June 12, 2000

NOTICE TO THE
GREATER VANCOUVER TRANSPORTATION AUTHORITY
BOARD OF DIRECTORS

You are requested to attend a Regular Meeting of the Greater Vancouver Transportation Authority (GVTA) Board of Directors to be held on Wednesday, June 21, 2000 at 8:00 a.m. in the 2nd Floor Boardroom, 4330 Kingsway, Burnaby, British Columbia.

A G E N D A

1. ADOPTION OF THE AGENDA

1.1 June 21, 2000 Regular Meeting Agenda

Recommendation:

That the Agenda for the Greater Vancouver Transportation Authority Board of Directors Regular Meeting scheduled for June 21, 2000 be adopted as circulated.

2. ADOPTION OF THE MINUTES

2.1 May 17, 2000 Regular Meeting Minutes

Recommendation:

That the Minutes of the Greater Vancouver Transportation Authority Board of Directors Regular Meeting held May 17, 2000 be adopted as circulated.

3. REPORTS

3.1 First Quarter 2000 Expenditure and Revenue Forecast

Recommendation:

That the Board receive the report dated May 25, 2000 titled First Quarter 2000 Expenditure and Revenue Forecast for information.

3.2 Tender/Contract Award Information - April 1, 2000 to May 31, 2000

Recommendation:

That the report dated June 2, 2000 titled Tender/Contract Award Information - April 1, 2000 to May 31, 2000 be received for information.

3.3 Treasury Policies

Recommendation:

A. That the Board receive the report dated June 6, 2000 titled Treasury Policies, and

B. That the Board approve the investment policies attached to the report.

3.4 Project 1875 – Electronic Farebox Request for Capital Budget Re-Allocation

Recommendation:

That the Board approve the re-allocation of $1,110,000 in capital funding from the Capital Contingency Reserve to the Electronic Farebox Project to accommodate an additional 77 fareboxes required to meet the current conventional bus fleet projection in the Strategic Transportation Plan.

3.5 2000 Capital Projects - Specific Project Approval

Recommendation:

That the Board provide specific project approval for the following 2000 capital projects:

- Bus Fleet Replacement – 50 forty-foot, low-floor, clean diesel - Budget: $20,265,200
- Bus Fleet Expansion – 29 forty-foot, low-floor, clean diesel - Budget: $12,287,600
- Major Road Network - Rehabilitation – Budget: $6,735,000
- TransLink Owned Bicycle Facility Program - Budget: $698,000
- Steveston Passenger Facilities & Relief Point – Budget: $730,000
- West Coast Express – Network Controller Unit/Communication Upgrade – Budget: $418,300
- Albion Ferry Administration Office Expansion – Budget: $231,400
- SkyTrain Station Platform Edge Warning System (PEWS) – Budget: $2,103,900
- Coquitlam SkyTrain Station Extension – Consulting/Contractor Services – Budget: $1,125,000.

3.6 Trolley Bus Fleet Replacement

A. That the Board approve the replacement of the present trolley bus fleet with a current service requirement of

- 205 low-floor, standard (12m) electric trolley buses,
- plus an option of either 60 low-floor standard (12m) trolleys or 40 low-floor articulated (18m) electric trolley buses,

procured as described within this report. Staff will report back to the Board prior to the selection of the option.

B. That the Board approve the inclusion of a fleet expansion option in the procurement to meet service requirements to 2006 for a further

- 60 low-floor standard electric trolley buses, or
- 40 low-floor articulated electric trolley buses,

procured as described within this report. Staff would be required to report back to the Board for approval of this purchase in 2004.

C. That the Board approve the concept of banking carbon dioxide emission credits incurred due to the avoidance of emissions from the purchase of trolley buses instead of diesel buses. Staff will pursue opportunities for trading these credits, or using the credits internally, for carbon dioxide credit offsets.

3.7 Richmond Area Transit Plan Year 1 - #98 B-Line and City Bus Integration

Recommendation:

A. That the Board approve the report dated May 31, 2000 titled Richmond Area Transit Plan Year I - #98 B-Line and City Bus Integration and direct staff to proceed with implementation of the September, 2000 changes; and

B. That the Board refer the report to the City of Richmond for review and comment.

3.8 2001 Program Plan Development

Recommendation:

That the Board receive the report dated May 10, 2000 titled 2001 Program Plan Development for information.

3.9 Transit Service Extension Request to Mission Border

Recommendation:

A. That the Board direct staff to advise Ms. Linda Meyer her requested extension of bus service toward the District of Mission boundary cannot be accommodated at the present time due to the limitations of the existing roads; and;

B. That the Board direct staff to investigate the feasibility of the extension as a specific task in the Area Planning Program for Maple Ridge scheduled for 2001.

3.10 Performance Report of Transit Services for First Quarter 2000

Recommendation:

That the Board receive the reported dated May 30, 2000, titled Performance Report of Transit Services for First Quarter 2000 for information.

3.11 Status Report on Area Transit Plans

Recommendation:

That the Board receive this report dated May 23, 2000 titled Status Report on Area Transit Plans for information.

3.12 First Quarter Status Report & Municipal Update

Recommendation:

That the Board receive the report dated June 21, 2000 titled First Quarter Status Report & Municipal Update, and forward it to municipal Councils and other stakeholders for their information on TransLink's progress.

3.13 Status Report on #98 B-Line Infrastructure

Recommendation:

That the Board receive the report dated June 5, 2000 titled Status Report on #98 B-Line Infrastructure for information.

3.14 Progress Report – Rapid Transit

Recommendation:

A. That the Board receive the report dated June 9, 2000 titled Progress Report - Rapid Transit for information.

B. That the Board appoint Director Kumagai to the Rapid Transit Sub-Committee and include planning for rapid transit to Richmond and the Airport within its mandate.

3.15 Station Car Pilot Program

Recommendation:

A. That the Board receive the report dated June 21, 2000 titled Station Car Pilot Program for information, and

B. That the Board direct staff to release an Expression of Interest for operation of the proposed pilots.

3.16 Transportation and Climate Change: Options for Action

Recommendation:

A. That the Board request that the federal government:

(i) consult directly with the appropriate municipal and regional agencies in Greater Vancouver, Montreal and Toronto regarding the development of a coherent national program to assist metropolitan areas to address greenhouse gas, growth management and transportation problems in these areas

(ii) recognize that it is in the national economic interest for there to be healthy, vibrant and efficient cities and implement a stable and ongoing program for funding urban transportation in the three large metropolitan areas; and

B. That the Board direct staff to co-ordinate their efforts with the staff of the appropriate municipal and regional agencies in Toronto and Montreal to make these actions more effective.

3.17 Lower Mainland Truck Freight Study: Progress Report

Recommendation:

That the Board receive the report dated June 1, 2000, titled Lower Mainland Truck Freight Study: Progress Report for information.

3.18 Terms of Reference for the Strategic Planning Transportation Plan Technical Advisory Committee

Recommendation:

A. That the Board approve the attached Terms of Reference for the Strategic Transportation Plan Technical Advisory Committee; and

B. That the Board receive the correspondence from the Chair, Strategic Transportation Plan Technical Advisory Committee, to the Chair and Members of the TransLink Board of Directors, dated March 22, 2000, for information.

4. INFORMATION ITEMS

No items presented.

5. OTHER BUSINESS

No items presented.

6. ADJOURNMENT

GREATER VANCOUVER TRANSPORTATION AUTHORITY

Minutes of a Regular Meeting of the Greater Vancouver Transportation Authority (GVTA) Board of Directors held at 8:17 a.m. on Wednesday, May 17, 2000, in the 2nd Floor Boardroom, 4330 Kingsway, Burnaby, British Columbia.

DIRECTORS PRESENT:
Chair G. Puil, Vancouver
D. Bell, North Vancouver *(Arrived at 8:40 a.m.)*
J. Clarke, Vancouver *(Arrived at 8:21 a.m.)*
M. Grinnell, Langley City
M. Hunt, Surrey
J. Kingsbury, Coquitlam
K. Kumagai, Richmond
D. McCallum, Surrey
G. Price, Vancouver
H. Sparkes, New Westminster *(Arrived at 8:27 a.m.)*
L. Traboulay, Port Coquitlam

REGRETS:
J. Cashore, MLA
D. Drummond, Burnaby
F. Randall, MLA
T. Stevenson, MLA

STAFF IN ATTENDANCE:
K. Dobell, Chief Executive Officer
F. Kirby, Recording Secretary
P. Vetleson, Corporate Secretary

1. ADOPTION OF THE AGENDA

1.1 May 17, 2000 Regular Meeting Agenda

MOVED AND SECONDED
That the Agenda for the Greater Vancouver Transportation Authority Board of Directors Regular Meeting scheduled for May 17, 2000 be amended by adding the following items:

3.3 On table replacement report titled "Tariff Revision" dated May 16, 2000.

3.3.1 On table report titled "Tariff Revision: Corrections" dated May 16, 2000, including replacement page 14 for Transit Tariff.

5.1 On table report titled "Authorization for the Chair of the Board to Attend the Millennium Transportation Conference in Toronto - June 10 - 13, 2000."

and that the Agenda as amended be adopted.

CARRIED

2. ADOPTION OF THE MINUTES

2.1 May 3, 2000 Special Meeting Minutes

MOVED AND SECONDED

That the Minutes of the Greater Vancouver Transportation Authority Board of Directors Special Meeting held May 3, 2000 be adopted as circulated.

CARRIED

8:21 a.m.
Director Clarke arrived at the meeting.

3. REPORTS

3.1 First Quarter (Jan - Mar) - 2000 Capital Project Summary Report

Report dated May 17, 2000 from Sheri Plewes, Vice-President, Contracts and Acquisitions.

MOVED AND SECONDED

That the Board receive the report dated May 17, 2000 titled First Quarter (Jan-Mar) – 2000 Capital Project Summary Report for information.

CARRIED

8:27 a.m.
Director Sparkes arrived at the meeting.

3.2 2000 Capital Projects - Specific Project Approval

Report dated May 17, 2000 from Sheri Plewes, Vice-President, Contracts and Acquisitions.

At the request of Director Hunt the Board agreed to vote separately on the recommendation relative to the custom vehicle expansion - 9 minibuses / 1 microbus - budget: $1,245,560 for the proposed service in South Surrey/White Rock.

8:40 a.m.
Director Bell arrived at the meeting.

MOVED AND SECONDED
That the Board provide specific project approval for the following 2000 capital projects:

- Custom Vehicle Replacement – 26 microbuses / 1 minibus - Budget: $2,429,800
- Custom Vehicle Expansion – 6 microbuses / 1 minibus – Budget: $662,200
- Minor Capital Account (MCA) - Budget: $3,600,000
- Minor Capital Account (MCA) – Consulting & Studies – Budget: $1,000,000.

CARRIED
Directors Clarke and Traboulay absent at the vote.

MOVED AND SECONDED
That the Board provide specific project approval for the following 2000 capital project:

- Custom Vehicle Expansion – 9 minibuses/ 1 microbus – Budget: $1,245,560

but that the tender for this project not be awarded until such time as the decision on the contract award for the community buses has been made.

CARRIED
Directors Clarke and Traboulay absent at the vote.

3.3 Tariff Revision

On table replacement report dated May 16, 2000 from Larry Ward, Senior Vice-President, Planning and Service Contracts, and Ian Jarvis, Vice-President, Finance and Administration.

MOVED AND SECONDED
That *Greater Vancouver Transportation Authority 2000 Tariff Amendment Bylaw Number 12, 2000* be introduced and read a first, second and third time.

CARRIED

MOVED AND SECONDED
That *Greater Vancouver Transportation Authority 2000 Tariff Amendment Bylaw Number 12, 2000* be reconsidered, passed and finally adopted.

CARRIED

3.3.1 Tariff Revision : Correction

On table report dated May 16, 2000 from Larry Ward, Senior Vice-President, Planning and Service Contracts, and Ian Jarvis, Vice-President, Finance & Administration, citing corrections to be made to the report dated

May 2, 2000 titled Tariff Revision, which are reflected in the replacement report dated May 16, 2000 titled Tariff Revision.

No action taken.

3.4 AirCare II Certification of Repair Industry

Report dated May 17, 2000 from Martin Lay, Chief Executive Officer, Pacific Vehicle Testing Technologies.

Discussion ensued relative to the proposed additional certification fees for the auto repair industry. The Board requested that the report and recommendations be deferred, pending receipt of the full report on costs of the AirCare Program requested at the May 5, 2000 Board Meeting, to be presented to the Board at its meeting in July.

MOVED AND SECONDED

That the report dated May 17, 2000 titled AirCare II Certificate of Repair Industry be deferred.

CARRIED

Directors Clarke, Price and Chair Puil voted in the negative.

3.5 Burnaby Heights Community Shuttle - Service Design and Implementation Plan

Report dated May 2, 2000 from Larry Ward, Senior Vice-President, Planning and Service Contracts.

MOVED AND SECONDED

That the Board approve the Service Design and Implementation Plan for the Burnaby Heights Community Shuttle as described in the report dated May 2, 2000 titled Burnaby Heights Community Shuttle - Service Design and Implementation Plan, and

A. That the Board approve the Service Design and Implementation Plan for the Burnaby Heights Community Shuttle as described in the report dated May 2, 2000 titled Burnaby Heights Community Shuttle - Service Design and Implementation Plan, and
B. That the Board direct staff to proceed with implementation of the Plan in September 2000.

CARRIED

3.6 June 2000 Transit Service Changes

Report dated May 2, 2000 from Larry Ward, Senior Vice-President, Planning and Service Contracts.

MOVED AND SECONDED

That the Board receive the report dated May 2, 2000 titled June 2000 Transit Service Changes for information.

CARRIED

3.7 Status Report on Area Transit Plans

Report dated May 2, 2000 from Larry Ward, Senior Vice-President, Planning and Service Contracts.

MOVED AND SECONDED

That the Board receive the report dated May 2, 2000 titled Status Report on Area Transit Plans for information.

CARRIED

3.8 Request for Exemption from the Power Levy

Report dated May 5, 2000 from Paul Barlow, Manager, Revenue and Risk Management.

MOVED AND SECONDED

That the Board, upon application being made, exempt Mrs. V.G. Dorn of 19540 80th Avenue, Surrey, BC from payment of the power levy for their second hydro account and provide notice of such exemption to the collector.

CARRIED

4. INFORMATION ITEMS

4.1 Correspondence from Chair Puil, GVTA Board to GVTA Directors dated April 17, 2000 titled TransLink One Year Review

MOVED AND SECONDED

A. That staff prepare a list of key issues that TransLink must address in the next five years for presentation to a Board workshop;

B. That the Board schedule a series of workshops to review these issues and provide direction to staff in the preparation of a corporate plan for TransLink; and

C. That the Board direct staff to prepare terms of reference for consulting services to support the proposed Board-staff workshops, including preparation of appropriate background material and consultation with stakeholders.

CARRIED

5. OTHER BUSINESS

5.1 Authorization for the Chair of the Board to attend the Millennium Transportation Conference in Toronto - June 10 - 13, 2000

On Table report dated May 10, 2000 from Ken Dobell, Chief Executive Officer.

MOVED AND SECONDED
That the Board approve Chair Puil to attend the Millennium Transportation Conference in Toronto from June 10 - 13, 2000.

CARRIED

6. ADJOURNMENT

MOVED AND SECONDED
That this meeting now conclude.

CARRIED
(Time: 8:40 a.m.)

CERTIFIED CORRECT:

_____ _____

Corporate Secretary Chair

To: GVTA Board of Directors

From: Ian Jarvis, Vice-President, Finance and Administration

Date: May 25, 2000

Subject: **First Quarter 2000 Expenditure and Revenue Forecast**

Recommendation:
That the Board receive the report dated May 25, 2000 titled First Quarter 2000 Expenditure and Revenue Forecast for information.

PURPOSE

To provide the Board with a projection of total expenditures, revenues and reserve balance for the 2000 fiscal year based on actual results to March 31.

BACKGROUND

Expenditure and revenue forecast are prepared by all of the TransLink entities following each quarter end close. Forecasts reflect actual results for the period plus projections for the balance of the year. This report is based on first quarter 2000 results. An updated forecast will be presented at the September Board meeting.

DISCUSSION

It is anticipated that the 2000 annual deficit will be $12.6 million, $17.7 million (58.3%) lower than the budgeted deficit. The reserve balance was originally projected to be $29.2 million at December 31. The updated projection has the reserve at $47 million by year end.

The following table summarizes the first quarter 2000 forecast compared to budget. Expenditures are projected at $531.2 million, $18.4 million (3.4%) below the $549.6 million budget. The revenue forecast of $518.5 million is marginally (0.2%) lower than budget. An overview of the major reasons for variance follows.

	$ MILLIONS		
	Forecast	**Budget**	**Variance F/(U)**
EXPENDITURES			
TransLink Administration	29.18	29.06	-0.12
Subsidiary Operating Costs	372.65	372.37	-0.28
Subsidiary Allocated Costs	12.38	12.28	-0.10
Contractor Costs	26.23	26.23	0.00
MRN	21.38	21.38	0.00
Total Operating Costs	461.83	461.32	-0.51
Extraordinary Item - Public Service Pension Plan Rebate	-12.60		12.60
Debt Service Costs	81.93	88.27	6.33
Total Expenditures	**531.16**	**549.59**	**18.43**
REVENUES			
Transit	203.37	202.08	1.30
Taxation	290.93	293.00	-2.07
AirCare	24.22	24.22	0.00
Total Revenues	**518.52**	**519.30**	**-0.78**
Net Surplus / (Deficit)	-12.64	-30.29	17.65
Reserve Fund Balance	46.99	29.21	17.78

TransLink Administration – $ 0.12 million (0.4%) Unfavourable

- The majority of TransLink's administration departments anticipate being on budget at year-end. The minor overage primarily relates to establishing a separate Human Resources function for the TransLink workforce. The budget only provides for the salaries for 3 Human Resources positions and related support costs. The forecast is based on a more refined estimate of the impact of TransLink handling its own labour relations, arbitration and organizational development activities. A one-time relocation expense is also included in the forecast.

- The Transportation Property & Casualty Insurance Company advises that the past practice of paying a dividend to the parent company is not appropriate from a risk management perspective, as risk exposure increases as the transit system expands. This advice is reflected in the forecast. A similar amount will be received from a higher than anticipated GST refund related to West Vancouver transit services. TransLink had anticipated a refund of $1 million in 1999 and accrued that amount. We have recently been advised that the total refund will be $2.2 million.

Subsidiary Operating Costs – $ 0.28 million (0.1%) Unfavourable

All subsidiaries are projecting minor variances or anticipate being on budget.

- **Coast Mountain Bus Company** anticipates to marginally exceed its budget by $0.32 million (.1%). This reflects the net impact of:

  - 3,845 fewer service hours than planned, reducing variable costs by $0.25 million. All approved expansion initiatives will be implemented.

  - Higher than budgeted fuel prices. Diesel fuel accounts for the majority of the projected $0.59 million variance. The budget was based on a price of $0.4941 per litre. Prices for the first quarter averaged $0.5163 per litre. The forecast assumes a price of $0.5182 per litre for the next quarter and $0.50 per litre for the balance of the year. Diesel prices continue to fluctuate with April at $0.5438 and May at $0.5104.

- **Pacific Vehicle Testing Technologies Ltd**. is forecasted to be on budget at the end of the year. A ruling on GST status is still outstanding. A favourable ruling will reduce program costs by $1 million.

- **SkyTrain** is forecasted to be under budget by $0.04 million (0.1%). Savings result from hiring delays and a partial recovery for an insurance claim that began in 1999. These savings are reduced by additional costs for overtime to cover for vacant positions and for unscheduled escalator repairs.

- **West Coast Express** is projecting to be essentially on budget for the year. Rolling stock maintenance was over budget for the first quarter and this is expected to continue for the remainder of the year. This will be offset by numerous cost containment initiatives now underway, including spreading out the timing of station light replacement and ground maintenance, the deferral of upgrade projects and consulting work, and reduced train promotion.

- **Fraser River Marine Transportation Ltd.** is projecting an unfavourable variance of $0.01 million (0.3%), due to higher diesel prices.

Subsidiary Allocated Costs – $ 0.10 million (0.8%) Unfavourable

- The Station Tower rental lease for the Coast Mountain Bus Company executive office has been adjusted to exclude the 9th floor, effective end of March 2000. The new lease contract is higher than our original estimation by $92,940.

Contractor Costs – on budget

Major Road Network – on budget

Extraordinary Item – Public Service Pension Plan Rebate – $12.6 million

We have recently been advised that a March 31, 1999 actuarial evaluation of the Public Service Pension Plan indicates that the Plan continues to be in a surplus position. As a result, the Superannuation Commission is providing member employers with retroactive contribution reductions for the fiscal year April 1, 1999 to March 31, 2000. We have now received a rebate of $7.2 million for that period.

The Superannuation Commission also anticipates that contribution reductions will continue to be paid on a quarterly basis for the 2000/01 period. The payments will be approximately one quarter of the annual amount already received. Accordingly, this forecast includes the $7.2 million 1999/00 rebate plus an additional $5.4 million for the April – December 2000 period.

Debt Service Costs – $6.33 million (7.2%) Favourable

The projected favourable variance is the result of a higher than anticipated cash balance, project cash flows being deferred to the latter part of this year or into the following year, and the spring debt issue interest rate being 80 basis points below the 7.25% budgeted rate.

Revenues – $0.78 Million (0.1%) Unfavourable

The projected revenue shortfall is the net result of increased fare revenues and reduced fuel tax revenues.

Fare revenues are anticipated to be $1.30 million greater than budget. This is the year-to-date variance. An on-budget position is assumed for the balance of the year.

Taxation revenues are projected $2.07 million (0.7%) unfavourable. Unfavourable fuel tax revenue ($2.30 million) is reduced slightly by increased property tax and hydro levy revenue. Fuel sales volumes in the Vancouver region are 6.5% lower than the January – March 1999 period. This is a risk item and is being closely monitored.

CONCLUSION

This forecast indicates that TransLink is anticipating a $12.64 million deficit in this fiscal year of operation. The deficit will decrease the December 31, 2000 reserve balance to $46.99 million, $17.78 million higher than originally projected.

To: GVTA Board of Directors

From: Ian Jarvis
Vice-President, Finance & Administration

Date: 2 June, 2000

Subject: **Tender/Contract Award Information - April 1, 2000 to May 31, 2000**

Recommendation:
That the report dated June 2, 2000 titled Tender/Contract Award Information - April 1, 2000 to May 31, 2000 be received for information.

PURPOSE

The purpose of this report is to provide the Board of Directors with information on the award of contracts valued at, or originally estimated at more than $250,000.00

CONTEXT

Information pertaining to the award of contracts valued at more than $250,000.00 is reported to the board on a quarterly basis in accordance with GVTA contracting policy.

The following contracts were awarded during the months of March, April and May 2000:

1.	Orion Bus Industries	$ 29,257,872.00
2.	Imperial Paving Ltd.	$ 6,398,814.29
3.	West Coast Engineering Ltd.	$ 592,588.00
4.	Keith Plumbing & Heating Company Ltd.	$ 500,000.00
5.	Cochrane Engineering Ltd.	$ 330,527.00
6.	Corporate Express	$ 330,000.00

Appendix A
Item 1

Award of Contract
Tender No. Q0-0007, Supply of 76 40-Foot High Floor Clean Diesel Express Buses.

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1. A contract was awarded to:

   Orion Bus Industries of Mississauga, Ontario

2. In the amount of $ 29,257,872.00 for the supply and delivery of 76, 40-Foot High Floor Clean Diesel Express Buses.

3. Tender documents were issued to a select list which included all North American builders of high floor buses. Only four of which submitted a tender.

   Closing date: February 28, 2000

4. Tenders received:

Orion Bus Industries, Ontario	$ 384,972.00 Each
New Flyer Industries, Manitoba	$ 402,179.00 Each
Nova Bus Industries, Quebec	$ 431,413.00 Each
Neoplan USA Corporation, Colorado	$ 459,535.00 Each

5. Tenders reviewed by:

   Contractual: TransLink Purchasing Department Staff
   TransLink Engineering & Project Services Staff

   Technical: CMBC Vehicle Engineering Staff
   TransLink Engineering & Project Services Staff

6. Award made to the lowest bidder which was approved by the TransLink Board at the March 27th , 2000 meeting.

Appendix A
Item 2

Award of Contract
Tender No. Q0-0033, 98 B-Line, Richmond Civil Works

1. A contract was awarded to:

   Imperial Paving Limited.

2. In the amount of $ 6,398,814.29 for the No. 98 B-Line Richmond Civil works. Including the reconstruction and widening of No. 3 Road, station foundations and platforms, installation of street lights and traffic signal bases and conduits, and landscaping and all other associated work in Richmond.

3. Tender documents were issued to a select list of five (5) pre-qualified Contractors. Only three of which submitted a tender.

   Closing Date: May 1, 2000

4. Tenders received:

Imperial Paving Ltd.	$ 6,398,814.29
Progressive Contractors	$ 6,500,175.51
Columbia Bitulithic Ltd.	$ 6,747,083.00

5. Tenders reviewed by:

   Contractual: TransLink Purchasing Department Staff
   TransLink Engineering & Project Services Staff

   Technical: TransLink Engineering & Project Services Staff

6. Award made to the lowest bidder.

Appendix A
Item 3

Award of Contract
A Contract was awarded for the supply and delivery of Traffic Signal Poles and Street Light and Banner Poles for the Richmond No. 98 B-Line.

1. The civil work for the No. 98 B-Line required that TransLink purchase some materials on behalf of the City of Richmond, and recover the costs from the City.

2. This was done through the issuing of two purchase orders to West Coast Engineering Ltd. totalling $ 592,588.00

3. West Coast Engineering Ltd. is the only supplier acceptable to the City of Richmond for the supply of these particular products. The material suppliers and prices have been researched by TransLink's electrical consultant, Don McLean of Shaflik Engineering, and the prices are acceptable to Engineering and Project Services and to the City of Richmond.

4. TransLink will recover approximately 47 % of these costs from the City of Richmond.

Appendix A
Item 4

Award of Contract
Tender No. Q9-0065, Burnaby Transit Centre, Wastewater Treatment Works

1. A contract was awarded to:

   Keith Plumbing & Heating Co. Ltd.

2. In the amount of $ 500,000.00 for the supply and installation of the works required to upgrade the wastewater treatment system at the Burnaby Transit Centre.

3. This tender was advertised in the Vancouver Sun and The Province newspapers, and tender documents were issued to 12 companies. Only six of which submitted a tender.

   Closing date: January 20, 2000

4. Tenders received:

Bengal Construction Company Ltd.	$ 853,300.00
F & M Installations Ltd.	$ 618,653.00
Tri Tech Industries Ltd.	$ 583,860.00
Lockerbie & Hole Ltd.	$ 581,488.00
Lake Mechanical Ltd.	$ 508,900.00
Keith Plumbing & Heating Co. Ltd.	$ 500,000.00

5. Proposals reviewed by:

   Contractual: TransLink Purchasing Department Staff
   TransLink Engineering & Project Services Staff

   Technical: CMBC Environmental Staff
   TransLink Engineering & Project Services Staff

6. Award made to the lowest bidder.

Appendix A
Item 5

Award of Contract
Request for Proposal No. Q0-0009, Bus Operations and Maintenance Facilities Plan

1. A contract was awarded to:

   Cochrane Engineering Ltd.

2. In the amount of $ 330,527.00 for the development of a Bus Operations and Maintenance Facilities Plan.

3. RFP documents were issued to a select list of five pre-qualified consulting firms. Only two of which submitted proposals.

   Closing date: March 6, 2000

4. Proposals received:

Cochrane Engineering Ltd.	$ 320,900.00
Reid Crowther and Partners Ltd.	$ 104,465.00

5. Proposals reviewed by:

   Contractual: TransLink Purchasing Department Staff
   TransLink Engineering & Project Services Staff

   Technical: CMBC Facilities Maintenance Staff
   TransLink Implementation Planning Staff
   TransLink Facilities Maintenance Staff
   TransLink Engineering & Project Services Staff

6. Award made to the proponent that received the highest rating based on the criteria specified in the proposal.

   Criteria: Proposed work program, appreciation (understanding) of work, methodology and experience of project team & individual project members

Appendix A
Item 6

Award of Contract
Tender No. Q0-0013, GVTA Stationary Requirements

1. A contract was awarded to:

   Corporate Express

2. In the amount of $ 330,000.00 for the supply of stationary items for TransLink and Coast Mountain Bus Company Ltd. for a two year period.

3. Tender documents were issued to a select list of four pre-qualified vendors. All four vendors submitted a tender.

   Closing date: February 24, 2000

4. Tenders received: (figures calculated by the per unit price on a list of standard items purchased, the figures were adjusted to allow for the difference in volume of the various items and figures shown below are to illustrate the relationship of the prices tendered by the different vendors.)

Corporate Express	$ 51.70
Grand & Toy	$ 219.83
Mills Printing & Stationary	$ 181.17
Lyreco	$ 252.33

5. Tenders reviewed by:

   Contractual: TransLink Purchasing Department Staff

   Technical: TransLink Administrative Services Staff
   CMBC Administrative Services Staff

6. Award made to the lowest bidder.

To: GVTA Board of Directors

From: Vice President, Finance & Administration

Date: June 6, 2000

Subject: **Treasury Policies**

Recommendation:

A. That the Board:receive the report dated June 6, 2000 titled Treasury Policies, and

B. That the Board approve the investment policies attached to the report.

PURPOSE

To propose a policy for investments on behalf of GVTA and its insurance subsidiary.

BACKGROUND

It is considered an important part of good corporate governance that there be explicit policies in place with respect to treasury matters. As a natural interim measure, the policies of GVRD and BC Transit in these matters have generally been followed to this point. However, because of the size of the organization and the level of activity, staff feel that it is appropriate to bring policies in this area forward for Board sanction rather than continuing to rely on an estimate of what the Board would feel is appropriate and prudent.

DISCUSSION

Unlike the Municipal Act, the GVTA Act does not contain any limitations on the type of investments which the Authority may hold. However, the nature of the Authority's stakeholders, responsibilities and activities lead to the conclusion that investments should be similar to those allowed to municipalities. While equity has historically had over a long term a higher return than debt obligations, there is more variability in that return and a greater risk to principal. Corporate debt also has a higher return than government and bank debt, but this arises because of its greater risk. Staff consider that, given the normal levels of investments anticipated (generally low and fluctuating), the absolute amounts of higher income that would be received from these instruments are not sufficient to outweigh the lower liquidity and higher risk.

A further consideration is the organization structure in place, which has GVRD treasury functionally responsible for most parts of GVTA treasury management. It would be possible to develop and administer a separate policy for GVTA investments but this would be more cumbersome and there are not any obvious advantageous unless the governing philosophy is radically different.

It is therefore proposed that the GVTA's policy echo that of the GVRD.

This policy emphasises preservation of capital, liquidity, and return, in that order or priority. Accordingly, it restricts investments to high quality government and bank obligations. Consequently, it also requires diversification except where the highest quality obligations are concerned. It does not permit investments in equity or in corporate debt. The policy also places limits on the term of the investments, by category. With limited exceptions currently, the GVTA does not have a structure in which longer term investments would be a natural fit with its core business activities. Generally the GVTA would have excess cash needing investment either because it has taken debt in advance of capital expenditures for tactical reasons, or because some revenues, property taxes, for instance, are received only annually. The two exceptions to the short term nature of GVTA investment activities are reserve funds, such as the one received from the Regional Transit Commission, and the Captive Insurance Company. The arrangement for the sinking funds for the repayment of capital debt has those investments in the hands of the MFA, so these longer term investments are not currently an issue for GVTA.

An important part of treasury activities is a regular reporting regime, including comparison to benchmarks, and that is incorporated into the policy through reports to the CEO quarterly.

The Board should note that GVRD internal audit and its external auditors carry out substantive reviews regularly.

Schedule 1

Investment Policies

Guiding Principles

Investments will be evaluated in the context and priority order of:

1) Preservation of capital
2) Liquidity
3) Yield

Restrictions

Investments in all cases will be restricted to institutions rated the equivalent of Moody's A or better by one of the four recognized rating agencies.

Investments will be further limited in amount and term within a rating category as detailed in Schedule 2.

A list of approved institutions within each category will be presented quarterly to the Vice President, Finance and Administration for approval. Proposals to add institutions will be brought forward at that time. The Treasury Supervisor may suspend dealing with an approved institution on his own authority at any time.

Reporting

The Vice President, Finance and Administration will report quarterly to the CEO on the investment position.

Schedule 2

CATEGORY	Limits			
	Amount Individual Institution	**Per Cent Individual Institution**	**Per Cent Group of Institutions**	**Term**
Long Term Investments (beyond 1 year)				
AAA				
Government of Canada	unlimited			fund maturity date
Other*	25,000,000			fund maturity date
AA				
Provincial Government (each)	25,000,000			fund maturity date
Chartered Bank (each)*	1,000,000			shorter of 5 years/fund date
A				
Provincial Government (each)	10,000,000			fund maturity date
Chartered Bank (each)*	1,000,000			shorter of 3 years/fund date
Other				
MFA Pooled Funds	25,000,000			bond funds
*review for legality, varies with District				
Short Term Investments (1 year or less)				
A-1				
Government of Canada	unlimited	unlimited		no restriction
Provincial Government, with long term rating AA or better (each)	unlimited	50%		no restriction
Provincial Government, with long term rating A or better (each)	50,000,000	35%		no restriction
Sch. A Bank (each)	25,000,000	35%		no restriction
Sch. B Bank (each), small Sch. A Trust	10,000,000	25%	50%	180 days
Company (each)	10,000,000	10%	35%	180 days
A-2				
Provincial Government (each)	10,000,000	10%	35%	90 days
Sch. A or B Bank (each)	10,000,000	5%	25%	35 days
Other				
MFA Pooled Funds (note 1)	50,000,000	35%		Short Term

To: GVTA Board of Directors

From: Sheri Plewes, Vice-President, Contracts & Acquisitions

Date: June 21, 2000

Subject: **Project 1875 – Electronic Farebox**
Request for Capital Budget Re-allocation

Recommendation:

That the Board approve the re-allocation of $1,110,000 in capital funding from the Capital Contingency Reserve to the Electronic Farebox Project to accommodate an additional 77 fareboxes required to meet the current conventional bus fleet projection in the Strategic Transportation Plan.

PURPOSE

To provide additional funding to the Electronic Farebox Project to procure sufficient fareboxes to meet the current fleet projection in the Strategic Transportation Plan to the end of 2001.

BACKGROUND

The existing fareboxes on the Vancouver region conventional bus fleet are nearly twenty-five years old and have reached the end of their useful lives. The equipment is obsolete and parts are no longer available.

In 1997, BC Transit and the Vancouver Regional Transit Commission approved the replacement of the existing fareboxes with a new automated fare collection system. The new system will process and verify both cash and prepaid fare media and offers the following benefits:

- Reduced fare evasion;
- Reduced fare disputes between operators and customers;
- Increased revenue and ridership data by route;
- Increased revenue control; and
- The infrastructure to permit the introduction of new forms of prepaid media (e.g. multi-ride, stored value and smart cards).

The Board received and approved a proposed implementation schedule and project budget at the regular Board meeting in June 1999. Since that time, service plans in the

region have been established and the Strategic Transportation Plan has finalized the Region's conventional bus fleet plan.

Funds were budgeted for 1,184 units. On review of fleet projections, it was determined that 1261 units were required. The budgeting process at TransLink, prescribes that expansion bus fleet budgets must provide for all ancillary equipment including fareboxes.

The difference in numbers is due to:

- Failure to include budget for 60 fareboxes on expansion bus fleet budgets primarily due to vehicles originally scheduled to be retired, and retained to meet the acceleration of the service expansion; and
- 17 fareboxes are required for spares – 2 spares at each depot, two for SkyTrain special events and one for training.

DISCUSSION

In order to fund the additional 77 fareboxes required to meet the fleet projections and spare requirements to the end of 2001 it is proposed that funding be provided from the Capital Contingency Reserve:

	Current Budget	**Adjustment Required**	**Revised Budget**
Project 1875 – Electronic Farebox	$25,800,000	$ 1,110,000	$26,910,000
Capital Contingency Reserve (Apr. 2000)	1,739,900	(1,110,000)	629,900
	$ 27,539,900	0	$ 27,539,900

CONCLUSION

The Strategic Transportation Plan finalizes the conventional bus fleet requirements. In order to provide sufficient electronic fareboxes to outfit the entire bus fleet to the end of 2001, a transfer of $1,110,000 budget is required from the Capital Contingency Reserve.

To: GVTA Board of Directors

From: Sheri Plewes, Vice-President, Contracts & Acquisitions

Date: June 21, 2000

Subject: **2000 Capital Projects - Specific Project Approval**

Recommendation:
That the Board provide specific project approval for the following 2000 capital projects:

- Bus Fleet Replacement – 50 forty-foot, low-floor, clean diesel - Budget: $20,265,200
- Bus Fleet Expansion – 29 forty-foot, low-floor, clean diesel - Budget: $12,287,600
- Major Road Network - Rehabilitation – Budget: $6,735,000
- TransLink Owned Bicycle Facility Program - Budget: $698,000
- Steveston Passenger Facilities & Relief Point – Budget: $730,000
- West Coast Express – Network Controller Unit/Communication Upgrade – Budget: $418,300
- Albion Ferry Administration Office Expansion – Budget: $231,400
- SkyTrain Station Platform Edge Warning System (PEWS) – Budget: $2,103,900
- Coquitlam SkyTrain Station Extension – Consulting/Contractor Services – Budget: $1,125,000.

PURPOSE

To obtain Step 2 specific project approval for nine capital programs/projects.

BACKGROUND

The 2000 Capital Budget was approved by the TransLink Board of Directors at its regular meeting of March 15, 2000. The capital budget request comprised of 36 new projects totalling $131.5 million.

Individual project requests were submitted to establish the capital program envelope, and were approved by the Board in principle only. To release project funds, individual projects must receive specific project approval from the Board.

Prior to requesting specific project approval, detailed business cases and work plans for each project are completed and reviewed.

Projects submitted as programs, containing a number of small individual projects (e.g. Minor Geometric Improvements, Bicycle Programs, etc.), will come forward to the Board for approval to establish program envelopes for spending. As each individual candidate project is identified within a program, the Capital Review Committee (TransLink Executive Committee) will review the business cases to ensure that the scope of the work meets the original intent of the program approved by the Board. If a candidate project is of significant value, it will be referred to the Board for final approval. The Board will be advised of the initiation of program projects and expenditures through the Quarterly Capital Report.

Business cases for revenue vehicle procurements are developed and presented within the Strategic Transportation Plan. Work Plans are prepared and reviewed prior to submission to the Board for specific project approval to finalize project scope, budget, schedule and organization for all projects.

DISCUSSION

Specific project approval is requested for the following capital programs/projects. Comparisons of proposed expenditures versus approval-in-principle estimates are provided.

Revenue Vehicle Procurements

1. Bus Fleet Replacement – 50 forty-foot, low-floor, clean diesel - $20,265,200

Fifty replacement vehicles will be delivered in 2002 to replace existing buses in the CMBC fleet that meet or exceed the 17-year target replacement policy. The buses will be low-floor design with clean diesel engines, meeting all current urban transit emission regulations.

These replacement vehicles are identified in the Strategic Transportation Plan fleet allocation, and were approved-in-principle by the Board as part of the 2000 Capital Budget. TransLink is investigating the possibility of procuring these vehicles through an option previously negotiated with New Flyer Industries (NFI) at 1999 tender prices. As the delivery dates for the option would have to be extended to 2002 from 2001, vehicle pricing may have to be re-negotiated for these 2002 vehicles. The vehicle procurement will be re-tendered if pricing cannot be satisfactorily negotiated with NFI. Availability of tendered vehicle prices for 2000 delivery and more recent estimates of other equipment and project costs have resulted in a reduction to the overall project budget.

Approval Stage	Total
Approval in Principle	$21,060,000
Specific Project Approval	$20,265,200
Increase / (Decrease)	($794,800)

2. Bus Fleet Expansion – 29 forty-foot, low-floor, clean diesel - $12,287,600

Twenty-nine vehicles will be delivered in 2002 to meet TransLink's commitment for expanded bus service. The buses will be low-floor design with clean diesel engines, meeting all current urban transit emission regulations.

These expansion vehicles are identified in the Strategic Transportation Plan fleet allocation, and were approved-in-principle by the Board as part of the 2000 Capital Budget. The original project request was for 61 buses - including 17 forty-foot, diesel highway buses and 15 articulated diesel buses. The three bus types will be tendered separately, therefore, the project and budget has been split accordingly.

TransLink is investigating the possibility of procuring these vehicles through an option previously negotiated with New Flyer Industries (NFI) at 1999 tender prices. As the delivery dates for the option would have to be extended to 2002 from 2001, vehicle pricing may have to be re-negotiated for these 2002 vehicles. The vehicle procurement will be re-tendered if pricing cannot be satisfactorily negotiated with NFI. Availability of tendered vehicle prices for 2000 delivery and more recent estimates of other equipment and project costs have resulted in a reduction to the overall project budget.

Approval Stage	Total
Approval in Principle	$12,465,200
Specific Project Approval	$12,287,600
Increase / (Decrease)	(177,600)

Capital Programs

3. Major Road Network - Rehabilitation - $6,735,000

In May 1999, the TransLink Board approved a set of principles intended to guide the establishment, funding and operation of the Major Road Network (MRN). One of these principles stipulates that TransLink will fund the rehabilitation of declassified roads that do not meet the established standards or guidelines. In March 2000, as part of the 2000 Capital Budget, the Board approved-in-principle a budget to fund required road rehabilitation by December 2001.

Based on preliminary work, approximately 25 lane-kms of devolved roads in the MRN have been identified as sub-standard. The municipalities in which the roads are located will be responsible for all aspects of project administration, management and procurement. TransLink's primary role is to establish scope and costs jointly with municipalities, and to provide funding.

The MRN – Rehabilitation Project will fund:

- engineering and design work to identify appropriate rehabilitation strategies; and
- actual pavement rehabilitation and/or reconstruction.

Approval Stage	**Total**
Approval in Principle	$6,735,000
Specific Project Approval	$6,735,000
Increase / (Decrease)	0

4. TransLink Owned Bike Infrastructure & Facilities - $698,000

The scope of this project includes:

- Purchase of 300 bike racks for buses – to be installed at Surrey, Oakridge, Richmond and Port Coquitlam transit centres;
- Site preparation, purchase, assembly and installation of up to 90 bicycle lockers at transit exchanges and SkyTrain Stations.

The Bicycle Program was approved within the Strategic Transportation Plan to encourage cycling in the GVRD. The Program's objectives include the following:

- All buses are to be bike accessible as early as possible;
- Bike lockers are to be installed at all major transit exchanges and SkyTrain Stations.

The 300 new bike racks for buses will bring the total conventional fleet equipped with bike racks to 670 vehicles, or 55 percent of the existing fleet.

Approval Stage	**Total**
Approval in Principle	$698,000
Specific Project Approval	$698,000
Increase / (Decrease)	0

Capital Projects

5. Steveston Passenger Facilities & Relief Point – $730,000

Installation of three new bus stops on the east side of Steveston Interchange will facilitate passenger transfers between transit services on Steveston Highway and

northbound Highway 99 (from Delta, Surrey and White Rock to Vancouver). These facilities will complement the two bus bays under construction on the west-side of the interchange, which were incorporated in the Highway 99 HOV Project. As transfers between Steveston Hwy and Hwy 99 are virtually non-existent at present, this initiative will improve service quality for passengers.

The new facilities will also serve as an operator relief point to permit efficient changing of bus operators on Highway 99 services once the Richmond Transit Centre is in operation. With the new relief point, the operator's travel time from Richmond Transit Centre will be approximately five minutes. Without the proposed transit facilities on the east side of the interchange, relief operators would have to travel 40 minutes to Granville/70th for Surrey and White Rock express routes, or 15 minutes to Ladner Exchange for Delta routes. This significant reduction in travel time translates into a cost avoidance of $95,000 per year.

The scope of this project also includes implementation of required traffic management measures, and geometric improvements to the on-ramps on the east side of the interchange, thus improving traffic safety.

Approval Stage	**Total**
Approval in Principle	$730,000
Specific Project Approval	$730,000
Increase / (Decrease)	0

6. West Coast Express – Network Controller Unit/Communication Upgrade – $418,300

Replacement of the existing West Coast Express (WCE) ticket vending machine (TVM) network controller unit (NCU) and communications systems will eliminate the increasing risk of system failure. The five-year old NCU utilizes obsolete technologies that cannot be replaced and is difficult to maintain. Non-cash TVM transactions are processed on-line between the TVMs and the NCU. Should system failure occur, the ticket vending machines would shut down within 3-4 days, as on-board memory becomes full.

This is intended as a 3-5 year interim solution, until WCE ticket sales systems can be integrated into the fare collection strategy currently being identified for the conventional bus and SkyTrain systems. The NCU upgrade will support a phased-in integration by linking magnetic strip tickets and validators with the ticket vending machine replacement system.

The project budget is higher than the budget proposed at the Approval-in-Principle stage. Significant cost increases are due to:

- Unanticipated need to modify TVM firmware to change communications protocols - $75,000;
- Previous omission of taxes - $25,300;
- Addition of contingency budget - $20,000.

The annual operating savings are expected to be $25,000, as a result of reduced communication costs.

Approval Stage	**Total**
Approval in Principle	$286,000
Specific Project Approval	$418,300
Increase / (Decrease)	132,300

7. Albion Ferry Administration Office Expansion – $231,400

Expansion of the Albion Ferry administrative offices will provide functional workspace to accommodate the additional staff as a result of the transfer from the Province to TransLink. The existing building is a 135m^2 bungalow converted to office use. Minor improvements were made in 1986, including new washrooms, offices, insulation and mechanical and electrical upgrades. Six administrative employees and 75 operations employees share the existing office, storage and staffroom space.

The project scope includes renovation of the existing ground floor space plus the addition of a 115m^2 second floor. This option is preferable to expansion of the ground level, or use of a portable at ground level, as it does not reduce the existing parking and ferry queuing space (already inadequate for ferry operations). Furthermore, it does not change the building footprint, thus permits from Maple Ridge will be easier to obtain, and permits will not be required from the Ministry of Environment. A change in footprint would have required an environmental permit due to the building's proximity to the river's high water mark. Off-site office space options would result in higher operating costs, as well as operating inefficiencies and inconveniences to the travelling public.

The Strategic Transportation Plan identifies the replacement of the Albion Ferry with a fixed link in the medium term (about 10 years). Until then, the existing ferry service will continue to operate. The increase in the project budget is due to better estimates based on further development of the preferred option.

Approval Stage	Total
Approval in Principle	$203,000
Specific Project Approval	$231,400
Increase / (Decrease)	28,400

8. SkyTrain Platform Edge Warning System (PEWS) – $2,103,900

The twenty existing SkyTrain Stations from Waterfront to King George will be retrofitted with a highly visible and tactile Platform Edge Warning System (PEWS). Installation of PEWS address a safety need to provide a tactile platform edge warning system for the visually impaired ridership, and because of the new wider MKII cars under construction that encroach further onto the platform edge.

The Rapid Transit Project Office (RTPO) is installing PEWS at all thirteen new stations currently being designed. Installation of PEWS at only some stations may lead to confusion for visually impaired riders – a significant safety concern. The British Columbia Rapid Transit Company (BCRTC) and RTPO have recommended the same PEWS option and wish to enter contract negotiations with the supplier at the same time.

The project budget is higher than the budget proposed at the Approval-in-Principle stage. Revised cost estimates for materials, labour, taxes and contingencies, based on a more developed design, have resulted in a budget increase of $27,500 per station.

Approval Stage	Total
Approval in Principle	$1,393,000
Specific Project Approval	$2,103,900
Increase / (Decrease)	710,900

9. Coquitlam SkyTrain Extension – Consulting/Contractor Services – $1,125,000

TransLink is the lead funding agency for the SkyTrain Coquitlam guideway extension, from Lougheed Mall to Coquitlam Town Centre. Through the provision of consulting services, this project budget will ensure that TransLink participates effectively in the planning and design of the route and guideway, in collaboration with the Rapid Transit Project Office (RTPO) and affected municipalities.

The project budget allows for a Project Coordinator plus other contracted resources and/or activities over a five-year period. Resource requirements are expected to fluctuate throughout the schedule.

The Project Coordinator and other contracted resources will:

- Facilitate resolution of issues with municipalities and RTPO;
- Coordinate the integration of bus, handyDART and West Coast Express connector services;
- Assist with project negotiations;
- Participate in public consultation;
- Assist with maximizing community integration;
- Verify livable region goals are being supported;
- Verify future operational requirements are addressed;
- Monitor project contracts, schedules and budgets.

Approval Stage	**Total**
Approval in Principle	$1,125,000
Specific Project Approval	$1,125,000
Increase / (Decrease)	0

CONCLUSION

It is recommended that the Board approve funds totalling $44,594,400 for the nine capital programs/projects listed in the report. The Step 2 specific project approval budget request for these nine projects is a net reduction of $100,800 compared to the approval-in-principle budgets. To date, the specific project approval budgets for projects approved in the 2000 Capital Budget is $115,600 lower compared to initial estimates.

To: GVTA Board of Directors

From: Sheri Plewes, Vice President, Contracts and Acquisitions

Date: June 5, 2000

Subject: **Trolley Bus Fleet Replacement**

Recommendation:

A. That the Board approve the replacement of the present trolley bus fleet with a current service requirement of
   - 205 low-floor, standard (12m) electric trolley buses,
   - plus an option of either 60 low-floor standard (12m) trolleys or 40 low-floor articulated (18m) electric trolley buses,

   procured as described within this report. Staff will report back to the Board prior to the selection of the option.

B. That the Board approve the inclusion of a fleet expansion option in the procurement to meet service requirements to 2006 for a further
   - 60 low-floor standard electric trolley buses, or
   - 40 low-floor articulated electric trolley buses,

   procured as described within this report. Staff would be required to report back to the Board for approval of this purchase in 2004.

C. That the Board approve the concept of banking carbon dioxide emission credits incurred due to the avoidance of emissions from the purchase of trolley buses instead of diesel buses. Staff will pursue opportunities for trading these credits, or using the credits internally, for carbon dioxide credit offsets.

PURPOSE

This report reviews the service requirements for routes currently served by the trolley fleet and recommends a strategy and technology for replacement. Strategies for both replacement and expansion of the trolley fleet to meet service requirements to 2006 have been reviewed.

BACKGROUND

Trolley buses have been in operation in Vancouver since 1948. The fleet is comprised of 244 high-floor standard length (12m or 40 ft) buses that were commissioned between 1982 and 1983. As such, the fleet is nearly 18 years old and nearing the end of its operational life. Most of the vehicles are corroded and spare parts can no longer be acquired. TransLink needs to replace the fleet with vehicles that meet current service and technology requirements.

The attached document, "Report on Trolley Bus Replacement for the TransLink Capital Plan", brings together information on Vancouver's trolley bus fleet and on current bus technology so that choices can be made for the replacement of the fleet. Much of the information in this report has been provided by Coast Mountain Bus Company and the TransLink Implementation Planning Group.

The trolley bus replacement report summarizes the present operation of the trolley fleet. There are currently 244 high floor trolley buses operating on 13 trolley routes in Vancouver, with limited trolley bus service on 41st Avenue, covering a route length of 309 km. The average weekday boardings total 245,000. Each trolley bus carries an average of over 1000 people daily compared with 500 people per day on the average diesel bus.

The Oakridge Transit Centre houses the trolley bus fleet. Opened in 1948 as a base for trolley coach operations, it currently houses 244 trolley buses and 200 diesels for a total of 444 vehicles. The facility was originally designed to handle a maximum fleet size of 350 vehicles. Parking congestion on the site causes operational difficulties and inefficiencies, particularly with maintenance. The opening of the new Richmond Transit Centre will relieve the congestion at the Oakridge Transit Centre by reducing the vehicles on site to the 350 vehicle level. As well, Oakridge Transit Centre currently lacks the space and maintenance equipment to maintain 18 m (60 ft) articulated buses. A facility plan study is currently underway to develop a program of major improvements for Oakridge Transit Centre.

The 309 kilometers of trolley routes are serviced by overhead wire under which 925,000 hours of service are operated annually. The overhead trolley infrastructure has an estimated replacement cost of $184 Million. The existing network of overhead wires has been well maintained with ongoing, routine maintenance and rehabilitation. There is estimated to be a remaining life of 20 – 30 years for the overhead infrastructure.

DISCUSSION

Future Service Issues

No expansion is planned to the present trolley grid infrastructure. The coverage is mainly within the City of Vancouver and on the busiest routes in the bus transit system. The

immediate need is to replace the existing trolley buses with a new fleet, either with the same trolley technology or with the other available fleet options.

There are a number of issues that affect the planning of the future trolley bus service. These include:

- increases in population (population growth is projected to grow 50% and employment by 56% in the GVRD between 1996 and 2021);

- new transit services that are being considered within the City of Vancouver (these include SkyTrain, new B-Line services and community bus services);

- conditions on the present routes (issues such as ridership, loading, frequencies and overcrowding have been reviewed for each trolley route with suggestions being made for changes in frequencies and equipment).

One of the biggest problems associated with the present trolley bus operation is the traffic congestion on the streets over which it runs. Traffic increases annually and this affects the turnaround times of the buses and the need to operate a larger fleet.

TransLink planners have estimated the future trolley bus needs by modelling and analyzing the above factors. These future requirements are shown on **Table1**. The table shows the requirements for a future fleet of standard (12m) buses and an equivalent fleet of standard and articulated (18m) buses for the year 2006.

TABLE 1

Future Fleet Requirements

Route Number	Route Name	Current Fleet of standard electric trolley buses	Current Peak Frequency 2000	Projected Frequency (using 12 m buses) in 2006	Projected Frequency (using articulated buses on routes 3, 9 and 20) in 2006	Current Peak Service in 2000 On Trolley Routes *Note 1*	Projected Peak standard Trolley Buses Required in 2006	Projected Peak Trolley Buses Required with articulated buses on routes 3, 9 and 20 in 2006 (A = articulated)
3	Main/ Downtown	21	5	4	6	25	29	19 (A)
4	Powell/UBC/Downtown	12	11	9	9	12	16	16
5	Robson/ Downtown	10	5.5	4	4	10	15	15
6	Davie/ Downtown	9	5.5	4	4	9	14	14
7	Nanaimo Stn/ Dunbar	14	11	9	9	14	19	19
8	Fraser/ Granville	29	6	6	6	29	32	32
9	Boundary/ Alma/ UBC	28	4	3	4.5	32	41	28 (A)
10	Hastings/ UBC	19	8	-	-	19	-	-
15	Cambie/ Downtown	10	6	5	4	10	18	13
16	29th Avenue Stn/ Arbutus	19	9	7	7	22	27	27
17	Oak/ Downtown	16	7.5	6	6	19	17	22
19	Metrotown Stn/ Downtown	11	10	8	8	11	15	15
20	Victoria/ Downtown	23	5	4	6	28	32	21 A
	PEAK REQUIREMENT	**221**				**221**	**275**	**173 + 68 (A)**
	SPARES	**23**				**44 (18%)**	**50 (18%)**	**31 + 12 (A) (18%)**
	TOTAL FLEET REQUIRED	**244***				**265**	**325**	**204 + 80 (A)**

Note 1: In order to meet current (2000) demand on trolley routes, the electric trolley bus fleet is augmented with diesel buses.

Technology Alternatives

There are a number of existing and new candidate technologies for the replacement fleet. The characteristics of each technology have been assessed in terms of its operation, emissions, noise level and life cycle cost. In comparing the different technologies, account has been taken of the influence that vehicle age, heavy route loadings and stop-start conditions have on the present trolley fleet. These were evaluated with the different features of the buses and routes that are operated by the diesel and compressed natural gas (CNG) fleets.

In general terms, electric trolley buses require an overhead power infrastructure and are more expensive to purchase than diesel buses. The higher initial cost for the trolley bus results in higher life cycle costs. Trolleys are less flexible to operate than diesels but have similar shop maintenance requirements. The trolley bus compares favourably with diesels in terms of customer service, the environment and social impacts. Attention is drawn to the few transit agencies that operate electric trolley bus fleets in North America and the influence that this has on the market with resulting higher costs for new trolley buses.

The diesel engine has been the standard engine of choice in the transit industry for the last fifty years. It is a readily available stock item that is competitively priced. Refinements, upgrading and technology advancements have enabled diesel engine manufacturers to meet the stringent emission requirements now being imposed on the diesel technology. Despite these technological advances, the use of diesel fuels produces undesirable emissions such as carbon dioxide that is a greenhouse gas.

Buses fuelled with compressed natural gas have advantages over diesel buses in terms of the cleaner emissions they produce with respect to particulate emissions. However, CNG buses are heavier, costly to operate and emit similar amounts of carbon dioxide.

Electric trolley buses compare favourably with diesel and CNG buses in terms of their air emissions, lower noise levels and their operating characteristics on routes with high passenger loadings and frequent stops.

The two most promising emerging technologies are the hybrid and the fuel cell. Both technologies are in experimental stages and several North American transit agencies (including TransLink) are operating prototypes. Neither technology is yet in commercial production and is unlikely to be commercially viable within the next five years. They cannot be considered for the present trolley bus replacement acquisition, but may be attractive options for future fleet expansion.

Technology Assessment

An assessment was made of the technology that would best meet the needs of TransLink for service on existing trolley bus routes. Account was taken of the financial, customer service, environmental, economic, social, safety and operational features of each technology. This assessment is shown on **Table 2**.

This assessment shows that electric trolley buses have positive attributes over diesel and CNG buses in terms of customer service, environment, economic development and social factors. Trolleys are more expensive to acquire and their use is restricted to trolley routes. However, they are considered to be most appropriate for the kind of routes, passenger loadings and built-up urban areas where they are required to operate.

TABLE 2
Technology Assessment

	Trolley	**Diesel**	**CNG (Compressed Natural Gas)**	**Hybrid and Fuel Cell**
Financial (6.5% discount rate) Life Cycle Costs Premium over diesel Annual Life Cycle Cost	 $1.45m/vehicle 28% $73,000/year	 $1.13m/vehicle - $57,000/year	 $1.37m/vehicle 21% $69,000/year	 Not known -
Customer Service Value derived from each technology	• Clean • Quiet • Even ride	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet for bus riders • Reasonably comfortable	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet • Reasonably comfortable	Cleaner and quieter than diesel
Environment Biophysical impact of each technology	Zero air emissions from a bus	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	Fuel Cell approaches zero air emissions, Hybrids have reduced emissions varying with the different engine configurations.
Economic Development Market impact of each technology	Positive: Some permanence created by fixed overhead wires	Supportive of development	Supportive of development	Positive
Social Impacts on social fabric and values	• Neighbourhood friendly; little noise or air pollution • Visual intrusion of overhead wires	Noisy for residents with odorous emissions	Noisy for residents with odorous emissions	Unknown
Safety & Traffic Operations Impact on street safety and operation	• Good on heavy routes • Delays when disconnected from overhead	Neutral	Neutral	Unknown/neutral
Regional Bus Operations (Impact on Coast Mountain Bus Company Operations)	• Less flexibility • Specially equipped maintenance facility • Special replacement order requires pre-delivery units • Existing infrastructure in place and in good condition	• Flexible for any route • Standard Industrial Maintenance • Well supplied and competitive marketplace • Removal of trolley overhead and loss of overhead use	• Less flexible, carries fewer passengers • Special fueling equipment • Technology becoming more reliable • Removal of trolley overhead and loss of overhead use	• Hybrid is an emerging technology • Fuel cell remains experimental • Removal of trolley overhead and loss of investment

Carbon Credits

Most of the emissions from diesel engines are in the form of carbon dioxide which is a greenhouse gas. One average diesel bus emits approximately 100 tonnes of carbon dioxide per year. This means that a total replacement fleet of 265 trolley buses, if converted to diesel engines, will emit about 30,000 tonnes of carbon dioxide per annum. If the trolley buses are retained and these emissions to the atmosphere were not made, the carbon dioxide savings can be used to trade with a company that is trying to offset the risk of their own carbon emissions.

The ability for TransLink to trade carbon emission is made possible by the Kyoto Treaty, an international protocol agreement to which Canada is a participant. The Treaty aims at curbing global warming by reducing the greenhouse gas (GHG) emissions (carbon dioxide and methane) of developed countries to 1990 levels by the year 2010. In addition to restricting GHGs, the agreement encourages international trading in emissions to offset the costs of compliance.

The basis of the trade would be the avoidance of future emissions that would arise from TransLink replacing their electric trolley fleet with more economical diesel buses.

The weight of avoided diesel emissions (30,000 tonnes per year) are moderate compared to some recent international trades. The current cost of carbon trading is about CDN$3.00 per tonne. This indicates a possible trade at current prices in the amount of $90,000 per annum. The value of a tonne of carbon could increase if taxes or penalties are levied by federal governments on producers of GHGs.

Most Canadian energy utilities burn fossil fuels (coal, oil and natural gas) and are trying to make carbon trades. If the Board approves the purchase of trolley buses, TransLink should "bank" the carbon emission savings and pursue a carbon trade which will signal TransLink's ongoing commitment to the environment.

Procurement Schedule and Acquisition Costs

Based on the results of the technology assessment, which showed the appropriateness of replacing the existing trolley fleet with new electric trolley buses, a financial analysis was undertaken of acquisition strategies. The recommended strategy is shown on **Table 3**.

TABLE 3

Trolley Bus Replacement Strategy

Strategy	**2000 Service Replacement**				**2006 Service**	
				Option	**Expansion**	
Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Acquisition	205 Standard (12m) Trolleys			60 Standard Trolleys	60 Standard Trolleys	
				40 Articulated Trolleys	40 Articulated Trolleys	

It is recommended that TransLink should replace its trolley buses with a new fleet for delivery scheduled between 2002 and 2005. Options should be investigated for a further expansion of this fleet in 2006 or 2007. Options should also be investigated for articulated vehicles to replace standard vehicles in the later deliveries. If the Board approves the replacement of trolley buses, with new electric trolleys, procurement could take the form of:

- a request for a base order of 205 standard electric trolley buses for delivery between 2002 and 2004; with,
- a request for 60 standard electric trolley buses for delivery in 2005; or
- a request for an option of 40 articulated electric trolley buses for delivery in 2005.

The tender could also permit an option for the following expansion of service requirements to 2006 and to be approved by the Board at a later date. This would be for:

- a request for an option of a further 60 standard electric trolley buses for delivery in 2006 or 2007; or,
- a request for an option of a further 40 articulated electric trolley buses for delivery in 2006 or 2007.

TransLink would use a competitive tender to procure the trolley buses on the basis of best value. Due to the limited North American market for electric trolley buses, this may be achieved by international public tender to a prequalified list of suppliers. The conditions of contract should provide for the development of working relationships between TransLink/Coast Mountain Bus Company and the suppliers in the interest of acquiring the best, current equipment for the replacement fleet. It is expected that different manufacturers may supply the base order and the selected optional orders.

The annual acquisition costs of the above procurement, together with options for standard or articulated trolleys, is shown on **Table 4**.

TABLE 4

Trolley Bus Replacement Fleet
Annual Capital Acquisition Costs
2002 – 2007

Standard Trolley Bus Options

	2002	2003	2004	2005	2006	2007	TOTAL
Base Order of 205 standard trolleys	55,884,000	63,079,000	65,834,000	6,612,000			**191,409,000**
Complete service replacement with 60 std trolleys				59,829,000			**59,829,000**
Expand fleet with further 60 standard trolleys					56,509,000	6,279,000	**62,788,000**
Annual Requirements	**55,884,000**	**63,079,000**	**65,834,000**	**66,441,000**	**56,509,000**	**6,279,000**	
TOTAL				**251,238,000**		**62,788,000**	**314,026,000**
	Funding Required from TransLink Board				**Future Funding to be Requested**		

Standard and Articulated Trolley Bus Options

	2002	2003	2004	2005	2006	2007	TOTAL
Base order of 205 standard trolleys	55,884,000	63,079,000	65,834,000	6,612,000			**191,409,000**
Complete service replacement with 40 artic trolleys				64,492,000			**64,492,000**
Expand fleet with further 40 articulated trolleys					58,757,000	6,504,000	**65,261,000**
Annual Requirements	**55,884,000**	**63,079,000**	**65,834,000**	**71,104,000**	**58,757,000**	**6,504,000**	
TOTAL				**255,901,000**		**65,261,000**	**321,162,000**
	Funding Required from TransLink Board				**Future Funding to be Requested**		

Notes:

1. *Costs of pre-delivery units not included.*
2. *Costs of upgrading maintenance facilities not included.*

CONCLUSION

As identified in the TransLink Strategic Transportation Plan 2000 – 2005 and outlined in the "Report on Trolley Bus Replacement", TransLink needs to replace the present electric trolley bus fleet with 265 standard (12m) buses to meet the operating requirements for the year 2000. A further 60 standard vehicles will be required to meet projected requirements for operation in the year 2006.

It is recommended that the Board approve replacement of its trolley fleet service requirements with a new fleet of low-floor electric trolley buses with delivery scheduled between 2002 and 2005. Options should be investigated for an expansion of this fleet in 2006 or 2007.

It is also recommended that approval be given to seek to bank or to trade savings in carbon dioxide (a greenhouse gas) emissions created as a result of choosing a trolley bus replacement over a diesel bus replacement.

TRANSLINK CAPITAL PLAN
TROLLEY BUS SERVICE REPLACEMENT

FLEET ASSESSMENT REPORT

TRANSLINK

JUNE 2000

TRANSLINK CAPITAL PLAN
TROLLEY BUS SERVICE REPLACEMENT

FLEET ASSESSMENT REPORT

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EXECUTIVE SUMMARY

1. The Present Trolley Bus Fleet

Trolley buses have been in operation in Vancouver since 1948. Their 309km route coverage is shown on **Exhibit E1.1**. Their route allocation and ridership is shown on **Table E1.2**. A trolley bus carries over 1000 people daily. This is double the number of passengers carried by the average bus in the Coast Mountain Bus Company fleet.

The present trolley fleet is made up of 244 high-floor (600mm above curb height), standard length (12m or 40ft) buses manufactured by New Flyer Industries between 1982 and 1983. They are driven by Westinghouse D/C motors that takes current from the overhead trolley wires.

In order to meet present (2000) demands on the trolley bus routes, the trolley fleet is supplemented on a daily basis by up to 21 diesel buses.

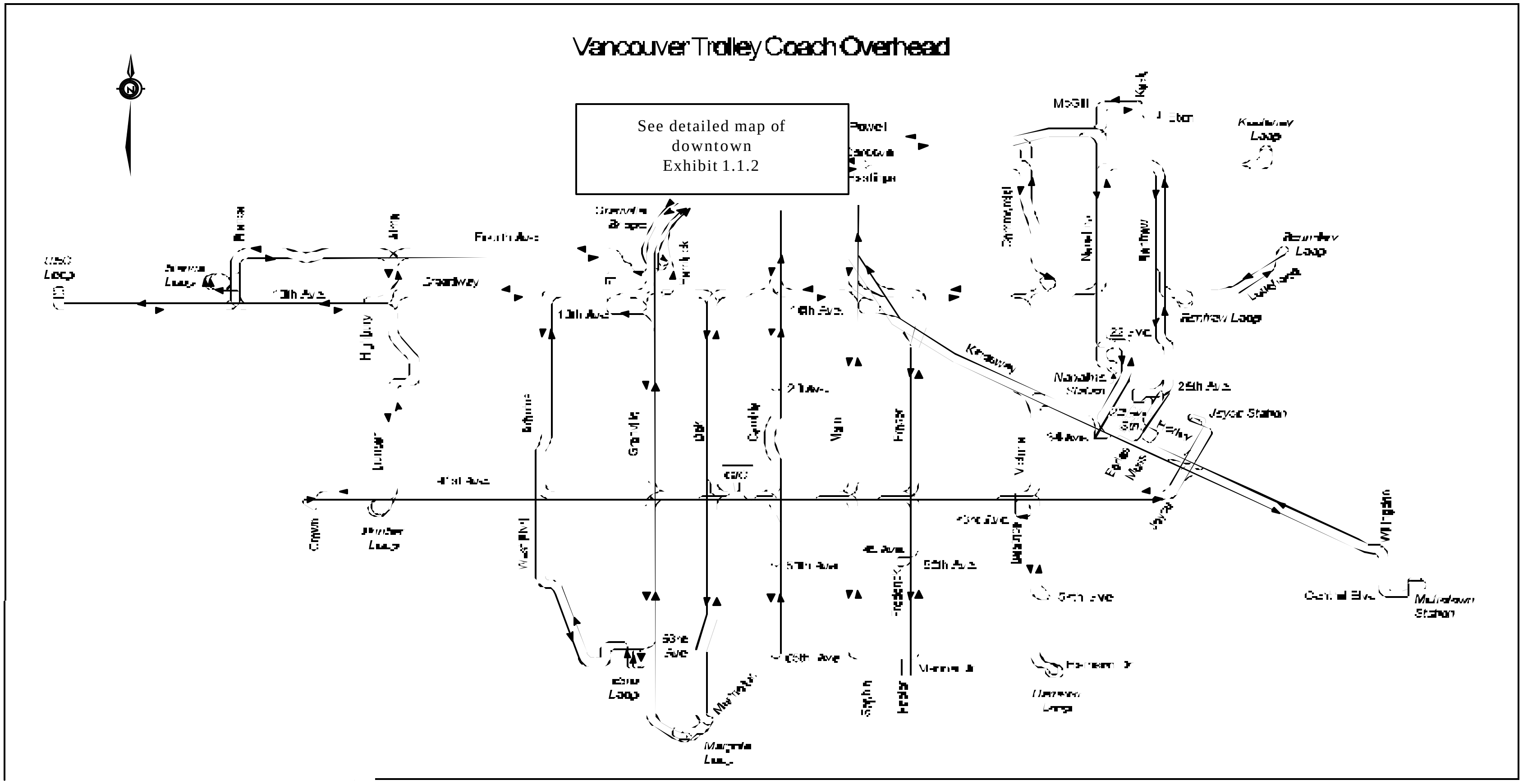
Buses are maintained at the Oakridge Transit Centre (OTC) which currently houses 244 standard trolleys and 200 standard diesel buses. The facility was built in 1948 to handle 350 buses. It currently requires a major upgrade as well as modifications for articulated (18m or 60ft) buses.

TABLE E1.2

Current Trolley Bus Routes Ridership					
Route Number	**Route Name**	**P.M. Bus Allocation**	**Weekday unlinked boardings**	**Boardings / Hour (weekdays)**	**Boarded Passengers /revenue km (weekdays)**
3	Main/ Downtown	21	23,170	100.67	7.40
4	Powell/UBC	12	11,940	69.87	4.16
5	Robson/ Downtown	10	12,730	87.31	9.48
6	Davie/ Downtown	9	11,100	94.19	9.91
7	Nanaimo Stn/ Dunbar	14	9,960	52.48	3.37
8	Fraser/ Granville	29	31,200	86.57	5.56
9	Boundary/ Alma/ UBC	28	44,500	119.03	8.21
10	Hastings/ UBC	19	22,520	81.72	5.00
15	Cambie/ Downtown	13	13,810	99.82	6.90
16	29th Avenue Stn/ Arbutus	19	13,810	57.09	3.57
17	Oak/ Downtown	13	11,020	70.56	4.44
19	Metrotown Stn/ Downtown	11	12,520	78.46	4.97
20	Victoria/ Downtown	23	26,450	91.90	6.80
	Spares	23			
	Total	**244**	**244,738**		

Reference: TransLink Implementation Planning

EXHIBIT E1.1


Vancouver Trolley Coach Overhead
See detailed map of
downtown
Exhibit 1.1.2
Powell
McGill
Fourth Ave.
Broadway
Kingsway
Renfrew Loop
Joyce Station
Nanaimo Station
Granville
Main
Fraser
41st Ave.
25th Ave.
Boundary Loop
Kootenay Loop
Marpole Loop
Metrotown Station

2. Technology Alternatives

Five existing and emerging technologies were identified and reviewed as candidate replacements for the trolley bus fleet:

- **Clean Diesel** -An existing type of engine fueled by a refined dieseline that meets current emission standards of Environment Canada.

- **Compressed Natural Gas** (CNG) -An existing type of engine fueled by CNG from BC resources.

- **Electric Trolley Bus** - An existing type of motor driven by direct electrical current taken from an overhead catenary system.

- **Hybrid Electric** - An emerging configuration of electric and diesel technology; a small diesel engine drives the bus in cruise mode as well as an energy storage device that generates electrical power for acceleration and hill climbing.

- **Hydrogen Fuel Cell** -An emerging technology that relies on an electrical motor which receives its electrical power from a chemical reaction of hydrogen and oxygen in a fuel cell.

The performance of each technology is summarized in **Table E2.1**. The trolley fleet costs 28% more to operate over its life cycle than the Series 50 diesel fleet. However, a trolley bus does more route kilometres in its life than a diesel bus, and trolley buses are used on the busiest routes in the system.

TABLE E2.1

Technology Comparison

Technology	Annual Life Cycle Cost ($)	Operational Life (Years)	Current Fleet Size	Emissions (g/mile)			
				PM_{10}	NOx	CO	CO_2
Trolley	73,000	20	244	0	0	0	0
Diesel	57,000	17	867	0.30	30.4	4.9	2984
CNG	69,000	17	50	0.08	20.8	9.0	2483
Hybrid	no data	no data	-	0.03	10.7	0.13	1761
Fuel Cell	no data	no data	-	0	0	0	0

Reference GVRD and Coast Mountain Bus Company

3. Future Service Issues

In planning future services for the routes currently being operated by trolley buses, the following factors were taken into account.

- New transit services planned for the Vancouver area – Express Bus, B-Line, SkyTrain extensions, Community Bus.

- Changing population and employment trends. Population growth is projected to grow by 50% and employment by 56% in the GVRD between 1996 and 2021. The origins and destinations of work trips made in Vancouver, Burnaby and Richmond in 1996 are shown on **Table E3.1**.

- Work trips. The percentage of Vancouver residents who work in Vancouver has been declining. Work trips are increasingly linked to emerging employment centres in Burnaby and Richmond.

- Current issues affecting existing routes. Issues such as ridership, loading, frequencies and overcrowding were reviewed for each trolley route with suggestions being made for changes.

TABLE E3.1

Work Trip Matrix
1996

City of Residence	City of Employment			
	Vancouver	Richmond	Burnaby	Total employed
Vancouver	146,695	18,940	18,385	258,010
Richmond	13,220	30,485	3,185	70,750
Burnaby	28,790	4,795	23,480	85,485

Reference: TransLink Implementation Planning

TransLink planners have estimated the future trolley bus needs by modelling and analyzing the above factors. These future requirements are shown on **Table E3.2**. The table shows the requirements for a future fleet of standard (12m) buses and an equivalent fleet of standard and articulated (18m) buses for the year 2006.

TABLE E3.2

Future Fleet Requirements

Route Number	Route Name	Current Fleet of standard electric trolley buses	Current Peak Frequency 2000	Projected Frequency (using 12 m buses) in 2006	Projected Frequency (using articulated buses on routes 3, 9 and 20) in 2006	Current Peak Service in 2000 On Trolley Routes *Note 1*	Projected Peak standard Trolley Buses Required in 2006	Projected Peak Trolley Buses Required with articulated buses on routes 3, 9 and 20 in 2006 (A = articulated)
3	Main/ Downtown	21	5	4	6	25	29	19 (A)
4	Powell/UBC/Downtown	12	11	9	9	12	16	16
5	Robson/ Downtown	10	5.5	4	4	10	15	15
6	Davie/ Downtown	9	5.5	4	4	9	14	14
7	Nanaimo Stn/ Dunbar	14	11	9	9	14	19	19
8	Fraser/ Granville	29	6	6	6	29	32	32
9	Boundary/ Alma/ UBC	28	4	3	4.5	32	41	28 (A)
10	Hastings/ UBC	19	8	-	-	19	-	-
15	Cambie/ Downtown	10	6	5	4	10	18	13
16	29th Avenue Stn/ Arbutus	19	9	7	7	22	27	27
17	Oak/ Downtown	16	7.5	6	6	19	17	22
19	Metrotown Stn/ Downtown	11	10	8	8	11	15	15
20	Victoria/ Downtown	23	5	4	6	28	32	21 A
	PEAK REQUIREMENT	**221**				**221**	**275**	**173 + 68 (A)**
	SPARES	**23**				**44 (18%)**	**50 (18%)**	**31 + 12 (A) (18%)**
	TOTAL FLEET REQUIRED	**244***				**265**	**325**	**204 + 80 (A)**

* *In order to meet current (2000) demand of 265 buses on trolley routes, the electric trolley bus fleet is augmented with diesel buses.*

4. Trolley Bus Replacement Fleet Assessment

An assessment was made of the future technology that would best meet the needs of TransLink for service on existing trolley bus routes. Account was taken of the financial, customer service, environmental, economic, social, safety and operational features of each technology. This assessment is shown on **Table E4.1**.

Electric trolley buses have distinct positive attributes over diesel and CNG buses in terms of customer, environment, economic and social factors. Trolleys are more expensive to acquire and their use is restricted to trolley routes. Trolleys have marginally higher life cycle costs than diesel buses and their use is restricted to routes with overhead wires.

The overall assessment is that electric trolley technology should be retained for its favourable characteristics.

5. Greenhouse Gas Emissions and Opportunities for Carbon Trading

Most of the emissions from diesel engines is in the form of carbon dioxide which is a greenhouse gas. One average diesel bus emits approximately 100 tonnes of carbon dioxide per year. This means that a total replacement fleet of 265 trolley buses, if converted to diesel engines, will emit about 30,000 tonnes of carbon dioxide per annum. If the trolley buses are retained and these emissions to the atmosphere are avoided, the carbon dioxide savings can be used to trade with a company that is trying to offset the risk of their own carbon emissions.

The ability for TransLink to trade carbon emission is made possible by the Kyoto Treaty, an international protocol agreement to which Canada is a signatory. Most Canadian energy utilities burn fossil fuels (coal, oil and natural gas) and are trying to make carbon trades. TransLink should "bank" their carbon emission savings and pursue a carbon trade which will signal their preference for clean propulsion of their vehicles.

6. Financial Analysis

Based on the fleet assessment, a financial analysis was undertaken for a service replacement with new electric trolley buses using various acquisition scenarios. These scenarios include strategies for replacement of year 2000 service and service expansion in 2006. The annual capital acquisition cost for inclusion in the TransLink Capital Plan is shown on Table E5.1.

7. Recommendations

For reasons discussed in Section A, it is recommended that the Board approve replacement of its trolley fleet with a new fleet of low-floor electric trolley buses with delivery scheduled between 2002 and 2005. Options should be investigated for an expansion of this fleet in 2006 or 2007.

Options should also be investigated for articulated vehicles to replace standard vehicles in the later deliveries. The procurement of the replacement trolley buses should take the following form:

- a request for a base order of 205 standard electric trolley buses for delivery between 2002 and 2004; with,
- a request for 60 standard electric trolley buses for delivery in 2005; or
- a request for an option of 40 articulated electric trolley buses for delivery in 2005.

The tender could also permit an option for the following expansion of service requirements to 2006 and to be approved by the TransLink Board at a later date. This would be for:

- a request for an option of a further 60 standard electric trolley buses for delivery in 2006 or 2007; or,
- a request for an option of a further 40 articulated electric trolley buses for delivery in 2006 or 2007.

TABLE E7.1

Trolley Bus Replacement Strategy

Strategy	2000 Service Replacement				2006 Service	
				Option	Requirement	
Year	2002	2003	2004	2005	2006	2007
Acquisition	205 Standard (12m) Trolleys			60 Standard Trolleys	60 Standard Trolleys	
				40 Articulated Trolleys	40 Articulated Trolleys	

TransLink would use a competitive tender to procure the trolley buses on the basis of best value. Due to the limited North American market for electric trolley buses, this may be achieved by international public tender to a prequalified list of suppliers. The conditions of contract should provide for the development of working relationships between TransLink/Coast Mountain Bus Company and the suppliers in the interest of acquiring the best, current equipment for the replacement fleet. It is possible that different manufacturers may supply the base order and the selected optional orders.

As identified in the TransLink Strategic Transportation Plan 2000 – 2005 and outlined in the "Report on Trolley Bus Replacement", TransLink needs to replace the present electric trolley bus fleet with 265 standard (12m) buses to meet the operating requirements for the year 2000. A further 60 standard vehicles will be required to meet projected requirements for operation in the year 2006.

TABLE E4.1
Technology Assessment

	Trolley	Diesel	CNG (Compressed Natural Gas)	Hybrid and Fuel Cell
Financial (6.5% discount rate) Life Cycle Costs Premium over diesel Annual Life Cycle Cost	 $1.45m/vehicle 28% $73,000/year	 $1.13m/vehicle - $57,000/year	 $1.37m/vehicle 21% $69,000/year	 Not known -
Customer Service Value derived from each technology	• Clean • Quiet • Even ride	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet for bus riders • Reasonably comfortable	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet • Reasonably comfortable	Cleaner and quieter than diesel
Environment Biophysical impact of each technology	Zero air emissions from a bus	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	Approaches zero air emissions
Economic Development Market impact of each technology	Positive: Some permanence created by fixed overhead wires	Supportive of development	Supportive of development	Positive
Social Impacts on social fabric and values	• Neighbourhood friendly; little noise or air pollution • Visual intrusion of overhead wires	Noisy for residents with odorous emissions	Noisy for residents with odorous emissions	Unknown
Safety & Traffic Operations Impact on street safety and operation	• Good on heavy routes • Delays when disconnected from overhead	Neutral	Neutral	Unknown/neutral
Regional Bus Operations (Impact on Coast Mountain Bus Company Operations)	• Less flexibility • Specially equipped maintenance facility • Special replacement order requires pre-delivery units • Existing infrastructure in place and in good condition	• Flexible for any route • Standard Industrial Maintenance • Well supplied and competitive marketplace • Removal of trolley overhead and loss of investment	• Less flexible, carries fewer passengers • Special fueling equipment • Technology becoming more reliable • Removal of trolley overhead and loss of investment	• Hybrid is an emerging technology • Fuel cell remains experimental • Removal of trolley overhead and loss of investment

TABLE E6.1

Trolley Bus Replacement Fleet
Annual Capital Acquisition Costs
2002 – 2007

Standard Trolley Bus Options

	2002	2003	2004	2005	2006	2007	TOTAL
Base Order of 205 standard trolleys	55,884,000	63,079,000	65,834,000	6,612,000			**191,409,000**
Complete service replacement with 60 std trolleys				59,829,000			**59,829,000**
Expand fleet with further 60 standard trolleys					56,509,000	6,279,000	**62,788,000**
Annual Requirements	**55,884,000**	**63,079,000**	**65,834,000**	**66,441,000**	**56,509,000**	**6,279,000**	
TOTAL				**251,238,000**		**62,788,000**	**314,026,000**
	Funding Required from TransLink Board				**Future Funding to be Requested**		

Standard and Articulated Trolley Bus Options

	2002	2003	2004	2005	2006	2007	TOTAL
Base order of 205 standard trolleys	55,884,000	63,079,000	65,834,000	6,612,000			**191,409,000**
Complete service replacement with 40 artic trolleys				64,492,000			**64,492,000**
Expand fleet with further 40 articulated trolleys					58,757,000	6,504,000	**65,261,000**
Annual Requirements	**55,884,000**	**63,079,000**	**65,834,000**	**71,104,000**	**58,757,000**	**6,504,000**	
TOTAL				**255,901,000**		**65,261,000**	**321,162,000**
	Funding Required from TransLink Board				**Future Funding to be Requested**		

Notes:

1. Costs of any pre-delivery units are not included.
2. Costs, if required, of upgrading maintenance facilities are not included.

It is further recommended that TransLink staff:

- continue to monitor the possibility of making future orders for buses that use hybrid engines or fuel cells;

- continue planning, with the City of Vancouver, for the provision of more bus priority during peak traffic periods on streets that are trolley bus routes;

- seek to bank or to trade savings in carbon dioxide (a greenhouse gas) emissions created as a result of choosing a trolley bus replacement over a diesel bus replacement.

Carbon dioxide credits may be traded with an energy company that is trying to offset the payment of possible penalties from its own carbon emissions. Such a trade will recover some of the marginal costs incurred in replacing the current trolley fleet with electric rather than diesel engines. It may also encourage further system-wide emission reductions in TransLink operations.

TRANSLINK CAPITAL PLAN
TROLLEY BUS SERVICE REPLACEMENT

FLEET ASSESSMENT REPORT

INTRODUCTION

The purpose of this report is to bring together information on Vancouver's trolley bus fleet and on current bus technology so that choices can be made for the replacement of the fleet. This report reviews the service requirements for routes currently served by the trolley fleet and recommends a strategy and technology to replace it. Most of the information has been supplied by Coast Mountain Bus Company and by the Implementation Planning Group of TransLink. Particular reference has been made to:

- Bus Technology Review – Coast Mountain Bus Company, September 1999 (not attached).

- TransLink Strategic Plan, Technical Memorandum No. 10, Trolley Bus System Review (not attached).

TRANSLINK CAPITAL PLAN
TROLLEY BUS SERVICE REPLACEMENT

FLEET ASSESSMENT REPORT

1. Background on the Trolley Bus Fleet

1.1 History of Trolley Buses in Vancouver

The electric trolley bus was introduced into Vancouver in 1948 as a replacement for the streetcar. Trolley buses were common throughout the world in the 1940's and 1950's and were a source of pride for cities with trolley fleets. In July 1998, at the time of the fiftieth anniversary of the trolley bus fleet, BC Transit produced a book entitled, "Vancouver's Trolley Buses, 1948 – 1998, Celebrating a Half Century of Service".

Significant improvements in diesel engine technology in the 1950's and 1960's lead to most North American transit agencies replacing their trolley fleets with diesel powered buses. Today there are only seven cities left in North America that operate electric trolleys (Edmonton, Seattle, San Francisco, Boston, Philadelphia and Dayton, Ohio). In total, there are about 1,000 trolleys left in North America of which TransLink has the second largest fleet (next to San Francisco). The Vancouver area retained its original trolley buses until the early 1980's at which time the replacement rationale was based on:-

- the existing infrastructure investment in overhead wiring;
- a stable grid route network;
- the clean, quiet characteristics of electric bus operation.

The current fleet of 244 vehicles was introduced between 1982 and 1983. All are high-floor Flyer E902 vehicles of similar specification, with capacity for 70 passengers (seated 38, standing 32).

Trolley buses operate almost entirely within the City of Vancouver: short extensions to Metrotown and UBC were added in 1986 and 1988 respectively. The extent of the existing overhead wire system is shown in **Exhibit 1.1.1 and Exhibit 1.1.2.**

EXHIBIT 1.1.1

Vancouver Trolley Network

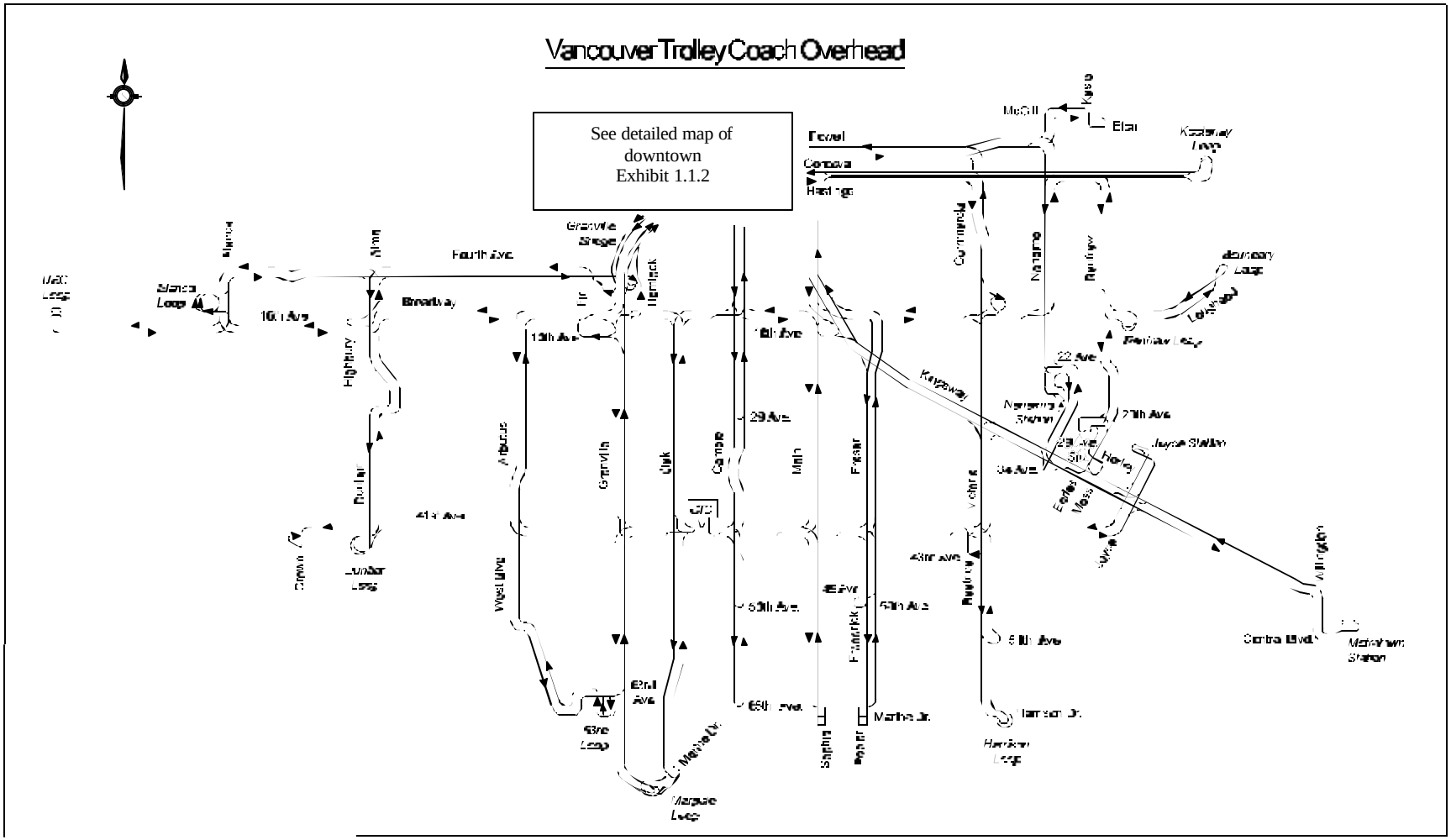
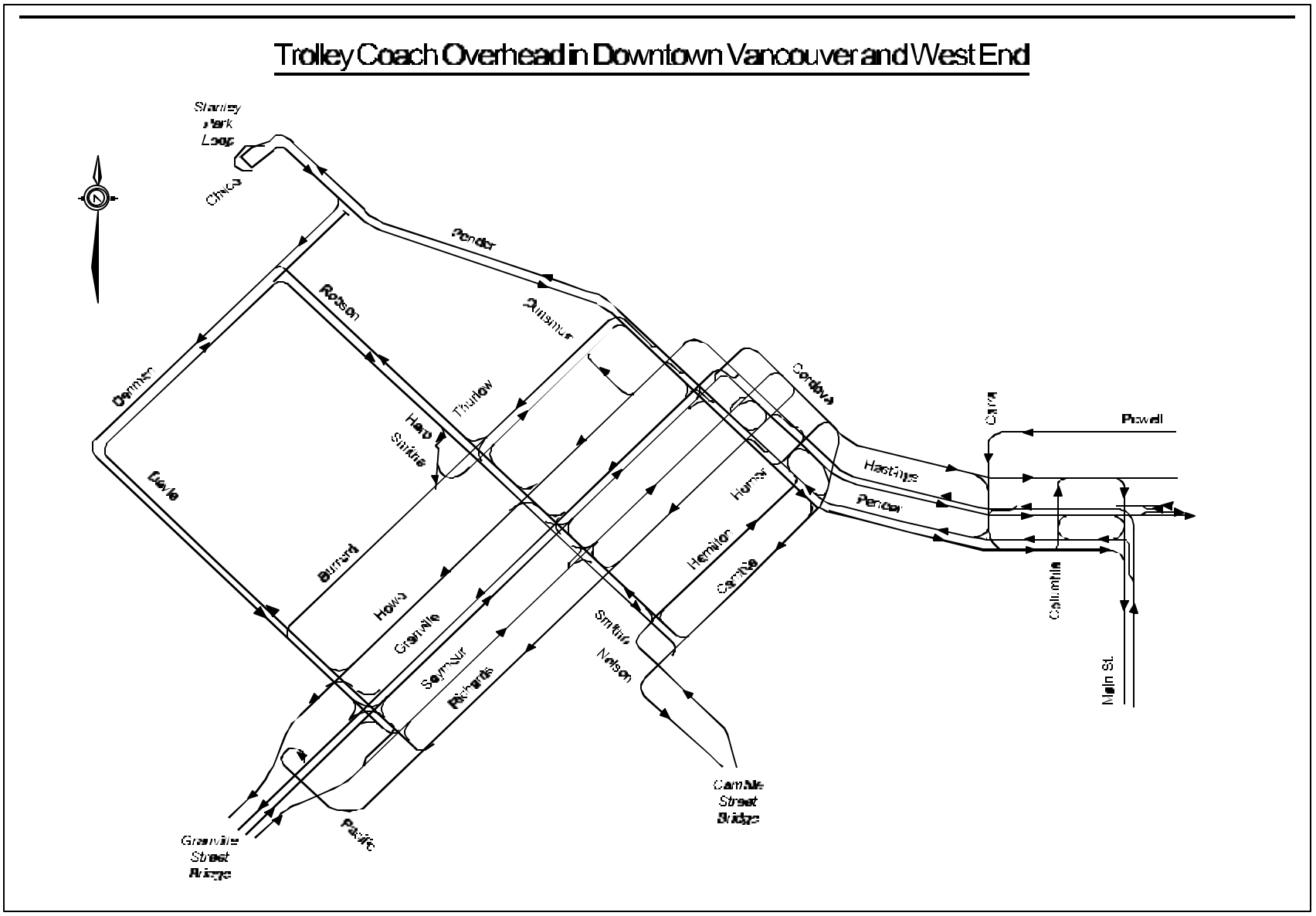


EXHIBIT 1.1.2


Trolley Coach Overhead in Downtown Vancouver and West End
Stanley Park Loop
Chilco
Pender
Robson
Alberni
Denman
Thurlow
Hornby
Cardero
Howe
Granville
Seymour
Richards
Nelson
Granville Street Bridge
Pacific
Cambie Street Bridge
Hastings
Carrall
Powell
Columbia
Main St.

1.2 Existing Fleet Service Characteristics

There are currently 13 trolley routes in Vancouver. An additional route on 41st Avenue operates a limited number of trolleys during peak hours.

The existing trolley bus fleet allocation is illustrated on **Table 1.2.1**. In the P.M. Peak Period (4 p.m. to 6 p.m.) 221 of the total fleet of 244 buses are in use, while 23 are undergoing maintenance. Coast Mountain Bus Company reports that an additional 21 diesel buses are currently needed to supplement the fleet and that a fleet of 265 buses are required to keep 221 buses on the road at peak hours.

TABLE 1.2.1

Existing Trolley Bus Fleet Allocation (Monday to Friday)

Route	AM Peak	Minimum Day Base	PM Peak	Minimum Night Base
#3, 20	36	30	44	12
#4, 7	19	19	26	11
#5, 6	17	15	19	7
#8	28	22	29	10
#9	24	20	28	10
#10	19	13	19	4
#15,17	22	16	26	7
#16	15	12	19	7
#19	10	8	11	5
#41	3	-	-	-
Total Scheduled	193	155	221	73
Spares	51	89	*	171
Total Vehicles	244	244	244	244

* *Augmented by Diesel Buses*

Source: April 2000 Coast Mountain Bus Company Schedule

The current trolley bus ridership is shown on **Table 1.2.2**. The average weekday boardings total 245,000. This is the same as the San Francisco MUNI trolley bus system that services a similar area. The busiest routes are #9 on Broadway and #8 on Granville Street. Both these routes will be affected in the near future by the introduction of new SkyTrain and B-Line operations. A trolley bus carries over 1000 people daily. This is double the number of passengers carried by the average bus in the Coast Mountain Bus Company fleet.

TABLE 1.2.2

Ridership

Current Trolley Bus Routes					
Route Number	**Route Name**	**P.M. Allocation**	**Weekday unlinked boardings**	**Boardings / Hour (weekdays)**	**Boarded Passengers /revenue km (weekdays)**
3	Main/ Downtown	21	23,170	100.67	7.40
4	Powell/UBC	12	11,940	69.87	4.16
5	Robson/ Downtown	10	12,730	87.31	9.48
6	Davie/ Downtown	9	11,100	94.19	9.91
7	Nanaimo Stn/ Dunbar	14	9,960	52.48	3.37
8	Fraser/ Granville	29	31,200	86.57	5.56
9	Boundary/ Alma/ UBC	28	44,500	119.03	8.21
10	Hastings/ UBC	19	22,520	81.72	5.00
15	Cambie/ Downtown	13	13,810	99.82	6.90
16	29th Avenue Stn/ Arbutus	19	13,810	57.09	3.57
17	Oak/ Downtown	13	11,020	70.56	4.44
19	Metrotown Stn/ Downtown	11	12,520	78.46	4.97
20	Victoria/ Downtown	23	26,450	91.90	6.80
	Spares	23			
	Total	**244**	**244,738**		

The round trip times of the average trolley bus has been lengthening by 2% per annum over the last 10 years due primarily to increased traffic congestion. This means that a bus on the #3 trolley route which takes 104 minutes on its round trip in 2000 is estimated to take 116 minutes in 2005 if bus priority measures are not provided on Main Street.

The frequency of buses on each route is shown on **Table 1.2.3**. Generally, it is difficult to maintain frequencies of 5 minutes or less on routes with heavy traffic congestion. Buses tend to bunch-up and the leading buses become overcrowded. This results in frequent customer complaints about overcrowding and poor frequency (due to "gaps" in service). One way of addressing the problem is to substitute larger, less frequent (articulated) buses in these corridors. Because the articulated buses have 50% more capacity, frequencies can be reduced which can lead to reduced bunching and improve service for customers. Articulated buses can also reduce the number of vehicles required.

TABLE 1.2.3

		Current Frequency						
Route Number	**Route Name**	**AM Peak**	**Midday**	**PM Peak**	**Early Evening**	**Late Evening**	**Sat Midday**	**Sun/Hol Midday**
3	Main/ Downtown	5	7	5	15	15	8	10
4	Powell/UBC/Downtown	15	15	11	20	20	15	15
5	Robson/ Downtown	5	7	5.5	10	15	7	10
6	Davie/ Downtown	5	7	5.5	10	15	7	10
7	Nanaimo Stn/ Dunbar	15	15	11	20	20	15	15
8	Fraser/ Granville	5	8	6	15	15	8	10
9	Boundary/ Alma/ UBC	4	6	4	10	15	8	9
10	Hastings/ UBC	7	10	8	20	20	12	15
15	Cambie/ Downtown	5	10	6	20	20	10	15
16	29th Avenue Stn/ Arbutus	10	15	9	20	20	12	15
17	Oak/ Downtown	7	10	7.5	20	20	10	15
19	Metrotown Stn/ Downtown	8	15	10	20	20	12	20
20	Victoria/ Downtown	5	7.5	5	15	15	8	10

None of the existing trolley bus fleet is fitted with wheelchair lifts, as the front axle weight rating is too low. Current policy is to have an entirely accessible fleet by 2006, and all new vehicle purchases will be low floor. In addition to improving accessibility for people with disabilities, low floor buses have proved to reduce boarding times by 50%.

1.3 Existing Facilities and Infrastructure

Existing Conditions

Oakridge Transit Centre (OTC) is the largest facility operated by Coast Mountain Bus Company. Opened in 1948 as a base for the trolley coach operation, it currently houses 244 trolley coaches and 200 diesels for a total of 444 vehicles. The facility was originally designed to handle a maximum fleet size of 350 vehicles. Parking congestion on the site causes operational difficulties and inefficiencies, particularly with maintenance. The congestion also creates safety risks in the travelled and parking portions of the site. This is exacerbated by the mix of buses and staff vehicles competing for the same space.

Oakridge is central to the trolley bus route network minimizing dead-heading; and affording convenient breakdown response and operator reliefs.

OTC includes an administration building, maintenance garage, fueling facility, trolley rectifier station, bus wash and tire shop. The buses housed at Oakridge serve the City of Vancouver and the City of Richmond, as well as the suburban communities of Ladner, Tsawwassen, South Surrey and White Rock. The central location allows deadhead and driver relief costs to be kept to a minimum. Although OTC offers some strategic advantages over the other transit depots in the region, the facility is 50 years old and requires a major retrofit to provide an efficient, cost-effective operation.

The Richmond Transit Centre (RTC) is currently being developed. Starting in the summer of 2000, this will help alleviate the overcrowding at OTC by accommodating the bus fleet servicing Richmond, Delta and South Surrey/White Rock. The OTC fleet will be reduced to 244 trolleys and 106 diesels (storage design capacity) and the future OTC fleet size will be kept as close to design capacity as possible,

pending service enhancements in Vancouver.

Bus routes operating out of OTC are limited to using standard vehicles, even though there are a number of routes that would be more productive if higher capacity vehicles were used. OTC currently lacks the space and maintenance equipment to maintain 18m (60 ft) articulated buses. The current ratio of buses to hoists at OTC is 40:1. Even with RTC in service, this ratio is only reduced to 32:1, still above the ideal transit industrial standard of 25:1. It is not possible to increase the number of hoists and service pits to bring the facility to industrial standard, without considering a complete reconstruction of the maintenance building. Reconstruction of the building would permit TransLink to consider adding articulated coaches to the OTC fleet. It would also afford an opportunity to redesign the layout of the property to provide a more efficient operation.

A facility plan is currently being developed that will help identify a program of major improvements for OTC. There are currently capital project proposals for a number of improvements at OTC including roof replacements, seismic retrofit and overhead door replacements. These improvements, while necessary to continue business at OTC, do not address the substandard condition of the Maintenance Shop. A facility upgrade would raise overall facility conditions, thereby providing an environment conducive to cost effective maintenance of TransLink's fleet of buses.

New Infrastructure and Facilities Requirements

The two underlying assumptions in discussing the storage and maintenance facility requirements for the trolley fleet are:

- the current location of the centre will remain at the Oakridge site for the foreseeable future, and
- the present facility requires reconstruction to raise the conditions of the facility to meet applicable codes.

The extent of recommended reconstruction will be confirmed in the next few months when the facility plan is completed. The facility plan will provide a phased implementation schedule for reconstructing OTC.

If service issues dictate that provisions be made for articulated trolley coaches, there will be a marginal increase in the cost to upgrade the OTC facility. The marginal increase is a result of service and inspection pits, hoists and circulation areas within the maintenance building that require additional space or need to be lengthened to accommodate the longer vehicles.

Without the benefit of a conceptual design, it is difficult to estimate the cost to reconstruct the OTC facility. The added difficulty of developing a construction plan that permits maintenance and operations to continue at OTC during construction will certainly add to the cost. A percentage of the fleet may have to be relocated temporarily during construction to provide sufficient space. This presumes that the maintenance garage would be located elsewhere on the site and that the current garage would continue to be operational during construction. Although the logistics of replacing a facility while maintaining operations would be a challenge, it is not without precedent.

Approximately $15 million has been estimated to reconstruct OTC. If articulated trolleys are added to the fleet, the facility cost could increase by approximately $2 to $5 million. The articulated trolleys may require additional power, and an additional $2 million may be required for upgrading the rectifiers throughout the system.

The facility estimates are currently under review and will be confirmed with completion of the facility plan during 2000.

Overhead Infrastructure

There are currently 309 kilometers of trolley wire in the transit system under which TransLink operates 925,000 hours of service annually. The overhead trolley infrastructure has an estimated replacement cost of $184 Million.

New overhead wire costs approximately $0.6 million per kilometre, including support poles. Switches and crossovers ("special work") add considerably to this cost. Rectifier stations are used to convert AC electricity as distributed by the BC Hydro grid to 600 volts DC.

The existing network of overhead wires has been well maintained and with ongoing, routine maintenance and rehabilitation is estimated to have a remaining life of 20-30 years.

1.4 Existing Operations

Coast Mountain Bus Company currently operates 244 Flyer E902 electric standard, trolley buses manufactured and delivered to similar specifications by New Flyer Industries (NFI) between 1982 and 1983. The electrical motors and drivetrains were supplied to NFI by Westinghouse. Coast Mountain employs a fleet management system in the operation and maintenance of the trolleys.

The vehicle characteristics of the standard trolley bus are described below.

Vehicle length:	***12m (40 ft.)***
Vehicle width:	***2.5m (8 ft.)***
Vehicle height:	***3.5m (11 ft.)***
Floor Height:	***high floor – 600mm above curb height***
Electric motor:	***located beneath floor provides even accelerating and decelerating performance on routes requiring frequent stops.***
Limited batteries:	***carried for off-wire operation (at low speed for recovery or off wire turn-around)***
Wheelchair accessibility:	***none***

There are a number of operational issues that limit the effectiveness of the trolley system.

- Installation of Short-turn Wires – one of the principal limitations of the existing trolley infrastructure is the lack of turnaround facilities on some corridors, this can cause service reliability to suffer. Short-turn wires provide the opportunity to turn a late bus around prior to the end of the route to allow it to return to schedule.

- Overcrowding – many of the trolley services experience over-crowding during periods of the day. Higher service frequency on some routes only causes buses to bunch up under these conditions.

- Oakridge (OTC) Depot – The maintenance facilities at OTC are designed to allow work on the existing high floor 12m trolley bus fleet and do not accommodate low floor or articulated trolleys.

1.5 Trolley Bus Replacement Considerations

The present trolley bus fleet is nearing the end of its 20 year life and decisions are required about replacement. The significant factors that must be considered in this replacement decision include:

i) lack of replacement parts for the present trolley fleet and the corrosion of the coach components;
ii) the electric trolley replacement must be weighed against wholesale replacement with a renovated fleet, an untried new technology, CNG or diesel buses;
iii) trolley buses are not manufactured in large numbers in North America and cost roughly twice as much as their diesel counterparts;
iv) total lifecycle costs of the trolley bus, including capital, operating and maintenance costs, must be compared to other bus technologies;
v) the trolley bus is restricted to routes with overhead wires, and can only operate for limited distances at low speed on batteries;
vi) the existing trolley bus overhead wiring is in good condition and may be expected to last for another 20 to 30 years;
vii) the cost of trolley maintenance needs to be compared with the cost of a diesel fleet of comparable age and use;
viii) The existing trolley fleet is 17 years old compared to the overall diesel fleet which is an average of 9 years old;
ix) diesels of comparable age to the trolley have less usage than the heavily used trolley
x) customers place value on the relative cleanliness, quietness and even ride of the trolley bus;
xi) exhaust emissions and noise of diesel or CNG buses are a concern of riders and of people who live and work in parts of the City through which buses pass.

2. Future Technology Issues

2.1 Alternative Technologies

In considering the replacement of the electric trolley bus fleet consideration needs to be given to alternative technologies. Should TransLink replace the fleet with a new set of electric trolleys or apply alternative technology?

In their Bus Technology Review of September 1999, Coast Mountain Bus Company identified five existing and emerging bus technologies:

- Clean Diesel
- Compressed Natural Gas (CNG)
- Electric Trolley Bus (ETB)
- Hybrid Electric
- Hydrogen Fuel Cell

The following is a brief description of each technology

Clean Diesel

"Clean" diesel refers to a diesel-fuelled engine that meets current emission standards and regulations adopted by Environment Canada. Coast Mountain Bus Company is currently using these engines and fuels.

The diesel engine has been the standard transit engine of choice for the last fifty years. It is a readily available stock item that is competitively priced. Refinements, upgrading and technology advancements have enabled diesel engine manufacturers to meet the stringent emission requirements now being imposed on the diesel technology. Other engine developments, such as electronic and material advancements will ensure that the clean diesel engine alternative remains available for transit authorities seeking a cost effective, reliable and efficient service.

Compressed Natural Gas (CNG)

Buses fueled by natural gas rather than diesel have been undergoing development since they were first mass produced in early 1990. The reliability of engines and fuel systems is slowly approaching that of diesel engines. Some of the operating experience still questions the long-term economic benefits that were projected for natural gas fuelled buses. This is because the volatility of the fuel and additional fuel system requirements increase maintenance costs. CNG fuel is cheaper than diesel fuel, but requires 20% more CNG fuel to operate the bus for the same amount of time as a diesel bus.

Electric Trolley Bus (ETB)

The trolley bus is named after the small wheel which is attached to the pole which collects current from the overhead electric wire to drive the vehicle.

ETB is a trackless trolley system requiring an overhead catenary system as its power source. ETB technology enjoys a long revenue service and a proven track record. Performance and reliability of

trolley buses can be the same as current diesel powered vehicles. They are environmentally cleaner and quieter.

Electric trolleys are currently in daily service in seven North American cities including Dayton, San Francisco, Boston, Philadelphia, Vancouver, Edmonton and Seattle. New vehicles are commercially available in Europe but need to be modified to North American specifications.

The overhead infrastructure required for trolley buses represent a valuable investment and add incentive to maintaining a trolley fleet of buses.

Hybrid Electric

The Hybrid bus is an emerging technology configured to be powered by more than one type of fuel. To date, this has involved a traditional diesel engine that drives an electric generator. The diesel engine has sufficient power to operate the vehicle in a "cruise" mode while energizing a generator. This energy is stored in a battery pack, flywheel, or super capacitor system and is used to accelerate the bus between stops and while climbing hills. Hybrid buses are being designed to improve vehicle fuel consumption and to reduce harmful emissions. The technology is too recent to have any reliable operating data, but early indications are very favourable.

Hydrogen Fuel Cell

A bus powered by a fuel cell relies on a chemical reaction to produce electricity. This is done by passing hydrogen and oxygen over opposite sides of a membrane within each fuel cell. The membrane is coated with a platinum catalyst that facilitates the passage of protons. Electrons from the hydrogen flow around the membrane and through an electrical device such as a motor. The more fuel cells that are stacked, the greater the electric current.

Oxygen for the reaction is generally available from air, but the hydrogen must be carried in high-pressure tanks. Hydrogen can also be chemically extracted from fuels like gasoline or CNG but this creates unwanted gas emissions. A small number of transit properties have been demonstrating fuel cell powered buses: these include Chicago and Vancouver. Fuel cell development programs are active with most of the major light-duty automotive manufacturers but are not yet in commercial production.

2.2 Emissions

The burning of all hydro-carbon fuels (petroleum, diesel, CNG) produce varying amounts of contaminants and greenhouse gases. "Clean" diesel and CNG emit much lower levels of unwanted emissions than the diesel fuels of previous years.

Hydrogen and oxygen gases for fuel cells produce water as an emission. Electric trolley buses produce no air emissions.

Table 2.2.1 records the levels of emission for each technology as permitted by Environment Canada (and the U.S. Environmental Protection Agency) and with which Coast Mountain Bus Company must comply.

PM10 - *refers to inhaleable particulate matter like soot*

NOx - *refers to nitrogen oxides which are the brown composition of smog*

CO - *refers to Carbon monoxide, another contributor to smog*

CO2 - *refers to Carbon dioxide and its equivalents like methane and nitrous oxides which are the primary greenhouse gases*

Diesel, CNG and hybrid vehicles also emit small quantities of sulphur oxides (SOx) and volatile hydro carbons (VOx) that are not shown on **Table 2.2.1**.

TABLE 2.2.1

COMPARATIVE EMISSIONS – DIESEL, CNG, HYBRID
(In g/mile)

Technology	PM_{10}	NO_X	CO	CO_2
Diesel	0.30	30.40	4.90	2984
CNG	0.08	20.80	9.00	2483
Hybrid	0.03	10.70	0.13	1761

Reference: GVRD

TABLE 2.2.2

EMISSIONS REDUCTION – TRANSIT FLEET, 1987 TO DATE

Reference: Coast Mountain Bus Company

Emission	Reduction
PM_{10}	61%
NO_x	48%
CO	38%

Table 2.2.2 records the improvements that the Coast Mountain Bus Company transit fleet has made in its emissions profile since 1987 by upgrading emission control systems and by replacing older diesel buses with state-of-the-art clean diesel buses. Coast Mountain Bus Company estimates that their total diesel transit vehicles contribute 139 tonnes per year of vehicle emissions in the form of particulants carbon dioxide and nitrogen oxides.

2.3 Noise

Although all current transit bus technologies meet the Federal Ministry of Transportation's noise emission requirements, some technologies are noisier than others. The relative noise levels for the five technologies described in Section 2.1 are shown on **Table 2.3.1.** There is a perceived doubling of noise for every 10 dba in sound.

TABLE 2.3.1

RELATIVE NOISE LEVELS

Diesel	83 dba
CNG	75 dba
Trolley	<70 dba
Hybrid	Unknown
Fuel Cell	<70 dba
Quiet Street	60 dba
Harmful to human ear	>95 dba

Source: Coast Mountain Bus Company
Seattle Metro

In an urban centre such as downtown Vancouver, noise is amplified by the proximity of the buses to tall buildings and this effect is further influenced by the frequency of the noise. While the absolute noise level of a CNG bus is lower than that of a diesel bus, its different frequency causes a resonance that is more perceptible to the human ear. The electric trolley bus has little engine noise and is well suited to service in dense urban areas.

The visual intrusion of the trolley bus is due to the overhead wires. These wires are located 6m above the street level and occasionally become snagged by passing trucks or construction equipment. They have a similar visual impact as overhead hydro and telephone wires. These intrusions are not pleasing but have become part of the urban landscape.

2.4 Operating and Maintenance Issues

Factors that affect the performance of buses in Vancouver include acceleration, hill-climbing ability, range, top speed, fuel consumption, mechanical reliability, and brake wear. These factors will impact operating costs, assignability to routes, operating safety and size of fleet required to provide a specified type of service.

Diesel buses have reasonable hill-climbing ability, good top speed and passenger carrying capacity and have the flexibility of being assigned to any route in the Vancouver region.

The electric trolley bus has good acceleration and is similar to diesel buses in being able to move around in dense traffic. It also has superior hill climbing ability compared to diesel buses. Its flexibility is limited by the need to operate under a fixed power grid. Trolley bus operators have to take special care in turning corners and in making passing manoeuvres

Heavier buses such as CNG, hybrid and fuel cell, carry fewer passengers and are not effective on routes having high passenger density. Heavier buses also have more wear and tear on tires, brakes and suspension, resulting in higher maintenance costs and lower service availability. Lower service availability requires a higher ratio of spare vehicles to meet an equivalent service demand. All these operating factors are accounted for in the operating cost data used to develop life cycle costs for each of the existing technologies.

Alternative fuel buses, such as CNG and the fuel cell, require special fuelling and maintenance infrastructure which in turn leads to higher initial capital costs and facilities maintenance costs. The

linking of a bus to a unique fueling infrastructure also restricts the flexibility of assigning the bus to another depot to meet changing service patterns.

Coast Mountain Bus Company prefers to use similar specifications for fleets of buses. This simplifies orders, training, driver familiarity, maintenance procedures and the number of spare parts that need to be stocked.

Spares can no longer be purchased for the present trolley bus fleet. This means that worn out parts have to be rebuilt or remodelled from scrapped parts. This applies to chassis parts as well as motor and propulsion unit parts.

2.5 Life Cycle Costs

Coast Mountain Bus Company have developed procedures to monitor the life cycle costs of each technology used; electric trolley, diesel and compressed natural gas (CNG). The running and maintenance costs of each vehicle in the fleet is monitored throughout its operational life; these are the costs used to calculate life cycle performance.

Life cycle costs, used in this report, include capital, operating, maintenance, material, facility and overhead infrastructure. In order to estimate the life cycle costs of future purchases, capital costs are based on recent purchases of similar equipment by similar transit agencies. Incremental operating costs over the expected life of the vehicle are based on historical costs.

Table 2.5.1 shows the fleet characteristics of the existing Coast Mountain Bus Company fleet of standard (12m) buses (articulated buses were not included in this model).

Table 2.5.2 shows a breakdown of life cycle costs by some of their cost components.

Coast Mountain Bus Company records its fleet costs on the basis of vehicle records and date of fleet acquisition. The cost shown in **Table 2.5.2** compares the operation and maintenance of the diesel fleet of 867 vehicles and average age of 9 years with the trolley fleet of 244 vehicles and average age of 17 years. Furthermore, the trolley fleet operates on the heaviest travelled routes in the system which have the most frequent number of stops. The hourly operating costs for trolleys and diesels are about the same ($78.50/hr. including drivers' time). The average trolley only operates 14 km. per service hour compared with 26 km. per service hour for diesels.

Table 2.5.3 compares the trolley fleet with the MCI diesel fleet which is of similar age and which was purchased in 1977 and 1982. The MCI diesel fleet now only operates as spare vehicles on routes with few hills and do less than half the distance of the trolleys. The table shows that annual maintenance costs rise significantly with age and the operating differences between the two technologies is more comparable.

Table 2.5.4 compares the maintenance costs of trolleys and diesels in the Seattle Metro fleet. Similar statistics are noted with vehicles in the Coast Mountain Bus Company fleet. Overall, the trolley fleet is older than the diesel fleet and maintenance costs are higher for the trolleys. When comparing fleets of similar age, the annual maintenance costs for the trolleys are closer to the diesel buses.

Comparative data from other transit agencies is not easy to compile. Other agencies record operating and maintenance costs in different ways and some agencies do not publish detailed transit data. **Table 2.5.4**

indicates that Coast Mountain Bus Company and Seattle Metro run similar trolley and diesel operations and their operations and maintenance statistics are similar.

The cost of maintaining the trolley fleet is about 20% higher than a diesel fleet of comparable age.

The cost of CNG technology is weighted by the small size of the fleet, high start-up costs and by the fuelling costs of the fleet. Coast Mountain Bus Company estimates that the life cycle costs of the current CNG fleet will continue to be higher than the diesel fleet. Hybrid and fuel cell technologies are still experimental.

TABLE 2.5.1

Comparative Fleet Characteristics of Existing Standard (12m) Bus Fleet

	Operational Life (Years)	Current Age of Fleet (Years)	Required Spare Ratio (%)	Passenger Capacity	Fleet Size	Annual Service Hours/Vehicle (h)	Annual Service Distance/Vehicle (km)
Trolley	20	17	18	64	244	3800	52,860
Diesel	17	9	18	65	867	3000	69,000
CNG	17	4	25	63	50	3000	69,000
Hybrid	No data available						
Fuel Cell	No data available						

Reference: Coast Mountain Bus Company and TransLink 2000 budget data.

TABLE 2.5.2

Life Cycle Cost Breakdown (excluding facility costs)

	Approx. Capital Cost ($)	Annual Operating Costs $/km	Annual Maintenance ($/km)	Annual Fuel ($/km)	Annual Trolley O/H ($/km)	Annual Life Cycle Cost ($m)	Life Cycle Costs ($m)
Trolley	851,400	0.89	0.46	0.15	0.28	73,000	1.45
Diesel	398,800	0.68	0.38	0.30	-	57,000	1.13
CNG	474,200	0.85	0.68	0.17	-	69,000	1.37

Reference: Coast Mountain Bus Company and TransLink 2000 budget data.

TABLE 2.5.3

Annual Maintenance Costs of Similar Aged Fleets

	Average Age of Fleet (Years)	Number in Fleet	Annual Service Distance/Vehicle (km)	Annual Maintenance $/km	Difference
Trolley Fleet	17	244	52,860	0.75	
MCI Diesel Fleet	20	45	21,000	0.64	17%
Total Diesel Fleet	9	867	69,000	0.40	87%

Reference: Coast Mountain Bus Company

TABLE 2.5.4

Comparison of Vehicles in the Seattle Metro Fleet

	1999 Average Age Years)	Overall No. in Fleet	Annual Maintenance US$/mile	1994 Average Age (Years)	Overall No. in Fleet	Annual Maintenance US$/mile	1998 Average Age (Years)	Overall No. in Fleet	Annual Maintenance US$/mile
Trolley	**17**	**155**	**1.68**	**12**	**155**	**1.45**	**12***	**155**	**1.53***
Diesel	**5**	**204**	**1.02**	**12**	**750**	**1.16**	**13**	**145**	**1.23**
Difference			**87%**			**25%**			**23%**

***Extrapolated from 1994 data*

3. Future Service Issues

3.1 Future Service Considerations

In planning a replacement trolley bus fleet, consideration has been given to the future route network over which trolleys will travel and the frequencies on each route. The following discussion assumes that there will not be any expansion of the trolley bus overhead system shown in Exhibit 1.2.1. The high cost of installing trolley wires precludes expansion of the system. No expansion is proposed at this time. There is likely to be some rationalization of routes based on new transit services that will be operating in Vancouver in the near future.

As travel patterns have changed, reviews have been undertaken of how bus services match up to demand. Transit routes shape or influence travel behaviour, particularly for those who have limited access to private transport. Greater choice of destinations available by transit to car drivers is an important influence in mode choice.

Since the opening of the first SkyTrain line, most major changes to the region's bus system have been designed to improve the integration of the two modes. However, most of the transit system is still focused on providing connections to downtown Vancouver. In the same period, there has been a growth of both suburban employment and other amenities which are more predicated on car travel. For example, the recent growth of cinema multiplexes has been mostly in suburban areas outside the designated regional centres.

If the transit system is to increase its market share, it will need to be able to respond to these shifts in demand. Fixed route systems require supportive land use policies that concentrate activities at nodes which can be serviced conveniently.

3.2 New Transit Services in the Vancouver Area

City Bus Express

City Express buses only stop at major intersections where transfers to other bus routes can be made. They respond to criticisms about buses being too slow and stopping too frequently. Any expansion of these services will impact on the trolley service which is an all-stop service.

B-Line

B-Line is a development of the City Express idea. The objective is service quality comparable to Rapid Transit achieved through a combination of bus priority measures (including exclusive lanes, signal priorities and other traffic management techniques), off vehicle ticketing and automatic vehicle location to provide users and management with real time information. Stops are significantly upgraded to be more like stations: large shelters, with passenger information, ticket machines and other amenities.

New B-Line services are soon to be introduced on the Granville Street/No. 3 Road - #98 B-Line which will affect the ridership on trolley route #8.

Future B-Line services are planned on Hastings Street (2002) and between the Downtown and UBC (2003). These will reduce the need for trolley services on trolley routes #10 Hastings/UBC.

SkyTrain extensions

Broadway/Lougheed SkyTrain

When the Broadway SkyTrain opens it will impact on the travel patterns of passengers using the trolleybus system on the east side of Vancouver as well as the service on Broadway. The introduction of SkyTrain will substitute for the existing #99 B-Line service between Lougheed Mall and Broadway Station.

The new SkyTrain service will likely increase ridership on the Broadway trolley route #9, especially west of Commercial Street. The City of Vancouver's Broadway West Rapid Transit Study has identified electric trolley buses as a possible technology for the rapid bus extension of SkyTrain from Granville to UBC after 2005.

Richmond Rapid Transit

The potential Richmond/Airport extension rapid transit is at an early stage of development. It would replace B-Line on Granville, and, depending on the route chosen, could have a significant impact on the #16 Arbutus, #8 Granville, #17 Oak and #15 Cambie trolley services. This is due to the bus network in Vancouver being a grid, which means that when one of the north-south links has significantly better service, passengers use the east-west links to access it.

The spacing of stations on SkyTrain is also an important consideration. Since stations are more widely spaced than bus stops, there is still a need for some local bus service along SkyTrain routes. People with limited mobility and those unwilling to spend time accessing SkyTrain (for example for short journeys) will still use the local bus service.

Community Bus

At the other end of the scale smaller buses (10m or less) are seen as desirable for providing quieter and less intrusive service on residential streets, and as frequent shuttle or "circulator" services within downtown areas. Community Circulators could also provide more flexibility and may be appropriate for residential areas such as Pacific Place/Yaletown and between the downtown, West End and Central Broadway.

While trolley buses are not appropriate for this kind of service, the service would be expected to increase overall ridership and feed more riders onto the trolleybus network.

3.3 Transportation Modelling Estimates

The estimated population and employment growth from 1996 to 2021 is shown on **Tables 3.4.1**. "HTS" refers to predictions made under the historic trend scenario and "GMS" refers to predictions made under the GVRD's Growth Management Strategy.

Both forecasts show that population and employment growth will be slower in Vancouver than in neighbouring Burnaby or Richmond.

Despite this trend, growth in both population and employment is likely to be considerable – approximately 50% in the GVRD over the next 20 years. Furthermore **Table 3.4.2** shows that while most Vancouver residents live and work in Vancouver there is a strong employment movement between

Vancouver and its two neighbouring municipalities. This points to increasing ridership potential on routes connecting these areas. As noted previously, new services such as B-Line and SkyTrain will meet these new demands, as the trolley service is limited primarily to the City of Vancouver.

TABLE 3.3.1

Comparison of Population and Employment Forecasts

Population	**1996**	**2006**		**2021**	
		HTS	**GMS**	**HTS**	**GMS**
Burnaby	186,015	214,608	223,625	267,420	280,000
Richmond	153,125	191,658	176,680	234,238	212,000
Vancouver	536,165	594,523	576,500	701,628	637,000
GVRD	1,896,775	2,271,932	2,246,775	2,875,916	2,771,800
Employment					
Burnaby	105,945	134,750	131,460	170,800	169,530
Richmond	100,255	137,600	117,520	186,850	143,340
Vancouver	341,530	399,350	372,630	466,500	419,150
GVRD	919,570	1,144,550	1,122,170	1,454,150	1,425,170

Population Growth	**2006**		**2021**	
	HTS	**GMS**	**HTS**	**GMS**
Burnaby	13.32%	20.22%	43.76%	50.53%
Richmond	20.11%	15.38%	52.97%	38.45%
Vancouver	9.82%	7.52%	30.86%	18.81%
GVRD	16.51%	18.45%	51.62%	46.13%
Employment Growth				
Burnaby	21.38%	24.08%	61.22%	60.02%
Richmond	27.14%	17.22%	86.37%	42.98%
Vancouver	14.48%	9.11%	36.59%	22.73%
GVRD	19.66%	22.03%	58.13%	54.98%

Source: GVRD

TABLE 3.3.2

City of Residence	**City of Employment**			
	Vancouver	Richmond	Burnaby	Total employed
Vancouver	146,695	18,940	18,385	258,010
Richmond	13,220	30,485	3,185	70,750
Burnaby	28,790	4,795	23,480	85,485

This population and employment information was used in conjunction with modelling techniques (emme/2 model) to estimate the travel demand on each major street in the region. This information, together with estimates for the travel split between cars, buses and rapid transit was used in the model to estimate transit ridership on each route in 1996, 2006 and 2021.

The 1996 results from the model were checked (calibrated) against actual counts for 1996 and these variances were used to refine the ridership estimates for 2000 and 2006**. The estimate for the number of buses required in the trolleybus service replacement was based on the 2000 and 2006 ridership estimates**.

3.4 Review of Existing Routes

Translink Planning staff have undertaken a careful review of each trolley bus route in the light of increasing population, increasing employment, new transit services and market analysis. The following **Table 3.4.1** summarizes this review and points to future service requirements.

Generally, all bus riders want their buses to be on time, frequent and un-crowded. All these three factors are caused by traffic congestion. When routes are congested: schedules cannot be maintained; frequently scheduled buses catch up with buses ahead; the forward buses become overcrowded; ridership satisfaction falls.

In the light of new transit services that are planned to be added to the Vancouver network, and in order to overcome issues of overcrowding and bunching, some changes are proposed for each route. Significantly, Route #10 Hastings/UBC, could be eliminated and replaced by proposed Hastings and UBC B-Line services.

TABLE 3.4.1
Summary of Existing Trolley Bus Review

Bus Number	Route Name	Ridership	Main Customer Issue	Main Operating Issue	Suggested Change
3	Main / Downtown	High	Overcrowding, poor reliability	Unproductive in downtown. Bunching of buses.	Reroute to Waterfront Station; introduce articulated buses. Introduce short-turn on Main Street
4	Powell / UBC	Medium		Introduce short turn at Commercial	This route may be combined with route #7 if the Hastings / DT and DT / UBC B-Line routes are introduced
5	Robson / Downtown	High	Overcrowding and poor reliability	Bunching of buses	Alleviate with downtown circulator (Community Bus)
6	Davie / Downtown	High	Overcrowding and poor reliability	Bunching of buses	Alleviate with downtown circulator (Community Bus)
7	Nanaimo Station / Dunbar	Medium	Overcrowding		Improve service frequency. Possibly redesign service when Hastings/UBC B-Line is introduced.
8	Fraser / Granville	High	Overcrowding	Service is already frequent; less opportunity to increase frequency	25% of ridership will be affected by introduction of the 98B Line
9	Boundary Loop / UBC	High	High customer satisfaction rating	Service is already frequent; less opportunity to increase frequency	Introduce articulated buses; ridership may be affected by Broadway Skytrain extension and future B-Line enhancements
10	Hastings / UBC	Medium	Passengers must transfer at Kootenay Loop to travel further east into Burnaby	Existing trolley infrastructure on Hastings Street only extends east as far as Kootenay Loop	Eliminate services of the #10 if the Hastings / DT and DT / UBC B-Line routes are introduced; provide local service the length of Hastings Street using diesel buses.
15	Cambie / Downtown	High	Overcrowded and unreliable	Existing Cambie terminus is poorly located	Increase frequency. Consider City Bus Express Service in future.
16	29th Station / Arbutus	Medium	Frequency of service	Short turn facility at Renfrew and Broadway will be eliminated in conjunction with new technology park	Relocate short turn facility to the proposed Renfrew Station. Increase frequency.
17	Oak / Downtown	Medium	Overcrowded and unreliable	Reliability	Increase frequency.
19	Metrotown / Downtown	Medium	Frequency of service	Since introduction of SkyTrain, demand for service on Kingsway has decreased	Extend trolley wire into Stanley Park. Increase frequency.
20	Victoria / Downtown	High	Overcrowding and unreliable service	Bunching of buses due to high frequency of service and traffic congestion	Introduce articulated buses
41	Joyce Station / Crown	High	Demand for through UBC service. Wire stops at 41st Ave and Crown	Only three trolley buses currently use this route in the a.m. peak only; lack of trolley overhead west of 41st Avenue and Crown	Introduce articulated diesel buses on the 41st Avenue corridor and provide a City Bus express service between Joyce Station and UBC

3.5 Future Trolley Bus Requirements

Using the modelling techniques discussed in section 3.3, and incorporating the review of the existing routes discussed in section 3.4, projections have been made for the trolley bus requirements on each route for the year 2006. These are shown on **Table 3.5.1**.

Table 3.5.1 shows projected fleet requirements for a fleet of standard buses and a fleet that includes articulated buses. The projections take into account the 2% per annum increase in running time over the last 10 years which is attributed to congestion.

Articulated buses can be used on routes #3, #9 and #20. These are high volume routes and are relatively straight. Route #9 could be changed in the future when the Broadway extensions to SkyTrain have been completed. The Broadway B-Line (#99) will still operate between the end of the SkyTrain and UBC. Initially this will be Broadway Station, however, as the SkyTrain is extended further west to Granville Street, the B-Line route will be shortened. It is possible that a B-Line service using articulated buses could connect Granville with UBC after 2005.

TABLE 3.5.1

Trolley Bus Requirements
Existing and Forecasted

Route Number	Route Name	Current Fleet of standard electric trolley buses	Current Peak Frequency 2000	Projected Frequency (using 12 m buses) in 2006	Projected Frequency (using articulated buses on routes 3, 9 and 20) in 2006	Current Peak Service in 2000 On Trolley Routes *Note 1*	Projected Peak standard Trolley Buses Required in 2006	Projected Peak Trolley Buses Required with articulated buses on routes 3, 9 and 20 in 2006 (A = articulated)
3	Main/ Downtown	21	5	4	6	25	29	19 (A)
4	Powell/UBC/Downtown	12	11	9	9	12	16	16
5	Robson/ Downtown	10	5.5	4	4	10	15	15
6	Davie/ Downtown	9	5.5	4	4	9	14	14
7	Nanaimo Stn/ Dunbar	14	11	9	9	14	19	19
8	Fraser/ Granville	29	6	6	6	29	32	32
9	Boundary/ Alma/ UBC	28	4	3	4.5	32	41	28 (A)
10	Hastings/ UBC	19	8	-	-	19	-	-
15	Cambie/ Downtown	10	6	5	4	10	18	13
16	29th Avenue Stn/ Arbutus	19	9	7	7	22	27	27
17	Oak/ Downtown	16	7.5	6	6	19	17	22
19	Metrotown Stn/ Downtown	11	10	8	8	11	15	15
20	Victoria/ Downtown	23	5	4	6	28	32	21 A
	PEAK REQUIREMENT	**221**				**221**	**275**	**173 + 68 (A)**
	SPARES	**23**				**44 (18%)**	**50 (18%)**	**31 + 12 (A) (18%)**
	TOTAL FLEET REQUIRED	**244 ***				**265**	**325**	**204 + 80 (A)**

* *In order to meet current (2000) demand of 265 buses on trolley routes, the electric trolley bus fleet is augmented with diesel buses.*

4. Trolley Bus Replacement Fleet Assessment

4.1 Technology Assessment

The various technologies discussed in Chapter 2 along with the service considerations of Chapter 3 are summarized below. An assessment of these technologies is shown on Table 4.1. This has been prepared in the format of a multiple account evaluation.

The overall assessment favours replacement with new, low-floor, electric trolley buses.

The deterrent aspect of a trolley is its higher life cycle cost and its operational inflexibility. A trolley bus costs 28% more than a diesel bus and 6% more than a CNG bus. A trolley bus can only operate under overhead wires.

Offsetting these aspects are the positive features of a trolley bus compared to diesel and CNG buses. Trolleys are favoured by customers for their cleanliness, quietness and even ride. Trolleys themselves emit no undesirable pollutants or greenhouse gases to the environment. They have a low impact on the social fabric. They have exhibited good operating characteristics on heavy and hilly routes with frequent stops.

4.2 Body Coach Requirements

Body coach design has changed over the years from the square, engine protruding designs of the 1930's to the streamlined, 'cut-back' designs of the 1990's. It is important to choose a modern looking bus design that fits the image of the appealing transit system that Translink is trying to promote.

The bus coach design will have to be low-floor to meet accessibility requirements. The step on a low-floor bus is 150 mm above curb height, making boarding and unboarding operations easy for most physically active people. Wheelchair access is simply provided by a small driver operated ramp located at the driver's door.

In order to maintain the capacity of existing fleet vehicles, TransLink planners are recommending the continuation of single seats on the one side of the bus in both 12m and 18m buses to increase the number of standees in the low-floor bus arrangement. This will give the following seating capacity.

- Standard low-floor (12m) bus: 32 seats, standing 32, total passenger capacity 64
- Articulated low-floor (18m) bus: 54 seats, standing 36, total passenger capacity 90

Without the continuation of the single row of seats, additional vehicles would be required as standing capacity would be lost.

TABLE 4.1
Technology Assessment

	Trolley	Diesel	CNG (Compressed Natural Gas)	Hybrid and Fuel Cell
Financial (6.5% discount rate) Life Cycle Costs Premium over diesel Annual Life Cycle Cost	 $1.45m/vehicle 28% $73,000/year	 $1.13m/vehicle - $57,000/year	 $1.37m/vehicle 21% $69,000/year	 Not known -
Customer Service Value derived from each technology	• Clean • Quiet • Even ride	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet for bus riders • Reasonably comfortable	• Fumes • Noisy for residents with odorous emissions • Reasonably quiet • Reasonably comfortable	Cleaner and quieter than diesel
Environment Biophysical impact of each technology	Zero air emissions from a bus	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	• Cleaner emissions than trucks in PM10 NOx and CO • Greenhouse Gas Emissions	Approaches zero air emissions
Economic Development Market impact of each technology	Positive: Some permanence created by fixed overhead wires	Supportive of development	Supportive of development	Positive
Social Impacts on social fabric and values	• Neighbourhood friendly; little noise or air pollution • Visual intrusion of overhead wires	Noisy for residents with odorous emissions	Noisy for residents with odorous emissions	Unknown
Safety & Traffic Operations Impact on street safety and operation	• Good on heavy routes • Delays when disconnected from overhead	Neutral	Neutral	Unknown/neutral
Regional Bus Operations (Impact on Coast Mountain Bus Company Operations)	• Less flexibility • Specially equipped maintenance facility • Special replacement order requires pre-delivery units • Existing infrastructure in place and in good condition	• Flexible for any route • Standard Industrial Maintenance • Well supplied and competitive marketplace • Removal of trolley overhead and loss of investment	• Less flexible, carries fewer passengers • Special fueling equipment • Technology becoming more reliable • Removal of trolley overhead and loss of investment	• Hybrid is an emerging technology • Fuel cell remains experimental • Removal of trolley overhead and loss of investment

Electric Trolley Bus

There are strong reasons to replace the existing trolley bus fleet with a set of new electric trolley buses.

Trolley buses are productive in Vancouver. They operate over some of the heaviest passenger routes in the TransLink system. They operate on arterial streets whose adjacent land use has for a long time been zoned by the City of Vancouver, for high density residential and commercial purposes. Access to public transit contributes to developers' decisions to invest in high density developments because of the alternative transportation choice they provide.

A new trolley bus fleet should incorporate the most up to date electric alternating current (A/C) motors and propulsion equipment. These reasons include:

- **Clean** – trolley buses are zero air emission vehicles
- **Quiet** – trolley buses operate at less than 70 decibels which is in keeping with the ambient noise level on a quiet suburban street
- **Rider Comfort** – trolley buses accelerate and decelerate evenly and without jerks; they are comfortable for seated and standing passengers
- **Neighbourhood Friendly** – trolley buses are acceptable to urban neighbourhoods because they are clean and quiet

Trolley buses are more expensive to acquire than diesel and CNG buses. They have a longer operational life than diesel and CNG buses. The differences between the electric and the diesel fleets are shown on **Table 2.5.1** and discussed in **Section 2.5.** The trolley bus fleet has a life cycle cost 28% higher than the diesel bus fleet and 6% higher than the CNG fleet. The current electric fleet is nine years older than the diesel fleet, fourteen years older than the CNG fleet, and operates on heavier routes. A new electric trolley bus is approximately double the price of an equivalent diesel bus while operating and maintenance costs are somewhat similar.

Trolley buses require expensive infrastructure with which to operate as discussed in Section 1.3, this includes overhead wires, support poles, transformers and rectifiers. Replacement cost of the existing infrastructure in Vancouver is $184 million. The present infrastructure has an existing life of twenty to thirty years. If the trolley bus fleet was to be replaced with diesel or another kind of technology, the existing infrastructure would have to be removed.

An alternative to purchasing new vehicles could be to renovate the electric motors and propulsion units of the current trolley bus fleet and to use them in new low-floor coaches. This alternative will overcome Coast Mountain Bus Company's major maintenance concern of maintaining badly corroded bus bodies, but it would mean retaining outdated DC electric technology for another 10 to 20 years. Metro Seattle has recently decided to renovate its electric motors and place in new bus chassis'. This has proven expensive and possibly close to the cost of buying new motors.

Diesel Buses

The efficiency and operating characteristics of new diesel buses are compelling factors for most transit agencies and their potential use as replacements for Vancouver's electric trolley buses has required careful consideration.

As discussed in Chapter 2, diesel buses have similar operating characteristics to an electric trolley bus. They are more flexible to operate and are cheaper, both to buy and to run. Over the last ten years, new diesel buses have become quieter and cleaner. Clean diesel fuels do pollute but engines no longer emit as many harmful gases as their predecessors. Their particulant emissions have also been reduced.

An alternative considered to replacing the trolley bus fleet entirely with new electric buses was to fill some of the requirement with diesel buses.

CNG Buses

CNG buses have become popular with transit agencies who are trying to reduce their levels of emissions. CNG emits significantly lower levels of particulants and of nitrogen oxides. CNG engines run at high temperatures and emit higher amounts of volatile organic compounds and of carbon monoxide.

Coast Mountain Bus Company have experienced some start-up difficulties in their fueling and operating of the CNG fleet. The CNG buses operate on longer routes with fewer stops and may not be best suited to the heavily trafficked trolley routes.

Other Technologies

Other technologies discussed in Chapter 2 do not appear to have reached the stage of production that they can be regarded as viable options to either the electric trolley bus or the diesel bus. The alternative technologies considered; compressed natural gas, hybrids and fuel cells are in various stages of rapid development and could become viable within the next 5 to 10 years.

TransLink and Coast Mountain Bus Company should closely monitor these emerging technologies since they may become both attractive and viable in the near future.

Not discussed in chapter 2 is the future of battery technology. This has not met the expectations of earlier years. The state of the art in batteries still requires vehicles to be driven by multiple heavy battery units of various alloy and chemical composition. Battery life has increased and is currently well utilized by light vehicles (new city personal vehicles, golf carts and handicapped vehicles). Their use in heavy city buses is not currently practical, but could become viable as a hybrid with current electric trolley technology.

Also not discussed in Chapter 2 is the dual mode technology used by Seattle Metro with a fleet of 236 vehicles. These buses use conventional electric and diesel motors. They use electricity in the downtown tunnel and diesel outside the tunnel. Dual mode buses are heavy and Seattle Metro have not had good operating experience with this fleet.

4.3 New Infrastructure and Facility Requirements

Most of the overhead wiring infrastructure is in place and can be used by a replacement trolley fleet. If A/C motor technology is chosen over the current D/C motors technology, there will be no reduction in infrastructure or maintenance costs and the same rectifier stations can be used. If the fleet is to increase significantly, especially with trolley articulated buses, verification will be required of the electric load capability of the system.

Coast Mountain Bus Company replaces about 10km of wire each year as part of their ongoing maintenance program. They maintain 20 rectifier stations that have all been overhauled in the last 10 years.

The 50 year old Oakridge Transit Centre requires renovations and modernization. Its central location is desirable for buses operating in the City of Vancouver.

4.4 The Use of Articulated Trolley Buses

Translink planners have recommended the acquisition of articulated buses (18m) as part of an expanded replacement fleet. Their reason for this recommendation is to reduce bus overcrowding and to improve service reliability by introducing larger buses at slightly less frequent intervals. This would reduce the amount of bunching that occurs on trolley bus routes during periods of traffic congestion and will also reduce operating costs. Proposed routes are the #9 Broadway, #3 Main and #20 Victoria.

Presently, there are no low floor trolley buses in North America. Seattle and San Francisco operate high floor articulated trolleys requiring two driven axles and two traction motors. This adds considerably to the cost of acquisition and maintenance. Difficulty is experienced with the synchronizing of the two motors. Electrical loading on the overhead power supply also requires some upgrading of the rectifiers and transformers. Articulated trolleys are widely utilized in Europe and Brazil.

Articulated buses are approximately 1.5 times the size and capacity of a standard city bus. Articulated buses are 18m in length (60 feet) as against a 12m (40 foot) standard bus. Standard buses (low floor) have a capacity of 64 people (32 seated and 32 standing) as against a 90 person capacity of an articulated bus (54 seated and 36 standing). This operation allows TransLink to reduce frequencies without reducing passenger capacity (e.g. 4 minutes to 6 minutes). This can be achieved without undue inconvenience to riders and is planned to provide more reliable service and better operation over congested streets.

Articulated buses reduce the overall bus requirement on a route by 30% (where 15 buses were needed for a route, only 10 articulated buses would be required). Service hours are reduced, operating and maintenance costs are reduced and a more efficient operation is established, on heavily travelled congested routes.

Articulated diesel buses have been in successful operation in the Vancouver area for a number of years and have largely fulfilled their passenger load carrying capacity without sacrificing safety or comfort. One alternative may be to use diesel articulated buses instead of electric articulated buses but this would eliminate some of the quiet, clean trolley operation in routes #3, 9 and 20.

The acquisition of articulated, low-floor electric trolley buses is likely to be more expensive than the incremental cost of standard, low-floor trolleys. They may also be more difficult to source. Articulated trolleys will comprise a smaller, special order than the standard trolleys since they are not frequently manufactured and if required, there will be a need to synchronize the two traction motors. Suppliers may not bid on a tender for articulated trolleys along with standard trolleys.

The opportunity to purchase articulated trolleys as part of an optional substitution order for standard trolleys should be explored. If a manufacturer can supply articulated trolleys that meet acceptable specifications at a reasonable price, these vehicles should be procured for service reasons. This can be evaluated during the first two years of delivery of standard trolleys.

4.5 Pre-Delivery Orders

There is a limited market for electric motors and propulsion units. Each new order generally secures the most up-to-date components and technology. The question arises about the need to specify pre-delivery vehicles so that the replacement fleet can be tested under Vancouver conditions before the production of the full multi-year order proceeds.

Pre-delivery vehicles usually refer to a new kind of vehicle using existing technology. When Coast Mountain Bus Company took delivery of their articulated diesel fleet, they required pre-delivery vehicles for testing under Vancouver regional conditions and on Vancouver streets where they were planned for use. Pre-delivery orders usually require some alterations to their dimensions or functional features before full production starts.

The replacement trolley bus fleet is likely to comprise existing technology and vehicles similar to those currently in use. The component parts of this technology should be stock items that can be easily adapted to Vancouver conditions. Under these conditions appropriate warranties can be specified.

4.6 Contracting and Scheduling Issues

The goal of a procurement project should be to optimise the resources of the commercial sector so as to gain

- competitiveness for favourable contract terms;
- innovative ideas and methods;
- appropriate acceptance of the contracting risk;
- Warranty for the product.

A contract that is too rigid stifles innovation and may present the supplier with too much risk. This will result in higher prices and less negotiating room for important service issues. Tender documents need to give careful definition to the following topics:

- pre-delivery units
- scope of the contract
- length of the contract
- optional deliveries at the end of the contract
- exact technology requirements

- methods of assuring quality and product delivery
- warranty provisions
- the expectations and performance standards of predelivery units
- annual number of buses to be delivered
- spares and parts to be carried for new buses.
- progress payments
- the options of bidding only for standard vehicles, only articulated vehicles or both standard and articulated vehicles

This replacement order would be a large one exceeding 200 vehicles. An order for electric trolley buses will require consideration be given to the limited size of the market and the likelihood of only a few suppliers bidding on the contract. Several alternative contracting methods can be considered.

- **By proposal and negotiation.**

  Publicize the upcoming proposal to suppliers or consortia of suppliers. Issue requests for proposals that will clearly outline selection criteria. Select one supplier with whom to negotiate. Fix the base price of a multi-year order subject to the performance of pre-delivery units. Assess the pre-delivery performance and finalize negotiation of a multi-year delivery contract

- **By public tender to pre-qualified shortlisted supplier.**

  Issue a request for qualifications to suppliers or teams of suppliers and clearly outline the expectations of the order. Evaluate and short list three suppliers. Issue tenders to the short list. Select one supplier based on a best value criteria. Proceed to finalize the order by negotiation. Negotiate the need for predelivery items, the multi-year delivery schedule and the terms of warranty.

- **By requesting two pre-delivery orders.**

  Use one of the two methods above to award two pre-delivery orders to two different suppliers and then select one supplier for the multi-year order based on price and on the performance of the pre-delivery units

- **By split order to two different suppliers.**

  Use one of the two methods above to award two identical orders to two different suppliers.

Coast Mountain Bus Company have proposed the following procurement schedule due to the urgent need to replace the ageing trolley bus fleet:

- Finalize form of tender in Summer 2000
- Request qualifications and proposals in Fall 2000
- Award a contract in Winter 2001
- Commence delivery in Summer 2002 with pre-delivery units (if required) early in 2002

The scoping and conditions of a contract may require more time than shown in the schedule. There may also be the need to alert possible suppliers and supply teams to the upcoming bid.

The likelihood of alternative technology becoming attractive soon after the commencement of a multi-year order should be monitored.

4.7 Trolley Bus Suppliers

The following is a list of Trolley Bus Suppliers and potential component suppliers that may be expected to respond to a request for proposals for a replacement trolley bus fleet.

Many of these European companies also have manufacturing facilities in Latin America and Asia which they may use in order to compete in the Canadian market.

The Canadian and United States bus builders also have full order books. They may be interested in the order because of its size and would be expected to partner with the electric component suppliers indicated.

Current Trolley Bus Suppliers

Renault (France)
Van Hool (Belgium)
Breda (Italy)
Skoda (Czech), (ETI in U.S. and Skoda Canada in Canada)
Trolza (Russia)
Volvo (Sweden)
Mercedes (Germany)
MAN (Germany)
Toshiba (Japan)
Mitsubishi (Japan)

Potential Trolley Bus Builders

New Flyer (Canada)
Nova (Canada)
Orion (Canada)
Gillig (U.S.)
Neoplan (U.S.)
NABI (U.S.)

Potential Suppliers of Electric Motors and Propulsion Units

Westinghouse (U.S.)
Alstom (France)
Adtrans (formerly ABB) (Germany)
Siemens (Germany)

5. Greenhouse Gas Emissions and Opportunities for Carbon Trading

5.1 Opportunities for Carbon Trading

The Kyoto Treaty, an international protocol agreement to which Canada is a signatory, aims at curbing global warming by reducing the greenhouse gas (GHG) emissions of developed countries to 1990 levels by the year 2010. In addition to restricting GHG's, the agreement encourages international trading in emissions to offset the costs of compliance.

GHGs are mainly carbon dioxide (CO_2) and methane (CH_4). Carbon dioxide is emitted whenever hydrocarbons (wood, coal, petroleum etc) are burned. Methane is emitted during the breakdown of vegetable matter in the swamps and in agriculture. Over 30% of these emissions come from industrial plants, 30% come from energy users for the purposes of heating and cooling and a further 25% from energy used in transportation.

The Prototype Carbon Fund, launched by the World Bank in January 2000, aims to establish a cost of carbon emissions and to encourage companies to invest in GHG reductions. A company that can reduce its carbon emissions can offset the cost of making a reduction by trading it for the emissions of an energy emitting company.

Leaders in the field of carbon trading are large energy and industrial companies like BP Amoco, Shell, and Dupont who are seeking insurance against the possible introduction of penalties arising from the Kyoto Treaty. The companies with whom they are trading are mainly agricultural businesses and forest companies who are able to make GHG reductions. There is a growing industry of promoters and brokers of carbon trades. These are insurance and accounting firms.

Recent trades have been in the range of $3 per tonne of GHG. Establishing a market price for carbon is in its early stages and its value will depend on several factors. These include doubts over the actual implementation of the Kyoto targets, the implementation of carbon taxes by country or regional governments and the future of the global warming debate.

The following table shows some examples of recent carbon trades.

TABLE 5.1

Recent Carbon Trades

Emitter	Type of Annual Carbon Emissions	Creditor	Type of Annual Carbon Savings
Ontario Power Generation	2.5m tonnes CO_2 from oil fired stations	Zahren Alternative Power	Use of methane from landfills to generate electricity.
American Electric Power	Coal fired emissions	Bolivia Rain Forests	$5.5m payment for protection
Canadian Energy Coalition	3.3m tonnes CO_2	Iowa Farmers	Use of seed injection instead of tilling.
Edmonton Power	Coal and Oil emissions	Argentinean cattle farmers	Use of feed pellets to reduce methane emissions from cattle

Reference: The Economist Magazine and Edmonton Power.

5.2 Carbon Dioxide Emission Savings

Most of the emissions from diesel engines is in the form of carbon dioxide which is a greenhouse gas. One average diesel bus emits approximately 100 tonnes of carbon dioxide per year. This means that a total replacement fleet of 265 trolley buses, if converted to diesel engines, will emit about 30,000 tonnes of carbon dioxide per annum. If the trolley buses are retained and these emissions to the atmosphere are avoided and the carbon dioxide content can be used to trade with a company that is trying to offset the risk of their own carbon emissions. The extent of carbon trading is currently small and the value of today's market is still being determined.

Carbon dioxide emissions per standard (12m, 40') diesel bus have been calculated by a number of different North American agencies and the results are shown below.

US Environmental Protection Agency, average standard bus 1998 - (See Table 2.2.1) 2984g/mile

Sypher Meuler report for a clean diesel BC Transit bus, 1999 - 1966g/mile

Society of Automotive Engineers using the CBD Cycle, 2000 - 2950g/mile

North American Advanced Vehicle Consortium using the NY Bus Cycle, 2000 - 5200 – 7000g/mile

Using the SAE (Society of Automotive Engineers) recommended rate of approximately 2950g/mile or 1833g/kg and assuming the annual service distance of each trolley bus is 56,000 km (see Table 2.5.2),

Annual emissions per diesel bus = 1833 x 56000 = 103 x 10^6 g/year
= 103 tonnes/year.

If the trolley fleet is converted to 265 standard diesel buses,

Average fleet emissions from an equivalent fleet of diesel buses = 103 x 265 = 27,400 tonnes of carbon dioxide per year.

Using different emission rates shown above, the average fleet emissions could vary from 20,000 tonnes to 40,000 tonnes of carbon dioxide per year.

5.3 Prospects for TransLink Making a Carbon Trade

There are prospects for TransLink making a carbon trade to offset some of their marginal costs of purchasing trolley buses rather than diesel buses. The basis of the trade would be the avoidance of future emissions arising from TransLink replacing their electric trolley fleet with financially more economical diesel buses.

As shown above, the weight of these emissions (30,000 tonnes) are moderate compared to the trades shown in the table. The current cost of carbon trading is about CDN$ 3.00 per tonne. This indicates a possible trade at current prices in the amount of $90,000 per annum. As discussed, the value of a tonne of carbon could increase if taxes or penalties are levied on producers of GHGs. Estimates range from $10 to $20 per tonne.

Most Canadian energy utilities burn fossil fuels (coal, oil and gas) and are trying to make carbon trades. TransLink should pursue such a trade which will signal a continuing support for the environment.

6. RECOMMENDATIONS

6.1 Principal Considerations

Five issues emerge from the considerations made in this report about the replacement of the trolley bus fleet.

1. The multiple account assessment of the various bus technologies (Table 4.1) shows that the electric trolley bus has strong customer, environmental and social attributes. Its overhead infrastructure is in place and in good condition.

2. The electric trolley bus operates on some of the busiest routes in the system. The trolley bus is well suited to stop-start, heavy load conditions. Bus routes are taking 2% longer each year because of increased traffic congestion.

3. Two interesting new technologies, the hybrid and the fuel cell, could become comparable with the electric trolley bus in the next five to ten years.

4. It is desirable, from a service perspective, to operate articulated electric buses on the busiest routes in the trolley system.

5. Maintenance of the existing fleet of trolleys is expensive because its average age is 17 years. The existing bus bodies are corroded and replacement parts for both the motors and the coaches are no longer available. Maintenance costs for new replacement vehicles will be considerably less.

6.2 Bus Replacement Recommendations

As identified in the TransLink Strategic Transportation Plan 2000 – 2005 and substantiated in this report, TransLink needs to replace the present electric trolley bus fleet with 265 standard (12m) buses to meet the operating requirements for the year 2000. A further 60 standard vehicles will be required to meet projected requirements for operation in the year 2006.

TransLink should replace its trolley fleet requirements with a new fleet of low floor, modern, electric trolley buses with delivery scheduled between 2002 and 2005. Options should be investigated for a further addition of this fleet in 2006 or 2007. Options should also be investigated for articulated vehicles to replace standard vehicles in the later deliveries.

TABLE 6.2

Trolley Bus Replacement Strategy

Strategy	**2000 Service Replacement**				**2006 Service**	
				Option	**Expansion**	
Year	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Acquisition	205 Standard (12m) Trolleys			60 Standard Trolleys	60 Standard Trolleys	
				40 Articulated Trolleys	40 Articulated Trolleys	

These new trolley buses should be tendered in the following manner.

- a request for a base order of 205 standard electric trolley buses for delivery between 2002 and 2004; with,
- a request for 60 standard electric trolley buses for delivery in 2005; or
- a request for an option of 40 articulated electric trolley buses for delivery in 2005.

The tender could also permit an option for the following expansion of service requirements to 2006 and to be approved by the Board at a later date. This would be for:

- a request for an option of a further 60 standard electric trolley buses for delivery in 2006 or 2007; or,
- a request for an option of a further 40 articulated electric trolley buses for delivery in 2006 or 2007.

TransLink should seek board approval for the award of the base order of 205 standard trolley buses and for the order of either articulated or standard trolley buses to meet the replacement requirement.

TransLink should carefully assess the feasibility of using articulated rather than standard buses in the later orders. They should also monitor the possibility of replacing the optional orders with buses that use one of the emerging technologies such as hybrid engines or fuel cells

TransLink should use a competitive procedure to procure the above buses on the basis of best value. This may be achieved by international public proposal to a prequalified list of body and electrical component suppliers. The conditions of contract should provide for the development of working relationships between TransLink/Coast Mountain Bus Company and the suppliers in the interest of acquiring the best, current equipment for the replacement fleet. It is expected that different manufacturers may supply the base order and the selected optional order.

The following procurement schedule could be pursued:-

• Complete scoping of bus requirements, for both standard and articulated buses. Write request for qualifications and specifications for proposal.	Summer 2000
• Contact likely suppliers and consortia.	Summer 2000
• Issue requests for interest and qualifications.	September 2000
• Receive and assess requests for qualifications. Short list 3 suppliers or teams of suppliers.	Fall 2000
• Issue requests for proposals to shortlisted suppliers.	January 2001
• Pre-delivery and assessment period of base order, standard trolleys.	Spring 2002
• First delivery of base order standard trolley.	Summer 2002
• Final assessment of articulated trolley and placement of selected optional order.	Summer 2002
• Final delivery of first or second option.	Summer 2005
• Final delivery of third or fourth option.	Summer 2007

6.3 Other Recommendations

TransLink should continue their co-operative efforts with the City of Vancouver to improve bus priority on the congested streets of trolley bus routes. This can be achieved in a number of ways that include selective parking restrictions, bus queue jumpers, exclusive bus manoeuvres and signal priority.

TransLink should seek to trade its savings in carbon dioxide (greenhouse gas) emissions with an energy company that is trying to offset the payment of possible penalties from its own carbon emissions. Such a trade will recover some of the marginal costs incurred in replacing the current trolley fleet with electric rather than diesel engines. It may also encourage further emission reductions in TransLink's operations.

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Service Contracts

Date: May 31, 2000

Subject: **Richmond Area Transit Plan Year I – #98 B-Line and City Bus Integration**

Recommendation:

A. That the Board approve the report dated May 31, 2000 titled Richmond Area Transit Plan Year I - #98 B-Line and City Bus Integration and direct staff to proceed with implementation of the September, 2000 changes; and

B. That the Board refer the report to the City of Richmond for review and comment.

PURPOSE

The purpose of this report is to highlight the proposed transit service changes for implementation in September and December 2000, as identified in the attached Richmond Area Transit Plan - Year I report.

BACKGROUND

In April 1999, the Board adopted an Area Transit Plan program whereby local transit service plans are developed for each of the seven sub-areas of the GVRD on a three-year rotating cycle. Plans are being prepared in close consultation with municipalities to ensure that transit and land use plans are well integrated and services are tailored to meet local needs. It was decided that Richmond should be the first Area Transit Plan because BC Transit had already launched a major upgrading of service with the decision to build a rapid bus line (renamed #98 B-Line) and a new operations and maintenance facility in Richmond. Because the latter were scheduled to open in 2000, it was decided to undertake the Richmond Area Plan in two parts. The first part, which is the subject of this report, details the changes proposed for implementation in 2000. The second part of the Area Plan outlines the next four years (2001-2004). This report will be brought forward for the Board's consideration in July 2000 and if approved would be implemented through future Program Plan and budgets.

The Richmond Area Transit Plan commenced in the summer of 1999. It has included a review of existing transit services, market research into travel needs and expectations as well as numerous public open house meetings and workshops to engage people in the development of a longer-term plan for improving transit service in Richmond. The Plan has been developed in consultation with Richmond and Coast Mountain Bus Company staff through a technical committee. A Council appointed Public Advisory Committee has provided feedback on consultation with the broader community and has acted as a sounding board on the various service initiatives.

Throughout the process there has been a clear message that transit needs to be improved. The dominant themes include improved local transit service for travel within Richmond, improved service connecting Richmond to other major centres of the region such as Burnaby, New Westminster, Delta and Surrey and better service connecting Richmond to downtown Vancouver, UBC and east Vancouver.

In March 2000, the Board approved the 2000 Program Plan and Budget, which included a major increase in transit service in Richmond in the year 2000. The approval was subject to staff bringing forward the Richmond Area Plan – Year 1 outlining the projects being implemented in 2000 (attached). The major improvements proposed for September and December 2000 include, the launch of the #98 B-Line, increased service to UBC, new service to North Delta and Central Surrey and improved local bus service within Richmond.

DISCUSSION

Market Analysis

Richmond's population grew by 22% between 1992 and 1999 to 164,000. The growing employment base is concentrated in the northern half of the City in the so-called "Golden Triangle," split between the business and industrial parks, the Airport and the City Centre. The latter is a mixed-use centre, with a population of 30,000, a strong retail core, a growing office component and the second largest concentration of hotel rooms in the region.

The emergence of Richmond as a major employment centre and a key regional destination has resulted in significant changes to travel patterns. In contrast to the traditional suburb, over half of the Richmond labour force works within Richmond. There are more trips entering Richmond for work purposes than leaving with equal numbers arriving from Vancouver and south of the Fraser River (Surrey and Delta). It is also notable that approximately 13% of the UBC student population originates from Richmond, the highest percentage in the region outside of the City of Vancouver.

The 1994 regional travel survey found that during the AM peak hour, transit accounted for 6% of all trips originating from Richmond and only 4% of trips destined to Richmond. These are lower than other inner suburbs such as Burnaby and North Vancouver. The poor market share for transit is a major concern as Richmond has over 10% of regional jobs and moreover has a balance of jobs and labour force that is considered desirable by other municipalities striving to become complete communities.

Analysis of the transit system indicates that it is heavily oriented toward downtown Vancouver. Transit use is highest for downtown Vancouver travel, although it is lower than other municipalities. In the fastest growing travel markets (e.g. within Richmond and suburb-to-suburb), there are very few options for people to use transit and market shares are very low (e.g. the Airport has only a 2% market share for transit). Even in a major transit market such as UBC, Richmond has the lowest transit market share of any municipality (9%) and is only one third that of the City of Vancouver.

In order for transit riderhsip to grow, it must increase its presence in the growing markets. This will require a major restructuring of transit service to reflect the more complex travel patterns that have evolved over the past 20 years and less focus on the traditional downtown Vancouver market.

Proposed Transit Service Changes

The proposed transit service changes include the following:

- Improved service within Richmond including increased frequency on routes, extended hours of operation and more direct (cross-town) services linking residential areas with employment centres;
- Improved service within the City Centre including very frequent B-Line service as well as a new busway facility along No. 3 Road;
- Improved service to the Airport from Vancouver and Richmond including increased frequency, hours of operation and speed of travel;
- Improved service to UBC including introduction of a direct route between Richmond Centre and UBC;
- Improved service to Vancouver including a frequent B-Line route that reduces travel time from the City Centre as well as direct express routes for peak hour commuters from West and South Richmond bypassing the City Centre direct to Vancouver; and
- Improved service connecting major regional centres including a new Express Bus route between Central Surrey, North Delta and Richmond.
- All buses to have bicycle racks for carrying two bicycles.

September Service Changes

The above improvements are proposed for introduction in December 2000, with the exception of the B-Line and UBC service. The latter will be introduced in September although it is proposed to operate the B-Line service on a partial route and schedule

between downtown Vancouver and the new Airport transit station at Russ Baker Way and Miller Road. The partial route and schedule will allow for testing and commissioning of new equipment and systems as well as completion of the busway in Richmond City Centre. The latter will not be available until October. Airport transit services will be redesigned to connect with the new B-Line at the Airport Station. In addition, a new Richmond-UBC transit route will be introduced in September to tap the large UBC market.

Projected Performance

The plan represents a 24% increase in service over current levels. A total of 31 new buses will be added when the improvements are fully introduced. Ridership is estimated to increase by over 1,000,000 trips per year after one full year of service. This represents an increase of 8 % over the current levels. It should be stressed that ridership will continue to grow in subsequent years as the Area Plan represents a multi-year investment in new transit service. A five-year projection for the full Area Plan will be included in report to be presented in July 2000. Transit usage could be higher if more transportation demand management measures were introduced. The table below shows the projected performance of the new system.

	Current Service	Plan after One Year	% Change
Service Hours	287,000	356,300	24%
Peak Buses	84	115	37%
Ridership	12,000,000	13,000,000	8%
AM Market Share			
♦ UBC	9%	11%	22%
♦ Richmond - Downtown	42%	44%	5%
♦ Airport	2%	4%	100%
♦ Vancouver - Richmond	6%	9%	50%
Revenue (a)	$8,880,000	$9,620,000	8%
Cost Recovery (a)	48%	41%	-13%
Rides per Hour	42	36	-13%
Cost per ride	$1.55	$1.79	15%
Cost per new ride	-	$4.62	-

(a) The fare revenue uses a system average. This may tend to understate the revenue generated in Richmond, which is likely to have a higher percentage of multi-zone trips than the system average. The fare revenues assume the average fares prior to the fare increase on June 1, 2000, which increased fares an average of 16%

Issues

The planned changes for Richmond represent a very significant restructuring of existing transit services to reflect the changes in travel patterns in the sub-area over the past two decades. With any change of this magnitude there will be impacts on existing customers. Several issues that have been brought up include the following:

Increased Transfers to Downtown Vancouver

Some existing customers have expressed concern about the loss of direct Vancouver buses from Richmond neighbourhoods. This is a result of the change in focus from one that catered to Vancouver travel to one that provides greater local travel opportunities. To respond to some of the concerns, it is proposed to introduce a number of direct commuter buses from West and South Richmond bypassing Richmond City Centre. The new commuter buses and the B-Line will reduce Vancouver travel times by up to 10 minutes for many Richmond to Vancouver commuters. The combination of direct express buses and B-Line serving the town centre has received strong support in consumer testing and public meetings. During off peak hours transfers will be required to reach Vancouver from most neighbourhoods other than the City Centre.

Poorer Connections to Oak Street in Vancouver

A number of hospital workers have expressed concerns that transfer connections to Oak Street in Vancouver will be reduced, increasing travel times from Richmond. This is due to the more direct routing via the Arthur Laing Bridge used by the B-Line and the express buses. The Emme/2 transportation model was used to estimate the size of the potential market for a direct Oak Street or Cambie route, however both performed poorly. It is not proposed to introduce such a service in 2000 however, more analysis will be undertaken after the implementation of the December changes.

Indirect route to UBC

Some UBC students have expressed concern that the proposed routing via Oak Street Bridge, Granville and 41st Avenue will take longer than a more direct route via the Arthur Laing Bridge and SW Marine Drive. Travel time simulations indicated the two routes were comparable in schedule time during the AM peak even though the SW Marine Drive route is shorter in distance. The Granville and 41st Avenue route has the added benefit of providing service to other westside Vancouver destinations. Nevertheless the new UBC service will need to be monitored closely and the routing reviewed again in the future if there continue to be concerns about the indirectness of the route.

ALTERNATIVES

An alternative would be to delay all the improvements until December instead of introducing the partial B-Line and UBC service in September. Such a delay would result in buses being stored and unused for the fall commuter season. A delay to UBC service would effectively lose the opportunity to increase market share commencing with the return to classes in September.

CONCLUSION

The Richmond Area Transit Plan represents a more consultative, community and customer based approach to transit planning. The changes recommended in Year 1 are substantial. They call for a massive restructuring of the way transit is delivered and the opening up of new markets such as UBC, the Airport and Surrey-Delta travel. Overall the plan is intended to reflect the needs of the community for more direct links within Richmond, more links between suburban centres while improving upon the traditional Richmond-downtown Vancouver market. Ridership is expected to grow slowly in response to the changes. It will take several years for the investments to take hold.

Richmond Area Transit Plan Year 1

#98 B-Line and City Bus Integration Plan

June 7, 2000

Table of Contents

#98 B-Line Integration Plan

Richmond Area Transit Plan – Year 1

Introduction

Purpose of Report

This report outlines the transit service design for the #98 B-Line Integration as Year 1 of the Richmond Area Transit Plan, including the commissioning phase of the B-Line.

The Integration Plan describes the implementation of #98 B-Line, the integration of City Bus service in Richmond and Vancouver as well as improvements to other local and regional services in Richmond through the Area Plan process.

Most of the changes are planned to occur December 2000, although the commissioning phase of the B-Line will begin in September 2000 and some service improvements began in April 2000.

Regional Policies

TransLink was created in October 1998 to plan and develop an integrated regional transportation system that meets the current and future needs of the Lower Mainland.

To achieve this, TransLink will support the regional growth strategy as stated in the GVRD's *Livable Region Strategic Plan* (LRSP) and its transportation component, *Transport 2021.*

TransLink's Vision Statement:
"*To improve **Livability** through **Managed Mobility***"

To ensure its success, TransLink is creating opportunities for its member municipalities and the general public to be key stakeholders to provide input for the planning and development of transit and the other transportation programs.

Area Transit Plans

TransLink is committed to develop 5-Year Area Transit Plans to place emphasis on local communities and municipalities, and to establish the general framework for integrated transit and transportation planning.

The Area Plans reflect each individual community's need for improved mobility and related services that help support official community plans and transportation plans. The plans focus on developing innovative, integrated and cost-effective solutions that can be achieved by the end of the plan lifecycle (i.e. 5 to 6 years). Each Plan outlines future transit services and improvements to existing services for that community, with considerable attention given to providing efficient linkages to neighbouring communities and regional town centres.

Area Transit Plans for 2000

- ***Richmond***
- ***South-of-Fraser***
- ***North Shore***

Area Plans will serve as vital contributions to the policy directions to be established in the TransLink Strategic Transportation Plan. Transit market areas and types of existing transit services influenced the sequence in which TransLink undertakes individual Area Plan Process. For 1999/2000, Area Plans for Richmond (including Vancouver International Airport), South of Fraser (Delta, Langleys, Surrey, White Rock) and the North Shore (North Vancouver City and District, West Vancouver, Bowen Island, Lions Bay) have been conducted.

Richmond Area Transit Plan – Overview

The Richmond Area Transit Plan process co-ordinates planning of local transportation issues and solutions, reviews of local service, with the #98 B-Line Project.

This Area Plan, begun in mid-1999, incorporates overall guiding principles and objectives for service strategy and design. Implementation of additional service changes in the community will occur in phases through annual Program Plan projects, until the completion of the Area Plan lifecycle.

#98 B-Line Integration Plan – Overview

#98 B-Line is the second B-Line service in the Vancouver region (#99 B-Line on the Broadway / Lougheed Corridor began in 1996). B-Line routes serve as bus-based rapid transit on a set of the region's highest density corridors. Service has the principal characteristics of frequency, trip speed and ease of use.

During the daytime buses operate every 10 minutes or better, with higher frequency in peak periods. Buses stop for pickup and dropoff at specified stops, spaced farther apart than traditional bus stops. For ease of use, all service operates with a dedicated fleet in special livery, the routings are consistent at all times (no deviations), bus stops are distinctly identified and the like.

In the case of #98 B-Line, special infrastructure will be developed for the start of service. This includes specially designed *stations*, automatic displays at the stations

projecting the time of the next trip, bus activated signals to keep trips on schedule and a dedicated bus lane on No 3 Road in Richmond.

To maximise #98 B-Line's overall success and the quality of interaction with its feeder services, this first phase of the Area Plan redesigns Richmond local and regional services, service to Vancouver International Airport (YVR) and service to UBC. There are also some elements to integrate with Vancouver local services.

The #98 B-Line Integration Plan is developed to guide the planning of local service changes by identifying specific changes necessary to fully support the #98 B-Line project. A set of guiding principles have been established as the overall theme of service re-design strategy, while specific objectives help direct the execution of each sub-plan. The Integration Plan does not fulfil *all* the Area Plan objectives identified through the complete Area Plan process. During Years 2 to 5 of the Area Plan additional enhancements will be made to local and regional services.

The 5 components of the #98 B-Line Integration Plan are:

- Richmond-Vancouver B-Line (Rapid Bus)
- Richmond local bus service integration
- Airport service revision and integration
- Regional connections to adjacent communities
- Vancouver local bus service integration

Integration Objectives and Principles

Principles

The Integration Plan principles provide guidance to ensure the objectives are consistent, direct and simple to manage. They:

- **Emphasise Service Integration with #98 B-Line**
- **Enhance Local and Regional Service**
- **Manage Risk to Ensure Maximum Success**
- **Develop and Implement Service Improvements in Phases**

These principles ensure the primary intent of the Integration Plan will remain integration with #98 B-Line rather than attempting to address all the system's shortcomings in one year; many service improvements will occur in years 2 – 5 of the Area Plan.

Objectives

As part of the #98 B-Line Integration Plan, specific objectives were developed to support the integration principles as outlined above. They are:

Principle 1: Emphasise Service Integration with #98 B-Line

- *Provide direct connections to #98 B-Line in central Richmond*
- *Provide direct connections to Vancouver International Airport at Airport Station*
- *Maximize the quality of the transfer experience to and from #98 B-Line*

Principle 2: Enhance Regional and Local Service

- *Improve the frequency of local services connecting with #98 B-Line at times when there are opportunities to attract new ridership.*
- *Improve service between Richmond City Centre and key regional destinations*
- *Improve service coverage within Richmond City Centre;*

Principle 3: Manage Risk to Ensure Maximum Success

- *Provide direct local routings for connections with #98 B-Line*
- *Ensure the revised system is simple and easy to use*
- *Improve service quality between key local destinations through improved frequency and reduced transferring*

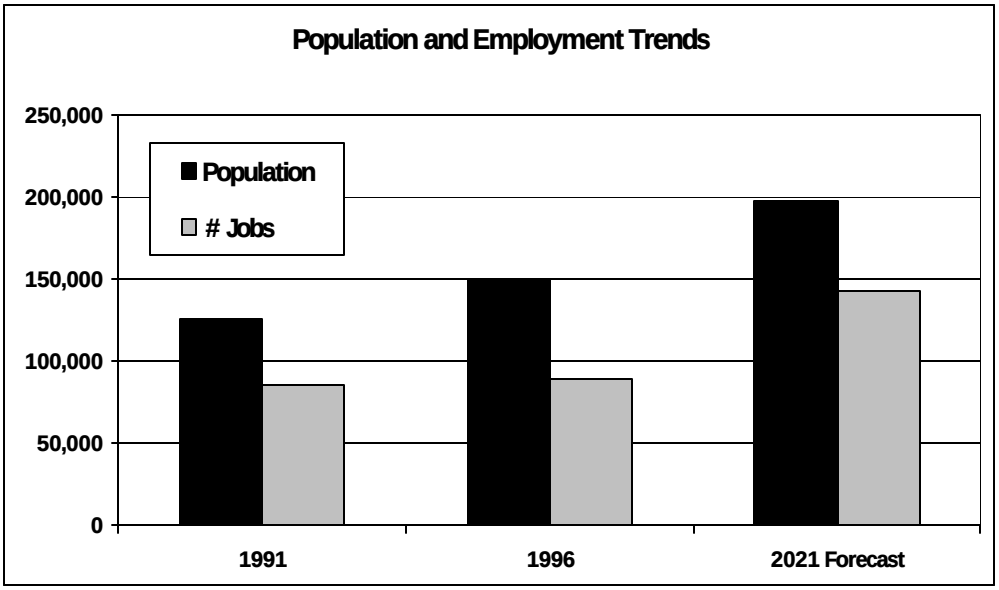
Principle 4: Develop and Implement Service Improvements in Phases.

- *Focus on integration as First Year of Area Plan. Service improvements are not expected to fulfil all of the Area Plan objectives in Year 1*

Market Analysis

Overall Growth Trends in Richmond

During the 1990s, Richmond has emerged as a major regional destination due to rapid growth in population, employment and commercial activities.



Population

Between 1991 and 1996, total population increased by 18% to 149,000, or 8% of the Vancouver CMA.

The GVRD predicts Richmond's total population to grow by another 60,000 to 212,000 by 2021. In particular, City Centre area population is expected to increase by *almost 50%*, to 41,000 by 2006 and *double* to 62,000 by 2021.

Projected Population Growths for Some Local Areas

Area	Est. Population Increase 1996 to 2006	Change	Est. Population Increase 1996 to 2021	Change
Bridgeport	470	18%	1170	46%
Cambie	200	3%	500	7%
Central Richmond	4750	6%	11885	16%
City Centre	**12055**	**41%**	**30135**	**102%**
East Richmond	2420	61%	6050	152%
Gilmore	410	9%	1030	22%
Steveston	800	5%	1995	14%

Source: GVRD, 2000

Employment

Total employment increased by about 5% from 1991 to 90,000 in 1996 GVRD predicts the number of jobs in Richmond may reach 120,000 in 2006 and approximately 150,000 in 2021.

The City predicts significant job growths in many local areas, with the majority of growth expected to continue within the "Golden Triangle" -- area bounded by City Centre, Sea Island and Bridgeport/Cambie. Other significant local areas include East Richmond and Central Richmond.

- *Richmond's share of total employment growth in the Lower Mainland between 1981 and 1996 was 10.5%, third highest in the region*
- *In 1996 about 9% of all Lower Mainland jobs were located in Richmond*

Lower Mainland Employment Study June 1999

Projected Employment Growths for Some Local Areas

Area	Est. Employment in 1999	Est. Employment in 2021	Change (%)
Bridgeport	**17,000**	**25,550**	**8,500** (+50%)
Cambie	**15,000**	**22,500**	**7,500** (+50%)
Central Richmond	6,000	9,000	3,000 (+50%)
City Centre	**30,000**	**45,000**	**15,000** (+50%)
East Richmond	3,000	4,500	1,500 (+50%)
Sea Island	**15,000**	**22,500**	**7,500** (+50%)
Steveston	2,000	3,000	1,000 (+50%)

Source: City of Richmond, 2000

Business Activities

Richmond's share of the total Lower Mainland office floorspace growth between 1981 and 1996 was 10.5%. In 1996, Richmond Town Centre accounts for 3% of total Lower Mainland office floorspace, while Riverside and Bridgeport/Cambie business parks collectively accounts for more than 4%. [1]

GVRD indicates that the majority of recent regional employment growth occurred in the "middle" of the region, in communities including Richmond. Region-wide, 19 major industrial/business parks currently account for nearly 40% of all employment floorspace, a trend that has been increasing in the past 15 years. [1]

Emerging Regional Centre

Richmond is fast becoming a regionally significant employer base by attracting many high-tech sector firms, largely due to its proximity to the airport, ferries terminal and major port facilities. Good access to these regional gateways has fuelled local tourism, retail and hospitality activities, and giving Richmond the second highest concentration of hotel rooms in the GVRD. The Airport is currently the second busiest in Canada in terms of passenger volume and cargo tonnage.

Richmond City Centre is a regional town centre with medium to high-density mixed land use with emphasis on residential and retail/service uses. Many regional activity centres such as the Richmond Hospital, Workers' Compensation Board, Kwantlen University College, Lansdowne Mall, Richmond Centre Mall, Aberdeen Mall and the Asia West district generate strong travel patterns during peak and midday periods.

[1] Lower Mainland Employment Study, June 1999

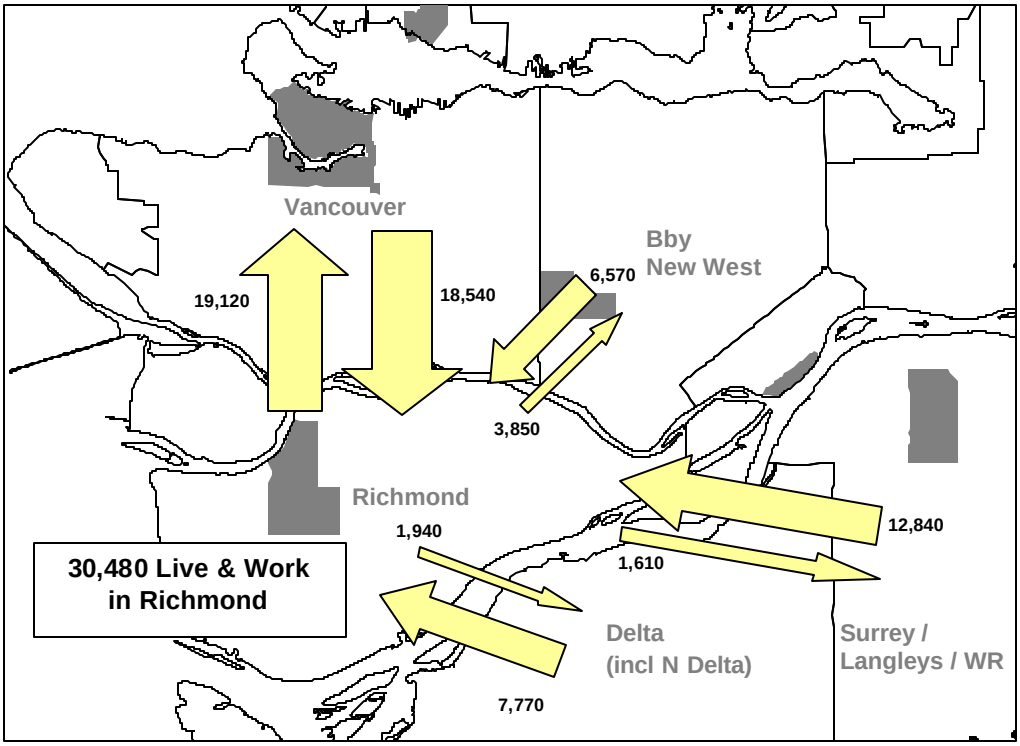
Changing Travel Patterns

With a solid employment base, the 1996 Census found that Richmond is attracting an increasing number of workers who live outside of Richmond. Of these workers, 23% live in Vancouver, 13% in Surrey, 9% in Delta and 6% in Burnaby.

Richmond has the second highest rate of residents who live and work in their own municipality, after Vancouver; of workers who live in Richmond 53% also work in Richmond. This can be attributed to Richmond's surplus of jobs over residents, unusual among suburban centres and, at 1.17 the highest in the Lower Mainland. As a result there are strong reverse-peak travel patterns between neighbouring communities and Richmond, a condition that contradicts the traditional suburban travel patterns focused towards downtown Vancouver.

Thus an opportunity for an enhanced local transit system to increase local transit market share.

1996 Census Journey-to-Work Survey
(Numbers indicate local residents travelling to neighbouring communities for work purposes)



Source: Statistics Canada

High Automobile Ownership

Richmond has maintained above-average household auto ownership rate compared with other communities[2]. Richmond's auto ownership increased from 1.9 vehicles per household to 2.1 between 1991 and 1996, a time when most of the region except Coquitlam saw a decrease in household auto ownership. Findings from the 1994 GVRD Trip Diary Survey suggest that one-vehicle households typically make 12% of all its trips by transit, while 2-vehicle households with make only 4% of all its trips by transit.

Low Transit Market Share

The 1994 GVRD Regional Trip Diary Survey found that, in the AM peak period, transit accounted for only 6% of all trips (79% auto) originating from Richmond to other parts of the region. During the same period, only 4% of all trips (82% auto) destined to Richmond were made by transit.

More recent screenline surveys conducted by GVRD and UBC since 1996 shows Richmond's transit market shares (AM peak) as the following:

Richmond Transit Market Share to/from Subareas (AM peak unless indicated otherwise)

REGIONAL	
Vancouver	To Vancouver: 10% To CBD: 42% From Vancouver & CBD: 6%
Vancouver Airport (YVR)	To YVR: 2%
UBC	To UBC: 9% From UBC: 9% (9am-3pm)
Burnaby / New Westminster	To Bby/NW: 3% Fom Bby/NW: 2.2%
Delta / Surrey / White Rock	To Delta/Surrey/WR: 0.9% From Delta/Surrey/WR: 3%
LOCAL	Within Richmond: 8%

Notable examples of low transit market share are UBC and the Airport. In the AM peak period, Richmond alone accounts for nearly 20% of all SOV trips destined to UBC, among the highest in the region, yet only 1 out of every 10 trips from Richmond to UBC was made by transit. Similarly, Richmond has just over 10% of total, but small, transit market to the Airport yet is home to second-largest (22%) share of Airport employees after Vancouver (26%).

Richmond's transit service has not fully maintained pace with the recent changes in the community and its transportation needs. In particular, commuter services have been designed to predominantly focus on getting people from Richmond to Vancouver. There is significant opportunity to enhance transit service quality to become more competitive with the automobile and increase market share.

[2] ICBC, GVRD

Market Preferences and Key Issues

BC Transit's 1998 Richmond transit market survey recommends two priorities for service improvements: 1) regional services; 2) local services.

Key areas customers identified as requiring new or improved regional services are between Richmond-Vancouver (includes UBC), Richmond-Burnaby, Richmond-Surrey and Richmond-New Westminster. This is consistent with all other recent indications of increases in suburb-to-suburb travels. The provision of more frequent and direct services between these regional centres is necessary if transit is to increase its market share.

The survey also indicated strong public desire to see improvements to local services in terms of reliability, connections and frequency level as reasons to increase their usage of transit. Directness of service was also a major issue for short-distance trips between local destinations where transfers at Richmond Centre are often still required.

The Area Plan public process also identified a range of transit issues expressed by public stakeholders as opportunities where improvements can be made in the short and long term. These include:

Local services:

- Connections to Activity Centres Within Richmond;
- Improved Service to Industrial Areas;
- Improved Service to Schools;
- Mobility Within Richmond City Centre;
- Service to Residential Growth Areas;
- Walking Distance to Bus Service;
- Service Frequency / Hours of Service;

Regional services:

- Frequency & Travel Time of Service to Vancouver;
- Direct Connections to Other Regional Destinations;
- Connections to Airport and Tsawwassen Ferry Terminal;

TransLink is also investigating other emerging markets in Vancouver where potential direct services will connect Richmond City Centre and downtown Vancouver. Potential corridors in Vancouver include Cambie Street and Oak Street.

The Integration Plan will initiate the first year of the Richmond Area Transit Plan by implementing significant improvements to regional trunk services including the new #98 B-Line, improving local accessibility, and enhancing regional connections.

The re-design of transit services under the guidance of the Integration Plan incorporated these issues to develop solutions that provide immediate benefits to customers. Despite limitations to available resources in 2000, service enhancements will be implemented to fulfil integration principles and objectives, although the Integration Plan also addresses improvements in a number of other key areas.

From years 2 to 5, the Area Plan process will continue to identify emerging issues and opportunities in order to develop new service solutions. Phased improvements will be implemented to reflect changing community needs and to maximise customer benefits and minimize risks.

Relationship to Identified Issues

The following table summarizes the key issues raised through the Richmond Area Plan public consultation process and the potential types of solutions to them. Beside each one is a qualitative assessment of the action taken in this Area Plan.

Opportunity	Action in 2000
Connections to Activity Centres within Richmond	• New emphasis on local travel with fewer transfers to local destinations • Improved local frequency on many routes • Increased evening service to Riverport Recreation Complex
Improved Service to Industrial Areas	• New direct connection from Steveston to Cambie Rd (route #410) • New direct connection from NE Richmond to SE Richmond (route #405)
Improved Service to Schools	• New direct connection from Westminster & No 1 Road to Garden City and Williams (incl McRoberts) • Improved service to Kwantlen University College • Improved service to UBC
Mobility within Richmond City Centre	• New B-Line service on No 3 Road • New service on Cooney Rd in Richmond City Centre
Service to Residential Growth Areas	• New service to No 4 Road (Alderbridge Estates)
Walking Distance to Bus Service	• New service on Cooney Rd in Richmond City Centre • New service to No 4 Road (Alderbridge Estates)
Service Frequency/Hours of Service	• More frequent daytime and evening service on many local routes • Earlier service to Airport
Direct Connections to Other Regional Destinations	• New Route from Richmond Centre Scottsdale and Newton • Improved transfer connections at Hwy #99 and Steveston Hwy for services from Richmond Centre to Ladner, Tsawwassen and White Rock/S. Surrey
Frequency & Travel Time of Service to Vancouver	• New very frequent service on #98 B-Line • New direct routes and improved existing service from west Richmond to downtown Vancouver • Increased daytime frequency to and from UBC • Increase peak frequency on existing routes to Knight & Marine
Connections to Airport and Ferry	• New frequent B-Line connection at Airport Station • Earlier service from Richmond to YVR • New direct services from south Richmond to Airport Station • Improved service to YVR south terminal • Improved transfer connections at Hwy #99 and Steveston Hwy for services from Richmond Centre to Ladner with transfer to Tsawwassen Ferry

Public Research and Transit Market Share Targets

As discussed previously, current transit market share of regional trips to/from Richmond and of local trips within Richmond has not been competitive with the private automobile market share. Major issues identified by key stakeholders through the Richmond Area Transit Plan led to concepts and ideas that, in turn, spawned numerous proposals aimed to increase transit usage over the next five years.

In spring 2000, TransLink's marketing research conducted a public opinion survey to determine community response to the proposed improvements and gauge its likelihood of increased transit usage. 44% of all Richmond target area market indicated they would be potential users of an improved transit system. Of all those who currently don't use transit regularly, 62% indicated they would consider transit with improved service.

The following table outlines the estimated transit share increase for each of the major markets to/from Richmond as a result of the transit improvements proposed to be implemented in Year 1 of the Richmond Transit Area Plan.

Market	Current Transit Share	Projected Transit Share After One Year	Change
Richmond to UBC	9%	11%	22%
Richmond to CBD	42%	44%	5%
All areas to Airport	2%	4%	100%
Vancouver to Richmond	6%	9%	50%

Conceptual design

The following describes the service concepts for the Richmond Vancouver B-Line integration and for local service improvements in the first phase of the Richmond Area Plan.

Regional Services

1) Vancouver

#98 B-Line

98 B-Line will operate as a frequent, direct route between downtown Richmond and downtown Vancouver, providing service to a limited set of stops along the route. It will use several Transit Priority Measures (TPM) and technologies to enable reliable travel times and to improve customer service. B-Line stops will have more customer amenities than traditional bus stops with platforms, shelter, lighting, static and real-time electronic customer information. Vehicles will be high capacity, low-floor articulated buses with padded seats and on-board stop announcements. Stops will be limited, but customers will be able to board or alight at any of these stations along the route (like SkyTrain and the Broadway / Lougheed #99 B-Line).

Frequency will be key to the success of B-Line. Service will operate from early morning to late night all days, with high peak frequencies determined by anticipated demand and off-peak frequencies set according to policy. High service levels will also reflect the role of #98 B-Line as a service connecting major destinations: Richmond, Vancouver and Vancouver International Airport.

In 2000 Richmond Vancouver B-Line will operate from Granville Avenue via No 3 Road, Sea Island, Arthur Laing Bridge, Granville, Seymour, Cordova, Burrard to major downtown destinations. A map of the #98 B-Line route is available on page 17.

Express City Buses

Several regional connections will be improved at the same time as 98 B-Line integration. Because they relate to #98 B-Line and Richmond local service they are included in this plan.

Express routes that currently do not operate through Richmond City Centre, the #490 and the #491 (formerly #411), will continue. Route #491 will have its service levels increased as well as providing two-way trips between Richmond, Airport and Vancouver. #491 service capacity will be increased by operating articulated buses.

Building on the continuing success of the #491, two new express routes will be introduced - the #492 Two Road and #496 Railway. These will operate as peak-period, peak-direction services between Steveston, Airport and Vancouver. Some articulated buses will also operate on these routes. Both routes will allow pickups/discharges at all local stops in Richmond, and at major stops in Vancouver served by the #98 B-Line.

- #492 (Burrard Station): new express route between West Richmond, Sea Island and Vancouver via Two Road and Dinsmore Bridge. This will operate as peak-period, peak-direction service, allowing for pickups/discharges at all local stops in Richmond, and at major stops in Vancouver served by the #98 B-Line.

- #496 (Burrard Station): new express route between West Richmond, Sea Island and Vancouver via Williams, Railway and Dinsmore Bridge. This will operate as peak-period, peak-direction service, allowing for pickups/discharges at all local stops in Richmond, and at major stops in Vancouver served by the #98 B-Line.

2) University of BC

The #480 UBC service will be significantly increased to better serve the large commuter market from Richmond to Vancouver and to develop a midday market from Vancouver to Richmond.

A two-directional, limited-stop service will operate all-day between Richmond Centre and UBC. Service will allow pickup/discharges at all Richmond local stops. In Vancouver, service will be at limited stops along Granville St. and W.41 Avenue to facilitate major connections while minimizing trip times. Service will allow for early work starts and late work ends in UBC and in Richmond.

3) Vancouver International Airport

As noted previously, Vancouver International Airport is a major destination and regional gateway. To better serve the Airport market, service will have the following features:

- New transit exchange at Airport Station to facilitate frequent connections with #98 B-Line.

- Very high service levels comparable to B-Line between Main Terminal building and Airport Station using combined services of the #100 and the #404.

- Direct #404 service from Richmond Centre will encourage Richmond and Vancouver residents to switch to transit. The number of transfers will be kept to a minimum, particularly in peak periods.

- Extended #425 South Terminal service to span full AM/PM peak periods to better meet commuter needs.

- Service designs will allow for buses to terminate at Airport Station to minimize the bus storage requirements at the Main Terminal building.

4) Surrey

Travel between Richmond and Surrey has increased in recent years. In 1996 22% of all workers in Richmond lived in Delta, Surrey and White Rock [3]. In 2000 a new Richmond to Surrey peak-period service will be introduced with the following features:

[3] 1996 Census Journey-to-Work Survey

- New direct limited-stop regional service between Richmond City Centre and Scottsdale/Newton municipal town centres in Surrey.

- Additional service to industrial and business parks in East Richmond along Westminster Highway.

- Service begins in December 2000 with peak period frequency of every 30 minutes.

- Service will be upgraded in 2001 to highway-style coach buses operating through midday, and with 15-minute peak frequency in late 2001.

Regional Service Frequency By Route and Corridor

REGIONAL Route	Corridor(s) Served	Frequency (minutes) AM Peak	Base	PM Peak	Evening	Night	Saturday	Sun/Hol
98	Richmond Vancouver B-Line	4-5	7-8	4-5	10	15	7-8	10
100	Marpole - Airport Station (to YVR in peaks only)	15	30	15	30	30	30	30
404	Ladner to YVR (to Rich Ctr only in Eve/Sun/Hol) YVR to to No 5 Rd/Steveston	30 30	30	30 30	30	60	30	30
YVR Shuttle	YVR main terminal to Airport Station (#100/#404)	6	10	6	15	15	15	15
425	Richmond Centre to South Airport	30		30				
480	Richmond Centre to UBC	30	30	30				
490	Vancouver Express via Steveston	30		30				
491	Vancouver Express via No 1 Road	15		15				
496	Vancouver Express via Railway	15		15				
492	Vancouver Express via No 2 Road	15		15				

Richmond Local Service

The primary objective of an enhanced local service is to:

- Emphasise the connections to the #98 B-Line in the centre of Richmond.

Secondary objectives include:

- Better circulation in the centre of Richmond

- Better connections among local destinations in Richmond

The overall design in 2000 will be constrained by the need to integrate existing routes with 98 B-Line, which terminates in the City Centre; this will reinforce the focus on trips to the central area. In future years of the Area Plan, better local connections and service to destinations outside the city core will be developed. For 2000, local service will feature the following:

- #98 B-Line will provide trunk service between Richmond City Centre and Vancouver. Local routes that currently operate through Richmond City Centre will connect with B-Line.

- Local bus routes will connect with B-Line in the centre of Richmond. Stops will be on-street adjacent to the B-Line bus route. Where possible buses will share stops with B-Line.

- Frequencies will be increased on many routes (in peak and/or off-peak) to make transfer times as short as possible, making service more attractive overall.

- Transfers to and from regional services will continue in the centre of Richmond (at No 3 Road and Cook).

- Local buses will operate on major roads in the City Centre including No 3 Road. Service will connect destinations such as Richmond Centre Mall, Lansdowne Mall, City Hall, Library / Arts Centre, Kwantlen University College, Richmond General Hospital and the Asia West retail complex.

- Travel between many local origins and destinations will be improved with new direct services. By combining, or *through-routing* some current routes, these services will provide customers the convenience of a direct "cross-town" service by reducing or eliminating transfer connections when travelling within Richmond. In 2000 new direct services are: #401 One Road/Garden City, #406 Railway/22nd Street Station (New Westminster SkyTrain), #402 Two Road/Bridgeport and #405 Five Road/Cambie.

Future changes (identified through the Area Plan) will likely create new connections within the community including potential crosstown services.

Local Service Frequency By Route and Corridor

LOCAL Route	Corridor(s) Served	Frequency (minutes) AM Peak	Base	PM Peak	Evening	Night	Saturday	Sun/Hol
401	No 1 Road / Garden City	15	20	15	30	60	20	30
402	No 2 Road / Bridgeport	15	30	15	30	60	30	30
410	Railway / 22nd St Stn	10	20	10	30	30	20	30
403	No 3 Road	12	20	12	30	60	20	30
404	Ladner to YVR (#404 to Rich Ctr only in Eve/Sun/Hol)	30	30	30	30	60	30	30
	YVR to to No 5 Rd/Steveston (#404)	30		30				
405	No 5 Rd Corridor	30	60	30			60	60
407	Gilbert	15	30	15	30	60	30	30
405	Cambie to Knight	30	60	30	60	60	60	60
YVR Shuttle	YVR main terminal to Airport Station (#100/#404)	6	10	6	15	15	15	15
425	Airport Station to South Airport	30		30				

Vancouver Local Service

Service in Vancouver will receive some minor modifications as required to complement the B-Line service.

- Local service on Granville St (route #8) will be reduced slightly to reflect the significant attractiveness of B-Line for trips within Vancouver.

- Some adjustments will be made to terminus locations of bus routes in downtown Vancouver.

Detailed Service design

The following section contains detailed descriptions of the various services being adjusted in this service plan. Each route has a map showing all adjacent routes, a listing of the major destinations served, a more detailed description of the corridors served and frequencies by time of day and day of the week.

Integration Plan Winter 2000

98 B-Line

Frequent service connecting Richmond City Centre, Vancouver International Airport and downtown Vancouver

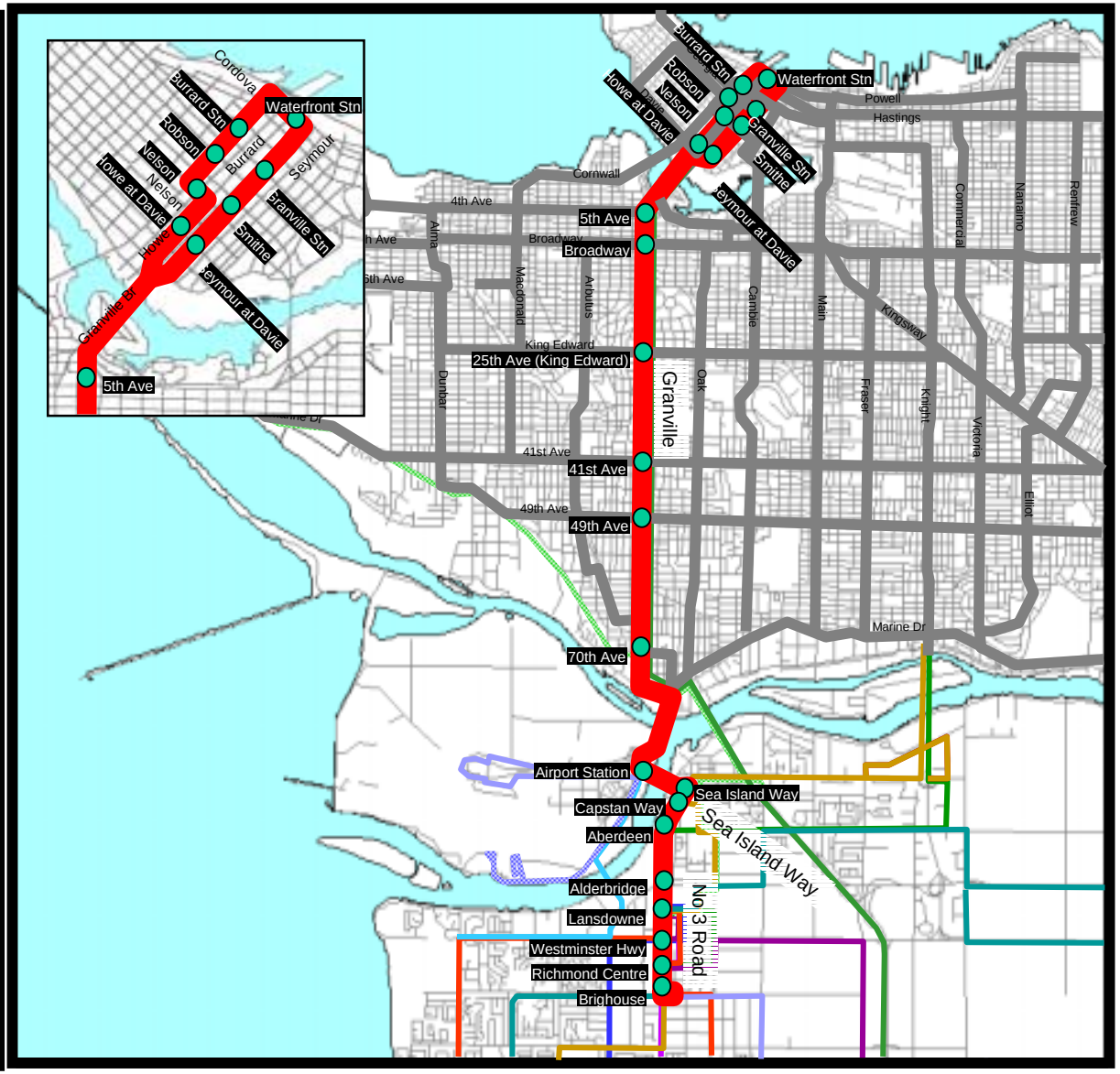
Serves: Richmond City Centre, Lansdowne, No 3 Road, Airport Station (Vancouver International Airport), Granville St and downtown Vancouver

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
4-5	7-8	10	7-8	10

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#401 One Road / Garden City

A new direct connection between Steveston, 98 B-Line, Richmond City Centre, Garden City and Horseshoe Way (Riverport evenings and weekends)

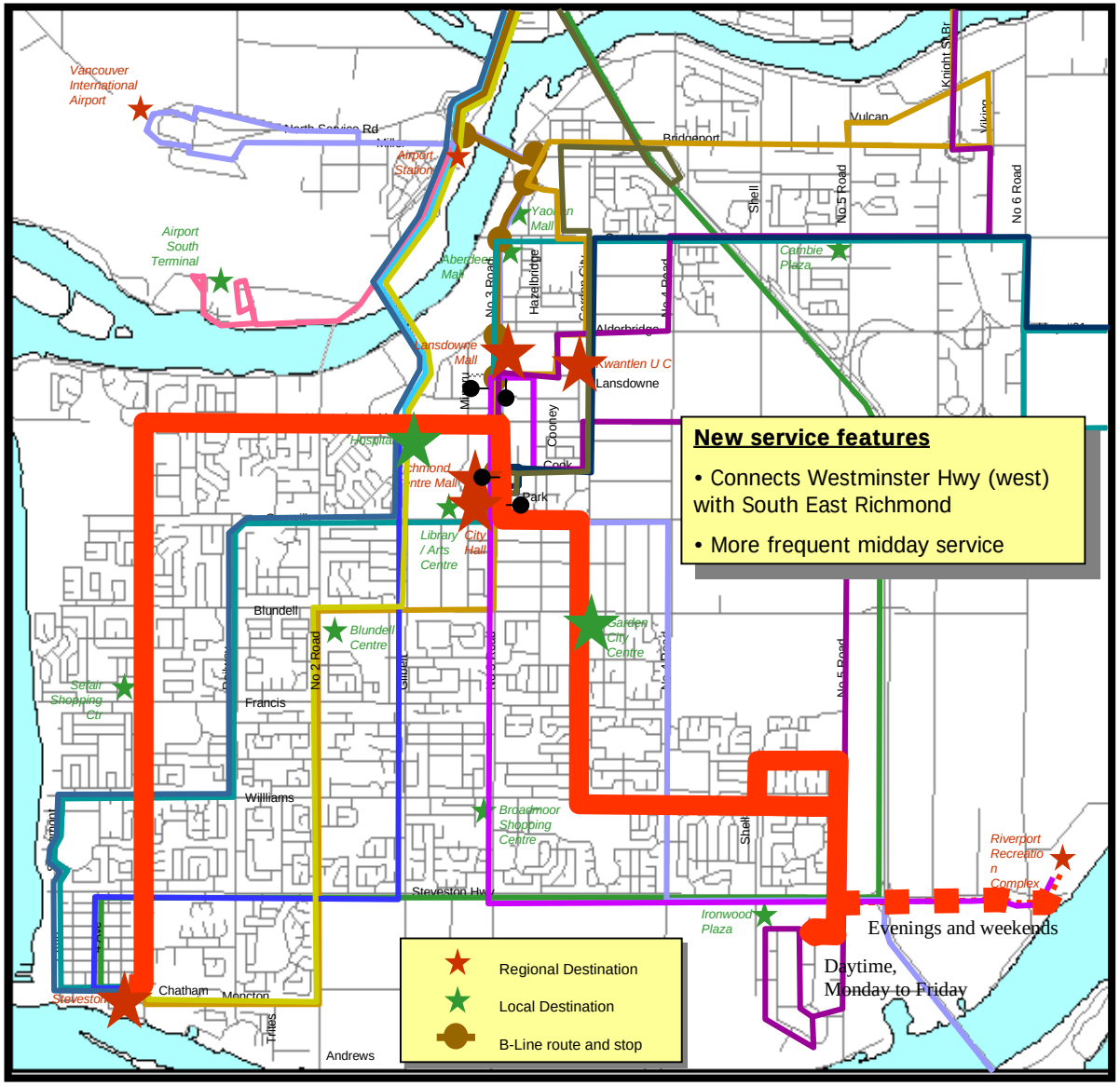
Serves: Steveston, No 1 Road, Westminster, Hospital, 98 B-Line, Richmond Centre, Williams, No 5 Road and Horseshoe Way (to Riverport evenings and weekends)

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	20	30	20	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#402 Two Road / Bridgeport

A new local and regional connection connecting Steveston, 98 B-Line, Richmond City Centre, Asia West, Bridgeport and East Vancouver

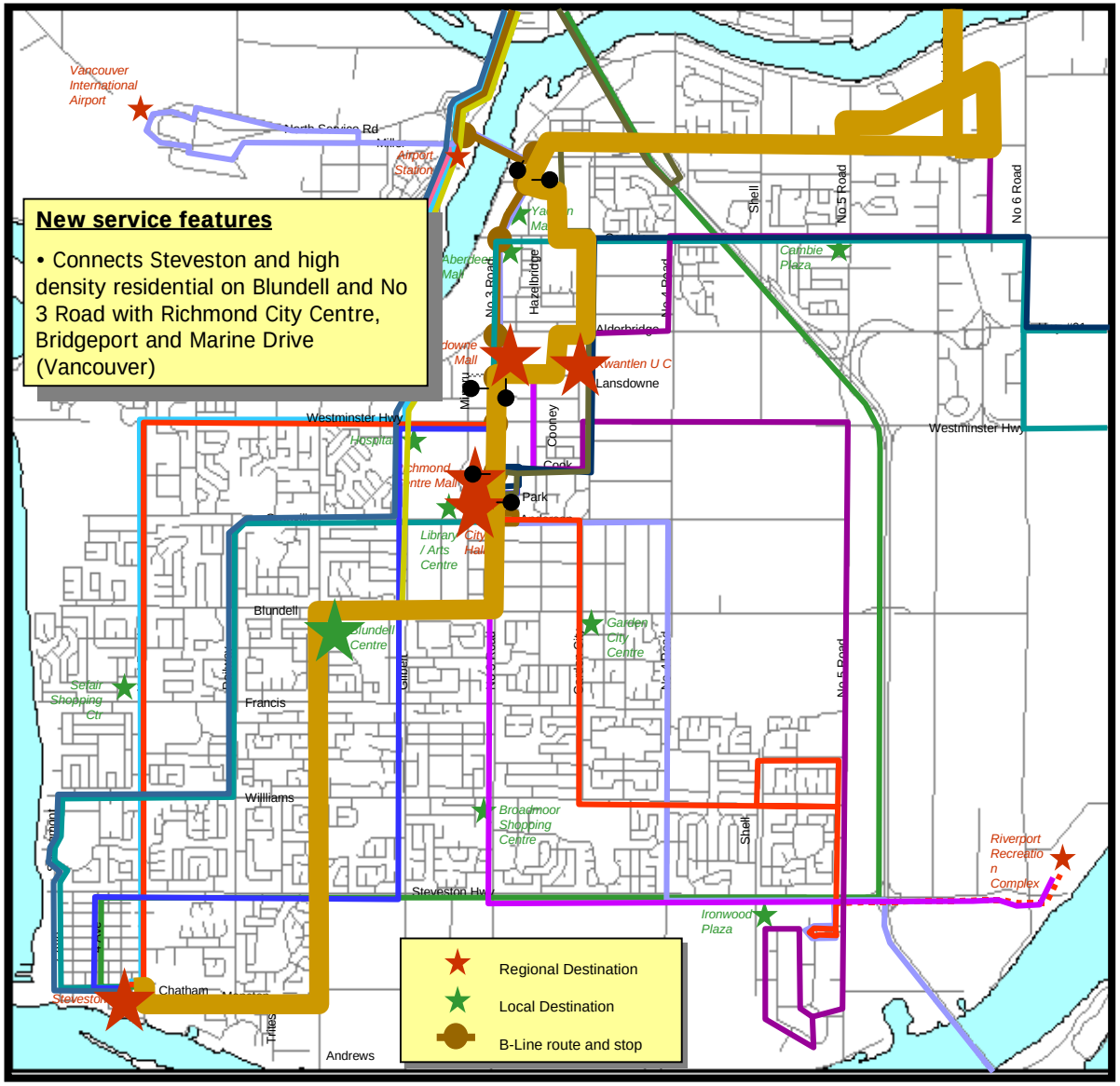
Serves: Steveston, Moncton, No 2 Road, Blundell, No 3 Road , 98 B-Line, Richmond Centre, Lansdowne Mall, Kwantlen University College, Garden City, Bridgeport and Marine Drive (Vancouver)

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	30	30	30	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#403 No 3 Road / Richmond City Centre

A local connection connecting Riverport, No 3 Road, 98 B-Line and Richmond City Centre.

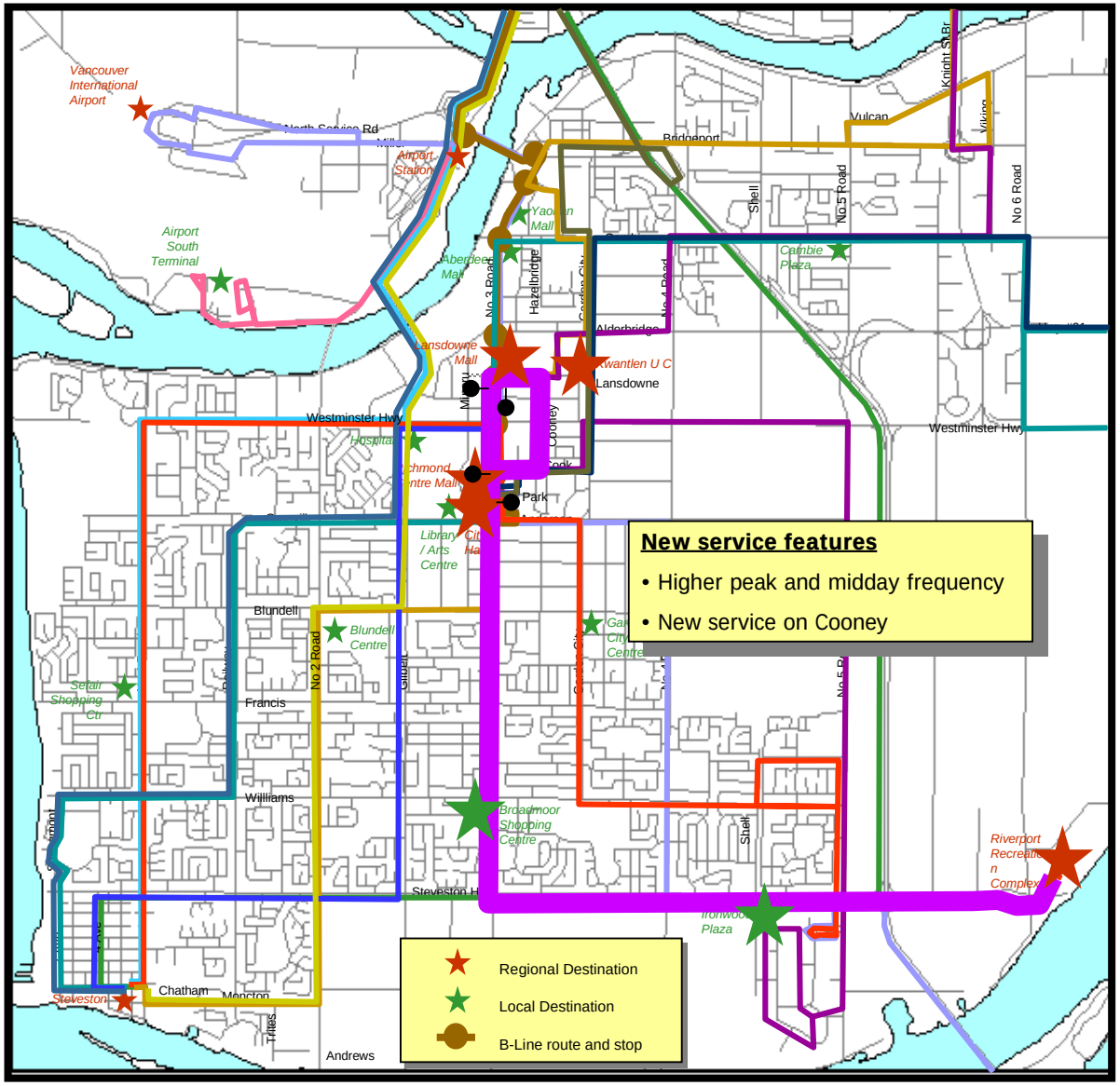
Serves: Riverport, Steveston Hwy (east), No 3 Road, 98 B-Line, Richmond Centre, Lansdowne Mall, Kwantlen University College

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
12	20	30	20	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#404 Ladner / Four Road / Airport

A local connection connecting Ladner and No 4 Road with 98 B-Line, Richmond City Centre, Asia West and Vancouver International Airport (peak periods).

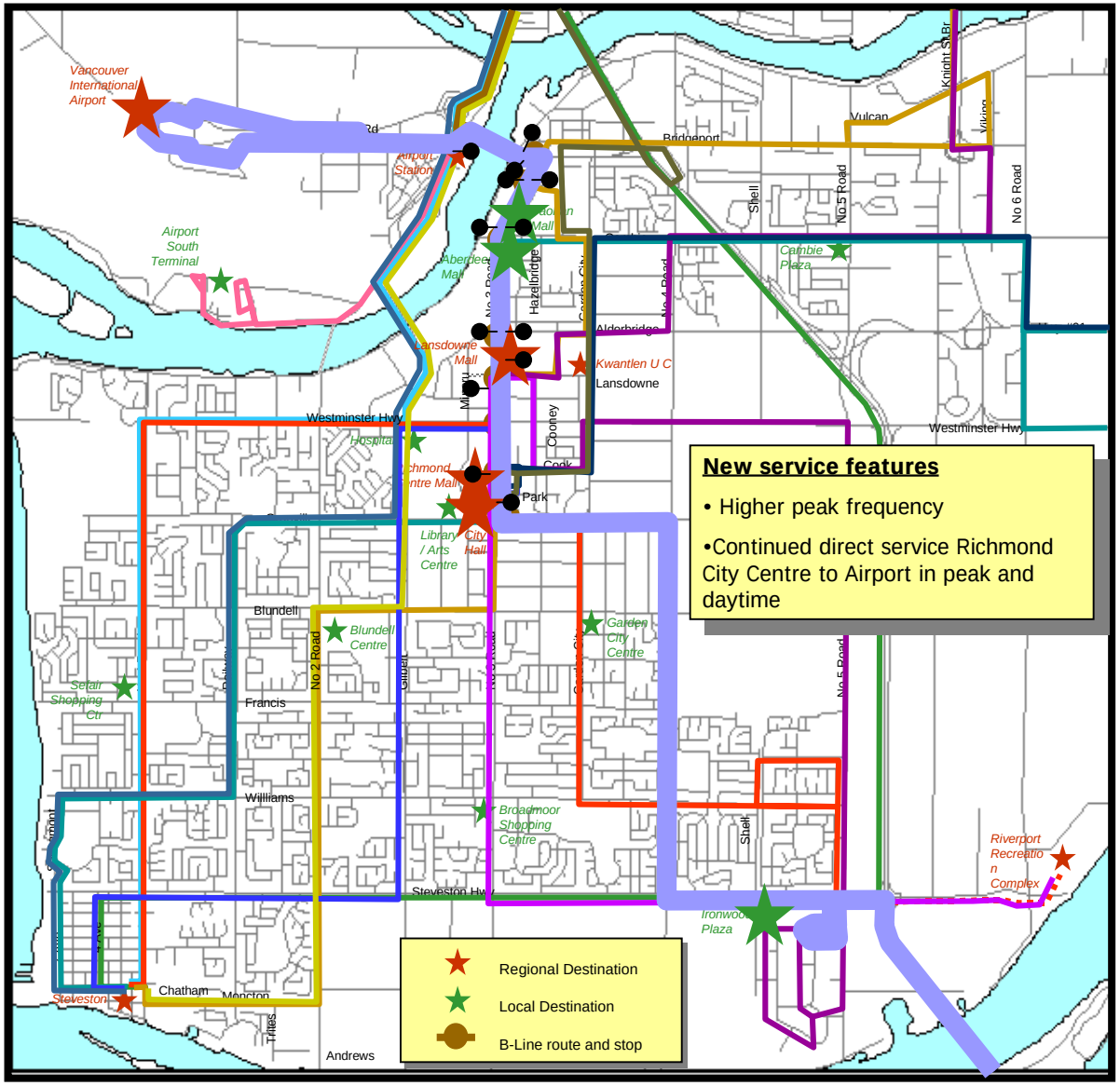
Serves: Ladner, Ironwood, No 4 Road , Granville (east), 98 B-Line, Richmond Centre, Lansdowne Mall, Asia West, Airport Station and Vancouver International Airport Main terminal.

Frequency (minutes)

	Peak	Midday	Evening	Saturday	Sunday / holiday
Between Richmond Centre and:					
Airport	15	30	-	30	-
Steveston Hwy	15	30	30	30	30
Ladner	30	30	30	30	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



New service features

- Higher peak frequency
- Continued direct service Richmond City Centre to Airport in peak and daytime

Integration Plan Winter 2000

#405 No 5 Road / Cambie

A local connection connecting Riverside Industrial Area with 98 B-Line, Richmond City Centre, Kwantlen University College, Cambie Rd and east Vancouver (Knight St)

Serves: Riverside industrial area, Ironwood, No 5 Road, Westminster Hwy (east), Cook Rd, 98 B-Line, Richmond Centre, Lansdowne Mall, Kwantlen University College, No 4 Road, Cambie, No 6 Road to east Vancouver (Knight St Bridge)

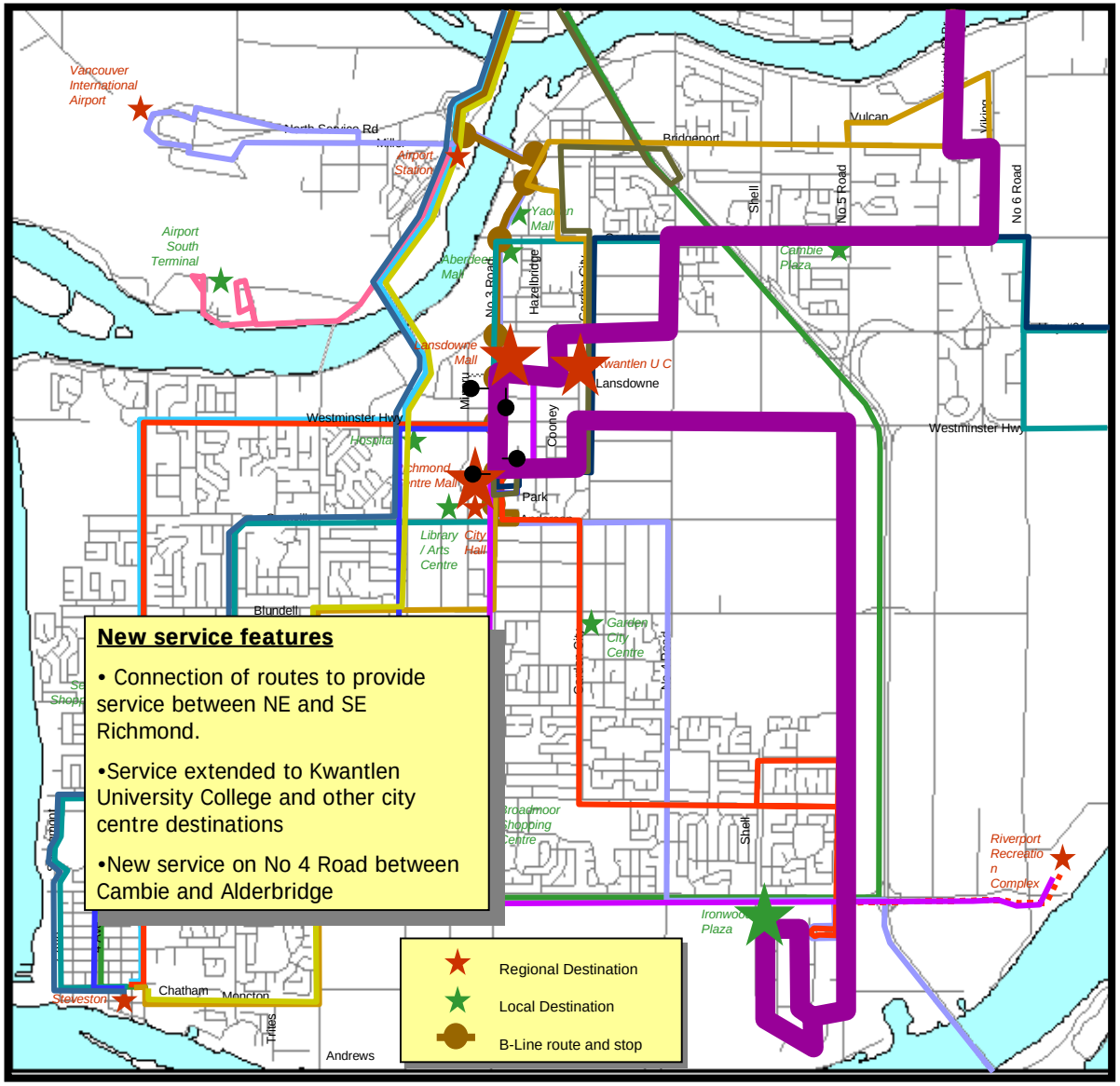
Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
30	60	60*	60	60

* Richmond City Centre to Knight St Bridge.

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



New service features

- Connection of routes to provide service between NE and SE Richmond.
- Service extended to Kwantlen University College and other city centre destinations
- New service on No 4 Road between Cambie and Alderbridge

Integration Plan Winter 2000

#407 Gilbert / Richmond City Centre

A local connection connecting Steveston, Gilbert, 98 B-Line and Richmond City Centre

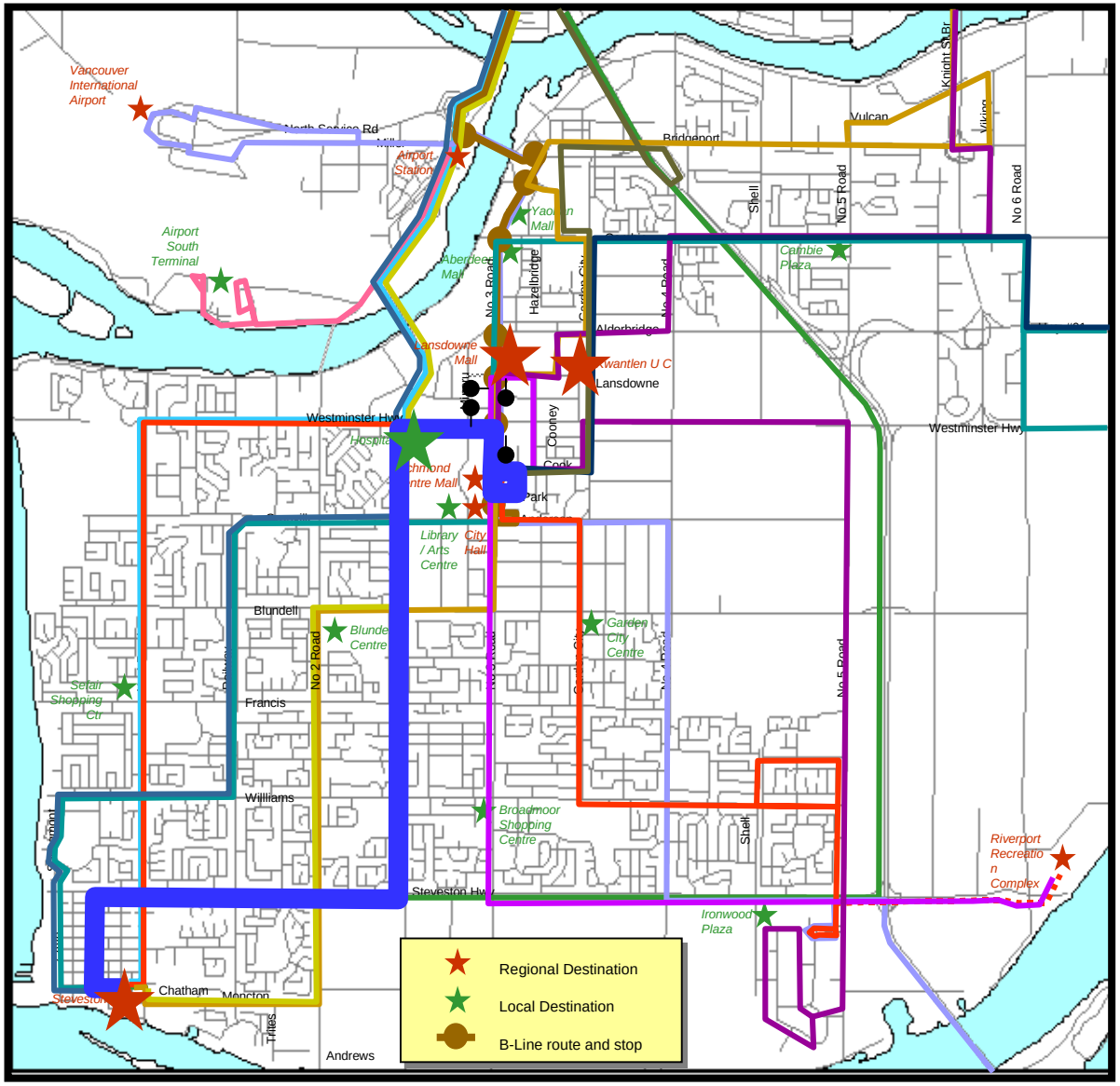
Serves: Steveston, Steveston Hwy, Gilbert, Hospital, 98 B-Line, Richmond Centre.

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	30	30	30	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#410 Railway / 22nd Street Station

An improved local connection connecting Steveston, 98 B-Line, Richmond City Centre, Cambie, East Richmond and SkyTrain.

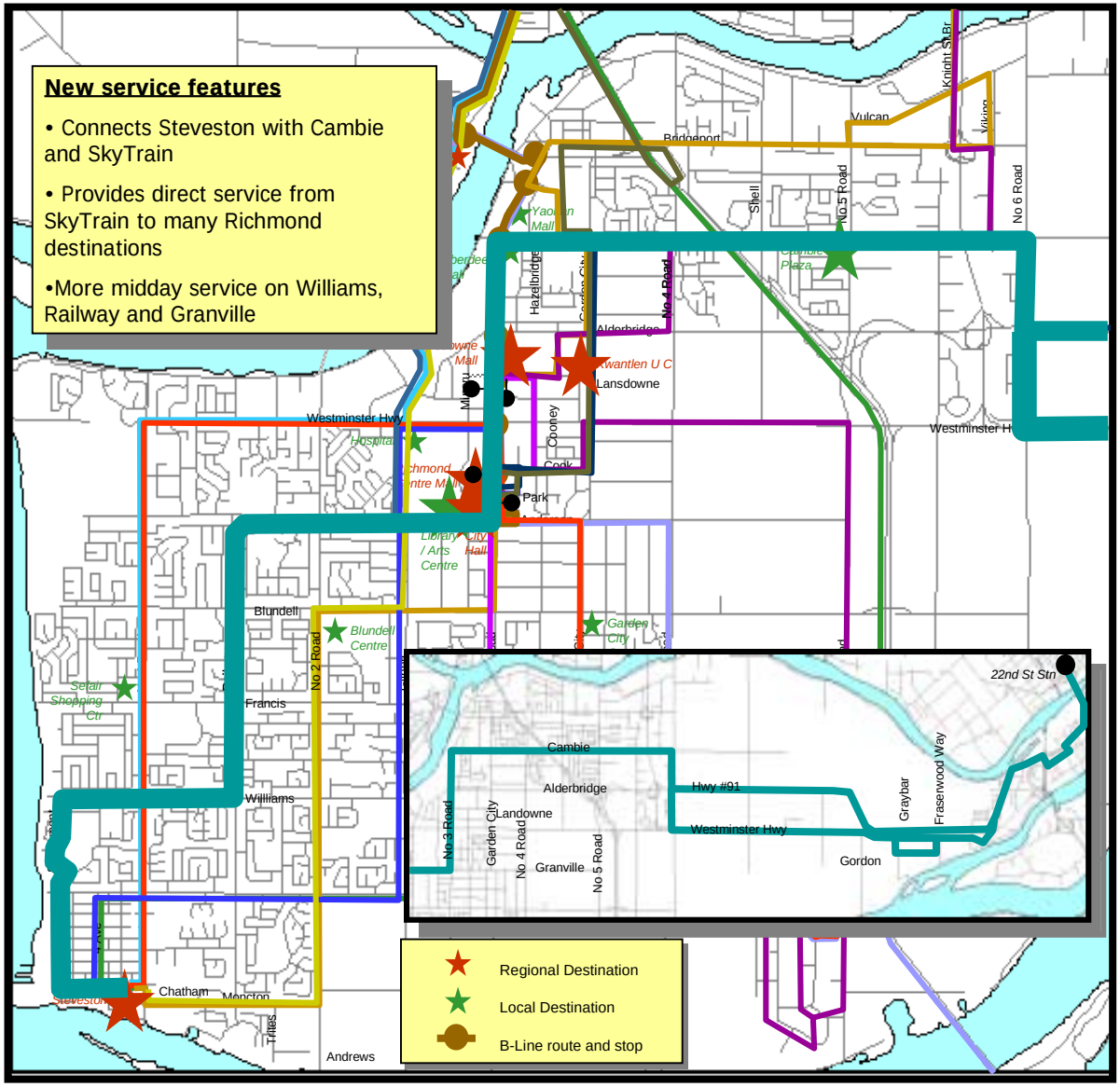
Serves: Steveston, Williams (west), Railway, 98 B-Line, Richmond Centre, Lansdowne Mall, Cambie, Crestwood Industrial Area, East Richmond and 22nd Street SkyTrain Station

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
10-15	20	30	20	30

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

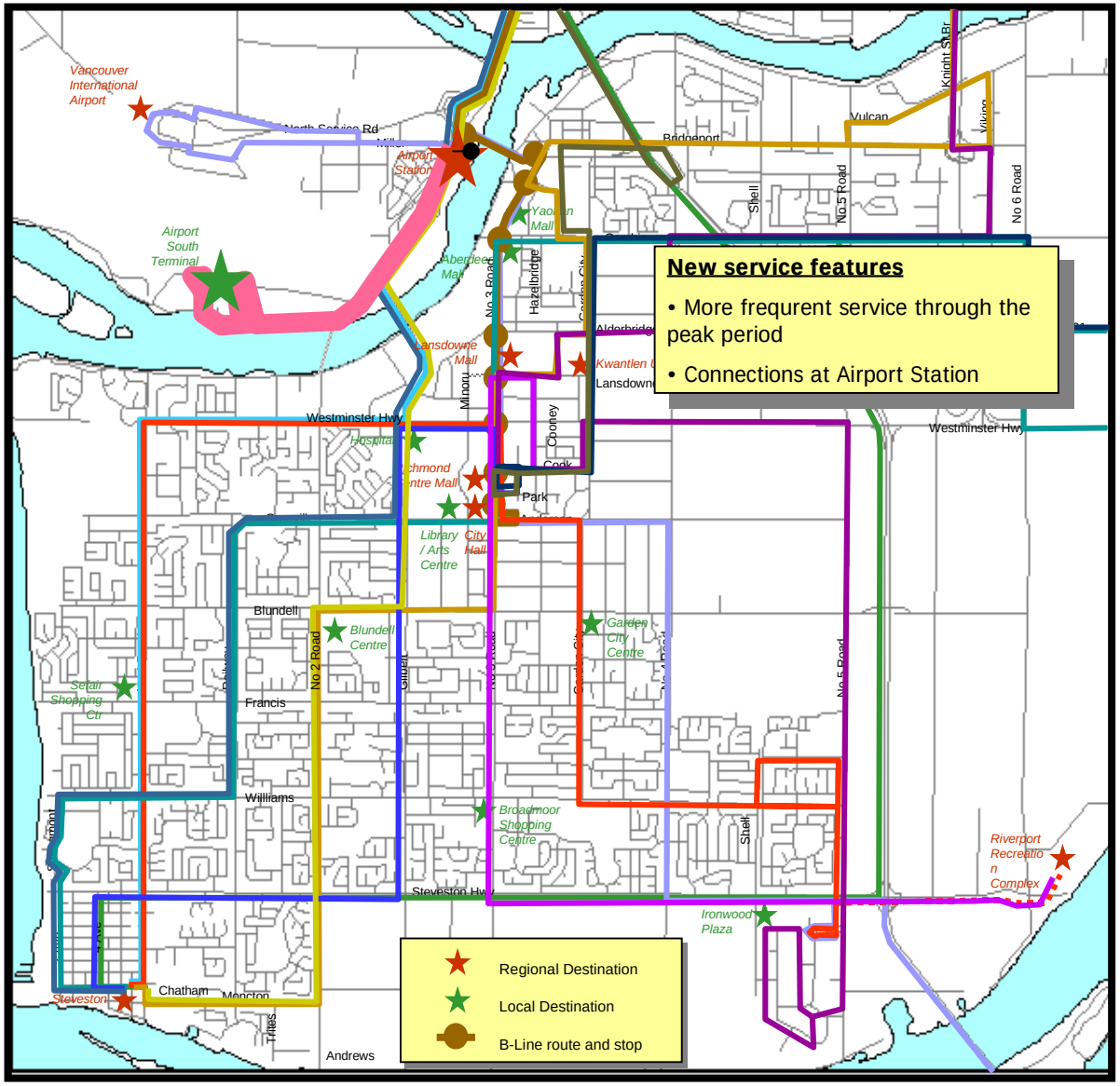
#425 South Terminal / Sea Island Exchange

An expanded service to YVR South Terminal from Airport Station

Serves: Vancouver International Airport South Terminal and Airport Station.

Frequency (minutes)				
Peak	Midday	Evening	Saturday	Sunday / holiday
30	-	-	-	-

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#480 UBC / Richmond City Centre

A expanded direct express service connecting Richmond City Centre and Marpole with UBC with service in two directions.

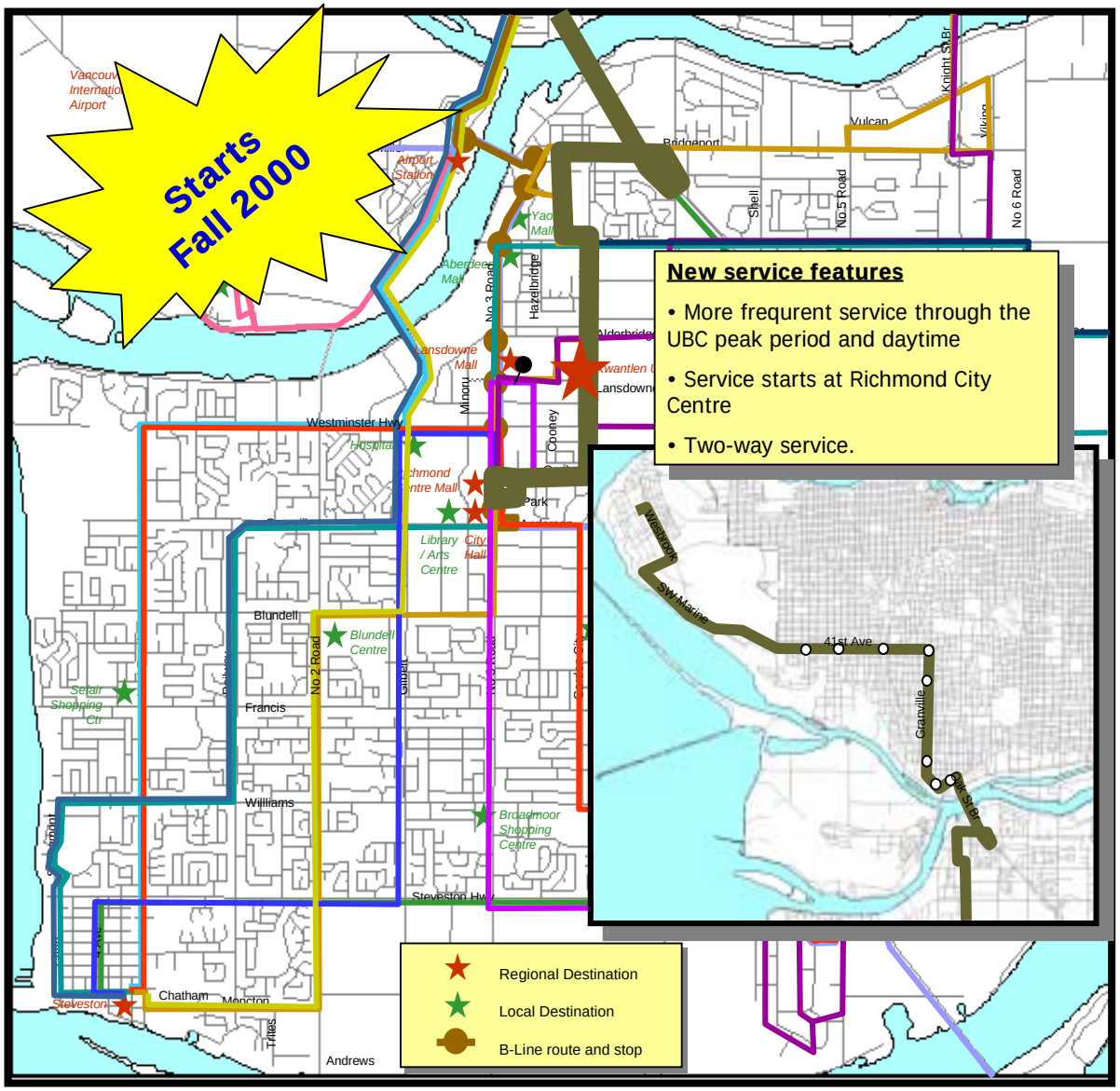
Serves: Richmond Centre, Lansdowne, Kwantlen University College, Marpole, Kerrisdale, Dunbar and UBC

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
30	30	-	-	-

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#490 Steveston / Vancouver

A direct express service connecting Steveston with downtown Vancouver

Serves: Steveston, Steveston Hwy, downtown Vancouver

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
30	-	-	-	-

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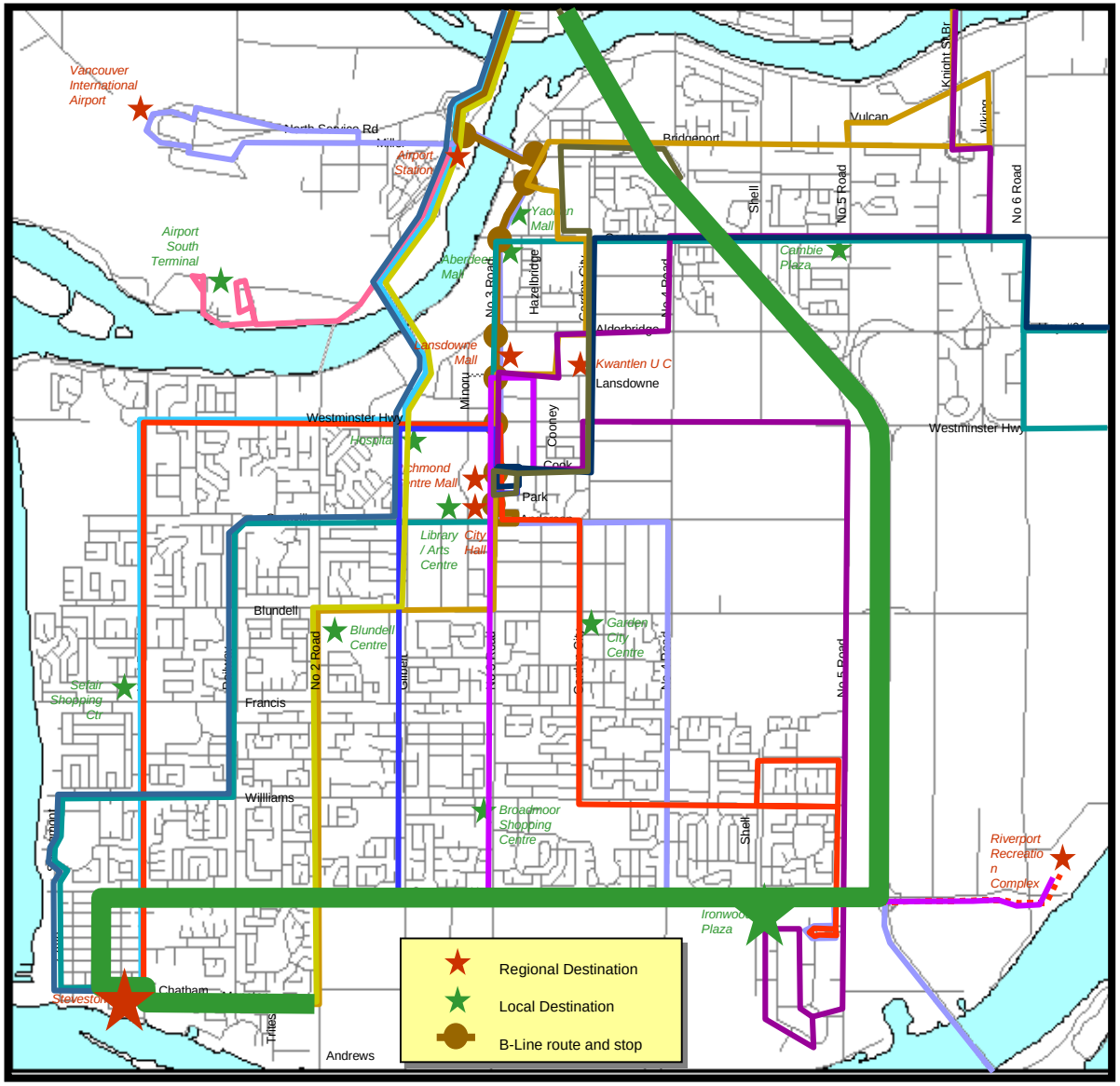
This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#491 Steveston / Vancouver

A direct express service connecting Steveston with Sea Island and downtown Vancouver expanded to operate more frequently and in two directions during peak periods.

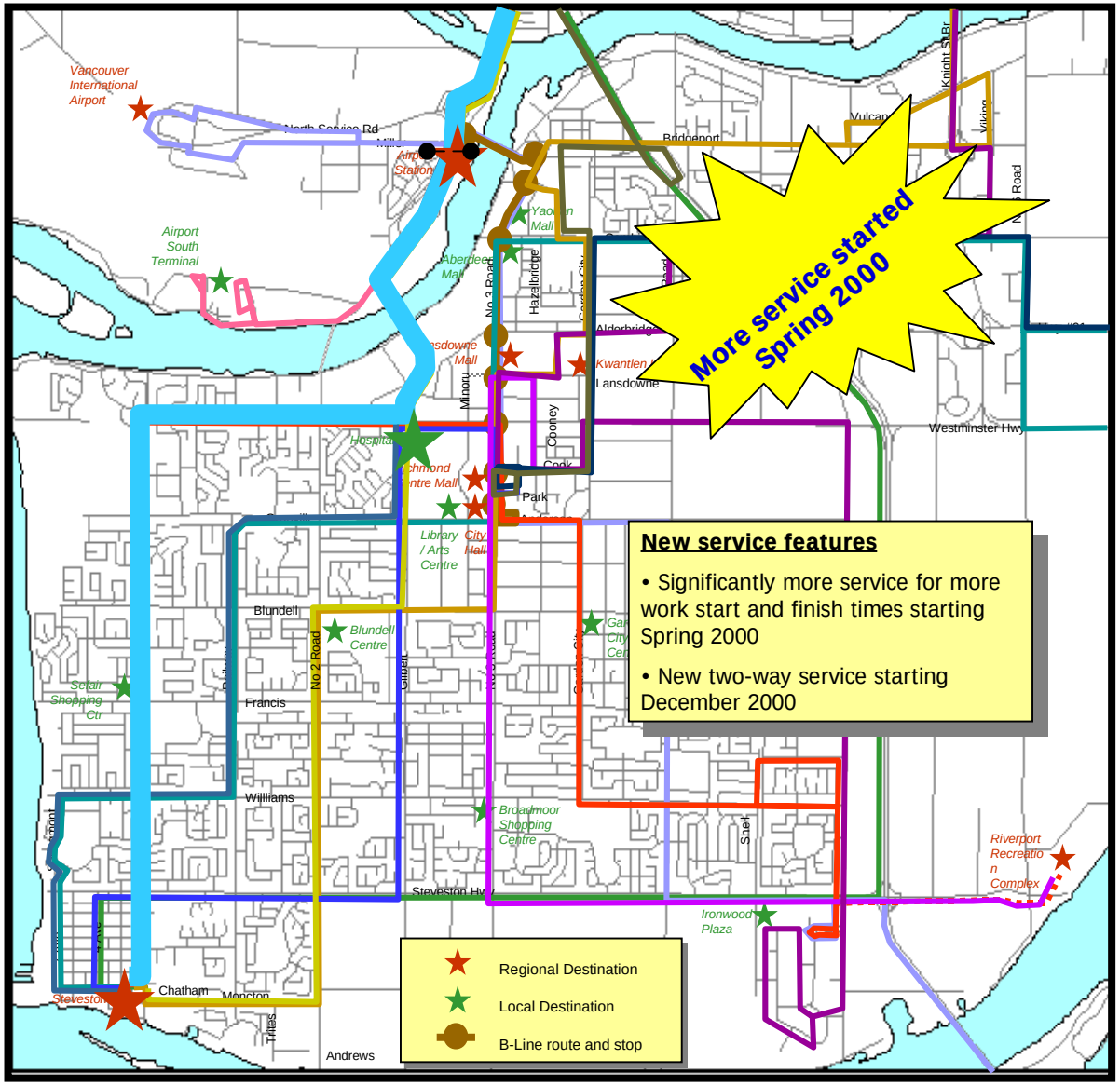
Serves: Steveston, No 1 Road, Airport Station, downtown Vancouver

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	-	-	-	-

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#492 Two Road / Vancouver

A new direct connection between Steveston, Airport Station and downtown Vancouver

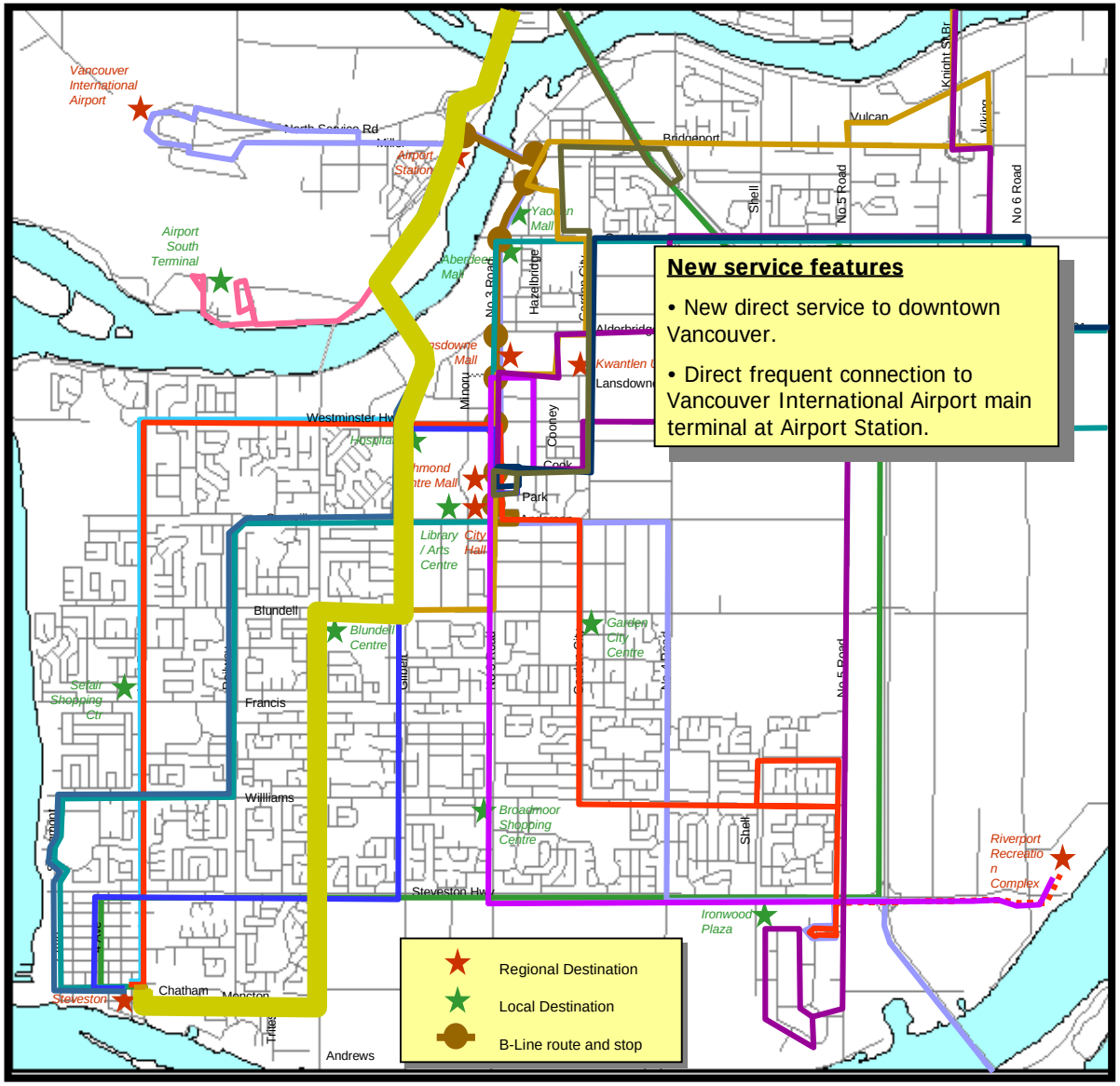
Serves: Steveston, Moncton, No 2 Road, Blundell, Gilbert, Airport Station and Granville St (Vancouver)

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	-	-	-	-

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

#496 Railway / Vancouver

A new direct connection between Steveston, Airport Station and downtown Vancouver

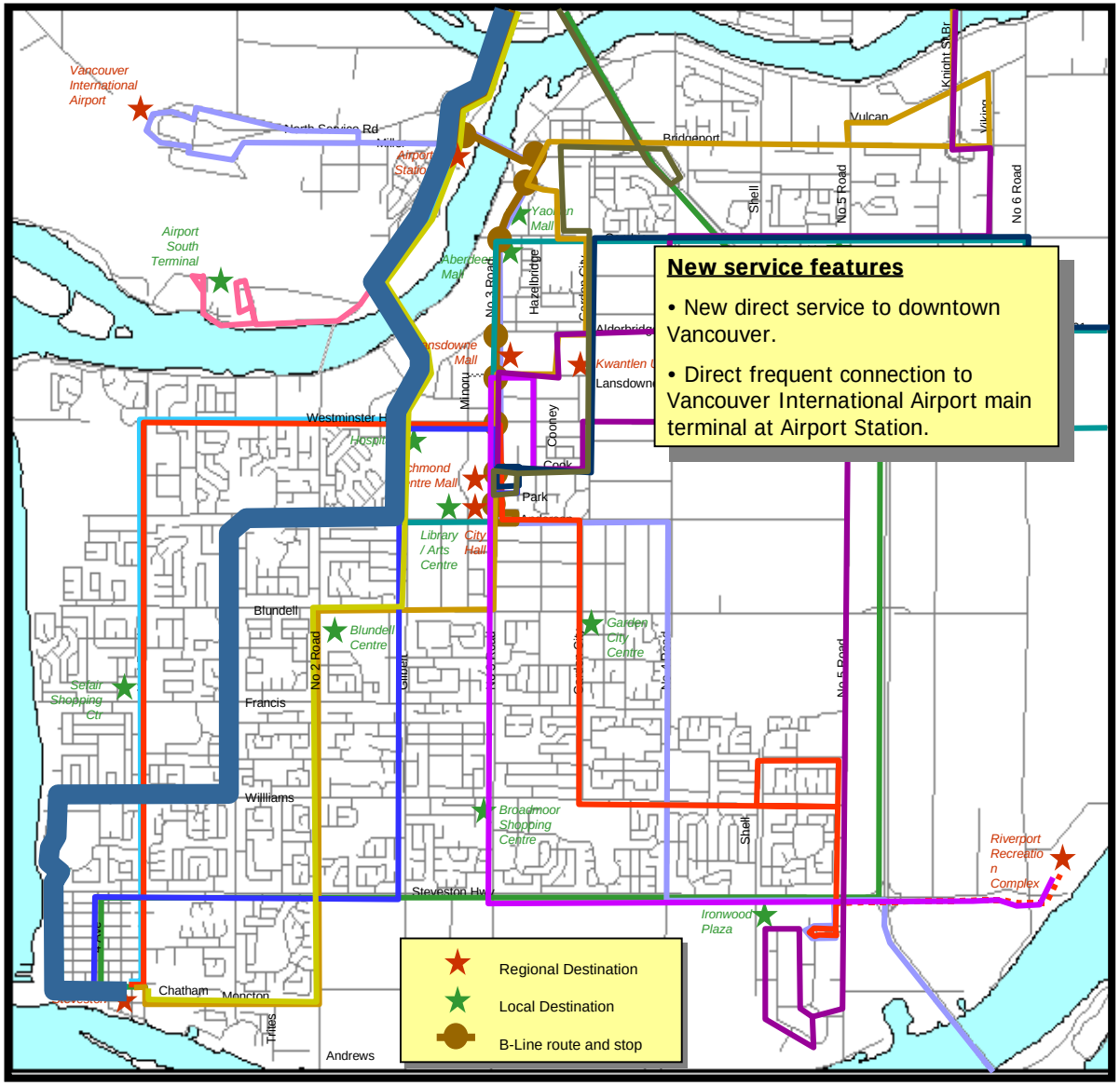
Serves: Steveston, Springmont, Williams, Railway, Granville, Gilbert, Airport Station and Granville St (Vancouver)

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
15	-	-	-	-

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



New service features

- New direct service to downtown Vancouver.
- Direct frequent connection to Vancouver International Airport main terminal at Airport Station.

Integration Plan Winter 2000

Richmond City Centre / Newton

New regional route connecting Richmond City Centre, 98 B-Line,, Kwantlen University College, Cambie, East Richmond, Scottsdale and Newton.

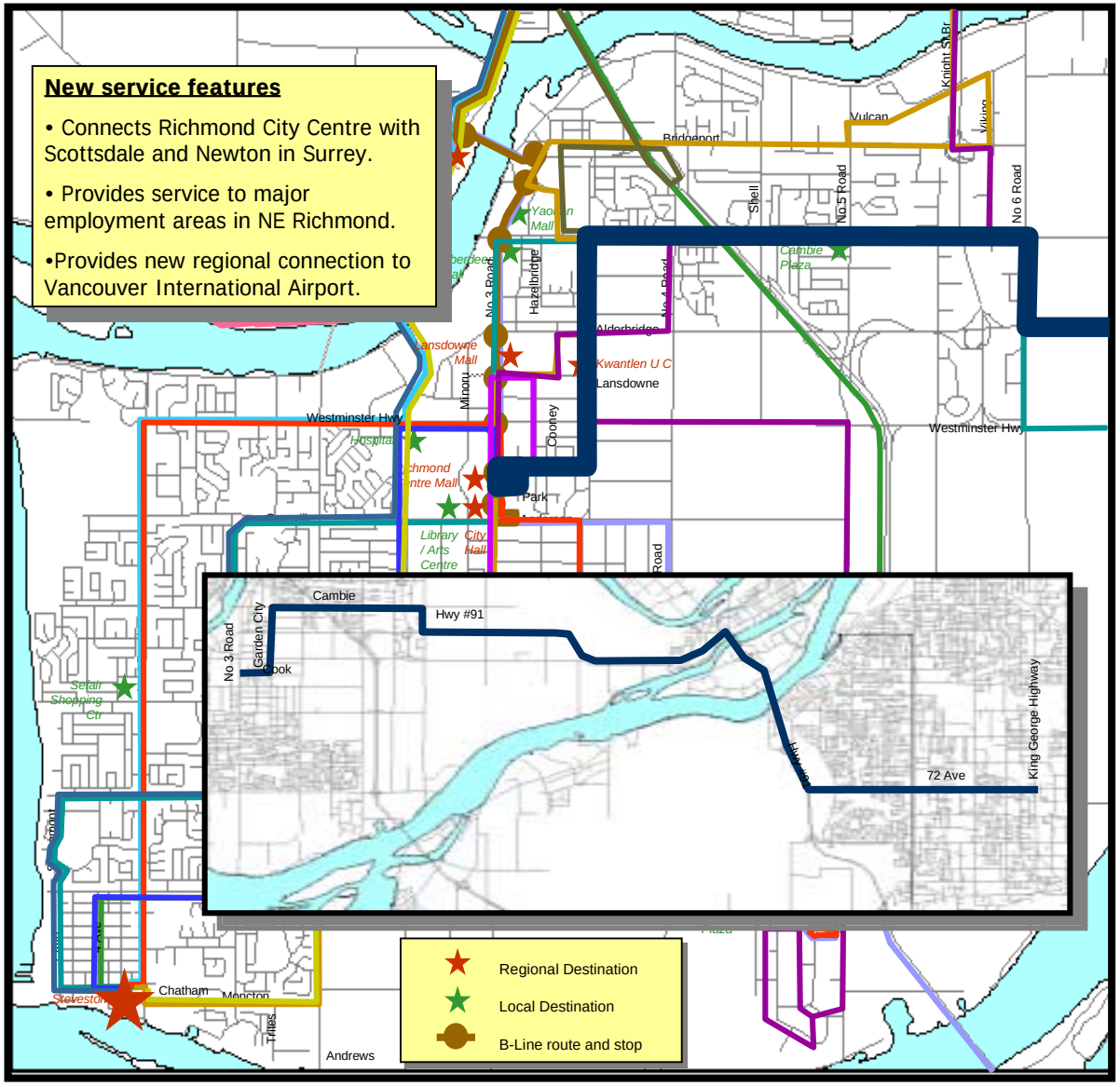
Serves: Richmond Centre, 98 B-Line, Lansdowne, Kwantlen University College, Cambie, Crestwood Industrial Area, Annacis Exchange, 72 Ave, Scottsdale, Kwantlen University College (Surrey) and Newton.

Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
30	-	-	-	-

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Integration Plan Winter 2000

Airport (Main Terminal)

Frequent service connecting 98 B-Line / Airport Station with Vancouver International Airport Main Terminal

Serves: Vancouver International Airport and Airport Station (98 B-Line)

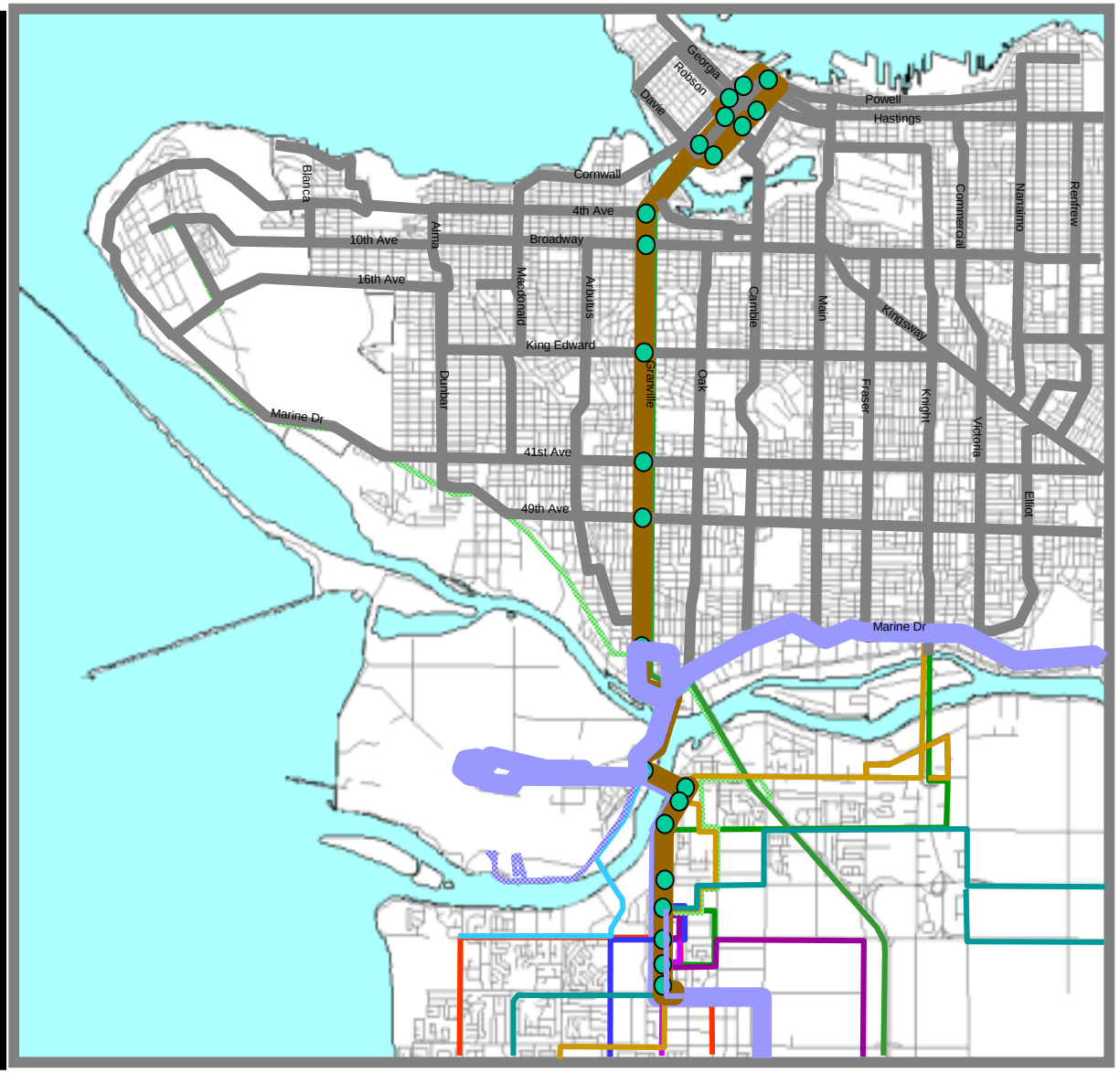
Note: Service operates as a combination of service from south Vancouver (#100), Richmond (#404) and buses on Sea Island

Combined Frequency (minutes)

Peak	Midday	Evening	Saturday	Sunday / holiday
5	7-8	15	10	15

TRANSLINK

This plan is the Integration of local service with #98 B-Line and Phase 1 of the Richmond Area Plan



Resources

This section identifies the resources required to provide expanded service. Resources include service hours, vehicles and infrastructure

Transit Resources

Service Hours

This plan represents a significant increase in service over the 1999 service levels. In total there is a net increase of 69,300 annual service hours at an operating cost of approximately $4,600,000 annually. Because most new service will be introduced in the last month of the year, the cost in 2000 will be 19,300 service hours, including the commissioning service. As the table below shows, these service hours are attributed to a number of elements of the project and include the full cost of projects that operate in Vancouver (#98 B-Line) and Surrey.

For Richmond, the plan represents an increase of 30% in regional service to and from downtown Vancouver, an increase of 20% locally within Richmond, a 14% increase in service to Vancouver International Airport Main terminal and a 400% increase in service to and from UBC.

Vehicles

In addition to the increased hours, a number of vehicles are required to implement this plan. In total, the plan requires a net increase of 31 peak vehicles, a growth of 37%. B-Line will be provided with a fleet of new articulated buses purchased specifically for the project. In peak periods up to 23 will be required. In addition the express routes from Steveston to downtown Vancouver will require 14 articulated buses. Since articulated buses replace existing regional service between Richmond City Centre and downtown Vancouver, the net increase will be 9 buses (the capacity increase will be higher since these vehicles have 50% more seating).

Twelve extra standard buses will be required to provide the enhanced local service. Additional buses will also be required to increase service on route #491 (renamed from #411) between Steveston and downtown Vancouver and on route #480 to UBC.

New express buses will be allocated to the new Richmond to Surrey route, though service will begin in late 2000 with existing fleet pending arrival of the new buses in early 2001.

A small saving will be realized from minor reductions to trolley bus service on Granville Street, which would otherwise duplicate #98 B-Line somewhat.

Ridership

The expanded service this plan introduces will provide a large amount of new capacity in Richmond. Computer modelling of #98 B-Line and the local integration of services project over 850,000 new trips will be generated after one year of service. A further 150,000 trips would be attracted to the new Richmond to Surrey service.

Such a significant increase in service is not expected to be fully used in the first year of service despite the extra million boardings; rider per hour will decrease by about 13% initially. However, the additional capacity and improved service quality is expected to increase ridership and transit's mode shares in key areas over time. This investment in the future is typical of the types of service improvements approved in the TransLink Strategic Plan. Although there are many transit improvements identified in this plan there is little significant transportation demand management. The rate at which residents shift modes will depend to a large extent on the types of land use land use and development of transit supportive measures within Richmond.

The cost per new ride to the system would be under $5, raising the total cost per customer in Richmond marginally to approximately $1.80.

Richmond Integration Plan Projected Performance			
	Current Service	Plan after one Year	% Change
Service Hours	287,000	356,300	24%
Peak Buses	84	115	37%
Ridership	12,000,000	13,000,000	8%
Riders Per Hour	42	36	-13%
Cost Per Ride	$1.55	$1.79	15%
Cost per New Ride	-	$4.62	-
Revenue*	$ 8,880,000	$ 9,620,000	8%
Operating Cost Recovery	48%	41%	-13%
AM Market Share			
Richmond to UBC	9%	11%	22%
Richmond to Downtown	42%	44%	5%
Richmond to Airport	2%	4%	100%
Vancouver to Richmond	6%	9%	50%

* (a) The fare revenue uses a system average. This may tend to understate the revenue generated in Richmond, which is likely to have a higher percentage of multi-zone trips than the system average. The fare revenues assume the average fares prior to the fare increase on June 1, 2000 which increased fares an average of 16%.

Infrastructure

Transit Related Road Infrastructure Improvements

The new transit routings have been reviewed to determine the scope of infrastructure improvements required on public right-of-way. There are four areas of desired improvement: minor geometric revisions, traffic management improvements, transit priority measures, and transit passenger facilities. Each area is discussed below.

Minor Geometric Improvements

There are numerous new turning movements that will be required for the new bus routings. The current road geometry provides adequate turning path for most of these turns. However, there are several locations where bus right turn movements will be very constrained.

In particular the right turn movement from EB Lansdowne Road to SB Cooney should be improved by either constructing larger corner radii or widening the departure road width.

Traffic Management Improvements

The City has recently installed parking/stopping restrictions on many of the roads that will become bus routes. Further opportunities to improve general traffic operations should be considered in detail.

Transit Priority Measures

The road network in Richmond City Centre is composed primarily of 4 lane roads with or without left turn bays at intersections. Given this limitation, exclusive bus lanes are not practical for most of the non-98 B-Line bus service area. However, there are several bus turning movements that could be provided with active or passive priority.

The intersection of Sexsmith at Cambie is presently stop controlled for Sexsmith with a pedestrian activated signal to assist crossings of Cambie. This pedestrian signal should be revised to permit activation by southbound to eastbound left turn buses. The signal controller could be programmed to provide early activation of the pedestrian phase when a bus has been detected.

There will be a significant number of buses completing new left turns at existing fully signalised intersections. The control of these signals should be modified to provide greater priority (level of service) to the left-turning buses:

- NB Cooney to WB Lansdowne Road.
- EB Cook to NB Cooney
- WB Cook to SB No 3 Road
- WB Lansdowne to SB No 3 Road
- WB Alderbridge to SB Kwantlen

Approval to Operate Buses on New Road Segments in Richmond

In addition to the construction of Transit Priority Measures for Richmond Vancouver B-Line, this service plan will require access to new roadways in the centre of Richmond. TransLink received approval from the City of Richmond in March 2000 to operate service on all of the following road segments:

- Cooney between Cook and Lansdowne (2-way service)
- Kwantlen between Lansdowne and Alderbridge (2-way service)
- No 4 Road between Alderbridge and Cambie (2-way service)
- Westminster Hwy between No 3 Road and Cooney (2-way service)
- Lansdowne between No 3 Road and Garden City (expansion to 2-way service)
- Alderbridge between Kwantlen and No 4 Road (expansion to 2-way service)
- Capstan Way between Sexsmith and No 3 Road (2-way service)

It is also noted that some routes will provide local service on portions of No 3 Road adjacent to the #98 B-Line median busway.

Transit Passenger Facilities (Bus Stops)

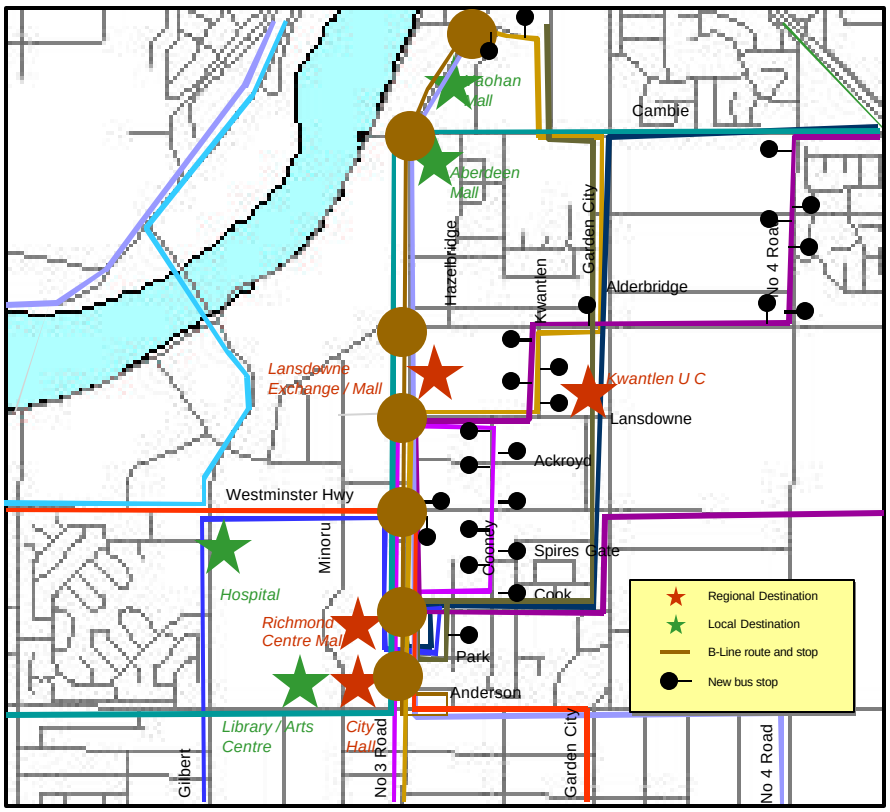
The revised route structure will require new bus stops and revisions to existing bus stops. TransLink and the City of Richmond have budgeted funds to equally cost share transit passenger facilities on the Major Road Network in 2000. The City is normally expected to fully fund transit passenger facilities that are not located on the Major Road Network.

TransLink will require these bus stops and transit passenger facilities to be approved and implemented by the start of service in December. TransLink has reviewed the new routings with Coast Mountain Bus Company and estimates that 20-25 new bus stops will be required. In addition a number of bus stops on express routes from Steveston to downtown Vancouver will require modification to accommodate articulated buses.

On a number of roadways, service levels will increase resulting in more trips per hour on bus routes. Several routes terminate in Steveston including the new express routes from Steveston to downtown Vancouver. This will increase the amount of bus traffic and looping of buses. In addition the new express routes will require terminus and stopping space in the Steveston area to enter service. TransLink will continue to work with the City of Richmond to identify options for an off-street exchange in the area.

TransLink encourages the City of Richmond to identify opportunities to improve the quality of transfers between local buses and B-Line. Improvements could include providing stops on both sides of B-Line intersections and improving passenger amenities existing stops.

Anticipated new bus stop locations in City Centre



Vancouver

Within the City of Vancouver most service changes will be the result of B-Line service and have been separately identified through that project. Within the downtown core there will be some revision to the stopping arrangements of buses around Burrard Station and Waterfront Station which could require modifications to bus stops. These will be separately identified in the detailed planning stages. In addition, TransLink encourages the City of Vancouver to identify opportunities to improve the quality of transfers between local buses and B-Line. Improvements could include intersecting local stops on both sides of streets served by B-Line, for improved access to and from crosstown routes, and improved passenger amenities at existing stops.

Appendix

#98 B-Line Commissioning service.

During fall 2000, while most B-Line infrastructure will be in construction, there will be a commissioning service for #98 B-Line. Service will operate on the portion of B-Line between Airport Station and downtown Vancouver. Trip will operate approximately every 10 minutes through the daytime Monday to Friday. There will be no evening or weekend service. All trips will operate with the new articulated buses purchased for the route.

Customers in Vancouver will be able to use the Vancouver and YVR portions of the route in September gaining many of the travel time benefits the #98 B-Line offers. Customers travelling to or from Richmond will be able to continue using existing routes until the full opening of #98 B-Line service and the Integration Plan in December 2000.

In addition there will be some improvements to service to YVR to provide earlier service to the main terminal and to begin service from Airport Station. Customers will be able to arrive Vancouver International Airport Main Terminal for work starts at 530 AM. Customers in both Richmond and Vancouver will also benefit from the opening of Airport Station in September.

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Service Contracts

Date: May 10, 2000

Subject: **2001 Program Plan Development**

Recommendation:
That the Board receive the report dated May 10, 2000 titled 2001 Program Plan Development for information.

PURPOSE

This report describes the proposed development process for the 2001 Program Plan.

BACKGROUND

The Program Plan is prepared annually to identify the base level of service as well as new service initiatives for the four program areas: Transit, Major Roads, Transportation Demand Management and AirCare. The plan represents the second year implementation of the Strategic Transportation Plan and is the basis for the 2001 operating and capital budgets.

The Program Plan 2001 will be developed in consultation with municipalities with input provided through the Transit Technical Advisory Committee (TTAC), Major Roads Technical Advisory Committee (MRTAC) and the Municipal Bicycle Committee (MBC). Several other processes underway, including the Area Transit Plans will provide a broad basis of public input. The recommendations from the three Area Transit Plans that have been developed over the past year (Richmond, North Shore and South of Fraser) are proposed for implementation in the 2001 Program Plan.

DISCUSSION

TransLink is about to initiate the planning for developing the 2001 Program Plan. The 2001 Program Plan should reflect the following:

- First full year of implementation of the approved Strategic Transportation Plan;

- Introduction of Area Transit Plan recommendations from Richmond, South of Fraser and North Shore;

- Opening of a portion of the new SkyTrain line, expansion of SkyTrain capacity and upgrading of Coquitlam, Port Coquitlam and New Westminster bus routes to connect with the new SkyTrain; and

- Optimization of the system as a result of improved transit system monitoring.

Staff have developed a proposed work program and public consultation process. The key activities and milestones are as follows:

1) **Review Plan Context:** A brief background report that will serve as the introduction to the Program Plan will summarize the regional travel market and outlook for 2001. *Completion date: July 2000*

2) **MRTAC and TTAC Working Groups:** It is proposed that MRTAC and TTAC select members for working groups to work with TransLink staff. It is proposed that this sub-committee hold an initial meeting by mid-June. The main purpose is to identify transit service priorities, road improvements and bicycle programs. Consultation will require about three to four meetings to be scheduled through the summer. *Completion date: August 2000*

3) **Evaluation of Candidate Projects:** The working groups will be involved in reviewing and evaluating potential transportation projects for 2001. The timeline for this work is from June through end of August. *Completion date: August 2000*

4) **Draft Program Plan Approval in Principle:** Following a Board workshop and input from MRTAC, TTAC and the TransLink Public Advisory Committee, a draft Program Plan will be prepared for presentation to, and consideration by the TransLink Board. *Completion date: September 2000*

5) **Public Consultation:** Formal public meetings to discuss and review the draft plan are proposed in October. *Completion date: October 2000, ongoing*

6) **Council of Councils Presentation:** The draft program will be presented to a Council of Councils meeting likely scheduled for late October 2000. *Completion date: October 2000*

7) **Final Program Plan:** Feedback from the public meetings and Council of Council meetings will be incorporated into the final plan to be submitted for final approval. *Completion date: November 2000*

ALTERNATIVES

None.

CONCLUSION

The 2001 Program Plan will represent the first full year of implementation of the Strategic Transportation Plan and the Area Transit Plans for the South of Fraser, North Shore and Richmond. A draft program plan will be presented to the Board in September 2000 with approval proposed for November 2000.

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Service Contracts

Date: May 23, 2000

Subject: **Transit Service Extension Request to Mission Border**

Recommendation:

A. That the Board direct staff to advise Ms. Linda Meyer her requested extension of bus service toward the District of Mission boundary cannot be accommodated at the present time due to the limitations of the existing roads; and;

B. That the Board direct staff to investigate the feasibility of the extension as a specific task in the Area Planning Program for Maple Ridge scheduled for 2001.

PURPOSE

At the April Committee of the Whole, the Board heard a delegation from Maple Ridge resident, Linda Meyer, requesting extension of bus service to the Mission border. In a subsequent letter to Ms. Meyer it was reported that this service would likely be extended in June or September, following investigation of routings. This report is intended to update the Board on this request.

BACKGOUND

TransLink currently operates bus services within the boundaries of the Greater Vancouver Regional District. Bus services within the District of Mision are provided separately by the Central Fraser Valley Transit System, in partnership with BC Transit. West Coast Express operates commuter rail and bus service between Mission and Vancouver, including five train trips westbound to Vancouver during the morning peak period and five train trips and one bus trip eastbound to Mission during the evening peak period. Mission, which is not part of the GVTA transportation service area, contributes $125,000 on an annual basis to the provision of the West Coast Express service. Mission also raises property taxes for its share of local bus services provided by the Central Fraser Valley Transit System through the BC Transit program.

Coast Mountain Bus Company operates bus services in east Maple Ridge. Route #721 connects the Haney town centre with Ruskin and Whonnock five times per day Monday through Friday and four times per day on Saturdays. There is no evening or Sunday service. The low level of service is commensurate with the level of development, which is predominantly rural. The #721 route operates within two kilometres of the Mission boundary.

Ms. Linda Meyer, a resident of Maple Ridge, has requested an extension of the #721 routing into Mission or to the boundary of Mission to enable a future connection with the Central Fraser Valley Transit System. Analysis of the schedule indicates that the extension could be provided for only marginal fuel and running costs as the current schedule has sufficient time to permit the extension. An extension into Mission is not possible at this time as the schedule would not allow it without the addition of new resources and moreover, discussions would have to take place with the District of Mission on cost sharing.

DISCUSSION

Three routings, which would allow for the extension have been investigated by TransLink (see map attached). The first routing would involve a diversion via 280 Street, 96 Avenue, 285 Street and Lougheed Highway. The route would bring service one kilometre closer to the municipal boundary. Tests conducted using a conventional transit bus indicate the proposed route is unsuitable for transit bus operation. Specifically the street is judged to be too narrow to safely allow transit buses to pass other vehicles while a corner at 96 Avenue and 285 Street is too tight to allow the bus to safely turn. Additionally, 285 Street is deemed too narrow for the safe operation of transit. Maple Ridge staff attended the field test and concur with the findings.

A second routing of sending the bus along Lougheed Highway to 287 Street was also examined however, there is no safe place to turn the bus around. A third routing was considered via Lougheed Highway to 288 Street, but a safe turn around area could not be identified. Also, for each of these options, the left turn from southbound 280 Street to eastbound Lougheed Highway would require a new traffic signal to allow safe left turns onto east Lougheed Highway. The attached exhibits illustrate the roadway conditions.

While it does not appear possible to extend the routing at this point in time, it is recommended that this be revisited at the time of the preparation of an Area Transit Plan in 2001. It may be possible to operate the extension with smaller vehicles. Discussions could also take place with the District of Mission about connecting bus service or possible through routings. This should be contingent upon an analysis of customer demand for travel between the two communities.

ALTERNATIVES

There do not appear to be any low cost solutions in the short term.

CONCLUSION

It does not appear possible to extend the existing Maple Ridge bus service further east towards the Mission boundary due to the lack of suitable streets for transit operation. The issue of extension to Mission should be further considered at the time of the Maple Ridge/Pitt Meadows Area Transit Plan in 2001 when the option of using smaller buses is available.

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President Planning and Service Contracts

Date: May 30,2000

Subject: **Performance Report of Transit Services for First Quarter 2000**

Recommendation:
That the Board receive the reported dated May 30, 2000, titled Performance Report of Transit Services for First Quarter 2000 for information.

PURPOSE

To provide a status report on the performance of the regional transit services for the period of January 1, 2000 to March 31, 2000.

BACKGROUND

Transit services in the GVTA transportation service region are provided by a combination of external contractors and operating subsidiaries of TransLink. The attached report summarizes the performance of the conventional rail and bus transit services provided by Coast Mountain Bus Company, SkyTrain, West Coast Express, West Vancouver Municipal Transit System and Bowen Island Community Transit Limited. It also provides a performance summary of the Taxi Saver Program and HandyDART service delivered by eight contractors in nine different areas.

DISCUSSION

Conventional transit accounts for approximately 90% of ridership and revenue, and custom transit makes up the remaining 10%. This service profile is reflected in both the structure and contents of the attached report, which includes a regional overview, performance indicators and results of the Rider Satisfaction Survey of the conventional transit services by mode. It also includes the performance indicators for the custom transit services. Performance highlights include:

- Region wide conventional transit service hours increased by 6.1% compared to the same period last year;

- Conventional transit ridership measured in linked trips (revenue passengers) increased by 7.3%. The number of unlinked trips (boarded passengers) increased by a relatively smaller percentage than linked trips (up by 5.7%);
- Operating cost per service hour for the Vancouver Region's Conventional Transit is lower in the first quarter in 2000 versus 1999 and is favourable to target; by 0.5% and 1.6%, respectively;
- Increased interest rates have resulted in higher debt servicing costs compared to the same period last year.
- Conventional transit fare revenue is 11.2% higher than last year and 2.6% higher than the target.

CONCLUSION

The quarterly performance report has been prepared to provide the Board with an overview of how the regional transit service and each of the transit modes are performing relative to both historical performance, as well as to set targets for the current reporting period.

PERFORMANCE REPORT – TRANSIT SERVICES
1ST QUARTER, 2000

January 1, 2000 to March 31, 2000

May 30, 2000

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OVERVIEW

CONVENTIONAL TRANSIT

Conventional Transit consists of Coast Mountain Bus Company's bus and SeaBus services, West Vancouver Transit's bus services, BCRTC's SkyTrain services and West Coast Express' commuter rail and TrainBus services.

Region wide service hours increased by 6.1% compared to the same period last year. However, transit ridership measured in linked trips (revenue passengers) increased by 7.3%. The increase ridership can be attributed not only to the service increase but also to employment growth and higher gas prices in the region. The combined effect of the increase in hours and riders led to an unexpected increase in revenue passengers per hour, since a significant portion of added service hours were geared to service quality improvements (e.g. reducing overcrowding and pass-ups). In the short run, service hours aimed at improving service quality do not tend to generate many new riders.

The number of unlinked trips (boarded passengers) increased by a relatively smaller percentage than linked trips. This indicates that fewer riders need to transfer during their trip, and this assumption is validated by the results of the Rider Satisfaction Survey, where there was an increase from 1999 to 2000 in the rider rating of "direct routes" (7.1 up to 7.2 out of 10). On the negative side, rider satisfaction was lower in "overall service" and "value for money", which can be interpreted as people expressing their concern about the upcoming fare increase.

Operating cost per service hour for the Vancouver Region's Conventional Transit is lower in the 1st quarter in 2000 vs. 1999 and is favourable to target; by 0.5% and 1.6%, respectively. Operating costs were 0.2% favourable to budget, while service hours were 0.1% above planned. Operating costs were favourable mainly due to lower than budgeted GVTA administration costs. Service hours are above budget as West Vancouver delivered extra service to serve customers transferring from the BC Ferries in Horseshoe Bay, and SkyTrain delivered extra hours due to a yard closure that made it necessary to run the trains longer hours.

Increased interest rates have resulted in higher debt servicing costs compared to the same period last year. This has caused a corresponding increase in total cost per service hour, which is unfavourable to target.

Conventional transit fare revenues for the region are 11.2% higher than in the previous year, (approximately 3.3% is due to a change in the agreement with the Province for MHR passes) and 2.6% higher than target: West Coast Express' fare revenue alone is up by 21%. Average fare (Fare revenue per revenue passenger) is up from $1.33 to $1.38 for the region, which can largely be attributed to average fare going up for West Coast Express and Coast Mountain Bus Company indicating longer trips taken by passengers. The increase in fare revenues is offset to some extent by a decline in fuel tax revenues, both of which would appear to be somewhat related to the increase in fuel prices and the effect on travel mode choice from private automobile to transit.

Conventional transit's summary of performance by subsidiary and/or operating company:

1. Coast Mountain Bus Company (Bus Services, SeaBus Services)

Coast Mountain Bus Company's bus services showed a 4.5% increase in boarded passengers from the previous year. However, boarded passengers per service hour is down, as a large portion of the service hour increases were geared to quality improvements such as reducing crowding, pass-ups and congestion, and it takes time for ridership to increase. Service reliability improved from the previous year and exceeded the target as both cancellations due to manpower and vehicle shortages were reduced. Operating cost efficiency decreased from the previous year, and is slightly unfavourable to the target set, as operating cost were basically on budget, and service hours delivered were just under target. Rider Satisfaction Survey results are almost identical to the same period last year, with slight decrease in ratings for "Overall service" and "Service frequency". This may be a response to the upcoming fare increase.

SeaBus is showing an increase in unlinked trips (boarded passengers), which can, in part, be attributed to: increasing traffic congestion on the Lions Gate and Second Narrows bridges; people preparing for potential disruptions due to the Lions Gate bridge repair work; general economic growth; and the increase in the language school enrolments on the North Shore. The ridership increase also led to a higher boarded passengers per service hour but resulted in lower ratings given for "Not being overcrowded" and "Service frequency" in the Rider Satisfaction Survey. SeaBus' operating cost efficiency is favourable for the 1st quarter, as costs in several areas were under budget, and costs are forecast to be under budget for year-end. Service reliability is lower than usual for SeaBus, as one of the two vessels had engine problems in January. Rider Satisfaction Survey shows declines in most areas surveyed, which is likely related to the service cancellation due to the engine problems, as SeaBus customers are used to very high reliability.

2. West Vancouver Transit

West Vancouver's unlinked trips (boarded passengers) for the period are 17.7% higher than in the same period last year, and 7.0% higher than target. However, service hours increased during the same time by a higher percentage than ridership (hours delivered are up by 30%). The target for Boarded passengers per service hour is exceeded, which indicates that the new services (especially the new cross-town route) have attracted more ridership than was expected. In general it takes time to build the new ridership for the services. Boarded passengers per service hour is significantly lower than last year because service hours were increased to improve the quality of service (to reduce crowding and pass-ups), which in the short run tends to decrease the rides per hour performance, but will increase ridership in the long run. Performance measured by operating cost per service hour is good year-to-date, showing a 12.1% improvement over the previous year. This is due to fixed costs remaining constant while the number of service hours increases. West Vancouver continues to perform well in the Rider Satisfaction Survey and shows

an improvement in most areas surveyed, indicating that the service quality improvements continue to have the desired effect.

3. SkyTrain (BCRTC)

Ridership, as measured by unlinked trips, is up by 8.3% from the previous year and above target. This increase in ridership caused the Boarded passengers per service hour to exceed its target even though more service hours were delivered than planned. The added service hours were mainly due to a yard closure (for testing purposes) that necessitated removing all trains from the yard and running the trains for longer hours. Operating cost was 0.9% favourable to budget and service hours 2.4% above planned. The Operating Cost per Service Hour is forecast to be closer to target by year-end. The Rider Satisfaction Survey shows slight decrease in most attributes surveyed. The largest decline was in "Helpful staff", which is likely due to the continued job action by the SkyTrain attendants until mid-February, as well as a spill-over effect from their December one-day strike.

4. West Coast Express

West Coast Express continues to increase its ridership (up by 8.8%) and to improve its operating cost effectiveness. Operating cost per service hour improved by 13.7% from the previous year, however, it did not quite reach its target. Service hours were lower than planned as WCE put one less passenger car to one of the trains than originally planned. Service levels have been increased significantly from the previous year with the addition of two new cars to existing trains and by the implementation of the TrainBus service. Fare revenue is up by 21.3%, as a result of increased fare checking and increased ridership. Service reliability and on-time performance are good and surveyed customers continue to be largely satisfied with the service.

CUSTOM TRANSIT

Custom Transit includes transit services that are offered exclusively to people with a disability that prevents them from using the Conventional Transit (except for the accessible services). Custom Transit services include the HandyDART Program and the Taxi Saver Program.

1. HandyDART Program

The number of revenue passengers in the HandyDART program (custom transit's dial-a-ride service) is slightly above last year but below target. The lower than expected ridership is due to the low usage of approved hours (only 95.72 % of the monthly approved hours have been used) but the usage of the hours is expected to go up in the traditionally more busy summer and fall months. Peak hour demand, in general, continues to exceed the service hours available since operating companies are limited by the number of vehicles they have available. Operating cost per service hour is currently artificially low, as the Operating Companies have been invoicing

TransLink for their services at last year's rate pending approval of the new Operating Agreements by the TransLink Board.

2. Taxi Saver Program

The Taxi Saver program continues to show a decrease in usage from the previous year. This is likely due to the increased usage of HandyDART and the increasingly accessible conventional transit, as well as to the higher cost of taxi use to the riders.

ECONOMIC FACTORS AFFECTING TRANSIT PROGRAMS' PERFORMANCE

Greater Vancouver Regional District (GVRD)

	PERCENT CHANGE	PERIOD REPORTED	FISCAL 1999	FISCAL 2000
FACTORS AFFECTING TRANSIT DEMAND				
Population estimates	2.5%	Calendar year	1,990,961	2,040,348
Employment (seasonally adjusted)	0.9%	Jan-Mar avg	1,006,233	1,015,333
Retail sales ($ millions)	3.7%	January	1,253	1,299
Insured motor vehicles (for work/school)	3.7%	Jan-Mar avg	478,342	495,869
Vancouver Internt'l Airport - domestic passengers	-1.2%	Jan-Feb	1,180,042	1,166,154
Housing starts (number of dwelling units)	-22.4%	Jan-Mar	1,951	1,514
FACTORS AFFECTING TRANSIT COSTS				
Consumer Price Index (1992 = 100)	2.2%	March	110.4	112.8

Estimated population growth and an increase in seasonally adjusted employment vs. the same period last year can explain some of the ridership growth for the 1st quarter.

The number of insured motor vehicles continues to increase faster than the population in general. ICBC insurance rates for motor vehicles are still frozen, implying a real rate decrease given inflation. However, gas prices have been high in recent months, causing some people to choose public transit over using their own vehicles.

There was a real increase in the consumer price index (2.2%) and conventional transit's operating cost per service hour decreased during the same period, indicating good fiscal performance year to date. However, it is too early to predict if this trend will continue for the balance of this year.

APPENDIX A

Definition of Performance Indicators

Revenue passengers (linked trips)
This measure defines the basic unit of production as a revenue passenger and indicates the level of use of the service. Revenue passengers are defined as the number of paying passengers travelling one-way from an origin to a destination regardless of the number of transfers made to complete the trip.

Boarded passengers (unlinked trips)
Boarded passengers indicate the total number of passengers using the system, and include both initial boards as well as transferring passengers. This measure assesses the capacity needed to carry the passengers using the different modes in a transit system.

Revenue passengers per service hour
This service efficiency measure indicates the level of the use of the service relative to the level of service provided.

Boarded passengers per service hour
This is an indicator of service effectiveness and of the average passenger flows within each mode and system and can be used to monitor the peak and off-peak capacity requirements.

Percentage of scheduled service delivered
This indicator measures the reliability of the service offered. It excludes all extra service and reports on the performance of regular, scheduled service only.

On-time performance
This indicator measures the on-time performance of the transit modes. For the modes reported, it measures the percentage of service delivered within 2 minutes of the scheduled and/or published times.

Operating cost per service hour
This indicates the expenditures required to produce a unit of production, which in the public transportation industry is a service hour. Service hours include all scheduled and extra hours provided including deadheading less cancelled hours. Operating expenditures do not include debt service costs of vehicles or facilities.

Total cost per service hour
This cost efficiency indicator measures the operating and debt service cost required to produce a unit of output, i.e. a service hour.

APPENDIX A

Total cost per boarded passenger
This measure indicates the total expenditure levied on each passenger using the different modes and systems. It assesses the cost effectiveness of both operating expenditures and investments (debt service) in all types of service.

Fare revenue
This measure indicates the revenue collected as fares for the region. It assesses the absolute fare revenue generated by carrying passengers in the various public transportation modes. Fare revenues are allocated between all the modes by using the percentage of revenue passengers using pre-paid passes on each mode and applying that percentage to the regionally collected pre-paid fares. Cash revenues are allocated to the mode where they were collected.

Fare revenue per boarded passenger
This measure indicates the average amount of fare revenue generated by each unlinked trip.

Operating cost recovery
This measure defines fare revenue generated per dollar of operating cost, and serves as a measure of operating cost efficiency.

Total Cost recovery
Total cost recovery defines total revenue generated per dollar of total cost, and serves as a measure of cost efficiency.

APPENDIX A

KEY PERFORMANCE INDICATORS, KEY DATA - REGIONAL ROLL-UP

Vancouver Region, Conventional Transit

Key Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Revenue Passengers (linked trips)	30,737,000	32,995,000	31,261,000
Service hours delivered	1,011,000	1,073,000	1,072,000
Budget (operating cost)	82,294,000	88,262,000	88,473,000

Comments:

Ridership, as measured in linked trips, is up 7.3% from the previous year, and above target. This increased ridership was achieved with a slightly smaller increase in service hours delivered (up by 6.1%), which may be due to the higher gas prices that make people choose public transit over private vehicles, and to the slightly improved economy.

Other factors - than the increase in service hours - that likely have had an effect on the ridership include: improved service (annualization of September 1999 and December 1999 service changes), high gas prices and stronger economy.

Increases in service hours have been directed at increasing the quality and frequency of service to reduce overcrowding and pass-ups, as well as introducing new services. All these type of service hours generally do not have an immediate positive impact on ridership growth.

Operating cost is slightly below budget, mainly due to a favourable variance in the GVTA administration costs. This favourable variance is due to vacancies in approved positions and timing differences.

[1] *Note: In order to normalize for the new organizational structure, 90% of TransLink's total administrative costs has been allocated to conventional transit.*

APPENDIX A

KEY PERFORMANCE INDICATORS and RIDER SATISFACTION SURVEY - REGIONAL ROLL-UP

Vancouver Region, Conventional Transit

Performance Measures [1]	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Revenue Passengers (linked trips)	30,737,000	32,995,000	31,261,000
Boarded passengers (unlinked trips)	56,208,000	59,408,000	57,159,000
Revenue passengers per hour	30.4	30.7	29.2
Boarded passengers per hour	55.6	55.4	53.3
Operating cost per service hour	$ 87.23	$ 86.77	$ 88.19
Total cost per service hour	$ 106.11	$ 106.53	$ 105.99
Operating cost per boarded passenger	$ 1.57	$ 1.48	$ 1.65
Total cost per boarded passenger	$ 1.91	$ 1.90	$ 1.99
Fare revenue	$ 40,974,000	$ 45,562,000	$ 44,425,000
Fare revenue per rev. passenger (avg. fare)	$ 1.33	$ 1.38	$ 1.42
Fare revenue per boarded passenger	$ 0.73	$ 0.77	$ 0.78
Operating cost recovery	46.5%	48.9%	47.0%
Total cost recovery	39.1%	41.6%	40.0%

Rider Satisfaction Survey Results*	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Overall service	7.4	7.2	down
Value for money	7.5	7.4	down
Good connections	6.8	6.8	same
Information availability	7.3	7.4	up
Direct routes	7.1	7.2	up

Comments:

Unlinked trips (boarded passengers) are up by 5.7% from the previous year (relatively less than linked trips), indicating a decrease in the number of transfers that our customer do. Linked trips per hour is up from last year, thereby showing an improvement in the service effectiveness.

Operating cost per service hour is favourable to last year and to target, as both costs and service hours were favourable. Total cost per service hour is slightly higher than last year, as higher interest rates have raised the debt servicing costs. This measure is also unfavourable to target.

Fare revenue is higher than anticipated, mainly due to higher than expected ridership. Fare revenue per revenue passenger (average fare) has increased from last year, indicating strongest growth in the multi-zone ridership. The high revenue combined with contained operating costs has led to a favourable Operating cost recovery, which year-to-date is fairly close to the ultimate target of 50% cost recovery.

Rider satisfaction survey results are very similar to year ago. Attributes for Overall service and Value for money have been rated lower, which is likely due to the anticipated fare increase.

[1] *Note: In order to normalize for the new organizational structure, 90% of TransLink's total administrative costs has been allocated to conventional transit.*

** Note: Performance measures are listed in order of rider priority (benchmarked in 1996) with most important first. Surveys are conducted on a quarterly basis. Numbers reported are based on a 10-point scale where "10" means "excellent" and "1" means "very poor"*

APPENDIX A

KEY PERFORMANCE INDICATORS and RIDER SATISFACTION SURVEY by TRANSIT MODE

Coast Mountain Bus Company

Bus services

Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Boarded passengers (unlinked trips)	42,533,000	44,467,000	43,137,000
Boarded passengers per service hour	51.2	50.6	49.0
Percent of scheduled service delivered	99.44%	99.62%	99.60%
Operating cost per service hour	$ 77.00	$ 79.96	$ 79.73
Operating cost per boarded passenger	$ 1.50	$ 1.58	$ 1.63
Fare revenue per boarded passenger	$ 0.68	$ 0.72	$ 0.73

Rider Satisfaction Survey Results *	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Overall service	7.8	7.7	down
Onboard safety	8.5	8.5	same
Service frequency	7.2	7.1	down
On-time performance	7.9	7.9	same
Hours of service	7.6	7.6	same
Helpful staff	8.1	8.1	same
Not overcrowded	7.3	7.3	same

Comments :

Ridership, as measured in unlinked trips, is up by 4.5%, which is likely directly related to the increases in service hours. Boarded passengers per service hour are higher than target as this measure was expected to be lower than in 1999, due to a large number of service hours are building new markets and directed toward improving service quality.

The new services seem to have built immediate strong riderships, as regional town centre connectors have proven to be very popular, and service overall is improved. Higher gas prices may also have contributed to the higher than expected ridership.

Operating cost per service hour is unfavourable to target, mainly due to the higher than anticipated fuel costs. Fare revenue per boarded passenger is basically on target. As one sign of improved service quality, service reliability is significantly better than last year.

Rider satisfaction survey shows basically no change from the previous year, although ratings for Overall service and Service frequency notched down a 0.1 point. A common request from customers continues to be the wish for more frequent service.

NOTE: 1999 data includes allocated costs, as allocated by TransLink to the different modes; 1998 excludes property taxes. Fare revenue allocated to modes based on TransLink's calculations.

** Note: Performance measures are listed in order of rider priority (benchmarked in 1996) with most important first. Surveys are conducted on a quarterly basis. Numbers reported are based on a 10-point scale where "10" means "excellent" and "1" means "very poor"*

APPENDIX A

Coast Mountain Bus Company

SeaBus services

Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Boarded passengers (unlinked trips)	1,124,000	1,207,000	1,146,000
Boarded passengers per service hour	440.2	467.3	442.5
Percent of scheduled service delivered	100.00%	99.76%	100.00%
Operating cost per service hour	$ 626.92	$ 565.77	$ 587.60
Operating cost per boarded passenger	$ 1.42	$ 1.21	$ 1.33
Fare revenue per boarded passenger	$ 1.00	$ 1.01	$ 1.02

Rider Satisfaction Survey Results *	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Onboard safety	9.0	8.7	down
Overall service	8.9	8.5	down
Not overcrowded	8.6	8.1	down
Service frequency	8.3	7.8	down
Helpful staff	7.9	7.9	same

Comments :

Ridership, as measured by unlinked trips, is up by 7.4% from the previous year, and is above target. Strong ridership also contributes to favourable Boardings per hour performance. Ridership is anticipated to grow at a fast pace also once the Lions Gate bridge work starts.

Operating cost per service hour is favourable to target, as costs are below budget in areas such as fuel, materials, and salaries.

Service reliability is lower than normal, mainly due to engine problems on one day in January when one of the two vessels was out of service most of the morning. This may have been reflected in the rider satisfaction survey results, where most attributes are slightly down. With the ridership growth it is easy to understand why the attributes for Overcrowding and service frequency are down the most; by 0.5 points.

NOTE: Includes allocated costs, as allocated by TransLink to the different modes, but do not include any cost allocation from CMBC head office. Fare revenue allocated to modes based on TransLink's calculations.

** Note: Performance measures are listed in order of rider priority (benchmarked in 1996) with most important first. Surveys are conducted on a quarterly basis. Numbers reported are based on a 10-point scale where "10" means "excellent" and "1" means "very poor"*

APPENDIX A

West Vancouver Transit Services

Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Boarded passengers (unlinked trips)	1,294,000	1,523,000	1,424,000
Boarded passengers per service hour	65.5	59.2	56.7
Percent of scheduled service delivered	99.88%	99.83%	99.90%
Operating cost per service hour	$ 79.15	$ 69.58	$ 70.36
Operating cost per boarded passenger	$ 1.21	$ 1.18	$ 1.24
Fare revenue per boarded passenger	$ 0.67	$ 0.72	$ 0.70

Rider Satisfaction Survey Results *	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Overall service	8.7	8.7	same
Onboard safety	9.3	9.3	same
Hours of service	8.0	8.1	up
On-time service	8.8	8.8	same
Service frequency	7.5	7.6	up
Helpful staff	8.7	9.0	up
Not overcrowded	7.8	8.0	up

Comments:

Ridership, as measured by unlinked trips, is 17.7% up from the previous year, but since service hours increased relatively more, Boards per hour is below last year's results. This decline was anticipated, since a large amount of the new service hours is on a new cross town route, and new services always take time to build the ridership up. Performance to-date is actually better than expected.

Operating cost per service hour is favourable to last year, as most of the new service added is work that enables improved efficiency of using the existing resources. Fare revenue per boarded passenger is fairly high, indicating that more riders seem to take longer, multi-zone trips.

In rider satisfaction survey, West Vancouver ratings have improved in most attributes, indicating that the service improvements seem to have a marked positive effect.

NOTE: Includes allocated costs, as allocated by TransLink to the different modes. Fare revenue allocated to modes based on TransLink's calculations.

* *Note: Performance measures are listed in order of rider priority (benchmarked in 1996) with most important first. Surveys are conducted on a quarterly basis. Numbers reported are based on a 10-point scale where "10" means "excellent" and "1" means "very poor"*

APPENDIX A

SkyTrain services (BCRTC)

Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Boarded passengers (unlinked trips)	10,791,000	11,691,000	10,953,000
Boarded passengers per service hour	71.1	73.6	70.6
Percent of scheduled service delivered	99.88%	99.52%	99.80%
On-time performance	96.80%	96.50%	96.50%
Operating cost per service hour	$ 70.18	$ 65.55	$ 67.73
Operating cost per boarded passenger	$ 0.99	$ 0.89	$ 0.96
Fare revenue per boarded passenger	$ 0.79	$ 0.80	$ 0.83

Rider Satisfaction Survey Results *	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Onboard safety	7.5	7.4	down
Station safety	6.9	6.8	down
On-time performance	8.7	8.5	down
Overall service	8.6	8.3	down
Helpful staff	6.3	5.9	down
Vehicle cleanliness	7.9	7.7	down
Not overcrowded	6.7	6.7	same

Comments :

Ridership, as measured by unlinked trips, is up by 8.3% from the previous year and above target. The ridership was so strong, that it caused the Boardings per hour to exceed its target even though more service hours were delivered than planned. The added service hours were mainly due to a yard closure that necessitated running the trains for longer hours.
Operating cost related indicators are favourable to both last year and the target, mainly due to favourable expenditures year-to-date. Costs are forecast to be on target by year end.
Rider satisfaction survey results show a large decline in Helpful staff attribute, which likely reflects a spill-over dissatisfaction from the users due to the December one-day strike, and continued job action until mid-February.

NOTE: 1999 data includes allocated costs, as allocated by TransLink to the different modes. Fare revenue allocated to modes based on TransLink's calculations.

** Note: Performance measures are listed in order of rider priority (benchmarked in 1996) with most important first. Surveys are conducted on a quarterly basis. Numbers reported are based on a 10-point scale where "10" means "excellent" and "1" means "very poor"*

APPENDIX A

West Coast Express, commuter rail and TrainBus services

Performance Measures	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Boarded passengers (unlinked trips)	467,000	508,000	486,000
Boarded passengers per service hour	73.6	73.1	66.0
Percent of scheduled service delivered	99.54%	99.87%	99.90%
On-time performance	98.80	98.80%	98.50%
Operating cost per service hour	$ 710.10	$ 612.94	$ 604.77
Operating cost per boarded passenger	$ 9.65	$ 8.38	$ 9.16
Fare revenue per boarded passenger	$ 3.17	$ 3.54	$ 3.19

Customer Satisfaction Report *	1999 (3 mos)	2000 (3 mos)	Change from Previous Year
Good connections	87.6%	87.3%	down
Helpful staff	97.5%	98.1%	up
Onboard safety	99.0%	99.8%	up
On-time performance	98.4%	99.0%	up
Overall service	99.2%	99.7%	up

Comments :

Ridership, as measured by unlinked trips, is 8.8% above last year's results and higher than target. This is due to more fare checks being conducted (leading more people paying and thus being counted as a passenger), as well as to the high gas prices, that move people from their cars to public transit. Boarded passengers per service hour are above target, but lower than last year, as the ridership needs to catch up with the added service hours.

Operating cost per service hour is unfavourable to target, as favourable costs are more than outweighed by unfavourable service hours. This measure is expected to be close to target at year end. Service hours are lower than planned, since WCE put one less passenger car to one of the trains than originally thought.

Fare revenue per boarded passenger is favourable, which can be attributed to the increased fare checking that WCE has implemented.

Customer satisfaction ratings remain positive, and show improvement in most attributes.

NOTE: 1999 data includes allocated costs, as allocated by TransLink to the different modes; 1998 excludes property taxes. Fare revenue allocated to modes based on TransLink's calculations.

** Data collected and reported monthly. Measures reported in alphabetic order as rider priorities are not available. Figures show the percentage of riders who were satisfied or better for each measure. For details, please refer to Appendix B.*

Vancouver Region, Custom Transit

HandyDART

Performance	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Revenue ridership (linked trips)	240,000	241,000	248,000
Boarded passengers (unlinked trips)	256,000	259,000	263,000
Revenue passengers per service hour *	2.3	2.3	2.3
Boarded passengers per service hour *	2.4	2.4	2.4
Operating cost per service hour	$ 40.27	$ 37.45	$ 38.12
Operating cost per boarded passenger	$ 16.58	$ 15.47	$ 16.86
Percent of approved service delivered	98.47%	95.72%	98.00%

Comments:

Ridership figures show minor growth in linked and unlinked trips. Rides per hour productivity target has been maintained so far.

Operating cost per service hour is favourable because the Operating Companies have invoiced the year-to-date hours at last year's rates. The retroactive increase in billing rates will bring this measure close to target.

Percent of approved service delivered is quite low, as the use of discretionary additional hours has been low. Usage of the approved hours is expected to be higher in the summer and fall months.

Taxi Saver

Performance	1999 Actual (3 mos)	2000 Actual (3 mos)	2000 Target (3 mos)
Revenue passengers (linked trips)	42,700	35,100	48,100
Boarded passengers (unlinked trips)	47,400	38,000	51,900

Comments:

Taxi Saver Program ridership is continuing to decline, likely due to the increased accessibility of the conventional transit and due to the expensiveness of taxi use to the riders. A rebound from the last year was expected, and some of it may still happen in the summer months.

NOTE: Cost figures include allocated costs, as allocated by TransLink to the different modes.

** Rides per hour targets are based on absolute productivity target. They are not calculated from the approved hours which include discretionary hours that vary widely from month to month.*

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Service Contracts

Date: May 23, 2000

Subject: **Status Report on Area Transit Plans**

Recommendation:
That the Board receive this report dated May 23, 2000 titled Status Report on Area Transit Plans for information.

PURPOSE

This report provides a brief update on the status of the three Area Transit Plans since the May 2000 meeting.

BACKGROUND

During the April 1, 1999 to July 2000 period, Area Transit Plans for the City of Richmond, the North Shore and the South of Fraser River region are to be prepared.

The Richmond Area Transit Plan is being developed in conjunction with the planning for the Richmond-Vancouver #98 B-Line, and the integration and improvement of local transit services with the B-Line in 2000. A separate report to the Board this month outlines these service improvements.

The South of Fraser Area Plan (Surrey, Delta, White Rock, Langley City and Township) will review both local and regional transit services, including different types of transit service which may be more appropriate to the markets. Community Bus 2000 is a specific sub-task of the South of Fraser Area Plan. This Project has focused on working with the White Rock/South Surrey community to examine the local bus service, and to develop new service which will better serve the community and market.

The Community Bus 2000 project is complete and the service specifications for the competitive tendering of this project was approved by the TransLink Board in March 2000, to enable the Community Shuttles using minibuses and an evening dial-a -ride service to be implemented in December 2000. The tender call was issued on the May 24, 2000 with bids to be returned by June 22, 2000. The White Rock/South Surrey Community Shuttle is included in the 2000 Program Plan and Budget. Staff will be reporting back to the Board in July 2000 with recommendations for vehicles and the selection of an operator.

Finally, the North Shore Area Plan will provide a plan for the next three years on the North Shore.

To assist in developing and implementing a broad public consultation program for the three Area Plans, the firm of Context Research has been hired. IBI/Delcan are providing transit planning consultant assistance for the North Shore and South of Fraser plans, and Urban Systems is playing this role for the Richmond plan.

DISCUSSION

Richmond

The following activities have occurred on the Richmond Area Transit Plan since the last progress report:

- Part I of the Area Plan dealing with service improvements to be implemented in December 2000 will be presented to Richmond Council on June 5, 2000;

- A Public Advisory Committee meeting was held to review an evaluation of potential local and regional service improvement strategies and to provide input on the relative ranking of these service improvements for the plan;

- A preliminary draft report of the final plan has been prepared for comment by TransLink and Richmond staff and for input from the PAC and the final public consultation events in Richmond scheduled for mid-June; and

- The above-noted input will be used to develop a complete Area Transit Plan by the end of June, which will be presented to the TransLink Board in July for referral to the City of Richmond for final comments.

South of Fraser River

The following activities have occurred on the South of Fraser River Area Transit Plan since the last progress report:

- A preliminary draft report of the final plan has been prepared for comment by TransLink and municipal staff and for input from the PAC; and

- The above-noted input will be used to develop a complete Area Transit Plan by the end of June, which will be presented to the TransLink Board in July for referral to municipalities for final comments.

North Shore

The following activities have occurred on the North Shore Area Transit Plan since the last progress report:

- The marketing research survey collecting information on travel patterns and the response of transit users and potential customers to service improvement concepts was completed;

- Ridership estimates were prepared for the potential service improvement strategies;

- A preliminary draft report of the final plan has been prepared for comment by TransLink and municipal staff and for input from the PAC; and

- The above-noted input will be used to develop a complete Area Transit Plan by the end of June, which will be presented to the TransLink Board in July for referral to the municipalities for final comment.

ALTERNATIVES

None.

CONCLUSION

Following approval in principle by the Board of the three Area Plans in July and consideration of final comments from the municipalities for final comments, the Plans will be returned to the Board in September for final approval. Service improvement projects in the first year of the Plans will be considered for inclusion in the 2001 Program Plan, with the exception of the White Rock/South Surrey Community Shuttle and the Richmond B-Line changes, which are scheduled for December 2000.

To: GVTA Board of Directors

From: Ken Dobell, Chief Executive Officer

Date: June 21, 2000

Subject: **First Quarter Status Report & Municipal Update**

Recommendation:
That the Board receive the report dated June 21, 2000 titled First Quarter Status Report & Municipal Update, and forward it to municipal Councils and other stakeholders for their information on TransLink's progress.

PURPOSE

To provide the Board of Directors and municipal Councils with an overview of key initiatives completed or initiated during TransLink's 1st Quarter, January, February and March 2000.

BACKGROUND

These reports will provide 1st Quarter information to keep municipal Councils and other stakeholders current work within TransLink and the major operation subsidiaries.

CONCLUSION

TransLink was established to deliver transportation infrastructure and services in support of the Greater Vancouver Regional District's *Livable Region Strategic Plan*. Quarterly reporting will provide regular updates to municipal Councils and other stakeholders.

First Quarter Municipal and Stakeholder Update
January 1 to March 31, 2000

Introduction

TransLink completed the last three months of its first year heavily engaged in meeting its obligation to produce a Strategic Transportation Plan.

The draft Plan, presented to the Board of Directors on January12th, set out the nature and scope of the steps necessary to improve the capacity of our transportation system to move people and goods throughout the region and to support the Livable Region Strategic Plan. It reflected earlier planning contained in Transport 2021 and, for the transit system, the work undertaken by B.C. Transit, but with the added value of public input gathered in consultation throughout the fall of 1999.

While there is currently much public attention on the revenue measures outlined in the plan, particularly the vehicle levy, it is important understand the public concerns which led to the creation of TransLink and the development of the Strategic Transportation Plan.

Inadequate transportation is identified by many citizens as one of the key issues in the region. Congestion has increased the cost of doing business, and meant residents have to spend more time travelling. Congestion brings air quality impacts and generally a loss of quality of life in the region. The GVRD and Province agreed on the creation of TransLink to address these issues, and to respond to historically inadequate levels of investment in transportation.

The Greater Vancouver Transportation Authority Act that created TransLink also required TransLink to produce a Strategic Transportation Plan supporting the Livable Region Strategy, with an accompanying financial plan. That same legislation limited the revenue measure options needed to pay for the improvements to transit fare increases, property tax increases, a vehicle levy and an increase in the sales tax for off-street paid parking. Of these options, an increase in property taxes represents the least publicly acceptable way to raise revenue and the parking sales tax (which has limited revenue potential) cannot be increased until 2005 so issues related to potential unfair impacts can be resolved.

The public consultation process showed clearly that the public wanted more investment in transportation, and wanted it now. The Plan reflects that need, but requires investment. Given the limited methods of raising funds under the Act the road and transit improvements in the Strategic Transportation Plan are financed through transit fare increases and a average vehicle levy of $75.

Critical Success Indicators

TransLink's Vision and Values statement prescribes the internal and external Critical Success Indicators as follows:

External Measures:

1. Public understanding and support for TransLink's Vision
2. Integrated systems performance
3. Financial performance
4. Customer satisfaction
5. Performance of service deliverers

Internal Measures:

6. Effective people
7. Effective systems and processes
8. Learning organization

Each quarter, this report highlights the performance of TransLink's divisions and operating subsidiaries toward meeting these indices.

1.0 Public understanding and support for TransLink's Vision

Highlight -- The production of the draft Strategic Transportation Plan, presented to the Board of Directors in January, represented a significant cross-divisional effort. The Plan is historic. For the first time, the Greater Vancouver region not only had complete jurisdiction over its transportation system, but also a plan that was widely acknowledged as taking a giant step toward improvements that were long overdue.

1.1 Planning & Service Contract Division

TransLink Strategic Transportation Plan

- The TransLink Strategic Transportation Plan was released in draft form on January 12, 2000. It received comprehensive press and broadcast coverage.

  Strategic Planning staff presented and discussed the draft Plan at a series of eight public forums held throughout the region. The forums were well attended, with a total of 785 participants. The public forums generated a good deal of discussion and debate, from a wide range of perspectives.

Strategic Planning staff also presented the draft Strategic Plan to GVRD municipalities both directly (North Vancouver, Delta) and through two TransLink committees - the Major Roads Technical Advisory Committee (MRTAC) and the Transit Technical Committee (TTAC) - both of which had representation from all member municipalities.

These committees discussed the draft Plan at length, and comments were solicited and recorded. A series of presentations were held for TransLink staff, and for other interested groups such as the Institution of Transportation Engineers, the Air Quality Advisory Committee and the Regional Economic Development officers.

Finally, Strategic Planning staff presented the draft Plan to the Strategic Transportation Plan Technical Advisory Committee, a committee comprised of private and public sector stakeholders in the regional transportation network, specially established to advise and guide the development of TransLink's Strategic Transportation Plan. The Committee submitted a letter to the TransLink Board, outlining its comments. As well, most of the interests represented on this committee submitted written responses to the draft Plan.

Upon completion of the stakeholder consultation processes, the draft Plan was revised to reflect the comments and input received. The revised draft Plan was on track to be completed early in the second quarter of 2000.

Strategic Planning staff also worked towards the completion of approximately 24 Background Papers to the Plan.

Several other presentations were made regarding TransLink, these included a presentation to the City of Toronto Transportation Management Association Forum on the role and function of TransLink and its impact on transportation management in this region. Staff also represented TransLink's views to the national Climate Change transportation table and the City of Vancouver Bus Impact Task Force, stressing the important contribution that transit makes to both the local and wider environment.

1.2 Implementation Planning

2000 Program Plan

- Staff developed a draft 2000 Program Plan, which was taken out to eight public meetings across the region in February and March. The Board of Directors approved a final Program Plan in March.

1.3 Customer Service & Marketing Division

Research

- Work proceeded on analysis of the Usage and Attitude Survey and the Trip Diary research. This research, conducted in the fall of 1999, represented the most comprehensive analysis of the factors driving decisions on mobility choices.

- A major public opinion poll on the Strategic Transportation Plan by the Angus Reid group mirrored the results of another survey commissioned by the Vancouver Sun. The key result was that public approval of the Plan's revenue measures (transit fare increases and the vehicle levy) increased with knowledge of the Plan's benefits to the transportation system.

Consultation

- The Consultation Department collaborated with Strategic Planning staff to support public forums on the draft Strategic Transportation Plan. The channels through which the public could participate in reviewing and discussing the plan were expanded to include interactive telephone services and access / feedback mechanisms on TransLink's web site.

Communication & Media Relations

- Media Relations support for the Strategic Transportation Plan included media briefings, news releases and follow-up coverage analysis and issues monitoring.
- Through partnerships with major community newspapers, TransLink created an innovative public involvement program called "Front Room Forums." These forums broadened the scope of public deliberation on the Strategic Transportation Plan and produced clear pictures of the fundamental values that shaped the public's reaction to and support for the Plan and the revenue measures.

Marketing

- An advertising campaign and a widely distributed public information digest on the draft Strategic Transportation Plan significantly increased awareness of the Plan and involvement in public forums. The digest produced a significant increase in TransLink's level of public approval.

2.0 Integrated Systems Performance

2.1 Contracts and Acquisitions Division

Electronic Farebox (Budget: $25,800,000)

- This new system will give customers efficient and flexible fare payment while maintaining the ease of transfer across the integrated system. Includes integrated farebox units, ticket vending machines and magnetic ticket encoding, and ticket validators. In-service testing for fareboxes scheduled to begin early in 2001, with all units in service by June 2001.

Infrastructure Projects

Work continues on projects to build or upgrade transit infrastructure. Major projects include:

- #98-B-Line Richmond-Vancouver Rapid Bus Infrastructure
- #99-B-Line Broadway-Lougheed Rapid Bus Infrastructure
- Richmond Transit Centre
- SkyTrain Systems Upgrades

2.2 Strategic Planning

Lower Mainland Truck Freight Study

- Strategic Planning staff continued work on the Lower Mainland Truck Freight Study, the first major comprehensive study of trucking activities within the Lower Mainland since 1988. The purpose of this study is to construct an origin-destination pattern of truck travel by trucks and to determine the 24 hours traffic volumes and vehicle classifications at major screenline locations and gateways in the Lower Mainland.

  This understanding will be used in the development of computerized models for the prediction of truck travel in the future. Such models will be a useful tool in future transportation planning, e.g. corridor studies, definition of a commercial vehicle network, or the elimination of segments of municipal truck routes. Study results should be available in late May 2000.

2.3 Implementation Planning

April 2000 Service Changes

- Staff worked with the operating companies to introduce service changes on April 10. These included mostly seasonal adjustments as well as improvements in Richmond, Vancouver and Burnaby.

June 2000 Service Specifications

- Staff completed the preparation of new service specifications for service changes to be introduced in June 2000. These are primarily seasonal however; there a number of permanent changes as well.

2000 Transit Count Program

- Staff developed a transit screenline and ride check program proposed for the fall of 2000. The program will greatly assist transit ridership and performance monitoring and will be used to produce a critical route review in 2001.

Richmond Area Transit Plan

- Work continued with the Public Advisory Committee and the technical committees on market research studies and developing alternative transit plan scenarios for Richmond. This work was undertaken con-currently with the developing the local route improvement plan to support the B-Line. Public open house meetings were held in February.

Service Design Guidelines

- Staff continued to work with a sub-committee of the Transit Technical Advisory Committee (TTAC) and a consultant on the development of new Service Design Guidelines.

Bicycle Program

- Staff worked with a sub-committee of the Municipal Bicycle Committee to assist in the development of regional bicycle network and 5 year plan as part of the Strategic Transportation Plan. A draft of the report is now available and has been utilised as part of the STP and 2000 Program Plan.

Burnaby Heights Service Options

- Staff met with local community groups as well as staff from the City to develop innovation options for a new TaxiBus service to replace an under-utilised conventional transit route.

SkyTrain Project

- Staff reviewed conceptual plans for bus loops and bus stops along the new SkyTrain line. In addition, worked with the cities and RTPO to finalize the infrastructure to be funded from the Municipal Infrastructure Fund (MIF).

Transit Priority Projects

- Staff continued to work with municipal staff on transit priority projects including the Willingdon HOV project, Dollarton Highway as well as numerous transit priority signal projects

Walnut Grove Park and Ride

- Staff worked with the BCTFA and Township of Langley to develop functional plans for the new Walnut Grove Park and Ride lot. The existing facility is proposed for relocation as part of the interchange upgrading.

Roadway Safety and Geometric Projects

- Staff continued work on roadway improvement projects to facilitate safe and efficient operation of transit buses. In addition, staff has responded to municipalities on issues concerning neighbourhood traffic calming which can affect transit operation.

2.4 Transit Security

Transit Centre Liaison Officers

- Implementation of the Transit Centre Liaison Officers at BTC, OTC and NVTC. This brings our number of depots being served by TCLO's to five, which also includes STC and PTC. Their primary role is to serve bus operation by addressing any security related issues either from an on-the-job security matter or by the promotion/liaison with local jurisdictional police agencies over issues where TransLink and/or its subsidiary companies have a key interest.

3.0 Financial Performance

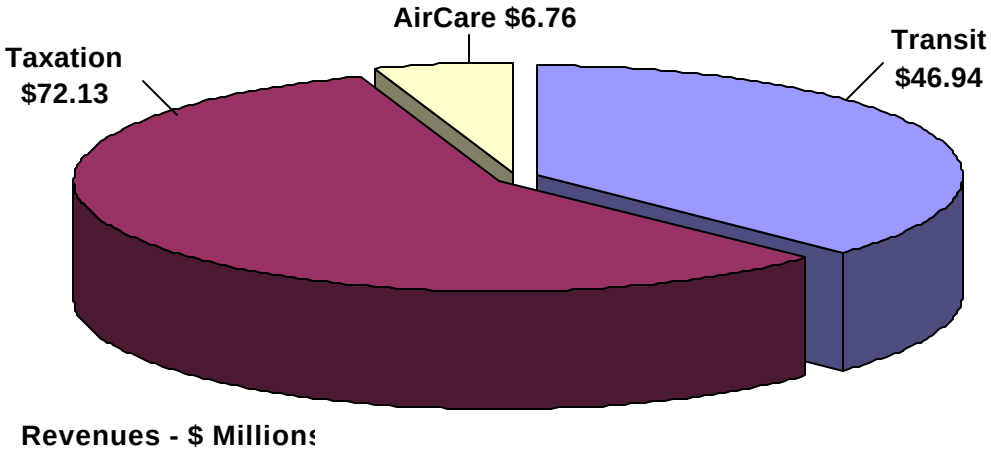
1999 Year End Results

- TransLink ended its first year of operation with a $3.75 million surplus. A deficit of $10.1 million had been assumed in the 1999 budget.

  The surplus increased the reserve to $59.5 million, $14.4 million higher than originally projected. The reserve is an available funding source for future years' expansion.

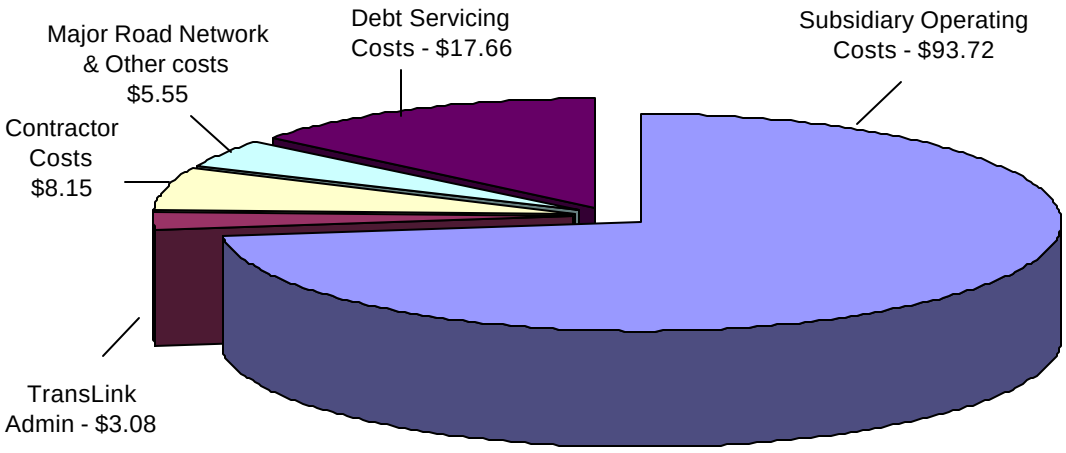
First Quarter 2000 Results

Revenues - $125.83 million



Total revenues from all sources were marginally below budget.

Expenditures - $128.16 million



Expenditures - $ Millions

Expenditures were $2.45 million (1.9%) lower than budgeted.

Projected revenues and expenditures indicate that TransLink will again operate at a surplus, as a result of below budget financing costs and a refund from the Superannuation Plan.

2000 Operating and Capital Budget

- The 2000 operating and capital budget was finalized in February and approved by the Board on March 15th.
- The $525.4 million operating budget is based on the 2000 Program Plan, which provides an implementation plan for the first year of the Strategic Transportation Plan. The budget will fund a 4.2% increase to existing service on an annual basis.

Strategic Transportation Plan – Financial Modeling

- The corporate financial model was used to develop estimates of the financial impact of the Strategic Transportation Plan and to determine various strategies to finance the plan
- The estimates are driven by assumptions on the timing of transit and road expenditures and the implementation of new revenue sources.
- The modelling indicated that plan while aggressive is financially viable. Appropriate revenue sources exist to fund the transit expansion and maintain and selectively expand the major road network.

4.0 Customer Satisfaction -

4.1 Contracts and Acquisitions

Vehicle Acquisitions

- **79 Low Floor Articulated Buses #98 B-Line** (Budget: $48.9 million)
  26 delivered and in service
  30 replacing older buses will be delivered starting in July
  23 additions to the fleet will be delivered beginning in July 2000

- **44 Low Floor 40' Clean Diesel Buses** (Budget: $17.9 million)
  36 additions to the fleet will be delivered from August to December
  8 delivered and are in service.

- **76 Highway Coaches** (Budget: $35.1 million)
  Contract awarded to Orion
  Buses scheduled to arrive in early 2001

- **West Coast Express 9 Passenger Cars** (Budget: $23.3 million)
  9 new passenger cars.
  First car scheduled for factory completion in July, 2000

- **SkyTrain Fleet Expansion** (Budget: $63.4 million)
  Mark II vehicles are on-line at Kingston factory
  10 MKII vehicles to be constructed in Kingston for scheduled delivery in Fall 2000
  10 MKII vehicles to be assembled in Burnaby Centre for Advanced Transit Systems
  First vehicle shells have arrived at SkyTrain facility in Burnaby

4.2 Implementation Planning

April 2000 Service Changes

- Staff worked with the operating companies to introduce service changes on April 10. These included mostly seasonal adjustments as well as improvements in Richmond, Vancouver and Burnaby.

June 2000 Service Specifications

- Staff completed the preparation of new service specifications for service changes to be introduced in June 2000. These are primarily seasonal however; there a number of permanent changes as well.

4.3 Coast Mountain Bus Company

Service Improvements

- Service reliability in the first quarter of 2000 increased to 99.6 per cent from 99.43 per cent in 1999. This resulted from a significant reduction in service cancellations: a 78 per cent reduction for staff-related cancellations and an 88 per cent reduction for vehicle-related cancellations.

- Service hours per operator and kilometres per maintenance employee improved by 1.17 per cent and 4.54 per cent respectively over 1999.

- Customer commendations rose by 48 per cent in the first quarter of 2000 over 1999, while complaints fell by 48 per cent.

4.4 Pacific Vehicle Testing Technologies (AirCare)

New AirCare Program Design Formally Approved

The TransLink Board approved the AirCare II program design. Changes include:

- Biennial testing of model years 1992 and newer vehicles
- Annual enhanced steady-state testing of model years 1991 and older vehicles
- Transient test and smoke measurement for all diesel vehicles
- Dynamometer testing of 'all-wheel-drive' vehicles
- Reporting of CO_2 emissions on the AirCare test report
- More stringent emissions standards

Customer Information on FM Radio

- AirCare inspection centres began broadcasting customer information on local area FM Radio (88.7 MHz).

4.5 West Coast Express

Quality Council Award

- West Coast Express was nominated and short-listed for the prestigious British Columbia Quality Council Award in the area of Customer Service. Nominees include public and private organizations demonstrating excellence in customer service.

Customer Satisfaction

- Customer satisfaction with the service remains at the 99 per cent level.
- On time performance in the first quarter exceeded 99 per cent.

5.0 Performance of Service Deliverers

5.1 Planning & Service Contracts Division

Operating Conditions – Subsidiaries

- Finalized and signed off on Operating Conditions with all Operating Subsidiaries. In conjunction with the Finance Department, reviewed and recommended fiscal 2000 Operating budgets of Operating Subsidiaries for approval by TransLink Management and Board. Amendments to the Operating Conditions will be submitted to the April Board meeting for approval.

Financial Reporting - handyDART

- Formalised process and format for the quarterly reporting of handyDART financial results. This management report will enable TransLink and handyDART contractors to determine how they are performing relative to budgets.

Service Delivery – handyDART

- Attended meetings with representatives from Ministry of Children and Family, Vancouver/Richmond Health Board and various senior groups to discuss handyDART service delivery issues and clarification of program plan and STP.

Training Program - handyDART

- Completed Train the Trainer Program for all Line Instructors of handyDART contractors so that they may competently carry out the next phase of a standardized driver training program. Driver training to meet TransLink standard is a contract compliance issue.

2000 Performance Targets – Subsidiaries and Contractors

- Completed the compilation of fiscal 2000 performance targets necessary to assess performance of contractors and operating subsidiaries. These targets based on the service plan and the approved operating budgets are used on a monthly basis to compare actuals to targets.

- Prepared a 1999 year-end report for the TransLink Board on the performance of contractors and subsidiaries. This report will be presented to the Board in their April meeting.

6.0 Effective People

6.1 West Coast Express

Competencies Review

- A full review of staff job competencies and training required as a result of that review has been completed and implemented.

To: GVTA Board of Directors

From: S. Plewes, Vice President, Contracts & Acquisitions

Date: June 5, 2000

Subject: Status Report on #98 B-Line Infrastructure

Recommendation:
That the Board receive the report dated June 5, 2000 titled Status Report on #98 B-Line Infrastructure for information.

PURPOSE

This report provides a brief update on the status of the #98 B-Line infrastructure.

BACKGROUND

Over the past year, staff have been working with Richmond and Vancouver to complete the design of the #98 B-Line infrastructure. The City of Richmond approved beautification works on No. 3 Road to be built in conjunction with the TransLink infrastructure, with Richmond funding this portion of the work. The final designs were completed early this year and Richmond and Vancouver Council approval was received.

The entire civil works (roadwork, landscaping, electrical, and bus shelters) were tendered as one package in March to simplify construction co-ordination and to make the contract attractive to the large, experienced civil contractors. However, the bids received were well over the budget for this portion of the work, resulting in staff withdrawing the tender. After discussions with the bidders and consultants, the work was repackaged into smaller contracts, by type of work and geographical area to attract competitive bidding from specialized contractors.

Concurrently with the infrastructure design, requirements for the Service Management System, which includes automatic vehicle location (AVL), traffic signal priority (TSP) and customer information signs (CIS), were finalized and the request for proposals issued.

DISCUSSION

The following work on the #98 B-Line is underway:

Civil Works

Richmond Civil Works

- The Richmond Civil Works Contract has been awarded to Imperial Paving Ltd. for a total value of $6,398,814.32. This contract includes widening of No.3 Road and the installation of street lighting, traffic signals, hard and soft landscaping, bus shelter foundations and below grade electrical work. Imperial Paving began construction on May 23.

- Translink staff and Richmond staff are working together to ensure that the contractor complies with traffic requirements and construction standards.

- Translink and Imperial Paving have established a site office (4800 No. 3 Road) to handle immediate construction issues and public communication.

Vancouver Civil Works

- The tender package is being prepared for the Vancouver civil works. This contract is for the bus shelter foundations only as the #98 B-Line uses the existing road infrastructure in Vancouver.

Material Pre-purchase

- Street lighting and traffic signal equipment has been pre-purchased.

Richmond Electrical Installation Contract

- The Electrical Installation Contract has been tendered. This work includes the above grade installation of street lighting, traffic signals and electrical wiring. The tender period closes on June 19.

Vancouver Electrical Work

- In accordance with City policy regarding work on City streets, City of Vancouver electrical crews will be providing electrical power to the bus shelters in Vancouver. This is the only electrical work required in Vancouver.

Bus Shelters

- The tender package is being prepared for the bus shelters. The contract includes the fabrication and installation of the shelters and the installation of the lighting fixtures. The shelters were redesigned to improve the efficiency of the design and reduce overall costs while retaining the unique #98 B-Line look.

Lansdowne Transit Exchange

- The Lansdowne transit exchange was redesigned to improve the flow for buses picking up passengers and buses laying over. Detailed design will commence after the larger contracts have been awarded and further discussions will be ongoing with Lansdowne Mall.

Airport Exchange

- This work is being undertaken by the airport authority. The exchange is scheduled for completion in September.

Park'n Ride

- The terms of the lease have been agreed upon with the property owner. Detailed design will begin after the lease has been secured.

Service Management System (AVL, TSP and CIS)

- The request for proposals closed on May 11. Negotiations are underway with the proponent to define the scope of the contract and the final price.

Property Acquisitions

- Property acquisitions and work easements are being concluded for all property south of Capstan Way in Richmond.

- Richmond was planning on obtaining the properties north of Capstan Way through rezoning requirements. However, it has become apparent that the rezoning will not proceed within the required timeframe and the property must be purchased to accommodate the centre median bus operation. Richmond will provide five of the properties through a land swap with the owners and Translink has agreed to purchase the remaining two properties.

The majority of the infrastructure for the #98 B-Line will be completed by the end of September and bus operator training will begin. The landscaping and Service Management System will be completed by December. The full #98 B-Line is scheduled to begin service on December 11, 2000.

With the repackaging of the #98 B-Line infrastructure into smaller contracts and the redesign of the bus shelters, the project is forecast to be completed on budget. However, until the remaining contracts such as the Service Management System, the Richmond Electrical contract and the Bus Shelter Contract are awarded, actual contracted costs will not be known.

Related Projects

Richmond Transit Centre

- Substantial completion of the Richmond Transit Centre is expected in July. Transit operations are scheduled to begin in September.

Bus Purchase

- The 44 articulated buses are in production with delivery scheduled to commence in July and conclude in October.

CONCLUSION

This report provides a brief update for the Board on the progress of infrastructure works on the #98 B-Line project for information.

To: Board of Directors

From: Ken Dobell, CEO

Date: June 9, 2000

Subject: **Progress Report – Rapid Transit**

Recommendation:

A. That the Board receive the report dated June 9, 2000 titled Progress Report - Rapid Transit for information.

B. That the Board appoint Director Kumagai to the Rapid Transit Sub-Committee and include planning for rapid transit to Richmond and the Airport within its mandate.

PURPOSE

This report updates the Board on the status of the SkyTrain project, and reviews progress on outstanding related issues. Preliminary discussions on Richmond/Airport rapid transit planning are reviewed.

BACKGROUND

Construction of the L-line segment of the SkyTrain project is underway. Planning for the Coquitlam extension is underway, with a number of open houses completed. The Board's decision requesting that SkyTrain be extended to Granville has been communicated to the Provincial negotiator. Initial discussions have been held with staff from the proposed participants in the planning process for Richmond/Airport rapid transit.

The legal agreement implementing the negotiator's agreement on SkyTrain cost sharing has been completed and will be signed in the near future.

There is a number of outstanding issues that are under discussion with the Province/Rapid Transit Project office, which are outlined briefly in this report. A more detailed presentation on these issues, progress on the Coquitlam and Western Extensions, and preliminary work on Richmond/Airport rapid transit planning will be presented to the Rapid Transit Committee in late June or early July.

DISCUSSION

Legal Agreements

The finalization of the legal agreement implementing the negotiator's agreement and access agreements in Vancouver and Burnaby formalizes most matters related to the construction of the L-line segment from New Westminster to Vancouver Community College. The agreement also formalizes the process for finalizing the Coquitlam Extension and the Western Extension (including the agreements which have been reached regarding Municipal Integration Fund projects). The Chair, Director Kingsbury (in his role as Chair of BC Rapid Transit), and Minister Bowbrick will sign the agreement in the near future

Vancouver and the Province have entered into the access agreement for Vancouver, and TransLink and Vancouver have entered into a side agreement related to the implementation of Municipal Integration Fund programs. Burnaby, TransLink, and the Province have entered into the access agreement for Burnaby, which also deals with the Municipal Integration Fund projects in Burnaby.

The cost sharing agreement provides for the planning and preliminary engineering for the Coquitlam extension, and the process for agreeing on the endpoint of the Western Extension, with agreement on alignment and station locations and preliminary engineering to follow. The status of the extensions is discussed further below.

There are outstanding issues related to or arising from the negotiator's agreement. These issues have been discussed between Chair Puil and Minister Bowbrick; all are currently under discussion with the appropriate agency.

- Start up costs – the negotiator's agreement is silent on start up costs. As the Board has been advised, these are significant staffing and equipment costs that for the most part must be incurred prior to the transfer of the system to TransLink. TransLink has taken the position that these are project costs, while the Province argues that they are costs to be borne by the operator, TransLink. A submission has been made to the Minister in this regard.
- Start up timing and sequence – Rapid Transit 2000 has proposed a start up sequence and schedule for the L-line that raises some cost and operational questions. This will be reviewed with Rapid Transit 2000 staff in the near future.
- Bombardier Operations and Maintenance Agreement – these discussions have proceeded over the past several months. The negotiator's agreement provides a deadline (now extended to July 30, which can be extended further by agreement of the negotiators) for completion of these negotiations. An In Camera report on this subject will be submitted to the Board at its next meeting, prior to the July 30 date.

- Guideway lease – the Order in Council establishing GVTA and the negotiator's agreement require that a guideway lease be completed between TransLink and the Province. It is anticipated that this agreement will be completed in the near future and reported to the Board.

Coquitlam Extension

Planning for the Coquitlam extension is in progress, with TransLink staff participating in the planning process and meeting regularly with municipal staff to review progress, issues, and timing. A number of open houses have been conducted, and there is substantial agreement on alignment and station locations through much of the alignment. There are also, as would be expected, a number of areas where further work is required to reach agreement on the planned alignment and station locations.

TransLink staff anticipate that a report outlining a substantial degree of agreement on the alignment and station locations north of Cottonwood will be presented to the Board in July for ratification. Options for the alignment on North Road will be defined, with further information to be presented to the Board in September. At this stage, Coquitlam and Burnaby have substantially different preferences for this section of the Extension, and the TransLink Board will be presented with the available choices for decision. This process will allow preliminary engineering and costing to proceed north of Cottonwood while the Lougheed to Cottonwood section is finalized.

Chair Puil has advised Minister Bowbrick that finalization of the Coquitlam Extension agreement is TransLink's priority, and requested Minister Bowbrick to ensure that a rapid schedule is maintained, with a view to reaching a formal agreement on the Coquitlam Extension early in 2001.

Western Extension

Following the Board's concurrence with Vancouver's request that the SkyTrain line be extended to Granville, the Provincial Negotiator was advised of this position. He has responded that the Province requires additional information before it can make a knowledgeable decision as to its position, and requested that TransLink, Vancouver, and Rapid Transit 2000 undertake the necessary work to allow the discussion to proceed. Staff anticipate that Rapid Transit 2000 will initiate these discussions in the near future.

Chair Puil has advised Minister Bowbrick that TransLink would like to reach agreement on the alignment, station locations, and scope on a similar timetable to the Coquitlam extension. This will require a significant effort by all agencies.

Richmond/Airport Rapid Transit

The Project Manager and CEO have met with staff from seven of the eight agencies proposed to be involved in planning for Richmond/Airport rapid transit. Chair Puil has written to Minister Bowbrick to request provincial participation. These discussions have been positive in all cases. The program for the initial phase of the planning program will be reviewed with the agencies individually and in a joint session during June, and staff anticipate that a report outlining the program will be presented to the Board for approval in July. Staff from participating agencies are expected to seek approval of their Councils/Boards as required in the July-September period.

With the addition of Richmond/Airport rapid transit planning, it would be appropriate to include this work within the mandate of the Rapid Transit Sub-Committee, and add Director Kumagai to the Committee.

ALTERNATIVES

There are no relevant alternatives to this information report.

CONCLUSION

Significant progress is being made in the implementation of SkyTrain, including planning for the Coquitlam Extension and preliminary discussions on the Western Extension. The program for planning for Richmond/Airport transit is under development. The terms of reference for the Rapid Transit Sub-Committee should be extended to include Richmond/Airport rapid transit planning, and Director Kumagai appointed to the Committee.

To: GVTA Board of Directors

From: Ken Hardie, Acting Vice President, Customer Services & Marketing

Date: June 21, 2000

Subject: **Station Car Pilot Program**

Recommendation:

A. That the Board receive the report dated June 21, 2000 titled Station Car Pilot Program for information, and

B. That the Board direct staff to release an Expression of Interest for operation of the proposed pilots.

PURPOSE

In response to a request from the Board of Directors, following the presentation of a report at its April 19, 2000 meeting, attached is detailed report regarding Station Car Programs including its history, goals, objectives, costs and benefits.

BACKGROUND

A Station Car Pilot Program fits with TransLink's vision to improve livability through managed mobility by providing services that supplement and complement traditional public transit use and increase transportation choice.

Station Car mobility systems are an extension of mass transit designed to link commuters, who live or work in low-density areas, with high quality transit corridors. They are intended to be complementary to transit and vanpools and designated for areas not well served by these modes. However, should there be sufficient demand, station cars could potentially take the form of a van.

As described in the previous report presented to the Board at its April 19, 2000 meeting, the station car concept, in various forms, has been successfully demonstrated in Europe and the United States. The immediate opportunity in Greater Vancouver is to increase access to existing high quality transit corridors (SkyTrain, B-line and West Coast Express) for both inbound and outbound trips with an innovative private sector offering. Rather than attempting to service low density areas with conventional fixed 40'

bus routes, a user-pay fleet of 2 person micro cars are deployed to serve residential and low density business areas, within a 10km radius of designated transit stations.

Since the program is predicated on public/private partnerships, the station car service is intended to be self-sustaining through user fees after start-up financial assistance. For example, Hertz Rental Car is partnering with Bay Area Rapid Transit (BART) in San Francisco (See Appendix VI attached) on a "station car rental service" at its Freemont station. BC Hydro has indicated that they would be interested in working with TransLink on this program should the cars be electric vehicles and Natural Resources Canada have also indicated an interest in this program.

DISCUSSION

TransLink staff recommend three pilot programs in the region. The proposed pilot sites are: Edmonds SkyTrain Station, 98 B-Line Airport Exchange and West Coast Express Coquitlam Central Station. The first pilot proposed is the 98 B-Line Airport Exchange to provide a feeder service to and from the new B-Line Bus Service, opening in December 2000. South and east of the airport are business parks that cannot be effectively served by conventional transit. The pilot would also serve a number of low to medium density residential areas in both Richmond and Vancouver that are within 10 km of the airport exchange.

This pilot hopes to:

- show the acceptability of the multiple user cars
- develop/demonstrate intelligent electronics to support multiple use
- learn how to maximize multiple use without interfering with the instant mobility needs of the users
- drive the cost out of providing the service (relative to traditional car rental) to make station cars cost-effective from the consumer's viewpoint

Why are we encouraging people to drive cars?
Using independently operated, environmentally friendly vehicles for relatively short trips to major transit corridors will attract higher ridership and avoid the need for costly, under-utilised conventional fixed route collector services. Through the provision of an innovative range of mobility services, there is a greater likelihood that the varied transportation needs of the region's residents can be fulfilled and dependence on the traditional single occupant vehicle further reduced.

Can taxis effectively serve this market?
Subscribers would use station cars on a regular basis - typically five to seven days a week to get to and from the station and in the evenings and on weekends for personal use. It is not likely that customers would use taxis every day, as the cost would be prohibitive. Station cars are more cost effective as multiple users are sharing the costs. However, organizations such as taxi companies and car rental agencies may be interested in

participating in the pilot program. The Expression of Interest and subsequent Request for Proposal processes provide an opportunity for them to do so.

CONCLUSION

Based on the market research done to date, there appears to be a market for this niche product in the region. A pilot will help determine the level of interest both from a corporate partnership and individual consumer perspective.

Station Car White Paper

Prepared by : Customer Services & Marketing Division
June 2000

Background/What is a Station Car

Station Car mobility systems are an extension of mass transit designed to link commuters, who live or work in low-density areas, with high quality transit corridors. Station cars are typically alternatively fuelled micro cars driven to and from mass transit stations by transit riders. Station cars provide the same instant—yet more convenient--mobility as conventional vehicles. While away from the station, they can be used for any type of short trip. When fully implemented, station cars can change the transportation paradigm of many metro-area households. Each mobility system will be designed to support the specific transportation needs of each community.

Different users will rent station cars more than once a day--this is called multiple use. A station is a place for quickly renting and returning a station car, for charging and storing station cars, and for cleaning and performing some level of maintenance on the cars. Initially, stations are located at mass transit stations, but eventually stations could be located at places that require high regular access, e.g., university campuses, convention centres, airports, and residential and commercial complexes. Station cars will be kept and charged in queues to minimise space requirements and maximize use.

The High Cost of Underutilized Household Cars

Household vehicles provide a superior level of mobility for almost all North American households. This is the main reason why 43% of Lower Mainland households have two or more vehicles and 9% have three or more vehicles. The costs of this high level of mobility are the environmental (air, noise, and water) impacts of vehicle use and the fuel distribution system; the dependence on oil; the cost of dedicating so much high value urban land for streets, vehicle parking, and fuelling facilities; and the value of household time used in fuelling the vehicles and interacting with the local auto mechanic. The station car concept is designed to reduce or eliminate these costs.

Purchasing household vehicles over the years is one of the largest investments that most households make. For such a major commitment of funds, the household receives instant mobility, but surprisingly small productivity from the vehicle. A vehicle driven on average about 10,000 miles per year at an average speed of 35 mph is used 286 hours per year or 3.26% of the hours of a year. The rest of the 8,474 hours in the year the vehicle is parked, taking up space. If the household car has five seats, it is theoretically capable of producing 43,800 seat-hours of travel per year. If the typical average of 1.2 people ride in the car when it is in use, the car produces only 343 seat-hours of travel per year. This is 0.78% of its seat-hour capacity. This is an unbelievably poor productivity. And the car's trunk is probably mostly empty all of the time, too!

Compare this to other household appliances and the house itself. The utilization factor for a refrigerator is 100% because it is always keeping food frozen and refrigerated. A typical clothes dryer takes 45 minutes to dry a load of wash. At four loads per week the dryer is used 156 hours per year, or interestingly, over half as much as a household

vehicle. A typical electric heating system in a Pacific Northwest home operates a total of 2,333 hours per year or 26.6% of the annual hours.

What about owning a house? One could argue it is used 100% of the time, since, even with no one home, it is protecting the family's belongings, including animals and plants. However, if the house is vacant 10 hours per day and that time is non-productive, the house is in use 5,110 hours per year for a productivity of 58%.

Typical cost per hour of use for the following items are:

Household car = $14.50
Refrigerator = $0.03
Clothes drier = $0.58
Electric heating = $0.33
House (24 hr/day) = $0.25
House (14 hr/day) = $0.43

Thus the cost of instant mobility to a household is comparatively extremely high, even if the other negative household and societal impacts are not included. Is instant mobility so much more important than having cold drinks and preserved food, or dry clothes, or heat, or even the house itself? This is not a question a household asks. All are considered necessities. If the car, or the refrigerator, or the heating system breaks, it is fixed or replaced.

Station cars provide high levels of mobility and can be made available to the household at a more reasonable price.

How the Multiple Use Program Works

The economics of station cars require that many of them be used multiple times each day. Consider a suburban low-rise business park, about a square-mile in size, containing office buildings and high-tech industry, such as the Flatlands in Burnaby where Ballard is located and an office Tower on a rail transit station such as Edmonds. The remainder of the surrounding area is typical suburban residential.

A commuter coming to Edmonds via rail gets a station car from the queue at the station drives it to the Flatlands and parks it at her office building.

Next, another commuter in an office in the Business Park needs to run to a meeting on the other side of the park, go to lunch, or run an errand to the shopping mall. They refer to a map on their computer showing the available station cars closest to their office. They touch the screen to indicate which one they want. Commuters will also be able to reserve cars hours or days in advance.

At the end of the workday, the cars migrate back to the station and, later BC Hydro employees or residents of the area arriving at the station take the station car home

overnight. Some shoppers use them between the station and the shopping mall. Thus during the day the vehicle could have been rented several times.

Eventually, the station car subscriber may be able to select the size and type of vehicle for the trips between leaving and returning to the station.

Station Cars vs. Car Sharing: What's the Difference?

The two concepts were developed simultaneously, but independently. Car sharing, developed in Europe, is becoming a significant form of mobility there, while it has just begun here in the last few years in several North American cities. Station cars is a U.S. concept and some programs have been implemented in Europe.

The station car concept is being developed through a series of field tests sponsored by mobility providers, governmental organisations, and corporations. Car sharing, however, usually starts at the grass roots level with one or two vehicles and develops locally as a co-op (such as the Vancouver based Cooperative Auto Network which currently has 29 vehicles in Tofino, Nanimo and Vancouver). Recently government sponsorship of car sharing is becoming more common. And in Europe, car sharing has become so prevalent that profit-making corporations often run it.

Both concepts are based on the premise that households don't need to own or long-term lease cars to maintain mobility. Both are mobility systems with several to many cars and subscribers. Subscribers reserve and use the cars for some or all of their trip-making needs. Different subscribers use each car multiple times per day. Thus the proportion of cars to subscriber households is smaller, as much as a factor of 10 smaller, than if every subscriber household had its own car. This means the amount of land dedicated to parking cars can be reduced substantially because there are many fewer cars to be parked.

Both mobility systems require similar reservation and billing systems, fleet management systems, vehicle access systems, and other hardware and software.

In car sharing, one or two cars are parked in several places throughout residential neighbourhoods. The station car concept has several to many cars parked at central locations such as business and college campuses, high density residential areas, convention centres, airports, and transit stations for subscribers to make local trips, including going to work or home. Car-sharing vehicles are seldom used for commute trips.

History of the Station Car/Other Jurisdictions

The station car concept was developed in the United States and has successfully been demonstrated in Europe and the United States, as detailed in the attached Case Studies (Appendices I – VI) and outlined in the summary Status of U.S. Station Car Demonstrations and Pilot Programs (Appendix VIII).

However, the premise of many of the early programs was to demonstrate the capability of electric vehicle technology. Now that the effectiveness of electric vehicles in a station car environment has been assessed, the focus of more recent programs has been to test the economic viability and consumer response to the concept of multiple, or shared-use. Additionally, many jurisdictions hope to evaluate the role that station cars could potentially play in addressing the concerns of urban traffic congestion and air quality.

Benefits/Why a Station Car Program?

It is often said that North Americans have a love affair with their automobiles. Some do, but most actually love the instant mobility a car provides. Station cars provide the same mobility with fewer hassles, while improving urban liveability.

Station cars: Station Cars Benefit:

Mobility/Congestion Benefits	Subscriber	Environment	TransLink	Vendor	Employer
• provides a wider range of transportation choices and therefore a greater likelihood that the varied transportation needs of the regions residents can be fulfilled and dependence on the single occupant vehicle will be further reduced.	✓	✓	✓	✓	✓
• improves the effectiveness of transit corridors	✓	✓	✓		
• increase access to existing high quality transit corridors (SkyTrain, B-Line and West Coast Express) by linking low-density areas using a **user-pay** fleet of 2 person micro cars rather than providing conventional fixed 40' bus routes	✓	✓	✓		
• are reliable--ready to go at any time	✓				
• Daytime users at employment sites who need a car during the day may be able to no longer drive to work but car pool or bicycle.	✓	✓	✓	✓	✓
• **Financial Benefits/Consumer Savings**					
• have the ability to increase utilisation on segments where there is excess capacity (such as the West Coast Express commuter who travels from Mission to Coquitlam and the reverse commuter who travels from Vancouver to the Flatlands), yielding additional ridership at no incremental cost.	✓		✓		
• reduce government spending by reducing the need for ever expanding arterial street systems	✓		✓	✓	✓

• eliminate the need for a second family car. Over 43% of Canadian households own two or more vehicles. Many of these second cars are purchased solely for the purpose of commuting to and from work. Almost all of these second and subsequent vehicles are larger than need be and are capable of traveling much farther than typical daily use.	✓	✓			
• are parked in free, preferred and guaranteed spaces close to the station, saving time searching for parking and saving money on parking costs.	✓				
• demonstrate the benefits of public private partnerships			✓	✓	
• serve a minimum of four trips per day per car– two inbound to a designated transit station and two outbound with possible trips taken mid-day by employees and employers who use the vehicles as "pool vehicles"	✓	✓	✓	✓	✓
• impose no maintenance or repair responsibilities on the user.	✓				
• A new business is started with new jobs for the region.				✓	
• The new business becomes profit making and citizens are receiving a high level of mobility at no cost to TransLink.	✓		✓	✓	✓
• The vendor may be financially able to rent the space required for the station car operation from TransLink giving TransLink a revenue stream.			✓		
• provide the ultimate in flexibility--selection of the exact vehicle to suit the requirement of the next trip away from the station.	✓				
• **Reduced pollution Benefits**					
• reducing urban/suburban traffic congestion reduces pollution		✓			

• Commuters living or working in low density areas can commute via transit and clean station cars instead of driving all the way, and home-end users have a clean car evenings and weekends, allowing the household to give up one "dirty" car and have lower vehicle related costs	✓	✓	✓		
• Alternatively fuelled vehicles contribute far less to metropolitan air, noise, and water pollution than vehicles with engines; liquids that are spillable, toxic, and explodable; and tailpipes. Also, using the smallest, lightest vehicle possible is energy efficient.		✓			

Land Use and Productivity

Two basic aspects of station car programs result in far more productive use of the valuable land around transit stations. By definition, station cars are used several times each day, so the use of each parking space is doubled or tripled. Furthermore, because station cars are smaller than conventional cars, less parking area is required for the same number of vehicles. And, if queuing technology is used, which includes parking the cars bumper-to-bumper and fewer and narrower aisles, 3.5 station cars can can be parked in the space of one conventional car. Thus less land is required to give access to more riders. The result is:

- Less of the valuable land is required for parking
- Stations are less isolated from the surrounding community.
- Transit-oriented development is encouraged and supported because more land is available and the residents and/or businesses in the development can use station cars.
- Riders can reduce the number of conventional cars in their households.

Pilot Program Goals and Objectives

The primary goal of the station car pilot programs is to demonstrate the commercial viability of station car mobility systems as well as the viability of multiple use in the Greater Vancouver region. Previous station car programs were designed for the purpose of testing electric vehicle technology, were highly subsidized and the vehicles were under-utilised in terms of multiple use.

Statements of objectives and measures of effectiveness reflect the needs of TransLink, Vancouver residents (subscribers), the vendor(s), participating employers, and other stakeholders (e.g., West Coast Express, SkyTrain). Any issues specific to a single pilot program location are included as measures of effectiveness.

Measurable objectives are described in the following table. The process of formulating statements of objectives and their measures requires more detailed development of the

programs therefore; some of the objectives are not yet quantifiable (denoted as "XX"). These measures are largely a function of the cost, and thus number of vehicles, and may need to be determined via negotiations with the vender selected to run the programs.

Objectives	***Measures of Effectiveness***
1: After 18 months, the private sector will be willing to grow the pilot programs into self-sustaining businesses.	1.1: Use of each vehicle increase (overnight and weekend, to and from employment site, midday) throughout the program such that the vendor can project a path to breaking even and potential profit. 1.2: The number of vehicles deployed increases during the program. 1.3: Competitors display interest in providing services at other locations. 1.4 Subscriber willingness to pay full cost
2: The pilot programs will move subscribers between well-served transit corridors to areas that are not well-served by existing transit and/or that are inappropriate for traditional transit services.	2.1: The Edmonds Station pilot program will enable residents to use SkyTrain who previously could not because no station parking exists and walking, taking a bus, or being dropped off are not viable choices. 2.2: The Airport Exchange pilot program will extend the Express Bus service to include home-end and work-end commuters who previously drove SOV to work. 2.3: Assess the impact of the Coquitlam Central West Coast Express Station Pilot Program to increase train ridership, without adding capacity. 2.4 The cost of providing connecting service through station cars is competitive with other modes, such as vanpools and buses 2.5 Locations served are not currently serviced by public transit. 2.6 The number of new transit riders increases.
3: Employers at nearby business parks will support and participate in the program.	3.1: TransLink will have firm commitments from at least one employer at each location by the end of the first 3 months. 3.2: Monitor the growth in the number of participating employers, by the end of 18-month pilots. 3.3: Employers will remain in the programs up to the end of the first 18 months and choose to continue after.

4: The station car pilot programs will contribute positively to the goals set forth in the Region's Strategic Transportation Plan.	4.1: Track the number of subscribers willing to give up one or more household vehicles, thus reducing the number of people commuting by car. 4.2: Monitor the reduction in the number of single-occupancy vehicles (SOVs) will be reduced during commute times. 4.3: Monitor & track emissions reductions due to the use of alternate-fuelled or energy-efficient cars. 4.4: The pilot programs will contribute to development of a larger intelligent transportation system for the region as evidenced by requests for station car services at other niche locations.
5: The EOI/RFP processes will result in finding a single vendor[1] to operate the three pilots and the vendor will successfully perform the required functions.	5.1: The vendor will establish acceptable contractual agreements with subscribers.[2] 5.2: The vendor will establish a hassle-free reservation system. 5.3: The vendor will establish a fee structure and successfully collect all such fees.
6: Subscribers will experience highly positive levels of satisfaction with the pilot program experience.	6.1: Pre-, during, and post-surveys (and interviews) with subscribers will ensure that 100% satisfaction is maintained regarding: ➢ Contracts and paperwork ➢ The reservation system ➢ The fee structure and payment process ➢ Interactions with the vendor and TransLink ➢ Back-up cab service or substitute vehicles ➢ 24-hour on-road assistance
7: The pilot programs will use alternate-fuelled vehicles with appropriate infrastructure, or highly efficient gasoline-fuelled hybrid vehicles.	7.1: Monitor the growth in demand for and supply of these vehicles in service at the three program locations. 7.2: The vendor will install adequate and problem-free infrastructure as needed for each pilot program during the 3-month start-up period (adding infrastructure as needed), such that no subscriber experiences any difficulty refuelling at any time.

[1]TransLink recognizes that, depending on proposals received, more than one vender (such as a non-profit organization and a car-rental company) may present the best means of operating the pilot programs. Should this modification occur, the goals and objectives should be revised accordingly.

[2]Subscribers will include employers, their employees, and individuals.

8: TransLink will support the vendor by performing specific functions that will help ensure the success of the vendor.	8.1: TransLink will develop a successful marketing package in conjunction with the vendor and ensure that its materials are properly and sufficiently distributed. 8.2: TransLink will recruit subscribers/participants with sufficient interest, such that the vendor will have a pool of subscribers/participants large enough to ensure adequate use of the vehicles; sufficient follow-up will ensure that at least 25% actually subscribe to the program. 8.3: TransLink will provide parking space at the pilot program locations at no cost to the vendor. 8.4: TransLink will monitor the pilot programs, tracking changes in design, operations, and implementation, so that success (and failure) is clearly understood. The three pilot programs will be compared to determine which components are most successful and therefore should be replicated.

Pilot Program Costs

- TransLink will provide in-kind services such as parking, and marketing.
- A budget of $50,000 has been approved for marketing the pilot program.
- TransLink will provide preferred and guaranteed parking spaces for the station cars at the pilot sites at no cost to the vendor.
- Grants and partnerships could offset infrastructure costs. BC Hydro has indicated an interest if the vehicles are electric and the Natural Resources Canada has indicated that they may be interested in a partnership.
- The Vendor bears all other costs

Estimated Cost to the Subscriber

It typically costs $600-$650 per month to own, maintain and operate a car, (including capital costs, fuel, insurance and maintenance). Given multiple use of the vehicle, it is anticipated that each subscriber will pay $200-$300 per month to get to and from a station on a regular basis (5-days a week).

Costs in other Jurisdictions

To date other programs have been highly subsidized and the vehicles have been underutilized in terms of multiple use. As a result, no complete cost analysis has been completed.

In California, Hertz plans to charge "home end users" and the "corporate work site users" $400 U.S. a month for premium service that includes guaranteed parking near the station entrance; all cleaning, servicing and maintenance; and refuelling up to 1,000 miles per month. The California Automobile Association estimates that the average family automobile costs more than $500 per month to own, fuel and maintain. A station car service is less expensive and it eliminates the refuelling and maintenance hassles associated with owning a car.

Costs of a Full-scale Program

The economics of a full-scale station car program are such that they do not need to be subsidised. The revenue from rentals are intended to cover the costs of the vehicles, facility and the operation of the service. The viability depends on generating multiple uses of the vehicles.

- There should be no long-term costs to TransLink other than possibly promoting the service as an integral part of the regional transportation network.

- The program should be self-sustaining and not require subsidization as users will pay the full-cost of the service.

Potential Markets for Station Cars

What will be the demand for station cars? Thousands of families in the Lower Mainland purchase second cars solely for the purpose of commuting. Many of these families would gladly give up the expense of a second car if they had access to quality transit corridors.

A GVRD/TransLink study of 2,000 Greater Vancouver residents was conducted in February, 2000, to explore attitudes toward environmental conservation issues. Residents were asked to state how likely they were to use a Station Car program, where registered transit users could use a car from a pool of vehicles to travel to and from a transit exchange or station. Twenty-six percent of Lower Mainland residents think they would use a station car program, with 15% saying they would be very likely to use it. See Appendix VII - GVRD Study on Station Cars.

Those who are more likely to use the station car program are:

- Age 18 to 34, although significantly more of those age 55 and over indicate the strongest likelihood of using station cars (7out of 7 rating)
- Earning between $30,000 and $59,000 per year
- In a single person household or in a household with 3 or more residents
- Residents of Surrey
- More retired and unemployed people are likely to use station cars

Other non-transit locations for stations could be campuses, business parks, convention centres, tourist areas, airports, downtown high-rise office buildings, recreation areas and

apartment and condominium complexes. Although these markets have not yet been assessed the market potential is significant.

The Future of Station Car Concept

Many urban regions around the country are planning pilot programs. All of these will have multiple users of each car. The scenario set out below represents the potential future application of this pilot – TransLink's pilot implementation will demonstrate the concept, and establish the basis for continuing development to this future vision.

Intelligent electronics

Station car intelligent electronics will be the computer-based system for managing reservations, access, user accounts, queues, and station car fleets. Station cars will require unique hardware for queuing, charging, and cleaning.

Station cars will be electronically sophisticated. This electronic sophistication will make them convenient. Convenience is important if a household is going to give up owning one or more cars. Consider this scene. It's a typical late afternoon in the year 2005 outside a rail-transit station. Sue exits the station and walks a few steps to the station car pick-up area. The computer terminal greets her by name and asks if she wants her usual mini-electric car.
"No, I need a van with seating for at least six."
"Will an 50-mile range be sufficient?"
"Yes."
"Good. It will be here in 30 seconds."
The computer recognises Sue because she has a computer ID chip in her purse. The rail-transit computer also recognised her when she boarded the train, as did the computer at the dry cleaner in the station area when she picked up some clothes. Her bank account is automatically debited each day for her station car use, her transit riding, and the other facilities and services she used in the station area.

The electric van Sue requested unparks itself and drives over to her. On the way it adjusts its mirrors, seat, and steering wheel to suit Sue and turns on its radio to her favourite station. As she drives the van away, it asks her where she wants to go and then tells her the quickest route given current traffic conditions.

Queue

The station cars would be charged automatically while in the queue and each car's controller (computer) can move the car forward the distance specified by the computer managing the queues. They might be steered just like in automatic car washes, i.e., by two rails, one on each side of one front tire. While in the queue, the car might possibly be washed while it is charging. If it is not parked in a queue, but at places where it is normally parked (including the work site and home), the station car docks; i.e., it "plugs" itself in. Seldom will the user have to pull out the electrical cord and plug it in.

Bibliography:

National Station Car Association Website: www.stncar.com

University of California, Riverside InteliShare www.cert.ucr.edu/intellishare

Online TDM Encyclopaedia www.vtpi.org/tdm/

About the National Station Car Association:
Founded in 1993, the National Station Car Association is a national technical non-profit corporation with the purpose of guiding the development, testing, and commercialisation of the electric station car concept. It provides a forum for information and data sharing, analyses data from the demonstrations, and will write the specifications for vehicles and infrastructure for the permanent programs in Phase III.

Appendices

Appendix I-VI - Case Studies

Appendix VII - A GVRD/TransLink study of 2,000 Greater Vancouver Residents conducted in February 2000. Residents were asked about their likely use of station cars.

Appendix VIII – Status of Station car Demonstrations and Pilot Programs

Appendix 1

Case Study

San Francisco Bay Area Station Can Demonstration Evaluation:

Executive Summary

The San Francisco Bay Area Station Car Demonstration was a preliminary test of a larger vision of solving several problems associated with line-haul mass transit (rail, ferry, and possibly express bus), in general, and the Bay Area Rapid Transit District (BART), in particular. Except for downtown stations, stations are surrounded by huge parking facilities, isolating the station from the surrounding community and limiting pedestrian access. The need to park conventional cars in a conventional manner near a station limits transit-oriented development opportunities. As this report shows, the station car concept directly addresses reducing the requirement that prime land near the station be dedicated to inefficient, static parking. The concept also offers the opportunity for transit to better serve the ever-growing number of suburban work sites, thereby increasing patronage by reverse commuters.

The main air-quality benefit of using electric vehicle (EV) technology as station cars is to eliminate cold starts and the first hard acceleration onto a freeway, the two events when most tailpipe emissions occur with conventional cars. For EVs, "quick charging" will be available at homes, transit stations, and work sites. The ultimate vision is to have thousands of station cars parked in queues at BART stations. The service would be operated by a private-sector vendor at a profit. The use of queues and the fact that the cars do not spend much time at a station allow a fraction of current parking acreage to serve current and additional patrons.

The Demonstration was a field test with many components: an alliance between a transit agency and a utility; use of prototype EV technology; charging and infrastructure installation; multi-source funding; selection and training of users; many different types of participants; car sharing logistics; liability issues; billing and collecting user fees; service and maintenance support; data acquisition; and regional goals for air quality and congestion management. In short, it was a rugged field experiment with many variables. It succeeded, as described in this report, while providing many lessons that will benefit BART and others.

The purpose of the Demonstration was to determine the viability of EVs for making short, everyday trips in a variety of settings: between home and BART station; between BART station and work site; and pool cars used at work sites. Other short trips were encouraged during the workday or during evenings and weekends when the cars were at participants' homes. A mix of public and private organizations and individuals used the station cars. Participants were recruited from BART, Pacific Gas & Electric Company (PG&E), two corporations—Sybase and Bank of America (BofA), and the general public.

Planning for the Demonstration began in 1992. BART was the lead agency. Total funding was $1.486 million as follows:

Bay Area Air Quality Management District	$700,000
Defence Advanced Research Projects Agency via CALSTART	$521,000
Pacific Gas and Electric	$100,000
California Energy Commission	$90,000
Bay Area Rapid Transit District	$75,000

The station car was a two-seat CITI prototype battery-powered EV made by the Norwegian firm, Personal Independent Vehicle Company (PIVCO). Charging ports were installed at selected BART stations. BART and PG&E jointly designed and installed the infrastructure. The turnkey service provider was Green Motorworks, Inc. (GMW), an EV dealership located in North Hollywood, California, with field staff in the Bay Area for the Demonstration. GMW provided the CITIs, vehicle maintenance, insurance, road service, interaction with the participants, and vehicle data.

Between November 1995 and March 1998, 94 people participated in the Demonstration, including two-person carpools, but not counting midday users at work sites. In addition, some cars were used as pool cars or, when vehicles were available, leased on a short-term basis to people not in the program. Assuming that many spouses and housemates also used the EVs, well over 200 people experienced driving the CITIs.

During the Demonstration, the station cars were driven 154,802 vehicle miles of travel (vmt) and produced 179,470 passenger miles of travel (pmt). For the participants, internal combustion engine (ICE) automobile pmt decreased 94%. There would have been 16,572 ICE automobile trips, mainly on freeways, without the Demonstration. With the Demonstration, there were only 3,083 ICE automobile trips and most of these were short to access BART on the home end when a station car was used on the work end. BART pmt for the participants increased by 125,222 (56%) because of the Demonstration. In fares, this represented approximately $18,464 in increased revenue. Carpooling actually increased because it was encouraged for participation in the Demonstration. There would have been 11 carpools without the Demonstration and there were 24 carpools with it.

Due to the changed travel patterns of the participants, emissions of reactive organic gases, nitrogen oxides, and carbon dioxide were reduced 93.5%, 98.0%, and 90.0%, respectively. The average kWh/mi for the CITIs was 0.34.

Based on data from the Demonstration, a scenario of 10,000 station cars in the Bay Area was constructed to show the positive impacts that a large-scale deployment of station cars could have. In terms of BART fares, the scenario adds $32.8 million annually. The scenario shows that the station car concept could have the potential of improving the transportation-related problems in the Bay Area during the first decade of the next century, especially if it is extended to the other Bay Area rail systems, ferries, and some express bus routes.

The Demonstration produced many non-quantifiable effects, many of which may be more important than the quantifiable ones. During the Demonstration, the station cars dripped no gasoline, crankcase oil, transmission fluid, or coolant onto streets and parking places, which would eventually drain to the San Francisco Bay. Socially and educationally, the station cars were important. Because of broad exposure, extensive national and international press coverage, and their visibility on a daily basis in the Bay Area, possibly millions of people learned that small EVs are real, are here today, and are providing pollution-free transportation. This awareness will encourage people to explore owning an EV when the option is presented to them. It will no doubt help the EV industry sell/lease EVs. It will help the local economy if, as planned, the EV industry establishes manufacturing in the Bay Area.

It is clear that people who displayed interest in the Demonstration were true innovators. People participated either because they were fascinated by Evs and EV technology or because they believed the program benefited the environment, which fit in with their personal value systems. The average length of participation among the general public during the 12 months when they could join was 6.7 months (they could sign up for three-month periods). The people in the program longest were Bank of America employees for 19.5 months.

Drivers rated the relative importance of benefits and limitations of EVs and the Demonstration while in the program. It is not surprising that environmental benefits are highly rated, but "no vehicle maintenance" came in third—higher than "more convenient mass transit" (a major reason given before entering the program), which tied with "not stopping at gas stations."

While in the program, participants were queried about their interest in continuing to use station cars at the home-end, work-end, and both. Opinions were correlated to how respondents used their station cars. All of the home-end users would continue to use station cars at the home end, but only 36% would want them also at the work end; 90% of the work-end users would use station cars at the home end and 60% would continue use at the work end. The primary reasons for continuing were convenience, a good commute, good for the environment, and "love the car."

People who were sent contracts, but did not sign and return them, were contacted to learn their reasons, including sensitivity to the lease rate. The four major reasons were that it cost too much, the CITI was too small, the CITI could not be driven on the freeway, and their circumstances had changed.

Among the challenges facing station-car and car-sharing programs that use EVs rather than gasoline-fuelled cars is recruiting participants who fit the programs' "profile," determining the appropriate fee/lease structure, and meeting drivers' needs within the limitations of the program's infrastructure. Recruitment of participants from BART, PG&E, Sybase, and BofA was coordinated within each organization by someone assigned to the task. Four methods of marketing the station cars were tested to determine which one (or which combination) was most successful in recruiting participants from the general public: (1) neighbourhood newspaper ads; (2) displaying the vehicles at highly trafficked places; (3) flyers at BART stations; and (4) one-on-one contacts via e-mail, phone numbers on vehicles, word-of-mouth, and television news items. In the end, the most effective method was the fourth—an indication of the importance of finding true innovators who will act as ambassadors and influence others' decisions to participate.

While participants were still driving the CITIs, they were asked what they would be willing to pay for a station car at the home-end, the work-end, and both home- and work-ends. They were also given the American Automobile Association's estimate for the fully-loaded monthly cost of owning a vehicle, which was $450. Five groups emerged: those who wouldn't pay more than $100 per month; a group that was willing to pay $100; those willing to pay $200; a group that varied its willingness-to-pay between $100 and $200; and a fifth group that valued station cars at around $300. Willingness-to-pay to continue using a station car was compared to current lease amounts. In all cases where two people shared the lease amount, they were willing to pay as much as an additional $200 per month (splitting the cost). The majority of respondents were happy with the current lease amount, with over half wishing to continue at the same or slightly higher level. Again, there were two groups at both tails of the curve, willing to pay either considerably more or considerably less.

A willingness-to-pay issue to address in future demonstrations, and more systematically through research, is the perceived difference between the station car as a "product" and as a "service." When perceived as a product, the potential user considers a monthly leasing cost over a long period of time; when perceived as a service, the potential user considers a daily—or even hourly—cost.

A most important conclusion is that the Demonstration took BART and others far along the station-car learning curve. It has been the starting point for demonstrations elsewhere and set the stage for more complex multiple-user demonstrations as the next step in commercialising the concept.

The Demonstration had many non-quantifiable positive benefits. The response from the drivers and the general public was clear—people "love" the idea and "love" small functional EVs. From transit's point of view, the increased ridership (especially in the reverse-commute direction), increased turnover from oversubscribed parking areas, and the potential for more profitable land use may be the greatest benefits. Certainly, these will be primary goals of an expanded program.

Increased awareness of EVs by the general public, the potential impact on the EV industry, lessons learned about the evolving station-car concept, and the station-car momentum that exists within and outside BART comprise the true legacy of the Demonstration. All this exists because of 40 red, green, and blue plastic/aluminum EVs, plus the vision and dedication of all the stakeholders—a plastics company, the sponsors, the service provider, key BART staff, and two private corporations—and, of course, the participants who were out there, day after day, demonstrating the concept and showing off their EVs.

Based on this evaluation of the Demonstration, which shows the potential of the station car concept, the authors recommend that BART proceed with more complex and technically challenging demonstrations and field tests. These tests should include electronics for vehicle access by multiple users and electronics for tracking the vehicles and communicating with the drivers. Reservation and billing systems should be tested. Other participants from the mobility industry (i.e., car makers, rental car agencies, and electronics firms) should be invited to participate in and contribute to these tests. In addition, market research is needed to determine how and where station car use can be maximized.

Appendix II

Case Study

France - Liselec

With its offer of self-hire electric cars, LISELEC is renewing and extending the range of urban mobility options. Complementary to other modes of transport, LISELEC offers subscribers a service which combines the flexibility of the private car with the advantages of public transport.

The service comprises a fleet of electric cars located at special LISELEC stations throughout the town. Subscribers gain access to a LISELEC car using a special pass ; they are then free to drive off in the vehicle and return it later.

A fleet of ten electric Peugeot 106s equipped with the electronics necessary for timeshare use is already operational. This fleet can be used to illustrate operation of the LISELEC service.

- It operates with silent electric cars which respect the environment.
- It is a perfect complement to the existing public transport network; in the long-term the pass will allow access to all public services with the option of combined tariffs.
- It improves traffic flow.
- It frees various public spaces hitherto reserved for parking.

In the long run, the Ç pass È will give access to all public transportation services and will offer the advantage of combined rates.

ELEC stations, identified by their special signs, are located at strategic points in the town: railway stations, office blocks, shopping malls, sports and leisure centres, isolated residential areas.

The stations have terminals for charging the cars and an electronic management unit which provides an interface between the parked cars and the central control station supervising the system. Movement of vehicles in the LISELEC fleet, both departures and returns, are detected and the central control station is informed in real time of the number of vehicles still available.

On the ground, specialised personnel known as "jockeys", move the cars from one station to another as instructed by the central control centre, to maintain optimum distribution of the fleet. These teams also check the satisfactory condition of the cars and that they have been fully recharged at station terminals. A system of video surveillance connected to the control centre is integrated in the stations. All this equipment is designed to occupy a small area in the station.

La GÉNÉRALE DE TRANSPORT ET D'INDUSTRIE, on the strength of its experience of personal transport in 87 French conurbations supplied the logistics for the LISELEC system, and adapts the scheme to meet the needs of each urban centre.

Finally, CEGELEC (CGA division), specialist in automatic payment and telematics systems manages the making available of vehicles and the payment by card.

Appendix III

Case Study

New Jersey's Project: PowerCommute

The New Jersey Department of Transportation and NJ TRANSIT started testing electric station cars on May 19, 1997. This test demonstrates a new train commuting model and the utility of electric vehicles. The project partners include the state's major utility companies--GPU Energy and PSE&G, who have contributed grants for charging facilities. Bell Atlantic NYNEX Mobile has installed cell phones in each EV and AAA Clubs of New Jersey provides roadside service.

Project: PowerCommute enlisted companies to lease electric vehicles (EVs) for at least two of their employees to drive from the train station to work. Key to the program is increased rail ridership. Thus employees who normally drive to work were asked to start using transit instead. Inbound or reverse commuting employees use the train and station cars instead of their personal vehicles. After the station-to-workplace commute has been established, employers assign each EV to a local employee. That person will drive the EV from home to the station, pick up fellow employees, and carpool to work. Charging facilities will be placed at the work location to increase range and make EVs available for transportation to meetings and for errands during the day.

PowerCommute vehicles are also leased to the public. Commuters who apply and agree to ride the train to work are leased an electric vehicle to drive from home to the train station. Special parking spots with charging stations are reserved for the cars at the station. If an EV commuter carpools to the station, they will receive free parking. Home charging systems will be installed to demonstrate the viability of personal EV use.
It has a motion detection sensor to turn on a light at night and the doors covering the outlets are lockable. Transportation Management Associations (TMAs) enlist the train riders and corporate sponsors at each of the project's three locations. NJT's Morristown Station in Morris County was the first PowerCommute location. Lucent Technologies, Bell Atlantic NYNEX Mobile, GPU Energy, and Bayer Consumer Care Division are participating in Morristown. Eight Cars were in operation as of April 1, 1998. PATCO's Cherry Hill Station in Camden County is the second site. On April 1, 1998 three cars were in operation driven by employees of L3 Communications, Taylor Wiseman Taylor Engineers, and Cross County Connection. The third station, NJT's Princeton Junction Station in Mercer County, on April 1, 1998 had four cars used by
Employees of Parsons Brinkerhoff, David Sarnoff Research, and Greater Mercer TMA.

TMAs will also support commuters through the guaranteed ride home program and coordinate the day-to-day operation. The Project will have a total of 21 EVs and, after one year, will be evaluated to determine if the service can be provided by NJ TRANSIT or a private enterprise. Commuters will be surveyed to see how much they would pay for the service.

Appendix IV

Case Study

The Atlanta Region Shared/Station Car Program

Georgia Power provided the following description.

The Georgia Regional Transportation Authority (GRTA), created in 1999 by the Georgia Legislature, has obligated nearly $10 million for express bus and vanpool purchases and operations from outlying counties into the Centre City of Atlanta. However, there is a missing link in this plan as there are no accommodations for bus and vanpool riders to have access to transportation during the workday. This lack of daytime mobility will reduce the likelihood of commuters using any mode of transportation other than single occupant vehicles. The introduction of the Atlanta Region Shared/Station Car Program will make electric vehicles a key element in a regional program that is being watched nationally. The long-term implications can lead to exponential increases in electric vehicles in Atlanta and other areas. Shared/Station Car programs have been tested, but have still not reached a level of widespread acceptance and have not produced results that can be transferred simply to other areas. This project will provide research information to quickly expand vehicles and operations in Atlanta and be duplicated in other metropolitan areas.

The Atlanta Region Shared/Station Car Program will be implemented at two locations in the Atlanta area: Emory University and at a private company in the Atlanta region. The shared/station car concept provides participants in GRTA programs with access to zero-emission vehicles for business meetings and personal use while at work. Changing individual travel patterns is one of the biggest challenges in implementing transportation alternatives. This program alleviates the daytime mobility barrier as commuters using transit or participating in rideshare programs coordinated through the project's partners will have access to an electric-powered shared car during the workday.

A shared/station car concept allows for a pool of vehicles to be used by a group of pre-registered users that reserve a vehicle for use during a specific period of time. Access to this vehicle alleviates the need for the user to bring their personal vehicle to the work place. The shared/station car program eliminates the pollution and congestion impacts caused by commuters' personal vehicles during the commute trip as well as pollution impacts from work-based trips. Each location targeted in this program is in a highly congested employment centre. The locations have considerable peak travel congestion and a significant number of trips during off-peak times.

The Emory University location will be used by university staff and federal employees that must commute between the university campus, the Veteran's Administration Hospital and the Centres for Disease Control and Prevention. The second location will allow a private employer to offer an incentive to its employees to use alternative modes of

transportation for the commute trip by providing a link to transit and access to a vehicle with zero tailpipe emissions for use during the workday.

The project will initially add at least 40 electric vehicles to the Atlanta region and represents the beginning of a program with tremendous potential as the region searches for means to reduce single-occupant vehicle traffic and meet federal air quality requirements. The program will also include both a substantial reporting element and analysis of operations to perfect the shared/station car program. The ability to demonstrate the benefits of the program will be key in replicating this program beyond its initial two locations. Program partners will be asked to provide detailed information on program usage, which can be used to calculate reductions in SOV trips, and the resulting reductions in congestion and emissions. The final program can be expanded and duplicated in numerous areas in the Atlanta region and easily replicated in any urban setting.

The project will achieve four major objectives in each location: 1) reduce parking demand; 2) ease traffic congestion; 3) reduce mobile source emissions; and 4) provide incentives for commuters to use transit or participate in rideshare programs. In addition, the program will increase environmental benefits through the deployment electric vehicle technology, as well as provide a case study to promote shared car programs throughout the Atlanta region. The shared car project will engage electric vehicle interests in Atlanta and utilize new EV technology. This project would represent one of the largest single-location EV deployments in 2000.

Appedix V

The BART CarLink Field Test

Please note, the CarLink Field Test operated between January and November, 1999. This description was written near the beginning of the test.

The first Bay Area Rapid Transit District (BART) field test of station cars (1995-1998) was an initial test of the concept, designed to focus on electric vehicles with a simple use pattern of only one user per car for extended periods (months) and so did not include daily multiple-use of the vehicles. To enhance our knowledge of the station car concept, a second, more complex test was designed and implemented. Now under way, this test has multiple users of each car each weekday. The first test was "manual," i.e., the driver was given the car key for the duration of his or her participation. The second test includes some basic "smart" electronics to facilitate the multiple use.

A second field test, called CarLink, is at the Dublin-Pleasanton BART station, in the suburbs about 35 miles southeast of San Francisco, and at Lawrence Livermore National Laboratory, about fifteen miles east of the station. Some participants who commute via BART from the station drive the cars between their home and the station and use them or local trips on weekends and evenings. Lab employees, who commute by BART to the station, drive the cars between the station and their jobs at the Lab. They also may use the cars for personal or business trips during the day, as may other Lab employees.

The CarLink field test employs a fleet of 12 1998 Honda compressed natural gas (CNG) fuelled Civic GX cars, a smart key dispenser with contactless smartcards at the station, a reservation system, a fleet management system, and a vehicle tracking system.

The Institute of Transportation Studies at the University of California at Davis is the lead on the project, which is co-sponsored by BART, American Honda Motor Company, Lawrence Livermore National Laboratory, and the California Department of Transportation (Caltrans). Honda is supplying the vehicles and fleet support; the Institute is performing system design, data collection and analysis; BART is supplying parking at the station entrance and project management support; the Lab is supplying employee participants, the fuel, and the fuelling facility; and Caltrans provides funding.

Appendix VI

BART, Hertz Launch World's First Station Car Rental Service

Press Release

OAKLAND, Calif., Sept. 24, 1999, The "shared-car" concept of automobile non-ownership expanded yesterday when theBART Board of Directors authorized the world's first demonstration of a "station car rental service" with a major rental carcompany. The project with Hertz will take place at the Fremont BART Station with possible expansion to the Bay Fair, Colma, and Concord stations in the future. A station car is a car that is shared by several users each day for more convenient, less expensive access between a transit station, home and work.

Earlier this year BART worked with the University of California at Davis and American Honda to launch the shared-car "CarLink" demonstration project at the BART Dublin/Pleasanton Station using Honda Civic GX sedan's fueled by compressed natural gas. The Hertz cars will be gasoline-powered.

"We consider station cars to be an important new service that holds multiple benefits for BART," said BART General Manager Thomas E. Margro, "specifically, by serving more than one customer per parking space and by making it possible for reverse commuters to get from suburban stations to suburban work sites." Margro is the chair of the American Public Transit Association's Technical Forum on Station Cars.

The attended Hertz rental service will take up space currently striped to accommodate 21 cars. "Stacked" (bumper-to-bumper)parking by Hertz will also allow more cars to serve more subscribers as the program grows. Hertz expects to double thenumber of BART customers served by each parking space, half driving from home to the station and the other half driving the same cars from the station to work.

Andrea Church, Manager of Hertz's Fleet Operations for Northern California, told BART's Board of Directors that "Hertzlooks forward to working with BART to develop this new transportation concept and to offer commuter solutions for growing suburban employment sites."

A primary feature of station cars is that the cars are not dedicated to individual drivers. The station car fleet provided by Hertz will be shared by a pool of subscribers, allowing home-to-station commuters and station-to-work commuters to use the same cars and thus reduce parking demand at the station.

BART has been developing the station car concept for several years. Last year it completed a three-year demonstration program using electric cars, and the Honda program at the Dublin/Pleasanton Station may be extended.

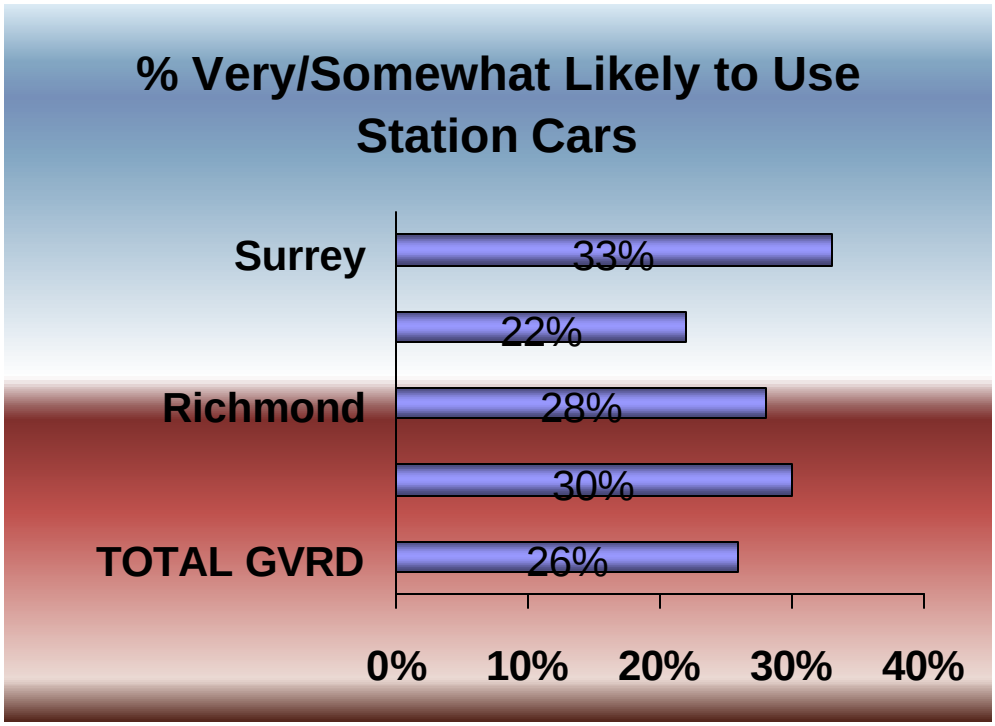
Appendix VII

GVRD/TransLink Station Car Research

A GVRD/TransLink study of 2,000 Greater Vancouver residents was conducted in February, 2000, to explore attitudes toward environmental conservation issues. The range of error around a sample size of 2,000 is +/-2.2%, 95 times out of 100. The following question was asked:

> "How likely would you be to use a station car program where registered transit riders could use a car from a pool of station cars located at each major transit exchange or station to get to and from the transit station to work, home or other local destinations near the station. They would be billed at the end of the month according to the number of kilometers driven and the number of hours they had the car? Please use a 7 point scale where 1 means not at all likely and 7 means very likely to consider using this?"

Twenty-six percent of Lower Mainland residents think they would use a station car program, with 15% saying they would be very likely to use it.



Those who are more likely to use the station car program are:

- Age 18 to 34, although significantly more of those age 55 and over indicate the strongest likelihood of using station cars (7out of 7 rating)
- Earning between $30,000 and $59,000 per year
- In a single person household or in a household with 3 or more residents
- Residents of Surrey
- More retired and unemployed people are likely to use station cars

Status of U.S. Station Car Demonstrations and Pilot Programs

The word "pilot" is used to indicate the beginning phase of permanent programs, as opposed to demonstrations and field tests, which have finite completion dates.
Acronyms included in this document are explained in the list below the table.

Region	# of Station Cars @ # of Stations	Dates	Funding	Comments
Anaheim, California	10 RAV-4s @ 2 Metrolink	May 1, 2000 Start	Federal, regional and local	Used by commuters during the week and visitors to Amaheim on weekends. Operated by EV Rental. Funding from the DOE Clean Cities Program, the South Coast Air Quality Management District, and the Anaheim Public Utilities.
Atlanta	At least 40 @ 2	Late 2000	Proposals to DOE Clean Cities Program, local funds	Proposed multiple-user station cars at Emory University and a private firm. Infrastructure installed for 13 charging ports at 3 MARTA Stations.
Boston	31 @ 2	Begun in 1994	CMAQ and local funds	An EV technology assessment as required by state law, independent of NSCA, 26 Solectria Forces (Geo Metro conversions) and 5 Honda EV Pluses operating from one commuter rail station and one Park-N-Ride lot, user cost is $200/mo. Note, some cars operate on commutes directly between home and work.
Denver	Many EVs @ 1	Late 2000 maybe	Have TEA21 planning funds	The Denver Union Station Transport Development Company is undertaking a massive urban renewal project with major transportation consequences. Station car users would be from the residential and commercial units, riders from the express buses and light rail, and tourists.
Los Angeles	3 (Cars and S10s) + 2 spares @ 2 Metrolink sta.	Begun in late 1995, completed 1 year later	SCAQMD and LADWP funded the vehicles	LACMTA did day to day management, LADWP provided and maintained the cars, another partner was LADoT.
Montgomery Co., Maryland	Several EVs @ 1 Metro	Planned for late 2000	Proposal to DOE Clean Cities Program, local funds	Early planning stages, County and North Bethesda Transportation Center to take lead, WAMTA has pledged support. Would be a multiple-use pilot program.
New Jersey	18 @ 3 commuter RR stations	Begun May 1997	Mainly N.J. Transit	N.J. Transit, N.J. DOT. EVs are converted Geo Metros. Initial demonstration ends in 2000. May continue at Morristown.
Northern NYC Suburbs	6 @ North White Plains commuter RR station	Nov. 1995 to Nov. 1999	Participant fund and in-kind services	Metro North, MTA, and New York Power Authority reverse commuter car pools (average 2 persons) using Geo Metro conversions. IBM employees car pool between the Metro-North station and IBM.
University of California--Riverside	15 Honda EV-Pluses @ 3	Begun March 1999	Private sector and participants	This is an important joint research project between the University's Transporation Systems Research Laboratory and Honda using intellegent technology to operate the system.

Region	# of Station Cars @ # of Stations	Dates	Funding	Comments
Sacramento	3 Toyotas RAV 4s @ 1 light-rail station	April to November 1998	local, Toyota lent the cars	Cars used by employees of McClellan Air Force Base.
San Francisco Bay Area	40 purpose-built 2 seater PIVCO CITI @ 4 BART stations	Oct. 1995 to April 1998	ARPA, state, and local funds	This initial demonstration included both home to transit and transit to work with BART, PG&E, a major bank, and other BART patrons.
San Francisco Bay Area	12 Honda CNG cars @ 1 BART station	Jan. to Nov. 1999	Private/public	At Dublin/Pleasanton BART station, called CarLink. In this field test same cars were used by both home-end and work-end commuters each week day. Plans are to run a second field test beginning in late 2000.
San Francisco Bay Area	Up to 40 conventional cars, possibly some EVs @ 1 BART Station	mid-2000	Private	At BART Fremont station, multiple-use pilot program. BART announced that Hertz would be the vendor.
San Francisco Bay Area	Unknown @ 1 BART	2001	Private/public	A major car-sharing program is in planning stages for the San Francisco Presidio, one phase would be a station car program to the nearest BART station. Plans are to use TH!NK *city* EVs.
San Francisco Bay Area	Unknown @ 1 CalTrain	Late 2000	Public/private	Led by the City of Palo Alto, plans are to use TH!NK *city* EVs in a multiple-use pilot program.

ARPA = Federal defense funds
BART = San Francisco Bay Area Rapid Transit District
CMAQ = Federal Congestion Mitigation and Air Quality funds
DOE = U.S. Department of Energy FTA = U.S. Federal Transit Administration
LACMTA = Los Angeles County Metropolitan Transit Authority
LADWP = Los Angeles Department of Water and Power
MARTA = Metropolitan Atlanta Rapid Transit District
Metrolink = the commuter rail system serving the Los Angeles metro area
Metro North = the commuter rail lines north of New York City
MTA = Metropolitan Transportation Authority
NSCA = National Station Car Association
PIVCO = Norwegian EV maker
PG&E = Pacific Gas and Electric

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Contract Services

Date: June 1, 2000

Subject: **Transportation and Climate Change: Options for Action**

Recommendation:

A. That the Board request that the federal government:
   (i) consult directly with the appropriate municipal and regional agencies in Greater Vancouver, Montreal and Toronto regarding the development of a coherent national program to assist metropolitan areas to address greenhouse gas, growth management and transportation problems in these areas
   (ii) recognize that it is in the national economic interest for there to be healthy, vibrant and efficient cities and implement a stable and ongoing program for funding urban transportation in the three large metropolitan areas; and

B. That the Board direct staff to co-ordinate their efforts with the staff of the appropriate municipal and regional agencies in Greater Vancouver, Toronto and Montreal to make these actions more effective.

PURPOSE

To report on the findings contained in the Options paper of the National Transportation Climate Table, its relevance to Vancouver and to recommend a strategy of requesting federal funding to the three largest regions in Canada.

Staff have been in close contact with staff in the City of Toronto in preparing this report. Toronto staff who were also represented on the Transportation table are understood to be finalizing a similar report for Council in Toronto.

BACKGROUND

In December 1997, the Kyoto Protocol was agreed by the United Nations Framework Convention on Climate Change. If ratified, the Protocol would commit Canada to reduce

Green House Gas (GHG) emissions by 6% below 1990 levels during the 2008-2012 period (GHGs of concern are carbon dioxide, methane and nitrous oxide).

In April 1998, Canada's First Ministers agreed on a process to examine the impacts, cost and benefits of implementing the Kyoto Protocol. The process was intended to produce a strategy by December 1999.

DISCUSSION

The federal and provincial Energy and Environment Ministers set up 15 "Issue Tables" to develop a strategy to reduce greenhouse gas emissions for each sector of the economy, for review and decision by the Ministers. The tables included a "Transportation Table," which is concerned with transportation issues and a "Municipal Table" which is concerned, among other issues, with land use. The Transportation Table included representatives from the petroleum industry, motor vehicle manufacturers, railways, airlines and other transportation service providers as well as government and environmental groups. GVRD Director, Gordon Price, was an initial participant in the Table; however, his place was subsequently taken by then GVRD staff member, Clive Rock.

Appendix 1 presents a synopsis of the National Climate Change Transportation Table's Options paper. In reviewing the Paper, with particular reference to the needs of the three largest urban areas in the country, the results of the Transportation Table's efforts are disappointing in a number of respects:

- The Table's paper fails to present an integrated strategy. Rather it presents a series of often disconnected 'tactical' measures.
- There is no explicit recognition that the issue of GHG's can largely be addressed in metropolitan areas by solving other problems. Only with an approach which deals with issues such as urban sprawl, creating complete communities, etc. through plans such as the LRSP and integrating this with a complimentary transportation plan can effective GHG reductions be achieved.
- Further, the paper fails to recognize that metropolitan areas are likely to represent opportunities as 'early winners' because of the relative ease and potential for switching SOV travel to other modes such as transit.
- There is no recognition that in addressing GHG's as part of an overall urban strategy, there are likely to be economic benefits from the urban regions being more efficient. With metropolitan areas being much of the driver of the 'new economy' it is in the national, federal economic interest that the healthy vibrant cities exist.
- The Table did not recommend that the federal government has to become relevant in urban areas for all of these issues to be addressed.
- While consultations took place across the country, and in most areas many of these shortcomings were clearly identified, i.e. no coherent approach for cities, the Table did not revisit its reports or analysis as a result of the feedback. Municipal and regional members on the Table also noted this concern. In addition, many of these concerns were

communicated by the Transportation Association of Canada's Urban Transportation Council (Appendix 2).

Reducing Greenhouse Gas in Urban Areas

One component of the of the table's work is particularly relevant to Greater Vancouver. This is the study *Strategies to Reduce Greenhouse Gas Emissions From Passenger Transportation in Three Large Urban Areas*. This study was one of several under the stewardship of the Transportation Table.

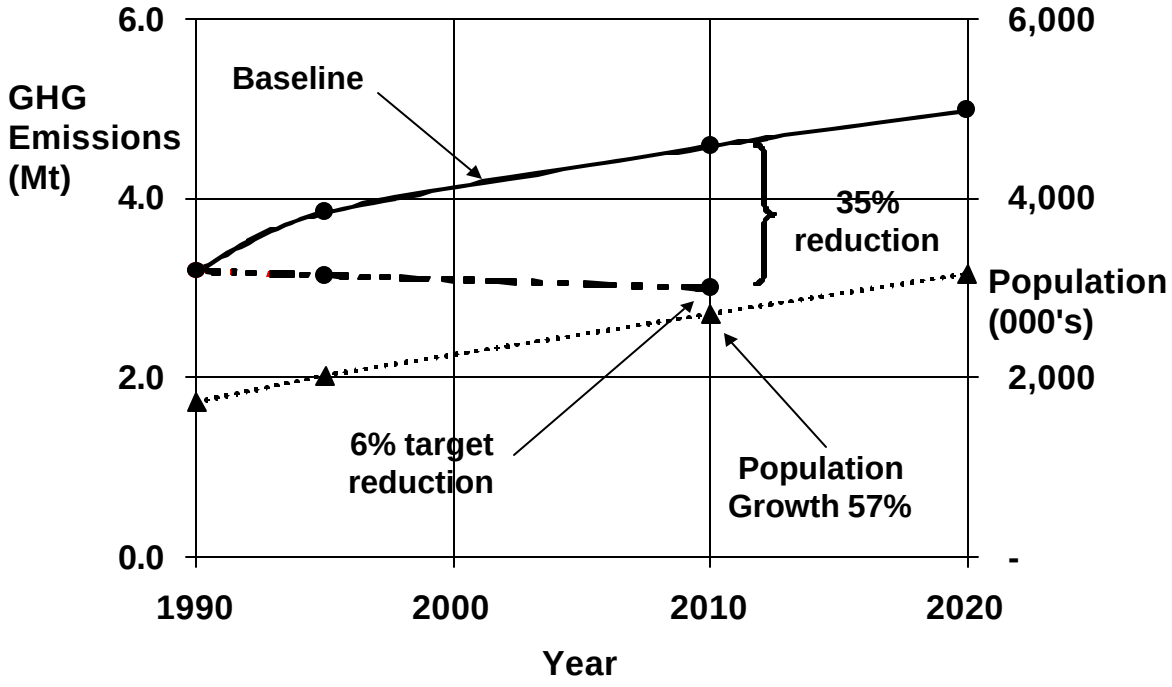
Meeting the Kyoto target in transportation will require reducing GHG emissions by as much as 25% in 2010 for Canada, and possibly more depending on the sector and region. Approximately half of all transportation GHGs in Canada originates in urban areas. Of these, over three-quarters come from personal use autos, vans, sport utility vehicles and light trucks. Therefore, any strategy to reduce GHGs from transportation must focus on urban passenger transportation. Since the three largest urbanized areas (Greater Vancouver, Greater Toronto, and the Montréal Region) account for more than one-third of all GHGs from urban transportation, they were given special consideration and were the subjects of this study. The focus of this study was to identify practical and realistic packages of mutually reinforcing urban passenger transportation GHG reduction measures tailored to each area. A parallel study is looking at measures that could be applied in all of the urban areas of Canada.

A second key objective of the "three cities" study was to deliver quantified estimates of GHG reductions, with costs in $/tonne plus other quantifiable and non-quantifiable costs and benefits, for a variety of individual options and selected packages of mutually reinforcing options in Canadian urban passenger transportation.

Relevance of Kyoto target to Transportation in Greater Vancouver

The population of the Vancouver region has been growing rapidly – in the last twenty years it has roughly doubled from 1 million to 2 million. Increasingly, this population is dispersed across the region, and therefore use of motor vehicles has increased. The result is that since 1990, GHG emissions have been growing, so that meeting the target of a 6% reduction over 1990 levels poses a significant challenge. Of the three urban regions studied, the greatest reduction is needed in Greater Vancouver. The study projected a 45% growth in CO_2 (GHG) for the Greater Vancouver region by 2010, which accounts for just under 5 megatonnes to be produced that year. As shown in Figure 1, a 35% reduction in GHGs will be needed in Greater Vancouver to meet the Kyoto target.

Figure 1



The corresponding figures for Toronto and Montréal are 22% and 16% respectively.

Measures need to meet Kyoto targets

The package of Primary Measures identified for the Greater Vancouver region to meet the Kyoto targets included the following:

- Investment in public transport: improved transit delivery
- Investment in public transport: rapid transit
- Land use planning and control for sustainable development
- Region-wide parking strategy
- Road pricing mechanisms
- Public education/awareness/outreach programs

Even if this package were to be fully implemented for the Greater Vancouver region, the delay in addressing the transportation issues in the region means that only a 16% reduction would be realized, reaching less than half of the Kyoto target for the region.

Barriers to Reduction

The major barriers to successfully addressing GHGs in the three urban areas include the following:

- The absence of senior levels of government (notably at the provincial and federal levels) in the funding and implementation of initiatives with a high GHG reduction potential;
- The existing institutional framework and fiscal inequities;
- Insufficient funds at the local level to adequately address the greenhouse gas problem;
- The current mind-set, the lack of a political awareness and buy-in, the lack of public awareness of the extent of the problem;
- The possible economic impacts of the measures on a region or within a specific area;
- The lack of co-operation among all levels of government;
- Current trends in land development and market forces.

ALTERNATIVES

The Board may prefer to proceed with direct approaches to the federal government without involving the other major regions, or it could decide that the proposed course of action is not worth pursuing, as the prospect of federal involvement is limited.

CONCLUSION

The National Transportation Table included a wide range of stakeholders and to a significant degree proceeded by consensus. As a result, their recommendations do not fully address the issues posed by the recent growth in the major urban regions in Canada. However, a study commissioned by the Table did produce valuable information and recommendations for actions in these regions.

The findings of this study provide the Greater Vancouver region with an environmental target and assessments on the impacts of certain measures to meet this target. Based on the preliminary study findings, this region is estimated to be the most challenged in terms of reducing CO2 emissions to meet the stringent Kyoto target. This is fueled by the projected increase in population and use of the automobile in the region, as stated in the one of the conclusions:

> "…more drastic measures beyond the identified package would be needed to approach a 2010 Kyoto target in Vancouver, due to the significant expected population increase in that urban area."

The package of measures to reduce CO2 emissions to Kyoto levels are substantial and will require additional support and funding to meet this aggressive target. Traditionally, the Federal Government has not entered into dialogue on such issues as climate change directly with municipal governments. Since implementation of the urban measures will not be possible without the cooperation of urban centres, the National Climate Change Secretariat should be strongly encouraged to involve larger urban governments in their ongoing consultations.

Attachments

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Service Contracts

Date: June 1, 2000

Subject: **Lower Mainland Truck Freight Study: Progress Report**

Recommendation:
That the Board receive the report dated June 1, 2000, titled Lower Mainland Truck Freight Study: Progress Report for information.

PURPOSE

To advise the Board of Directors of the current status of the Lower Mainland Truck Freight Study and its potential future applications.

BACKGROUND

Efficient goods movement/trucking is essential to the regional economy. TransLink's Strategic Transportation Plan (STP) recognizes the importance of goods movement in the regional transportation system and identifies actions towards facilitating efficient goods movement. In support of this recognition in 1999 Translink, in partnership with other agencies, initiated the Lower Mainland Truck Freight Study.

DISCUSSION

Prior to this study, the analysis and planning for goods movement was inhibited by a lack of relevant and current information on the trucking industry. The last truck survey was undertaken in 1988; as the information is 12 years old, it is inadequate to address present and future regional trucking issues. In part, this is due to the significant changes to the nature of goods movement over the last decade including:

- *Infrastructure:* development of Deltaport, Seaspan, CP Intermodal; increased congestion due to limited road network improvements;
- *Spatial:* suburbanization of distribution facilities; increased use of business parks;
- *Structural:* just-in-time delivery, increased use of containers; significant growth in international trade induced by NAFTA and an amplified economic relationship with Asia;
- *Policy:* deregulation of the trucking industry.

Study Objectives

The objectives of the Lower Mainland Truck Freight Study were to:

- Develop a 'snapshot' of the trucking/goods movements for a typical day during October/November, 1999;
- Quantify the changes in truck movements since 1988;
- Develop of a set of computer models that can be used to forecast future truck demand.

Survey Components

The study included a series of related surveys:

- **Internal Trips:** Truck trips that are registered and operate in the Lower Mainland;
- **External Trips:** Truck trips with either an origin or destination outside the Lower Mainland;
- **Special Generator Trips:** Truck trips that are generated at major trucking generating facilities such as the ports, airport and inter-modal yards.

These surveys gathered information regarding vehicle characteristics, number and nature of trips made throughout the day; time of trip; origins and destinations; and land use that generates and attracts truck trips. The sum of the surveys produces a composite of truck movements for a typical day during October/November, 1999. An extensive traffic count program complemented these surveys, where total vehicles of all types were counted at 254 locations throughout the Lower Mainland. Vehicle classification counts, which distinguished between light and heavy trucks, were conducted at 75 locations.

Data collected from these surveys serve the additional benefit of supporting the ongoing monitoring of the Strategic Transportation Plan as well as other transportation model development efforts.

Collaborative Approach

A trademark of this study was considerable co-operation between goods movement stakeholders in the Lower Mainland. The study budget was $418,000 of which $100,000 (24%) was funded by Translink. Other study sponsors were Transport Canada, Ministry of Transportation and Highways, British Columbia Transportation Financing Authority, Insurance Corporation of British Columbia, Vancouver Port Authority, Fraser Port Authority and Vancouver International Airport. The British Columbia Trucking Association and the Vancouver Gateway Council provided useful advice and resources.

Study Status

At this time the data collection for this study has been completed, and the data checking is approaching completion. The truck forecasting model has been developed and integrated with the regional transportation model. The truck forecasting model is already being used for analysis of trucking for the South Fraser Perimeter Road Study.

The next steps in the study include a draft summary report anticipated by late-June. Individual reports describing survey results and the model development will be forthcoming during the month of July.

Potential Applications of Data and Truck Forecasting Model

Because the truck flow information collected during the Lower Mainland Truck Freight Study allows for explicit analysis of truck movements, this information can also be used to support the following type of initiatives:

- Corridor/route analysis and major infrastructure planning;
- Truck route planning;
- Monitoring truck traffic throughout the region;
- Examining the transportation impact of industrial development;
- Inter-modal freight planning;
- Pavement deterioration and management analysis;
- Air quality modelling;
- General transportation planning.

Sample Results

The attached technical report titled, *Lower Mainland Truck Freight Study: Preliminary Results,* provides a preview of some of the data that can be extracted from the surveys and model output for the above planning and engineering purposes. Please note that the results presented in this report are mostly for the Corporation of Delta. They are used as illustrations of the type of information that can be derived from truck study.

CONCLUSION

The Lower Mainland Truck Freight Study will provide up-to-date information on the trucking industry in the Lower Mainland, and result in a truck forecasting model that is integrated with the regional transportation model. This data and the truck forecasting model can be used for a variety of transportation planning and engineering purposes including major infrastructure planning and the development of a truck network.

Attachment

Attachment 1

Lower Mainland Truck Freight Study: Preliminary Results

June 2, 2000

1 INTRODUCTION

The Lower Mainland Truck Freight Study was undertaken to collect up to date information on the trucking movements in the Lower Mainland. Specifically, the objectives of the study were to:

- Develop a 'snapshot' of the trucking/goods movements for a typical day during October/November, 1999;
- Quantify the changes in truck movements since 1988;
- Develop of a set of computer models that can be used to forecast future truck demand.

The objectives of the study were met through conducting a number of surveys. Data collected from these surveys will support ongoing monitoring of the Strategic Transportation Plan. In addition, the data was also used for developing the truck forecasting models.

The purpose of this report is to introduce the reader to the surveys that were conducted, and the type of information that will be available upon final validation of the surveys. Please note that the results presented in this report are mostly for the Corporation of Delta. They are used as illustrations of the type of information that can be derived from truck study.

2 TRUCK SURVEYS

There are three major distinct types of truck trips:

- **Internal Trips:** Truck trips that are registered and operate in the Lower Mainland;
- **External Trips:** Truck trips with either an origin or destination outside the Lower Mainland;
- **Special Generator Trips:** Truck trips that are generated at major trucking generating facilities such as the ports, airport and inter-modal yards.

These three types of trips were surveyed individually, and the information gathered included vehicle characteristics, number and nature of trips made throughout the day; time of trip and origins and destinations. The sum of the surveys produces a composite of truck movements for a typical day during October/November, 1999.

These surveys were complemented by an extensive traffic count program, where total vehicles were counted at 254 locations throughout the Lower Mainland. Vehicle classification counts which distinguished between light and heavy trucks were counted at 75 locations.

2.1 Sample of Overall Results

The following exhibits are a sample of the type of data that can be expected from the surveying portion of the study. ***Please note that the figures presented are preliminary.***

Exhibit 1 presents the total number of light and heavy truck trips that have an origin or a destination within the Lower Mainland on a typical day in October/November 1999.

Exhibit 1 1999 Total 24 Hour Light and Heavy Truck Trips with Origin or Destination Within the Lower Mainland (Survey)

Light Trucks	Heavy Trucks
98,500	41,600

The share of light and heavy truck trips by sub-area is presented in Exhibit 2. It is interesting to note that Delta and Langley East have higher shares of heavy truck trips, while Vancouver has a much higher share in light truck trips.

Exhibit 2 Total Light and Heavy Truck Trips by Sub-Area

Subarea	Truck Trips	Light Trucks	Heavy Trucks
North Shore	6%	6%	5%
Vancouver	31%	37%	17%
Burnaby, NW / N.E. Sector	19%	18%	21%
Richmond	12%	12%	11%
Delta	6%	4%	10%
Surrey / White Rock	11%	11%	13%
Langleys / East	11%	8%	18%
PM / MR / East	4%	4%	5%
Lower Mainland	100%	100%	100%

The estimated daily origins and destination of total light and heavy truck trips by sub-area are presented in Exhibit 3. The *rows* represent trip origins, where, for example, the total truck trips generated by Vancouver was 42,497. The *columns* represent destinations where, for example, Vancouver attracted 42,784 trips. The *individual cells* within the matrix represent origins and destinations where for example, there were 1,916 truck trips between Vancouver and Richmond.

Using a geographic information system, the individual cells in Exhibit 3 can be illustrated on a map. For example, Exhibits 4 and 5 illustrate the origins and destinations of truck trips to and from Delta.

Exhibit 3 Origins and Destinations of Total 24 Hour Light and Heavy Truck Trips

Origin / Destination	North Shore	Vancouver	Burnaby/ New West/ NE Sector	Richmond	Delta / Surrey / White Rock	Langley & East	Maple Ridge/ Pitt Meadows & East	Externals	Total
North Shore	5,356	705	781	212	189	68	25	160	7,496
Vancouver	800	35,273	2,410	1,916	1,352	348	42	356	42,497
Burnaby/New West/ N. E. Sector	761	2,664	16,591	1,020	2,614	1,099	438	826	26,013
Richmond	190	1,733	862	10,163	1,872	278	126	494	15,718
Delta/Surrey/White Rock	86	1,650	2,347	1,670	12,829	2,819	234	1,396	23,031
Langley & East	126	398	1,117	252	2,511	9,031	448	1,168	15,051
Maple Ridge / Pitt Meadows & East	39	38	522	92	222	259	4,049	312	5,533
Externals	141	323	760	463	1,335	963	251	473	4,709
Total	7,499	42,784	25,390	15,788	22,924	14,865	5,613	5,185	140,048

Exhibit 4: Origins of Total 24 Hour Truck Trips Destined to Delta

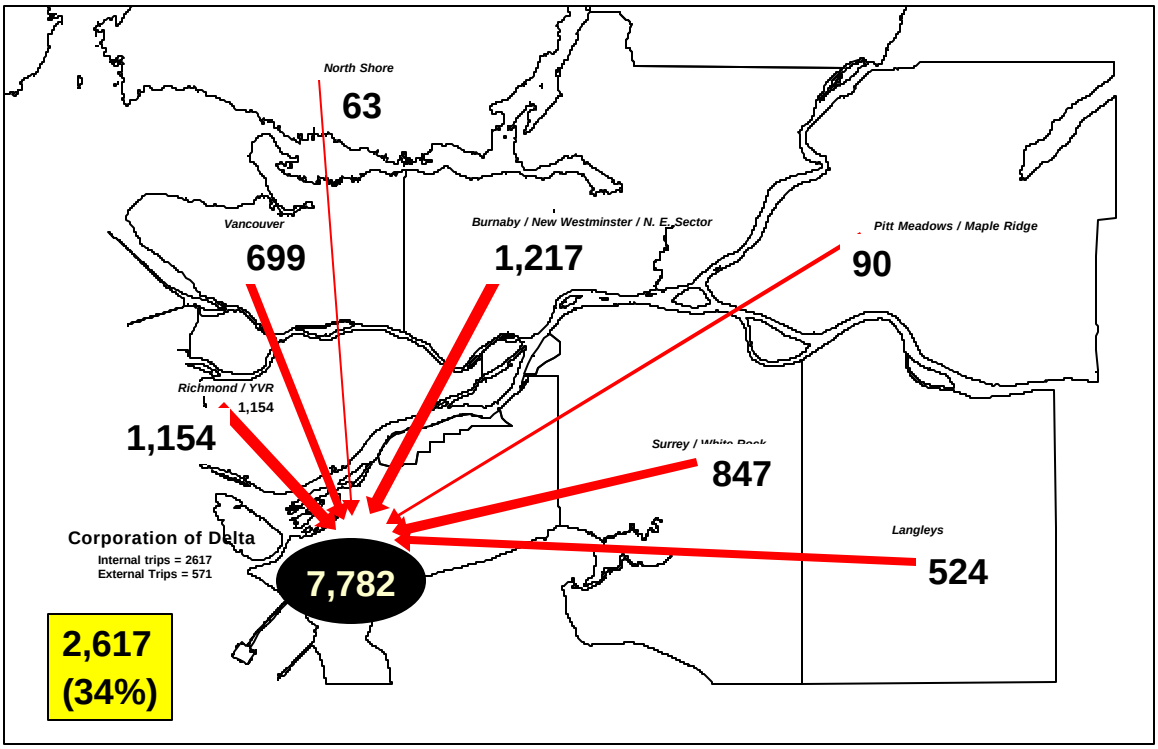


Exhibit 5: Destinations of Total 24 Hour Truck Trips Originating From Delta

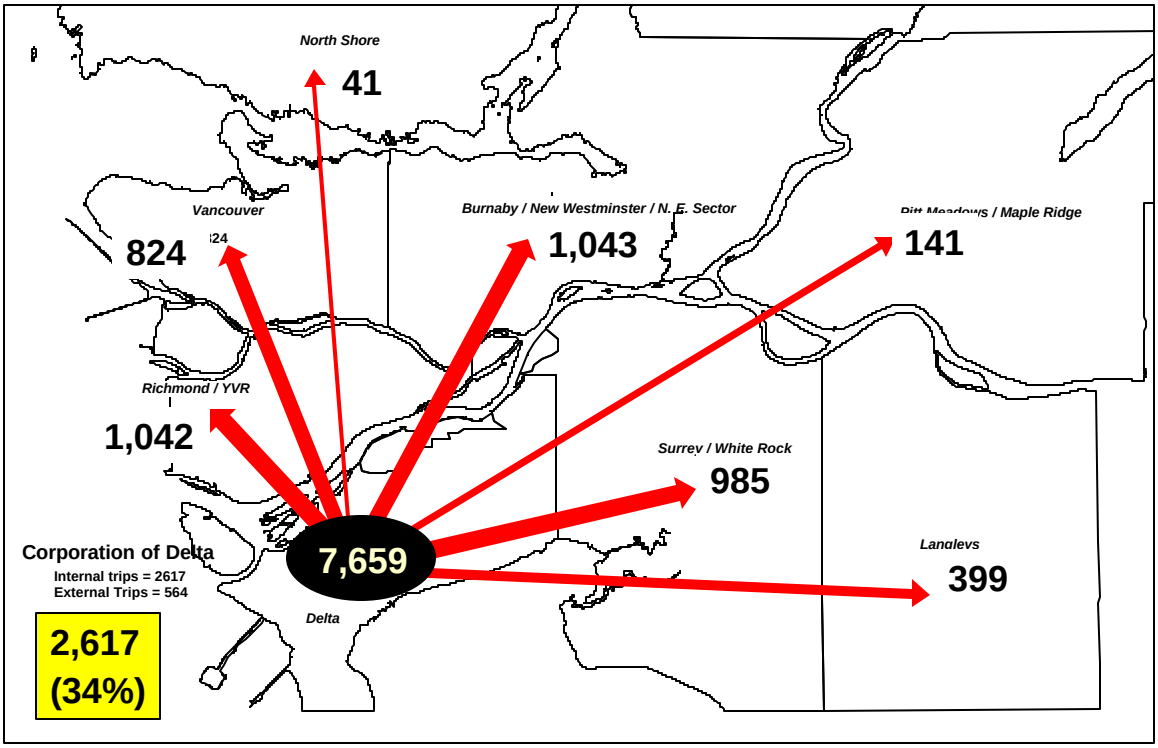


Exhibit 4 shows that 7,782 trips were attracted by Delta. Of these trips 2,617 (34%) have both an origin and destination within Delta, 1,127 (14%) originated in Burnaby/New Westminster/NE Sector and 1,164 (15%) from Richmond. Only a small portion of trips to Delta originated in Pitt Meadows/Maple Ridge and the North Shore. Likewise, Exhibit 5 shows that most trucks trips originating from Delta are destined to Burnaby/New Westminster/NE Sector, Vancouver and Surrey/White Rock.

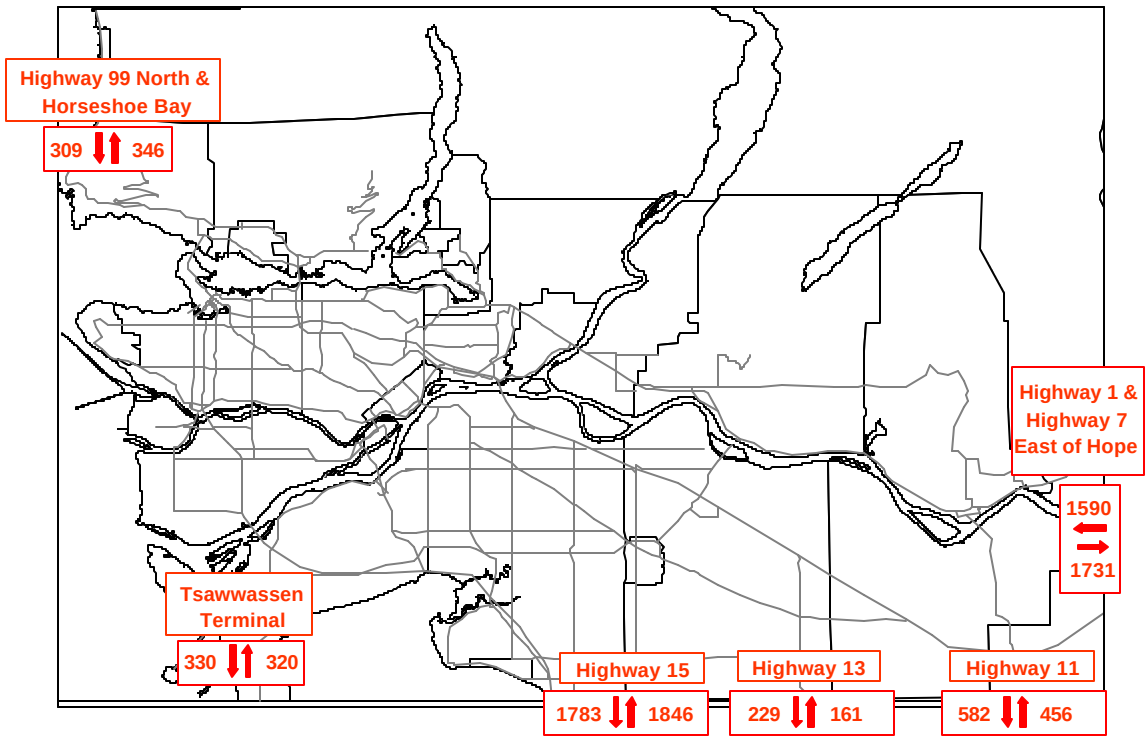
2.2 Sample of External Truck Trips

A component of the trips to and from Delta were truck trips that have either an origin or destination outside of the region. For example, Exhibit 5 showed that approximately 564 (7%) of truck trips had an origin outside the Lower Mainland.

As it is evidently important to have an understanding of the influence of external trips on overall truck movements in the Lower Mainland the following external sites were surveyed: Highway 99 in West Vancouver; Tsawwassen Ferry Terminal; Highway 15, 13 and 11 Border Crossings; Highways 1 and 7 east of Hope.

Exhibit 6 illustrates the points of entry/exit for the truck trips that entered or left the Lower Mainland. The most heavily used external stations were the Pacific Truck Crossing Border station (Highway 15), and the eastern entries/exits into the Lower Mainland.

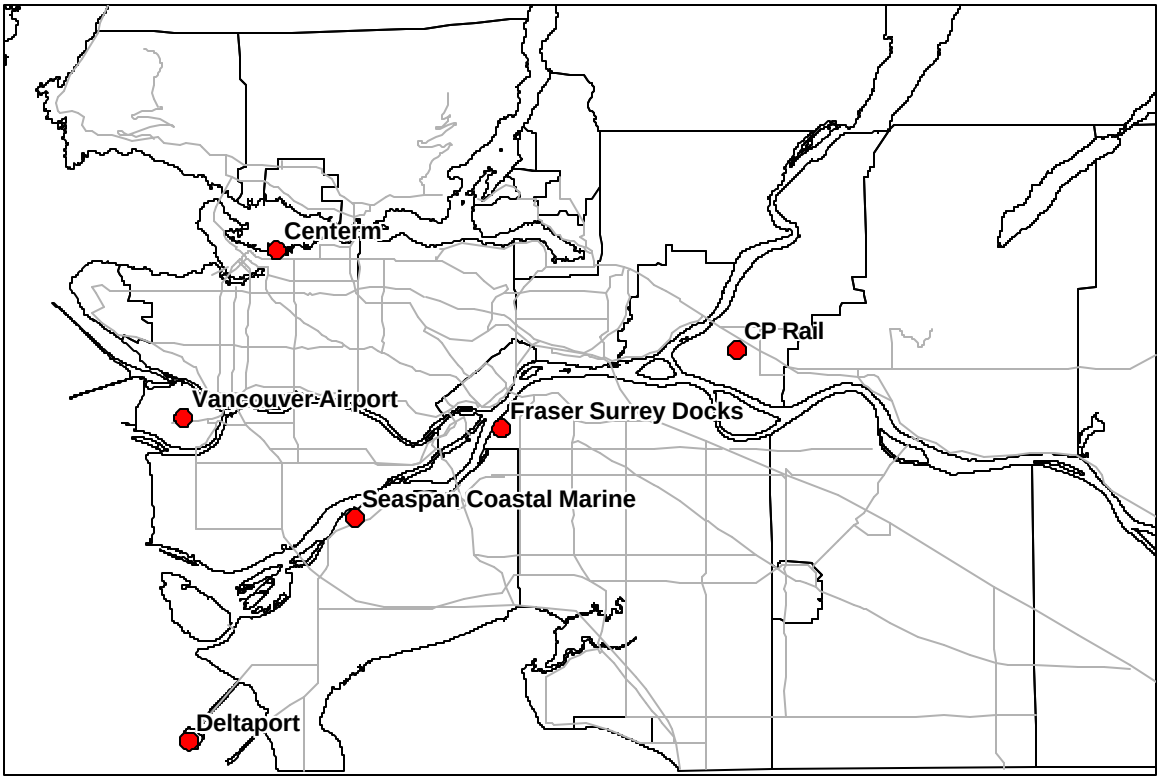
Exhibit 6 Total Light and Heavy Truck Trips Entering and Exiting the Lower Mainland



2.3 Sample of Special Generator Truck Trips

Another component of the total truck trips are those generated by inter-modal yards where goods being moved have an origin or destination outside the Lower Mainland. The following special generators were surveyed: Vancouver Port (Burrard and DeltaPort); Fraser Port; Vancouver International Airport; Seaspan; CP Intermodal Yard. Commodity information was also collected during this specific survey. Exhibit 7 identifies the location of special generators that were explicitly surveyed.

Exhibit 7 Locations of Surveyed Special Generators



The majority of goods moved through the ports and inter-modal yards are shipped in containers, where each container usually generates one heavy truck movement. Exhibits 8 and 9 illustrate the origins of heavy trucks destined to DeltaPort, and vice versa. The volume of heavy trucks at DeltaPort ranges between 1000–1200/day. It is important to note that the volume and patterns of these movements is dependent upon the time of the year, commodity, and the shipping line being serviced at the terminal. Exhibit 8 illustrates that heavy truck trips destined to DeltaPort generally originate from Vancouver, Richmond, Delta and Surrey. Only a limited number of trips are generated from the North Shore, Pitt Meadows/Maple Ridge and the eastern Fraser Valley.

Exhibit 8 Origins of Heavy Truck Trips Destined to DeltaPort

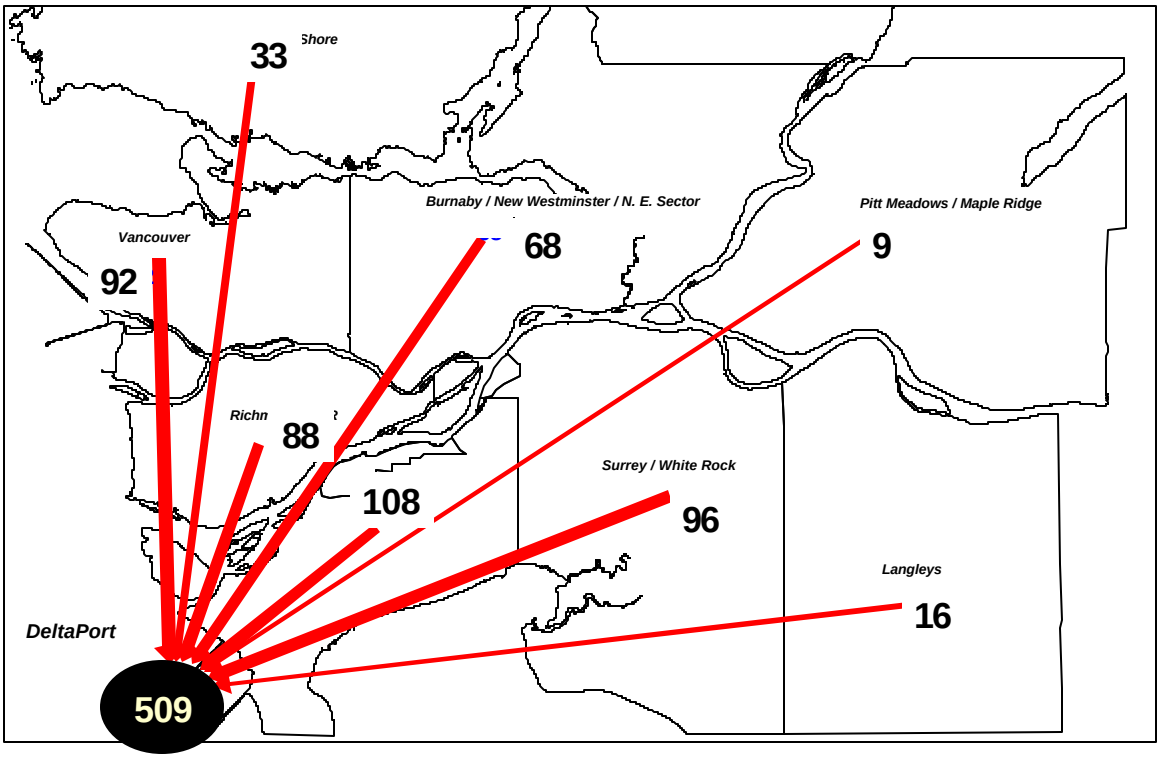
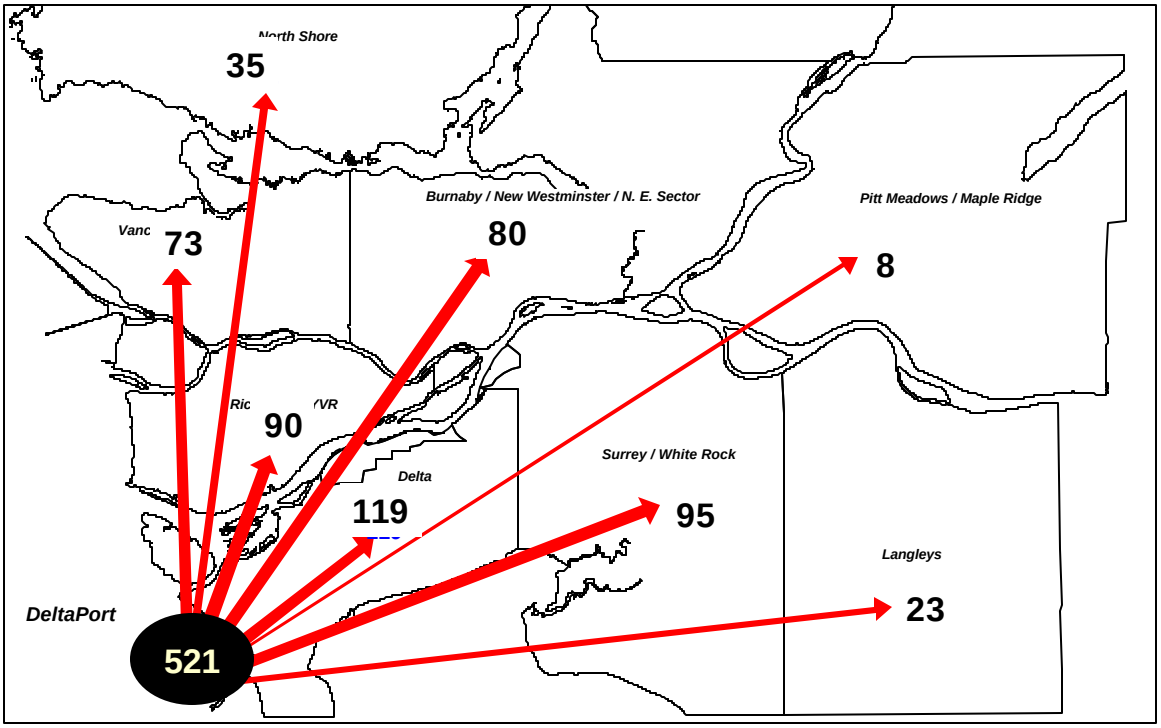


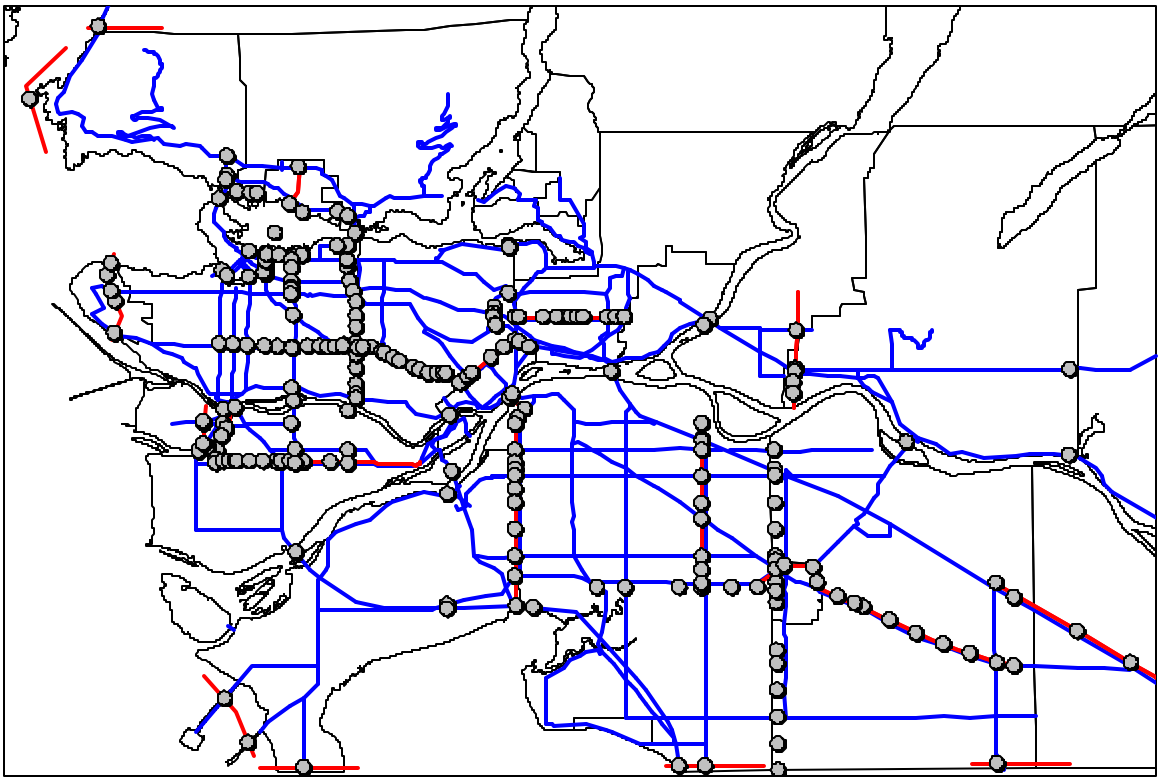
Exhibit 9 Destinations of Heavy Truck Trips Originating at DeltaPort



2.4 Sample of Screenline Classification Counts

The survey information was complemented by comprehensive traffic counts at major locations throughout the region. Total 24 hour vehicles were counted at 254 stations. Furthermore, the counts were divided into 10 separate vehicle classes including light and heavy trucks at 75 additional stations. These counts are useful for establishing an understanding of truck movements on the ground; gaining insight into route selection and the identification of major truck routes; for establishing a current base for relative comparison to historic counts and to support monitoring of in the future; and for calibration of the truck model. The locations where total vehicles were counted within the GVRD are illustrated in Exhibit 10. Note that many of the stations follow physical barriers (rivers), municipal boundaries and/or major roads. These artificial boundaries are called screenlines, and the object is to count all movements crossing the screenline such that the quantity of trips from these sub-areas can be tracked.

Exhibit 10 Vehicle Count Locations Within the GVRD



Four screenlines that can be identified from Exhibit 10 are:

- Main/South Arm: Port Mann, Pattullo, Alex Fraser and George Massey crossings;
- North Arm: Arthur Laing, Oak Street, Knight Street and Queensborough bridges;
- Burrard Inlet: Lions Gate and Second Narrows bridges;
- North Road: all major roads west of North Road.

Exhibit 11 Change in Total 24 Hour Traffic at the Main/South Arm, North Arm, Burrard Inlet and North Road Screenlines Between 1996 and 1999

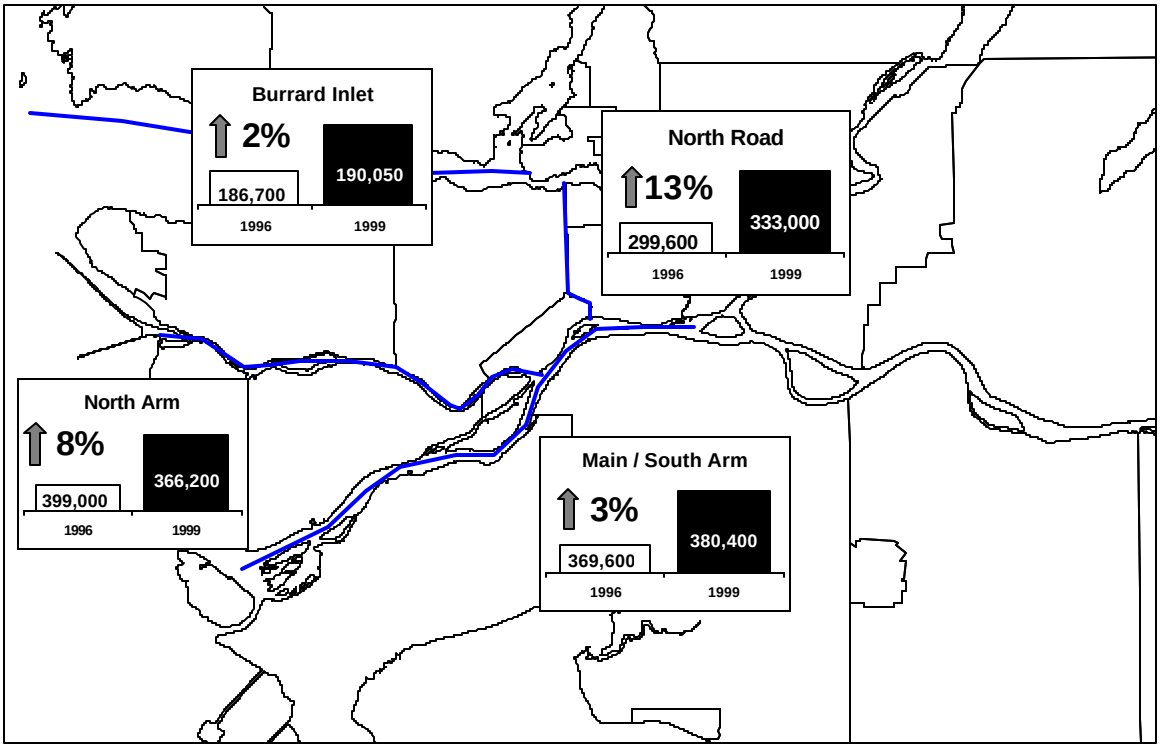


Exhibit 11 shows that total vehicles crossing the four screenlines over a typical day during 1996 and 1999. The Main/South Arm increased by approximately 10,800 (3%) from 369,600 in 1996 to 380,400 in 1999. The Burrard Inlet screenline experienced similar growth rate of 2%, or 3,800 vehicles/day. Alternatively, the North Road and North Arm screenline experienced relatively high growth. The North Road screenline grew by 33,400 vehicles/day, or 13%. The North Arm screenline grew by 27,200 vehicles/day, or 8%.

Where Exhibit 11 provided the total 24 hour traffic over a screenline, Exhibit 12 illustrates the profile of total vehicles and truck traffic throughout a 24 hour period using Port Mann bridge. Northbound demand for Port Mann bridge starts to increase at approximately 4:30 AM, and peaks during the 6:00-9:00 AM period. Truck traffic constitutes approximately 11% of the total traffic demand during the late morning to mid-afternoon period. The midday peak for truck traffic using Port Mann bridge is further illustrated in Exhibit 13.

Exhibit 12 Daily Profile of Total Traffic on Port Mann Bridge

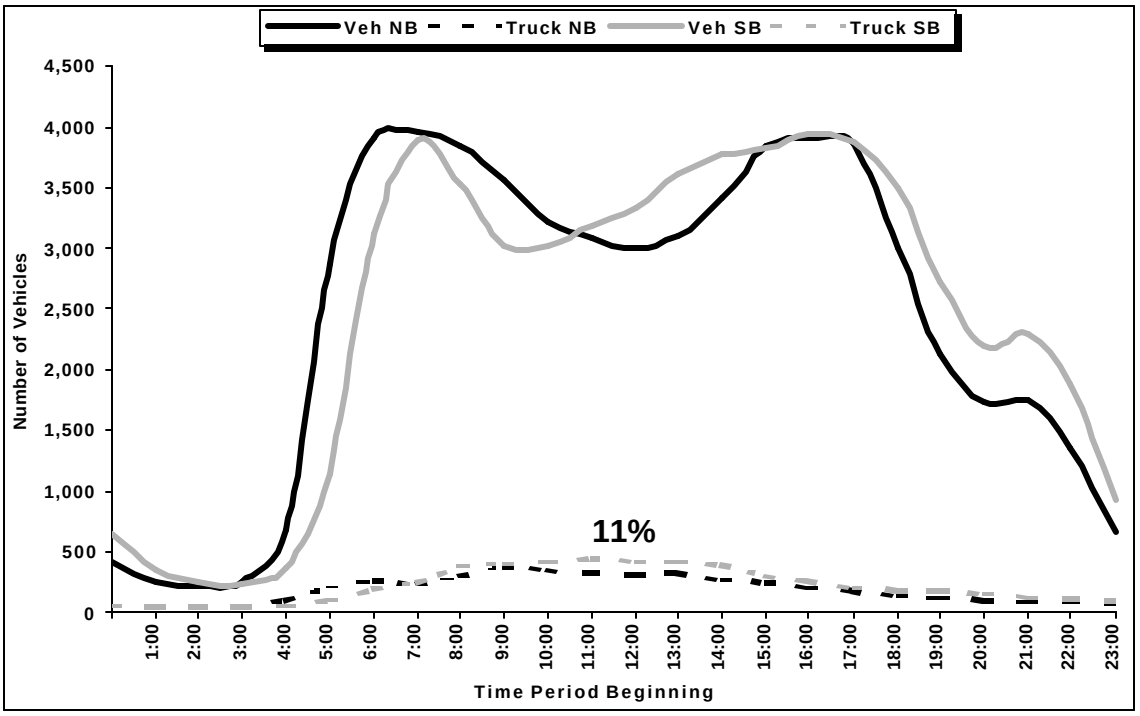
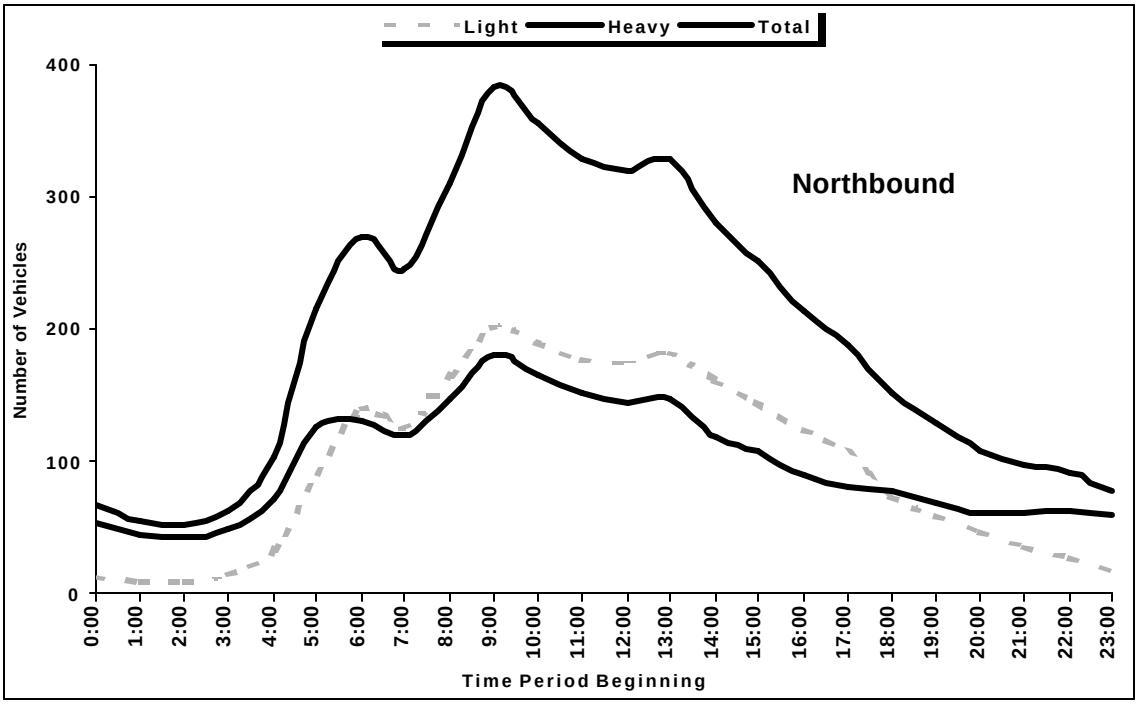


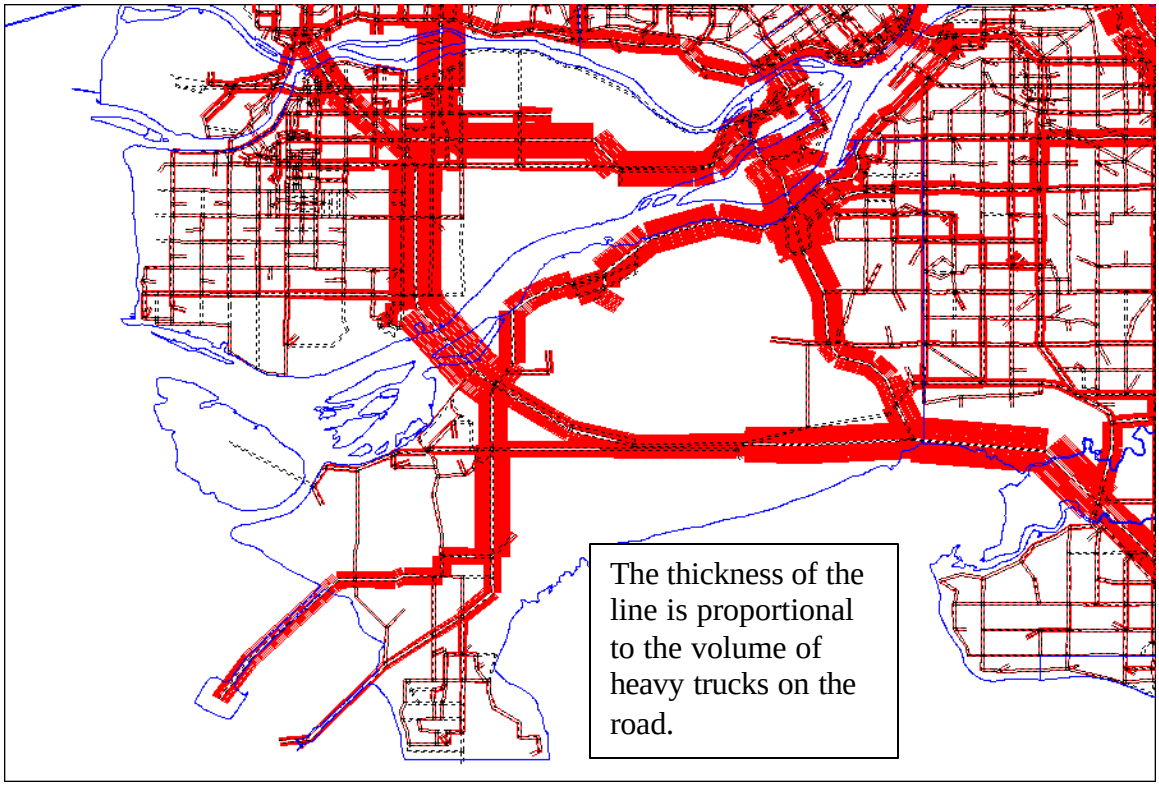
Exhibit 13 Daily Profile of Light and Heavy Truck Traffic on Port Mann Bridge



3 TRUCK FORECASTING MODEL DEVELOPMENT

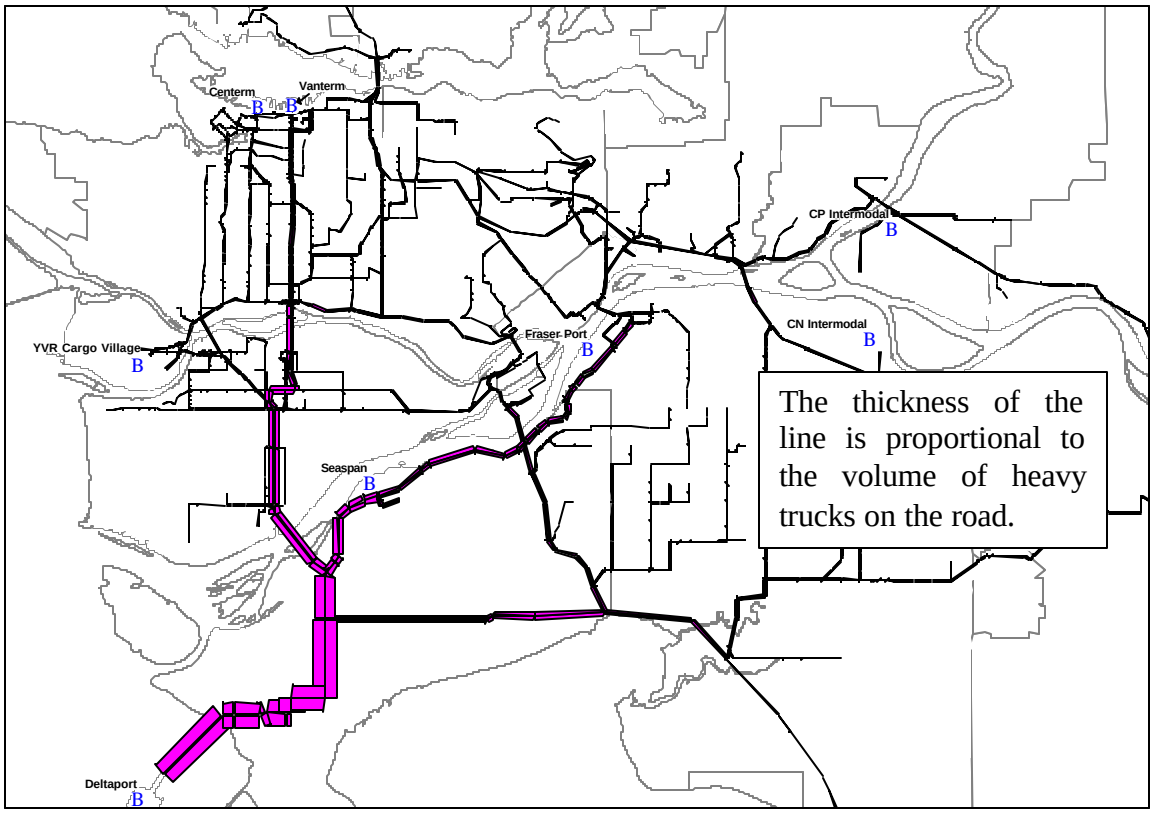
The preceding information was used to calibrate and validate a truck forecasting sub-model within the Regional EMME/2 Transportation model. The model is able to forecast the quantity of truck trips, the origins and destinations of these trips, and the most likely route taken between the origin and destination. Exhibit 14 is an example of the graphical output from the EMME/2 truck model, and shows the total 24 hour heavy truck traffic in Delta and Richmond. The thickness of the line is proportional to the heavy truck volume on the road. The thicker line identifies the main heavy truck routes in these sub-areas, and the thin lines represent a lower volume of heavy trucks.

Exhibit 14 Total 24 Hour Heavy Truck Traffic In Delta and Richmond



It is evident from Exhibit 14 that the major truck routes in these sub-areas include Highway 99 and Highway 91, East-West Connector, Knight Street and River Road. DeltaPort way also carries a relatively high volume of heavy truck traffic. Exhibit 15 focuses on DeltaPort and shows the routes taken by heavy trucks entering or exiting DeltaPort over a 24 hour period. The width of the line represents the proportion of truck traffic and hence the decay of truck traffic as it disperses throughout the region.

Exhibit 15 Origins and Destinations of Heavy Trucks using DeltaPort (Model)



4 POTENTIAL APPLICATIONS OF DATA AND TRUCK MODEL

Because the truck flow information collected during the Lower Mainland Truck Freight Study allows for explicit analysis of truck movements, this information can also be used to support the following type of initiatives:

- Corridor/route analysis and major infrastructure planning;
- Truck route planning;
- Monitoring truck traffic throughout the region;
- Examining the transportation impact of industrial development;
- Inter-modal freight planning;
- Pavement deterioration and management analysis;
- Air quality modelling;
- General transportation planning.

5 CONCLUSION

The Lower Mainland Truck Freight Study will provide up-to-date information on the trucking industry in the Lower Mainland, and result in a truck forecasting model that is integrated with the regional transportation model. This data and the truck forecasting model can be used for a variety of transportation planning and engineering purposes including major infrastructure planning and the development of a truck network.

To: GVTA Board of Directors

From: Larry Ward, Senior Vice President, Planning and Services Contracts

Date: June 21, 2000

Subject: **Terms of Reference for the Strategic Transportation Plan Technical Advisory Committee**

Recommendations:

A. That the Board approve the attached Terms of Reference for the Strategic Transportation Plan Technical Advisory Committee; and

B. That the Board formally receive the correspondence from the Chair, Strategic Transportation Plan Technical Advisory Committee, to the Chair and Members of the TransLink Board of Directors, dated March 22, 2000, for information.

PURPOSE

To advise the Board of the views of the Strategic Transportation Plan Technical Advisory Committee on the TransLink Strategic Transportation Plan and to seek endorsement from the Board of the Terms of Reference for the Strategic Transportation Plan Technical Advisory Committee.

BACKGROUND

The Strategic Transportation Plan Technical Advisory Committee (STP TAC) was originally established in June 1999, on an "ad-hoc" basis to allow private and public sector stakeholders in the regional transportation system a forum to advise and guide the development of TransLink's Strategic Transportation Plan. Accordingly, a Terms of Reference was prepared to define the role and procedures of this group. As the STP TAC was an "ad-hoc" group, the original Terms of Reference were not approved by the Board but it was identified as a participant in the public consultation process.

As the Strategic Transportation Plan is now completed, the emphasis of the Committee is now on monitoring and using the Committee on a more strategic basis. In addition, a review of the GVRD's Livable Region Strategic Plan is scheduled to commence in late 2000, and the

Committee has expressed interest in providing input to this process. The Terms of Reference have been changed to accommodate this new focus.

The STP TAC endorsed the revised Terms of Reference on May 18, 2000.

DISCUSSION

The STP TAC brought together a broad range of stakeholders in the regional transportation system to advise and guide the development of TransLink's Strategic Transportation Plan. Through the course of six meetings convened between June 1999 and March 2000, the Committee was able to reach agreement on some priorities for the Strategic Transportation Plan. These are contained in a letter from the Chair of the STP TAC to the Chair of the TransLink Board, dated March 22, 2000 which was previously circulated to the Board members, along with other related correspondence, and is attached to this report for formal receipt.

The STP TAC identified regional goods movement as an area which needed to be addressed by the Strategic Plan. This input was key to the high priority placed on regional goods movement in the Plan. The Committee was able to identify high level needs, as well as specific infrastructure improvement needs.

The STP TAC serves an important role as a conduit between TransLink and key private and public sector interests in the transportation system. For some agencies, it is the only point of contact with TransLink. As well, synergies are developing around the table for co-operative planning solutions. Several partnerships have been facilitated, as discussions have shown the commonality of the challenges many members face. On these grounds, it is recommended that the STP TAC continue as a working committee.

ALTERNATIVES

Alternatives to convening meetings of the STP TAC could include first, holding separate meetings with stakeholder agencies and second, conducting surveys of such agencies.

The first alternative would involve holding separate meetings with agencies, on a regular basis, to solicit their views. This would consume a good deal of staff resources, as meeting venues and material would have to be prepared separately. In addition, dialogue with other stakeholders would not be able to take place.

The second alternative would be to survey stakeholder agencies regarding their transportation needs. Stakeholder agencies would be surveyed on a regular basis. Again, with this alternative, dialogue between stakeholders would not be able to take place.

CONCLUSION

It is recommended that the Board approve the attached Terms of Reference for the Strategic Transportation Plan Technical Advisory Committee.

TRANSLINK STRATEGIC TRANSPORTATION PLAN:
TECHNICAL ADVISORY COMMITTEE

TERMS OF REFERENCE

1. PURPOSE

The purpose of the 'TransLink Strategic Transportation Plan Technical Advisory Committee' is to provide a forum for representatives from transportation service and support providers, major terminals and gateways, as well as municipal, regional, provincial and federal agencies to:

- advise and guide the development of TransLink's Strategic Transportation plans from time to time, as required
- advise and monitor the implementation of TransLink's Strategic Transportation plans, and
- keep up to date on relevant transportation issues impacting the region through ongoing communication.

2. ESTABLISHMENT AND AUTHORITY

The Technical Advisory Committee's role is advisory. The Technical Advisory Committee shall provide TransLink staff and others with advice and comments.

3. COMPOSITION

The Technical Advisory Committee members are senior representatives of their respective agencies, which include:

- British Columbia Transportation Financing Authority
- BC Trucking Association
- Fraser River Port Authority
- Gateway Council
- Greater Vancouver Regional District
- ICBC
- Major Road Technical Advisory Committee (MRTAC)
- Ministry of Transportation and Highways
- North Fraser Port Authority
- Regional Engineers Advisory Committee (REAC)
- TransLink
- Transport Canada
- Vancouver International Airport Authority
- Vancouver Port Authority
- Greater Vancouver Regional District Technical Advisory Committee

4. DUTIES AND RESPONSIBILITIES

The Activities of the Technical Advisory Committee are to include, but not be limited to, the following:

- to provide advice, assistance and input to the development and implementation of the TransLink Strategic Transportation Plan;
- to provide informed comment on Technical Memoranda and other TransLink working papers;
- to provide a forum to discuss matters of mutual and/or strategic importance that impact transportation in the region;
- to identify areas in which partnerships can be established to advance specific projects and initiatives;
- to serve as a mechanism for developing informed opinion and undertaking analysis of specific sectoral interests;
- to act as a mechanism for members to update the Technical Advisory Committee on each member agency's own specific projects and initiatives;
- to provide comments upon request to the TransLink Board of Directors.

5. ORGANIZATION

- With the concurrence of the Technical Advisory Committee a Chairperson for the Technical Advisory Committee will be appointed by the TransLink CEO.
- The Technical Advisory Committee may form task-oriented working groups to address specific projects.
- Working groups may be composed of representatives of agencies wishing to participate in the subject area.

6. PROCEDURES

- The Technical Advisory Committee shall normally meet bi-monthly or at the call of the chair, with minutes of the previous meeting and an agenda being provided in advance of each meeting. Members shall identify issues for future agendas as soon as possible to ensure adequate time for preparation of background material.
- The majority of members shall constitute a quorum.
- While consensus is the goal of the Technical Advisory Committee, in the event a vote is required, a majority shall constitute 50% plus one other member of those present. In the event that an agency has more than one person in attendance, only one person shall vote for that agency.
- Working groups shall meet as required. Meeting notes shall be prepared for the information of the members and the Technical Advisory Committee.

7. BUDGET AND ADMINISTRATIVE SUPPORT

TransLink shall provide administrative support and budget for the Technical Advisory Committee and also for any working groups as necessary.

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Greater Vancouver
Transportation Authority

March 22, 2000

Chair and Members
TransLink Board of Directors

Dear Chair Puil and Members of the Board

Re: <u>Comments on TransLink Draft Strategic Transportation Plan</u>

The Strategic Transportation Plan Technical Advisory Committee would like to thank the TransLink Board of Directors for convening this Committee. As a working group, with a diverse range of public and private sector interests, we have brought to the table our needs and visions and are pleased to be part of the development of the Draft Plan. (A list of member agencies is attached.)

The Committee has now had an opportunity to review the summary of submissions on the Draft Plan, results of the polling, and the recommendations for changes put forward by your staff. We recommend you accept the overall direction of the Plan. Its key elements include:

- support for the GVRD Livable Region Strategic Plan;
- focus on intermodal connectivity and transparency for users;
- inclusion of goods movement; and
- continued application of the "user pay" principle. When combined with the public consultation process, this makes an excellent first step toward solving the transportation challenges in the Region.

Your Committee endorses the changes recommended by staff, with the request that the Board specifically consider:

1. The Plan makes commitments to a number of initiatives. We encourage the Board to work with and gain commitment of the other stakeholders to ensure adequate and timely resources will be made available to allow completion within the timeframe specified in the Plan.

2. The need to develop a comprehensive Goods Movement Strategy has been recognized. As this should include the provision for all commercial transport, e.g. tourism, perhaps it is more appropriately named a Commercial Transportation Strategy. Regardless of the name, it needs to be clarified who is leading, who is participating, and how this major undertaking will be funded. The completion of the Strategy should be made a priority.

3. While the initiatives contained within the Plan can be funded with the additional revenue sources proposed, beyond the term of the Plan, there are significant capital improvements that will require new sources of funding.

4. The rail transit connection to Richmond is a significant key to the long-term success of the regional transportation strategy. Once commitment has been finalized for the other two SkyTrain lines, and given the economic benefit to the Vancouver region, the Board should involve the benefiting agencies and aggressively pursue senior government funding for this line.

5. A statement that the Plan is intended to be a solution seeking document that transcends municipal and jurisdictional boundaries and, as such, allows the Region to speak as one. The committee strongly believes a unified position will mean more effective use of existing resources and an enhanced ability to secure additional funding. It will also further "sell" to the public, who want their transportation system to work, regardless of how they are travelling.

6. Ensuring that in considering decisions on both operating and capital expenditures that the costs and benefits are specified and measurable.

7. Evaluation criteria for improvement to the movement of people or goods (or combination thereof) should take into account operational considerations, in addition to broader environmental, economic and societal impacts. The interaction between people and goods movement is an example of an operational consideration, while environmental criteria could include quality of life issues, e.g. air quality and safety. The broader economic considerations of having an effective, efficient and safe transportation network play a part in whether people or businesses wish to locate here and should be part of this evaluative process.

8. While the committee did not provide specific comments on the level of fare increases, vehicle charges, the distribution between same, etc., we are unanimous in the belief that the public should understand the full range of TransLink's responsibilities and, within that context, where these funds are being allocated, e.g. service improvements, maintenance of roads or bridges.

The Committee is available to answer any questions that the Board or staff may have.

Once again we would like to thank you and the TransLink Board for the opportunity to participate in the process leading to the development of the TransLink Strategic Transportation Plan. It is our view that this Plan will start to provide the mechanism which will combine resources and maximize effective transportation linkages for people and goods movement in and through the Region.

Yours truly,

J. Douglas Allan
Chair
TransLink Strategic Transportation Plan
Technical Advisory Committee