

TO: CITY MANAGER 1995 SEPTEMBER 06

FROM: DIRECTOR PLANNING & BUILDING OUR FILE: 08.230.3

**SUBJECT: MULTIPLE ACCOUNT EVALUATION OF
RAPID TRANSIT OPTIONS IN GREATER VANCOUVER**

PURPOSE: To advise Council of the results of the Multiple Account Evaluation of Rapid Transit Options conducted by the Crown Corporations Secretariat and BC Transit.

RECOMMENDATIONS:

1. **THAT** Council affirm the Multiple Account Evaluation as a comprehensive and consistent approach upon which to base decisions regarding rapid transit.
2. **THAT** a copy of this report be forwarded to the Honourable Glen Clark, Minister of Employment and Industry and D. Corrigan, Chair, BC Transit Board.

REPORT

1.0 BACKGROUND

On 1995 May 29, Burnaby staff received a copy of the Multiple Account Evaluation of Rapid Transit Options for Greater Vancouver. The report undertaken by the Crown Corporations Secretariat with the assistance of BC Transit and was prepared as technical input to the development of a 10 year Transit Development Plan for BC Transit and an overall South Coast Transportation Plan including both road and transit projects. Subsequently, on 1995 June 02 the GVRD Board of Directors, in considering a number of options with regard to rapid transit, approved the following recommendations:

"That the Board advise the Premier that:

- ▶ *the information provided in the studies provides a sound basis for the implementation of the Board's policy that improved bus transit service throughout the region and particularly in transit corridors be provided as interim steps prior to installation of rapid transit in designated transit corridors;*

- ▶ *an early commitment to build rapid transit is essential to the achievement of the Board's growth management strategy as reflected in the Livable Region Strategic Plan approved in principle on December 9, 1994;*
- ▶ *the Board wishes to establish with the Province and member municipalities an implementation agreement under the Growth Strategy Act for the development, financing and operation of a program of transit improvements in the medium term that respects the necessary relationships between rapid transit, growth management and land use policies so that the authorities responsible for these matters can make decisions within the context of a comprehensive framework of agreements;*
- ▶ *the GVRD believes that the initial objective for such a program should be to build rapid transit facilities connecting Coquitlam Regional Town Centre, the Lougheed Mall area, New Westminster Regional Town Centre, Brentwood and Central Broadway (in Vancouver); and*
- ▶ *before the decision-making process can proceed, further information and dialogue with the province are needed on the financial resources and technological choices available.*

The results of the Multiple Account Evaluation were not received by the GVRD Board in sufficient time for review by GVRD staff prior to the Board's consideration on rapid transit. However, the Board's recommendation on rapid transit priorities on 1994 December 09 which previously supported a New Westminster/Coquitlam line as a first priority was amended as a result of this June 02 resolution to include provision for a rapid transit link via Lougheed and Central Broadway, ie. the Lougheed/Broadway line without regard to priorities.

The intent of this report is to review the results of the Multiple Account Evaluation for consideration by Council as it relates to the evaluation of rapid transit corridors and technologies.

2.0 METHODOLOGY

The purpose of the Multiple Account Evaluation was to provide a consistent comparison of rapid transit in the three major corridors including Lougheed/Broadway, Coquitlam/New Westminster and Richmond/Vancouver. Unlike previous analyses the Multiple Account Evaluation assesses rapid transit options based on a broad range of accounts including the following:

- (i) Financial accounts: capital and operating costs, taxes, charges, and incremental fare revenues;
- (ii) Customer service accounts: total and incremental ridership, route travel time and the value of travel time savings;

- (iii) Environmental accounts: reduced air pollutant emissions and the benefits of reduced automobile use;
- (iv) Urban development accounts: qualitative assessments of how well a corridor or particular option would contribute to regional land use goals contained in the Livable Region Strategy;
- (v) System operations accounts: assessments of how readily each option can be adjusted for changing demand and how easily each can be integrated into the existing transit system.

The Multiple Account Evaluation assesses the range of rapid transit corridors and technologies previously evaluated by the rapid transit studies undertaken by BC Transit and the Crown Corporations Secretariat. In terms of corridors these include the Lougheed/Broadway, New Westminster/Coquitlam and the Richmond/Vancouver. The technologies considered for each corridor include Rapid Bus and Intermediate Capacity Transit Systems (ICTS) including Light Rail Transit (LRT) and automated Light Rail Transit (ALRT). Table 1 shows the range of rapid transit options considered in terms of corridor and technology.

TABLE 1

Rapid Transit Options

CORRIDOR	TECHNOLOGY
Lougheed/Broadway	Rapid Bus Basic LRT (totally at grade) Enhanced LRT (some grade separation) ALRT
Coquitlam/New Westminster	Rapid Bus Enhanced LRT (some grade separation) ALRT
Richmond/Vancouver	Rapid Bus (Granville) Enhanced LRT (Arbutus; some grade separation) Basic LRT (Cambie; at grade) Enhanced LRT (Cambie; extensive grade separation) ALRT (Cambie)

The following sections evaluate all of the rapid transit options relative to each of the accounts.

3.0 EVALUATION OF RAPID TRANSIT OPTIONS

3.1 Financial Accounts

i) Indicators

The financial evaluation is based on a calculation of the net financial cost of each rapid transit option. The net financial cost is the difference between the costs (capital and operating) and the revenues (fares and taxes). Table 2 provides a comparison of net financial cost for each corridor based on the assumption of Enhanced LRT or ALRT in each corridor.

TABLE 2
Financial Accounts
Rapid Transit Options
(\$ Millions)

Financial Accounts	Lougheed/ Broadway		Coquitlam/ New Westminster		Richmond/ Vancouver	
	LRT	ALRT	LRT	ALRT	LRT	ALRT
Capital Costs	377	612	367	535	707	678
Operating Costs	63	111	90	111	76	62
Fare Revenue	16	30	3	14	46	53
Taxes / Charges	12	15	30	39	14	19
Net Financial Costs	413	677	425	593	723	668

ii) Analysis

The net financial costs of Enhanced LRT in the Lougheed/Broadway corridor are the lowest of all rapid transit options. Capital costs for the New Westminster/Coquitlam line are slightly less than those of the Lougheed/Broadway corridor. However, as the Lougheed/Broadway corridor is the longest line (at 18.5 Km), the capital costs and net financial costs of the Lougheed/Broadway line on a per kilometre basis as shown in Table 3 are substantially lower than either of the other two rapid transit options.

TABLE 3

**Cost Per Kilometre Comparison
 Rapid Transit Options**

Item	Lougheed/ Broadway		Coquitlam/ New Westminster		Richmond/ Vancouver	
	LRT	ALRT	LRT	ALRT	LRT	ALRT
Total line length	18.5km	18.5km	15.8km	15.8km	14.3km	14.2km
Capital cost per kilometre	\$20.3M	\$33.1M	\$23.2M	\$33.9M	\$49.4M	\$47.7M
Net financial cost per kilometre	\$22.3M	\$36.6M	\$26.9 M	\$37.5M	\$50.6M	\$47.0M

Based on the analysis of financial accounts Enhanced LRT in the Lougheed/Broadway corridor is the lowest cost rapid transit option.

3.2 Customer Service and Environmental Accounts

i) Indicators

The Customer Service and Environmental Accounts provide an indication of the following:

- ▶ customer service indicators including the number of people boarding the rapid transit line, the travel time, the travel time saved relative to other modes and the total value of the travel time saved.
- ▶ environmental indicators resulting from reduced auto use including emissions such as nitrous oxide, hydrocarbons and carbon dioxide.

Both the value of time savings and the environmental benefits are then quantified and summed as the Quantified Social Benefits. Table 4 compares the three rapid transit corridors assuming either Enhanced LRT or ALRT.

TABLE 4
Customer Service and Environmental Accounts
Rapid Transit Options

Customer Service and Environmental Accounts	Lougheed/ Broadway		Coquitlam/ New Westminster		Richmond/ Vancouver	
	LRT	ALRT	LRT	ALRT	LRT	ALRT
Total Boardings (\$ Millions)	21.6	28.8	12.2	16.5	17	20.2
Route Time Saved (Minutes)	22	32	26	30	13	18
Reduced Auto Emissions (Tonnes)	4852	9094	(932.2)	8150.8	24202	27476
Travel Time Savings (\$ Millions)	117	151	6	9	80	95
Environmental Benefits (\$ Millions)	22	42	(4)	37	111	126
QUANTIFIED SOCIAL BENEFITS (\$ MILLIONS)	139	193	2	47	191	221

ii) Analysis

Analysis of the customer service and environmental accounts shows the Richmond/Vancouver line as offering the highest Quantified Social Benefits. This result is largely due to the superiority of the Richmond/Vancouver line in terms of the environment accounts such as reduced auto emissions and environmental benefits. With regard to the customer service accounts, the Lougheed/ Broadway corridor offers the highest total boardings, route time saved and travel time savings. The Coquitlam/New Westminster corridor offers substantially lower customer service and environmental benefits and in fact could result in an increase in total auto emissions by attracting most of its riders from local services rather than from automobile drivers.

3.3 Urban Development and System Operations Accounts

i) Indicators

- ▶ the urban development indicator reflects a qualitative measurement of the degree to which the rapid transit option would contribute to regional land use goals. The measure combines the potential of the corridor to achieve regional land use goals with the likelihood of the technology (LRT or ALRT) to promote compact development. The capability of the technology to promote development is largely based on the speed of transit service and to some degree the scale and importance of stations and other fixed facilities.
- ▶ system operations assesses the operational aspects of the technology and the degree to which each can adapt to changing passenger demand and can easily be integrated into the existing transit system.

Table 5 provides a summary of the urban development and system operations accounts for each corridor.

TABLE 5

Urban Development and System Operations Accounts Rapid Transit Options

Urban Development & System Operation Accounts	Lougheed/ Broadway		Coquitlam/ New Westminster		Richmond/ Vancouver	
	LRT	ALRT	LRT	ALRT	LRT	ALRT
Contribution to Regional Land Use Goals	Medium	Medium/ High	Medium/ High	High	Low/ Medium	Low/ Medium
Flexibility in Adjusting Capacity	Poor	Poor	Poor	Poor	Poor	Poor
Ease of Integration into Transit System	Poor	Good	Poor	Good	Poor	Good

ii) **Analysis**

The urban development account focuses on the capability of each of the rapid transit options to achieve regional land use goals. As the Coquitlam/New Westminster corridor is the most underdeveloped of the corridors, and connects the most number of **regional** town centres, it is rated as having a medium/high to high potential to achieve **regional** land use goals. However, the Multiple Accounts Evaluation notes the uncertainty of creating compact development in this corridor due to the presence of relatively new low density auto oriented development which may not turnover for some years.

Lougheed/Broadway is rated as medium to medium/high in terms of achieving regional land use goals, as it does not connect **regional** town centres and is already highly developed on its western end.

The Richmond/Vancouver corridor is rated low/medium in terms of its contribution to regional land use goals, as it would direct development to areas which are incompatible with the Compact Growth Strategy.

With regard to transit technologies, the analysis of urban development accounts also notes the superiority of ALRT over Enhanced LRT as a catalyst to development.

The two criteria for evaluating systems operations feasibility in adjusting capacity and ease of integration into the system show no differences amongst corridors. The analysis points out that rapid transit is relatively cumbersome in its ability to adjust capacity to meet demand, and that construction of an ALRT system would be easier to integrate into an existing ALRT system.

4.0 OVERALL CORRIDOR COMPARISON

4.1 Criteria

The Multiple Account Evaluation provides a comprehensive comparison between corridors as a basis to determine which ICTS line should be constructed first. This analysis applies to the following criteria:

1. Contribution to Regional Land Use Goals.
2. Transit Ridership (2006)
3. Cost Effectiveness as measured by Cost per Boarding and the Net Social Cost. The Net Social Cost is the difference between the Net Financial Cost and the Quantified Social Benefits of each rapid transit option. The lower the Cost per Boarding and the Net Social Cost, the higher the cost-effectiveness of the corridor.

TABLE 6
Comparison between Corridors

ITEM	Lougheed/ Broadway	Coquitlam/ New Westminster	Richmond/ Vancouver
	Enhanced LRT /ALRT	Enhanced LRT /ALRT	Cambie ALRT
Contribution to Regional Land Use Goals	Medium to Medium/High	Medium/High to High	Low/Medium
Transit Ridership	High	Low/Medium	Medium/High
Boardings in 2006	21.6 to 28.8 million	12.2 to 16.5 million	20.2 million
Cost-Effectiveness	High	Low	Low
Cost per Boarding	\$3.26 to \$3.89	\$5.39 to \$5.60	\$5.54
Net Social Costs (PV)	\$274 to \$484 million	\$424 to \$547 million	\$447 million

4.2 Analysis

The results of the overall comparison between corridors shows the superiority of the Lougheed/Broadway corridor to the other two corridors. As shown in Table 6 above the Lougheed/ Broadway corridor is the only one of the three corridors which does not rank low on any of the three criteria. The Coquitlam/New Westminster ranks low/medium on transit ridership and the Richmond/Vancouver corridor ranks low/medium in contribution to regional land use goals. Both of these corridors however rank low in terms of cost effectiveness with cost per boarding from 45% - 65% higher than the Lougheed/ Broadway corridor and net Social Costs substantially higher.

The Lougheed/Broadway corridor is the only corridor which is both cost effective and contributes substantially to shaping growth in a manner compatible with the regional plan. As the most cost effective, it cost less to build, it provides the highest benefits to the transit user and is more environmentally sound. As a shaper of growth it connects three major centres within the compact metropolitan area. These benefits are realized using either ALRT or Enhanced LRT as a transit technology but based on the results of the Multiple Account Evaluation, Enhanced LRT in the Lougheed/Broadway corridor would appear to be the most cost effective transit technology.

5.0 CONCLUSION

This report is intended to advise Council of the results of the Multiple Account Evaluation as it relates to the rapid transit network approved by the GVRD Board on 1995 June 08. In this respect the results of the Multiple Account Evaluation are clear and unequivocal in the assessment of the Lougheed/Broadway corridor as the best choice overall.

In conclusion the Multiple Account Evaluation represents the only comprehensive and consistent evaluation of all the options for rapid transit in Greater Vancouver. In this respect it provides a solid foundation upon which to base decisions regarding the phasing of development of the rapid transit network approved by the GVRD Board.


D.G. Stenson, Director
PLANNING & BUILDING


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cc: Director Engineering
Director Finance
Director Recreation and Cultural Services

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