Report to Vancouver City Council

on the

Richmond/Airport/Vancouver Rapid Transit Project

Independent Review: Phase I

February 2003
Edited & Expanded 20 Feb 03

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February 20, 2003

To Vancouver City Council,

It gives me great pleasure to transmit to you the Final Report of the Phase 1 Independent Review of the Richmond-Airport-Vancouver Rapid Transit Project.

This report was initially prepared between January 30, 2003, when Council requested it, and February 4, 2003, the submittal deadline. Small edits were made overnight and a corrected report widely distributed on February 5, 2003. This very short time frame did not allow sufficient time for adequate review by the authors, nor was there time for external review.

On February 11, 2003, the report was presented to the Transportation and Traffic Committee, along with additional information about the Richmond/Airport/Vancouver Rapid Transit Project planning process and Multiple Account Evaluation methods and results.

The February 5th report has now been extensively reviewed by staff from the City of Vancouver, TransLink, and the Greater Vancouver Regional District and numerous corrections have been incorporated. We are grateful for their time and attention and the excellent comments received; any errors that remain in the report are mine.

The updated report includes new information from the Richmond-Airport-Vancouver-Project Bus Network Strategy report, dated January 31, 2003. It also includes a brief discussion of transit modes; more detail on modes is included in the PowerPoint slides from the February 11, 2003 presentation. Finally, more information has been added about the Public-Private-Partnership approach.

The only significant change in the report's Gaps and Questions for Council is inclusion of a question regarding the comparative costs and transportation benefits of different mode choices, the fundamental question contained in your December motion that has not yet been addressed.

Thank you for the opportunity to work with you on this very important project.

Respectfully submitted,

Mary Jo Porter, Partner
The Underhill Company

Contents

Why an Independent Review?

The region is moving quickly to a decision to proceed with the Richmond/Airport/Vancouver Rapid Transit Project (RAV).

In a January meeting[1] TransLink reported project capital cost, without interest during construction, to be:

- $ 1.75 billion*

Interest during construction could increase this to:

- $2.0 billion

Funding for RAV is expected to come from four of its eight project partners:

- Province of British Columbia
- Federal Government
- Vancouver International Airport
- Greater Vancouver Transportation Authority (TransLink)

RAV is also looking to a private partner, who would receive an annual payment from TransLink – from fares and increased taxes – over 30 to 35 years, to design, build, finance and operate the project.

***See Appendix A: How Much Will RAV Cost**

With a decision on the project imminent, the City of Vancouver Council has asked for:

- an independent review of project work to date;
- a report on the adequacy of technical information to support a Council decision on RAV; and
- recommendations for areas of further study.

The critical questions are:

> ➢ **Do Vancouver City Councillors have adequate information to make an informed decision about the RAV Project?**
>
> ➢ **If not, where are the gaps and what questions need to be answered before a decision is made?**

How the Review was Conducted

Project Reports

The RAV Project has been working through 2002-03 on:

- Project Definition, including:
  - Scope and Configuration
  - Performance Standards
  - Cost Estimates
- Financing, including
  - Ridership and Revenue Forecasts
  - Financing Plan
- Governance and Government Approval
- P3 Structure and Process
- Project Tendering, including a process for:
  - Requests for Expressions of Interest
    - Released November 2002
  - Requests for Proposals
  - Selection of Bidders
  - Best and Final Offers
- Pre-Construction, including
  - Geotechnical
  - Mapping

As a part of this effort, a Peer Review was convened for two days in November 2002 to review project work to date.

Reports in all these areas have yet to be completed and released; they are expected to be available by February 27, 2003.

It was decided, however, rather than have the consultants wait for the new material, to review the huge amount of work completed to date and, on that basis, to identify information gaps and unanswered questions.

Many of these gaps may be filled, and the questions answered, once the RAV reports are released. Other questions will no doubt remain.

Meetings and Conversations

In addition to reviewing the written reports, the consultants also participated in formal meetings with staff representing:

- City of Vancouver Engineering Department
- City of Vancouver Planning Department
- TransLink
- GVRD
- RAV Project Office
- Pricewaterhouse Coopers

The consultants were also able to talk informally with a number of people working on or associated with the project.

Project Background

Rapid transit between Richmond and downtown Vancouver has long been a part of regional and local plans. The first major study of project alternatives, done in 1992, presented technical data but did not state conclusions.

Now or later: In 2000, a study was undertaken to decide whether to consider building rapid transit in the Richmond/Airport/Vancouver (RAV) corridor by 2010, or to wait until 2021. The study consisted of two parts: a Multiple Account Evaluation (MAE) that looked at the costs and benefits of building rapid transit now or later; and a Public-Private-Partnership (PPP) study that looked at opportunities to attract private financing to the project.

The MAE concluded that a comparison of capital costs and user benefits reveals that the net benefits for 2010 implementation are similar to those for 2021 implementation. That is, in terms of timing, transportation benefits do not favor early implementation over later. It also concluded, however, that results related to economic, land use, environmental and social benefits, justified building the project earlier.

The PPP report concluded that there were numerous opportunities to attract private financing to the project, including transfer of land development rights to a private partner. It also suggested that to attract a private partner the rapid transit line must be primarily grade-separated.

Cambie subway decision: Without further consideration of project alternatives, the region moved forward to pursue grade-separated rapid transit between downtown Vancouver, the Airport and Richmond, primarily in a tunnel under Cambie.

Project development: Over the last year, the RAV Project has been engaged in developing the project and exploring a structure to finance, build and operate it as a PPP. The Project released a Request for Expressions of Interest last November and is now moving forward to deliver the project in time for the 2010 Winter Olympics.

Range of costs: Early analysis showed that the RAV line, if built in a subway under downtown and Cambie, could easily cost more than $2 billion. Early analysis of at-grade options suggested costs in the range of $800m-$900 million (up to $1.3 billion with the airport extension), but these options were never fully developed.[2]

Council request for more information: Vancouver City Council expressed its support for the project in April 2002, subject to a complete analysis of surface rail and bus options, which Council has not yet seen.

Now, Vancouver councilors have asked for the answers to questions raised in motions last April and December, and for an analysis of options to achieve the goals of the RAV project more economically.

Based on the information reviewed to date, the following key conclusions can be drawn:

- **Funding Gap**: Assuming capital contributions of $1.05 billion from the Federal Government, the Province of British Columbia and Vancouver International Airport, a $2 billion project could have a capital funding shortfall closet to $900 million. This shortfall will have to be covered from fares and tax increases.

- **Impacts on TransLink**: The long term financial impacts of the RAV investment on TransLink's services and other projects needs to be detailed.

- **Cost-effectiveness**: A subway under Cambie has not been conclusively demonstrated to be the most cost-effective option for rapid transit in the RAV corridor.

- **Surface options**: A comparison to an optimized, predominantly surface light rail or bus alternative needs to be reviewed in order to determine the most cost-effective option for the RAV project.

- **Cost savings**: Based on early Multiple Account Evaluation analysis, the potential cost savings of developing and implementing an acceptable at-grade rail system could approach $1 billion, while savings for a bus rapid transit system would be even higher. The comparative costs and advantages of other options need to be revisited when the new RAV documents, defining the project and detailing its costs and benefits, are released.

Gaps and Questions for Council

Is rapid transit in a tunnel the best project for Vancouver? How do other, lower cost alternatives compare?

Background

Linking Richmond and Vancouver with Rapid Transit has been a long-standing regional objective. More recently, much of the planning for RAV has been driven by considerations of how to get people from the Airport to downtown on rapid transit as fast as possible. To do this requires a train in its own right-of-way stopping as few times as possible.

However, only a small share of trips on RAV will be to or from the Airport. The vast majority will be commute trips for riders from Richmond and points south, as well as commute and local trips in Vancouver.

Council has explicitly asked for a comparison of costs and benefits for different technologies, including SkyTrain, at-grade light rail, and Bus Rapid Transit. That work has not been forthcoming.

Gaps and Questions

- What are the costs and transportation benefits of SkyTrain, or a primarily grade-separated system, compared to those of an optimized rail system primarily at-grade and a Best Bus alternative?
- If it were possible to build both the RAV line and the Broadway line at-grade, for the same cost as the RAV line in a tunnel, how many more riders would be served on these lines and system-wide?
  - Would higher revenues from two lines defray a greater portion of the total capital and operating costs?
- What analysis has been done of Vancouver ridership? Where are Vancouver riders coming from and going to?
- Is the additional time required to get in and out of tunnel stations (about five minutes more per trip compared to at-grade stations), made up for by faster trains, particularly for short trips?
- Would it be better for Vancouver riders to provide more at-grade stations and serve more locations, versus providing fewer tunnel stations? (At-grade stations are less than a tenth the cost of tunnel stations.)
- What will be the impacts on bus service in Vancouver due to the added cost to TransLink for RAV over the 30-35 year repayment period?
- What are the construction impacts of digging the tunnel and constructing the underground stations along Cambie, compared to building the project in street right-of-way?

Will the project achieve the expected land use, economic and environmental benefits?

Background

The RAV analysis that served as the basis for the decision to build a Cambie subway asked only the question: "Should the project be built now or later?"

The basis for the work was theoretical "shadow routes" that were not meant to fully represent actual transit investments that might best serve the corridor.

Only a limited comparison of alternatives was undertaken (based on roughly developed theoretical "shadow routes"), although an optimization study did conclude that moderate improvements in an at-grade system would result in major ridership increases.

The conclusion to build the project now was based on economic, land use, environmental and social benefits. The conclusion to build a subway was based on the PPP study recommendations as well as the other analysis.

Gaps and Questions

- **Land Use:** What specific land use benefit, or land-shaping, is anticipated from this project? Will there be major changes in the zoning in the Cambie corridor to support high density development around the stations?

- **Economic:** What economic benefits are anticipated from the project? The MAE showed the major economic benefit was the receipt of taxes by government on the cost of construction; taxes that will, in fact, be paid with government funds. Are there other demonstrable economic benefits? How do they balance against the costs required to build it?

- **Environmental:** Replacing on-street bus routes with rail in a subway in this corridor could free up substantial road space for vehicles. Early project analysis showed that up to half the travel time benefits accrued to drivers rather than to transit riders. Have the air quality impacts of more traffic been fully explored? What are the air quality impacts of building the system (manufacturing concrete is extremely polluting) and how many years does it take to balance these with the air quality benefits of more transit riders?

Is the project affordable?

Background

SkyTrain's Expo and Millennium lines were built by the Province. This time, with the Province facing a deficit, it proposes to pay only a small percentage of the cost. The Federal government may also contribute, but probably less than a quarter of the total cost. YVR's contribution – covered by the Airport User Fee – can only be spent to serve the Airport.

TransLink proposes to contribute about $300 million up front, and will also have to cover, from fares and tax increases, payments to a private concessionaire to cover the remaining cost required to build the project. This funding gap could be as much as double or more TransLink's initial contribution.

By 2005, TransLink will need to find new revenues simply to operate the service already in place.

Simply stated, aside from the Provincial and Federal contributions, and the share of Airport User fees paid by non-residents, the project costs will come from local taxpayers and transit riders.

Gaps and Questions

- **Fare and tax increases**: What fares, taxes and fees will have to be raised for TransLink to fund its $300 million share, and its 30-35 year stream of payments to cover the private concessionaire's investment?

- **Other transit needs**: With the debt burden of RAV, how will TransLink maintain the existing system, as well as fund other regional transportation infrastructure and service expansion needs?

- **Fares and regional ridership**: If increased fares are required to pay for the RAV line, what will be the impact on regional transit ridership? How much could fares be raised without overall system ridership declining?

- **Fares and capital costs**: Could construction of a lower cost system avoid the need for fare increases and would total system ridership be higher as a result?

Does a PPP bring added value?

Early analysis of a PPP identified three major reasons to consider a Public-Private Partnership (PPP) approach.

- Increased transfer of risk to the private sector
- Improved cost effectiveness of service delivery of the project
- Increasing level of 'user pays' in the community

In subsequent project development, the possible private sector role has been substantially redefined. TransLink will control schedules, fares and marketing, thus limiting the ridership/revenue risk that can be transferred to the private sector.

Payments to the private sector for building, financing and operating the system will have to come from fare revenue or tax increases.

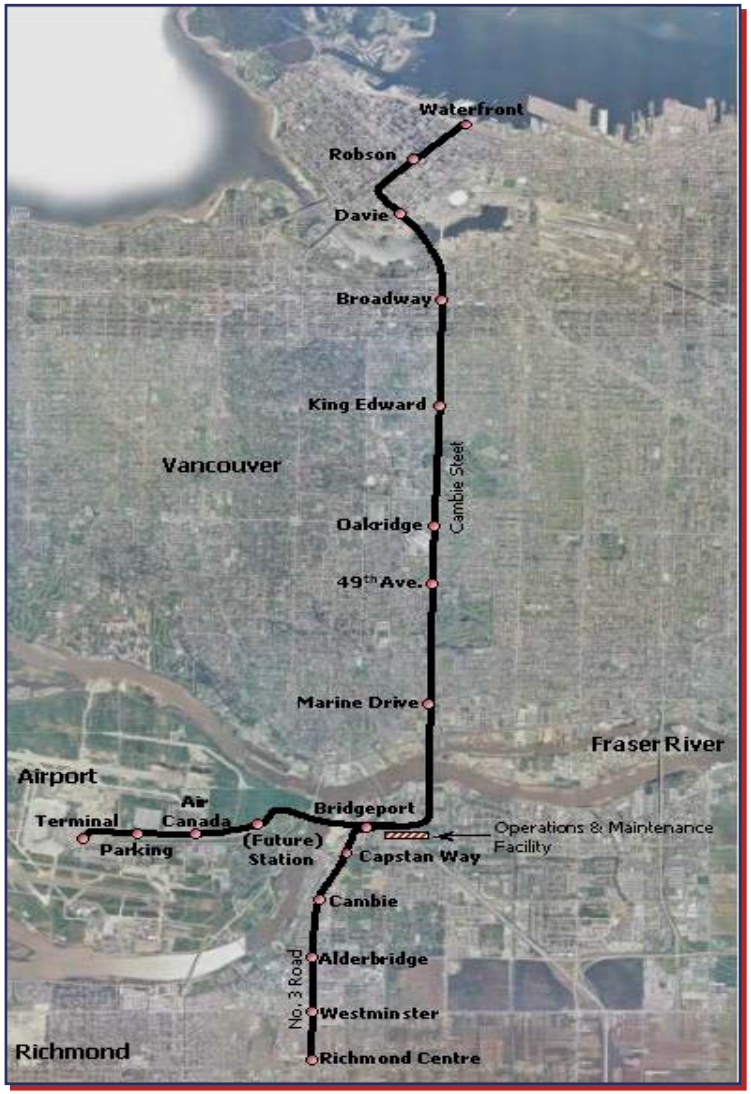
- **Risk**: What risk will be transferred to the private sector to justify the substantially higher cost of private debt/capital (possibly about 4% higher) and of GST (7% for the private sector versus 3% for the public sector)?
- **Cost-effectiveness**: What benefits, and cost savings, will a PPP deliver beyond those that would be delivered by a conventional Design/Build approach to project construction?
- **User Pay**: What fare revenue will be tapped to repay private debt and capital? Will fares be increased to pay for RAV? If so, are the increases higher or lower with a PPP?
- **Tax increases**: What taxes will be increased to pay for RAV? Are the increases higher or lower with a PPP?

Richmond/Airport/Vancouver Rapid Transit Project

The RAV Project

RAV is a rapid transit line between downtown Vancouver, Richmond Centre and Vancouver International Airport. The following description comes from the Request for Expressions of Interest issued in November 2002.

- 19.5 km in length (including both branches)
- Travel Times: Vancouver/Richmond: 30 minutes
  Vancouver/Airport: 25 minutes
- Required design capacity to serve peak hour ridership
  - Bridgeport/Vancouver: 5,300 passengers
  - Bridgeport/Airport: 1,640 passengers
  - Bridgeport/Richmond: 1,900 passengers
- 15-18 stations, including:
  - 3 in downtown Vancouver
  - 5 along Cambie in Vancouver
  - 6 in Richmond
  - 4 at the Airport
- Alignment Profile
  - Significant portion in tunnel in Vancouver
  - Bridge over the Fraser River
  - Park-and-ride and transfer facility at Bridgeport
  - Grade separated with Highway 99 in Richmond
  - Elevated on Airport lands
  - Richmond: Not specified
- Operations and maintenance facility in the Bridgeport Area
- Project Approach: Design/Build/Finance/Operate



RAV Planning: MAE and PPP

RAV Line: Build by 2010 or 2021?

In 2000, the Richmond/ Airport/Vancouver Project office undertook a "Multiple Account Evaluation" (MAE) study to answer the question:

- Should a rapid transit line be built connecting Vancouver, Richmond and the Airport by 2010, or delayed to 2021?

Framing the options: Shadow Routes

In order to answer the 'now or later' question, the study team defined 'shadow routes' to represent the range of rapid transit alternatives in the corridor. The four routes were at-grade (LRT) and grade-separated (SkyTrain) alternatives in the Cambie and Arbutus corridors.

The shadow routes were not designed to represent actual transit projects that might be constructed and were only roughly detailed in terms of cost and performance.

Alignments and Cost Estimates

Rough capital costs were developed for all four alternatives. On the Arbutus route, SkyTrain was assumed to operate in a tunnel in downtown Vancouver, and in an open cut along the Arbutus rail corridor. On Cambie, SkyTrain costs assumed a tunnel from downtown to 37th, after which SkyTrain would operate in an open cut in the middle of the street. Both alignments were elevated south of the Fraser River. **The capital cost estimates for these alternatives were about $1.5 billion (excluding vehicles) or $1.85 billion if the airport extension is included**.

The at-grade (LRT) routes costs were based on a system with its own right-of-way (the rail ROW on Arbutus and a separate ROW in the street on Cambie), but with little or no grade separation at intersections, and no priority measures such as a system to turn lights green for the trains. **The capital cost estimates for these alternatives were about $850 million, excluding vehicles, or $1.1 billion with a line to the Airport**.

Performance

Not surprisingly, the SkyTrain alternatives were 10-14 minutes faster than the LRT systems, and ridership was correspondingly about 50%-60% higher.

Macquarie Bank PPP Analysis

Simultaneously with the MAE Analysis, Macquarie Bank was hired to prepare an analysis of the Public Private Partnership potential for the RAV Project. Underlying key principles for a PPP reported by Macquarie are:

- **Increased transfer of risk to the private sector**
- **Improved cost effectiveness of service delivery of the project**
- **Increasing level of 'user pays' in the community**[3]

Macquarie stated …"the RAVP displays strong characteristics supporting a PPP delivery mechanism…

- ability to meet all operating costs from the farebox;
- strong potential for premium services…to cross subsidize other elements of the project;
- potential for innovation in route and technology selection and implementation;
- comparatively few government or institutional constraints on private sector involvement;
- significant capital cost recovery potential through farebox revenues and potential associated commercial benefits arising from the project;
- economic justification for government capital cost support or other forms of contribution;
- potential for private sector cost of capital to come close to public sector cost on an appropriate risk transfer basis; and
- potential for significant construction, maintenance, operations and financial risk transfer to the private sector..."[4]

Macquarie acknowledged that project revenues (primarily fares) would not generate enough revenue to cover the project's capital costs. The report also noted that transaction costs and costs of capital are higher for the private sector. However, it went on to say that if a larger benefits capture (beyond farebox revenues for RAV) could be incorporated into the project, the private sector might be able to support "a full Build Own Operate Transfer model."

PPP: Why borrow/finance privately

Governments can borrow at lower interest rates than the private sector, in line with the limited risk faced by bond holders when debt is backed by tax revenues. Generally these tax revenues are fairly stable and have a long history of collections, allowing lenders to easily assess the likelihood a government will default on its obligations.

The GVRD can raise funds quite cost-effectively for TransLink through the Municipal Financing Authority of British Columbia, but only up to a debt limit of $1.39 billion, subject to increase by the GVRD.

If TransLink were unable to raise adequate funds for this project through conventional means, it would have to look elsewhere. However, its debt obligation for the additional funds would still remain, and would still have to be covered almost entirely by fares and tax revenues.

Where to find the details

A more detailed explanation of how a PPP might work is in the funding section of this report, starting on page 48

How the Private Partner Earns a Profit

Macquarie identified a number of ways in which the private partner in a transportation project can recover its costs, with profit. These include:

Operating support: The government agrees to a set annual operating payment; in exchange the private partner must deliver the project/service.

Shadow fare: Each transit rider pays a cash fare and the government pays an additional 'shadow fare' to the private partner for every rider.

Top-up fares: The government pays an additional "top-up fare" for riders who pay reduced fares, such as children and the elderly and, potentially in this case, airport employees.

The following are Macquarie options that have reportedly now been eliminated from consideration:

Value Capture: The private partner is granted property development rights along the corridor, particularly at the stations.

Expand project: Include the existing SkyTrain lines and possibly the Western Extension in the PPP.

Road Tolling and Parking Charges: Fees levied on other facilities are paid to the private partner.

Making the Decision: A Cambie Subway

Based on the MAE analysis and the PPP report, the region moved forward with Richmond/Airport/ Vancouver Rapid Transit Project implementation. Vancouver City Council has approved the project in principle, subject to analysis of surface rail and bus options, review of the financing plan and the results of a broad public consultation process. This has not yet been provided. The Greater Vancouver Regional District has not yet approved the project.

Although the MAE analysis was designed only to answer whether the line should be built "now or later," the decision was made to go forward including corridor and alignment selection – rapid transit largely in a subway in Vancouver.

An April 3, 2001 memo from the RAV Project Director and the CEO of TransLink to the TransLink Board of Directors reported as follows:

Quantifiable measures neutral on project

*"On the question of timing: for the quantifiable benefits and costs, where the study put the most emphasis and rigour, the answer to the timing question is neutral within the accuracy of the analysis**; the quantifiable measures alone give no reason to delay or proceed with rapid transit for 2010**."*

Project supports smart growth, environment, economy and livability

*"The report concludes that the quantitative measures – costs and benefits – associated with construction of the line do not provide a clear answer within the limits of the analysis. However, **when qualitative benefits – more appropriate urban development (smart growth) and the advantages for the environment, the economy, and livability of the region – are considered, these lead to a conclusion to build rail transit from Richmond and the Airport sooner rather than later**"*

Surface options eliminated

*"**The CEO recommends that further analysis of a rail transit connection through Vancouver be restricted to underground (tunneled or cut and cover) options**."*

*"The Richmond/Airport to Vancouver Project was not intended to reach technical conclusions related to alignment or technology in this phase. However, the CEO, noting Macquarie's comments and the substantially greater benefits identified for high speed grade separated options, believes that for this **project the Board should preclude at grade options in Vancouver in future work, to avoid both unnecessary analysis and continuing community issues related to surface options**."*[5]

Public asked about timing only, not corridor or technology

With regard to public consultation results, the memo noted:

*"**Questions were restricted to a rail project connecting the Airport, Richmond and Vancouver; they did not address technology or corridor preference**."*[6]

Vancouver Council Actions on RAV

October 21, 1986; February 7, 1989; October 22, 1991; July 25, 2000

Council rejected elevated rapid transit in the City.

April 2002

- Support regional transit subway generally along Cambie to Richmond and Airport subject to the following conditions:
  - financing package approved by TransLink after consideration of implications for other regional transit priorities
  - technical review of:
    - specific alignment and station locations
    - bus-rapid transit integration plan
    - recommended solutions to traffic and environmental impacts
    - impacts of stations and alignment on adjacent neighborhoods
  - broad consultation process and approval process involving affected cities, and considering city issues and neighborhood feedback.

[*As of February 2003, the information requested in this motion has not yet been provided to Council.]*

The April motion also stated:

- First priority is replacement of trolley fleet and expansion of bus service.
- Support participation in TransLink – Vancouver Area Transit Plan and request TransLink to place high priority on commencing this study.
- Support Downtown Streetcar.
- Support extension of Millennium Line as subway to Granville.

December 2002

- Motion supporting rapid transit in RAV corridor subject to:
  - Analysis of Light Rail, SkyTrain and Rapid Bus to demonstrate:
    - Subway more cost-effective than surface system
  - Analysis to include:
    - Alternate routes to Richmond
    - Identify full funding before commencement
    - Effects on operations and capital funding of entire Transit system

January 2003

Council hired an independent consultant to review RAV project and the suggest how to provide the information asked for in the April and December 2002 motions.

Context:
Goals for Transit

Regional Context

This section describes the work that underlies the RAV project, including the framework of regional and city transit planning.

Gaps and Questions for Council

- Specifically how, in terms of ridership and vehicle volumes, does the project contribute to meeting the region's and the city's land use goals and transportation targets?
- What specific land use benefits, or land-shaping is anticipated from this project? Will there be major changes in the zoning in the Cambie corridor to support high density development around the stations?
- What economic benefits are anticipated from the project? The MAE showed the major economic benefit was the receipt of taxes by government on the cost of construction; taxes that will, in fact, be paid with government funds. Are there other demonstrable economic benefits? How do they balance against the potential $2.0 billion required to build it?
- Replacing on-street bus routes with rail in a subway in this corridor could free up substantial road space for vehicles. Early project analysis showed that up to half the travel time benefits accrued to drivers rather than to transit riders. Have the air quality impacts of more traffic been fully explored? What are the air quality impacts of building the system (manufacturing concrete is extremely polluting) and how many years does it take to balance these with the air quality benefits of more transit riders?

Planning: The Regional Context

Master Framework: A Livable Region

In 1992, the first major study looked closely at rapid transit alternatives in the Vancouver/Richmond corridor. Between 1992 and 2000, when the present work started, additional studies built on the 1992 work and explored different elements of the project.

Ultimately, the decision to advance the project was made based on perceived land use, environmental, economic and social benefits, not transportation benefits. This section provides background on the region's and the City's planning framework.

Livable Region Strategic Plan

Greater Vancouver's Livable Region Strategic Plan is a blueprint for a compact region of strong centers linked by major investments in Intermediate Capacity Transit Systems, (technologies capable of carrying 10,000 passengers per hour). **Achieving the Plan's goals relies heavily on the idea that transit can shape land use**. This is an idea that continues to be vigorously debated among planners.

Results in Greater Vancouver have been mixed: at some SkyTrain stations there has been tremendous new development and at others very little.

Transport 2021

Transport 2021 details the region's transportation priorities to implement the LRSP. "Intermediate Capacity Transit System" (ICTS) projects included in the plan are:

- **Lougheed-Broadway**
- **Coquitlam-New Westminster**
- **Richmond-Vancouver**

GVTA Strategic Transportation Plan (STP) for 2000-2005

TransLink (the Greater Vancouver Transportation Authority) prepares a five-year program within the framework of Transport 2021. Its Rapid Transit Actions for 2000-2005 are:

- **Implement Coquitlam-New Westminster**
- **Implement Western Extension-Broadway**
- **Study Richmond/Vancouver Line**

TransLink's 2003 Transportation Plan

TransLink's 2003 Plan calls for it to complete an **Area Transit Plan for Vancouver/UBC, one of two area plans not yet completed**. Ideally this work will develop a balanced and affordable approach to optimizing transit service in Vancouver; it's unfortunate that it's not available now to inform Councillors' decision on RAV.

The 2003 Transportation Plan also calls for TransLink to:

- **Gain Project Approval, RAV Rapid Transit Line**

2010 Winter Olympics Bid

TransLink's website on the RAV project states:

> "*Late last year [2002] the Province announced it intended to seek federal and local cooperation to include a Richmond/Airport/Vancouver rapid transit link in the 2010 Winter Olympic bid. In February, the TransLink board of directors identified this project as a candidate for federal funding under the Olympic umbrella. City of Vancouver, as host city, approved the Cambie corridor as the corridor most appropriate for a regional connection between Richmond and downtown*." [7]

Ultimately, the decision was made not to include RAV in the Olympic Bid book: Doing so would have raised the local cost of the Olympics by about $2 billion; and committed the region to completing the project as part of the Olympics infrastructure preparations.

The current project schedule, however, would deliver the project in time for the Olympics.

Kyoto Accord

Canada has recently signed onto the Kyoto Accord. This is major important initiative to lead the country toward a reduction in greenhouse gas emissions.

Is RAV best option to reduce greenhouse gases?

This question has not been answered in the analysis to date. An important issue is the balance between air quality benefits of more users on transit, and the greenhouse gas emissions generated in building the project. (Concrete production is a major contributor to greenhouse gas emissions.) Related questions are:

- How do the greenhouse gas emissions (ghg) of building rapid transit primarily in a tunnel compare to the greenhouse gas emissions of constructing light rail at-grade?
- Does replacing on-street buses with rapid transit in a tunnel – and potentially opening up more road space for vehicles – reduce or increase overall greenhouse gas emissions?

Planning: The Vancouver Context

Serving Growth with Transit

Vancouver's Transportation Plan is grounded in a vision of transportation as a means to a better city, not a goal in itself. The Plan sets out specific actions and targets.

- **Road capacity will not be increased**, except for the Port Road for Port-related traffic.
- **New trips will be served by transit, walking and biking.**
- **Light Rail Transit (LRT) corridors**:
  - **Lougheed-Broadway to Granville and eventually to UBC**
  - **Richmond to Downtown**
- **Convenient local access to transit will be maintained in the LRT corridors**

The Plan establishes specific 2021 Targets for Transportation against which progress is measured.

The targets are aggressive and can only be achieved through major expansion of transit in several targeted corridors. Otherwise, traffic will continue to grow and its impacts will worsen.

2021 Targets for Peak Period (6-9 AM) travel

- Downtown Vancouver:
  - 120,000 trips, with 44% on transit
  - *Requires rail and bus to deliver 52,000 people –* **20,000 more** than 1992
- Central Broadway
  - 38% on transit (up from 15% in 1992)
  - From 3,600 to 11,000 riders – **threefold increase**
  - *Most new transit trips on light rail.*
- UBC
  - 36% on transit, versus 20% in 1992
  - **12,500 peak riders**
- Rest of City
  - 15% on transit versus 12% in 1992

2021 Targets: All Day Travel

- No increase in road capacity downtown.
- 34% transit use to Downtown
- 25% transit use to Central Broadway
- 33% transit use to UBC
- 19% of all trips in Rest of City on transit

Some Remarkable Successes in the City

In contrast to the mixed results of growth management/transportation strategies for the region as a whole, Vancouver has had some remarkable success stories.

In the downtown, balancing housing and jobs is working. With more people living downtown – and walking to work – fewer vehicles are coming into the downtown peninsula during peak hours.

At UBC, transit ridership has grown significantly with the introduction of the B-Line Rapid Bus. A referendum on U-Pass passed overwhelmingly just this month. Set to take effect in the fall of this year, U-Pass could increase transit ridership to UBC by another 25-30%, assuming more bus service is made available to meet the demand.

Shaping Vancouver with RAV?

What does Vancouver hope to achieve with RAV in terms of shaping and serving the city? On the Expo line, for example, 25 acres of industrial land was rezoned for 2,500 housing units in the Collingwood Village development. At other stations, such as Nanaimo and 29th Avenue, very little development has occurred, because residents and Council decided to preserve existing neighborhoods as they were before SkyTrain.

Land Use Plans

Reviews of Vancouver's City Plan, the Transportation Plan and the Downtown Transportation Plan, show that the city is not trying to shape land use along the Cambie corridor – no new Collingwood Villages are planned there.

The key policy is to better serve existing riders, attract new riders, increase growth in the downtown, and minimize the impact of commuters passing through the city.

Role of RAV

The role of rapid transit in the RAV corridor in Vancouver, therefore, is most importantly to provide transportation to support Vancouver's vision.

The MAE analysis done at the beginning of the RAV project found that the transportation benefits of the project were "neutral" with regards to "now or later" and, on a transportation basis alone, did not support early implementation of the project.

Technology and Serving the Riders

Technology and Serving the Riders

Gaps and Questions for Council

Much of the planning for RAV has been driven by considerations of how to get people from the Airport to downtown as fast as possible. To do this requires a train in its own right-of-way stopping as few times as possible. However, the vast majority of RAV riders will be commuters and local trips, not air travelers.

- What are the costs and transportation benefits of SkyTrain, or a primarily grade-separated system, compared to those of an optimized rail system primarily at-grade and a Best Bus alternative?
- What analysis has been done of Vancouver ridership? Where are Vancouver riders coming from and going to?
- Is the additional time required to get in and out of tunnel stations (about five minutes more per trip compared to at-grade stations), made up for by faster trains, particularly for short trips?
- Would it be better for Vancouver riders to provide more at-grade stations and serve more locations, versus providing fewer tunnel stations? (At-grade stations are less than a tenth the cost of tunnel stations.)
- If it were possible to build both RAV and a Broadway line at-grade, for the same cost as the RAV in a tunnel, how many more riders would be served?
- What will be the impacts on bus service in Vancouver due to the added cost to TransLink for RAV over the 30-35 year repayment period?
- What are the construction impacts of digging the tunnel and constructing the underground stations along Cambie, compared to building the project in street right-of-way?

Technology: SkyTrain, Light Rail or Bus

The RAV project is leaving the choice of rail technology up to the private bidders, an approach that is certainly unique in North America and may be unique in the world.

Technology choice does not necessarily define the performance of a rapid transit system, but it does significantly define its physical characteristics: whether or not it must be entirely grade-separated; how it looks; how it fits into downtowns and neighborhoods; its right-of-way requirements; station access, convenience and appearance; and so on.

Generally technology choice is driven by a combination of:

- operating requirements – primarily capacity and speed;
- right-of-way availability and preferences – for example is an elevated system acceptable; and
- rider and community preferences – how do they want to access the system and what look and feel do they want.

In its motions, Vancouver Council asked for analysis and comparison of rapid bus, surface rail and SkyTrain. This section looks very briefly at the pros and cons of these three technologies. Additional information, including slides of projects in other cities, is included in the PowerPoint presentation made to Council on 11 Feb 2003.

Technology pros and cons

SkyTrain

+ If the project is in a tunnel, SkyTrain requires a smaller diameter tunnel which reduces tunnel costs.
+ Driverless operation reduces cost.
+ Flexible with regards to headways; relatively low cost to add more service.
+ Capacity – more than enough to meet demand in corridor.
+ Visibility – if elevated, tells people where the line is.

- Proprietary technology. Drives up cost. Locked in forever to one supplier.
- Must be 100% protected right-of-way because of third rail and no drivers.
- Elevated is visually intrusive; Vancouver has longstanding policy of no elevated transit in the city.
- Elevated more expensive than at-grade; tunnel much more expensive.
- Because of very high cost, concentrates investment in few corridors.

Light Rail

+ Flexible: can be elevated, tunnel, at-grade.
+ Non-proprietary: components widely available from multiple manufacturers through competitive bidding.
+ Can benefit from future advances in technology; systems routinely upgraded over time to improve performance and passenger comfort and convenience.
+ Major upgrades can be accomplished over time to improve performance as needed, for example grade separating major intersections.
+ Visibility – elevated or at-grade – tells people where the line is.
+ Access: if at-grade, stations are low cost and access for riders is fast and convenient
+ Security: if at-grade, passengers wait in open, visible environment.
+ Capacity: more than enough to meet RAV demand.

- Train length (and capacity) limited by block length at station locations; Vancouver has many long blocks available for stations.
- Requires drivers; higher cost operation.
- At-grade, slower operations; though only marginally slower in peak direction with signal priority.
  - With at-grade crossings, high-frequency service limits signal priority because of effects on cross-traffic.
- Concentrates investment in few corridors.

Rapid Bus

+ Fraction of the cost of rail alternatives.
+ Performance can be selectively enhanced over time with street improvements.
+ Common technology widely available from multiple bidders.
+ Flexible, expandable – by adding vehicle trips or adding corridors.
+ Network possibilities support many-to-many trip pattern.
+ Because of low cost, can be developed in multiple corridors (as the region is doing now).

= Lower capacity than rail – if demand very high may require splitting service between streets.

- "Wall of buses" perception of pedestrians.
- Not as clearly understandable as rail, particularly to visitors.

RAV Markets: Who Will Ride

Just as local travelers often use freeways as a shortcut, and long distance travelers sometimes choose to snake their way through less congested city streets, rapid transit projects typically serve many different types of riders for many different trip purposes. Some riders will travel end to end for a work trip, while others might ride only to the next station to go shopping.

Ridership: Who Will Ride RAV

Ridership forecasts for RAV are scheduled to be released late-February. Preliminary numbers show about 100,000-110,000 daily riders on the line, or twice the ridership on the Millennium Line and about 80% of that on the Expo Line.

Currently, 18,000 people ride Rapid Bus in this corridor, and close to 40,000 altogether commute by transit from Richmond and the southern suburbs – Delta, White Rock and Surrey. Adding the riders on local routes on Cambie, Oak and Main increases the total corridor ridership to over 60,000.

To achieve RAV's ridership projection there would have to be a significant transfer of riders from the buses in the corridor to 'feed' the rail route. To accomplish this, suburban express buses would terminate at a rail station.

Local riders now on Cambie, Oak and Main buses will likely use RAV for some trips, and stay on the local buses for others.

Bus Network Strategy

The Bus Network Strategy recently completed by TransLink[8] envisions adding about 35% more bus hours in the corridor, to support the rail line. (Without RAV the plan envisions nearly 50% more bus hours in the corridor.) TransLink will likely be challenged to fund the increased service; the annual cost is $35 million more than today, plus a one-time $8 m in capital costs for new bus facilities. However, if it is successful in doing so, the bus investment will go a long way to ensuring the success of the rail line.

Most of the trips are relatively short

The average trip length is about 8 km, about half the length of the line, compared to an average regional commute of about 14 km. (The 19 km line includes two branches; the distance from Richmond to downtown Vancouver is about 15 km.)

Travel time: does it matter

It matters a great deal but a faster train isn't always the best solution.

Travel Time: What it means for RAV

A transit trip is not only time riding, but also getting to and from the station and waiting for the train or bus.

Time on the train – 15 minutes

Given the relatively short average trip length on RAV, the time spent on the train, whether it's SkyTrain or LRT, is likely to be only about 15 minutes.

Waiting for the train – 2-1/2 to 3 minutes

The time between trains will be about 5-6 minutes during peak hours and mid-day. (It will be longer in the evenings and at night.) The average wait time is half the time between trains, so it will be about 2-1/2 to 3 minutes.

Station access/egress: 1-6 minutes

At-grade stations take about 30 seconds to access once you "get there"; the time it takes to cross to the middle of the street. Elevated stations take about 90 seconds to access, so overall add 2 minutes to the average trip compared to at-grade stations. Tunnel stations take about 3-4 minutes to access, depending on design; if there's a tunnel station at both ends of the trip, it adds about 5 minutes.

Getting to the station

The time to get to and from the station will vary widely based on where people start from, where they are going, and whether they walk, bike, bus or drive.

Travel time on RAV, therefore, for the average rider will be comprised of:

- 15 minutes on the train
- 2-1/2 minutes waiting for the train
- 1 to 6 minutes getting in and out of the station
- + walk, bike/bus/drive time to/from the station

RAV Speed Specifications

The Request for Expressions of Interest sets train travel time requirements proponents must meet. These are:

- 25 minutes from Airport to downtown Vancouver
- 30 minutes from Richmond to DT Vancouver

These travel times will be difficult or impossible to achieve without a fully grade separated system.[9] This would mean that the system must be in a tunnel or elevated in Vancouver.

However, increasing the requirements by 5 minutes for an at-grade system, could result in about the same total travel time for passengers, because of faster station access times.

Waiting is worse than both walking and riding

There are a number of factors that affect ridership; suffice it to say that time spent waiting for the train is considered twice as "onerous" as time on the train; while time getting to and from stations is about 1-1/2 times as onerous.

RAV Market 1: Airport Passengers

A small share of the market

Much of the design work on RAV has been driven by the needs of Vancouver International Airport.

Potential riders to and from the airport include:

- Cruise ship passengers
- Business travelers
- Tourists
- Local travelers and "Meeters and Greeters"
- Airport employees
- Intra-Airport travel

Cruisers

The vast majority of cruise ship passengers arrive in organized groups, have trolleys full of luggage, and travel with family or friends. Most are met by tour buses and taken to and from the ships. Initially considered a potentially lucrative market that might pay a premium fare, cruise passengers are no longer anticipated to be at all likely to ride the train between plane and ship.

Business Travelers

They tend to be on an expense account and take cabs or rent a car. Some might ride RAV.

Tourists

Tourists coming to visit Vancouver will ride transit from the airport if it's easy to find, easy to pay, easy to understand, and if it takes them to or very close to their hotel. (Tourists are very likely to ride transit during their stays, particularly rail because people feel they can't get lost – the train always goes back to where they got on.)

Local Travelers and Meeters and Greeters

Most locals flying out of YVR are dropped off by family or friends. Most people meeting flights drive to the airport. Some will take rail, particularly if they don't have a lot of luggage and it's convenient at the home end.

Airport Employees

Airport employees are the most reliable users for a rapid transit to the airport. They behave like other commuters. Their most likely reason *not* to ride is free parking at work. Currently only 2% of airport workers commute by bus.

Intra-Airport Travel

YVR has asked for 4 stations at the airport to serve as an airport circulator. These three additional stops add 2 minutes or more to travel time, making it even harder to meet the airport's required 25-minutes-to-downtown standard with anything but ALRT.

RAV Market 2: Suburban and Richmond Riders/Commuters

The project has 6 stations over 3.6 km in Richmond, a station spacing of about ½ to ¾ of a kilometer. This spacing is very close for a rail project. Commonly stations are about 2 km or more apart, except in dense downtowns.

There is a park-and-ride lot at Bridgeport that will attract additional riders from the Highway 99 corridor, including bus riders from Delta, White Rock, and Surrey. Express buses now operating to downtown would be terminated at a RAV station where riders would transfer to the train.

RAV Market 3: Vancouver Riders

Whether traveling downtown to work or shop, to Broadway to connect to the UBC Rapid Bus, to City Hall, the hospitals or Oakridge shopping center, Vancouver riders could find their transit trips fundamentally reshaped by the RAV line.

If 35% more bus service is added in the corridor, in addition to the rail line, most Vancouver riders should see better service. However, if the bus service is cut, many will be worse off.

Is a tunnel the best way to serve Vancouver?

Because other options were never fully explored, there is no analysis about how best to serve Vancouver riders. Although the Richmond Rapid Bus line is very successful, when it was implemented ridership initially went down because some people who used to have a "one-seat-ride" were forced to transfer to the rapid bus. Because there weren't enough buses on the #98 B-Line Rapid Bus in the early days, the added transfer and wait time resulted in longer trips for many riders. (Five peak period express routes now supplement the #98 B-Line, up from three initially.)

At a minimum, decision makers need to understand:

- where riders are coming from and going to – an origin/destination analysis;
- travel times including walking or taking a bus to the station, waiting and riding the train, and walking or busing from the station;
- total ridership comparisons for an at-grade, more easily accessible service

Paying for RAV

Paying for RAV

This section reviews the financing arrangements being discussed for the RAV Project. *It's important to note that, as far as the authors of this report know, none of the financing details have been finalized. The project numbers and associated comments in this section are speculative, based on conversations with TransLink and others, and may change significantly.*

Gaps and Questions for Council

Federal Contribution: ± $450 million

- **Amount of contribution**: Would the Federal contribution remain constant if the project were able to significantly reduce the total costs of the line?

- **Uses of Federal funds**: Would the Federal government be willing to have its contribution split between two projects (RAV and Broadway) if it were possible to build both for the cost (or near to the cost) of RAV as it is currently conceived?

- **Kyoto Accord**: GAP → A full analysis has not been done of the traffic impacts of RAV as it is currently conceived. The project could increase road capacity for cars and trucks if it removed a significant number of buses from the corridor. Early analysis showed that up to 50% of the project's travel time savings accrue to drivers.
  - What are the total air quality impacts of additional traffic, versus the air quality benefits of drivers attracted to the rail line? (A small proportion of RAV riders are likely to be 'new riders' – that is people attracted out of their cars.)

- **Olympics**: GAP → An analysis of the comparative construction schedules for LRT substantially at-grade versus LRT/ALRT substantially in a tunnel (in Vancouver) and the additional time available to make a decision should tunneling be minimized.

Gaps and Questions for Council

Provincial Contribution: ≈ $300 million

- **Amount of contribution**: Would the Provincial contribution remain constant if the project were able to significantly reduce the total costs of the project?
- **PPP**: GAP → Need a full analysis of the comparative costs over the life of the project for a design-build-finance-operate PPP versus a traditional publicly-financed, design-build project.

Airport Contribution: ≈ $300 million

- To meet the Airport's requirement of a 25 minute travel time to downtown, RAV has to achieve very high speeds, which require grade separation and limit the number of stations that can be served. There are 4 stations on Airport lands and only 5 stations the entire length of Cambie in Vancouver.
  - GAP → Analysis of the cost impacts of YVR's project requirements on the total costs of the project.
  - GAP → Analysis of economic cost-benefit of investing $500m-$750m or more in public funds to compete with private taxi/bus services now serving air travelers. (Should look at comparative cost of full grade separated system capable of 25-minute travel time, versus mostly at-grade light rail system that would take longer.)
- The Airport will assume the risks of cost overruns on Airport lands, but Airport actions and requirements could change or delay the whole project.
  - How will the impact of the Airport's actions be assessed vis-à-vis the cost overrun risks of the entire project, and can the Airport pay an appropriate share of the costs across the entire project?
- The Airport will contribute to project elements off Airport lands, such as an operating and maintenance facility. How will the Airport's "fair share" of off-airport elements be calculated?
- How will the Airport's ongoing share of operating risk be calculated?

Gaps and Questions for Council

TransLink
Public Debt up front: ≈ $300 million
Fares and Add'l Tax Increases: Funding gap – repay private debt/equity

- Where will the money come from?
  - Gap → What is the effect of financing this project on TransLink's other services?

- Is this the most cost-effective investment TransLink can make for as much as a billion dollars in local funds?

Private Financing/PPP: Amount to cover gap, repaid by TransLink through Fares and Tax Revenues

- **Value added**: What is the private partner providing that the public sector cannot provide for itself more economically?

- **Risk**: What risk will be transferred to the private sector to justify the substantially higher cost of private debt/capital and of GST (7% versus 3% for the public sector)?

- **Cost-effectiveness compared to Design/Build**: What benefits, and cost savings, will a full PPP deliver beyond those that would be delivered by a conventional Design/Build approach to project construction?

- **User Pay**: Will all TransLink riders have to pay higher fares if the project is built as a PPP?

Gaps and Questions for Council

- **Changes in structure**: The basic structure of the PPP financing detailed in the Macquarie report is no longer being considered. This structure was the basis both of the recommendation to build the project as a PPP, and also to build the project in a tunnel under Cambie. Given that the PPP approach now being proposed is much more conventional, does it make sense to drive project design based on perceived opportunities (such as private land development rights) that are not going to be available to the private partner?

- **35-year Concession**: Does the 35-year concession work against TransLink, in that the private concessionaire has no incentive to perform major upgrades or repairs near the end of the term, when they will be most needed?

General Financing Questions

- Who will pay for cost overruns?

- The potential funding gap is a major portion of the original estimate for a conventional light rail system in the corridor, which would have enough capacity to meet the project's demonstrated demand. What does the region get for the significant added cost to build a grade-separated project?

Paying for RAV: Proposed Financing

Capital costs

The RAV project has not released construction cost estimates for the project, but conversations suggest early estimates for capital costs in the range of $1.8-$2.2 billion. These early numbers include the financing charges incurred during the construction period – Construction (IDC) – which total roughly $250 million or more. (One Pricewaterhouse Coopers estimate is $340 million.[10])

Current project capital cost estimates do not include IDC and are said to be in the $1.5 billion to $2.0 billion range. With IDC this would give a project capital cost range of $1.75 billion to $2.25 billion.

RAV can reduce the cost of the project – and may have done so by this stage – by refining the project definition.

Eliminating one tunnel station, for example, could save as much as $40 million or more.

Who pays

In preliminary financing discussions, project partners have suggested the following shares to cover capital costs:

Federal Government	$450 million
Province of British Columbia	$300 million
Vancouver Internat'l Airport	$300 million
TransLink (public debt)	$300 million
TOTAL	**$ 1.350 billion**
Funding Gap	**≈$??? million**
TOTAL	**$1.75 - $2.25 B**

Source of funds to cover gap

Private capital/debt to be repaid by TransLink through fare revenues and tax increases.

This section discusses the potential contributions of each partner, focusing on:

- Source of funds
- Conditions set by partner
- Risk assumed

RAV Potential Funding/Financing Partners

	Federal	Province	Airport	TransLink	Private
Source of Funds	General Revenues	General Revenues (increase deficit or raise taxes)	Airport User Fees	None currently available (facing a deficit) Potential: ◆ Fare increase ◆ Property Tax increase ◆ other?	Private capital. Annual payment from TransLink operating sources and/or tax revenues over 35years to cover capital, operations and profit/interest.
Repay?	No	No	No	Yes	Yes
Conditions		Must be PPP	◆ YVR$ spent serving YVR lands only ◆ YVR Circulator/ Distributor ◆ Elevated on YVR lands ◆ Travel time to DT Vancouver 25 min.		◆ Authority to design, build, finance and operate RAV ◆ 30-35 year stream of payments for design, construction, finance and operation
Risk Assumed	None	None	Responsible for cost overruns on YVR lands	May be responsible for cost overruns other than YVR	◆ Must design and build project ◆ Must provide service specified in contract
Potential Share	± $450 m	≈ $300 m	≈ $300 m	≈ $300 m plus funding gap	no contribution private debt financing

Funding: Federal

± $450 million Grant

The proposed federal contribution would be in the form of a grant to the project. The federal government would assume no risks associated with building or operating RAV.

Why Willing to Partner

The consultants preparing this report have not spoken directly to federal representatives. The following is based on conversations with others and may be inaccurate.

The Canada Line Partnering on the RAV project would demonstrate the federal presence in B.C. The line could be given a "national name" – The Canada Line – versus a "local name".

Kyoto Accord Transit is generally assumed to reduce atmospheric emissions from motor vehicles that contribute to global warming.

In the case of the RAV project, if the line were built in a substantially new right-of-way, whether elevated or in a tunnel, or even through road widening, it would substantially increase road capacity in the corridor. Replacing bus service with rail and taking the buses off the streets creates significant new space for cars and trucks. Given the current level of congestion and the likely latent demand, it's highly likely that any space created would get used.

In addition, the construction of the system itself, whether in a tunnel, elevated or at-grade, creates major emissions. This construction impact needs to be balanced over the life of the project.

2010 Olympics The RAV project was not included in the Olympic bid book; doing so would have increased the cost of the City's bid by $2 billion and represented a promise to finish the project by 2010. However, having the project in time for the Olympics is clearly attractive to the Federal government.

Planning to build a lengthy tunnel increases construction time and forces an early decision to ensure project delivery on time for the Olympics. A project with less tunneling would be faster to construct, allowing more time to make a decision about project details.

Funding: Province of BC

≅ $300 million Grant

The proposed provincial contribution would be in the form of a grant to the project. The provincial government would assume no risks associated with building or operating RAV.

In the past, the Province paid

The Province of British Columbia made the decisions to build both the SkyTrain Expo line and the Millennium line. It also provided 100% of the funding. When TransLink was created it assumed a portion of the debt while the Province retained significant debt. (TransLink's current transit-related annual debt payment is $115 million.[11])

Current proposal, Province pays small share

RAV would be a major departure from past practice, with the Province providing only a small share of the funding.

Must be a PPP

The consultants preparing this report have not spoken directly with Provincial officials involved in the RAV project. It is our understanding from other staff that one of the Province's requirements for agreeing to contribute to the project is that it be a Public-Private-Partnership, with a private concessionaire responsible for design, construction, financing and operations.

Questions regarding the role, risks and cost impacts of implementing this project through a PPP are detailed below in the section discussing how a PPP would be structured.

Funding: Vancouver Intern'l Airport

≈ $300 million from Airport User Fees

The consultants preparing this report have not spoken directly to Airport officials involved in the RAV project. We cannot confirm the amount of a YVR contribution, or how and when it would be paid.

Airport Money Only to Serve the Airport

The Airport contribution to the project could only be spent to serve the Airport. In general, this means the money has to be spent on Airport lands, but YVR could contribute a share of the cost of the maintenance and operating base necessary to operate its share of the service.

The Airport contribution also represents a small percentage of the total project costs. the Airport will cover 100% of the costs of construction at the airport and a portion of system-wide costs, to be negotiated.

Elevated Circulator/Distributor for YVR

The Airport's four stations (including one to be built later) will connect the Terminal, parking and Air Canada, providing an internal circulation function for the airport. The Airport requires that the project be elevated on Airport lands.

25 minutes to Downtown Vancouver

The most significant Airport requirement is a 25 minute travel time to downtown. Meeting this requirement may require ALRT technology, and definitely would require a high degree of grade separation for LRT.

This raises the cost of the entire project, but most of the added costs would be borne by other partners, not the Airport. The travel time requirement also limits the number of station stops, which may limit the attractiveness and utility of the system to other riders, particularly those in Vancouver who would have to walk longer distances to stations.

Service frequency to the airport is scheduled to be about half of that in Vancouver. This means that air travelers will had 7-10 minute average wait before even boarding the train. Furthermore, it's not clear if air travelers, after flights that might have been several hours, plus airport check-in times, are that sensitive to a few minutes more or less on a train ride downtown.

Risks

The Airport is responsible for any cost overruns on Airport lands. It is not clear whether they will assume responsibility for a share of system-wide cost overruns that may be attributable to Airport decisions. It is also not clear how they will contribute to operating costs for the Airport service not covered through the farebox.

Funding: TransLink

≈ $300 million up front and repay private debt/capital

TransLink is proposing to contribute $300 million up front, through debt financing, towards the capital costs of RAV. TransLink would be the project owner (or major owner) and would be responsible for ongoing costs of maintenance and operations, whether or not RAV is a PPP.

No obvious and easy revenue sources

TransLink has no identified revenue sources to pay for the RAV project. Assuming fares generate enough revenue to operate the line – TransLink would need to make debt payments to cover its $300 million direct contribution, plus make an additional annual payment to the private concessionaire to cover the private capital/debt raised to close the funding gap.

From Surplus to Deficit

When TransLink was created, it began life with a $50 million surplus transferred from Vancouver Regional Transit Commission. Anticipating new revenues from a vehicle levy, TransLink used the surplus to expand transit service across the region.

When the vehicle levy was not implemented, TransLink faced an immediate shortfall and was forced to cut service.

An analysis prepared for TransLink in 2001 details the agency's budget problems and financing options – this analysis is the source of information in this section[12].

Assuming the Risk

Ultimately, the risks of the RAV project will fall on TransLink.

If the project is design/build, or a full PPP – design/build/ finance/operate – the private sector will assume some risk in building it, and possibly operating it. However, the PPP as it is now structured does not appear to transfer substantial project risk to the private sector.

As currently structured, TransLink's risks would include:

- cost overruns due to changes in design parameters;
- a share of the risk related to ground conditions for the tunnel;
- a share of the risk related to relocating utilities;
- ridership (i.e. if ridership projections are optimistic and fares do not meet projections, TransLink would make up the shortfall).

TransLink 2003 Budget – A Snapshot

2003 Budgeted Revenues

SOURCE	$millions/rounded	nearest %
Farebox	$251	39%
Gas Tax	$250	39%
Property Tax	$118	18%
Hydro Levy	$ 16	3%
Parking/Other	$ 11	2%
Total	**$ 636**	

2003 Budgeted Operating Expenditures

USE	$millions/rounded	nearest %
Transit	$446	70%
Debt Service/Capital Contribution	$128*	20%
Roads & Bridges	$30	5%
Other	$32	5%
Total	**$636**	

* $115 million of TransLink's debt service is transit-related

Revenue Sources Potentially Available to TransLink for RAV Debt Repayment (Public and Private) and Return on Equity for Private Concessionaire[13]

Assumes $2.0 billion project: $1.05 B Fed/Prov/YVR; $300 m TransLink; $650 m private debt/equity

		Required to Raise Annually		
Revenue Source/Comments	**Authority to use**	**$30 million** (to service $300m public debt over 20 yrs)*	**$75 million**** (to service $650 m private debt/ equity over 30 yrs)*	**$105 million** TOTAL
Transit Fares (Estimate does not account for lost ridership due to fare increase)	TransLink alone	+ 30 cents (1 zone)	+ 75 cents (1 zone)	+ $1.05 (1 zone)
Property Tax	TransLink with GVRD approval	1.2 % ($28/avg HH)	3.5 % ($70/avg HH)	4.7 % ($98/avg HH)
Benefitting Area	TransLink with GVRD approval	limited revenues		
Vehicle Levy	Need assistance from Province & GVRD approval	$27/vehicle	$68/vehicle	$95/vehicle
Parking Tax	Need assistance from Province	$105/ stall	$263/stall	$368/stall
System Tolling: Tolls on all new and existing bridges	Need new legislation from Province & GVRD approval	30¢/peak period trip	75¢/peak period trip	1.05¢/peak period trip
Fuel Taxes	Need new legislation from Province & GVRD approval	1.4¢ cents/litre	3.4¢ cents/litre	4.8¢ cents/litre
Sales Tax	Need new legislation from Province & GVRD approval	0.1%	0.3%	0.4%

* TransLink commonly amortizes its debt over 20 years. Private debt/equity would more likely be amortized over 30 or 35 years. As with a home mortgage, longer terms reduce annual payments but increase the total amount ultimately repaid.

** Reductions in the cost of the project could reduce the amount to be financed while surplus revenues after operations (from fares), would reduce the total required from tax increases or fare increases to service the private debt/equity.

Assessment of TransLink Revenue Sources

The chart on the previous page details revenue options available and potentially available to TransLink and shows how much each would have to be increased or imposed to cover the annual payments for TransLink's potential $300 million up front contribution, as well as a potential investment of $650 million in private debt/equity to cover the funding gap. Following is a brief outline of issues related to each potential source.

For all sources, it's important to remember there would likely be major issues if a significant increase were planned to fund a single project, versus system-wide improvements.

Fares

- Nearly 40% of total TransLink revenues
- Recently increased 25¢ for one-zone cash fare
- Significant increases reduce ridership; could result in overall loss of revenue

Property Taxes

- Recently increased
- Stable and predictable
- Easy to administer
- Not transportation related
- TransLink Board policy is to not increase property taxes to finance improvements in system.

Benefitting Area Charges

- A charge on the property tax bill of new development along rail line
- Not likely to generate significant revenue

Vehicle Levy

- Stable and predictable
- Transportation related
- Strong public opposition
- Requires Provincial support, not previously forthcoming

Commercial Parking Tax

- Stable and predictable
- User pay if passed onto parker
- Transportation related
- Complicated to implement because not all private parking areas, as they might show up on the assessment rolls, are used for commercial parking; would require a shake-out period to implement.

Parking Sales Tax

Parking sales tax currently generates about $11 million a year, 2% of TransLink revenues. Agreement is already in place to triple the tax (from 7% to 21%) to generate $23 million/year.

- stable and predictable
- user pay
- transportation related
- affects only about 5% of vehicle trips in region; greatest effect would be in downtown Vancouver, which would relate RAV project

Facility/Project Toll

Not included here because the transit fare is already a toll.

System Tolling

Toll would be applied on all major bridges, either during peak hours only, or at all times.

- 24 hour $1 toll generates $240 million
- peak period $1 toll generates $75 million
- user pay
- transportation related
- stable and predictable
- Requires GVRD approval and Provincial legislation

Additional Fuel Taxes

Fuel taxes account for almost 40% of TransLink's revenues. TransLink recently received an additional 2¢ in fuel tax from the Province to cover its deficit.

TransLink receives 11¢ per litre from the Province, which will increase to 11.5¢ in April of this year, and rise to 12¢ in April 2005.

Each 1¢ in fuel tax raises about $20m - $22m a year.

Under the GVTA Act, TransLink cannot levy a fuel tax; it must be done by the Province.

Provincial Sales Tax

Sales tax revenue is not currently available to TransLink, though it is common throughout the U.S. to dedicate a certain portion of the sales tax to transit and/or transportation.

A half-cent sales tax region-wide could raise enough revenue to cover TransLink's debt for RAV, and make TransLink's annual payment to the private concessionaire, depending on the total cost of the project.

- stable and predictable
- not transportation related
- not a user fee

Funding: PPP, the Private Concessionaire

Why a Public-Private-Partnership

The critical question when looking at a PPP project is: What does the private partner bring to the project that the public sector can't do for itself?

For a PPP to pencil out, the private partner needs to add at least enough value to balance out the additional costs associated with private financing.

For this project, major added costs associated with a PPP include:

- **Approximately 4% higher cost of debt/equity**
- **4% higher cost of GST**

The financing a private partner would bring to the RAV project would depend on the size of the project, detailed assessment of future revenues, contributions by government and so on. The updated PPP analysis that should answer these questions is now being prepared by Pricewaterhouse Coopers and is not expected to be available for Council review until late February.

This section focuses on the possible structure of private financing and should be considered speculative, in the absence of new information since the earlier Macquarie work.

Structure of Private Participation

The apparent structure of a PPP for RAV is:

The private partner would:

- Design and build RAV using a Design/Build approach
- Finance RAV through private debt & capital
- Operate and maintain RAV for a period of 30-35 years

Payments to the private partner could consist of:

- A periodic "availability payment" paid by TransLink for delivering the project and providing service.
  - Payment would be tied to performance goals: that is on-time service.
- RAV fares
- 'Shadow fares' and 'top-up fares' paid by TransLink or, in the case of Airport employees, paid by Airport User Fees.
- A portion of the fare revenue on the entire TransLink system "attributable to the RAV line."
- The costs of operating bus service increases that will not be implemented because of RAV

See page 52 for a discussion of these payments.

The private partner could increase its return by:

- Finding ways to build the line at lower cost.
- Finding ways to operate the line at lower cost.
- Finding ways to attract more riders
  - Constrained by TransLink control of schedules, fares and marketing

Designing to Operate and Maintain Risks inherent in 30-35 year term

In conversation, Pricewaterhouse Coopers suggested a private concessionaire could add value by improving project design with regards to long term operations and maintenance. Because the concessionaire would also operate and maintain the system, it would find innovative ways to reduce the long term costs of operations, beyond what a publicly financed, conventional design/build process would be able to achieve.

The 30-35 year time frame, however, could work against TransLink's long term interests. As the end of the term approaches, the private concessionaire would have little incentive to perform major refurbishments or replace equipment. TransLink could find itself, when it takes control of the RAV line in 35 years, immediately faced with major capital costs to refurbish and upgrade the system to then modern standards.

Roles involved in PPP

There are three parts to the potential role a private consortium could play as part of a PPP structure:

- **Design/Build**
- **Finance**
- **Operate and Maintain**

1. Design/Build

Design/Build has become routine in public projects.

In the traditional "Design/Bid/Build" project, a public agency hires an engineering/architecture firm to prepare a complete project design, including construction drawings. The designs are then put out to competitive bid. A contractor is selected based on lowest price and/or best value.

With Design/Build, the agency develops project specifications which may range from very rough to quite detailed. It then advertises for a team – engineers, architects and contractors – to design and build the project. Advantages over design/bid/build are generally speed and quality. A major project can be shortened by a year or more and, because the contractor is involved in the design, constructability is considered from the very beginning and innovative solutions found.

TransLink could choose to construct the RAV line using a Design/Build approach whether or not the project is a PPP.

2. Finance

The second role for a PPP consortium is project financing. Justifying private finance of a public project is very different from justifying a design/build approach to the construction. In order for private financing to make sense for RAV the private partner must be able to overcome a number of inherent disadvantages.

Interest rates lower on public debt

The private sector is at a significant disadvantage in borrowing money**. A combination of private equity/private debt financing could require an effective combined interest/return rate of about 10-11%, whereas TransLink can finance public debt at about 6½%.**

GST lower for public sector

In British Columbia the public sector pays 3% GST while the private sector pays 7%. The difference on this project could exceed $50 million. (This figure assumes GST is not paid on all components of the project.)

3. Operations and Maintenance

The third role for a private consortium is to operate and maintain the service after the line is built. Private operation of public services, like design/build, is also common in many cities. TransLink does have some privately contracted operations today but they are very small scale.

The early RAV analysis explored the possibility of providing 'premium' service at higher fares – ranging from about a dollar more to $12-$18 for a trip from the airport to downtown.

The intention now for the RAV Project is that TransLink will define the parameters and market the service as an integrated part of its system. The private partner's opportunities for additional profit potential in operations are limited. It may be able to increase ridership through offering amenities; or save money in operations and maintenance. If the project is SkyTrain technology, however, to do the latter it would have to overcome inherent inefficiencies in having two different operators for the same service.

Elimination of Macquarie options

According to RAV Project and TransLink staff, the following private financing mechanisms suggested in Macquarie's 2000 work on PPP are no longer under consideration.

- Commercial land development rights at stations
- Premium fares for express service
- Turning all SkyTrain operations over to the private sector
- Adding the Broadway Western Extension to the project

Discussion continues regarding another Macquarie option:

- Tolling bridges in the corridor with tolls paid to the private partner

What Risks are Assumed by Private Partner

Given the restructuring of the PPP approach from that described by Macquarie, it's not clear what risks the private partner would be assuming, other than the risks commonly associated with Design/Build projects that are not PPPs.

Private Operations

A final reason to consider a PPP would be to capture any advantages there might be in having a private operator

TransLink previously explored the idea of private operations for SkyTrain and found at that time that costs of private operations would exceed TransLink's own costs.

The Pricewaterhouse Coopers report still to come will likely address this issue.

Paying it all with Fares

On February 27th the RAV Project Director is scheduled to give Vancouver Council an update on technical studies and public consultation. On February 13th, the Project Director told Council the costs over and above the $1.35 billion from government partners will be paid by fares; how this will be accomplished also will be reported on the 27th.

TransLink's choices to increase revenues from fares to pay for RAV are limited. TransLink expects 246 million 'boardings" in 2003; that translates to 135 million "revenue rides" because most passengers transfer.

An important aside: "Boardings" versus "Riders"

In Transit-Speak, "boardings" is the number of times someone gets on a transit vehicle. In Vancouver, as is common elsewhere, the rider pays once, on the first boarding, and gets a free transfer.

A person who takes a bus from home and transfers to SkyTrain is *one* "revenue rider" but *two* "boardings".

TransLink's projections for 2003 show 246 million "boardings" on conventional transit, or 135 million "revenue rides."

This means that about 80% of TransLink's riders transfer at least once every time they take a trip. Some people transfer twice (or more).

Riders pay only one fare, as long as they complete their trip in 90 minutes, regardless of how many times they transfer.

TransLink's one-zone cash, adult fare is $2.00. Average fare per boarding is less because:

- Transfers are free
- Seniors and children pay less
- Pass holders pay less

(All common practices in North America.)

Average fare on SkyTrain is $1.03 per *boarding.*
Average fare on the buses is 97¢ per *boarding.*[14]

Fares don't cover transit capital costs

If the RAV project were able to cover hundreds of millions of dollars in capital costs through fare revenues it would be unique in North America, if not in the world. Right now, only the SkyTrain Expo line covers even its operating cost from fares. Fares on the Millennium line and the buses cover about half the operating costs. None of TransLink's services make any contribution to capital costs from the farebox.

Size of Fare Increases to Pay RAV Debt

Given the anticipated structure of RAV financing, TransLink will need to make an annual payment of about $30 million to cover the debt of its contribution (likely to come from tax increases), and an additional payment, or set of payments, to cover the private debt/equity raised to cover the funding gap.

If the project cost only $1.75 billion, towards the lower end of the many estimates being discussed, and if private debt/capital covered $400 million of that, TransLink would need to make additional annual payments of about $45 million dollars.

Examples of one-zone fares that would be required to generate an annual surplus of $45 million dollars are:

- RAV fare of $5.60
- All SkyTrain (including RAV) fares of $3.25
- Bus/SkyTrain fares of $2.35
- Bus/SkyTrain fares of $1.20 with no free transfers
  - About 80% of riders would pay $2.40 per trip

Significant fare increases reduce revenue

An analysis done for RAV tested a $1 increase in fares.

Ridership fell by 50%. The revenue effect can be demonstrated as follows:

$2 fare x 10 riders = $20 in revenue
$3 fare x 5 riders = $15 in revenue

Payments to the Private Concessionaire

On page 43 there's a listing of possible payment mechanisms by which the private concessionaire can recoup its investment. Following is a brief explanation of these terms.

Availability Payment

The Availability Payment is an annual payment from TransLink to the private concessionaire for financing and building the line and operating ("making available") the RAV service.

- Payment would be tied to performance goals: that is on-time service.

If the agreement reached with private partner includes future availability payments, the payments will come from TransLink through fare increases or tax increases

Shadow Fares

A "shadow fare" is an additional fare paid by government to the private operator every time someone boards the train. For RAV, shadow fares could be negotiated as part of the basic PPP agreement. Shadow fares could be paid by:

- TransLink: from system-wide fare increases or tax increases
- Vancouver International Airport, for Airport employees only, or for all riders to and/or from YVR: from Airport User Fees

Top-up Fares

A "top-up fare" is a payment from government to the private operator to make-up the fare reductions granted to certain classes of riders, such as seniors and children and, in the case of RAV, possibly Airport employees.

If top-up fares are negotiated as part of the PPP agreement, those paid by TransLink would come from system wide fare increases or tax increases, while those paid by YVR, if any, would likely come from Airport User Fees.

Fares from System-wide Ridership Increases

In conversation with Pricewaterhouse Coopers[15] it was suggested that the introduction of the RAV line would result in incremental ridership increases on the entire TransLink system.

The private concessionaire, therefore, could receive a share of the fares paid by these incremental riders on services other than RAV.

What is Incremental Ridership

Any major new transit investment – whether a rail line or better bus service – will result in more riders on the total system, including more trips on existing services.

As an example, riders on the West Coast Express might have previously driven to work. Some of these people may now use transit for midday trips they used to make by car. These new midday trips could be considered "incremental" trips, "caused" by the availability of West Coast Express.

"Revenues from Incremental Ridership" Who can claim the fares

While, on the surface, it may seem a straightforward proposal to credit RAV with 'incremental fare revenues,' there are a number of issues relating to allocating all or a portion of such revenue to RAV.

- **Cause and effect – Who gets the credit**

Take the example of the West Coast Express rider who now makes a midday bus trip. This 'incremental trip' could be 'credited' to West Coast Express, but it's just as valid to credit the availability of bus service downtown for the trip on West Coast Express.

That is, because commuters know there's transit available for running errands or going to meetings, they don't need to drive to work. Without the bus service, they'd continue to drive, or drive on days they needed to make midday trips.

- **Cost to provide service**

As mentioned above, aside from the Expo line, TransLink covers only about 55% of operating costs from fares.

Therefore, there is a net cost to TransLink (taxpayers) for every person who boards transit. If fares paid for other trips are diverted to the RAV, TransLink will have to backfill this loss with tax increases or system-wide fare increases.

- **RAV is on both sides of the equation**

If RAV is built, and other services are not cut to pay for it, ridership will increase system-wide over and above the new riders on RAV. But ridership on RAV itself will also be higher because of the availability of the rest of the transit system.

This was demonstrated during the 2001 transit strike, when boardings on SkyTrain fell, even though it was the only transit available. Without bus service to and from SkyTrain stations, people weren't able to take advantage of the train.

The accounting for such a scheme would also be so complex as to be unworkable. For example, the West Coast Express rider may, because it's there, decide to ride RAV to run errands up on Broadway. Is that an incremental ride "caused" by West Coast Express and should West Coast Express claim the fare revenue?

Bus Service" Savings"

Once RAV is operating, some bus service in the corridor can be cut back or eliminated. The 98B Line would cease operations, and some suburban buses to downtown would be diverted to RAV where riders would transfer to the train. Theoretically, TransLink could give the private concessionaire the money it 'saved' in bus operating costs.

But, in fact, TransLink is not planning to spend less in the corridor on bus service once RAV is running, it's planning to spend more.

The chart in the next column illustrates how this might work in practice.[16]

In 2002, TransLink operated 1.3 million hours of bus service in the RAV corridor at a cost of $111.5 million (includes operating costs and debt service on the buses).

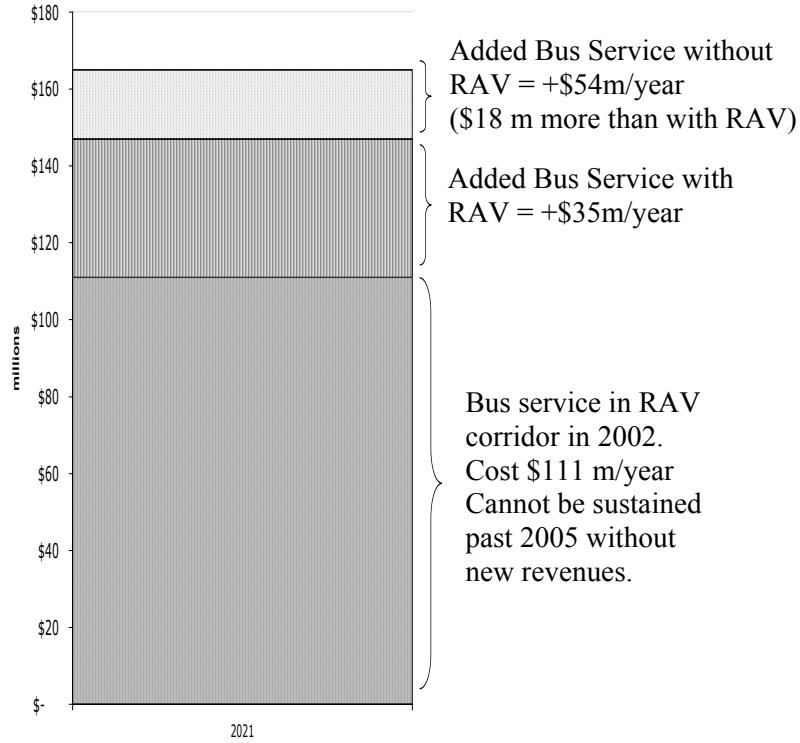
In 2021, if RAV is built, TransLink hopes to operate 34% more service in the corridor, at an added cost of $35 million a year*.

If RAV is not built, bus service is projected to increase by 50% at an added cost of $54 million a year, $18 million more than with RAV.

*all figures in this section 2002$

Thus, it would appear that TransLink has a "savings" in bus costs of $18 million a year with RAV.

Bus Costs in Corridor with and without RAV



There are two important things to understand about the "savings". First, before TransLink can "save" the $18 million it has to raise it.

This will not be easy to do.

New revenues needed just to stay even

After 2005 TransLink needs to find new revenues, from fares or tax increases, simply to operate the service now on the street. If new revenues are not found, service will have to be cut.

Commitment to pay private must be met

Second, if TransLink commits to paying the private concessionaire $18 million a year in "bus savings", TransLink *must* find the money – through tax increases. It would not have the option to forgo the payment, as it might forgo a service increase if there were no revenues to support it.

Thus, in one way, TransLink is worse of *with* RAV under this scheme because it would be obligated to make annual payments to the private concessionaire, to be paid from "savings" that may not real and that it may not be able to afford.

Flexibility of future funding commitments

If RAV is not built, TransLink can implement $54 million worth of bus service increases in the corridor, or something less, or nothing at all, if the funds aren't available.

Summary of Project Related Revenues Potentially Available to PPP

Project Revenue Source	Revenue Potential	Sources of Revenue	Issues
Savings in construction	Unknown Would be a portion of project reserve	Reduces private sector debt/equity	Need to demonstrate how PPP can save more than conventional Design/Build. Large savings would imply appropriate value engineering not done, project estimates faulty, and/or project reserve overstated.
Savings in operations	Unknown		Need to overcome inherent disadvantage of duplicated functions/additional overhead for second operator.
Availability Payment	Likely to cover significant majority of private capital repayment –most likely to be negotiated up front.	TransLink - tax increases - fare increases	TransLink will control fares, schedules and marketing; private has few opportunities to increase return by increasing ridership; will require on-going revenue guarantee.
RAV Fares	Likely to cover operations. In best case, potential for about $10 m/year, over operations, in 2021, increasing in later years.	RAV riders	Limited potential: After 18 years, SkyTrain Expo line operates near or at capacity and just breaks even. Need to negotiate agreement to fairly allocate fare revenue from transferring riders between RAV and TransLink.
Shadow Fares	Could substitute for a portion of the availability payment.	TransLink - tax increases - fare increases	TransLink will control schedules, fares and marketing, so private will not assume major ridership risk. Shadow and top-up fares could reduce availability payment, and could increase private return/profit if ridership exceeds expectations.
Top-Up Fares	Could substitute for a portion of the availability payment.	TransLink - tax increases - fare increases	
Incremental System-wide Fares	For each 1% ridership increase claimed by RAV, fare revenue claimed could be $2.5m.*	TransLink - tax increases - fare increases	Represents a direct loss to TransLink of fares it would otherwise receive. Complex to determine appropriate share. Other modes could claim share of RAV revenues.
Bus Operating "Savings"	About $18 m a year in 2021	TransLink - tax increases - fare increases	Assumes TransLink finds new revenues to increase transit service in corridor by 50% and that TL then transfers some of that revenue as a payment to private.

*2003$ based on TransLink 2003 budget: $251 m in fare revenue system wide on ALL transit.

Conclusions/ Summary

Conclusions/Summary

Where is the project today

- Critical Reports Have Not Yet Been Released
  - Project definition
  - Pricewaterhouse Coopers on PPP and Financial Analysis
  - Halcrow on Ridership
  - Peer Review
  - Best Bus Alternative

These reports will have important answers, but major questions are likely to remain. Council and the public must have the time to fully evaluate the project justification, its performance, and how it will be paid for.

What are the risks associated with delaying the decision

Clearly, if the project is to go forward, it makes sense to have it operating by the 2010 Winter Olympics, should Vancouver be awarded the games.

- What is a reasonable decision schedule that meets this deadline while giving adequate time for a thoughtful and well informed decision?

- Could a project mostly at-grade be built in a much shorter time frame, taking the pressure off the Olympic deadline?

Is this the most cost-effective way to meet the transit needs in the corridor?

A full analysis of optimized options was never done. The imperative for a project in a tunnel under Cambie came from the early PPP analysis. It was based on opportunities for a private partner to cover its costs in ways that have since been eliminated from consideration.

Yet the project never re-visited the original decision despite the realization that virtually all of the costs of the project would have to come from tax payers and transit riders. There are no significant opportunities for private profit outside the framework of the project itself still under consideration.

A full analysis of real alternatives has never been done. The early look at primarily at-grade options built off the shadow routes developed to answer the question of timing, and did not represent fully developed alternatives.

In the absence of good information about light rail primarily at-grade and Bus Rapid Transit options, the Council does not have the ability to compare alternatives and make well-grounded decisions about what would be best for Vancouver.

Is it Affordable?

How could the region say no to $750 million in federal and provincial funds? Hopefully, it won't be faced with that choice. The proposed federal/provincial share could come close to building an at-grade light rail project in the corridor. Such a project would have more than enough capacity to meet demand, would probably be more supportive of the Kyoto Accords, could meet the Olympics deadline for construction, and might provide better service, despite slower trains, to Vancouver residents.

The RAV alternative as it appears to be defined now, could require TransLink to find new revenues to cover nearly $1.0 billion of debt, possibly more.

Options are higher fares (which after a certain point are counterproductive because fewer people ride), and higher taxes.

What Next for Vancouver City Council

City of Vancouver Council has taken a significant step in ensuring regional and local transit users and taxpayers get best value in building and funding a rapid transit link between Richmond Centre, the Airport and Downtown Vancouver.

The prospect of senior government funding presents a distinct opportunity for constructing an important rapid transit link sooner than anticipated. However, it also presents significant challenges and potential financial risks for the City of Vancouver and TransLink. An appropriate system design and location can ensure that any system that is constructed meets regional goals, is appropriate to the needs of residents and the corridor and is affordable. Local and regional decisions on technology, system design and corridor can cost or save as much as a billion dollars.

The Phase I of the RAVP Independent Review commissioned by City Council has identified a number of critical questions that need to be answered before an informed decision on the most cost-effective, affordable and appropriate system for the corridor can be made. Answering these questions will help to deliver a high level of transit service to existing and prospective transit users, while ensuring prudent expenditure of local and regional taxpayer dollars and the continued ability to meet other pressing transportation needs.

Appendix: How Much Will RAV Cost

COST ESTIMATES NOT YET RELEASED

The cost estimates for RAV have not yet been released. The following sources were used as a basis for the assumptions in this report.

City of Vancouver Staff Report to Council, April 2002

Project Costs: **$1.1 billion to $1.9 billion**

Pat Jacobsen, CEO, TransLink: January 2003 meeting with independent review consultant and TransLink, City of Vancouver and GVRD staff

Project funding:
- $300 m from Province
- $450m from Federal Government
- $300m from TransLink
- $300m from Airport
- $400 million "order of magnitude" from private sector.

Totals $1.75 billion.

Does not include interest during construction which would give total project cost of ±$2.0 billion

Tony Poulter, Pricewaterhouse Coopers: January 2003 conversations with independent review consultant

$1.60 to $1.75 billion funded in construction.

Does not include interest during construction which is stated to be about $340 million. The public sector has agreed they will account for their interest themselves.

Gives total project of **$1.94 billion to $2.09 billion**.

John Eastman, RAV Project Technical Director, January 22, 2003 meeting

Reference alignment cost $1.8 billion to $2.0 billion. Started with this and now cutting back. **Cost now somewhat under $1.5 billion**.

Pat Jacobsen to Vancouver City Council Traffic and Transportation Committee, Feb. 11, 2003

Private investment now in range of $400 m to $500 m.
If other contributions held constant, this gives a project of as much as **$1.85 billion**. No comment was made regarding Interest During Construction.

TransLink, Long Range Transportation Plan Context Paper, February 12, 2003, pg 16

$1.8 billion

Endnotes: Sources

[1] January 20, 2003, Meeting with Pat Jacobsen, CEO TransLink, and staff from City of Vancouver, GVRD and TransLink
[2] See Appendix: What will RAV cost
[3] Macquarie, PPP Review of RAV Rapid Transit Project, Final Report, December 2001, Executive Summary, page 1
[4] ibid, page 5
[5] April 3, 2001 Macquarie Memo from Jane Bird, Project Director, and Ken Dobell, CEO, TransLink, to TransLink Board of Directors
[6] ibid
[7] http://www.translink.bc.ca/Transportation_Plans/RAV_Rapid_Transit.asp
[8] TransLink, Richmond-Airport-Vancouver Project Bus Network Strategy, January 31, 2003
[9] Memo from Tom Parkinson to J. Eastman, September 2002
[10] Tony Poulter, conversation with Mary Jo Porter, January 2003
[11] email: TransLink, 17 February 2003
[12] TransLink, Discussion Paper, Long-Term Sustainable Funding Sources – TransLink, May 16, 2001
[13] Developed from table in TransLink, Discussion Paper, Long-Term Sustainable Funding Sources – TransLink, May 16, 2001
[14] email: TransLink, 17 February 2003
[15] Tony Poulter conversation with Mary Jo Porter, January 2003
[16] TransLink, Richmond-Airport-Vancouver Project Bus Network Strategy, January 31, 2003