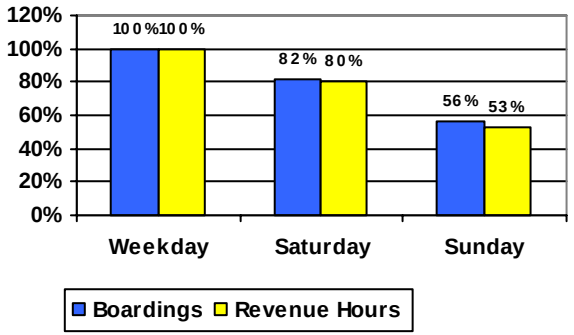


Exhibit 4-18 Productivity by Route, Weekend Days vs. Weekdays

(Bolding indicates each route's most productive day.)

Service Category	Route	Corridor	Weekday	Sat	Sun
B -Line	98	Granville	**84.5**	78.8	71.7
	99	Broadway	132.5	**154.8**	112.7
Ltd stop	135	Hastings Limited	**62.1**	53.5	46.7
Frequent Local	2	Cornwall-Macdonald	**87.1**	70.1	No svc.
	3	Main	87.6	89.1	**92.8**
	4	Powell, W 4th	**67.8**	57.6	55.7
	5	Robson	84.9	79.7	**90.0**
	6	Davie	64.2	89.7	**102.6**
	7	Nanaimo, Dunbar	**70.5**	61.2	59.6
	8	Fraser	79.4	**84.3**	76.0
	9	Broadway	96.0	**100.7**	90.0
	10	Granville, Hastings	**74.5**	72.8	56.8
	15	Cambie	**79.1**	69.4	56.7
	16	Arbutus, Renfrew	**73.4**	71.2	69.1
	17	West Broadway	**87.5**	74.6	68.8
	19	Kingsway	63.2	57.4	**65.9**
	20	Victoria	88.5	**89.1**	86.7
	22	Knight, Macdonald	**76.7**	74.1	65.8
	25	King Edward	**84.5**	62.9	61.9
	41	41st Ave Local	107.4	91.0	**112.6**
	49	49th Ave	**95.7**	79.9	86.9
Secondary	26	Champlain Heights	**82.3**	58.6	58.6
	27	Rupert	87.1	73.7	**98.4**
	28	Boundary	**69.7**	49.7	62.4
	29	Elliott	**77.6**	50.5	56.5
	50	False Creek South	**69.8**	60.6	45.7
	100	Marine Dr	56.8	50.0	**102.1**

4.3.6 Comfort

Average Maximum Load Guideline

TransLink's maximum load guidelines measure Comfort and are shown in Exhibit 4-19. These guidelines apply to the busiest time of the day on each route, and indicate the highest allowable average maximum load. For example, on a given trolley route, in a given direction, for the 15 minutes of the AM peak hour when the loads are highest for that route, the average maximum load for all trips should not exceed 60. Compliance of Vancouver-UBC routes with this guideline is illustrated in Exhibit 4-20.

On very frequent routes, slight variations in the spacing of buses can cause uneven loading.[10] The maximum load guideline averages this out. The guideline recognizes that some variation in the spacing of buses is inevitable in urban operations with traffic congestion, traffic signal delay and uneven passenger boardings, so the variation in load from one trip to the next is inevitable also. The issue of buses bunching together has negative consequences for customers as analyzed by other criteria.

If several consecutive buses are all overloaded, this indicates that there is not enough capacity on the line. In that case, the average maximum load will register the problem as a violation of the guideline.

Exhibit 4-19 TransLink Maximum Load Guidelines

Bus Type	Seats	Weekday AM and PM Peak Periods		Busiest 60 minute-period, weekday midday, evening, weekend
		Busiest 15 minutes, peak hour	Busiest 30 minutes, peak hour	
12m high-floor trolley coach	38	60	55	45
12m low floor diesel coach	38	55	50	45
12m high floor diesel coach	40	55	51	45
18m articulated coach	54	85	75	65

Peak Period Overloading

During peak hours, the average-maximum-load guideline is higher, because the marginal cost to maintain lower levels of crowding during a short period of time is very high and customer tolerance for crowding during peak periods is also higher.

If high average loads are sustained over several trips in the same direction, passenger delay may occur due to on-board congestion impeding boarding and alighting the vehicle. At that point, capacity must be increased. Some passengers are probably already turning away from transit due to unacceptable – or unpredictable – levels of crowding. TransLink's Customer Satisfaction surveys correlate loosely with crowding data, as presented in Section 5, Transit Issues. The crowding data presented below was collected in the December 2003 to April 2004 period and may not precisely reflect current conditions due to ridership and service changes.

[10] The bus that falls 5 minutes behind will have a 50% higher load, but the bus behind it will have only 5 minutes worth of accumulated passengers ahead of it, rather than 10, so it may end up with only half the normal load. Left unchecked, these situations create a positive feedback cycle where a late bus gets later while the following bus gets earlier, resulting in bunching.

Exhibit 4-20 Transit Service Guideline: Comfort

Exhibit 4-21 lists the routes that are exceeding one or more of the peak guidelines. The percentage indicates by how much the maximum load exceeded the guideline. Note that since the guidelines for peak loading are relatively high, exceeding the guideline, especially the higher guideline for a 15-minute period, indicates significant overcrowding that could discourage ridership. All of the cases listed below need remediation.

Several things stand out:

Articulated bus routes do not exceed the 15-minute guideline: These routes (#43, #44, #98 B-Line, #99 B-Line, #135) include several of the most crowded lines in the system, but the loads tend to even out over 15-minute periods to be within guideline levels. The two B-Lines,

Exhibit 4-21 Routes Exceeding the Peak Period Maximum Load Guideline (December 2003-April 2004)

Route Number	Service Category	Corridor	15 minute guideline.	30 minute guideline
4	Frequent Local	Powell, W 4th		4% over, PM westbound
7	Frequent Local	Nanaimo, Dunbar	1% over, PM westbound	
15	Frequent Local	Cambie		2% over PM westbound
22	Frequent Local	Knight, Macdonald	6% over AM westbound	11% over, AM westbound
25	Secondary	King Edward	6% over AM westbound	17% over, AM westbound
26	Secondary	Champlain Heights		7% over, AM eastbound
28	Secondary	Boundary	5% over AM northbound, 7% over PM southbound.	2% over AM northbound, 18% over PM southbound.
32	Peak	Dunbar	16% over, AM eastbound.	25% over, AM eastbound.
41	Frequent Local	41st Ave Local	13% over, AM westbound, 3% over, PM eastbound	9% over AM westbound, 9% over PM eastbound
49	Frequent Local	49th Ave	both peaks, 2% over eastbound. AM westbound, 13% over.	17% over, AM westbound, 5% over PM eastbound.
98	B-Line	Granville		6% over, AM northbound
99	B-Line	Broadway		2% over, AM westbound
100	Secondary	Marine Dr		5% over, AM eastbound

however, exceed the 30 minute guideline, indicating that they experience sustained demand just below their maximum capacity.

Trolley routes rarely exceed the peak guideline: (Routes #3-#20). Partly, this reflects the role of the high frequency on trolley routes, which allows peak loads to even out among several consecutive buses. However, it may also reflect the high loading standard for the trolleybuses, based on the suitability of their interior layout for handling high passenger volumes. Regardless, the APC ridership data does indicate some very high load samples within the average, suggesting that additional peak capacity will soon be required.

Some regular-bus routes routinely exceed both guidelines: This is common on the less frequent routes – though all routes studied run no worse than every 15 minutes on the peak. Less frequent service means that fewer consecutive buses need to be crowded to exceed the guideline. For example, when running every 15 minutes, the 15-minute guideline is tripped by a single overcrowded bus. Still, the overages occur against the 30-minute guideline as well, suggesting sustained high-demand periods where the current frequency or capacity is inadequate.

Route #32 seems worse, and appears to be routinely over-loaded in the peak direction. CMBC also reports pass-ups on the #32. It may be that passengers are not boarding the #7 local bus on this same route in favour of the #32 because it is faster (limited-stop express) and serves the Burrard corridor downtown rather than Granville.

Weekday Off-Peak Performance

Off-peak guidelines are governed more by comfort than by capacity and recommend up to 7 standees on a 12-metre bus, and 11 on an articulated bus. More passengers can and should be accommodated when operationally possible. The following routes (Exhibit 4-22) exceed the off-peak weekday guideline:

Exhibit 4-22 Routes Exceeding the Weekday Off-Peak Maximum Load Guideline (December 2003-April 2004)

Route Number	Service Category	Corridor	Vehicle	Weekday off-peak.
4	Frequent Local	Powell, W 4th	12T	Evening, up to 7% over.
10	Frequent Local	Granville, Hastings	12T	Daytime, 1% over.
16	Frequent Local	Arbutus, Renfrew	12T	**20% over eastbound daytime**, 2% over westbound.
25	Secondary	King Edward	12D	**29% over westbound daytime.**
41	Frequent Local	41st Ave Local	12D	6-10% over, daytime, both ways.
49	Frequent Local	49th Ave	12D	10-14% over, daytime, both ways.
99	B-Line	Broadway	18D	12% over, evening eastbound.

This is a fairly small list, reflecting the high levels of service running all day throughout the city. One of these incidences indicates a peak-overload condition occurring leaving UBC in the evening. This is on route #25 (King Edward) where a 29% overload on a 12-metre diesel exceeds what would exceed the highest peak load guideline. Routes #41 and #49 should also be cause for concern, because the overloads occur in both directions, suggesting a more sustained inadequacy in the service and capacity provided. Either additional frequency or articulated coaches on these routes may be the solution.

Routes exceeding the guideline only in the evening (#4, #99 B-Line) may need additional evening service.

Weekend Overloading

Weekend overloading uses the same guidelines as weekday off-peak, but compared to weekdays, weekend overloading is more widespread.

Exhibit 4-23 Routes Exceeding the Weekend Off-Peak Maximum Load Guideline (December 2003-April 2004)

Route Number	Category	Corridor	Vehicle Type	Saturday	Sunday
3	Frequent Local	Main	12T	Daytime, both ways, 7-9% over	Daytime, northbound, 10% over
5	Frequent Local	Robson	12T	**Daytime eastbound, 31% over.**	
6	Frequent Local	Davie	12T	**Daytime westbound, 24% over.**	
7	Frequent Local	Nanaimo, Dunbar	12T	Daytime westbound, 11% over.	Daytime westbound, 4% over.
8	Frequent Local	Fraser	12T	Evening 2% over.	
9	Frequent Local	Broadway	12T	Daytime eastbound 19% over. Evening westbound, 11% over.	
10	Frequent Local	Granville, Hastings	12T	Daytime eastbound 14% over.	Daytime eastbound, 16% over.
16	Frequent Local	Arbutus, Renfrew	12T	4-13% over.	**Daytime both ways, 39-46% over.**
17	Frequent Local	Oak, West Broadway	12T	Daytime eastbound, 12% over.	
19	Frequent Local	Kingsway	12T		Daytime, 11-19% over.
20	Frequent Local	Victoria	12T	Daytime eastbound, 2% over. Evening westbound, 9% over.	
22	Frequent Local	Knight, Macdonald	12D	Daytime westbound, 15% over.	Daytime both ways, 3-11% over
41	Frequent Local	41st Ave Local	12D	Daytime, both ways, 11-12% over.	**Eastbound daytime, 53% over**, 4% over evening. Westbound 5% over daytime.
50	Secondary	False Cr South	12D	Daytime northbound, 13% over.	
98	B-Line	Granville	18D	Daytime, both ways, 3% over.	Daytime, both ways, 2% over. Northbound evening, 6% over.
99	B-Line	Broadway	18D	Daytime, both ways, 14-15% over.	Daytime, westbound, 2% over.

As noted in a previous section, several routes have higher productivity on weekends than on weekdays. These include Routes #5, #6, #41, and #99 B-Line – all of which have weekend overcrowding. High productivity measures occur because weekend service is lower than weekday, but ridership demand remains high.

4.3.7 Reliability, Travel Time & Speed

Is service reliable? How long does a trip take? These questions are fundamental, because travel time has two independent positive effects on productivity:

Reliability and Speed are qualities that customers value and influence ridership.

Higher speeds and reduced variability in trip time reduce the cost of providing service, thereby increasing the quantity of service that can be provided for the same dollar.

Reliability

The Transit Service Guidelines for reliability use on-time performance relative to the published schedule as their measure.

The APC data have provided some insight as to how well services adhere to schedules. The analysis below lists the top ten route segments, where the schedule times are the least predictable.

Exhibit 4-24 ranks in descending order by time period, the routes and route segments where the variability is the highest (Standard Deviation of Run Time Variance). Run Time Variance is the difference between the scheduled run time and the observed average run time. These segments have the highest potential for improving the Service Reliability since they are the most unreliable service. The segments are predetermined locations on a route that are indicated in schedules with specific times.

Traffic congestion affects the speed and reliability of transit services

Exhibit 4-24 Rank of Routes and Segments by Standard Deviation of Run Time Variance

AM PEAK 6 - 9 AM				
Rank	Route	Direction	Start Segment	Finish Segment
1	43	East	UBC Loop	41 Ave & Granville
2	50	East	Waterfront Station	Keefer & Taylor
3	19	East	Stanley Park Loop	Kingsway & Broadway
4	4	East	Nanaimo & Dundas	Eton & Renfrew
5	20	South	Broadway Station	Harrison Loop
6	135	East	Burrard Station	Hastings & Kootenay
7	49	East	UBC Loop	41 Ave & Dunbar
8	4	East	Granville & Hastings	Nanaimo & Dundas
9	17	East	UBC Loop	Alma & 10 Ave
10	2	East	Macdonald & Broadway	Burrard & Robson

MIDDAY 9 AM - 3 PM				
Rank	Route	Direction	Start Segment	Finish Segment
1	50	East	Waterfront Station	Keefer & Taylor
2	22	East	Macdonald & Broadway	Burrard & Robson
3	22	South	Clark & Broadway	Knight & 41 Ave
4	2	South	Burrard Station	Burrard & Davie
5	44	East	UBC Loop	Waterfront Station
6	20	South	Victoria & 41 Ave	Harrison Loop
7	10	East	Hastings & Commercial	Kootenay Loop
8	100	East	Marpole Loop	Marine & Knight
9	44	West	Waterfront Station	UBC Loop
10	9	East	Broadway & Alma	Broadway & Granville
PM PEAK 3 - 6 PM				
Rank	Route	Direction	Start Segment	Finish Segment
1	25	East	25 Ave & Granville	25 Ave & Knight
2	2	East	Macdonald & Broadway	Burrard & Robson
3	99	East	UBC Loop	Broadway Station
4	22	East	Macdonald & Broadway	Burrard & Robson
5	41	East	41 Ave & Dunbar	41 Ave & Granville
6	7	East	Granville & Hastings	Nanaimo & Dundas
7	98	South	Howe & Davie	Airport Station
8	16	East	Hastings & Homer	Hastings & Commercial
9	3	South	Granville & Robson	Main & Broadway
10	100	East	Marpole Loop	Marine & Knight

EARLY EVENING 6 - 9 PM				
Rank	Route	Direction	Start Segment	Finish Segment
1	22	South	Macdonald & Broadway	41 Ave & Carnarvon
2	19	East	Stanley Park Loop	Pender & Hamilton
3	3	South	Granville & Robson	Main & Broadway
4	7	North	Dunbar Loop	4 Ave & Alma
5	17	North	Marpole Loop	Oak & 41 Ave
6	26	West	Joyce Station	Champlain & 5500 Blk
7	4	East	4 Ave & Alma	5 Ave & Granville
8	50	North	Lamey's Mill & Anderson	Waterfront Station
9	98	North	Airport Station	Seymour & Davie
10	100	East	Marpole Loop	Marine & Knight

Please note that this list may miss trips on some routes that have fewer timing points, resulting in some key segments where reliability is an issue being omitted. The #50 appears in all time slots except the PM Peak, and since part of its route serves housing for people using wheelchairs, it is likely that some of the variance is explained by unpredictable boardings.

For many Vancouver routes, where service is frequent during much of the day, it is often more important that the buses be evenly spaced than run right on-time. For example, a bus running three minutes late (on-time according to the guideline) on a route that runs every five minutes where all other buses are on-time will be more disruptive than if all buses are just over three minutes late.

CMBC adjusts scheduled run times. Incrementally these adjustments will eventually push the limits of the schedule and require another vehicle to be added. Over time, the cumulative costs can be significant in service hours and vehicles and customers see no benefit other than slightly more accurate schedules. (However, the alternative is worse, allowing running times to increase without adding vehicles would result in a reduction in service frequency.) The schedule efficiency also drops dramatically each time a vehicle is added to a schedule due to increased run time requirements.

Travel Time & Speed

Operating speed is of primary importance in providing attractive and efficient service. The following data analysis demonstrates that operating speed ranks with reliability as one of the main issues facing transit in Vancouver. Operating speed is analyzed first from a route level, and then by specific segments by time of day.

The following Exhibit shows the average speed of each route. Layover and recovery time are excluded, but boarding time and intersection delay are included, so these numbers reflect the average speed experienced by the passenger. With reduced variability in overall trip time, the recovery and layover time can be adjusted to allow better utilization of the existing bus fleet.

Exhibit 4-25 Average Weekday Operating Speeds for Vancouver-UBC Routes

Route	Service Category	Corridor	Average Speed (km/h)	Productivity (Boardings/ revenue hr)	Avg. Stop spacing (m)
2	Frequent Local	Macdonald	**18.0**	87.5	303
3	Frequent Local	Main	**15.0**	87.5	217
4	Frequent Local	Powell, W 4th	**20.4**	67.8	290
5	Frequent Local	Robson	**10.9**	84.9	192
6	Frequent Local	Davie	**11.6**	94.2	175
7	Frequent Local	Nanaimo, Dunbar	**18.5**	70.5	241
8	Frequent Local	Fraser	**15.7**	79.4	227
9	Frequent Local	Broadway	**17.1**	95.9	270
10	Frequent Local	Granville, Hastings	**17.8**	74.5	249
15	Frequent Local	Cambie	**16.7**	79.1	244
16	Frequent Local	Arbutus, Renfrew	**17.9**	73.4	252
17	Frequent Local	Oak, West Broadway	**19.4**	87.5	274
19	Frequent Local	Kingsway	**17.7**	63.2	264
20	Frequent Local	Victoria	**15.7**	88.5	238
22	Frequent Local	Knight, Macdonald	**18.9**	76.8	207
25	Frequent Local	King Edward	**23.4**	84.5	322
26	Secondary	circulator	**23.0**	82.3	247
27	Secondary	Rupert	**20.5**	87.0	247
28	Secondary	Boundary	**21.7**	69.8	379
29	Secondary	Elliot	**22.9**	77.5	276
32	Peak	Dunbar – peak only	**19.5**	110.0	353
41	Frequent Local	41st Ave Local	**23.5**	107.4	307
43	Peak Ltd	41st Ave Peak Ltd	**26.5**	72.5	1,419
44	Secondary Ltd	W 4th Limited	**25.3**	83.3	752

Route	Service Category	Corridor	Average Speed (km/h)	Productivity (Boardings/ revenue hr)	Avg. Stop spacing (m)
49	Frequent Local	49th Ave	**24.3**	95.7	312
50	Secondary	False Creek South	**16.9**	69.8	302
98	B-Line	Granville	**22.2**	84.5	942
99	B-Line	Broadway	**23.2**	132.5	1,349
100	Secondary	Marine Drive	**28.3**	56.8	343
135	Ltd Stop	Hastings Limited	**21.9**	62.0	543

Observations:

The bus system is slow overall.

The Frequent locals are consistently below 21 km/h. Some are below 11 km/h.

The B-Lines operate at 22-23 km/h, only about 5 km/h faster than the locals in the same corridors. The same is true of other limited-stop services.

High ridership segments are slower.

Lower-ridership routes tend to run faster, all other things being equal. In all likelihood, then, the average rider experience is toward the slower end of the range, possibly below 20 km/h. Slower travel times may have a greater proportion of delay attributable to stop utilization and passenger boarding and egress.

The fastest routes, #100 (Marine Drive) is among the least productive.

Among locals, the fastest tend to be the eastside and crosstown secondary routes, especially Routes #25 through #29.

The slowest of all, #6 Davie, is one of the most productive. The two slowest, the #6 and its interline, #5 Robson, also serve the City's most densely populated area, hence the highest potential market, of any local route in the system. However, their low speeds may limit their penetration of that market.

Land uses along the routes play a major role.

- The slowest routes tend to be those that travel the most intensely developed commercial streets in the City, such as West 4th Avenue, Main, Fraser, Broadway,

Commercial/Victoria and Hastings. These streets have long transit histories, being former streetcar routes, now trolleybus routes, and all have commercial focal points. The adjacent uses generate demand for both transit travel and automobile traffic, the former generating ridership which slows transit service constructively while the other is more of a destructive influence.

- Routes that spend relatively little time in commercial areas, such as the #25 and #49, tend to be faster. Trolley routes in areas of lower commercial development (such as Renfrew and Nanaimo) also achieve relatively attractive speeds.

Passenger-service delay is one key explanatory factor. Some of the delay is associated with the time required to board and alight passengers. This delay can be reduced through stop-respacing and also by various strategies to reduce the time required for fare collection.

The highly productive bus system operates in a dense urban area on a congested road network. In addition to passenger-service delay, traffic congestion and signal density explain much of the variance in running time. The fastest Frequent locals are #41 (41st Avenue) and #49 (49th Avenue). They achieve higher average speeds despite very high productivity, largely because they avoid the most congested parts of the city (41st Avenue in Kerrisdale being an obvious exception), and operate along SW Marine Drive to UBC with a higher speed limit and no traffic signals. Reviewing the portions of both routes within the City's boundaries reveals slower average speeds through sections with commercial activity and more signals.

Speed and Stop Spacing

The spacing between stops is important to overall speed since every stop requires time spent decelerating, stopping, accelerating and re-entering the traffic stream. If stops are too close together, passengers have the opportunity to spread themselves out among many stops, rather than gathering in larger numbers at fewer stops.

The guideline is for a minimum 250 metre separation between stops on local routes, unless closer spacing is needed for convenient transfers or specific access needs. Nevertheless, there are many places where stops are closer together than they ought to be as indicated by the following observations.

- **Some Frequent local routes have stops placed too close together**. Stop spacing is only 175 m on the #6 (Davie), which is also the second slowest route.

- **Spacing is closest where blocks are short.** North-south streets have shorter intersecting blocks, which has created the expectation that buses will stop frequently. Spacing on short blocks should be the same as on long blocks, all things being equal.

Exhibit 4-26 AM Peak Bus Speeds Inbound to Downtown

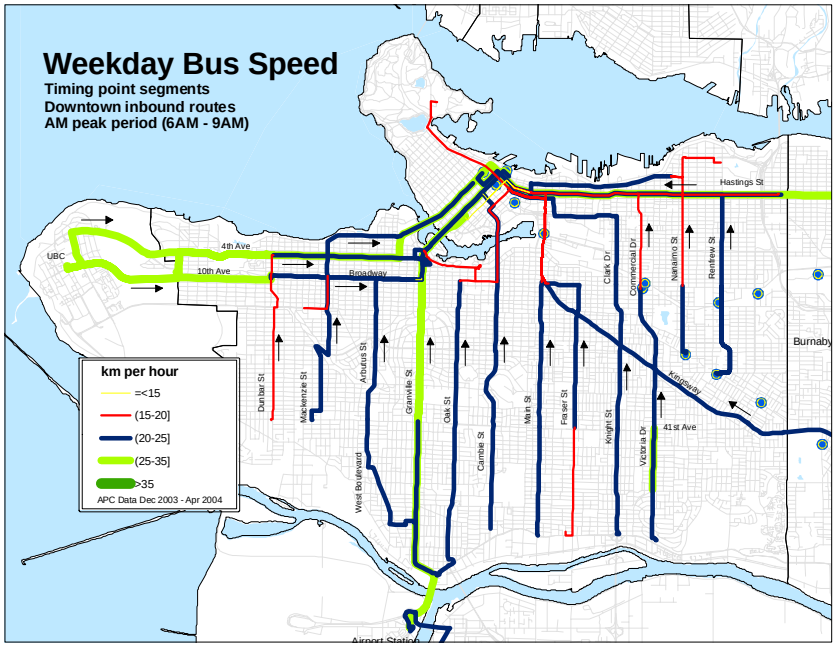
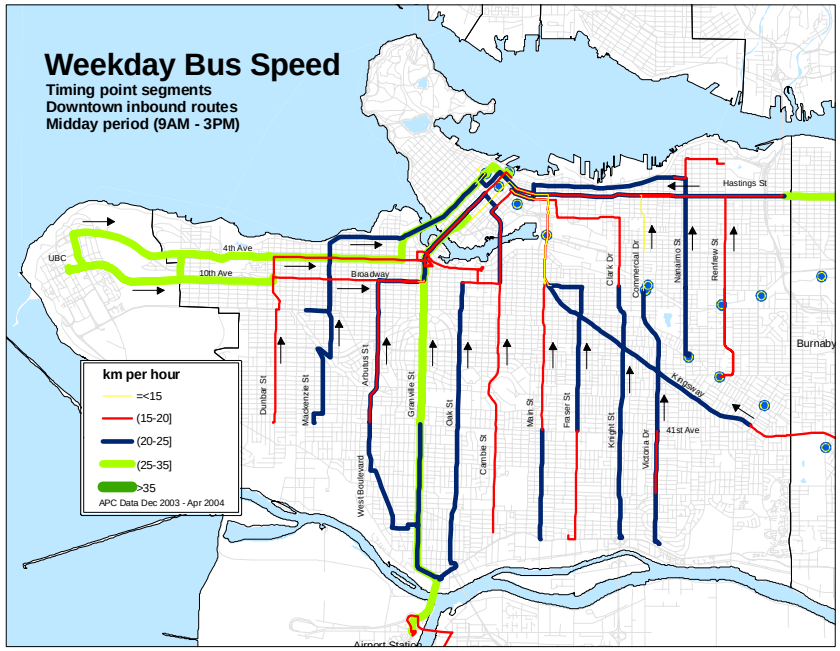


Exhibit 4-27 Midday Bus Speeds Inbound to Downtown



- Many routes stop every block in the downtown area.
- **UBC services have wider average spacing,** partly because of the presence of Pacific Spirit Park and the University Golf Course, which separate UBC from the rest of the region.

Speed by Segment

Because the causes of delay can vary along a route, speed should be examined at a segment level. What parts of the system are especially fast? What parts are especially slow?

The first question is easy. Consistently, across all times of day, the fastest segments in the system are the brief stretches of non-stop travel movement, namely (a) bridge crossings and (b) approaches to UBC, where service crosses Pacific Spirit Park and the University Endowment Lands.

Route #98 B-Line on the South Granville segment, between the Airport and False Creek, is the fastest segment that has any stops – though of course these are widely-spaced B-Line stops.

Slowness is what needs attention.

Slowest Segments:

Travel time between timing points (i.e., segments) was recorded by the APC data collection system. The maps following show the distribution of segment speeds in Vancouver and UBC for each of the four periods of the weekday. For simplicity, only segments associated with inbound/outbound routes with respect to Downtown and UBC are shown. A detailed table of slowest segments in the PM peak follows this section as Appendix B.

Note that the data are based on the travel time between timing points and these distances may be far apart. This aspect of the data can mask known local congestion points, such as the Kerrisdale shopping area on 41st Ave between Larch and Maple. Also, most north-south routes have timing points at Broadway and at 41st Ave.

The AM time period for downtown inbound routes shows the slowest segments in red,. A review of boardings during the same time frame indicates that on the west side, Dunbar and Macdonald, slowness is partially due to heavy boardings noted in the route profiles, however, on Dunbar the bus service may be competing with a large volume of traffic heading westbound to UBC. Elsewhere, on Main Street north of Broadway, Commercial north of SkyTrain, Hastings east of Boundary and Nanaimo north of Grandview are heavily boarded, but not excessively. The signal delays may be contributing to more delay.

In comparison to the AM peak it is noticeable that Dunbar stays slow, as does south Fraser, and Main St. north of Broadway along with Commercial Drive get slower. This is likely due to more parking on the street and higher volumes of traffic since loads are smaller at this time of day.

New to the slow speed category at this time of day are #15 Cambie, which also has lower boardings in midday than peak. The Main Street corridor south of Broadway to 41st is also slow, but the boarding profile of the #3 indicates that it is only slightly lower in the midday. So difference between midday on these are likely due to traffic conditions. The #16 Renfrew appears, and interestingly has a higher midday boarding profile than the AM peak, although low numbers, combined with traffic it appears slow.

Exhibit 4-28 PM Peak Bus Speeds Outbound from Downtown

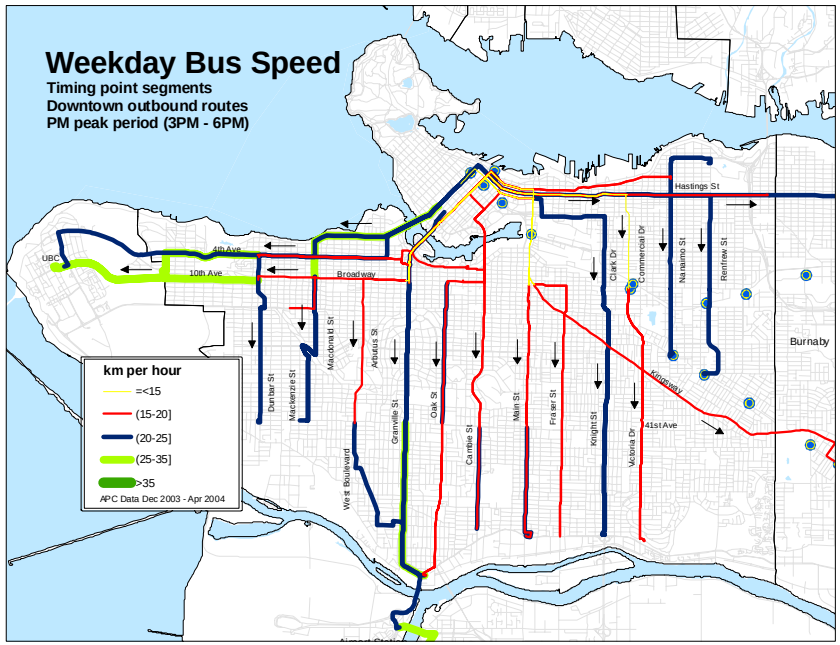
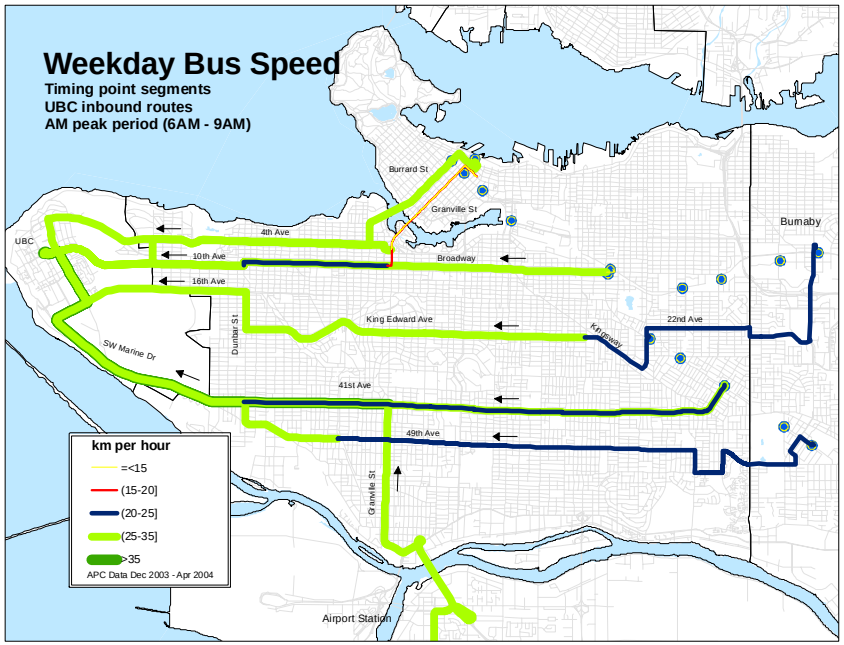


Exhibit 4-29 AM Peak Bus Speeds Inbound to UBC



The PM peak slowest corridors are longer, and Kingsway, south Oak, Arbutus, and Victoria are new. Broadway remains slow as it was in midday. It is well known that PM peak traffic volumes are higher, and that combined with some corridors without parking bans may explain these routes.

Slowest Segments: Discussion

A review of this data reveals the following:

Downtown is the slowest part of the system at all times of day. Downtown segments dominate the maps. The cause is not just congestion, but also the extremely close stop spacing that prevails in the downtown. Additionally, traffic signal timings along Granville Mall, despite its intense use by buses, tend to favour cross-traffic, not buses on Granville. High-volume front-door boarding for fare collection is also a significant element of delay.

Other high-density areas are also slow, notably:

- Central Broadway for at least a kilometre east and west of Granville and around Cambie (Routes #9 and #17.)

- Main Street north of Broadway to Terminal Avenue (routes #3, #8 and #19). As there is lower use of bus stops in this section, the slowness is due to traffic and signals.

Segments of the #98 B-Line appears among the slowest segments, all day. Since B-Lines are limited-stop and marketed for speed, this is a major problem.

- Route #98 B-Line is below 12 km/h for most of the day from Waterfront Station to Howe & Davie. This segment reflects the time cost of making three turns within the downtown, in order to serve both Waterfront and Burrard stations while leaving downtown via the Granville Bridge. The poor outbound speed also reflects greater delay associated with passenger boardings, as opposed to alightings; due to fare collection.

Granville Mall is slow, but so are other streets. Routes that do not use Granville Mall, such as #8 and #15, still operate slowly downtown. This may be related to the next point.

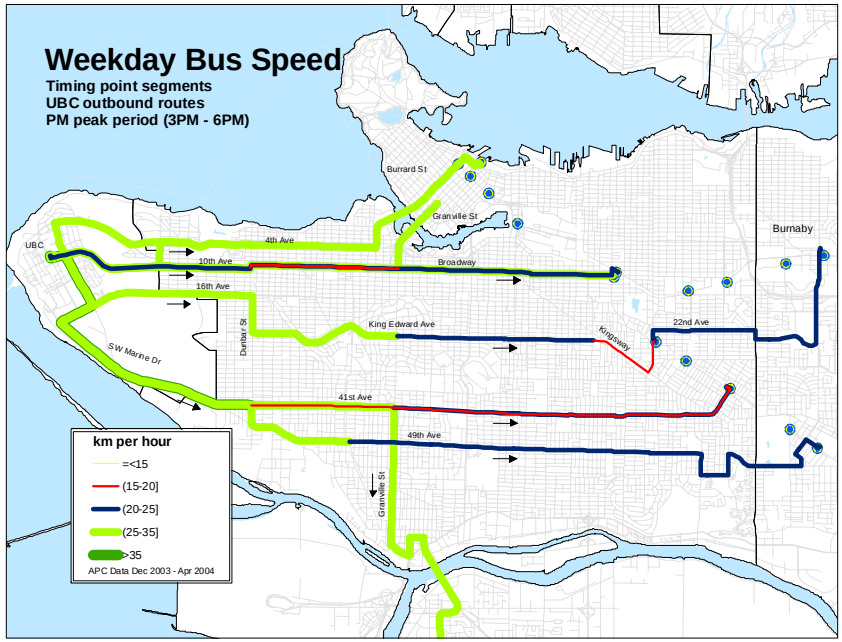
Turns cause delay in congested areas.

- Many of the slowest segments include congested turns within downtown. Turns to and from Hastings, Cordova, and Pender seem to be common among the slow segments. Turns into and out of Granville Mall also need attention.

- One of the fastest trolley routes through downtown is Route #19, which has no significant turns downtown. Its passenger activity downtown is also relatively low, compared to other routes.

- Route #98 B-Line's outbound speed of around 12 km/h can be attributed partly to the series of difficult turns required on its outbound route.

Exhibit 4-30 AM Peak Bus Speeds Outbound from UBC



Stop-Level Ridership and Loading

The APC data is comprehensive and allows TransLink to produce charts of loading by stop as well as maps showing the boardings at each bus stop along each route. This material has been used in creating the plan but, at over 120 pages, is available as a separate Technical Report on the project's web site.[11]

4.4 Summary of Observations and Recommendations

Vancouver is one of the most transit-oriented cities of its size in North America. Over many years, the transit network has evolved to become a highly utilized part of the regional transportation network.

However, the demand is nearing the limits of what can be served with current resources. To create the capacity for further growth in demand, the focus needs to be on serving riders more efficiently . Efficiency means:

- Ensuring that service is adequate to demand, but not providing more service than demand requires.
- Looking at overlapping routes on common service corridors as though they were one route, to ensure that the level of service is appropriate.
- Keeping parallel routes far enough apart so that they attract riders from a different area rather than competing for the same riders.
- Rationalizing the location of bus stops so that everyone can walk to one, but not closer than that.
- Focusing long-distance passengers onto faster limited-stop and B-Line service.
- Doing everything possible to improve operating speed and minimize delay to buses, thus allowing the same bus to make more trips and serve more customers.

Adding more buses into service that moves slowly in traffic is not only expensive, there comes a point where customers will not use a service with severely disadvantaged travel times as compared to driving, and, in some cases, in comparison to walking. In the broadest sense, the mantra should be:

[11] See www.translink.bc.ca/vutp.bc.ca/transit plan library/route and ridership information.

"To move more people, we must move them faster!"

The following are some specific observations along these lines.

Speed and Delay

How slow is too slow?

Without intervention, speed is likely to continue to decline. The system is already recording segments where the average speed is below 10 km/h. These occur in areas of high density, which means that as further densification occurs, average speeds could deteriorate further, unless the City of Vancouver and TransLink implement strategies to minimize this. There is a history of deteriorating running times on Vancouver routes. Exhibit 4-31 compares current scheduled running times on a selection of Vancouver routes with their values in 1976.

Exhibit 4-31 Comparison of selected running times, 1976 vs. 2005

Route	Segment and time period compared	Scheduled Running Time (minutes)		1976-2005 change
		1976	2005	
3	Main at Broadway to Main at Marine (PM)	19	23	+21%
4	Pender at Hamilton to Blanca at 8th (PM)	28	34	+21%
9	Lougheed at Boundary to Alma at Broadway (AM)	37	45	+22%
9	Lougheed at Boundary to Alma at Broadway (Sunday)	35	43	+23%
41	Joyce at Kingsway to UBC (AM)	44	48	+9%
41	Joyce at Kingsway to 41st at Crown (Saturday)	36	39	+8%
49	Dunbar at 41st to 54th at McKinnon (PM)	27	35	+30%

A future of ever-increasing running times is not sustainable and will not help transit meet the goals that the City and region have set for it. Longer running times make transit less competitive, making it harder to attract riders from less sustainable modes, and add capital and operating costs in the form of additional vehicles and driving time.

The potential hours of service that are saved by running the current service with less delay, and the reinvestment of those hours to benefit high-demand areas is discussed more thoroughly in the section improving Transit Travel Time and Reliability.

Improving Travel Time Strategy

A first step to improve speeds is to respace stops in support of the policy minimum spacing of 250m for local routes, being mindful of topography, existing bus stop usage, and nearby land uses. Particular focus should be given to:

- Segments with high ridership, because it is here that buses make almost every stop, and will therefore save time by making fewer stops.
- Segments where intersecting streets are closely spaced, so that a two-block spacing is less than 250m. In this short-block pattern, stops should be distance based.
- Downtown since it contains the slowest segments in the network, and has the highest bus and passenger activity. Particular attention should go to:
  - Trolleybus turnarounds and other turns involving Hastings/Cordova/Pender in the segment between Granville and Cambie.
  - Turns on to and off of Burrard, especially the Line #8/#15 routing and the #98 B-Line southbound routing.

The Granville Mall redesign provides an opportunity to adjust the spacing of stops along the mall, the busiest but slowest street in Vancouver's transit system. Since intersecting blocks are short, 2-block spacing (about 350 metres) should be acceptable, except in the busiest locations.[12] Relocation of stops in relation to future Canada Line stations may resolve some issues.

In areas where passenger boarding activity is nearly continuous (such as at consolidated stops on Granville Mall), means by which passengers holding passes or transfers can board by the rear door to reduce dwell times should be explored.

4.4.2 Optimizing the B-Lines and Limited-Stop Routes

In both B-Line corridors, the parallel local lines do much of their business at or near B-Line stops. This is especially notable on Granville, where the only significant local-stop activity is in the South Granville and Marpole business districts. The same is also true of several other corridors served by both locals and limiteds, such as 41st Avenue (Routes #41 and #43.)

[12] Seattle's King County Metro is using spacing of up to four blocks (roughly 400 m). This policy will extend to 3rd Avenue through downtown, their equivalent of Granville Mall.

The meaning of the B-Line brand also needs to be upheld. The #99 B-Line should be upgraded to at least the level of reliability that Los Angeles achieves with its mixed-flow equivalent service, the Metro Rapid. (#98 B-Line's cumbersome outbound routing from Vancouver may be acceptable for now, given that the line will be replaced by the Canada Line.)

The most relevant peer for the B-Lines, in this regard, is the Metro Rapid system in Los Angeles. Nearly identical to B-Line in its service type and goals, the Los Angeles project has achieved higher average speeds, largely through the effective management of secondary signals. The two starter corridors, Wilshire and Ventura Boulevards, are wider than Broadway but similar in the land use and circulation pattern. They have signals every few blocks (central Broadway has them every block), and major arterial intersections are widely spaced (roughly 700m). Where the priority system has been implemented, Metro Rapid buses pre-empt all the minor signals, stopping only at the major arterial intersections. On Ventura Boulevard, where this system operates on the entire length of the corridor, the result is an average operating speed of 31 km/h, up from 24 km/h before the project.[13] TransLink's #99 B-Line on Broadway, without such preferences, now operates at 23.2 km/h.

4.4.3 Other Key Observations for Improving Service

- Peak overloading can be mitigated on some routes by shifting to articulated buses.
- Weekend service is inadequate on several routes, as discussed in the section on weekend loading above. The most urgent needs from a capacity standpoint appear to be #5, #6, #41, and #99 B-Line. Weekend service at 15 minute headways should also be a priority on all of the grid routes.
- Investigate the benefits of breaking #100 somewhere in southeast Vancouver or southwest Burnaby with the goals of:
  - Connecting both parts of Marine Drive to a major activity centre, such as Metrotown, or to Joyce SkyTrain Station. This would increase the range of access to Marine Drive destinations, especially from east of Victoria where north-south routes do not reach Marine.
  - Support a higher frequency on the Vancouver segment of Route #100, where demand is higher than on the Burnaby segment. This could boost use of the

[13] For details on this implementation, including other signalization techniques used, see pp. 10ff at http://gulliver.trb.org/publications/tcrp/tcrp90v1_cs/LosAngeles.pdf

southern ends of the north-south grid routes, by expanding opportunities for trip-completion from the Marine Drive terminus.

4.5 Conclusions

This evaluation of service performance presents a number of key findings and challenges to the development of the Vancouver UBC Transit Plan:

1) Service on the existing network is well utilized. Most routes experience overcrowding during one or more time periods.

2) Some corridors in the network have too many services overlapping, while small gaps exist in other areas.

3) A few routes in the network are operating at service frequencies, mostly evenings or weekends, that do not meet Transit Service Guidelines.

4) Several core routes in the network are operating at very low speeds and efforts to improve speed should be pursued.

5) Bus schedule reliability and headway maintenance are suffering likely due to a combination of traffic delay, traffic signal delay, and high volumes of passengers boarding.

6) The schedule reliability guidelines are too broad for bus services operating at high frequencies, and as noted, it is more important to maintain even spacing of buses for high frequency routes.

7) UBC is a major transit destination, and all routes converging on UBC are crowded at some point, especially weekdays.

8) The Broadway corridor routes, especially the #99 B-Line, are very busy, with all routes combined carrying over 65,000 passengers per day, challenging the capacity of transit vehicles.

9) Future services for UBC markets should be targeted off Broadway.

Today's operating constraints are the number of vehicles in fleet, the hours of service that can be funded, the ability to hire additional bus operators, and the ability to operate more efficiently

on city streets. Service expansion plans need to address all of these factors to ensure demand can be met in a cost-effective manner.

The Vancouver UBC Transit Plan service proposals following in section 6 are aligned into categories that address the main findings of this evaluation, in addition to findings from the following sections on the “Future Transit Market” and “Transit Issues”.

Appendix A Route Ridership by Day of Week

Weekday Ridership Statistics for Vancouver Routes
December 2003 - April 2004 (draft)

Route Number	Route Name	Daily Boardings	Daily Passenger-km	Revenue Hours	Service Hours	Revenue km	Average bus speed (Rev-km / Rev-hr)	Boards/ Revenue-hr	Pass-km/ revenue-km	Average Passenger Trip Distance (km)	Average Passenger Trip Duration (minutes)
1	Beach/Burrard Station	1,630	2,640	26	36	387	15.1	63.8	6.8	1.62	6.42
2	Macdonald-16 Ave/Burrard Station	3,580	11,080	41	48	738	18.0	87.4	15.0	3.10	10.30
3	Main/Downtown	18,760	54,260	214	249	3,219	15.0	87.6	16.9	2.89	11.55
4	Powell/Downtown/UBC	9,640	47,220	142	168	2,896	20.4	67.8	16.3	4.90	14.43
5	Robson/Downtown	8,630	14,800	102	124	1,112	10.9	84.9	13.3	1.72	9.41
6	Davie/Downtown	8,930	15,060	95	116	1,102	11.6	94.2	13.7	1.69	8.70
7	Nanaimo Station/Dunbar	11,240	43,400	159	189	2,957	18.5	70.5	14.7	3.86	12.50
8	Fraser/Downtown	14,200	41,330	179	205	2,805	15.7	79.4	14.7	2.91	11.14
9	Boundary/Broadway Stn/Alma/UBC	25,650	69,410	267	330	4,571	17.1	96.0	15.2	2.71	9.50
10	Granville/Hastings	12,340	45,900	166	198	2,957	17.8	74.5	15.5	3.72	12.50
15	Cambie/Downtown	10,970	36,120	139	159	2,309	16.7	79.1	15.6	3.29	11.87
16	29th Ave Station/Arbutus	15,400	56,180	210	240	3,755	17.9	73.4	15.0	3.65	12.23
17	Oak/Downtown/UBC	20,750	79,060	237	278	4,592	19.4	87.5	17.2	3.81	11.80
19	Metrotown Station/Stanley Park	10,820	37,950	171	205	3,035	17.7	63.2	12.5	3.51	11.87
20	Victoria/Downtown	22,000	63,480	249	289	3,889	15.7	88.5	16.3	2.89	11.06
22	Knight/Macdonald	16,280	67,310	212	249	4,009	18.9	76.7	16.8	4.14	13.13
25	Brentwood Station/UBC	13,900	80,940	165	186	3,852	23.4	84.5	21.0	5.82	14.92
26	Joyce Station/29th Ave Station	4,670	14,210	57	79	1,305	23.0	82.3	10.9	3.05	7.94
27	Kootenay Loop/Joyce Station	3,460	8,870	40	55	816	20.5	87.1	10.9	2.56	7.49
28	Phibbs Exchange/Joyce Station	5,310	23,210	76	106	1,651	21.7	69.7	14.1	4.38	12.10
29	29th Ave Station/Elliot	1,970	4,980	25	35	582	22.9	77.6	8.6	2.53	6.62
32	Dunbar/Downtown	850	3,660	8	9	151	19.5	109.7	24.3	4.31	13.29
41	Joyce Station/Crown/UBC	22,010	114,460	205	245	4,813	23.5	107.4	23.8	5.20	13.28
43	Joyce Station/UBC	2,490	21,120	34	38	909	26.5	72.4	23.2	8.49	19.26
44	Downtown/UBC	2,620	23,130	31	41	798	25.3	83.1	29.0	8.85	20.94
49	Metrotown Stn/Dunbar Loop/UBC	12,730	74,830	133	158	3,238	24.3	95.7	23.1	5.88	14.50
50	Waterfront Stn/False Creek South	3,860	10,720	55	73	935	16.9	69.8	11.5	2.77	9.85
98	B-Line Richmond Ctr/Burrard Stn	20,160	174,130	238	276	5,293	22.2	84.5	32.9	8.64	23.35
99	B-Line Broadway Station/UBC	30,880	193,740	233	298	5,404	23.2	132.5	35.9	6.27	16.24
100	22nd St Station/Airport Station	3,870	30,340	68	82	1,926	28.3	56.8	15.8	7.84	16.62
135	SFU/Burrard Station	11,820	86,980	191	253	4,165	21.9	62.1	20.9	7.36	20.19
	Totals/averages (averages in italics)	328,320	1,364,320	3,942	4,737	75,048	*19.0*	*89.1*	*20.7*	*4.41*	*13.91*

Note: 40% of #98 ridership, 60% of #100 ridership and 20% of #135 ridership is assumed to be internal to City of Vancouver for grand totals
65% of #98 service (hours and km), 60% of #100 service and 40% of #135 service operates within the City of Vancouver for grand totals

Appendix B Slowest Segments: Weekday PM Peak (3 – 6 p.m.)

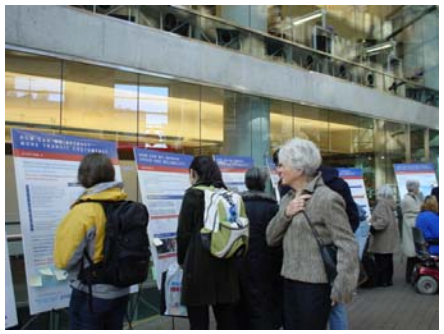
Route	Direction	Segment		Average speed (km/h)
		From	To	
22	Eastbound	Pender/Hamilton	Pender/Main	15.7
17	Westbound	Oak/Broadway	Pender/Hamilton	15.4
17	Eastbound	Pender/Hamilton	Oak/Broadway	15.3
16	Eastbound	Granville/Robson	Hastings/Commercial	15.2
22	Eastbound	Burrard/Robson	Pender/Hamilton	15.2
10	Westbound	Hastings/Hamilton	Granville/Broadway	15.2
8	Northbound	Broadway/Kingsway	Pender/Hamilton	15.2
20	Southbound	Granville/Robson	Commercial/Hastings	14.8
10	Eastbound	Granville/Robson	Hastings/Commercial	14.7
9	Westbound	Broadway/Main	Broadway/Oak	14.7
10	Westbound	Hastings/Carrall	Granville/Broadway	14.7
9	Eastbound	Broadway/Kingsway	Grandview/Commercial	14.7
9	Eastbound	Broadway/Granville	Broadway/Kingsway	14.6
16	Westbound	Hastings/Carrall	Broadway/Granville	14.5
9	Eastbound	Broadway/Oak	Broadway/Kingsway	14.4
20	Northbound	Hastings/Carrall	Davie/Seymour	14.4
20	Southbound	Commercial/Hastings	Broadway Station	14.1
17	Westbound	Pender/Hamilton	Broadway/Granville	14.0
3	Northbound	Main/Broadway	Hastings/Carrall	13.9
19	Eastbound	Pender/Hamilton	Kingsway/Broadway	13.9
3	Northbound	Hastings/Hamilton	Robson/Granville	13.6
6	Westbound	Granville/Robson	Davie/Denman	13.2
2	Southbound	Burrard Station	Burrard/Davie	13.1
3	Northbound	Hastings/Carrall	Robson/Granville	13.1
3	Southbound	Granville/Hastings	Main/Broadway	13.0
8	Southbound	Pender/Hamilton	Broadway/Kingsway	12.9
6	Eastbound	Davie/Denman	Granville/Robson	12.5
7	Westbound	Pender/Hamilton	Granville/5th	12.4
4	Westbound	Pender/Hamilton	Granville/5th	12.3
22	Westbound	Pender/Abbott	Burrard/Davie	12.2
20	Southbound	Granville/Robson	Hastings/Homer	12.1
5	Eastbound	Davie/Denman	Granville/Robson	12.0
3	Southbound	Granville/Robson	Main/Broadway	11.9
98	Southbound	Waterfront Station	Howe/Davie	11.7
20	Northbound	Broadway Station	Hastings/Commercial	11.7
5	Westbound	Richards/Hastings	Davie/Denman	11.5
5	Eastbound	Granville/Robson	Granville/Hastings	11.3
17	Eastbound	Granville/Robson	Pender/Hamilton	11.2
3	Southbound	Granville/Robson	Granville/Hastings	10.8
17	Eastbound	Granville/Davie	Granville/Robson	10.7
9	Westbound	Broadway/Oak	10th/Fir	10.5
6	Eastbound	Granville/Robson	Granville/Hastings	10.5
3	Southbound	Davie/Richards	Granville/Robson	10.5
5	Eastbound	Granville/Robson	Richards/Hastings	9.9
6	Eastbound	Granville/Robson	Richards/Cordova	9.8
8	Southbound	Robson/Granville	Pender/Hamilton	9.8
6	Westbound	Richards/Cordova	Granville/Robson	8.0
15	Southbound	Pender/Hamilton	Robson/Granville	7.8

Section

5 Transit Issues

5.1 Objectives & Methods

The purpose of this section is to share the comments about the transit system received from transit customers and key stakeholder groups such as the CMBC bus operators, SkyTrain Attendants, and the Public Advisory Committee. The Plan structured the public involvement to hear from a wide range of groups and interests, and TransLink also involved subsidiary company employees who have experience on the "front-line" to provide their opinions and ideas.



The planning process featured extensive public consultation

Subsidiary company staff input was received through focus groups held with SkyTrain Attendants familiar with Vancouver SkyTrain station activity and also with bus operators from Oakridge, Burnaby and Richmond Operating Centres who are familiar with bus routes in the City of Vancouver and UBC. Both groups were asked to discuss their views with regard to current situation, and with regard to some proposed changes to the transit network. The discussion guide for both focus groups is in Technical Report #6: Focus Group Reports. In addition the City of Vancouver Council appointed members of the relevant unions (Canadian AutoWorkers, OPIEU, CUPE) representing SkyTrain, SeaBus and bus operators to a "Frontline Transit Operators Advisory Committee" to provide advice during the development of the plan.

TransLink's Customer Satisfaction Surveys were analysed to provide results for the Vancouver UBC area as of September 2004.[1] In addition, the verbal comments by route were documented and circulated among TransLink and CMBC staff for review. Both sources of information are useful to identify trends, the effect of recent service changes, and current 'top of mind' issues. Other TransLink market research reports, which were reviewed by the Vancouver UBC Transit Plan team, include:

- SFU and UBC U-Pass Survey, December 2004
- Qualitative Research: SkyTrain Services and Amenities, March 2004

[1] Vancouver Area Transit Plan Route Analysis, Marketing Dept. September 2004.

- Interest in Viable Transportation Options Among Private Vehicle Drivers, July 2004 TransLink & BCAA

TransLink also commissioned a comprehensive market research study for the Vancouver UBC area, and the region to examine travel patterns to Vancouver and UBC and to test some proposed service options with a random sample of potential transit customers.[2]

The public involvement strategy for the Vancouver UBC Area Transit Plan was developed for TransLink following the City of Vancouver model, by Eclipse Environmental Consulting.[3] Results of the public involvement are also summarized in this section, as well as highlighted throughout the plan document where relevant. The public involvement process involved over a dozen events in various neighbourhoods in the preliminary planning phases, and further consultation with the draft plan. A comprehensive summary of the public input received is available in the report *Technical Report #2: Public Involvement Summary*.

This section summarizes the issues found from these sources and the conclusion highlights themes.

Guiding Principles for Public Involvement were adopted by Vancouver City Council in July 1999 as part of a Public Involvement Review - Policy Report. They embody best practices in public involvement.

5.2 Issues Identified from Operating Subsidiaries Input

5.2.1 CMBC Bus Operators

The most frequent comments had to do with running times. Operators expressed considerable frustration with running times because they find that almost all Vancouver routes have insufficient time due to the growing congestion in the City. Comments unrelated to specific routes are summarized below.

- Bus priority measures introduced to-date are inadequate to facilitate bus movement.
- Running times were mentioned so frequently that at a certain point in the groups the decision was made that we would accept this problem as widespread, and move on to other pressing problems. Operators then focused on all issues related to the need for buses to be able to move more freely along their routes.
- The need for HOV or bus-only lanes was repeated over and over in these groups. Such lanes should be put in place along 4th Ave., Burrard Street, Kingsway, and

CMBC bus operators working out of Oakridge Operations Centre (trolley bus depot and some Vancouver diesel services) were invited to drop in at an open house March 16th, 2005 to review specific service concepts and provide comments.

Overall, the operators favoured transit priority measures, measures to speed up boarding and the new transit services.

[2] Vancouver Area Transit Plan Research, Mustel Group, April 2005
[3] http://vancouver.ca/publicprocess/citizens.html; Eclipse Environmental Consulting also developed the City of Vancouver model.

Broadway — all major arteries with significant traffic and parking on both sides, affecting the ability of the bus to move easily along the street or in and out of bus stops.

- Bus bulges were also seen as a valuable tool to help the bus move through its route. The bulge is effective because the bus does not have to move in and out of the travel lane to reach its stop. Bulges are thought to be most valuable near an intersection that has a lot of right- and left-hand turns where the bus gets stuck while waiting for the turns to be made. Bus bulges are seen as especially valuable when they work in combination with HOV or bus-only lanes.

- The streets discussed most throughout these groups were: 4th Avenue with its problem of being narrow with parking on both sides of the street; Broadway for similar reasons and because of the sheer volume of traffic that it accommodates; Burrard because it is a major artery and the flow of traffic along there is significant.

- Joyce station bus loop and its overcrowding was mentioned, with the difficulty of getting in and out of the area (bus loop) on certain routes.

- Extending hours and frequency of service was thought to be important in some areas.

- Less interlining of buses would make them more efficient. Running a long interlined bus can result in problems experienced in one area being carried over into the next area.

- Enforcement of parking by-laws is vital, according to these Operators. Parking enforcement at bus stops is not being handled effectively at the moment.

- Extending the time of restricted parking areas was also seen as a tool that could help move things along more smoothly.

- Better customer information is needed. Confusion about fares and routes is a common complaint from riders because information at stops and on-board is inadequate. Signage, particularly for re-routes, is not always clear.

Bus operators also provided many comments on specific routes and on a group of proposed service changes, which are incorporated into the Service Evaluation and Service Proposals sections of this plan.

Issues for Bus Operators are centred on traffic and schedule adherence.

The need for Customer information was also noted by Operators – as they are often answering (or unable to) questions.

5.2.2 SkyTrain Attendants

In the discussion of SkyTrain Stations and service amongst these SkyTrain Attendants (STA's) there were some consistent themes that emerged.

The STA focus group report was presented to SkyTrain Management staff, as many issues were operational in nature.

- Most of the stations discussed have problems with fare-sellers and many of them have problems with drug dealers. It was agreed that having additional transit police in the area of the stations would be helpful.

- Having a Community Policing Station at the SkyTrain Station as happens at Joyce Station is very helpful in alleviating the level of problems that arise.

- Organizing the stations so the Station Attendant can be "in two places at once" would also help. This can be done by moving ticket machines, where possible, to an area where they can be viewed by the STAs while they are dealing with issues that arise on the platform. It would also be aided by providing a two-way mirror in the door of the STAs booth in many of the stations.

SkyTrain management noted that a program was underway to upgrade the lighting in Expo line stations, and that considerable effort was being made to coordinate STA staff with Security staff.

- Lighting is a problem throughout the Expo Line according these individuals. That line was built many years ago and does not reflect the openness of the Millennium Line. Darkness feels threatening even if it is not. The Expo Line also has more corners and hidden areas that need to be lit so they feel exposed and are not harbors for drug dealers and vagrants.

- There is inadequate signage directing people in, out and through stations to buses.

- Broadway Station is one of the most problematic with fare sellers and drug dealers present but there is also a lack of proper lighting and signage necessary to direct customers. It is confusing and chaotic and also a very busy station especially at rush hour.

- There was disagreement amongst these STAs on whether the bike program is working. It seems to be more successful outside of the downtown core. Changes need to be made to this program to make it more effective.

Any routes that can tie in to a SkyTrain route are more effective than those that do not. The idea should be to take SkyTrain for as far as possible and only then transfer to a bus.

- The area surrounding SkyTrain Stations contributes to the perceived safety of the station. Creating lighting that spills over into the surrounding areas is helpful in diminishing the level of crime and vagrancy around the station.

- Some SkyTrain Stations (like Broadway or Waterfront) need more staff particularly at rush hour, as the current staffing level cannot deal with the problems that arise.

The group of STA's participating in this focus group were not all familiar with the bus routes being discussed. From the point of view of some, any changes that result in greater frequency and more direct routes will have a positive effect on the overall transit system.
Response to the idea of making changes to Broadway Station both from within but also to the vicinity surrounding the Station was extremely well received by all respondents. They understand very clearly that everything affects the efficiency of the system so anything that can be done to alleviate problems (signage, lighting, crime, safety and security) all contributes to a more efficient system.

5.3 TransLink Market Research

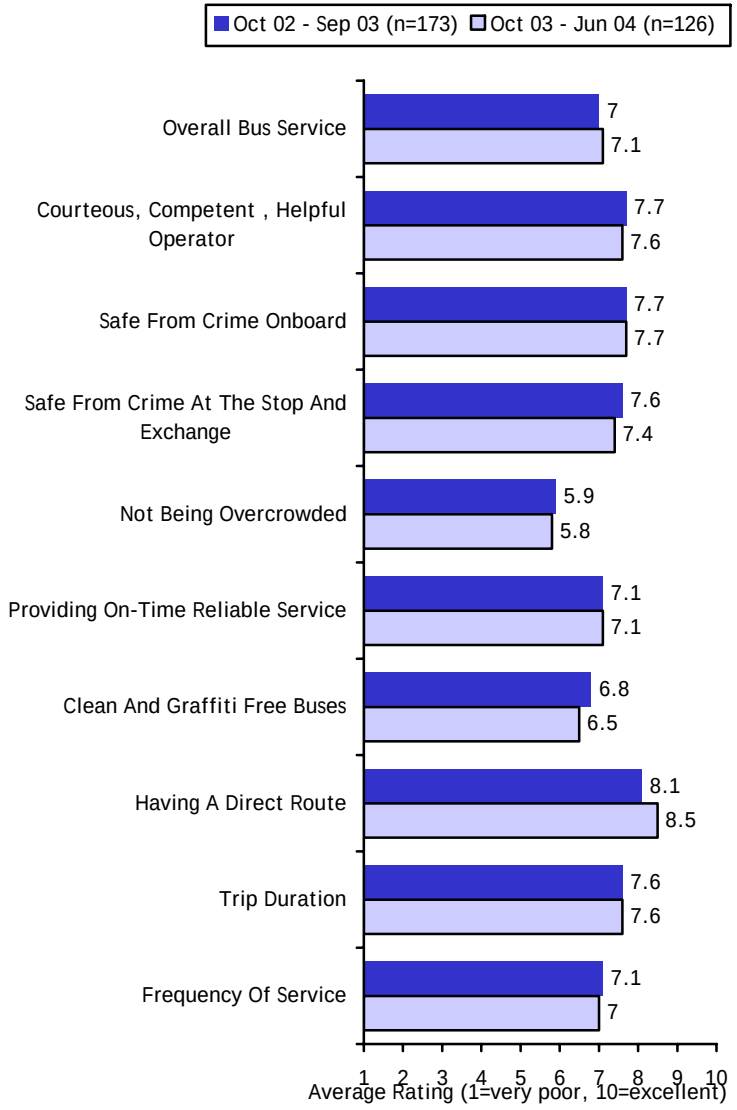
5.3.1 Customer Satisfaction

The Bus, SeaBus, SkyTrain Customer Satisfaction Survey, launched in October 2002, focuses on the key service attributes affecting transit customers' overall satisfaction, and provides a snapshot of current transit riders and an indication of what issues are.

Trends in Regional Transit Rider Profile and Transit Usage

Compared with 2003, the demographics of transit riders remained much the same in 2004. However, rider composition in 2004 included more students taking transit (accounting for 22% of the riders in 2004 compared with 19% in 2003). This change is a direct result of the U-Pass, which also affected the fare payment method. With U-Pass being introduced in September 2003, only 2% of the 2003 riders listed U-Pass as their fare payment method, whereas in 2004, U-Pass was the main payment method for 8% of riders. The added students also affected trip purpose, with 18% using transit for going to/from school in 2004 compared with 15% in 2003. During the same period, the proportion using transit for shopping trips fell from 27% to 23%.

Exhibit 5-1 Overall Vancouver Bus Satisfaction Ratings
September 2004



In 2004, fewer riders took trips during the morning peak period (48% versus 51% in 2003) and more took transit during the afternoon peak period (53% versus 48% in 2003). Further, more riders in 2004 took transit during weekends and holidays (30% compared with 23% in

2003). This shift in usage may account for some comments received at open houses about the inadequate levels of service provided at weekends and during evenings. The APC data also suggests more crowding at these times than might be anticipated.

In reviewing Exhibit 5-1, the Rider Satisfaction ratings for Vancouver bus routes in September 2004, the following highlights are noted:[4]

- Satisfaction with the overall service is moderate for 2004 (7.1 out of 10 in 2004).
- Having a direct route is the highest rated of the specific service attributes (8.5).
- Overcrowding is an issue with the service, receiving the lowest score of all attributes (5.8) for routes #3 Main, #98 and #99 B-Line, as well as the #20 Victoria
- The #3 also receives a moderate rating for having clean and graffiti-free buses (6.5).
- Impact Scores suggest that improvements to overcrowding (0.91), frequency of service (0.69) and providing on-time reliable service (0.50) will have the greatest impact on customers' perception of the service overall.

The attributes scoring highest are shown in Exhibit 5-2.

Exhibit 5-2 Highest Vancouver Bus Satisfaction Ratings by Category

Attribute	Score out of 10	Route
Direct Route	9.1	#99
Safe on Board	9.1	#50
Trip Duration	9.0	#50
Safe on Board	9.0	#25

Routes #3, #6, #7, #20 received the lowest "Overall" rating of 7/10, which corresponds to observations from the APC data about service reliability and crowding on these routes.

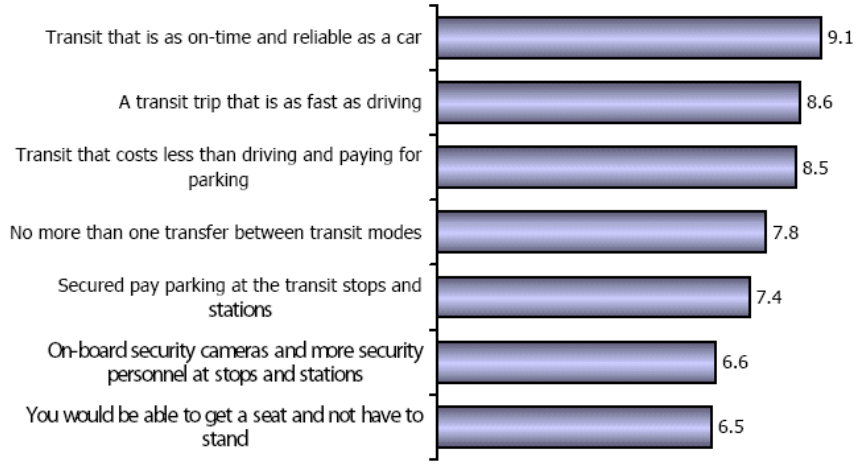
5.3.2 BCAA Market Research

In partnership with BCAA, TransLink conducted a survey of 900 BCAA members to explore the viability of changing SOV usage patterns.

Switching some trips from SOV to transit was not rated as easy, and lifestyle changes were cited as being necessary for some people to consider transit. But among those who indicated they might switch to transit (660/900 respondents) several factors were mentioned as shown in Exhibit 5-3. Respondents also indicated that there are some "must-have" attributes for them to switch to transit:

- Greater Frequency of service

Exhibit 5-3 Importance of Transit Improvements



Mean scores based on 10-point scale:
1 = Not at all important and 10 = Very important.

[4] Vancouver UBC Area Transit Plan Route Analysis, TransLink Market Research 2004.

- Closer service
- Faster trips
- More direct routes and less transfers

The issues for drivers who would consider using transit are:

- service is not frequent enough
- service is not close enough to them
- service is not reliable enough
- service is not fast enough

Exhibit 5-4 Transit Modes SOV Drivers Would Consider Switching to

Transit Mode Most Likely to Consider Switching to

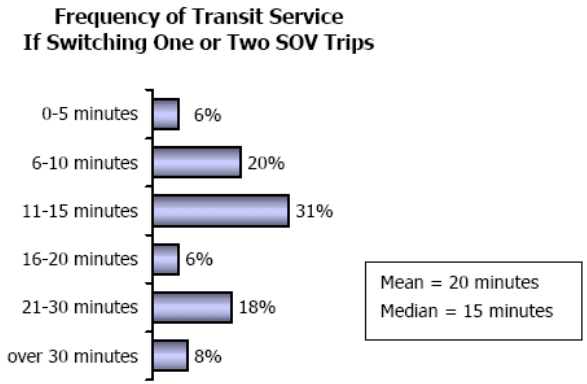
	Total SOV in typical week (761) %	Membership		Region				
		BCAA Members (388) %	Non-Members (371) %	City of Van (201) %	Bby/NW Rmd (169) %	North Shore (75) %	NES (72) %	South Fraser East (244) %
Rail service like SkyTrain	60	59	61	56	72▲	49	58	58
Small shuttle buses	58	60	57	52	63	57	64	59
Regular city bus	50	50	51	53	54	56	38	47
Limited stop express B-Line	48	50	47	54	49	40	46	47
SeaBus/ other ferry	29	32	27	26	32	53▲	16	26
Rail line WCE	28	26	28	24	25	28	37	29
None of the above/ transit absolutely impossible	13	12	14	12	10	15	15	14

As shown in Exhibit 5-4, drivers in the City of Vancouver rank SkyTrain and bus travel almost equally viable as a mode they would switch to, likely due to the well defined bus routes in the city and the two SkyTrain options.

Interestingly, when asked about how frequent service should operate for them to switch to using transit the preferences (Exhibit 5-5) match what is currently available in Vancouver for most time periods: a service of 15 minutes or better.

Over sixty percent (61%) of this group of respondents indicated that they would be most likely to take transit for trips to Vancouver, and less inclined for all other trip destinations such as Burnaby (32%).

Exhibit 5-5 Desired Transit Service Frequency



Base: Total SOV for any trip purpose who would consider switching one or two of their trips to transit (n=660)

5.4 Public Input on Transit Issues

In addition to regular monthly meetings with the Public Advisory Committee – 25 members appointed by Vancouver Council, UBC and UEL - the public involvement strategy offered four methods of communicating with TransLink:

- Telephone: a dedicated line to receive questions, comments and requests for information or translation services
- Email: a dedicated email address
- Internet: an on-line "Workbook" structured to match the open house display boards
- In Person: Public open house meetings and 2 workshops held during late February and March.

Public involvement events were held at various locations in Vancouver and UBC (listed in Appendix A to this section). These were designed to receive comments on specific proposals and to receive issues and ideas for ways to improve the service. Over 2,000 individuals attended the events, with up to 700 at one open house. Hundreds of comments were received on all the display boards, and many issues were raised in regard to the question below "How can we improve transit services?" and "How can we attract more customers"? Each of the comments received were entered into a database and this section summarizes them.

In addition to the public open houses, VUATP staff attended meetings with the stakeholder groups listed in Exhibit 5-6 on request to receive comments and suggestions.

In addition to several individuals, written submissions were received from the Vancouver Area Cycling Coalition, the Seniors Network B.C., and several letters of support for community shuttles from Vancouver Coastal Health staff and community agencies dealing with seniors.

The Public Advisory Committee met on 14 occasions to

Exhibit 5-6 List of Stakeholders Consulted

Stakeholder Group	Venue
Hastings Park area stakeholders	Hastings Community Centre
Fraser Lands stakeholders	Sunset Community Centre
Seniors	Douglas Park Community Centre
Bicycle Advisory Committee (City of Vancouver)	City Hall
South Vancouver Seniors	Killarney Community Centre
Granville Island CMHC	Granville Island
Transportation Sub-Committee of the Council appointed Seniors and Disability Issues Advisory Committees	City Hall
Seniors	411 Seniors Centre Society
Environmental Youth Alliance	EYA Office
Vancouver Area Cycling Coalition	City Hall
Seniors	Douglas Park Community Centre
Disability Issues Advisory Committee (City of Vancouver)	City Hall
Victoria-Fraserview-Killarney Visions Meeting	Sunset Community Centre
Advisory Committee on Diversity Issues	City Hall

discuss various aspects of the plan. At a final meeting to discuss the Draft VUTP, PAC members agreed to the following points:[5]

1) There is general support for the transit service proposals, as well as the service design and policy recommendations outlined in the Plan. Members feel that the Plan successfully develops the rationale for the proposed service improvements and new bus routes to better serve existing customers and to capture new riders. Members broadly support the recommended frequency improvements, route designs, new bus routes and Canada Line integration scheme (with some individual disagreement on specific items).

2) There is support in principle for the application of transit priority measures for transit corridors designated in the Plan, with details to be worked out over time for specific roads/areas. (See notes above.)

3) The City of Vancouver Council and/or TransLink Board should establish an on-going Transit Advisory Committee to monitor implementation of the VUTP, including transit service design and policy recommendations for the City and UBC.

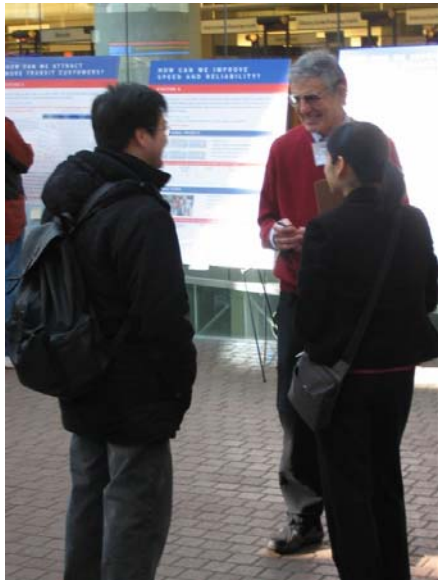
4) The Committee should report directly to City of Vancouver Council and/or the TransLink Board (just as the PAC reported to a joint TransLink/City team).

5) The Committee should be based on the model of the Bicycle Advisory Committee. (Some members felt that the mandate of the Committee should focus on the Plan only. Others thought it could evolve beyond Plan implementation to include broader City and UBC transit and/or transportation issues and/or encompass regional transit and transportation issues. In either case, the Committee could liaise with other relevant City committees, e.g., Bicycle Advisory Committee, Cool Vancouver.)

Finally, PAC members noted that the following TransLink actions will also be important to the successful implementation of the Plan and the achievement of ridership goals:

1) More transportation demand management measures, including incentives to use transit as well as disincentives to single occupant auto travel.

2) A better TransLink/City of Vancouver/UBC consultative mechanism to resolve challenging issues related to implementing transit priority measures and other aspects of City's Transportation Policy, which gives priority to non-car modes.



Open houses featured extensive direct consultation

[5] Meeting Held June 6, 2005. 16 of 24 members were present.

3) Communication to the public by TransLink regarding what resources are available for transit improvements, and how they are being allocated in the region in light of new funding recently announced by the Federal Government.

Comments from all groups relating to specific service proposals are woven into the discussion about the service proposals. This section brings forward general concerns and issues raised about the transit system, and they are presented here in categories that correlate to the Transit Service Guidelines: Convenience, Comfort, Reliability, Efficiency, Customer Information, Vehicles. Sample paraphrased comments are included in the side bar throughout this section.

5.4.1 Convenience

At least 200 comments were received under the category of "convenience" across a broad range of topics, since convenience is quite subjective to the customer. Many suggestions received fall into the category of new service suggestions or making the system more frequent or reliable.

Sample comments on convenience

I've had to pass up on 2 jobs I would have liked to take because the buses don't run early enough. They should start @ 5 or at least 5:30am.

Main St/Science world has very steep flight of stairs - often see people with suitcases coming to/from Train station - should have an escalator (is one or other exit at station doesn't solve problem - still have to struggle with cases across busy road - Main at Terminal)

Daypass available on bus from fare ticket printer, Fares are too high for parents and kids

More frequent late night service on more routes

More priority for buses – Bus lanes, Queue jumping, Bus ways

More B-Lines everywhere!

Accessible buses please, Bike rack on every bus

The recently "improved" shelters are AWFUL

Frequent service on Sundays

Make employee pass cheaper and less complicated to get

Old fashioned printed bus schedules at every stop
Electronic bus passes like the bus pass service in Hong Kong

#C23 needs to run later on weekends

More buses more frequency!

Some commonality exists within specific groups of customers. For example, the input received from seniors and people with disabilities indicated that conventional transit service is not always appropriate to their limited mobility and travel destinations. Existing bus services are not very attractive options because of overcrowding, perceived safety concerns, and walking distance to bus stops. There were also concerns expressed about transit operations, both bus and SkyTrain particularly in regard to crowding. Many seniors desire a Community Shuttle service designed to meet their unique needs. They requested service that is tailored to the dominant midday travel period for seniors as well as to their specific trip destinations. Seniors should be able to receive priority loading on future Community Shuttles.

Cyclists want more bike racks around transit stops and racks on all the buses. They also wish to see better bike routes that are well marked leading to public transit stations, major stops and SkyTrain stations. The issue generally is that bicycle connections to transit are not as good as they could be, and the accommodation of bicycle parking or bicycles on transit is not as good as it good be. Cyclists advocate that more of them would use transit for part of their travel if there was better accommodation.

Seniors need to sit, and crowded buses are uncomfortable

Walking distances are long or are on difficult terrain (hills etc.)

HandyDART should recognize the Provincial Pass (for those people receiving Guaranteed Income Supplements)

Policy to give seats to Seniors should be enforced

Operators should regularly announce bus stops

Operators should make sure that the curb is not too far from the bottom step

Better communication of which bus route is pulling into the stop is needed

5.4.2 Comfort

This topic received a wide range of commentary, clearly indicating that the meaning of comfort goes beyond the level of crowding on a bus. There were a significant number of comments related to comfort and a higher level of consensus on this topic than the others. The top areas of concern were:

Crowding – general crowding was mentioned by the largest group of people, with specific routes including the #3 Main/Downtown, #41 Joyce Station/UBC, and #99 B-Line.

Bus stops – there was consensus that the City's new shelters were not meeting the needs of transit patrons, and that stops without shelters needed better amenities. Suggestions for improvements include having maps, schedules, seating and garbage cans at all stops, improving the design of the shelters to increase their wind/rain/sun protection and amount of

seating as well as improving the lighting to increase safety at stops, and emphasizing customer information and comfort over advertising.

Customer Service – many comments related to the courteousness of transit personnel, and bus drivers in particular. While some had positive experiences, most felt the drivers needed to be more sensitive to language barriers and those with strollers and special needs.

Cleanliness - there was a general consensus that the bus fleet in particular needed to be cleaned more often, both inside and out, and that graffiti should be removed immediately.

There were a number of comments related to how the buses functioned. It was felt that there needs to be more seating on buses and that it needs to be more comfortable, with the #98 B-Line used as an example of comfortable seating. It was felt by some that drivers were allowing buses to be too overcrowded, while others were concerned that drivers weren't asking people to move to the rear and remove their backpacks, resulting in needless pass-ups, as people were jammed at the front of the bus.

A number of people felt the buses didn't have enough ventilation, and with their slow speed stop and go crowded conditions they should have air conditioning. There were also a number of concerns that the buses were too jerky and erratic, for example running red lights or speeding up to red lights then slamming on the brakes, and that the stairs at the rear of the low floor buses compounded this safety concern.

A number of other safety and security suggestions were made. These included having cameras on buses, more reliable evening and NightBus service, enforcing the no-food rule, and increased bus and SkyTrain security.

Comfort issues other than crowding seem to be operational details such as:

- dirty buses inside & out
- lack of passenger etiquette
- uncomfortable bus shelters
- aesthetics of stations and bus shelters

Have enough buses to avoid overcrowding. Overcrowding makes bus uncomfortable and discourages people from taking it.

Clean the exterior and interior of the vehicles more frequently

Post multi-lingual signs

Drivers should encourage people to not only move to the back but also to fill every seat

Too much food, drinks, & coffee allowed on buses

Drivers should receive more courtesy training

Get a Canadian company to build better bus shelters, Too many bus shelters LEAK and don't have enough seats
Still concerned with many diesel buses using future underground loop at UBC

Buses are not high quality and don't last. Buy high quality buses.

Increase security at SkyTrain stations and have security officers actually check passes instead of socializing

Why are SkyTrain seats smaller here than your average tram in Japan when North Americans are bigger?

Have buses with type of seating on #98 B-Line

More low buses for handicapped

5.4.3 Reliability

Transit customers are inconvenienced by unreliable transit service, and sometimes report unacceptable events to CMBC. The public open houses comments were no exception; many route specific complaints were received. There were two main themes to the comments on reliability – specific areas or routes where there were problems, and the desire for more information on transit schedules.

Many people felt that bus bunching was an issue that was city wide, while others mentioned downtown and Broadway as the two main problem areas. Respondents from UBC tended to cite east/west routes, while respondents in other parts of the city tended to cite north/south routes. Bus routes mentioned more than twice in descending order were:

- #5 Robson/Downtown
- #3 Main/Downtown
- #25 Brentwood Station/UBC
- #16 29th Avenue Station/Arbutus
- #17 Oak/Downtown/UBC
- #20 Victoria/Downtown
- #6 Davie/Downtown
- #8 Fraser/Downtown
- #9 Broadway
- #44 UBC/Downtown
- #49 Metrotown Station/UBC

Reliability Issues

- reported city wide on many bus routes
- reported mostly during the daytimes of weekdays and weekends
- creates stress for transit customers

There was a desire for more information about transit schedules. This included posting schedules at all stops and on board buses and more “next bus” displays.

Sample comments on Reliability:

> Drives me wild when I wait 30 minutes on Cambie for a bus, then 2 or 3 come together
>
> Please do something about the buses stuck in gridlock on Robson
>
> In regards to the #16 bus (going & coming from downtown weekdays) often @5pm you wait & wait & wait and then 2 or 3 buses show up. Better spacing please!
>
> #25 UBC is completely unreliable in morning. Always too full and never running on schedule.
>
> Need transit with its own right of way
>
> #3 is always late
>
> Please ask bus drivers to wait when they see people running and waving to catch bus
>
> Buses should never leave early at night
>
> Buses lumped together – not good

5.4.4 Bus Stop Spacing

TransLink added the topic of bus stop spacing to the public discussion because there are conflicting requests for either more or fewer stops. Seniors, and the less able bodied customers tend to prefer the status quo (or closer spacing) with the distance from bus stops to their destinations a major concern. In contrast, commuters and other passengers without impediments to walking prefer fewer bus stops and faster travel times. While those in favour of fewer stops slightly outweighed those against, by far the majority comments were requests for a stop at a specific location.

Bus stop spacing needs to consider all users, and be aware of the target market

Sample comments listed below indicate a few ideas, and there were other specific requests for either adding or deleting a stop.

> Do not have stops further than 2 blocks apart. Remember those with mobility issues.

99 B-Line should have one or two more stops: Fraser & Arbutus are both too far away from stops
Make #43 stop on Rupert!!! It's close to school and community centre!

Too many bus stops on Dunbar just before 16th (3 stops within 4 blocks)

I think there should be intermediate express buses (ie: not as few stops as B-Line, not as many as local service) along major E/W routes ie: #25, #41.

Stops on both sides of an intersection are stupid and slows everything down.

If the distance is far it creates problems for elderly, disabled, injured, children & strollers.

Frequent stops slows route, but also means less walking, maybe more people would use it. Frequent stops are good less walking in rain, cold, dark etc.

In general people seem to feel safe walking, however, there were comments from more vulnerable groups that expressed concerns about safety walking at night in some locations and safety while waiting at bus stop at night.

Of the large group of people who mentioned they would like a stop implemented at a particular location, only two were mentioned more than once – introducing #99 B-Line stops at Arbutus Street and Fraser Street.

5.4.5 Frequency

Improving service frequencies was the second most cited suggestion (1/4 of comments) for increasing ridership. Crowded buses are a major detractor for both existing and new customers.

Many comments were received requesting additional frequency at all times of the day. In many cases this request reflects overcrowding on a specific route or the unreliability of scheduled trips. However, there were also more general comments relating to frequency in the evenings, weekends, and late night.

Several comments were received about too rapid a reduction in service frequency between the AM peak period and midday, and from PM peak to evening service levels.

Sample comments about Frequency:

Frequency issues:

- need to extend peak period frequency in the PM peak
- need to recognize some destinations function until 9pm, such as downtown and other retail districts
- need to account for the volume of weekend travelers
- attractiveness of evening services is limited due to frequency

The definitions of the time periods should reflect local trends in the City. "Shoulder" periods between peak periods and off-peak periods in which changes in service frequencies do not match commuter travel demand. For example the AM Peak period could begin at 5:00 or 5:30AM (currently it is from 6:00AM to 9:00AM), or more recognition should be given to pre-AM Peak services (4:00AM to 6:00AM).

Also, the PM Peak needs to be extended to 7-7:30PM; service needs to meet demand in the shoulder periods.

During off hours there should be core routes that are run more frequently like Broadway, Granville St. etc.

Love the new shuttle C21 but run later than 7 pm

All north south routes need more buses

Increase Sunday and Saturday service to beaches during late spring, summer

#44 – need more

Increase the frequency of all buses after 7pm

Make a DEDICATED bus lane in streets and increase frequency of buses

More weekend buses and night buses too

Extend SkyTrain service later on weekends!

5.4.6 Route Coverage

This topic was also one of the more popular, with responses covering a wide geographic and subject range. Suggestions included improvements to the rapid transit and B-Line network, services to cultural, civic, and recreational destinations, services to and within the downtown, UBC, and other locations.

Suggestions to improve the rapid transit network included extending SkyTrain to Langley, the Northeast Sector, the North Shore, and West Fraserlands, adding a Canada Line station at 2nd Avenue, and connecting Crescent Beach with SkyTrain instead of going downtown. Improvements to express and B-Line services suggested were a direct route to the airport pre-Canada Line such as via every second #98 B-Line, keeping the #98 B-Line post-Canada Line, new B-Lines on 41st Avenue and north/south routes including suggestions for

Victoria/Commercial, Knight, and connecting South Vancouver with Downtown, and extending the #135 Burrard Station/SFU to Coquitlam.

Suggested services to cultural, civic, and recreational destinations included: city beaches, namely Spanish Banks, Locarno, Jericho, New Brighton, and West End beaches, Granville Island, Vanier Park and the Vancouver Museum, Roundhouse and the Plaza of Nations, PNE, City Hall, Vancouver General Hospital, Oakridge, and Gastown and Chinatown via the #50 Waterfront Station/False Creek South.

Improvements to services to and within the downtown were popular and included: Maple Ridge and the North Shore to downtown, and various neighbourhood serving routes including the West End to BC Place, Coal Harbour to Yaletown, evening and more frequent service on the new C21 and C23 Community Shuttle, Denman Street to Main Street Station via Beach and Pacific, and strong support for the West End to Central Broadway route. It was also suggested that Venables and the viaducts be used to improve travel time for buses into the downtown from the east, that there was the need for more accessible service, and that the Davie and Denman layover for routes #5 and #6 should be moved to Waterfront Station.

UBC related routes generated a great deal of comment. There was strong support for the proposed B-Line on 41st Avenue and new route on 16th Avenue. There was also a request for a B-Line on King Edward, and improved connections with various locations including North Vancouver, South Richmond including Steveston, SkyTrain, Kootenay Loop, and South Vancouver along 57th or 33rd Avenues. A number of people also requested a UBC Community Shuttle type service. Suggestions for routes that serve UBC include that the addition of #99 B-Line stops at Fraser and Arbutus, and improved service is needed on the #44 Downtown/UBC. It was also noted that service is usually full close to UBC and there are many pass-ups.

Sample comments on Route Coverage

- Bus service to Vanier Park/Vancouver Museum
- More night buses are needed
- #20 Victoria/Downtown needs a B-Line service
- Make it easier to get to Granville Island on Transit please
- Coal Harbour to Yaletown – 1 bus
- Nice to have a seasonal shuttle bus between the beaches & to Jericho and Spanish Banks
- Greater late-night coverage!
- Venables/Georgia viaduct bus route would help access to downtown
- Put bus that runs straight down Boundary without detours
- More B-Line buses i.e. along Knight Street and 41st

5.4.7 Transit Information

Timely and accurate transit information is a constant request of customers, and many comments were received through public consultation. The main problem for customers is being secure in their knowledge of when the next bus will arrive, because there is no 'real-time' on-street information system except for the #98 B-Line. The overhead electronic displays are requested for all major transit points across Vancouver, with many references to SkyTrain and the #98 B-Line.

There were also suggestions about better distribution of public timetables, especially on board buses or at major transfer points such as SkyTrain Stations. Several requests for printable

schedules from the web without have to specify a trip were received, along with requests for these schedules to be available for downloaded to PDA's and other mobile electronic devices.

There were a number of constructive suggestions for improving transit information. Most frequently mentioned were

- Customer Information Line: have a real person answer it or have it numeric based. Many complaints were received about the automated voice system. For many people with English as a second language, the voice recognition system did not work at all, and that it couldn't function with cell phones and when there was background noise such as when calling from an outdoor location like a bus stop.

- Website: while one comment was complementing the current website, the others suggested it was awkward and could offer increased services such as cell phone/PDA access and downloadable schedules in PDF format as well as for PDAs.

Other suggestions included having stop announcements on buses, having more real time information including traffic delays, and improving the bicycle route and facility information such as a trip planner that took into account the need for a bike rack. Better NightBus information, colour coded bus routes, a better way of identifying the Broadway and Commercial stations, unique phone numbers for each stop which provide their transit schedules, and schedules that list all arrival times were also mentioned.

A number of respondents would like to see better accessible transit information, including routes, trips, stops, and stations. It was also noted that timetables should be updated in December if there are service changes and that the lost property office should be open evenings and weekends, when people are able to claim their belongings.

"User Friendliness" was also a theme among the comments received. Issues identified included the lack of signage at street level indicating where underground SkyTrain Stations are, such as at Burrard. In general, wayfinding through the system is considered inadequate by many customers, some provided comparisons to other major systems such as London, New York and Tokyo.

5.4.8 Transit Vehicles

Vancouverites expressed a number of priorities for their transit vehicles, including alternative fuels, better maintenance, low noise levels, comfort and efficiency.

By far the largest group of comments was related to the electric trolley buses and alternative fuels. There was a strong desire to not just maintain but increase the trolley service, with both

- *I find the web trip planner very clumsy. It can't find many streets unless you enter them exactly according to the database - No 2 Rd, Richmond or try getting E. Boulevard Vancouver! Also need ways to go back & find new times after 1st try with trip plan*
- *Colour-code bus routes to make them easier to understand.*
- *Rename bus routes to include major street plus destination*
- *Route maps on board buses - Route maps on SkyTrain platforms & directional arrows Vancouver -Surrey*
- *The map in the bus schedule brochure is poor, and not very helpful. Downtown routes are especially impossible to determine. Colour code the different routes. Have a legend for the colour, number and names of the buses. Improve the readability of the schedules.*
- *Exits at Skytrain stations: Exits at multi-exit stations should have numbers. There should be signs on each platform and within the station indicating each exit. Some stations might have signs that list streets, popular destination spots, buses, parks, shops/malls, bank/post office, etc. under the exit number. This sign should be located on the platform as well as near the exit.*

low-floor and articulated trolleys. There were also a number of comments that other alternatives should be pursued for non-trolley routes, such as hydrogen, bio-diesel, and hybrid propulsion systems.

There were a number of comments regarding bus interiors. The most common was that they were generally filthy and needed better maintenance, noting that the West Vancouver buses were much better maintained both inside and out. Other suggestions included better interior arrangements including upholstered seats, more legroom, better lighting, more grip bars, quieter brakes, bell buttons on the side poles so standees wouldn't have to reach over people to request a stop, and more single row seating to open up the interior. It was also felt that faster ticketing and smart cards were necessary and that drivers should take charge of their passengers and facilitate "moving to the back of the bus" and the no food rule.

- *Experiment with different vehicle types on existing and new routes: taxi-buses on low volume routes*
- *Operate trolley buses on trolley corridors only; diesel buses are noisy and dirty – also reduce their use late at night due to noise*
- *Introduce an articulated bus on Main Street to relieve crowding*
- *Buses should be quieter, buses are too noisy on 10th Avenue*

Diesel bus noise levels were a widespread source of complaint from both regular riders and from non-transit users living near diesel bus routes. Many people were concerned that newer diesel buses are noisier than their predecessors and that this makes them less comfortable to ride and to live near. Noise is becoming a route planning concern given that many objections to bus service are based on vehicle noise.

Related to the choice of vehicles, a large number of people noted there were higher quality, more modern and comfortable urban buses in other cities, and that TransLink should not stick with the same bus. There was also the request for more B-Line and articulated buses, double decker buses, and more rail rapid transit, particularly to UBC. There was also strong interest in increased bicycle access, including SkyTrain.

5.4.9 Policy Concerns

Strategic concerns like mode shares, ridership, transit priority measures, transportation demand management, and fare structure were also expressed. A number of suggestions about creating a transit friendly city through transportation demand management and transit priority. Ideas included:

- Increasing the cost of on-street parking, especially permit parking
- The need for more curbside parking bans to keep transit moving, including extending the bans to weekends, with one respondent noting that this would negatively affect local businesses.
- Implementing a vehicle levy and congestion charging
- Creating more bus-only streets

- Facilitating better land use/transportation integration, for example to prevent office parks which have poor transit service and no other local services

- TransLink, the municipalities, and the private sector should collaborate to increase the mode share of transit and to facilitate the development of transit-supportive land uses around SkyTrain stations

- U-PASS success still has not prevented many suburban residents from driving at least part way to campus & parking on Vancouver streets

- Implement reversible lanes in Kerrisdale (similar to Lions Gate Bridge setup) to facilitate peak period traffic volumes

- Implement westbound queue jumper at 41st nearside Granville

Various suggestions were offered to improve the transit trip and encourage multi-modal options. These included:

- Improved reliability by using transit priority measures

- Bus shelters with functional lighting and rain protection

- Customer service-oriented drivers

- Increased security at SkyTrain stations and in the cars

- Use of greener or non-polluting fuels

- Extended valid transfer time, recognizing many trips take longer than 1.5 hours

- Increased storage capacity for bicycles, for example more than 2 per car on SkyTrain, bus racks on all buses, racks and lockers at all stops, and opt-out of U-Pass for cyclists

- Integrate land use and transit with transit villages at all major transit nodes

- Invest in attractive suburban rapid transit (e.g., light rail) to counter the stigma of buses

There were also a significant number of suggestions for improving the fare system. The most common comment was that fares were too high, including children's fares. There were quite a few comments on new types of FareCards, including:

- Weekend 1, 2 or 3 day DayPasses as regular DayPasses are too expensive on the weekend when zone fares don't apply
- Weekly passes should be available
- 30 day passes that could start and end at any time of the month
- Smart cards to replace current passes, including U-Pass
- Being able to buy a DayPass on board buses
- Cheaper Employee Pass, as the discount was not sufficient to make it worthwhile, as well as 8, 9, 10, and 11 month Employee Passes, to suit people who only work part of the year, such as teachers.

5.5 Conclusion

Generally, the comments reflect that improvements can be made to the system, and not all suggestions necessarily require huge expenditures on big-ticket items. Overall bus route coverage seems adequate. The transit riding experience is the major issue. A transit customer's trip may involve multiple modes (i.e., bus, SkyTrain, or SeaBus). However, the dominant mode in the transit system, and in the immediate forethought of transit customers, is the bus.

A wide range of comments, from e-mail, web site, open houses, and workshops, indicate that improvements to bus services can provide much leverage to enhancing, the overall transit-riding experience for existing customers while helping attract new customers.

Improving the physical connections between the different modes of travel is another major factor. The modal interface encountered by the pedestrian/cyclist-turn-transit passenger needs to be re-examined in light of an ageing and more active population in this City (and region). The inadequacy (or lack) of relevant and accessible information is a frequent irritant for the public.

Appendix A Public Event Schedule

Date	Event	Venue	Estimated Number of Participants
February 8	Media Launch	Roundhouse Community Centre	30
February 19	Community Open House	Vancouver Public Library (VPL) Atrium	700
February 22	Community Open House	UBC Student Union Building (SUB)	600
February 25	Community Open House	West End Community Centre	25
February 28	Community Open House	Carnegie Centre Theatre	20
March 4	Community Open House	Collingwood Community Centre	4
March 5	Community Open House	Kingsgate Mall	300
March 9	Community Open House	VPL Alice Mackay Room	60
March 9	Public Workshop: *Picking Priorities for Transit Improvement*	VPL Alice Mackay Room	45
March 17	Community Open House	Oakridge Centre Auditorium	70
March 17	Public Workshop: *Transit Priority Measures*	Oakridge Centre Auditorium	45
March 19	Community Open House	Renfrew Community Centre	45
March 22	Community Open House	Kitsilano Community Centre	35
May 26	Community Open House	UBC SUB	370
May 26	Public Workshop	UBC SUB	17
May 31	Community Open House	VPL Alice Mackay Room	35
May 31	Public Workshop	VPL Alice Mackay Room	30
June 3	Community Open House	VPL Atrium	570
June 4	Community Open House	VPL Atrium	440

Section

6 Service Proposals

6.1 Introduction

This section identifies recommended changes in transit service based on a review of the objectives and priorities of the plan, existing TransLink, City of Vancouver and UBC proposals and service requests, public comments, including the Public Advisory Committee, and the Automated Passenger Counter (APC) data collected in 2004-5. The evaluation of service performance found in Chapter 4 forms the basis for many of the proposals included here. Towards the end of the plan horizon, the need to integrate the bus system with the Canada Line line, to provide convenient connections and avoid excessive duplication, is addressed.

6.2 Objectives

The key objectives used in determining how service should be allocated and where new routes should be created were based on TransLink's Transit Service Guidelines and include the following:

1) **Improving comfort for existing and new customers:** Public input to the plan was essentially unanimous in saying that much of the current transit system is operating at or near capacity. These observations were corroborated by the APC data, as indicated in Chapter 4. The first priority of the public and the plan is to bring the existing routes up to a level of service that meets or exceeds TransLink's Comfort guidelines. This will improve comfort and satisfaction for current customers as well as help create additional capacity for new riders in response to significant evidence that transit vehicles are often too crowded to attract those with other transportation options. In many cases, adding new routes that parallel existing service may relieve pressure on the existing routes and this was also a consideration.

Crowding has the lowest Customer Satisfaction score for all attributes in TransLink's rider satisfaction surveys (5.8 out of 10).

2) **Providing frequent service:** The bus network in the Vancouver and UBC area is based on a modified grid network that relies on random transfers to meet travel needs. It is therefore essential that buses operate frequently enough that transfers are not a significant source of delay and inconvenience. Consequently, the Transit Service Guidelines specify that random transfer routes operate at least every 15 minutes in the peak and daytime, and every 20 minutes in the evening. Many routes already operate more frequently than the guidelines require but a few do not and addressing these is a priority. To further increase convenience,

Crowding and frequency of services on many routes were the two most frequently mentioned issues among the public.

the plan will introduce 10 minute or better daytime service on major corridors, both in response to demand and to attract more customers.

3) **Improving service coverage:** While the grid network in Vancouver and UBC is extensive, there are some significant areas that lie beyond walking distance to a bus stop, including future high-growth areas such as Southeast False Creek and East Fraserlands. Additionally, the north-south, downtown-oriented grid of bus routes in the City is relatively mature compared to the east-west grid. The plan thus seeks to provide a more complete east-west grid, subject to suitable street infrastructure being in place.

Some service coverage requests:
"Make it easier to get to the Roundhouse and to the Plaza of Nations/Enterprise Centre"
"We need a bus along 16th Avenue or 33rd in East Van."

4) **Reducing travel time and improving reliability:** Customers value competitive and predictable travel times. Transit priority measures such as bus lanes and signal priority have an obvious role and are discussed elsewhere but bus routing and service design also play a part. Where possible, bus routes should be designed to take the fastest route and to minimize the need to transfer. Special service designs such as express and limited-stop services can be used to provide faster travel in high demand corridors where a high quality local service is also in place. The spacing of bus stops can be used to balance access and travel speed.

There is mixed public opinion about the most effective bus stop spacing. Many passengers appreciate regularly spaced bus stops, and others want more express buses.

5) **Create a fully accessible system:** By 2008 the bus network in the Vancouver and UBC area will be fully accessible to persons using wheelchairs and other mobility devices. Additionally, every bus will be equipped with a bike rack.

6) **Maximizing Canada Line benefits:** The Canada Line line, opening in late 2009, will introduce a high-frequency rapid transit line in the Cambie corridor, linking downtown Vancouver to Richmond and the Airport. The Canada Line will significantly shorten transit travel times and draw new commuters to transit, including reverse commuters from Vancouver to the Airport and Richmond. The Canada Line will attract some north-south transit trips from current bus routes and increase the demand for east-west service to the corridor. Bus service changes will help support the anticipated shift in demand and avoid excessive duplication of service.

7) **Addressing community goals:** The public has provided its aspirations for transit service through a range of processes, most notably the Community Visions program in the City of Vancouver. Service proposals respond to these goals.

8) **Increasing efficiency:** Some route segments have more bus service than demand suggests is needed. In these cases, resources should be reallocated to route segments where demand is not being met.

6.3 Improvement Strategy

Approximately 45% of TransLink's annual bus service hours operate within Vancouver and UBC. Even a small percentage increase in service within the area will therefore result in a large increase in service hours delivered and require significant resources. With much of the service already operating at high frequencies, and a relatively mature grid network of services, there is less opportunity for high visibility "new routes" than in some other Area Transit Plans. Addressing crowding to provide a more comfortable service is, however, essential.

The evaluation of service performance in Chapter 4 highlighted the need to build frequency on the existing network to alleviate crowding, and to improve upon transit travel times to achieve better use of bus resources. The analysis of future market requirements identified that additional capacity will be needed to keep pace with anticipated growth and achieve a higher mode share.

As a result, this transit plan asked the public to indicate preferred priorities in the following areas:

1) Improvements to existing routes

2) Integration with Richmond · Airport · Vancouver Rapid Transit (Canada Line)

3) Routing changes for existing routes

4) New routes

5) Maximize potential for faster transit trips on high capacity services.

With 56% of Vancouver residents and 72% of UBC residents already using transit at least once a month, the service improvements are intended to encourage these current customers to use transit more often, and to attract new customers.

The plan intends to meet a 20% increase in demand on Vancouver and UBC routes outside the Canada Line corridor within the next five years. Much of the system is currently operating at or near capacity and there is significant latent demand as a result. The region's computer transportation model projects a 16% increase in Vancouver and UBC bus demand over this period; however, the model is not capacity constrained and so already estimates bus ridership to be significantly higher than it is today, potentially indicating latent demand.

TransLink's current 2005-07 Three-Year Plan projects region-wide bus boardings to increase by 13.9% between 2004 and 2007, an average of 4.6% per year. The effects of U-Pass expansion and the

already high propensity for Vancouver and UBC residents to use transit suggest Vancouver and UBC ridership will continue to increase at a significant pace.

As part of the improvement strategy, the Plan recommends the creation of a new type of intermediate capacity bus service, between full-size buses and Community Shuttle minibuses. These services are dubbed City Shuttle and would use commonly available mid-sized low-emission, low-noise, low-floor buses. Alternative fuel models are also available. These routes would be an integral part of the Vancouver and UBC transit network serving areas of intermediate demand.

The full impact of the Plan is summarized in Exhibit 6-1.

Exhibit 6-1 Summary of Vancouver and UBC Area Transit System Performance and Resource Requirements

Measure	2004	2010 projection	Change
Route kilometres in City of Vancouver			
Bus and City/Community Shuttle	438	446	+1.8%
Accessible bus (wheelchair and bike rack)	251 (57%)	446 (100%)	+78%
Rapid Transit (SkyTrain and Canada Line)	10.9	21.8	+100%
Population with walk access (% of total population)			
to 10-minute or better peak bus service (450 m)	513,000 (88%)	618,000 (99%)	+21%
to a rapid transit station (1 km)	121,000 (21%)	216,000 (35%)	+79%
Peak vehicles			
Conventional buses	387	428	+10.6%
City/Community Shuttle	8	26	+325%
Rapid transit cars (full system)	180	246	+37%
Annual service hours (thousands)			
Bus	1,707	2,044	+19.7%
Rapid Transit (SkyTrain and Canada Line, **train-hours**)	100,000	165,000	+65%
Annual boardings (millions)			
Bus (inc. B-Line and Community Shuttle)	101.6	121.9	+20%
B-Line	11.8	16.5	+40%
Rail rapid transit (SkyTrain and Canada Line)	34.2	68.4	+100%
Annual bus passenger-km (million)	424.9	442.9	+4.2%
Bus Financial and Efficiency Measures			
Annual bus operating costs (millions)	$133.2	$156.7	+17.6%
Bus Boards/Bus service hour	59.5	59.8	+0.5%

6.4 Improvements to Existing Services

6.4.1 Bus Routes

The plan recommends improvements to existing services to meet current and future demand based on service monitoring, customer comments, U-Pass expansion, new land developments and rapid transit lines, and other anticipated projects, that induce or reshape demand.

The core route network will be simple to understand and offer a consistent and frequent service. The following Exhibit indicates the frequency of service that the Plan proposes be in place on existing Vancouver and UBC local routes by the end of 2010.

Exhibit 6-2 Proposed Vancouver and UBC Route Frequency Standards

Time period	Primary local routes	Secondary local routes
Peak periods	10 minutes or better	12 minutes or better
Midday (weekday and weekend)	10 minutes or better	15 minutes or better
Early evening (until 9:30 p.m.)	15 minutes or better	20 minutes or better
Late evening (after 9:30 p.m.	20 minutes or better	20 minutes or better

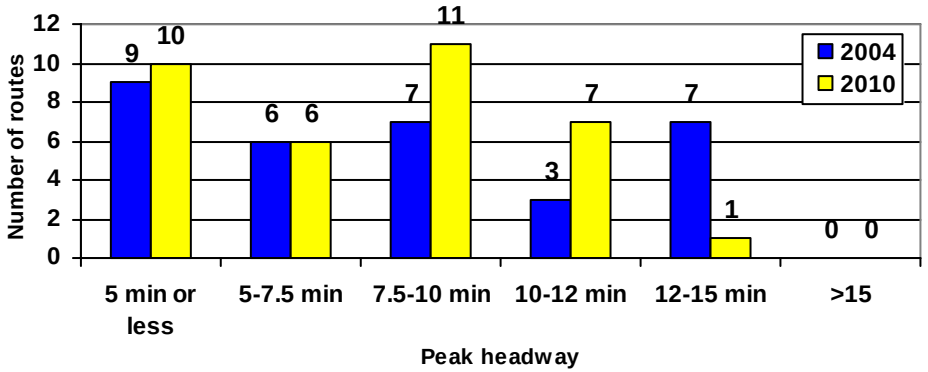
(Secondary local routes include the #25, #26, #27, #28, #29, #50 and #100.)

These changes will bring all local routes up to or beyond the 10-minute service levels targeted for major routes in TransLink's 10-Year Outlook and will help ensure that transit is an attractive travel option during off-peak hours, responding to the growth in travel demand in these periods.

Initially, improvements to existing routes will focus on compliance with the Comfort component of the Transit Service Guidelines, during both peak and off-peak periods. On more frequent routes, the changes in service may be hard to perceive in terms of reduced waiting time but will result in greater comfort and reduced potential for pass-ups. (For example, increasing service from every 6 minutes to every 5 minutes will reduce the average waiting time by only 30 seconds but represents a significant 20% increase in capacity.) These improvements will be based on buses operating, on average, at no more than 90% of their guideline capacity in the peaks and 85% of capacity in off-peaks. This will help provide a measure of robustness to account for uneven loadings and demand surges.

Exhibit 6-3 illustrates the effect of the proposed service increases, also taking into account new and discontinued routes (e.g. #98 B-Line).

Exhibit 6-3 2004 and Proposed 2010 Peak Headways on Vancouver and UBC Routes



(Note: The ranges are best explained by example, e.g., services in the "7.5-10 min" range operate less often than every 7.5 minutes but at least as often as every 10 minutes.)

With the introduction of a permanent APC system, now in progress, continuous monitoring of service demand will be possible. TransLink and Coast Mountain Bus Company (CMBC) will review this data regularly to determine where service needs to be added and if there are any route segments that are under-performing.

Accessibility

The entire transit network in the City of Vancouver and UBC will become fully accessible by 2008, once the new low-floor trolley fleet, which begins arriving in 2006, has replaced the existing fleet of non-accessible high-floor trolleybuses. This will add 188 km of accessible route to the 250 km already in operation. The plan also includes service improvements on many of the trolley routes to respond to the slightly lower per vehicle capacity of the low-floor fleet. Additional service changes will take into account the increased per vehicle capacity of the articulated trolleybuses to be delivered in 2008.

6.4.2 SkyTrain

TransLink has received a capacity study of the transit system that addresses whether SkyTrain has adequate capacity to meet current and future demands, the key SkyTrain-related issue within Vancouver. This study will be finalized shortly before the Vancouver and UBC Area Transit Plan.

The next planned increase in SkyTrain service will be in 2009, when 34 additional Mark II cars are to begin entering service to increase capacity.

As noted in Chapter 4, the SkyTrain Expo line is well utilized and experiences very high loads in the peak periods. Broadway/Commercial station has become a major hub in the system because of its relationship with the #99 B-Line service and is the maximum load point for SkyTrain. Bus route proposals for the next five years are cognizant of the limitations for further growth in passenger volumes at the busiest stations.

Commercial Drive SkyTrain station is part of the major transit hub at Broadway and Commercial

6.4.3 SeaBus

Linking Waterfront Station in downtown Vancouver to Lonsdale Quay in North Vancouver, the SeaBus passenger ferry provides a vital link in the regional transit system. TransLink's Ten-Year Outlook plans for the introduction of a third SeaBus vessel in 2009 to add capacity as North Vancouver's Lower Lonsdale Regional Town Centre grows and to provide some relief for the existing vessels, which have now been in service for 28 years.

6.4.4 West Coast Express

TransLink's West Coast Express commuter rail service operates from Mission to Waterfront Station in downtown Vancouver, a distance of 65 km. While West Coast Express has only one station in Vancouver, many of its passengers transfer to transit services reviewed in this plan at Waterfront Station to reach employment and education locations, such as Central Broadway and UBC. Construction of the Coquitlam light rail line is expected to divert some ridership growth from the West Coast Express and this effect will be reviewed in assessing the need for a sixth train. Committed West Coast Express improvements include additional and improved stations outside Vancouver, much expanded TrainBus service, and purchase of a spare locomotive.

6.5 Integration with the Canada Line

The Canada Line (formerly Richmond · Airport · Vancouver or RAV line) is scheduled to open in late 2009, introducing a high-quality north-south rapid transit service from the Waterfront Station intermodal transit hub to Richmond Centre and Vancouver International Airport, via the Cambie Street corridor.

The 19 km Canada Line will take passengers from Marine Drive to downtown Vancouver in 15 minutes

The Canada Line will add approximately 82,000 annual service hours of rapid transit service with the City of Vancouver. Taking into account the speed and capacity of the Canada Line, this is equivalent to about 310,000 annual service hours of bus rapid transit (based on #98 B-Line performance and vehicle capacity) or 515,000 annual service hours of standard local bus service (based on Vancouver and UBC averages). On opening day, the Canada Line will represent a six-fold increase in people-moving capacity over the current #98 B-Line service within Vancouver.

The majority of Canada Line passengers will use the line within Vancouver. 69% of the 122,000 weekday boardings predicted in 2010 will be at Vancouver stations, with the Waterfront and Broadway-City Hall stations being the busiest in the system.

The overall effect of the Canada Line on bus usage within Vancouver and UBC is expected to be an increase in demand for east-west service connecting to the line and a decrease in demand for north-south service along and near the Canada Line corridor as customers adjust their travel patterns to make use of the time savings and frequency offered by the new line. Overall, an increase in bus boardings is anticipated given that most of the Vancouver and UBC resident population is not within walking distance of a Canada Line station and the increased connectivity and faster travel times offered by the line will attract new riders to transit. This is consistent with the experience gained from the Expo and Millennium lines.

The Plan proposes changes to existing services, to respond to changes in travel patterns induced by the Canada Line, as well as some new services to enhance connectivity to the new rapid transit line, such as a B-Line on 41st Avenue and a neighbourhood-oriented service to connect the line to the major hospitals near the Cambie corridor.

6.5.1 Canada Line Bus Integration Route Changes

The opening of the Canada Line in late 2009 will require significant changes to routes in central Vancouver to provide connections, reduce duplication and match service to demand. A range of changes to routes and service levels is proposed.

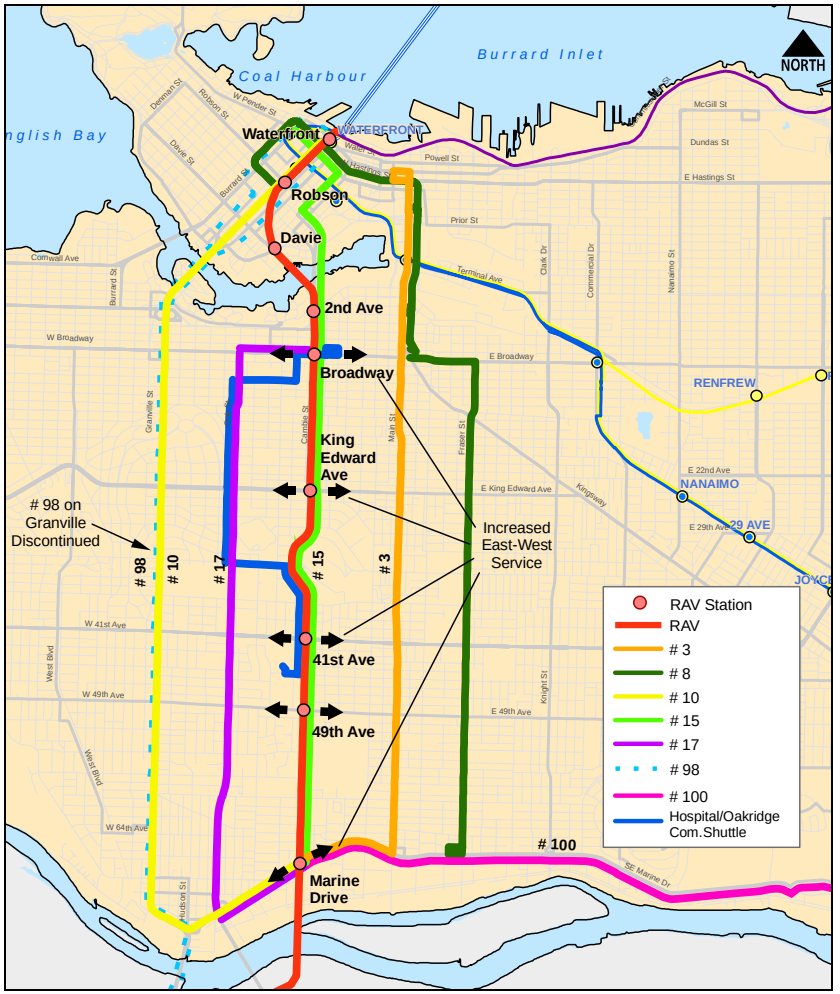
Projected Frequencies

Exhibit 6-5 Projected Headways on Routes to be Integrated with the Canada Line

Route	AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
#3 Main (to Marine Dr Stn)	6	8	8	12-15
#8 Granville (to Marine Dr Stn)	7	8	8-10	15
#15 Cambie (City Shuttle)	10	10	10-12	15-20
#17 Oak (to Marine Dr Stn)	10	10	12-15	15-20
#100 22nd St Stn – Marine Dr Stn	10	15	15	20
Oakridge/Hospitals/Broadway City (or Community) Shuttle	12	15	15	20

These changes represent essentially no change in total service hours between 2008 and 2009, for the routes shown. This is largely due to extensions of routes to the Marine Drive Canada Line station, a significant service level increase on the local Granville and Marine Drive services, and the introduction of a new City Shuttle route. (The calculation also includes the remnant UBC-downtown segment of the #17, to be combined with the #10 Hastings). If the cancellation of the #98 B-Line is included, the net result is a savings of 95,000 Annual Bus Service Hours in the Canada Line corridor. Offsetting this reduction is increased service on east-west routes, included as part of the plan's general service frequency increases.

Exhibit 6-4 Canada Line Bus Integration Route Changes



Discussion

Corridor by corridor, the Canada Line-related changes are summarized as follows:

Cambie: Cambie bus passenger boardings are forecast to decline by at least 50% from 9,700 per day to fewer than 5,000 per day; the passenger kilometres travelled will fall even more as buses are used primarily for short trips between the six Canada Line stations on Cambie. Most #15 riders will likely switch to Canada Line given that 78% of #15 Cambie bus boardings occur at bus stops within three

The "City Shuttle" buses to be used on Cambie once RAV opens will be low-floor, low-noise and low-emission medium sized buses.

blocks of a planned Canada Line station. The projected market for local bus service will be people whose origins and destinations are between stations and seniors who may have difficulty in walking to Canada Line stations. The existing 12-metre trolley vehicles have capacity for up to 60 persons (55 with the new low floor models), which will be underutilized following the opening of the Canada Line. Continuation of the full-size trolleybus service would support a bus every 15 minutes during the daytime and would be the lowest used trolley route in the system. Given the considerable investment that trolley overhead and the new vehicles represent, the Plan proposes a new service model for the Cambie corridor that would permit more frequent service than had been assumed in earlier Canada Line related studies or plans.

The choice of vehicle and level of service operating on the Cambie corridor are influenced by the RAV and the proposed new cross town route that will operate on the busier portion of Cambie between 16th Avenue and 33rd Avenue (see page 6-25) and overlap the Cambie St. service. The use of smaller mid-size vehicles (8 to 9 metres in length with capacity for about 35 persons) for the Cambie corridor would provide a more economic service providing a higher frequency for customers (a bus every 10 minutes during the daytime) with service to the downtown. Therefore, the plan proposes that TransLink consult with the residents within walking distance of bus service (450 m) on the Cambie corridor to review the opportunities for introducing a new vehicle type and more frequent service. The intent of this consultation process would be to explore the potential of using a smaller low emission, low noise vehicle instead of a trolleybus service, and make a decision by the end of 2006 so that vehicles could be procured, or alternatively adjustments could be made to the overall plan in regard to trolleybus allocations. The proposal to use a new vehicle type allows trolleybuses to be deployed to other routes where their greater capacity is more useful. Within downtown, the Cambie route is proposed to follow Hamilton and Pender Streets to a terminus at Pender and Burrard, minimizing overlap with the Canada Line station at Robson.

In support of this recommendation, information on service provision and utilisation was obtained from the Toronto Transit Commission (TTC) for two bus routes that operate in parallel to subway service in corridors that are more densely developed than Cambie. The routes reviewed were the #97 Yonge on Yonge Street, between Eglinton Avenue and Finch Avenue, and the #85 Sheppard East on Sheppard Avenue between Yonge Street and Don Mills Road. The findings of this comparison are shown in Exhibit 6-6.

The conclusion from this review is that the service level proposed for Cambie is appropriate, even generous, given the comparability of the level of service proposed and the subway station spacing in comparison with two more intensely developed corridors in Toronto.

Exhibit 6-6 Comparison with Toronto Transit Commission Routes for Future Cambie Street Service Levels

Factor/Route compared	TransLink #15 with Canada Line (proposed)	TTC #97 with Yonge subway	TTC #85 with Sheppard subway
Segment compared	Broadway-Marine	Eglinton-Finch	Yonge-Don Mills
Distance (km)	5.9	8.2	5.4
Average subway station spacing (km)	1.5	1.7	1.4
Peak bus headway (minutes)	10	15	15
Midday bus headway (minutes)	10	15	20
Peak hour bus capacity	210 (35/bus)	220 (55/bus)	228 (57/bus)
Peak hour, peak point riders	n/a	105	183

Oak: The #17 Oak will be extended at the south end to the Marine Drive Canada Line station but shortened at the north end to terminate at the Broadway-City Hall Canada Line station. This change reflects the large transfer anticipated at the Broadway-City Hall station as customers opt for the faster Canada Line service to reach downtown. This will isolate the two current legs of the #17 route so one option would be to combine the Tenth-UBC portion of the current #17 with the Hastings portion of the current #10 to become the #10 Tenth-UBC/Hastings.

Granville: The #8 (ex-#10) Granville will be extended to the Marine Drive Canada Line station, to provide a frequent connection between the Marpole area and the Canada Line. With the removal of the #98 B-Line from Granville, the frequency of the Granville local service will be increased significantly. This frequent local service will justify continued transit priority measures. Given the increased local service levels on Granville, this route could be interlined with the #8 Fraser to create the #8 Fraser/Granville.

Main: The #3 Main route will be extended to the Marine Drive Canada Line station. No changes in service levels are proposed since the introduction of articulated buses on the #3 in 2008 will have already reduced frequencies and there is a need to maintain an attractive service on this major corridor. Additionally, there is extensive local traffic on the Main Street route and these riders are likely to continue using the #3 service.

Marine Drive: With the #8 Granville connecting Marpole to the Canada Line, and the Canada Line providing fast and frequent service to Richmond and the Airport, the #100 will terminate at the Marine Drive Canada Line station. Service levels on this route will be significantly improved.

Oakridge/Hospitals City Shuttle: This new route (proposed C17 on page 6-35) would be introduced with the opening of the Canada Line to enhance connections with destinations just off the Cambie corridor and to improve seniors' mobility. This could be operated either with Community Shuttle minibuses or City Shuttle midibuses, depending on the route. See the discussion of the concept on page 6-34 for details.

Issues

Infrastructure

- A transit priority review of bus operations on SW Marine Drive should be undertaken to ensure that buses from Main, Oak and Granville can reach the station with minimal interference from traffic congestion.

- A major bus terminal is planned at the Marine Drive Canada Line station to accommodate the proposed services.

- Additional trolley overhead will be needed along Marine Drive and within the Marine Drive Canada Line station bus terminal to accommodate three terminating trolley routes. Much of the required wire will already be in place for buses travelling to and from the Vancouver Transit Centre at Hudson Street and SW Marine Drive.

- A potential on-street loop for the #17 Oak trolleybus has been identified near the Broadway-City Hall Canada Line station.

Alternatives

A range of alternatives for integrating the bus network with the RAV were considered and are not supported for the following reasons:

- Continue trolleybus service the length of Cambie: Demand is inadequate to justify full-size buses and the investment in replacing the trolley overhead after Canada Line construction. High-capacity trolleybuses are better deployed to higher demand routes.

- Terminate the #8 Fraser at Broadway Canada Line station: Demand on the existing route via Main Street is too high to allow rerouting and the capacity the #8 currently provides between Chinatown and downtown helps permit the shortening of the #3 Main as proposed on page 6-14.

- Maintain the #98 B-Line on Granville: Too closely parallels the rapid transit service on Cambie and would be an inefficient use of resources. Local service on Granville is relatively fast and could be made faster with some stop respacing and transit priority.

Public Response

There was considerable interest in the Canada Line bus integration proposals. Public comments generally supported the changes proposed, although there were some concerns with the original

proposal of maintaining trolleybus service on Cambie only between downtown and King Edward Canada Line station, requiring a transfer to a Community Shuttle at King Edward if riding through this point on the Cambie local service.

There was significant concern about any loss of service on Main resulting from the Canada Line line.

A majority of participants at the workshop preferred to terminate the #17 at the Broadway Canada Line station. Since many participants generally preferred to split the two legs of the #17 route (Oak Street and Tenth-UBC segments) to improve service reliability, the Canada Line integration at Broadway provides an opportunity to do so.

There was general disagreement on whether to terminate the #8 at the Broadway Canada Line station or to keep the route as it is now. The general concern expressed was the additional time, inconvenience, and discomfort induced by having to transfer to get Downtown (via the Broadway Canada Line Station on Cambie) or Chinatown (via the often crowded #3 Main). Other participants saw the potential redundancy in service by retaining the Downtown segment of the #8.

6.6 Changed Routes and New Routes

6.6.1 Introduction

The Plan evaluated a number of new and modified bus routes for the Vancouver and UBC area. These originated from various sources, including previous TransLink, City of Vancouver and UBC plans, public comments, transit operating staff and the Plan team. A review of the options and their ability to meet the goals described earlier, including assessments by the public, resulted in the recommended new routes and significant route changes. These are summarized in the remainder of this section, roughly in the order in which they could be implemented. The proposed implementation sequence is presented on page 6-46.

In some cases several alternative options were generated, and these are mentioned along with the rationale for the recommended option. Service concepts may be have been rejected due to one or a combination of the following factors: inefficient use of resources, lack of public interest, operational restrictions, or poor ridership estimates.

The service frequencies and hours indicated for new routes are those, which would be in effect by late 2009, when the Canada Line opens. Routes introduced earlier may have service “ramped up” from lower levels as ridership matures. Vehicle requirements and annual service hours are based on year of introduction requirements, to facilitate net change comparisons.

6.6.2 Main Street Local, Chinatown Terminus

This proposal concentrates service on the most used portion of the #3 Main route while eliminating the underutilized direct service to downtown. This change should improve reliability on the #3 and allow resources to be reinvested in more frequent service on this and other high demand routes. SkyTrain and many other bus routes provide convenient connections for downtown trips. (The 2009 extension of the route to the Marine Drive Canada Line station is discussed under the Canada Line-related bus changes.)

Exhibit 6-7 Shortened #3 Main with Chinatown Terminus

Frequency and Hours

Vehicle type	AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
12 m trolley (to 2008)	4-5	6	7	10-15
18 m trolley (in 2009)	6	8	8	12-15

	Weekday	Saturday	Sunday
First trip	5 a.m.	5 a.m.	6 a.m.
Last trip	1 a.m.	1 a.m.	1 a.m.

This concept would replace 27 peak standard trolleybuses with 19 peak standard trolleybuses initially, and 13 articulated trolleybuses once this fleet is available. With articulated trolleys, there would be a net saving of 38,000 annual service hours.

Route

Shortens #3 Main route by deleting the Chinatown – Downtown segment. Service would operate from Main and Marine to Hastings, looping via Hastings, Columbia, Cordova, and Main.

Key Destinations

Chinatown, Science World, Pacific Central Station, South Main, Central Main, Punjabi Market.

Connections

SkyTrain Expo Line, Canada Line and local and suburban bus routes. Proposed City of Vancouver downtown streetcar.

Issues

Infrastructure

- Route will take advantage of Main Street Showcase infrastructure such as bus bulges, signal priority, real-time information, and enhanced bus stop facilities.
- Requires a new trolley right-turn wire from westbound Hastings to northbound Columbia for preferred looping. The City of Vancouver's proposed downtown streetcar would also use Columbia so coordination with this project's street changes will be required.

- A turning loop in the vicinity of 41st or 49th Avenues is required to increase scheduling and operational flexibility.

Other

- Main Street customers wanting an all-bus trip to downtown would need to transfer; however most customers currently transfer to/from SkyTrain at Main Street Station for downtown access and ridership between Chinatown and downtown is relatively light.

- All-door loading would be beneficial southbound at Main Street Station to keep dwell times manageable.

- When articulated trolleys are introduced on the #3 (2008) average customer wait times will increase slightly. Shortening the route will make it easier to maintain frequent service.

- Route reliability should be increased due to the shorter route and avoidance of the congested downtown area.

Alternatives

Continuing service to downtown would be the primary alternative but would perpetuate duplication in a well-served corridor. The APC data on stop activity shows that the majority of customers are transferring at Main St. SkyTrain station. Those that board northbound at Main St. Station are mostly alighting in Chinatown.

Public Response

Public opinion was somewhat split, though most people thought shortening this route was sensible based on their experiences. Those opposed did not appreciate the forced transfer to reach downtown and this concern will likely be raised upon implementation.

Concerns were expressed about terminating the #3 at Main/Hastings. The respondents were concerned for their personal safety if they need to make a transfer at Main/Hastings, that reducing service in the Downtown Eastside will hurt revitalisation efforts, and that the route should at least go to the Waterfront Station hub.

The market research analysis found that this route proposal is popular and generates a potential for additional trips. Of all residents responding to this option 79% of residents in the Main Street corridor indicated they would likely use it, as would 48% of East Vancouver residents.

6.6.3 Extend #22 to Dunbar Loop

Responds to neighbourhood safety and residential compatibility concerns regarding use of Carnarvon Street and West 39th Avenue for a bus turnaround. Also provides improved access to the 41st and Dunbar commercial area for #22 customers.

Frequency

This change will not result in any changes in scheduled frequencies or times but will require 1 additional peak bus and 4,900 Annual Service Hours.

Route

Extends the #22 Knight/Macdonald route from the current terminus at 41st and Carnarvon west on 41st to Dunbar Loop. Removes #22 from Carnarvon Street and West 39th Avenue.

Key Destinations

Dunbar and 41st commercial area.

New Connections

#7 Dunbar/Nanaimo Station, #32 Dunbar Downtown, #49 UBC/Dunbar Loop/Metrotown Station

Issues

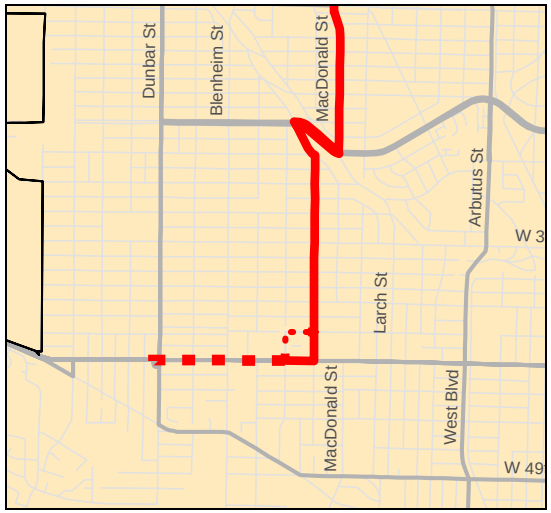
Infrastructure

- Terminus capacity at Dunbar Loop.
- Left turning ability from eastbound 41st to northbound Mackenzie.
- Transit priority measures on 41st (e.g. westbound bus lane approaching Dunbar in a.m. peak) would be beneficial due to congestion.

Alternatives

TransLink, CMBC and the City extensively reviewed a range of alternative extensions of the #22 route but found to be less desirable.

Exhibit 6-8 #22 extension to Dunbar Loop



- An extension to Kerrisdale, while likely more beneficial to customers, was considered undesirable due to traffic congestion and the lack of a good turnaround location.

- Alternative loops on residential secondary arterial or collector streets would perpetuate residential impacts and require excessive one-way service.

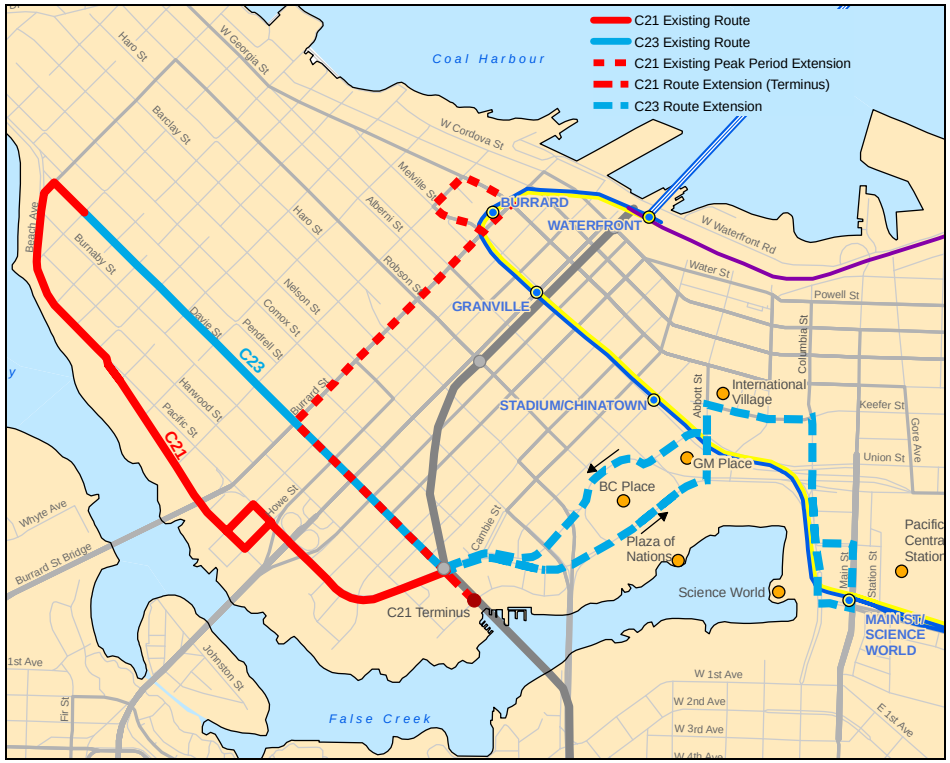
Public Response

Residents on the existing #22 terminal loop on Carnarvon Street and West 39th Avenue strongly favoured extending the route to Dunbar Loop.

6.6.4 Extend C23 to Main Street Station

Extending the C23 to Main Street Station responds to a common request to provide direct service to International Village, Chinatown and Main Street Station from the south West End and Yaletown areas. It will also provide improved service coverage to an area that is currently experiencing rapid redevelopment and test the market of one of the City's proposed streetcar routes. Options for rerouting the north-south portion of the C21/C23 route from Burrard Street to the east side of downtown should be reviewed in the future.

Exhibit 6-9 Extension of C23 to Main Street Station



Frequency and Hours

AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
10	10	10-15	15

	Weekday	Saturday	Sunday
First trip	6 a.m.	8 a.m.	9 a.m.
Last trip	9:30 pm	9:30 pm	9:30 pm

As part of this change, evening service would be introduced on the C21 and C23. This concept would initially require a net increase of 2 peak buses and 15,000 Annual Service Hours.

Route

Extends the C23 Davie/Yaletown Community Shuttle to Main Street Station and return via Pacific/Expo Boulevards, Abbott Street, Keefer Street, Columbia/Quebec Street, National Avenue, Main Street and Terminal Avenue. Review future potential reroute of C21 from Burrard to Homer or Cambie streets.

Key Destinations

Plaza of Nations, BC Place, GM Place, International Village, Chinatown, Science World, Pacific Central Station.

Connections

SkyTrain Expo Line, Canada Line, local and suburban bus routes.

Issues

Infrastructure

- Bus stops required on extended part of route.
- Need to identify a terminus in the Main Street Station vicinity.
- Community Shuttle vehicles (van cutaways) will likely be too small to meet demand on the C21/C23 routes, especially once they connect with Canada Line at Pacific and Davie. Larger midibus "City Shuttle" vehicles are proposed for this route by the time the Canada Line opens.

Other

- Re-routing options for the C21's Burrard Street service should be explored once traffic conditions have stabilized following the City's conversion of some one-way streets on the east side of downtown to two-way streets. Either Homer or Cambie streets could be good candidates for all-day north-south service if travel times are reasonable and reliable.
- The route could remain on Pacific and Expo boulevards, rather than routing via Keefer Street, but significant destinations such as Stadium-Chinatown SkyTrain Station, International Village and Chinatown would be less well served.

Alternatives

Extension to just the Stadium SkyTrain/International Village area could be achieved with the addition of one peak bus but would provide less direct service for some customers.

Public Response

The original consultation work for the Beach/Yaletown Community Shuttle (C21 and C23) included many requests for a service connecting the West End, Yaletown, International Village and the City Gate development. Evening service, at least until downtown stores close, was also a popular suggestion. This proposal addresses those requests, which were echoed through the public process.

The City Gate residents' association supports a service connecting them to Yaletown.

6.6.5 UBC Community Shuttle (New C18 and C19)

Pilot two Community Shuttle routes at UBC to respond to growing residential development and the new below grade transit terminal. Also provides improved access to the various cultural and recreational facilities not currently served by transit. Routings and destinations served to be subject of detailed design in late-2005.

Frequency and Hours

AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
15	15	15	20

	Weekday	Saturday	Sunday
First trip	6 a.m.	8 a.m.	9 a.m.
Last trip (C18)	9:30 p.m.	9:30 p.m.	9:30 p.m.
Last trip (C19)	1:00 am	1:00 am	12 am

Requires 4 peak Community Shuttles and 20,500 Annual Service Hours (assumes routes are interlined).

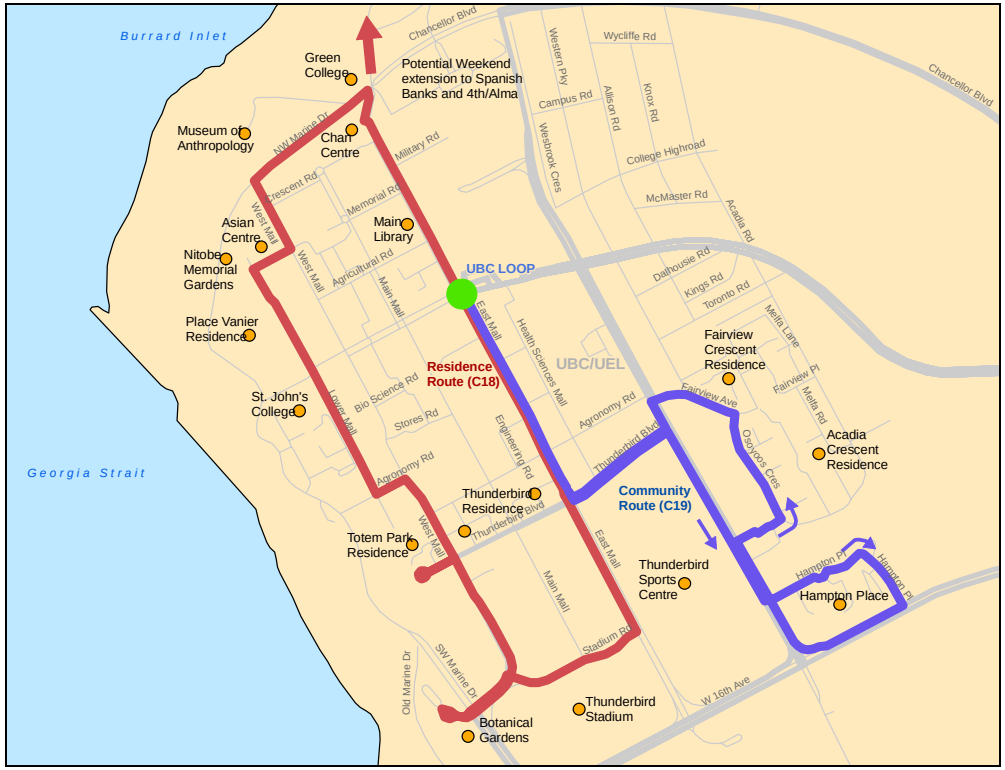
Routes

C18 (Red on Exhibit 6-10) begins at the surface level of the UBC transit terminal and travels via East Mall to Stadium Road, UBC Botanical Gardens Stadium Road, West Mall, Agronomy Road, Lower Mall, Memorial Road, West Mall, Northwest Marine Drive then East Mall back to the transit terminal.

C19 (Blue on Exhibit 6-10) begins at the surface level of the UBC below grade transit terminal and travels via East Mall to Thunderbird Boulevard, Wesbrook Mall, Hampton Place, West 16th Avenue, Wesbrook Mall, transit-only access, Osoyoos Crescent, Fairview Crescent, Wesbrook Mall, Thunderbird Boulevard and West Mall back to the transit terminal.

The routes indicated are conceptual only and will be subject to consultation in late-2005. Consideration will need to be given to phasing of future developments on campus and the potential to operate the C19 route on weekdays only, with the resources used on weekends (when #25 and #41 service is less crowded) to provide a Spanish Banks and Jericho Beach service, connecting with regular bus service at 4th and Alma.

Exhibit 6-10 Conceptual C18 and C19 UBC Community Shuttle Routes



Key Destinations

C18: UBC transit terminal, Thunderbird Residence, Thunderbird Stadium, UBC Botanical Gardens, Totem Park Residence, St. John's College, Place Vanier Residences, Nitobe Memorial Gardens and Asian Centre, Museum of Anthropology, Green College, Chan Centre, and Main Library.

C19: UBC transit terminal, Thunderbird Residence, Fairview Crescent Residence, Acadia Park Residence, Hampton Place, and Thunderbird Sports Centre.

Connections

Local and regional bus routes at UBC Loop.

Issues

Infrastructure

- On-street stops adjacent to UBC transit terminal.
- Requires transit-only access between Osoyoos Crescent and Wesbrook Mall, near RCMP.

Other

- Supports VanCity U-Pass and future UBC Community Pass.
- Need to resolve future of UBC's own fare-free shuttle service and integration with TransLink Community Shuttle service.

6.6.6 4th/6th Limited-Stop, VCC to UBC (New #46)

This new cross-town route connects Millennium Line SkyTrain riders to UBC, reducing pressure on Broadway services such as the #99 B-Line, and adds service to the currently unserved False Creek Flats and Southeast False Creek areas, which are slated for significant residential and employment-generating development. It will also provide Kitsilano and South False Creek residents with a direct connection to the 2nd Avenue Canada Line station, allowing them to continue connect to regional north-south service without travelling through downtown. This would be a limited-stop route between Cambie and Blanca and would make widely spaced local stops east of Cambie and west of Blanca, where there is not a parallel local service. The route would parallel the City's proposed streetcar between Quebec and Granville streets.

The bus operators' focus group suggested that this route should terminate at VCC Station rather than Broadway Station because of the bus crowding at Broadway/Commercial Station and the desire to offer an alternative to passengers on the Millennium Line.

This proposal, along with the plan's three other proposed new east-west routes, is mapped on Exhibit 6-11 and the service characteristics are given in Exhibit 6-12.

Exhibit 6-11 East-West Route Proposals (#33, #46, #91 and #95)

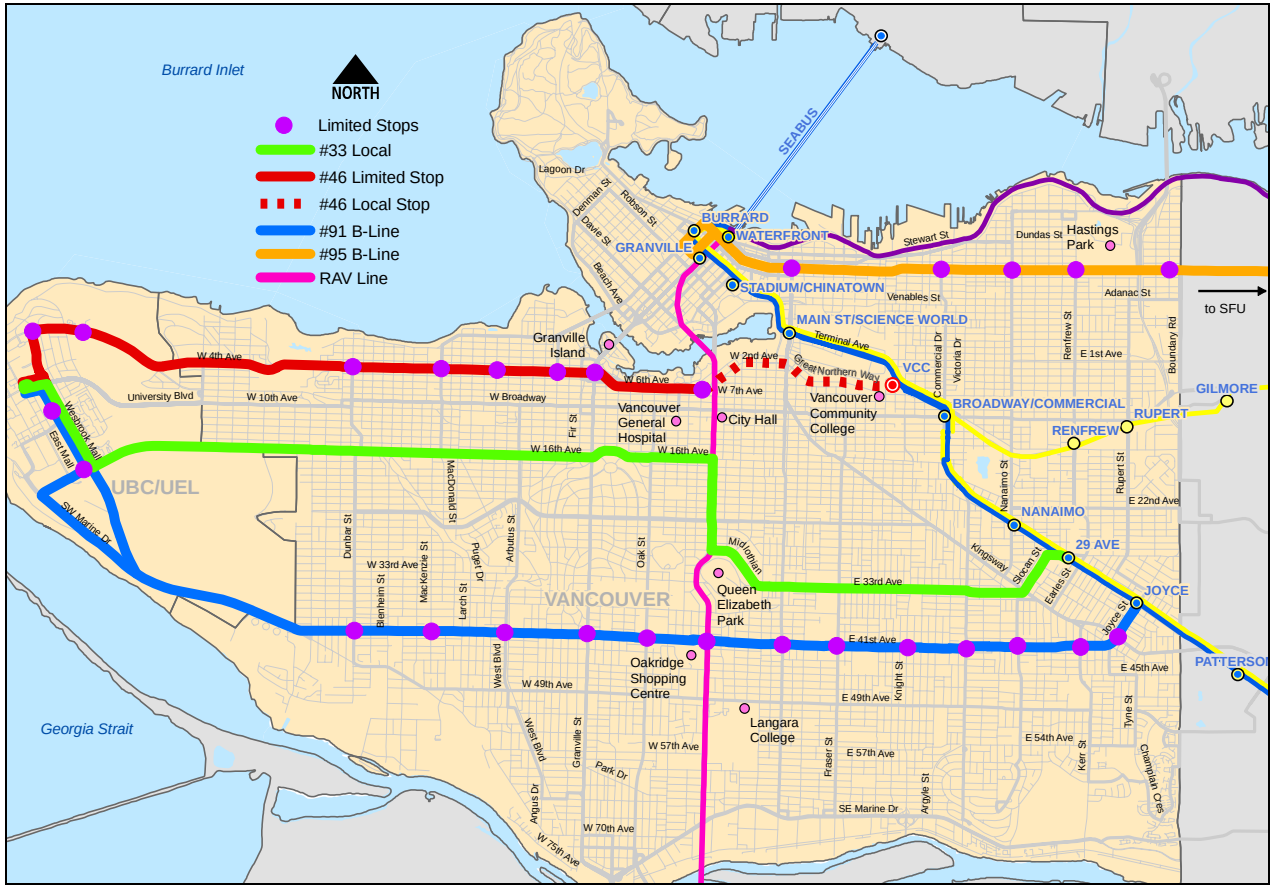


Exhibit 6-12 Service Frequencies and Hours for East-West Route Proposals (#33, #46, #91 and #95)

Route	Headway (minutes)				First/Last Trips			Net requirements	
	AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)	Weekday	Saturday	Sunday	Annual Service Hours	Buses
#33 16th/33rd local	7.5	10	12-15	15-20	6 am – 1am	7 am – 1am	8 am – 1 am	48,000	10
#46 4th/6th limited	7.5	10	12-15	15	6 am – 1 am	7 am – 1 am	8 am – 1 am	27,700	9
#91 41st B-Line	5	10	10	15	6 am – 12 am	7 am – 12 am	8 am – 12 am	41,000	1
#95 Hastings B-Line	6-7.5	10	10-12	12-15	5 am – 1:30 am	6 am – 1:30 am	7 am – 1:30 am	6,000	0

Net of reductions on the #99S, this concept requires 9 standard low-floor peak buses and 27,700 Annual Service Hours. It would release 3 articulated buses from service on the #99S.

Route

This limited-stop service would operate between the Millennium Line terminus at Vancouver Community College Station through the Mount Pleasant, Fairview, Kitsilano, and West Point Grey neighbourhoods, to UBC, via E 6th Ave, Great Northern Way, W 2nd Ave, W 6th Ave, W 4th Ave, and Chancellor Boulevard.

Key Destinations

Vancouver Community College, Great Northern Way Campus (UBC, SFU, BCIT, Emily Carr) Granville Island, Burrard Slopes commercial and employment area, W 4th Ave shopping area, and UBC.

Connections

SkyTrain Millennium Line terminus at VCC, Canada Line at 2nd Avenue and local bus routes.

Issues

Infrastructure

- Adds new bus service to 6th, 2nd, Great Northern Way between Hemlock St. and Keith Dr.
- Requires new bus loop at VCC Station.
- Terminus capacity at UBC.
- Transit Priority Measures recommended at major intersections and in 4th Ave commercial area.
- A westbound to southbound left-turn bay at 4th and Alma may provide benefits for this service, as well as the local #4 service, and has been suggested by the City. The potential benefits of this facility should be reviewed further at the technical and community level.

Public comment: "Need priority measures along 4th Ave (dedicated bus lanes, bus bulges) buses are too slow through this section."

Other Implications

- Should attract some current riders from the #99 B-Line (limited-stop) and #99S (non-stop), especially those transferring from the Millennium Line. A slight reduction of #99S morning service, and elimination of the under-used afternoon service has been assumed. Further

review of ridership projections will be needed to see if #99 B-Line service can be reduced as a result of this route.

- Would permit #44 to be rerouted to Cornwall, Point Grey Road, Macdonald, by-passing the often congested West 4th Ave business area, and adding another service onto Cornwall for both UBC and downtown trips. Capacity is observed to be an issue in peak periods along Cornwall (#2, #22) and the #44 will provide an alternative to customers in the area.

Alternatives

None, other than increasing #99 B-Line service on Broadway to meet SkyTrain-UBC demand.

Public Response

All sources of public input agreed that this route would fill a service gap between Granville Street and Clark Drive.

Public comment: "I like it! Relieves congestion on Broadway/Commercial Stations, and eases the current problem of too many passengers on 99 UBC and 99 UBC Special at am peak periods."

While not universally ranked as the highest priority by all groups, including UBC, many people remarked that it provided a needed connection to the VCC station opening in January 2006. While the route will not reach its full potential until redevelopment in the Great Northern Way to 2nd Avenue corridor is complete, there will be ridership generated from the Millennium Line station itself.

This was the third most popular concept in the Market Research Study in terms of the number of trips it could generate. Interest in this service is very high among UBC/UEL residents (77%), Kitsilano residents (77%), and those living west of Main and in Downtown (43-45%). Of note, VCC draws demand in the PM peak for night classes more than during the midday.

29% of the 1700 people surveyed said they had some likelihood of using the service and that 43% of these would be new transit trips. While market research alone cannot reliably estimate ridership for a new route, it does provide a 'reality' check for the attractiveness of a proposed new service.

6.6.7 Hastings B-Line (New #95 B-Line)

Upgrade the #135 service to B-Line standards to provide faster, more reliable limited-stop service in the Hastings corridor between downtown Vancouver and SFU's Burnaby Mountain Campus. This change is programmed for 2007 in TransLink's Three-Year Plan.

See Exhibit 6-11 and Exhibit 6-12 (on page 6-23) for route map, service levels and resource requirements.

Route

The #135 route will remain essentially unchanged, operating from Burrard and Dunsmuir to SFU via Burrard, Hastings, Burnaby Mountain Parkway and SFU campus roads. The key change will be to the stopping policy in Burnaby, where the route will change from local stops to some form of limited stops.

Key Destinations

Downtown Vancouver, East Hastings commercial areas, Simon Fraser University.

Connections

Expo SkyTrain line, Canada Line, local and regional buses.

Issues

Infrastructure

- Will require additional transit priority measures on Hastings Street, such as bus lanes and/or queue jumpers, and traffic signal priority.
- Upgraded passenger amenities at bus stops, including enhanced bus shelters, at-stop information and real-time bus arrival displays will be needed to support B-Line brand.

Other

- Provision of continued local service on Hastings in Burnaby will need to be reviewed.
- APC data indicates that this route may not yet be at the productivity levels required of a B-Line. Additional review and/or changes to service design may be needed.

Alternatives

None considered as this change is already programmed through the Three-Year Plan.

Public Response

This concept was not formally consulted upon given the minimal change to service in Vancouver, aside from B-Line branding. However, it was mentioned in the context of combining the #4 Powell and #16 29th Ave Station and received favourable comments.

6.6.8 33rd Avenue/16th Avenue Cross-town (New #33)

This new local cross-town bus route is intended to fill gaps in the east-west transit network in Vancouver, provide improved access to SkyTrain and, in the future, Canada Line, and help address some capacity issues on parallel routes, especially UBC-related travel on the #25 King Edward and other routes on Broadway.

See Exhibit 6-11 and Exhibit 6-12 (on page 6-23) for route map, service levels and resource requirements.

Route

From 29th Avenue SkyTrain station via East 29th Avenue, Slocan St, East 33rd Avenue, Midlothian Avenue, West 29th Avenue, Cambie Street, West 16th Avenue, Wesbrook Mall, and University Boulevard to UBC Loop.

Key Destinations

Main Street "Antique Row", Riley Park Community Centre and 2010 Olympic venues, Nat Bailey Stadium, Queen Elizabeth Park, South Cambie, South Granville, UBC.

Connections

SkyTrain Expo Line, Canada Line, and local bus routes.

Issues

Infrastructure

- Terminus location at 29th Avenue Station.
- Adds bus service on East 33rd from Slocan to Ontario, on Midlothian/West 29th Avenue from Ontario to Cambie, and on 16th from Cambie to Dunbar. Stop spacing to be at least at the 250 m spacing identified in Transit Service Guidelines.
- Road widths on 16th in the Cambie to Granville segment should be reviewed. The hill westbound on 16th from Waterloo to Collingwood is steep (up to 15%) but not beyond hills found on other bus routes.
- On Street parking on Midlothian proposed as part of the Riley Park Master Plan may need review.

- UBC terminus capacity – additional service included for new loop, current temporary loop options to be confirmed.

- Service introduction is proposed for 2008, once cut-and-cover Canada Line construction on Cambie is complete.

Other

- This route serves one-third more residents (based on the population within 400 m of the route, per kilometre of route) than the #25 and could rapidly achieve the same level of ridership success, leading to a need for additional service. Initial service levels and budget estimates may need to be increased based on modelling results.

- Resident concerns about new/additional bus service are likely.

- Should help relieve some peak demand on the #9, #17, #25, #41 and #99 B-Line. Given persistent overcrowding on the #25 east of Dunbar, no immediate reduction on the #25 is recommended and this concept should be introduced as early as possible.

Alternatives

- An earlier proposal continued east on 16th Avenue to Main Street, then north to Main Street-Science World SkyTrain station. Given concerns about the road widths on 16th Avenue between Cambie and Main, this was identified as a difficult option to implement and was withdrawn. This alternative would also lack a Canada Line connection.

- Extending the #2 route to UBC via 16th, from its current terminus at 16th and Trutch, was discussed as a short-term improvement to address crowding on the #25. This was popular with transit operators and UBC. Caution is needed as this could over serve the market on 16th Avenue, given that service levels on the #2 are determined mainly by the high demand through Kitsilano, but this option should be considered if there are delays introducing the recommended concept.

- Operating the #25 with articulated buses could help address recurring pass-up issues and reduce the urgency of this concept.

Public Response

This route option was significantly modified after the initial public involvement phase but was well supported in the draft plan. Concerns about the route have, however, been raised by residents along the route, especially near the large hill on West 16th.

6.6.9 41st Avenue B-Line, Joyce-Collingwood to UBC (New #91 B-Line)

This proposed B-Line replaces the #43 and connects key destinations along the City's second busiest east-west bus corridor. The route responds to ridership patterns in the corridor by stopping only at transfer points and providing enhanced service to UBC. Previous plans have looked at extending the service to BCIT and/or Brentwood but a Joyce-Collingwood – UBC route is initially recommended.

See Exhibit 6-11 and Exhibit 6-12 (on page 6-23) for route map, service levels and resource requirements.

Route

From Joyce-Collingwood Station to UBC, via Joyce St, 41st Ave, SW Marine Drive, W 16th Ave (or future bus-only access), Wesbrook Mall and University Blvd. Stops located at transfer points only.

Key Destinations

Oakridge Shopping Centre, Kerrisdale shopping district, and UBC.

Connections

SkyTrain Expo Line, 41st-Oakridge Canada Line station, and local bus routes.

Issues

Infrastructure

- Need to provide B-Line stop amenities (distinctive shelters, real-time information, etc.)
- Terminus capacity at Joyce-Collingwood Station and UBC.
- Convenient stop locations at Joyce-Collingwood station need to be identified.
- Transit Priority Measures required at major intersections, in the Kerrisdale commercial area, and from east of Dunbar to the W 41st Avenue/SW Marine Drive intersection. Long-term transit priority needs and pedestrian accommodation in the Kerrisdale area will be an input to the City of Vancouver's review of building lines.
- Opening of the bus-only direct connection between SW Marine Drive and Wesbrook Mall, as proposed in UBC transportation plans, will improve travel times and route directness.

Other

- Demand on the Joyce-Collingwood - Brentwood segment, identified in previous plans, may not support full B-Line service levels, suggesting UBC-Joyce service only. (Joyce-Brentwood trip time needs to be less than 18 minutes to be faster than SkyTrain via Broadway-Commercial.)

- Would be introduced in conjunction with reduced frequency on the #41 local service. Weekend trips on the #41 would no longer extend to UBC, allowing weekend #41 service to be provided with electric trolleybuses.

Alternatives

- 49th Avenue was considered as an alternative route but destinations are fewer and travel time benefits are unclear. 41st has a much stronger nodal pattern of development that is well suited to a B-Line and currently handles twice the daily volume of transit passengers (24,500 vs. 12,700). Connections to SkyTrain from 49th are also less direct.

- Extension to BCIT/Brentwood could be considered in the future, as recommended in the Burnaby/New Westminster Area Transit Plan, but a more detailed review of demand is needed as there is already extensive service from SkyTrain stations in eastern Vancouver and western Burnaby to this area and streets are some streets are not suited to very high-volume bus service.

Public Response

There was general support for this proposal, with a number of comments for improvements:

- Bus-only lanes are needed to ensure adequate speed and reliability. Suggested locations include Kerrisdale and between Victoria and Granville.

- Add stops at Rupert and UBC hospital.

- #41 local service should not be reduced too much.

- All #41 trips should terminate at UBC.

The market research survey respondents rated this service concept second among those tested in terms of total volume of trips generated. Residents most interested in the concept live in UBC/UEL (59%), Burnaby/New Westminster (49%), and the City of Vancouver (46%). The concept would generate more new trips than all other concepts except one.

6.6.10 Combine the #4 Powell and #16 29th Ave Station

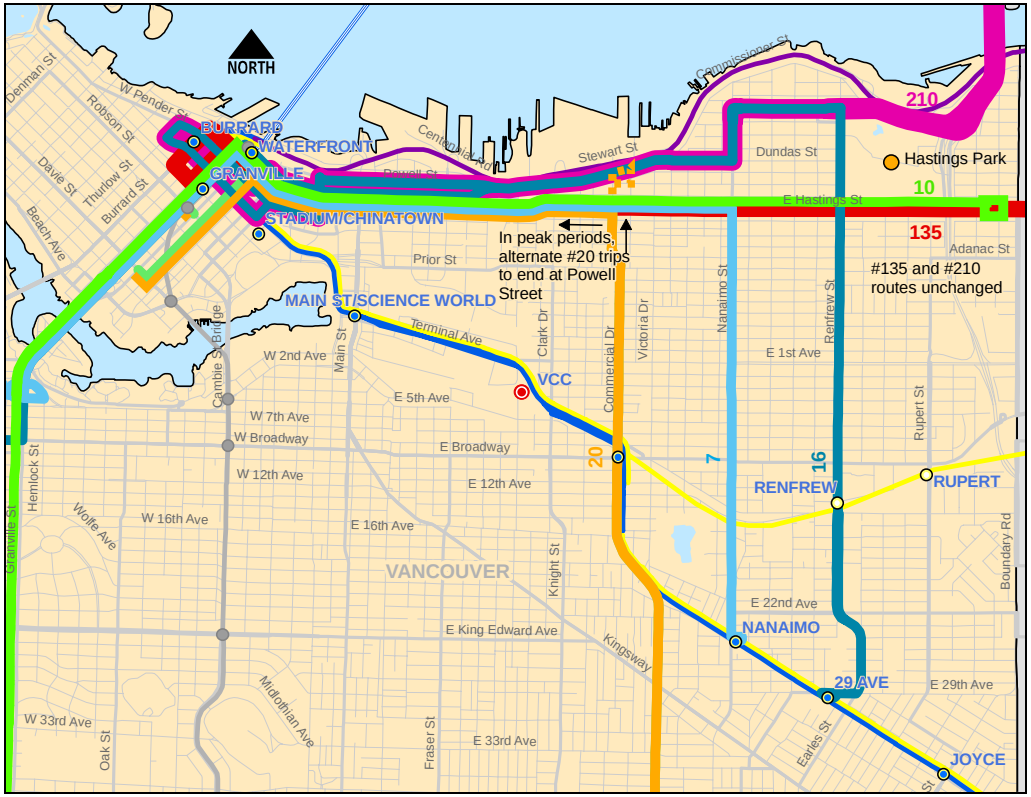
Currently Powell and Hastings streets are served by multiple local trolley and suburban diesel services. This results in more service being provided than is needed to meet demand. The plan recommends reconfiguring the trolley routes in this area to reduce duplication, provide a consistent network, continue trolley service and meet local travel demands. Introduction of service on Renfrew, between Hastings and McGill, would improve access to the redeveloping Hastings Park site, including 2010 Olympic venues.

Frequency

Route	AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
#7 Nanaimo	10	10	10	15-20
#10 Hastings	10	10	10	15-20
Hastings West of Nanaimo (7 & 10)	*5*	*5*	*5*	*7.5-10*
#16 Powell/Renfrew	8	10	10	15
#20 Victoria	6	6	6-7.5	10-15

This change would result in a net decrease of 8-9 peak trolleybuses and 20,000 Annual Service Hours. The savings will increase to an estimated 32,500 Annual Service Hours once articulated trolleybuses are introduced to the #20 route. (Note that these savings are net of improved peak and off-peak frequencies on the routes concerned.) The proposed upgrading of the #135 to a B-Line will also improve service in the Hastings corridor.

Exhibit 6-13 Revised East Side Routes for #4, #10, #16 and #20



Routes

The portions of the #4 and #16 routes east of downtown would be combined, such that the #16 would route via McGill and Powell streets rather than Hastings. Travel times from Renfrew to downtown would change little since McGill and Powell are less congested than Hastings. With the removal of the #16 from Hastings, #10 service to Kootenay Loop would operate through the evening. The #7 Nanaimo Station would be rerouted to Hastings, rather than Powell Street. This concept also includes terminating some daytime and peak #20 Victoria trips at Powell Street: Alternate trips on the #20 would

terminate at Commercial and Powell during periods when #20 service is at least every 10 minutes. This would allow more service to be provided on the busiest part of the #20 route. This would be supported by increased local and limited-stop (#95 B-Line) service on Hastings.

New Destinations

Service to Hastings Park would be significantly improved. Renfrew customers would lose direct service along Hastings Street but can transfer to frequent local and limited-stop Hastings services.

New Connections

The primary new connection introduced is direct service from the McGill street area to 29th Avenue SkyTrain Station, using the rerouted #16.

Issues

Infrastructure

- Combining the Powell and Renfrew routes will require new trolley overhead on Renfrew Street between Hastings and McGill, and additional modifications to the trolley overhead at the Hastings/Renfrew and Hastings/Nanaimo intersections. A trolley terminus at Powell and Commercial for the #20 short-turn would also be required. The cost of these modifications is estimated at $2.0 million, less than the annual savings of the route restructuring, estimated at $2.8 million, including vehicle cost savings. The timing of this proposal will be determined by capital budgets and the availability of trolley overhead crews to make the modifications, both estimated for 2008.

- Assurance from the City that buses would be able to operate efficiently along Renfrew between Hastings and McGill during special events at Hastings Park would be required.

- Maintaining the existing #4 Powell terminal loop on Eton and Kaslo streets is recommended to preserve future short-turn opportunities. Alternatively, a trolley short-turn facility could be introduced at Coliseum Loop.

Other

- The relocation of the #7 Nanaimo route to Hastings from Dundas and Powell will remove service from Nanaimo Street between Hastings and Dundas, a distance of 400 metres. However, customers on this segment will be no further than 200 m from a bus stop, well within the 450 m walking distance guideline. The addition of #16 service along Renfrew between

Hastings and McGill will add service along 850 metres of this street and improve access to the residential uses on the west and Hastings Park on the east.

- Renfrew-downtown passengers would experience out of direction travel on the portion of the revised #16 route via McGill. While this might have a psychological effect, they would experience little if any additional travel time since average speeds on the proposed route are significantly higher than on the existing route via Hastings.

- The introduction of a scheduled Powell short-turn on the #20 will cause inconvenience to some customers but reflects the much higher observed demand on this route south of Hastings. To mitigate this inconvenience, the alternate trip short-turn operation is proposed only for times when the #20 runs to downtown at least every 15 minutes. Removing the short-turn operation would require two additional peak articulated trolleybuses (together with the #3, this would increase the peak articulated trolley requirement to 31, still within the capability of the fleet of 40 articulated trolleys) and 8,500 additional annual service hours but could attract some additional ridership.

Alternatives

The primary alternative involved replacing two of the current local trolley routes with suburban diesel routes making local stops. The #210 North Vancouver bus would replace the #4, operating via its current route but making local stops, while the #135 limited-stop service would be improved to replace the #10 on Hastings, with the #16 providing the only local service on Hastings from Commercial to Renfrew. While this could potentially achieve the largest savings, it is not recommended for the following reasons:

- Replacing the #4 with full-time local service on the #210 would require peak and off-peak increases in #210 service to meet existing passenger volumes and to maintain off-peak service at frequencies consistent with the Transit Service Guidelines. Reconciling a demand-based schedule for #210 in Vancouver with the timed transfer schedule in North Vancouver would be challenging.

- With the #16 providing the only local service on Hastings east of Commercial, service levels on this route would need to be driven by this high-demand area, potentially leading to inefficiencies as other sections of this fairly long route could end up being over-served. The preferred alternative uses the #7 to provide additional Hastings capacity to Nanaimo and the #10, being a relatively short route, could have its service levels adjusted to meet demand east of Nanaimo relatively efficiently.

- The alternative option would not support short-turning alternate #20 trips at Powell Street as it relies on the #20, and the #16, to provide Hastings service. The recommended option uses

the #7 to provide additional Hastings service and so enables the resource saving #20 short-turn.

- Maintaining a distinction between local and suburban services, especially with respect to the #210 on Powell, was preferred by many attendees at public events.

Public Response

Public comment on this proposal was almost evenly split between supporting the recommended proposal and the alternative. Stakeholders who looked at the trade-offs in detail tended to prefer the recommendation since it was seen as providing better local service (and better suburban service for North Vancouver customers) and being more environmentally friendly with its greater use of electric trolleybuses. Many also supported continuous service on Renfrew, from SkyTrain to McGill Street, especially given the redevelopment of Hastings Park.

- The extended #16 would serve the new school at Dundas and Renfrew; however, customers bound for destinations along Hastings would need to transfer at Hastings

- A Community Shuttle could provide additional linkages in New Brighton Park, Wall/McGill, and Hastings.

This service concept was not tested in the market research due to its complexity.

6.6.11 Oakridge/Hospitals City (or Community) Shuttle (New C17)

Introduce a new City Shuttle route connecting the 41st Avenue-Oakridge and Broadway-City Hall Canada Line stations via Oak Street hospitals and VGH. This route would be introduced for Canada Line opening and possibly earlier if it is able to operate on streets not already served by full-sized buses. Community Shuttle minibuses would be used if their smaller size permitted a better penetration of the neighbourhood.

Frequency and Hours

AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
12	15	15	20

	Weekday	Saturday	Sunday
First trip	6 a.m.	8 a.m.	9 a.m.
Last trip	1 a.m.	1 a.m.	12 a.m.

Requires 4 peak City (or Community) Shuttles and 20,200 Annual Service Hours.

Route

The route begins at Oakridge Mall and travels to Children's and Women's Health Centre of BC via Cambie, 33rd Avenue and Oak Street. From here it continues to VGH via Oak Street, 12th Avenue, Ash, and Broadway.

Key Destinations

Oakridge Mall and Library, 41st Avenue-Oakridge Canada Line station, Queen Elizabeth Park, Children's and Women's Health Centre of BC, King Edward Canada Line station, Vancouver General Hospital, BC Cancer Agency Vancouver Centre and Broadway-City Hall Canada Line station.

Connections

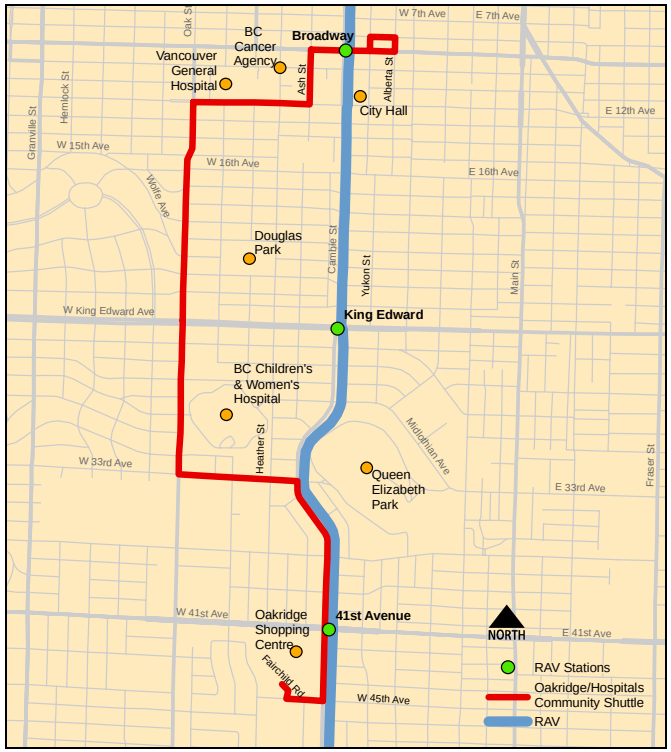
Canada Line and local bus routes.

Issues

Infrastructure

- Operates on streets not currently used by transit (33rd Avenue, 12th Avenue and Ash Street.)
- The preferred terminus at Oakridge is on the southwest side of Oakridge Shopping Centre to provide better access to the many seniors' residences in this area.

Exhibit 6-14 Oakridge/Hospitals City (or Community) Shuttle (New C17)



Other

- The route north of King Edward largely duplicates the #17 Oak, without providing additional connectivity, and could be dropped if a lack of resources so demands. The C17 would then be routed to the King Edward Canada Line station, further improving access from Canada Line to Children's and Women's Health Centre of BC.

Alternatives

Various route options were considered. Several requests for a direct bus to Douglas Park and along Heather were received, and there were also requests for the route to connect to various seniors' centres as far west as Granville and as far east as Main Street. While requested, the route is not proposed to operate on Heather due to the presence of the bikeway and neighbourhood traffic calming.

Public Response

There is much support for a route in this area, however, as proposed it will not meet all the needs identified through various meetings with seniors' organizations. Given the degree of interest in this specialized service, the area transit plan has referred much of this input to the "Accessible Transit Strategic Plan" now being initiated.

6.7 Other Routes Reviewed

Several additional service concepts were part of the consultation phase of the Plan but are not recommended, due either to their replacement with better concepts or redundancy with other routes. Those similar to recommended concepts have been addressed as Alternatives to the recommended concepts while the more distinct rejected concepts are addressed here.

6.7.1 West End - Central Broadway Local Trolley

This route would operate between the West End, Downtown South, Downtown and Central Broadway. Trips served by this route now require one or two transfers over a relatively short distance.

Exhibit 6-15 West End - Central Broadway Local Trolley

Discussion

This route, based on a concept in the City's Downtown Transportation Plan, generated considerable interest but is not recommended for two primary reasons:

- **Duplication with Canada Line:** The primary market for this route is commuter traffic from the West End and downtown to Central Broadway but this will be well served by Canada Line as West End bus routes will connect with the Robson and Davie Canada Line stations and RAV will serve Broadway and Cambie directly, with very attractive travel times. Also, if introduced before Canada Line opening, the route would suffer significant disruption due to Canada Line tunnel and station construction.

- **Lack of ridership shift:** When originally conceived, it was anticipated that this route would shift significant ridership from the #5 Robson and #6 Davie routes and that a number of buses could be reallocated. However, ridership modelling has shown little shift in ridership from the existing routes, suggesting that reallocating buses could create crowding issues. Additionally, due to the different anticipated demand levels for this route and the #5 and #6, it would be next to impossible to create a blended headway along Robson and Davie to balance bus loads.

Alternatives

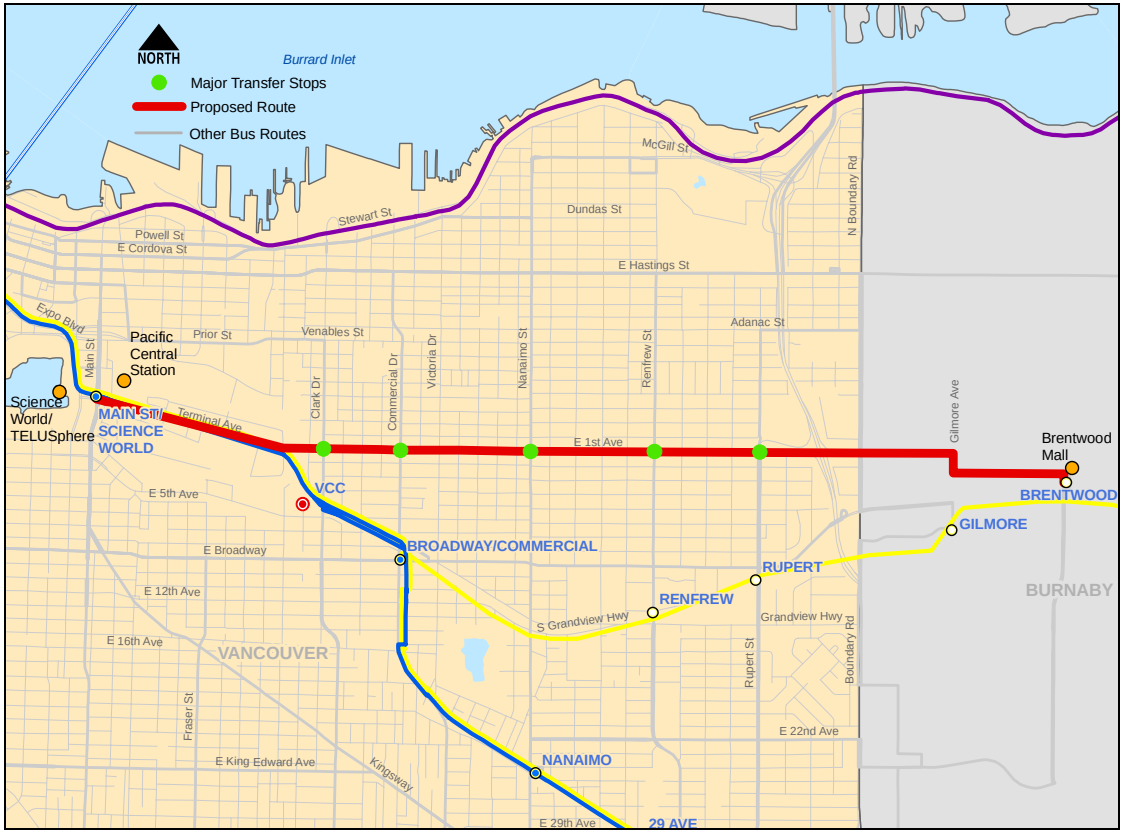
Several alternative routes have been proposed to achieve the general goals of this concept. Key variations include avoiding the loop into the West End and using Burrard and Main, rather than Granville and Cambie, to travel between downtown and Central Broadway. Most alternatives introduce an undesirable level of service duplication along Broadway or through the neck of the downtown peninsula.

One alternative that avoids some of these issues would be to extend the Broadway Station - Granville short-turn trips on the #9 Broadway route to downtown via Burrard Street, with a terminus near Waterfront Station. This would require either converting these short-turn trips from trolley to diesel operation or extending trolley wire along Burrard Street and over the Burrard Bridge. The former raises environmental concerns while the latter has significant heritage and capital cost issues.

6.7.2 East 1st Local, Main Station to Brentwood

A bus service on East 1st Avenue has been a recurring request and would help complete the east-west grid of routes within Vancouver.

Exhibit 6-16 East 1st Local, Main Station to Brentwood



Discussion

While previously requested by the City and residents, this route generated relatively little public interest and was seen by some as duplicating the #9 on Broadway and the SkyTrain Millennium Line. Some suggested extending the route to downtown but this would create more duplication and use more resources than would be justified for a relatively low-demand route. The City also raised concerns about bus operation on East 1st Avenue given extensive areas of peat under the roadway. While not recommended as a full-size bus route, this corridor could be amenable to future review as a City Shuttle midibus route.

6.7.3 Downtown to UBC B-Line (Conversion of #44)

Connecting downtown and UBC, the two largest transit markets in the City with a B-Line route is, at first glance a logical idea. Already the #44 route provides limited-stop service in this corridor during the weekday peaks and daytime and is quite productive, with 83 boardings per revenue hour. Upgrading this route to a B-Line would entail providing full-time service and would require service reductions on the local routes in the corridor that would be expected to lose ridership, notably the #4 and, to some extent, the #7. The reasons for not upgrading the #44 to a B-Line route are:

- Demand to and from UBC is highly peaked and providing midday, evening and weekend service at the levels required of B-Line routes would result in excessive service during periods of low demand.

- Bus stop activity on the local routes (#4 and #7) on West 4th Avenue through Kitsilano is quite linear rather than nodal around potential B-Line stops. This demand justifies a high frequency of local service and limits the potential to shift current local riders to a B-Line.

- Current travel time savings on the #44 are marginal relative to the local service. An AM peak trip on the #4 local from Granville and Robson to UBC takes 34 minutes while the trip on the #44 from Burrard and Robson is only three minutes shorter, at 31 minutes.

- The highest demand portion of Kitsilano is too close to downtown to justify limited-stop service; the timesavings for Kitsilano-downtown trips would be even lower than those for UBC.

- Local service on West 4th Avenue from Granville to Alma is operated by routes #4 and #7 as a common service corridor, with co-ordinated schedules. Introducing a limited-stop service that reduced demand for the #4 more than it reduced demand for the #7 would thus be problematic in terms of maintaining co-ordinated schedules and providing attractive service levels.

- The section of the #4 between Alma and UBC is not busy enough to support two full-time routes. Introducing a B-Line here would suggest eliminating the #4 service and adding more widely spaced B-Line stops to replace it. This would result in a degradation of the local service and the B-Line brand as B-Lines, by definition, should only stop at high demand stops.

In summary, the travel characteristics of the downtown-Kitsilano-UBC market do not suggest a B-Line route. Operating the #44 limited-stop service during high demand periods, complemented with a quality local service, as today, is recommended.

6.7.4 City of Vancouver Downtown Streetcar (for information only)

The Downtown Streetcar is proposed by the City of Vancouver to provide sustainable transportation alternatives to the currently underserved and high-growth areas of Southeast False Creek, the False Creek Flats, and Northeast False Creek. The streetcar is among several priorities in the City of Vancouver's Transit Strategy, and is part of a long-term network of transit services the City believes is needed to serve multiple trip purposes in and around the downtown and metropolitan core. Feasibility and planning studies have been completed and corridors have been reserved as part of recent redevelopments within the City.

Operating since 1998, the Downtown Heritage Railway (DHR) demonstration streetcar line provides limited service between Granville Island and Science World. The volunteer-operated DHR operates on weekends and holidays during the summer months and has enjoyed strong support from the public and numerous stakeholders.

Subject to further study and approval by Vancouver City Council, the DHR may be modernized and expanded into a full service transit operation within the time frame of the Vancouver and UBC Area Transit Plan. The City believes the redevelopment of Southeast False Creek, the construction of the False Creek South Canada Line station at 2nd Avenue, and the 2010 Olympics may provide opportunities to showcase this transportation technology.

Exhibit 6-17 City of Vancouver Downtown Streetcar (for information only)

Frequency and Hours

AM/PM Peak	Weekday Midday	Weekend Midday	Evenings (all days)
8	10	10	10

	Weekday	Saturday	Sunday
First trip	6 a.m.	7 a.m.	8 a.m.
Last trip	1 a.m.	12 a.m.	11 p.m.

For service by 2010, the Phase A routing from Granville Island to Science World would require 2 modern low-floor electric streetcars and 13,520 Annual Service Hours.

Route

Proposed routings for current and future phases are indicated in the map and described below. Phases shown have been approved in principle by Vancouver City Council and future possible extensions have been received

Exhibit 6-18 City of Vancouver Downtown Streetcar - Potential Phasing

Phase **(map colour)**	Link	Capital cost (rail, overhead, vehicles)
"A" (red) (proposed by 2010)	Granville Island to Science World	$12 -$15 million
"B" (magenta)	Science World to Waterfront Station	$75 - $85 million
"C" (green)	Waterfront to Stanley Park	$50 - $55 million
"D" (blue)	Science World to Yaletown and Granville Street	$60 - $65 million
A+B+C+D	All	$200 - $220 million
Notes:	Phase A requires only 2 new vehicles with the existing heritage vehicle being utilized for the 20% spare capacity. Phase A is in existing rail or road right-of-way and road reconstruction is being coordinated with adjacent redevelopment (though Southeast False Creek) therefore, the per km cost is much lower than for future phases. This phase could be developed as part of a demonstration project for the 2010 Olympic and Paralympics winter games. Phases B,C,D require the development of a new maintenance facility . Cost for this facility has been estimated at $9 million. Phases B,C, D are longer term proposals (post 2010)	

Key Destinations

Phase A (red): Granville Island, False Creek South and Southeast False Creek (Athletes Village for the 2010 Olympic and Paralympic Winter Games), and Science World.

Phases B and C (magenta and green): Chinatown, Gastown, Waterfront Station, Convention Centre, and Stanley Park.

Phase D (blue): Northeast False Creek and International Village, GM Place and BC Place, Plaza of Nations, Yaletown, and Granville Street.

Connections

Expo SkyTrain line at Main Street-Science World and Waterfront stations, Canada Line line at False Creek South station (at 2nd Avenue), West Coast Express and SeaBus at Waterfront Station, local and regional bus routes at several locations.

Issues

TransLink participation in the streetcar project has been limited to an advisory capacity during the development and technical review of studies.

- TransLink has expressed a number of concerns regarding the streetcar, including its relationship to the regional transportation system and how it will be funded and operated. Furthermore, TransLink has identified transportation network priorities for the future through the development of the Three-Year Plan and Ten-Year Outlook but the Streetcar project was not part of the regional discussion of potential transit projects. The relationship of the Streetcar to the transit priorities within the City of Vancouver and the Region (e.g. Western Extension of rapid transit to Central Broadway) needs to be determined.

- The GVTA Act requires independent transit services to be approved by the GVTA and this approval can only be granted if they will not reduce the effectiveness or financial viability of the regional transportation system.

- The Streetcar could compete with other regional transit projects for funding from senior levels of government.

- Does the Streetcar investment provide good value for the GVRD and address travel in the most efficient manner?

The Vancouver and UBC Area Transit Plan makes recommendations for new service and service improvements to areas that would be served by the Streetcar, assuming that it would not be fully operational within the timeframe of this plan. If the situation were to change, some recommendations would be revisited.

Development and expansion of the system requires further study to determine feasibility, review the business case and develop a long term funding strategy.

Infrastructure

- New rail and overhead.

6.8 Summary of Route Proposal Evaluation

Exhibit 6-19 below summarizes the evaluation of the service proposals, and their alternative versions where applicable, based on the Objectives given in section 6.2.

Exhibit 6-19 Summary of Route Proposal Evaluation

Route		Improves comfort for existing and new customers	Provides frequent service	Improves service coverage	Reduces travel times, improves reliability	Supports Canada Line integration	Increases efficiency	Responds to Community goals	Overall assessment
#3	Main-Chinatown terminus - artic	++	++	-	++	0	+++	+	++
#22	Knight/Macdonald - Dunbar Loop	-	0	+	0	0	--	++	0
C23	Extend C23 to Main St Stn	0	+	++	++	++	0	++	+
C18/C19	UBC Community Route	+	+	++	+	0	0	+++	++
#46	4th/6th local/limited (VCC-UBC)	++	++	++	+	+++	+	++	+++
#95	Hastings B-Line	+	++	0	++	+	+	++	++
#33	33rd/16th local (29th Ave Stn-UBC)	++	++	+++	++	++	+	+	++
#91	41st Ave B-Line (Joyce-UBC)	+++	+++	0	++	+++	+	+	++
#4, #16, etc.	Combine #4 Powell and #16 Renfrew	+	+	+	0	0	++	++	++
#4, #16, etc	Replace #4Powell and #10 Hastings with suburban diesel routes	-	-	--	-	0	+++	--	-
C17	Oakridge/Hospitals Comm. Shuttle	+	++	+	0	++	0	+++	++
n/a	West End-Central Broadway Circ.	+	+	0	++	-	--	+	0
n/a	East 1st Local	+	+	++	+	0	0	+	0

Scale of +++ (very positive) to --- (very negative) with 0 being neutral.

6.9 Areas for Future Review

In addition to a consultation process with the Cambie corridor residents in 2006, two sub-areas within the Vancouver and UBC service area stand out as needing further review of transit service requirements, once roadway layout and development phasing is known.

Fraserlands

A major development planned for the East Fraserlands will bring approximately 10,000 residents into a new neighbourhood in the extreme southeastern corner of Vancouver. This will spur a need for increased transit service and should also permit better access to the West Fraserlands development, which TransLink attempted to serve in the past. This development is still in the planning stages and may not be built-out until 2021 or later, though early phases are expected to be populated in 2009. Route planning for this area should start once a street network is approved and the timing of occupancy is known. Early implementation of service in this area will be critical as much of the development area is well beyond the Transit Service Guidelines walking distance of 450 m to a bus stop, unlike the West Fraserlands development. Key route planning considerations include:

Recommendation: Support City of Vancouver policies endorsing transit accessibility within the East Fraserlands. Plan to introduce service to this area as soon as development permits due to its scale and distance from existing service.

- **Need for a transit-accessible road network:** Roadways in the West Fraserlands were not designed to be transit accessible, leaving Marine Drive as the only potential bus route, despite its shortcomings as a pedestrian environment. Transit service to the East Fraserlands should be much easier to provide given City policy statements that ensure that new roads will be transit accessible. TransLink will work with the City to ensure effective transit access is designed into the community in accordance with the priority the City places on the early implementation of transit service to this area.

- **Discontinuous road networks:** Road and pedestrian route connectivity between the East Fraserlands and existing developments to the north will likely continue to be challenging, due to property ownership and slope issues.

- **Fare zone boundary:** The transit fare zone boundary along Boundary Road complicates service design as it makes routes that force multiple zone travel (e.g. East Fraserlands to Metrotown) difficult to implement due to fare equity issues.

UBC – University Town

The plan proposes pilot Community Shuttle routes for UBC and these may be modified or expanded as the campus develops. Full build-out of University Town, the University's name for its mixed-use and residential areas, is projected for 2021 when 18,000 people will live on the campus.

Recommendation: Ensure University Town neighbourhoods are developed to be transit accessible, using existing routes where possible.

There are also opportunities to route some of the major routes to UBC through or adjacent to University Town neighbourhoods. Indeed, much of the residential area within UBC's land area, including Acadia Park and Hampton Place, is already within 450 metres of regional bus routes such as the #25 and #41. The 4,000 resident South Campus neighbourhood is projected to reach build-out in five to 10 years and includes a bus-only connection between Southwest Marine Drive and Wesbrook Mall that will allow SW Marine Drive bus routes (#41, #43 (future #91 B-Line), #49 and #480) to directly serve the community. However, two factors mitigate against relying on the regional routes to serve local UBC demand. Firstly, these routes tend to be full or near-full arriving on campus and may have little or no room to accommodate local riders. Secondly, these routes use full size buses that are typically quite noisy and unwelcome in relatively quiet residential areas, as recent resident efforts with respect to the evening Totem Park route of the #41 have indicated.

In the longer term, some form of rapid transit connection between UBC and the region will be required and this plan recommends that this link be the priority once the Canada Line and Evergreen Line projects are complete. Over 100 buses arrive at UBC in the AM peak hour currently and this is projected to increase to in excess of 120 buses per hour in the future. The establishment of the proposed local shuttle-type service on the campus as proposed will help build a local distributor service that will support a long-term rapid transit terminus on campus.

6.10 Phasing of Service Changes

The Exhibits below summarize service changes being proposed through the life of the plan. Where possible, changes have been scheduled to minimize spikes in resource requirements. Consequently, initiatives that reduce bus requirements such as Canada Line integration and Powell/Hastings route changes, are accompanied by service increases elsewhere in the system. The key changes in each year are as follows:

- **2005:** Shorten #3 Main route (page 6-14). Increase some peak and off-peak services that are in greatest need of improvement based on Transit Service Guidelines. Introduce limited stop route to UBC on 4th and 6th Avenues (Route #46, page 6-22) to coincide with opening of VCC Millennium Line SkyTrain Station in January 2006.

- **2006:** Additional increases in peak and off-peak services based on Transit Service Guidelines. Evening and weekend improvements to meet Transit Service Guidelines, introduce pilot Community Shuttle at UBC (C18 and C19, page 6-21) and expand Community Shuttle service in Northeast False Creek (page 6-19). Extend #22 to Dunbar Loop (page 6-17).

- **2007:** Ensure trolleybus route service levels are adequate to meet the Transit Service Guideline for Comfort as low-floor trolleys are introduced. Convert #135 to a B-Line service (#95 B-Line, page 6-25).

- **2008:** Introduce articulated trolleys to routes #3 and #20 and adjust service levels. Introduce Powell/Hastings route changes, (requires trolley overhead modifications) and improve service, especially off-peak, on affected routes (page 6-31). Introduce 33rd Avenue-16th Avenue cross-town route (#33, page 6-27). Improve off-peak service on south-east Vancouver routes to Transit Service Guidelines levels.

- **2009 (December):** Introduce Canada Line-related route changes, including increased east-west service on major routes, 41st Avenue B-Line (#91 B-Line, page 6-29), and Community Shuttle route in central Vancouver (C17, page 6-31). Improve service on other routes to meet projected demands.

- **2010:** Increase service on additional routes anticipated to gain ridership due to Canada Line.

6.11 Service Design Recommendations and Policies

6.11.1 Bus Stop Spacing

The Transit Service Guidelines specify that bus stops on local routes should be no less than 250 metres apart, except at major transfer points, or unless closer spacing is needed to provide safe access. Many Vancouver routes have stops spaced much more closely than the guidelines recommend. While this makes it easier for some people to get to a bus stop, it compromises operating speed as buses must make frequent stops.

Recommendation: Work with CMBC to ensure the Service Guidelines on stop spacing are applied to existing and new routes.

It is recommended that the stop spacing guideline be followed for the new routes in this plan and that existing routes with stop spacing that does not meet the guideline be reviewed for opportunities to eliminate and/or consolidate stops. This should be done sensitively, taking into account whether a stop is used heavily by elderly customers or by persons with disabilities. A review of this type has already been done on Main Street as part of the Urban Transportation Showcase Program and should be pursued on other routes where slow speeds can be attributed to stop spacing issues.

6.11.2 #99 B-Line Stop at Arbutus

Adding a #99 B-Line stop at Arbutus has been a frequently heard request through the Area Transit Plan process. The Plan recommends that this stop be introduced, in conjunction with transit priority measures along the route to make up the increase in travel time. This recommendation would improve rapid transit access for the 3,000 residents located nearby in the adjacent Arbutus Lands neighbourhood, which developed largely after the #99 B-Line was introduced. The additional stop would most significantly improve access for UBC-bound commuters and for reverse commuters using SkyTrain and Canada Line to reach suburban employment centres.

Recommendation: Add #99 B-Line stops at Arbutus in conjunction with priority measures on the #99 B-Line route to maintain travel times.

Requests were also received to add a #99 B-Line stop at Fraser but this is not recommended since passengers headed west can transfer between the #8 Fraser and the #99 B-Line in the Broadway/Kingsway/Main area. Passengers heading east would be able to take the #99 B-Line no further than Commercial Drive, a short enough distance that the small time savings are not worthwhile, considering the time cost to other passengers.

6.11.3 Route Naming

Route naming in the Vancouver and UBC area has become inconsistent with some routes being named based on the major corridor they serve (e.g. #7 Dunbar) or taking the name of their terminus (e.g. #16 29th Avenue Station). The Plan recommends that routes be named for the destination of most

Recommendation: Route naming and numbering should convey as much useful information as possible, taking into account the significant destination on a route.

significance to passengers. For example, the east leg of the #16 would therefore be signed as the "Renfrew" rather than "29th Avenue Station."

Route numbering also has significance in Vancouver since most of the east-west routes take their route number from the avenue on which they operate. This practice assists in customer orientation and should be continued for new routes wherever possible. For example, the Plan takes advantage of proposed changes to suggest restoration of route #10 to the Tenth-UBC service.

TransLink's trolley fleet will be fully renewed in 2006-8 with low-floor trolleys

6.11.4 Transit Vehicles

The Plan received extensive comments regarding transit vehicles that TransLink (including CMBC) can incorporate in future bus procurement and maintenance programs. Many members of the public remarked that they had experienced more attractive, more comfortable and better-maintained buses in other cities. There was a clear implication that for people to feel good about taking transit, transit vehicles need to make them feel valued. Some of the key general themes to be addressed include:

- **Environmental effects:** Many comments were received that TransLink should maintain and enhance the use of alternative fuel buses, including the electric trolley fleet, to reduce emissions that create air pollution and contribute to global warming. TransLink's replacement program for the trolley fleet and the testing of alternate fuel buses, such as hybrids, are consistent with the public's aspirations but it is clear that public expectations on this issue are high.

Recommendation: Maintain and increase TransLink's commitment to alternate, environmentally sound, fuels.

- **Noise:** The engine and braking noise of the diesel buses in TransLink's fleet attracts significant negative public attention and affects passenger comfort both on and off the bus. Even the Community Shuttle fleet was identified as excessively noisy. External noise is also a significant issue for residents along bus routes and becomes a factor in route planning when much of the opposition to bus service on a street hinges on the noise issue. In consequence, TransLink should review best practices to reduce the noise emissions from current and future bus fleets.

Recommendation: Make reduced interior and exterior noise a priority in bus purchasing decisions.

- **Ventilation:** Poor ventilation on buses was raised as a concern by many, especially for the low-floor buses which have relatively small opening windows and so a lack of natural ventilation. Most new transit buses in North America are ordered with air conditioning and the bus industry designs vehicles with this assumption. Likewise, most automobiles sold today (i.e. transit's competition) have air conditioning. If air conditioning is not included on future buses, a much-improved natural ventilation system may assist in meeting comfort expectations on local bus routes.

Recommendation: Incorporate air conditioning or improved ventilation in new bus purchases.

- **Cleanliness/Graffiti:** The cleanliness of the bus fleet was often raised as an issue, with graffiti mentioned specifically on numerous occasions. While overall cleanliness comments suggest

the need for an improvement to bus cleaning and washing frequency and practices, some graffiti related issues can also be addressed with vehicle modifications, such as interior materials that hide and deter graffiti through colour or graffiti-hiding patterns, and the use of anti-graffiti film on window interiors. Local examples of both approaches include the anti-graffiti seat fabric pattern used on the SkyTrain Mark II cars and #98 B-Line buses, and the anti-graffiti window film used on all SkyTrain cars.

Recommendation: Set standards for bus cleanliness and monitor adherence. Employ vandalism-resistant materials.

- **Seating comfort:** Comments received on seating comfort often gave the #98 B-Line seats as an example of the comfort standard that should be targeted. Opinion on vinyl vs. fabric seats was mixed, with some seeing the easier cleaning offered by vinyl as a reason for it to be favoured over fabric. Many people assumed that vinyl is more durable than fabric, unaware of the anti-vandalism features and durability of current fabric transit seats.

Recommendation: Purchase bus seats that are as comfortable and durable as possible.

- **Open aisles:** While there were some requests for more seats on buses, there was also a call for better circulation space on-board urban buses. Replacing 2+2 seating with 2+1 seating, to create a wider aisle, was a very common suggestion and this will be the primary seating configuration on the new trolley fleet.

Recommendation: Ensure bus seating layouts allow good interior passenger circulation.

- **On-board information:** Improving on-board information through system and/or route maps posted in the bus, and automated annunciation of stops (as on the #98 B-Line) is a priority for many customers.

Recommendation: Maximize availability of on-board information through displays and new technologies.

In addition to issues raised by the public, the Plan team identified the need for more flexibility in vehicle types to meet the requirements of specific routes.

- **Ability to assign articulated buses:** Several of the major local routes serving UBC commuters (#25, #41 and #49) are now operating every five minutes or better with standard, 12-metre buses. While very significant quantities of service have been added, crowding and pass-ups on these routes are still significant. Given the intense service already provided, converting these routes to articulated, 18-metre buses would seem to be next logical step in adding capacity but this change is not supported by the current fleet plan. A review of the fleet plan should be undertaken with a view to providing more flexibility in the types of vehicles than can be assigned to busy routes.

Recommendation: Increase flexibility in fleet planning to allow more use of articulated buses on high demand routes.

- **Recommendation:** Introduce midibuses ("City Shuttle") to provide needed intermediate capacity service in urban areas.

- **Community Shuttles:** TransLink's current models of van or truck cutaway Community Shuttle vehicles are not well suited to frequent urban service with their high-floor, narrow front door, limited capacity and time-consuming rear wheelchair lift. There is a need for an intermediate-size vehicle between the Community Shuttle and 12 m bus. The Plan proposes

that TransLink procure low-floor, low-noise, low-emission buses approximately 9 metres (30') in length. Such midi-buses are becoming quite popular and a range of vehicles, including alternative fuel models, are available from bus makers. These vehicles could become the standard "shuttle" type vehicle for urban service.

6.11.5 All-door loading

All door boarding is one measure that TransLink can implement to increase the speed and efficiency of transit service. However, certain conditions must be satisfied to protect fare revenue and maintain security. The first step toward implementing all-door loading would be for the TransLink board to declare buses a "Fare Paid Zone". The recent creation of the Greater Vancouver Transportation Authority Police Service (GVTAPS) provides the opportunity to ensure appropriate security and safety protection to bus operators. Both GVTAPS and CMBC support the notion of a "Bus Fare Paid Zone".

Recommendation: Introduce all-door loading at suitable high-demand locations once required organizational support is in place.

Once the "Fare Paid Zone" requirements are dealt with by CMBC and GVTAPS, both agencies have expressed support for an "All Door Loading" policy under specific circumstances. Issues, which need to be addressed, include:

- Potential for cost of fare inspection and monitoring to outweigh the operational cost savings;
- Perception of fare evasion among the public and other transit riders; and,
- Ability of law enforcement personnel to respond to threatening situations on the bus.

TransLink has provided bus stop boarding information to GVTAPS and CBMC so candidate routes and bus stops can be evaluated on the basis of the following factors:

- Sufficient volume of passengers boarding vehicles on a per trip basis;
- Ease of communication, consistency in application of the "rules";
- Ability to check fares between bus stops and at bus stops;
- Locations and times where all door boarding is permitted should be exposed to relatively low risk of fare evasion and troublesome/poorly behaving passengers;
- The rules of all door boarding are simple and clearly communicated to bus operators and passengers and that the messaging is strong, frequently repeated, and regimented; and,
- The locations of all door boarding outside the City of Vancouver and UBC would require more research, but the criteria for choosing candidate locations include:

- Locations with high volumes of passengers
- Locations with high volumes of passengers transferring and few "walk on/cash customers" – such as Phibbs exchange.
- Locations that respect other concerns for safety, security, and fare evasion.

Based on these principles, TransLink is prepared to recommend that all door boarding be expanded to all stops on B-Line routes, including the #98, #99, and future B-Lines, such that it becomes identified with the brand. Other locations where there are very high volumes of customers boarding multiple routes, such as at Joyce SkyTrain Station, Granville Mall, some Broadway stops (At Granville, and Main particularly) could be considered after a 'settling in' period with the B-Lines.

6.11.6 Fare Collection

TransLink's Intelligent Transportation Systems plan includes the introduction of a stored value smart card system to pay for transit fares, tolls and parking by 2009. The consultation work done for the Vancouver/UBC Area Transit Plan found a great deal of enthusiasm for a contactless smart card fare payment mechanism, based on the faster boarding process and the flexibility such cards offer if they can be used for incidental purchases in shops. Such cards should also offer efficiency and security advantages in the form of reduced fare processing times and the potential to install multiple readers on a bus to support all-door boarding.

Recommendation: Introduce a contactless smartcard fare collection system by 2009.

Given the customer interest and potential efficiencies, the Plan recommends that efforts to introduce smart cards by 2009 be maintained or advanced.

6.11.7 Service Scheduling

One area that emerged as a concern during the public consultation was scheduling of bus service, particularly on busy routes and at times when service is less frequent.

At busy times on frequent routes, many people found the use of pre-set schedules to be potentially misleading if they cannot be met on a regular basis. An alternative approach of trying to keep buses evenly spaced, rather than "on-time" was well received, especially for more frequent routes and times. Real-time "next bus" information displays could be used on these routes to provide customers an indication of waiting times. Moving to such a headway-based system would require a high level of operation supervision, to maintain the intended even spacing in the absence of a firm timetable.

Recommendation: Request CMBC to pilot headway based scheduling on the #3 Main and extend to other frequent routes if successful.

The other common issue was the scheduling of routes that start from a common point and serve common destinations, especially in evenings when service is less frequent. The most common example was the scheduling of the #4 and the #17 from UBC in the evenings. Both run to downtown and many customers bound for downtown or Kitsilano, where the routes run parallel five blocks apart, could take either route. However, the scheduling is such that both routes run every 20 minutes in the evening with the #17 leaving UBC two minutes before the #4, leaving an 18 minute gap before the next #17. Schedules in these circumstances should be written to minimize wait times.

Recommendation: Design schedules of complementary bus routes to minimize wait times for common trip origins and destinations.

6.11.8 Rapid Transit Expansions

The Broadway corridor handles in excess of 60,000 daily riders on multiple bus routes. While service has been added to keep pace with demand, especially on the #99 B-Line, bus congestion is becoming an issue, especially as dwell times at stops and headways begin to converge, leading buses to bunch-up at stops. Operational fixes, such as all-door boarding, and transit priority measures can and should be used to improve speeds and maintain efficiency but there will be a limit to what can be achieved in a corridor with such high demand. Already it is becoming difficult to manage termini on the #99 B-Line due to the frequency of the route.

Recommendation: Begin planning and project definition work on the westward expansion of rapid transit in the Broadway corridor towards UBC by the end of 2006.

The 10-Year Outlook indicates that studies to review alignments, technologies, community integration, cost, financing and phasing of a rapid transit line towards UBC should begin by 2009, though construction may have to wait until after 2013. Given the level of interest expressed in expanding rapid transit in this corridor, and the need to get the public on-board early in the planning stages, the Plan recommends that this work be advanced by the end of 2006, using the expertise that is being amassed during the planning of the region's other rapid transit projects. A review of phasing and integration with the regional plan will be key to this work.

In the interim, transit priority measures and all-door loading should be pursued to improve service for current customers and help build the market for rapid transit in the future.

6.12 Required Infrastructure

6.12.1 Transit Priority Measures

The City of Vancouver emphasizes developing land uses that preserve the neighbourhood character of the city, and promoting measures that maintain the liveability and environmental sustainability of the community. To this end, City policies limit roadway expansion; promote walking, cycling and transit; support TDM measures aimed at reducing travel; and target greenhouse gas emissions.

These policies, coupled with a transit operating and capital investment program by TransLink, have resulted in a steady and significant growth in transit ridership. Despite the successful expansion of the Vancouver transit market over the past five years, trip making by all modes has increased significantly faster than population growth, leading to increased competition for limited road space. In order to ensure that the level of transit market share increases, transit will have to increase its competitiveness with the private automobile.

The City's land use and transportation policies have a significant effect on the development, management, and operation of both the roadway and transit networks in the City of Vancouver. The arterial roadway grid is shared by public and private transportation. Because of the need to protect neighbourhoods from through traffic, the City has used traffic calming and traffic management measures to ensure that non-neighbourhood based traffic is directed to arterial roadways. Most traffic, public and private, thus competes for space on the arterial streets.

External traffic is "metered" at the City boundary by bridges and signalized intersections. These control points limit the traffic volume that can enter and leave the City. As a result peak hour traffic has grown only modestly over the last 10 years. The duration of peak traffic conditions has, however, expanded by over an hour over the last decade as evidenced by travel diary data analysis. To compensate for higher traffic volumes, the City has added traffic signals, particularly pedestrian signals, many of which assist passengers in accessing the bus system. However, the addition of traffic signals, increased transit demand and ridership, and increased traffic on arterial roadways has increased transit travel times and decreased reliability in both peak and off-peak periods.

In response to deteriorating traffic conditions and increased transit ridership, service hours have been added to schedule maintenance rather than service enhancement. Market research has identified transit route reliability and speed as a key factor in converting auto driver trips to transit trips. Transit priority measures can be effectively used to improve four key factors that influence ridership, namely speed, reliability, comfort and convenience[1].

TransLink's requests that the City increase the use of transit focused traffic management strategies and transit priority measures, to fully achieve the City's Vision as a sustainable community. These actions will increase the productivity of transit resources and make the service more attractive to potential new customers. Transit priority measures will affect other users, particularly automobile users. However, not implementing such measures will limit service expansion and result in reduced service quality, both of which will constrain the full achievement of the City Vision.

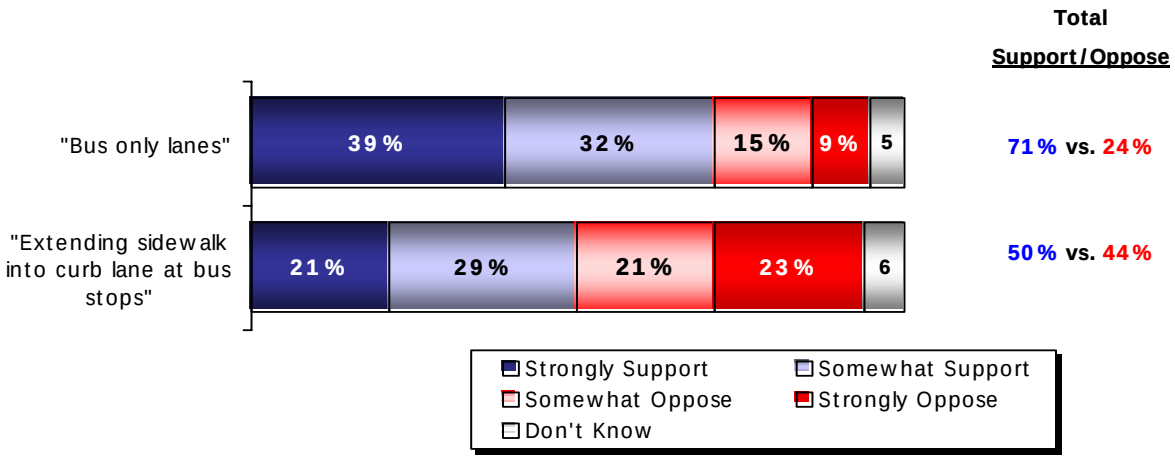
The benefits of transit priority appear to be well understood by Vancouver and GVRD residents. Public consultation carried out as part of the VUTP planning process and TransLink's regular market research indicates that current and potential transit customers and residents at-large support the expansion of

Bus lane in downtown Vancouver

[1] Source: Strategies For Implementing Transit Priority, A Best Practice Guide by the National Guide To Sustainable Municipal Infrastructure, 2005

transit accommodation and priority. Even non-transit users and auto drivers show support for such initiatives. Exhibit 6-20 identifies level of support of 500 randomly selected GVRD residents for two bus priority measures, which have been used in selected locations within the City of Vancouver.

Exhibit 6-20 Support for Transit Priority Measures among GVRD Residents



Candidate Measures For This Plan

The VUTP Technical Memo #5, Transit Priority Measures, provides detailed information on current and potential measures appropriate to the City of Vancouver. To re-confirm major transit accommodation priorities a high order assessment of all transit corridors was undertaken. The assessment included:

- A review of previous transit priority studies;
- An examination of the ratio of transit passengers to total persons travelling in the corridor (both directions) in the highest demand period (weekday PM peak hour); and,
- A review of weekday PM peak hour intersection delay along transit corridors.
- Service proposals for major investments in the corridor as described in Section 6

Based on this review the following corridors, shown in Exhibit 6-21, were re-confirmed as having the highest priority for implementation of enhanced transit accommodation and priority:

- Burrard Street;
- Hastings Street;
- Broadway;
- Main Street; and,
- 41st Avenue.

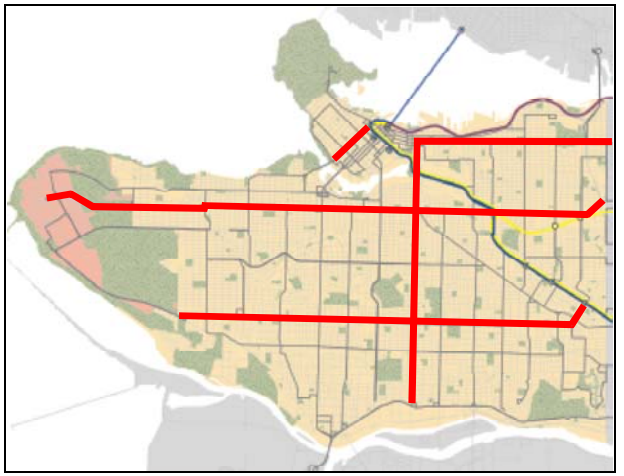


Exhibit 6-21 Priority Corridors for Improved Transit Accommodation and Priority

Despite strong enabling policies and a demonstrated need, implementation of transit accommodation and priority measures has been difficult due to stakeholder opposition to anticipated negative effects, such as parking loss. All Canadian cities struggle with this issue. On one hand the sustainability of communities is highly dependant on increased transit use while on the other hand 80 to 90% of overall trips are by private automobile. In consequence, the design and implementation of such measures must assess the full range of effects that are likely to occur. The questions to be addressed by such analysis include:[2]

- Do the transit priority objectives conform with City and TransLink policy?;

[2] Source: Strategies For Implementing Transit Priority, A best Practice Guide by the National Guide To Sustainable Municipal Infrastructure, 2005

- Do these measures improve the speed, reliability and comfort of transit services?;
- Are proposals to accommodate transit and other road users acceptable to stakeholders and the community at large?;

In order to answer these questions the following effects should be identified and discussed with affected communities and decision makers.

- Transit effects (bus operating costs, route time and variance, accessibility);
- Transportation effects by mode (person delay, safety);
- Socio-economic effects (official plan policies, community vision, financial effects, commercial viability, effects on residential land uses, institutional); and,
- Environmental effects (measured in terms of greenhouse gas emissions).

An example of a successful process was that leading to the recent decision to introduce bus lanes on Burrard Street in 2005.

In order to ensure the successful implementation of additional transit accommodation and priority measures it is suggested that relatively non-controversial measures be pursued initially. These measures include:

- Extension of parking prohibition times to reflect the peak spreading that has occurred over the past 10 years;
- Limited parking/loading prohibitions on Saturday and Sunday midday periods;
- Selective utilization of "right turn-only except buses" curb lane designations to reduce curb lane travel and thereby enhance transit travel;
- Selective parking prohibitions adjacent key intersections and/or bus stops;
- Modified Transit Signal Priority (not focused on schedule adherence but may be focused on headway maintenance). Differing control protocols could be considered for limited stop vs. regular transit services;
- Signal priority that is intersection based rather than corridor based; and,

TransLink is committed to providing the most efficient service possible and to working with municipalities to identify appropriate transit priority measures.

The "Transit Related Road Infrastructure Program" TRRIP was created by TransLink to provide 100% funding of the necessary municipal capital investments needed."

- Improved boarding and alighting procedures including "All-door loading" of buses where applicable.

Such measures should encounter relatively low resistance from the community. This will afford the opportunity to assess various measures and their perceived and actual effects. This information can then be used to plan additional measures for these and other corridors.

Monitoring

A key factor that has limited the acceptance of transit accommodation is that very little data exists with respect to the quantifiable benefits of transit accommodation measures in Vancouver. Before and after assessments should therefore be conducted with the planned improvements to Main Street bus service through the Urban Transportation Showcase Program and with the Burrard bus lanes. Further, over the course of the next five years, TransLink should monitor not only the implementation of service proposals but also follow up with the City on the implementation of the various transit priority measures identified.

The APC data collected in support of the VUTP provided information on bus loading delay and route travel times. Future APC installations should capture all aspects of travel time and delay to provide comprehensive data at the route and trip level. Vital information for monitoring and evaluation includes the breakdown of travel time to include the intersection delay, this was difficult to isolate within the APC data collected for the VUTP. This will greatly assist the monitoring of future implementation of transit priority measures. The knowledge gained from this monitoring will significantly influence the implementation of future measures.

6.12.2 Bus-Only Roadways

Two bus-only roadways, one existing and one proposed, are assumed in the plan.

Granville Mall

Granville Street between Smithe and Hastings is currently restricted to buses and authorized vehicles only. While the City of Vancouver and TransLink are reviewing redesign options for the downtown portion of Granville Street, including the transit-only Granville Mall, all options must maintain transit efficiency and a high-quality pedestrian environment.

Recommendation: Maintain transit benefits in the Granville Street and Mall redesign.

Wesbrook Mall

UBC intends to build a bus-only connection along Wesbrook Mall that will allow buses more direct access from SW Marine Drive to the university campus, avoiding the current deviation via 16th Avenue. This link will increase the efficiency of the #41, #43 and future 41st Avenue B-Line and provide excellent

Recommendation: Encourage UBC to construct the Wesbrook Mall bus-only access as soon as feasible, and no later than South Campus neighbourhood development.

transit access to the South Campus neighbourhood. While the earlier this connection can be completed the better, it should be available when the first residents move into the South Campus neighbourhood.

6.12.3 Transit Accessible Streets

While the need for new developments to be designed with a transit accessible street network has already been noted, current City of Vancouver initiatives to remove some streets used by transit from the designated arterial network may also affect the ability of TransLink to offer continued transit service in some areas. Given the importance of good transit service in ensuring neighbourhoods are liveable and sustainable, the City should review and report to Council the potential effects on transit of arterial street reclassifications.

Recommendation: Request the City of Vancouver to consider and report to Council the effects on transit of arterial street reclassifications.

6.12.4 Traffic Signal Installations

The City of Vancouver's Annual Traffic Signal Program has installed an average of over 20 new traffic signals in each of the last four years. While these signals often help transit passengers to reach bus stops and destinations, they also slow transit service, especially local buses which fall out of the signal co-ordination patterns (e.g. "green waves") designed to reduce signal delays to motor traffic. While transit priority has been provided at some signals, such as those along the #98 B-Line route, to reduce delay to transit, this is not yet a standard practice and there is a need to better consider the effects on transit speed and reliability when new signal locations are evaluated.

Recommendation: Request the City of Vancouver to consider and report to Council the effects on transit operations of all new traffic and pedestrian signals.

6.12.5 Bus Stops

The City of Vancouver is working to make all City of Vancouver bus stops accessible to persons in wheelchairs and other mobility devices, coinciding with the bus system becoming fully accessible in 2008. However, ways to accommodate other forms of disability at bus stops are still being developed. A pilot program to develop fully accessible stops for persons with visual disabilities, through such measures as tactile strips and distinctively shaped bus stop identification poles, is therefore recommended for inclusion in the Accessible Transit Strategic Plan.

Recommendation: Pilot fully accessible stops for persons with visual as well as mobility disabilities through the Accessible Transit Strategic Plan.

Through the public process of this Plan, many people called for increases in the availability and quality of transit information at bus stops, especially given extensive tourist use of Vancouver and UBC bus routes. A need for improved way finding information was highlighted.

Recommendation: TransLink and CMBC to review improved quantity and quality of information at bus stops.

6.12.6 Bus Loops and Terminals

In support of the increase in bus service frequency and quality proposed in this plan, several bus terminals will require upgrading to ensure operational feasibility and customer comfort.

UBC Below-Grade Terminal

The UBC below-grade terminal, currently in the planning stages and scheduled for completion in 2007-2008 will provide the capacity to handle the projected increases in bus service at UBC and offer a significant improvement in passenger comfort and convenience.

Joyce Station

The bus facility at Joyce Station has reached operational capacity, resulting in one service (the #43) already operating out of a less than convenient on-street stop away from the station. With the proposed upgrading of the #43 to a B-Line service, and increases in service to the other routes using the station (#26, #27, #28), there is a need to review opportunities to increase the capacity of the bus terminal. This review will include the application of Crime Prevention through Environmental Design (CPTED) principles to the expanded and redesigned terminal.

Recommendation: Pursue an expanded and improved Joyce Station bus terminal to meet future demand.

Broadway Station

Broadway Station's bus terminus is at or near capacity and its capacity limitations is an impediment to adding service to the #99 B-Line to meet ridership demand. Unfortunately there is little room to expand the existing facility due to lack of street space.

Waterfront Station

The City of Vancouver's Downtown Transportation Plan proposes making the block of Cordova Street in front of Waterfront Station into a more effective intermodal facility, through the introduction of boarding islands and a reduction in the number of traffic lanes. This proposal is being pursued as part of the Transportation Hub study by the City, with TransLink's participation, and may offer opportunities to improve routings, by bringing more bus routes to the front of the station to improve connections.

Recommendation: Work with City of Vancouver on creating an on-street surface transport interchange at Waterfront Station.

41st-Oakridge Canada Line Station

With the introduction of both a Canada Line station and a B-Line station at 41st and Cambie, the 41st-Oakridge Canada Line station will become a major intermodal transfer location. The efficacy of connections at this location will depend largely on the configuration of the Canada Line station, specifically whether it includes an underpass under 41st Avenue. In addition to station design issues, TransLink and the City will need to work together on ensuring that bus stops for the 41st B-Line are adequately sized for the passenger demand, offer a high standard of comfort and amenity, and can easily be reached from the station.

Recommendation: Ensure the 41st-Oakridge RAV station offers a high-quality rail-bus transfer environment.

Marine Drive Canada Line Station

The Marine Drive Canada Line station will become a major interchange point between the Canada Line and local bus routes as routes from Granville, Oak, Cambie, Main and Marine Drive converge on and terminate at this station. TransLink is working with the Canada Line team and the City of Vancouver on a station and bus terminal design to respond to this role.

6.12.7 Trolley Overhead

With most of the primary local routes in the City of Vancouver being operated by electric trolleybuses, some modifications to the trolley overhead network are almost inevitable in a transit planning process for this area. Some of these changes have already been programmed as part of Canada Line bus integration plans and the construction of the Vancouver Transit Centre but the key modifications, and desired completion dates, are as follows:

- Right-turn from westbound Hastings to northbound Columbia in support of Chinatown Terminus for #3 Main. (as soon as feasible)

- New overhead on Renfrew from Hastings to McGill, new turns at Hastings and Nanaimo, and potential creation of a short-turn loop for the Victoria service at Powell Street in support of combining the #4 Powell and #16 29th Avenue Station routes. (May need to be in 2008 due to capital budgeting and resources but earlier implementation would allow improved coverage on Renfrew and savings to be realized earlier.)

- New overhead on Marine Drive between Granville and Main streets to allow the Granville, Oak and Main trolley routes to access the Marine Drive Canada Line station. (2009 but much of this will be in place earlier to connect these routes with the new Vancouver Transit Centre trolleybus operating centre at the foot of Hudson Street.)

Along with these additions, the plan's recommendations for Canada Line integration replace local trolleybus service on Cambie with City Shuttle midibus service. In consequence, the trolley overhead on Cambie between Broadway and 65th Avenue will not need to be replaced following its removal for Canada Line construction.

6.13 Conclusions

The service proposals in this chapter seek to improve the comfort and quality of service for existing transit customers and attract new riders to transit through increased capacity, better service coverage and higher speeds. Integration with the Canada Line will bring increased local service in many corridors and offer faster service for many customers. Overall, the changes and new routes proposed

are intended to accommodate a 20% increase in ridership over the next five years. Productivity (rides/hour) will largely be maintained. Exhibit 6-22summarizes the key requirements and results of the proposed plans:

Exhibit 6-22 Projected Resource Requirements and Results from Area Transit Plan Proposals

Measure	2004	2010 projection	Change
Route kilometres in City of Vancouver			
Bus and City/Community Shuttle	438	446	+1.8%
Accessible bus (wheelchair and bike rack)	251 (57%)	446 (100%)	+78%
Rapid Transit (SkyTrain and Canada Line)	10.9	21.8	+100%
Population with walk access (% of total population)			
to 10-minute or better peak bus service (450 m)	513,000 (88%)	618,000 (99%)	+21%
to a rapid transit station (1 km)	121,000 (21%)	216,000 (35%)	+79%
Peak vehicles			
Conventional buses	387	428	+10.6%
City/Community Shuttle	8	26	+325%
Rapid transit cars (full system)	180	246	+37%
Annual service hours (thousands)			
Bus	1,707	2,044	+19.7%
Rapid Transit (SkyTrain and Canada Line, **train-hours**)	100,000	165,000	+65%
Annual boardings (millions)			
Bus (inc. B-Line and Community Shuttle)	101.6	121.9	+20%
B-Line	11.8	16.5	+40%
Rail rapid transit (SkyTrain and Canada Line)	34.2	68.4	+100%
Annual bus passenger-km (million)	424.9	442.9	+4.2%
Bus Financial and Efficiency Measures			
Annual bus operating costs (millions)	$133.2	$156.7	+17.6%
Bus Boards/Bus service hour	59.5	59.8	+0.5%

Graphically, the change in service area with 10 minute or better peak service is shown in Exhibit 6-23 and Exhibit 6-24.

Exhibit 6-23 2005 Bus routes with 10 minutes or Better service in AM Peak

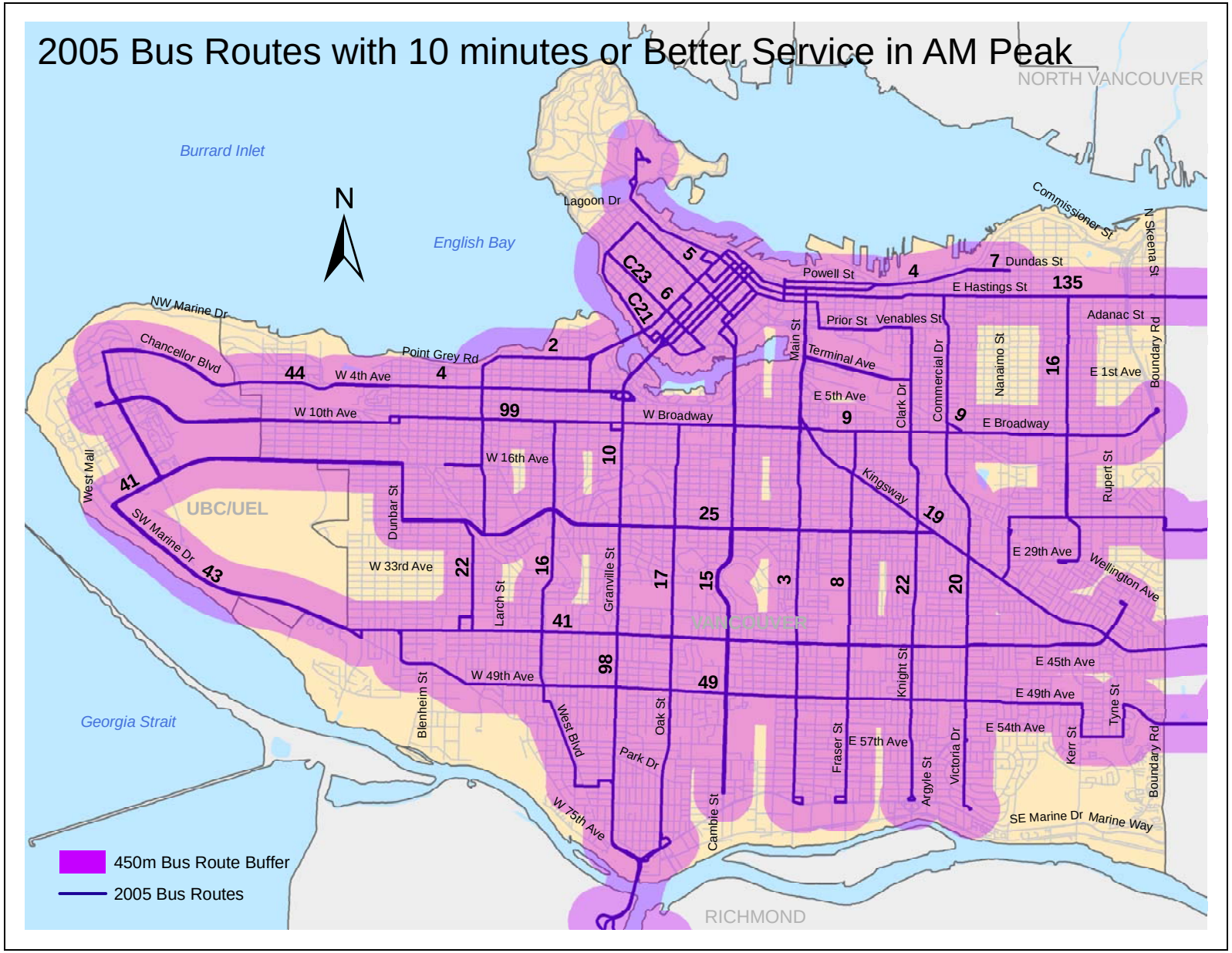


Exhibit 6-24 2010 Bus routes with 10 minutes or Better service in AM Peak