MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
BRIEFING NOTE

Cliff #: 202313
March 19, 2012

REGION: SOUTH COAST REGION

MoT DISTRICT: LOWER MAINLAND DISTRICT

ELECTORAL DISTRICT:
MUNICIPALITY / DELTA SOUTH / DELTA / METRO VANCOUVER
REGIONAL DISTRICT:

I. PREPARED FOR: Information

II. ISSUE:

Mayor Lois E. Jackson has requested a meeting with the Ministry of Transportation and Infrastructure (MoTI) to discuss a number of transportation related issues, including congestion at the George Massey Tunnel.

III. BACKGROUND:

The George Massey Tunnel (GMT) is a four lane crossing of the Fraser River between the communities of Richmond and Delta and connects Highway 99 from the US/Canada border to Vancouver at the Oak Street Bridge (see attached map).

Richmond and Surrey are rapidly growing communities and development is creating congestion at the tunnel during peak hour travel times. To ease congestion, the tunnel operates a counter-flow system by changing the direction to three lanes in favour of the heaviest movements during the AM and PM peak hours. The locations of two key interchanges immediately on either end of the tunnel also contribute to congestion as they support access to the communities of Richmond and Delta.

IV. DISCUSSION:

The GMT was constructed in the 1950's and was recently structurally seismically upgraded. The Ministry has recently invested in upgrading the power distribution, lighting, fire detection/response, drainage pumps, earthquake monitoring and lane control systems to ensure the long term safety and reliability of the tunnel operations. There is no major rehabilitation work required to the tunnel for at least the next 10 to 15 years and the ministry has no current plans to expand or replace the tunnel in the immediate term.

To address the current congestion at the tunnel, the ministry is undertaking several major initiatives in the area:

The construction of the new 40km South Fraser Perimeter Road (SFPR) connecting Deltaport Way to Highway15 will offer the largest impact to addressing congestion at

GMT. The SFPR is anticipated to reduce the amount of traffic (including truck traffic) that would normally travel through the GMT. The SFPR will divert some traffic originating from Deltaport and Tsawwassen area to alternative Fraser River crossings such as the Alex Fraser, Patullo or Port Mann Bridge depending on the final destination.

The Ministry is also continuing to invest in transit facilities such as the shoulder bus lane on Highway 99 from King George Boulevard in South Surrey to Bridgeport Road in Richmond, in order to move more commuters with transit. Our transit partners (TransLink, Coast Mountain Bus Company) have already indicated that transit travel times between Surrey and downtown Vancouver (via the Canada Line) is competitive if not faster than commuting by passenger vehicle over the same corridor.

The Ministry is also implementing an Advanced Traveler Information System for the GMT and Alex Fraser Bridges as part of the Border Thinning project. The system will provide travelers with real-time travel information for deciding on the most optimal route to travel between Vancouver and Surrey/Delta (GMT or Alex Fraser Bridge).

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V. CONSULTATIONS:

- Corporation of Delta

VII. RECOMMENDATIONS/SUMMARY:

- The Ministry will continue to ensure that the George Massey Tunnel and the Highway 99 corridor remain safe and reliable for the travelling public.
- Recognizing that congestion on the corridor will grow as communities continue to develop, the Ministry is committed to: continuing to expanding the transit/HOV network on Highway 99; working to complete the new SFPR to redirect some truck traffic demand away from the tunnel; and providing drivers with alternative choices by completing the GMT/Alex Fraser Bridge Advanced Traveler information System.
- s.13

Program Area Contact:	Brian Atkins	**Phone: 604-660-8303**
Director Approval:	Patrick Livolsi	**Date: March 12, 2012**
ADM Approval:	Shanna Mason	

BRITISH
COLUMBIA

FEB 1 8 2014

Total: 107 Pgs

Reference: 223465

Her Worship
Mayor Lois E. Jackson
The Corporation of Delta
4500 Clarence Taylor Crescent
Delta BC V4K 3E2

Dear Mayor Jackson:

Re: George Massey Tunnel

Thank you for your letter of December 16, 2013, and attached report, regarding the George Massey Tunnel Replacement Project.

I appreciated you forwarding me a copy of your report. The ministry remains committed to working with the Corporation of Delta as it proceeds with this project, and we value our continued collaboration and dialogue with you and Corporation officials, as well as other key stakeholders, going forward.

Should you have any questions or wish for an update on the draft project definition report, technical design and business case for the new bridge currently underway, please do not hesitate to contact Geoff Freer, the ministry's Executive Project Director of the George Massey Tunnel Replacement Project. He can be reached by telephone at 604 660-6052 or by e-mail at Geoff.Freer@gov.bc.ca and would be pleased to assist you

Thank you also for your Christmas greetings. I hope that you and your family enjoyed a happy holiday season.

Sincerely,

Todd G. Stone
Minister

..../2

Copy to: Premier Christy Clark

Scott Hamilton
MLA, Delta North

Geoff Freer, Executive Project Director
George Massey Tunnel Replacement Project

THE CORPORATION OF DELTA

From the office of:
The Mayor,
Lois E. Jackson

CLIFF #223465

RECEIVED
MINISTER'S OFFICE
MINISTRY OF TRANSPORTATION
DEC 2 0 2013
DRAFT REPLY ☐ FYI ☐ FILE ☐

December 16, 2013

The Honourable Todd Stone
Minister of Transportation and Infrastructure
Box 9055, Stn Prov Govt
Victoria, BC V8W 9E2

Dear ~~Minister~~, Todd

Re: George Massey Tunnel Replacement Update

Please be advised that at the November 4, 2013 Regular Meeting, Delta Council considered a report by the Chief Administrative Officer regarding the George Massey Tunnel Replacement Update and resolved that the report be sent to:

I. The Honourable Christy Clark, Premier of British Columbia;
II. The Honourable Todd Stone, Minister of Transportation and Infrastructure;
III. Scott Hamilton, Member of the Legislative Assembly for Delta North;
IV. Vicki Huntington, Member of the Legislative Assembly for Delta South; and
V. Geoff Freer, Executive Director, Gateway Program – South Fraser Perimeter Road.

Accordingly, this letter and report are provided for your consideration. Please note that Council also endorsed a recommendation to continue working with the Province, in particular on specific issues of importance to Delta.

We look forward to continued collaboration on this significant project.

Yours truly,

Lois E. Jackson
Mayor

Merry Christmas to you & your family!!

Enclosure

4500 Clarence Taylor Crescent, Delta, British Columbia, Canada V4K 3E2
Tel: 604 946-3210 Fax: 604 946-6055 E-mail: mayor@delta.ca

cc: Delta Council
George V. Harvie, Chief Administrative Officer
Steven Lan, Director of Engineering
Jeff Day, Director of Community Planning and Development

THE CORPORATION OF DELTA

From the office of:

The Mayor,
Lois E. Jackson

CLIFF # 221120

October 8, 2013

The Honourable Todd Stone
Minister of Transportation and Infrastructure
PO Box 9055, Stn Prov Govt
Victoria, BC V8V 9E2

Dear Minister, Todd

Re: Proposed Replacement of the George Massey Tunnel

I want to take this opportunity to thank you for your continued support of the George Massey Tunnel Replacement Project. The Premier's announcement on plans to move ahead with construction of a bridge in the existing Highway 99 corridor has been met with much anticipation. The replacement of the George Massey Tunnel with a new bridge crossing will help meet the growing needs of our communities, businesses and stakeholders who rely on this important crossing.

Please find enclosed a copy of a letter I recently provided to the Chair of the Metro Vancouver Board of Directors. The letter was in response to a Metro Vancouver staff report regarding the replacement of the George Massey Tunnel, which is also enclosed.

Thank you for your assistance with this important issue and we look forward to your continued collaboration on the replacement of the tunnel.

Yours truly,

Lois E. Jackson
Mayor

Enclosure

cc: Delta Council
George V. Harvie, Chief Administrative Officer

THE CORPORATION OF DELTA

From the office of:

The Mayor,
Lois E. Jackson

October 8, 2013

Mayor Greg Moore, Chair
Metro Vancouver Board of Directors
4330 Kingsway
Burnaby, BC V5H 4G8

Dear Chair Moore,

Re: Additional Information on the Proposed Replacement of the George Massey Tunnel

Further to Metro Vancouver's staff report titled "Comments on the Proposed Bridge to Replace the George Massey Tunnel", the Corporation of Delta has been working on this important issue for several years. The following is clarification of some of the noted issues, as well as additional information related to the replacement of the tunnel.

Potential for Induction of Vehicle Traffic and Emissions

The staff report notes that the proposed bridge to replace the tunnel could potentially induce additional vehicle traffic and emissions. In reality, the need to upgrade the tunnel exists today. The current crossing, opened in 1959, is over capacity during the morning and afternoon rush hours and midday demand has grown to near capacity. Traffic queue lengths in the morning rush hour can extend as much as 1.5 to 5 kilometres long.

The forecast peak-hour demand is significantly higher than what the tunnel is able to accommodate. The model forecasts suggest that by 2031 the excess unmet demand is around 1,500 vehicles per hour, which is 23% over capacity. A conservative estimate of

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the cost of congestion on the tunnel is between $74 million and $173 million per year by 2041 accounting for current and potential demand.

Highway 99 Corridor and Wider Transportation Network

The staff report notes that the work completed by the Province is missing the relationship between the Highway 99 corridor and the wider transportation network. The public consultation process conducted by the Province clearly outlined the importance of this corridor, in terms of the regional and provincial context. Metro Vancouver's Regional Growth Strategy was highlighted by the Province as providing context for determining the most appropriate solution for replacement of the existing tunnel.

Further, the Province noted that it will continue dialogue with municipalities, TransLink and Metro Vancouver as additional technical work including more detailed traffic, structural and corridor analysis, additional origin-destination studies, geotechnical drilling, marine clearance studies and environmental work is completed.

Regional People Movement (Transit, Pedestrians and Cyclists)

It is important to note that one of the Province's main goals of the tunnel replacement is to support objectives for regional people movement. This includes increasing transit ridership, protecting the Highway 99 corridor for future rapid transit and providing cycling and pedestrian access. Currently, there are ten TransLink bus routes operating along the Highway 99 corridor, generating up to 40 buses per hour during peak periods. The replacement of the tunnel with a bridge will also provide for direct access across the Fraser River for pedestrians and cyclists without having to rely on a bicycle shuttle through the tunnel.

Congestion Reduction – Improved Safety and Reliability

The staff report is missing important information on existing safety and reliability concerns. The Ministry of Transportation and Infrastructure's Highway 99 assessment

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identified the tunnel as significantly exceeding the regional and provincial average rate of collisions. This is due in part to high vehicle volumes, rush hour counter-flow conditions and narrow lanes and shoulders. High accident rates and severe congestion significantly impact the reliability of this corridor.

In comparison to a number of other river crossings in the Pacific Northwest and Alberta, the George Massey Tunnel has one of the highest vehicle volumes per lane at nearly 22,000 daily vehicles per lane. This lane volume is higher than the Arthur Laing Bridge, Queensborough Bridge, Oak Street Bridge, Pattullo Bridge, and Alex Fraser Bridge (Bridging the Infrastructure Gap, Get Moving BC, 2006).

In summary, the replacement of the George Massey Tunnel with a new bridge crossing will assist in meeting the growing needs of the communities, businesses and stakeholders who rely on this important crossing.

Yours truly,

Lois E. Jackson
Mayor

Enclosure

cc: Carol Mason, Chief Administrative Office, Metro Vancouver
Delta Council
George V. Harvie, Chief Administrative Officer

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Transportation Committee

From: Ray Kan, Senior Regional Planner, Planning, Policy and Environment Department

Date: October 2, 2013 Meeting Date: October 9, 2013

Subject: Comments on the Proposed Bridge to Replace the George Massey Tunnel

RECOMMENDATION

That the Board:

a) advise the Minister of Transportation and Infrastructure that the project scope, design, and performance of the proposed bridge to replace the George Massey Tunnel should take into careful consideration of the effects on the implementation of the Regional Growth Strategy, Integrated Air Quality and Greenhouse Gas Management Plan, and Regional Transportation Strategy, and that measures be included to support, and not detract from, regional objectives.

b) request the TransLink Board provide Metro Vancouver with technical analysis and commentary on the potential transportation and emissions implications of expanding transportation capacity on the George Massey Tunnel corridor and effects with proximate Fraser River watercrossings, including tolling and non-tolling scenarios, and the degree of consistency and support the proposed bridge would have on the Regional Growth Strategy, Integrated Air Quality and Greenhouse Gas Management Plan, the Regional Transportation Strategy, and Regional Goods Movement Strategy.

PURPOSE

On September 20, 2013, the Premier of British Columbia announced a preferred alternative for the replacement of the George Massey Tunnel. A new bridge will replace the tunnel on approximately the same alignment. This report provides comments based on published information from the Province, and the consultation that was undertaken over the past year.

BACKGROUND

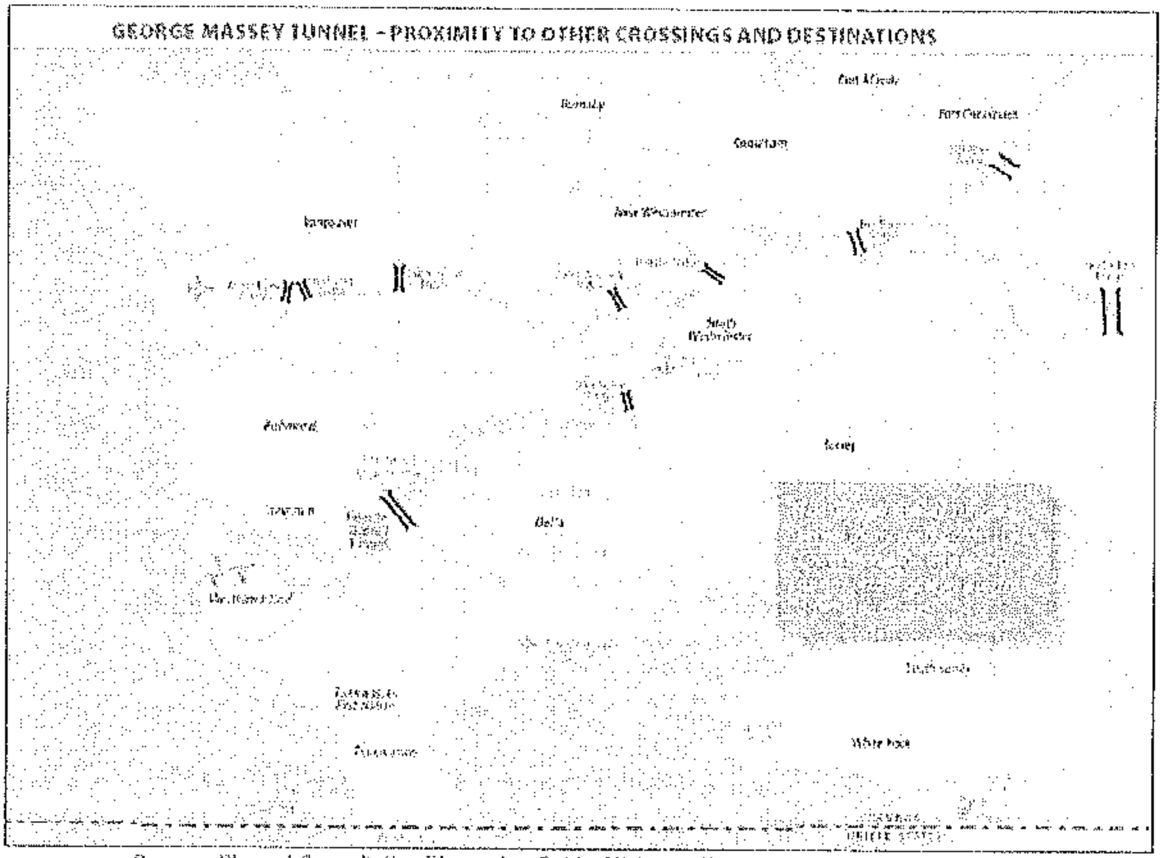
In fall 2012, the Province undertook Phase 1 consultation on the replacement of the George Massey Tunnel to solicit feedback from stakeholders on issues around the current tunnel. In spring 2013, the Province undertook Phase 2 consultation to solicit feedback on five scenarios for replacing the tunnel. Metro Vancouver staff participated in stakeholder sessions and attended public meetings in both phases. Two staff letters were sent to the Ministry of Transportation and Infrastructure (see Attachments 1 and 2).

There was a general understanding that the process to select a preferred alternative would take place after the provincial election, and after additional analysis have been completed and the results shared with stakeholders. The announcement by the Premier on September 20, 2013 was unexpected in light of the absence of technical information provided during consultation about the performance and other attributes of the alternatives.

DISCUSSION

Current Facility

The George Massey Tunnel is an important regional facility being one of five Fraser River crossings in the region. According to the Province, the George Massey Tunnel carried over 80,000 vehicles each day in 2011.



Source: Phase 1 Consultation Discussion Guide, Ministry of Transportation and Infrastructure

The existing capacity of the tunnel is close to or over capacity for most of the day, leading to long queues and travel times. The lack of capacity was identified by the Province as a key issue as both sides of the river is expected to experience growth in population, jobs, and travel. The Province also identified other issues with the tunnel such as not meeting modern seismic standards, aging operating systems, narrow lanes, the general lack of redundancy when traffic incidents occur, and no capacity for cyclists.

According to the Province, the modal share of vehicles traversing the tunnel in 2011 was:

- Single-occupant vehicles: 77%
- Multiple-occupant vehicles: 10%
- Heavy commercial trucks: 9%
- Light commercial trucks: 3%
- Buses: 1% (accounts for 26% of person throughput)

Proposed Bridge Concept

Only limited information has been provided by the Province about the proposed bridge. An animated flyover prepared by the Province depicts a facility with 5 lanes in each direction (4 general purpose lanes, plus one high-occupancy vehicle lane) and protected cycling/pedestrian lanes in each direction. In comparison, the current tunnel provides 3 lanes of travel in the peak direction (comprising a counterflow lane). The bridge concept represents an increase in vehicle travel capacity over the existing tunnel. Construction on the new bridge would start in 2017.

Table 1. Capacity of Proximate Fraser River Crossings

Lanes per Direction	George Massey Tunnel	Proposed Bridge Concept	Alex Fraser Bridge	Queens-borough Bridge	Pattullo Bridge	Port Mann Bridge	Golden Ears Bridge
General Purpose	3 in peak direction; 1 in off-peak direction	4	3	2	2 (reduced to 1 at night)	4 (3 in service)	3
High-Occupancy Vehicles	0	1	0	0	0	1	0
Total	3 in peak direction; 1 in off-peak direction	5	3	2	2 (reduced to 1 at night)	5 (4 in service)	3

The geographic scope of the project remains unclear. In earlier consultation materials, the scope was stated to include consideration of "all interchanges within the Highway 99 corridor from Bridgeport Road in Richmond to the Canada/US border in Surrey, as well as connections to other provincial highways, and regional and local routes". From inspection of the animated flyover and a schematic provided by the Province, the portion of the bridge on Deas Island appears to be located on land owned by the Province. This land divides the east and west portions of Deas Island Regional Park. The Province has owned this land since before the Park was established in the early 1980's. It is likely that the Province will release a more complete description of the project in the near future, and staff's analysis will be updated as appropriate.

Considerations for a Regional Dialogue

The George Massey Tunnel was identified by the Province as a longer-term gateway priority. With the Gateway Program nearing completion, the Province has elevated the watercrossing to be the next roadway expansion priority in the region. And much like the Gateway Program, the proposed bridge will engender debate and discussion about the way transportation projects are prioritized and the impacts of expanding road capacity on land use, air quality, transportation, and economic objectives.

A new bridge with expanded capacity provides opportunities to incorporate new measures that cannot be accommodated in the existing tunnel. These measures could include (subject to the release of detail project information by the Province):

- direct access for pedestrians and cyclists;
- a structure that meets modern seismic standards;
- lane widths that meet current guidelines;

- better lane allocation for trucks and high-occupancy vehicles;
- better lane allocation for longer-distance through trips and shorter-distance trips; and
- a better match between capacity and current and future travel demands by commercial trucks, buses, and general purpose traffic.

Staff sees no objections to these measures. From a transportation performance and economic perspective, ensuring traffic runs safely and efficiently benefits commuters in passenger vehicles and buses, transit service providers, and trucks carrying goods to market. From an environmental perspective, reducing extensive periods of idling vehicles is beneficial for air quality, fuel consumption, and greenhouse gas emissions. These interests are aligned with the Regional Growth Strategy:

> *RGS Action 1.2.9(c): That TransLink and the province, as appropriate, work with municipalities to support the safe and efficient movement of people, goods, and service vehicles, to, from, and within Urban Centres and Frequent Transit Development Areas (e.g., by enhancing the design and operation of the road network), where appropriate.*
>
> *RGS Action 2.1.5: That TransLink, the federal government and the province and their agencies develop and operate transportation infrastructure to support economic activity in Urban Centres, Frequent Transit Development Areas, Industrial, Mixed Employment areas and ports and airports.*

The major objections are the missing perspective on the relationship between this corridor and the wider transportation network, and the absence of appropriate capacity and transportation demand management measures required to carefully align this facility with broader regional land use, environmental, and transportation objectives. There are some potential near-term and long-term consequences.

1. **Potential for Induced Vehicle Travel and Emissions in the Near-Term**
   A new facility having expanded vehicle capacity could induce more vehicle trips. Inducing more vehicle trips runs counter to established regional objectives. TransLink's newly adopted Regional Transportation Strategy Framework establishes two regional targets:
   - To make half of all trips by walking, cycling, and transit; and
   - To reduce the distances people drive by one-third.

   Metro Vancouver has established ambitious greenhouse gas reduction targets and air quality objectives.

   An expanded facility might:
   - unleash pent up travel demand (travelers who may be adverse to sitting in traffic may decide to take more trips in the future as a result of the improved travel times and safety),
   - shift travelers from transit or carpooling to single-occupant vehicles, or
   - change travel patterns (travelers who were used to taking an alternate route, such as the Alex Fraser Bridge, may switch over to the new facility via the South Fraser Perimeter Road).

An expanded facility without additional complementary measures to discourage single-occupant vehicles and to encourage carpooling, transit, and cycling would indeed be deficient and short-sighted.[1] Unfettered access could easily result in a congested facility. Further, an expanded facility may simply move the "bottleneck" further downstream or upstream.

The Regional Growth Strategy anticipated that the current spate of road expansion projects would not be the last one. During consultation, Metro Vancouver advised the Ministry of the following actions in the Regional Growth Strategy:

RGS Action 5.2.6: That TransLink and the province, as appropriate, in collaboration with municipalities seek to minimize impacts from within-and-through passenger, goods, and service vehicle movement on the environment and public health affecting the region and areas within the Lower Fraser Valley Airshed.

RGS Action 5.2.7: That the TransLink and the Province, as appropriate, evaluate the following elements when contemplating future expansion of private vehicle capacity on major roads, highways, and bridges:

a) Transportation demand management strategies as alternatives to, or as integral with, such capacity expansion;
b) Impacts on the achievement of the Regional Growth Strategy and the Integrated Air Quality and Greenhouse Gas Management Plan, including potential cumulative impacts.

2. **Potential for Unanticipated Land Use Changes in the Long-Term**
Reducing travel time expands the catchment area for a given travel time budget. Improvements to accessibility are capitalized in land markets. The improved access to lands, be it residential, commercial, industrial, or agricultural, could have a distributional effect on shifting growth from one area to another. This is an uncertainty that the Regional Growth Strategy never explicitly considered in the population and employment forecasts. It is unclear what basic demographic assumptions the Ministry has been using to justify the proposed capacity on the bridge. It is also unclear what assumptions have been made about plans by Port Metro Vancouver to expand container throughput capacity at Roberts Bank, and to better utilize available marine terminal capacity at Fraser Surrey Docks.

3. **Unclear Impacts on the Development of the Regional Transportation Strategy and Regional Goods Movement Strategy**
The uncertainty around the new bridge puts into doubt the validity of the technical work being undertaken by TransLink for the Regional Transportation Strategy, the Regional Goods Movement Strategy, and the Pattullo Bridge Strategic Review Study. The development of the Implementation Plan is crucial – priorities for new medium-term transportation investments will be deliberated and established. The uncertainty around the capacity of the new bridge and interactions with other components of the regional transportation system must be understood (i.e., whether the new bridge will be tolled). The effect on truck movement is unclear.

[1] In recent years, the Province has implemented transit-supportive measures along Highway 99, such as the expansion of the South Surrey Park and Ride, highway shoulder bus lanes, and queue jumpers.

ALTERNATIVES

1. That the Board:
   a) advise the Minister of Transportation and Infrastructure that the project scope, design, and performance of the proposed bridge to replace the George Massey Tunnel should take into careful consideration of the effects on the implementation of the Regional Growth Strategy, Integrated Air Quality and Greenhouse Gas Management Plan, and Regional Transportation Strategy, and that measures be included to support, and not detract from, regional objectives.
   b) request the TransLink Board provide Metro Vancouver with technical analysis and commentary on the potential transportation and emissions implications of expanding transportation capacity on the George Massey Tunnel corridor and effects with proximate Fraser River watercrossings, including tolling and non-tolling scenarios, and the degree of consistency and support the proposed bridge would have on the Regional Growth Strategy, Integrated Air Quality and Greenhouse Gas Management Plan, the Regional Transportation Strategy, and Regional Goods Movement Strategy.

2. That the Board receive for information the report titled, "Comments on the Proposed Bridge to Replace the George Massey Tunnel", dated September 25, 2013.

FINANCIAL IMPLICATIONS

Information about the project scope, design, performance, cost, procurement method, and tolling policy has yet to be released by the Province. The availability of provincial funding for other transportation priorities in the region may be affected by this decision. There may be potential impacts imposed by the bridge on Deas Island Regional Park and proximate ecologically sensitive areas – these impacts may have financial bearing on Metro Vancouver, and will be further analyzed and deliberated by the Environment and Parks Committee.

If the Board approves Alternative 1, then staff will continue to work with the Province to ensure that the land use and air quality/GHG implications of the new bridge be considered and integrated into the project scope, design, and performance.

If the Board chooses Alternative 2, then no further action will be taken at this time. Given the lack of information about the proposed bridge, it may be prudent for the Board to simply monitor and respond once the project definition report, or equivalent document, is released by the Province. At that point, staff would be able to clarify some or all issues identified in this report, and a more fulsome discussion could take place.

SUMMARY / CONCLUSION

On September 20, 2013, the Premier of British Columbia announced a preferred alternative for the replacement of the George Massey Tunnel. A new bridge will replace the tunnel on approximately the same alignment. This report provides comments based on published information from the Province, and the consultation that was undertaken over the past year. Providing for the safe and efficient movement of people and goods is one of many regional objectives. Staff recommends Alternative 1 to ensure that the project takes into careful consideration of the effects on the implementation of the Regional Growth Strategy, Integrated Air Quality and Greenhouse Gas

Management Plan, and Regional Transportation Strategy, and that measures are included to support, and not detract, from these regional objectives.

Further, the regional transportation authority has an important role to play in this process. In the newly adopted Regional Transportation Strategy Framework, TransLink commits to "work with the Province to ensure a replacement to the Massey Tunnel is integrated with the regional network in a way that is consistent with the Regional Growth Strategy and the Regional Transportation Strategy." Therefore, staff recommends Alternative 1 requesting that TransLink advise Metro Vancouver on the potential transportation implications of this bridge. This information will be useful to advance the regional dialogue, not only on the merit of the bridge itself, but also implications for investment priorities in the Regional Transportation Strategy.

Issues related to potential impacts that a new bridge may impose on Deas Island Regional Park and ecologically sensitive areas, and the appropriate mitigation and compensation, will be addressed by the Environment and Parks Committee.

Attachments:

1. Province of British Columbia News Release, "B.C. moves forward with bridge to replace Massey Tunnel", dated September 20, 2013. *(Orbit doc # 7884824)*
2. Letter to Geoff Freer, Executive Project Director, dated April 3, 2013, "Metro Vancouver Staff Comments on the George Massey Tunnel Replacement Project, Phase 2" *(Orbit doc # 7882676)*
3. Letter to Geoff Freer, Executive Project Director, dated December 19, 2012, "Metro Vancouver Staff Comments on the George Massey Tunnel Replacement Project" *(Orbit doc # 7885026)*

THE CORPORATION OF DELTA

From the office of:

The Mayor,
Lois E. Jackson

COPY

March 28, 2012

The Honourable Kevin Falcon
Minister of Finance and Deputy Premier
PO Box 9048, Stn Prov Govt
Victoria, BC V8W 9E2

RECEIVED
MINISTER'S OFFICE
MINISTER OF TRANSPORTATION
APR 02 2012
203044
DRAFT REPLY ☐ FYI ☐ FILE ☐

Dear Minister, Kevin

Re: Delta Transportation Issues

It was a pleasure to meet with you at yesterday's South Asian Business Community luncheon. As we discussed, I am enclosing the information that was presented to Minister Lekstrom during our March 22, 2012 meeting – specifically, Highway 99 right-in/out at 80th Street, dredging local navigation channels and South Delta transportation issues related to the George Massey Tunnel.

I appreciate your interest and consideration of these important issues.

If you have any questions or comments, please do not hesitate to contact my office directly at (604) 946-3210.

Yours truly,

Lois E. Jackson
Mayor

Enclosure

cc: The Honourable Blair Lekstrom, Minister of Transportation & Infrastructure
Dave Hayer, MLA, Surrey-Tynehead

4500 Clarence Taylor Crescent, Delta, British Columbia, Canada V4K 3E2
Tel: 604 946-3210 Fax: 604 946-6055 E-mail: mayor@corp.delta.bc.ca

Underwood, Victor TRAN:EX

From:	Unwin, Holly L TRAN:EX
Sent:	Wednesday, February 15, 2012 9:40 AM
To:	Transportation, Minister TRAN:EX
Subject:	201943 - Incoming

Holly Unwin
Administrative Coordinator
to the **Honourable Blair Lekstrom**
Minister of Transportation and Infrastructure
Office:250-356-2784
Fax:250-356-2290

From: Lekstrom.MLA, Blair [mailto:Blair.Lekstrom.MLA@leg.bc.ca]
Sent: Tuesday, February 14, 2012 7:15 PM
To: Unwin, Holly L TRAN:EX
Subject: Fwd: Another Near miss in the Massey Tunnel !

Begin forwarded message:

> **From:** Mayor Lois Jackson <Mayor@corp.delta.bc.ca>
> **Date:** 14 February, 2012 7:10:19 PM PST
> **To:** s.22 , "Gentner.MLA, Guy" <Guy.Gentner.MLA@leg.bc.ca>, "Lekstrom.MLA, Blair" <Blair.Lekstrom.MLA@leg.bc.ca>
> **Cc:** "good@cknw.com" <good@cknw.com>, huntington <vhuntington@dccnet.com>, "Kerry-Lynne E. Findlay" <Kerry-Lynne.Findlay@parl.gc.ca>, "darrell.desjardin@portvancouver.com" <darrell.desjardin@portvancouver.com>, Steven Lan <SLan@corp.delta.bc.ca>, George Harvie <GHarvie@corp.delta.bc.ca>, Dona Packer <DPacker@corp.delta.bc.ca>
> **Subject: Re: Another Near miss in the Massey Tunnel !**
>
> Greetings:
> Thank you for writing and describing your experiences in the Massey Tunnel. There is no doubt that we are in need of a review of the existing and future "commuter traffic" and "goods movement" needs of this area. As you may be aware, Delta, at my request and concurrence of Delta Council, have supported a traffic study and needs analysis for this quadrant. Our Director of Engineering is arranging to have a thorough study completed, as it relates to Delta and the through traffic which presently uses this outdated tunnel.
>
> I am hoping to have a meeting soon, with Minister Lextrom in hopes that we can update him of the immediate and future needs of our area. Again, thank you for your observations as we look forward to planning and funding our needed infrastructure for the future. In hind site, this traffic situation should have been addressed in the Gateway Proposal.
>
> Respectfully, I remain,

Lois E. Jackson
Mayor of Delta

From: s.22
Date: Mon, 13 Feb 2012 16:27:22 -0800
To: <premier@gov.bc.ca>, Lois Jackson <mayor@corp.delta.bc.ca>, "Gentner.MLA, Guy" <Guy.Gentner.MLA@leg.bc.ca>, <blair.lekstrom.mla@leg.bc.ca>
Cc: <good@cknw.com>, huntington <vhuntington@dccnet.com>, "Kerry-Lynne E. Findlay" <Kerry-Lynne.Findlay@parl.gc.ca>, <darrell.desjardin@portvancouver.com>
Subject: Another Near miss in the Massey Tunnel !

Feb. 13,2012.

Hon Blair Lekstrom MLA
Minister of Transport and Infrastructure
Victoria B.C.

Monday P.M. Just after Two P.M. While South Bound through the Tunnel There was a Back Up ? Which was odd I'd made a point of attempting to miss rush hour leaving early ! Sure enough about the same location that the Container fell from the Semi earlier in the Year There in the South Bound Lane of the Tunnel was a large Truck Tire !! Luckily it was Dead Centre so both lanes of traffic could squeak by The South Bound ! Semi's probably had to rub up against the tunnel wall to get by !! There was a Semi Trailer In the Pull out on the South end of the Tunnel Not a container truck which is the usual culprit, those and tandem dump trucks ! But I do not know if this was the truck that lost the Tire !!!
Just How Do You Loose a Whole Large Truck Tire ??? We need MORE commercial Truck Inspections This Could well have killed several people Nice way to START the Rush Hour 14:15 And traffic was already backed past Stevenson Highway South Bound through the tunnel
Every day there are extensive delays caused by a truck flipping or breaking down dropping it's container in the tunnel Or Parts of it's FRAME ??? . Just what is happening to the standard of driver training ? Why does the municipality of Delta have to have a Commercial Truck Inspection Police team . Just to Insure that the people of Delta can get home safely ?
Is the Province as negligent with Driver certification and commercial vehicle safety and over sight as it is with a Court System or Environmental reviews or dam inspections or service to handicapped adults or child welfare or mining pollution and safety inspections ? Does the Province Do Anything anymore to protect it's citizens at all ? This is all so THIRD WORLD ?

Luckily though we get lots of glossy TV adds Telling us how great a job your doing though !!! Thanks Christy Spend some more Tax Dollars on YOUR PR see where it gets you

Yours s.22

January 4, 2012 Reference: 199631

Her Worship
Mayor Lois E. Jackson
The Corporation of Delta
4500 Clarence Taylor Crescent
Delta BC V4K 3E2

Dear Mayor Jackson:

Re: Highways South of the Fraser River

Thank you for your letter of October 18, 2011, expressing concern over the impacts of development and regional growth on the highway system south of the Fraser River. Please accept my apologies for the lateness of this reply.

While there are no current plans to replace or expand the George Massey Tunnel, the ministry is pleased to begin discussing future options to reduce congestion and improve the movement of people and goods between communities south of the Fraser River as well as Vancouver, Richmond and New Westminster.

I was glad to hear that the ministry's District Manager, Brian Atkins, is arranging a meeting with you to discuss the Corporation of Delta's concerns in detail as well as any other issues you may have. In the meantime, should you have any further questions or concerns, please don't hesitate to contact Mr. Atkins directly. He is available by telephone at 604 660-8303 or by e-mail at Brian.Atkins@gov.bc.ca, and would be pleased to assist you.

I also want to congratulate you on your recent re-election and look forward to continuing to work with you in the future. I wish you all the best in your new term of office.

Thank you again for taking the time to write.

Sincerely,

Original Signed By:

Blair Lekstrom
Minister

../2

Ministry of Transportation and Infrastructure
Office of the Minister
Mailing Address:
Parliament Buildings
Victoria BC V8V 1X4

Copy to: Premier Christy Clark

Honourable Kevin Falcon
Deputy Premier and Minister of Finance
MLA, Surrey-Cloverdale

Brian Atkins, District Manager
Lower Mainland

THE CORPORATION OF DELTA

From the office of:

The Mayor,
Lois E. Jackson

October 18, 2011

The Honourable Blair Lekstrom
Minister of Transportation & Infrastructure
PO Box 9055, STN PROV GOVT
Victoria, BC V8W 9E2

Dear ~~Minister,~~ Blair.

Re: South of the Fraser Transportation Infrastructure

With the largest shipping container terminal in Canada on its doorstep, Delta is experiencing first-hand the effects of Canada's growing trade with the Asia-Pacific economies. We have seen the Deltaport Third Berth port expansion; the construction of the South Fraser Perimeter Road; the extensive improvements being made along the Robert Bank Rail Corridor; and may soon see the proposed Terminal 2 port expansion.

These developments will undoubtedly provide a faster and more efficient transportation network for the movement of goods through the region. However, we are extremely concerned that the impacts of development and regional growth on the existing highway system, south of the Fraser River, are being overlooked and that deficiencies in the network of supporting highways will begin to undermine the efficiency of the new highway network.

We have specific concerns regarding the north-south movement of traffic across the Fraser River and U.S. border, and in particular, the congestion at the George Massey Tunnel which connects communities south of the Fraser River with Vancouver.

As an issue of longstanding concern, we must act now to initiate a formal dialogue between the senior levels of government and implement a planning process to identify options to resolve current traffic congestion as well as accommodate future growth due to port expansion and ~~regional growth~~ south of the Fraser River.

Yours truly,

Lois E. Jackson
Mayor

cc: The Honourable Christy Clark, Premier of British Columbia
The Honourable Kevin Falcon, Minister of Finance
Guy Gentner, MLA, Delta-North
Vicki Huntington, MLA Delta-South
George V. Harvie, Chief Administrative Officer

RECEIVED
MINISTER'S OFFICE
MINISTER OF TRANSPORTATION
OCT 28 2011
199613
DRAFT REPLY ☐ FYI ☐ FILE ☐

4500 Clarence Taylor Crescent, Delta, British Columbia, Canada V4K 3E2
Tel: 604 946-3210 Fax: 604 946-6055 E-mail: mayor@corp.delta.bc.ca

George Massey Tunnel Replacement Project
External Meeting Record

Agency: Corporation of Delta

Date: September 30, 2013

Purpose: **GMT-Delta Staff Project Update**

Attendees: **GMT:** Geoff Freer (GF), Neil Valsangkar (NV), Ron Lepage (RL), Timothée Merle-d'Aubigné (TMA), Pam Ryan (PR)
Delta: George Harvie (GH), Steven Lan (SL), Hugh Fraser (HF)

Distribution: As above

Written by	Reviewed by	Accepted by
PR		

Key Discussion Topics:

1) **General Update**
   - High level scope is to build a new bridge in existing corridor and remove the Tunnel.
   - Scope is supported by consultation and technical work.
   - The Project team has some ideas on the reference concept, but want feedback from Delta on areas to consider that will help address current issues as part of the design, and develop a concept that will work for communities on both sides of the river.
   - Looking forward to working with staff, to help ensure the Project team gets this right.

2) **Schedule**
   - Develop Project Definition Report (describing scope, cost and schedule, cost-benefit analysis) by early 2014 to share in next round of public consultation.
   - Concurrently conducting all of the necessary technical work including geotechnical drilling, environmental studies and traffic program. RFPs will be issued shortly on BC Bid to conduct this work.
   - The Project team assumes a provincial environmental assessment (EA) will be required because the Tunnel will be removed, but intends to go through an EA anyway to ensure thorough assessment.
   - Intend to enter EA by June 2014, or sooner. Likely will enter pre-application soon.
   - Hope to be in procurement sometime in 2015 with award in late 2016 so that construction can begin in 2017.
   - Target completion by 2022.

3) **Consultation Summary and Stakeholder Follow-up**
   - Strong support for the Project and moving forward.
   - Preference for using the existing corridor and for a new bridge as compared with a new tunnel.

- Follow up calls with stakeholders last week.

4) Traffic/Technical Update

- Permanent count stations upgraded along the corridor and the Project will be doing a detailed short count program in October.
- Origin/Destination surveys using Bluetooth will be done to confirm the results of the 2011 Trip Diary Survey and to test the traffic models.
- 2011 survey confirmed that the majority of traffic northbound in the AM peak is going to Richmond.
- For traffic forecasting, the Project is using two models – an updated version of the one used for SFPR/Port Mann, which goes to 2031, as well as TransLink's new regional model, which forecasts to 2045 and allows for a longer time horizon for traffic forecasting.
- Would like to meet with Delta to discuss traffic volumes and plans for improvements along the Delta side of the corridor and refining the reference concept.
- Will soon begin a drilling program to better understand geotechnical conditions.
- Begin developing potential traffic detour plans/sequencing. The Project intends to ensure no loss of service during construction.
- Exploring air and water clearance requirements. Currently assuming Alex Fraser clearances, while ensuring touch down prior to the existing interchanges, to minimize effects.
- The Province intends to remove the tunnel but does not intend to dredge, so there are limits to the amount of river traffic that can be accommodated in the short to medium term.
- Removing the tunnel – from a risk perspective, would want to remove as much as makes sense. May, for geotechnical stability reasons, keep the two end sections; however, anticipate there will be an expectation from an environmental perspective to remove the entire tunnel.

5) Discussion

- The Project's next steps include technical work, cost-benefit analysis and preparing for consultation.
- The property owner near the Highway 99/17A interchange would like to meet with Delta and the Province to discuss concepts.
- Regarding environmental assessment, the Project will likely undergo a provincial review. It is not yet clear if a federal review is required. Regardless, the Project team anticipates discussions with DFO, Transport Canada and the Canadian Wildlife Service.
- The project scope study area extends from the US border to Bridgeport Road.
- The new TransLink model, which is a 24-hour model can compare tolled/non-tolled scenarios.
- The facility will assist in conveying traffic from the Port (e.g. recent study from PMV comparing use of Tunnel vs. SFPR suggests it's still shorter to use the Tunnel); more analysis to be done in this regard.
- Delta would like to discuss:
    - SFPR intersection/interchange – if the new bridge opens by 2021, would future upgrades at Tilbury and Sunbury be delayed?
    - Hwy 17A interchange – connection to River Road in both directions and truck traffic restrictions at this interchange.
    - Will there be a movement from Hwy 99 northbound onto SFPR eastbound? (GMT confirmed this is in the Project scope.)

- Captain's Cove Marina development will go to fourth reading soon and the developer has requested design information. Likely to be many more questions coming forward. CoD will have someone from Community Planning attend the next meeting. Project team will coordinate with the MOT District Office in ensuring the developers and potential future buyers will know there will be a bridge in this area in the future. Delta staff has provided that info as part of the rezoning discussions.
- If Deas Slough Bridge is removed, recreational users may still want a pedestrian crossing, but Delta has had some issues with barging in that area so overall would prefer removal.
- People like the River Road west access and would want to see it preserved.

Decisions:
None to report.

Next Meeting:
TBD

Action Items:

Action	Who	When
Meeting with Delta staff on October 9 (afternoon or 11 to noon on October 8) to discuss Captains Cove development and the data collection program.		
After this meeting, follow up with Polygon – Captains Cove developer.		
Schedule next meeting with Delta staff re: traffic and cycling access.		

Amendments to meeting minutes can be sent to by email to pam.ryan@gov.bc.ca. Thank you.

The Corporation of Delta
COUNCIL REPORT
Regular Meeting

F.07

To: **Mayor and Council** File No.: **5220-30/GMTR**

From: **Chief Administrative Office**

Date: **October 21, 2013**

George Massey Tunnel Replacement Update

- **RECOMMENDATIONS:**

A. THAT staff continue working with the Ministry of Transportation and Infrastructure on the George Massey Tunnel Replacement Project to leverage opportunities and address local concerns associated with replacement, including:

- minimizing agricultural impacts and ensuring appropriate compensation;
- ensuring Delta's recently upgraded irrigation system is not adversely impacted by possible changes in the salt wedge profile associated with the potential removal of the tunnel;
- achieving appropriate and enhanced local connections to the new highway system, including an alternate access to Ladner by maintaining connectivity for River Road;
- incorporating bike lanes and alternate modes of transportation connectivity;
- enhancing access to the Vancouver Landfill;
- ensuring effective public consultation throughout the project; and
- investigating improved and new interchanges along the Highway 99 corridor, including, where feasible, Matthews, 80th Street and the Highway 17A interchanges.

B. THAT staff report back at least quarterly on the progress of the George Massey Tunnel Replacement Project.

C. THAT this report be sent to the following:

i. The Honourable Christy Clark, Premier of British Columbia;

ii. The Honourable Todd Stone, Minister of Transportation and Infrastructure;

iii. Scott Hamilton, Member of the Legislative Assembly for Delta North;

iv. Vicki Huntington, Member of the Legislative Assembly for Delta South; and

v. Geoff Freer, Executive Director, Gateway Program – South Fraser Perimeter Road.

- **PURPOSE:**

This report provides an update on the George Massey Tunnel Replacement Project and seeks Council's support for staff to continue working with the Ministry of Transportation and Infrastructure to leverage opportunities and address local concerns associated with the project.

- **BACKGROUND:**

The George Massey Tunnel was built in the late 1950s and officially opened in 1959. The tunnel is a key component of the regional and provincial transportation system and is currently used by more than 80,000 vehicles per day. The tunnel does not meet current standards, only has between 10 and 15 years of serviceable life before major operating systems need to be replaced, does not meet modern seismic performance, is an unreliable transportation option and routinely experiences queue lengths from 1.5 to 5 kilometres. The tunnel is a key pinch point as 55% of traffic northbound through the tunnel is bound for Richmond.

Over 20 years ago the need for expansion or replacement of the tunnel was recognized (1991, Ward Consulting, George Massey Tunnel Expansion Planning Study). Even with the introduction of the Alex Fraser Bridge in 1986, contra-flow lanes and the expansion of the Skytrain system into Surrey in 1990, the tunnel was still "near its practical capacity in both the morning and afternoon peak periods".

More recently, the BC Ministry of Transportation and Infrastructure Highway 99 Corridor Assessment (2009) was released (Attachment A). This report recognized that South of the Fraser Metro Vancouver municipalities had experienced the highest rate of growth in the previous 10 years and this was forecasted to continue for the next 20. The report found that with the addition of "demand from Highways 91, 10, and 17 the peak period demand significantly exceeds the available tunnel capacity. This results in speeds dropping to 10 km/h at the tunnel approaches. These effects rebound as far back as 80th St." With respect to the evening peak period, "with the addition of southbound demand from Highway 99 and Westminster Highway the southbound demand significantly exceeds the capacity available at the George Massey Tunnel."

Safety and collision rates along the George Massey Tunnel section were also a key issue identified in the 2009 study. Collisions in this section are significantly higher than provincial average rates and occur from head-ons in contra-flow lanes and from the very high vehicle densities. The provincial average collision rate in 2009 was 0.9 mvk (collisions per million vehicle kilometers). For the George Massey Tunnel section the average collision rate was between 35 and 60 mvk.

Travel demand at the time of the 2009 report was expected to increase 36% by 2021 and another 50% from 2021 to 2031. According to the 2011 census, Surrey's population has increased by 18.6%, or 73,000 people since the previous 2006 census while Vancouver's has increased by 4.4%, or 25,000 people. Surrey, Langley and White Rock combined added 85,000 people and accounted for 44% of Metro Vancouver's population gain. The City of Surrey's website suggests that the population will increase an additional 300,000 in the next three decades and Mayor Dianne Watts suggests that Surrey will be more populous than Vancouver within 10 years.

Delta's Mayor and Council have long been proponents of the tunnel replacement and commissioned an independent study that was completed in 2012 (Attachment B). This study echoed previous findings: during peak hours, traffic at the tunnel can be as slow as 6 km/h and reaches a maximum of 60 km/h. Trucks represent about 12% of peak hour tunnel traffic, which reduces overall speed and further impacts capacity. This level of trucks is quite high compared to other crossings; for example, the Ironworkers Memorial Second Narrows Crossing has only 4% heavy trucks. The unmet peak hour demand for the tunnel is forecasted to be 1,500 cars per hour, or 23% over the tunnel's capacity by 2031.

With the completion of the South Fraser Perimeter Road, growth on the south side of the Fraser River will only continue. The Tilbury Industrial Area is already experiencing renewed interest, Boundary Bay Airport is experiencing considerable growth, Tsawwassen First Nation is embarking on aggressive development plans and Port Metro Vancouver is well underway in their consultations for Terminal 2.

With the considerable data available and a strong understanding of the economic and regional importance of the tunnel, on September 20, 2013, Premier Christy Clark announced the replacement of the George Massey Tunnel with a bridge. Construction is scheduled to begin in 2017.

- **DISCUSSION:**

Provincial Public Consultation Processes

As a first step, the Province consulted with the public and stakeholders about support for a new crossing and potential crossing options. Key consultation findings include:

- Traffic congestion at the George Massey Tunnel is a significant problem that is causing safety concerns as well as community and economic impacts;
- Support for a new bridge on the existing Highway 99 corridor;
- Support to resolve problems with congestion, safety and reliability;
- Desire to have transit, cycling and pedestrian improvements, including potential future rapid transit; and
- Doing nothing is not an option.

Preliminary Bridge Design

The Province has released photo renderings (Attachment C), a preliminary design concept (Attachment D) and a video of the proposed new bridge, available at http://engage.gov.bc.ca/masseytunnel/information-centre/document-library/. Key features of the design concept:

- A multi-lane bridge structure with up to 10 lanes
- A multi-use path for pedestrians and cyclists that would connect to existing networks on either side of the bridge;
- Dedicated transit and HOV lanes, including extension of these lanes on either side of the bridge;
- Removal of the Deas Slough Bridge; and
- Replacement of the Highway 17A interchange to improve functionality and earthquake protection.

The next step in the George Massey Tunnel Replacement project is the preparation of a more detailed project scope and business case. Current thinking is that the tunnel will be decommissioned and removed once the new bridge is operational. Engineering and technical work is now underway for the new bridge and associated Highway 99 corridor improvements. The Province anticipates that this work will be presented for public discussion in spring 2014, in order to meet their commitment to begin construction in 2017.

Transportation Connectivity Opportunities for Delta

The long awaited replacement of the George Massey Tunnel will provide significant leveraging opportunities for Delta. Staff will continue working with the Ministry of Transportation and Infrastructure to define opportunities and address concerns. Specific opportunities currently identified for further exploration include:

Corridor Study
The Province has indicated that it plans to review the need for upgrades along the Highway 99 corridor from the US Border to Oak Street Bridge. This may include upgrades at interchanges in Delta, including Highway 17, Highway 17A, 80th Street, Matthews and Highway 91. This could be an excellent opportunity for Delta to leverage the work for enhanced access to Boundary Bay Airport, additional upgrades to the Matthews Interchange and to enhance vehicle movements to the Vancouver Landfill for current and future requirements. Whether the future use of the landfill is a passive park concept or a more active concept such as a park and ride appropriate access will need to be maintained.

A Secondary Ladner Access
Concerns have been raised by residents regarding the concept drawings, which do not currently show a southbound access off the new bridge to River Road. Staff understand the importance of connectivity with Ladner and the issue has been raised with the Province, which is now investigating options for connectivity with River Road.

Highway 17A and 99 Interchange (Town and Country)
This interchange has long been a source of frustration for commuters. The early concept design shows a new interchange configuration with enhanced vehicular movements for Highway 17A at Highway 99. These concepts are still preliminary but staff will continue to work with the Province to develop a final concept that addresses current and future needs along this corridor, especially considering the importance of the Tilbury Industrial Area.

Agricultural Impacts
The conceptual plans indicate possible changes in highway access ramp alignments, which may require additional lands. To ensure agricultural stakeholders are involved, staff have asked that the Province consult with the Delta Farmers Institute. The Province has indicated that a study is being undertaken to examine the possible change to the river hydraulics with the removal of the tunnel and any changes to the areal extent of the salt wedge in the Fraser River. It is important that any change to the salt wedge related to the bridge construction or the potential removal of the tunnel does not adversely impact the enhanced irrigation system implemented as a result of the South Fraser Perimeter Road construction. As well, staff will work with the Province to ensure any loss off agricultural land is minimized and appropriately compensated.

Pedestrian, Cycling and Alternate Transportation Improvements
Initial public consultation identified a need for enhanced pedestrian and cycling improvements, both connecting to, and across the bridge. Staff will work with Ministry representatives to achieve improvements that tie into existing Delta corridors. Additionally, transit improvements were identified as a key public concern and staff will work with the Ministry to ensure positive improvements are planned.

Upcoming Upgrades
In the interim, before bridge construction begins, the Province has indicated that they will proceed with upgrades to the Steveston off-ramp from Highway 99 at the north end of the George Massey Tunnel. Lengthening the off-ramp will improve safety and reduce congestion on Highway 99. The works to improve the Steveston off ramp are in the design and tendering phase.

Staff intends to report to Council on at least a quarterly basis as this project moves forward and more frequently if required. Staff will also work with the Ministry of Transportation and Infrastructure to maintain their high level of public consultation.

Implications:
Financial Implications - The George Massey Tunnel Replacement Project is provincially funded and although there are no direct costs associated with this project for Delta, there are significant local and regional financial benefits. The cost of tunnel congestion has been studied, including by Delta's 2012 report, and in all cases the costs have been found to be significant. The Province has indicated that the annual cost of congestion at the tunnel was $66 million in 2008 and will rise to $100 million by 2041.

▪ CONCLUSION:

On September 20, 2013 Premier Christy Clark announced the George Massey Tunnel Replacement Project. This project is necessary and long overdue; doing nothing is no longer an option. The project provides Delta with an excellent opportunity to leverage the benefits of the project and create enhanced vehicular movement throughout the community, particularly to our industrial areas.

George V. Harvie
Chief Administrative Officer

Department submission prepared by: Doreann Mayhew, P.Eng. and Sean McGill

This report has been prepared in consultation with the following listed departments.

Concurring Departments		
Department	Name	Signature
Engineering	Steven Lan	
Community Planning & Development	Jeff Day	

▪ ATTACHMENTS:

A. Highway 99 Corridor Assessment
B. George Massey Tunnel Transportation Study
C. Renderings and Flyover Video Snapshot Photos of the New Bridge
D. Preliminary Design Concept of the Highway 99 Corridor with the New Bridge Scenario

BRITISH COLUMBIA
The Best Place on Earth

BC Ministry of Transportation and Infrastructure

Highway 99

(King George Highway to Oak St. Bridge)

Corridor Assessment

DRAFT V 1.5

TABLE OF CONTENTS

1.0 BACKGROUND

Highway 99 is a major north-south corridor through Metro Vancouver that runs from the south at its connection with Interstate 5 at the Canada-US border, to the Highway 97 junction near Cache Creek (a total length of 409 km). The 40 kilometres of Highway 99 between the US border and the City of Vancouver is configured as a four lane freeway, with interchanges, tunnels, and overpasses that were constructed between the mid 1950's and 1986. Only structures built since 1986 (Highway 91 interchanges) meet current seismic design standards.

The South of Fraser portion of Highway, depicted in Figure 1.1, is located within the Greater Vancouver Regional District (GVRD) and runs through the City of Surrey, Corporation of Delta and City of Richmond,

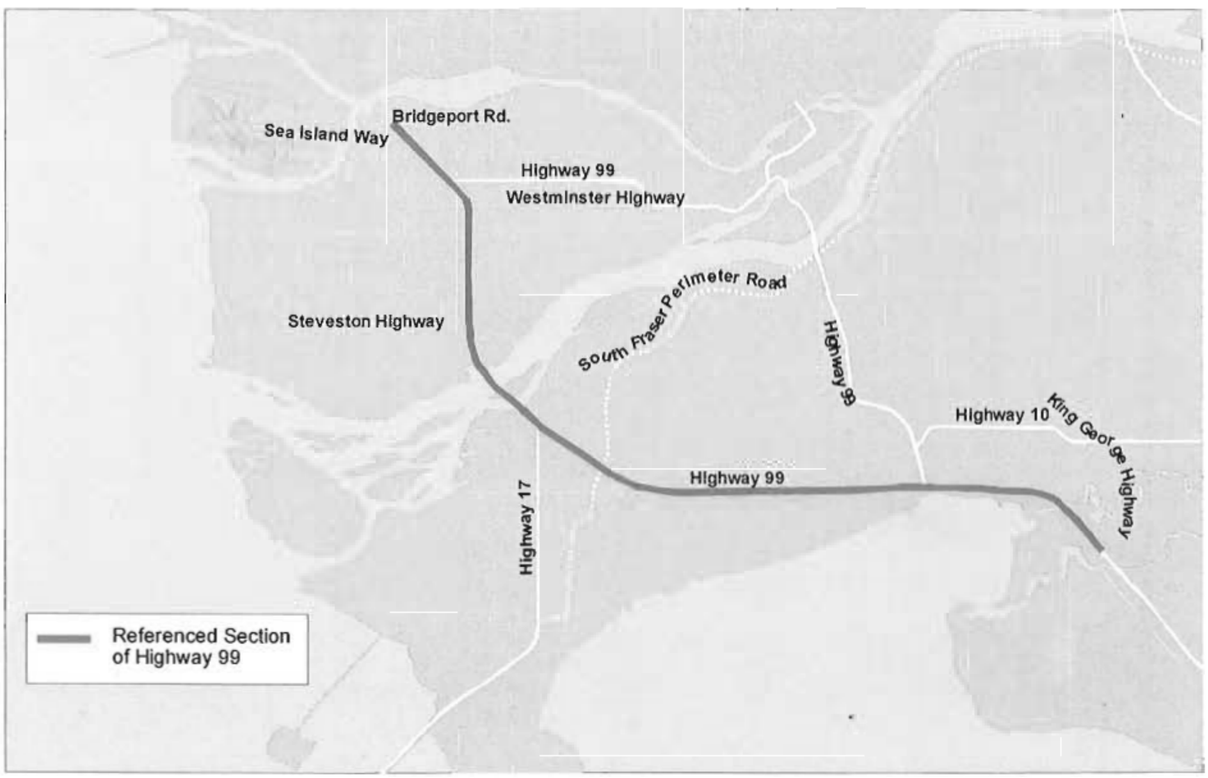


Figure 1.1 – The South of Fraser Portion of Highway 99

Highway 99 provides strategic goods movement connections between the US interstate Highway System and the BC Lower Mainland, Vancouver Island, and the Whistler-Pemberton area. Significant goods movement hubs served by this highway include the Tsawwassen Ferry Terminal, Delta Port and Vancouver International Airport.

In addition to goods movement support the highway also connects Surrey, White Rock, Delta, and Richmond with the Lower Mainland highway and municipal roadway systems. In fact the majority of demand served by Highway 99 is commuter shed traffic generated by these and neighbouring municipalities.

2.0 REGIONAL CONTEXT

The South of Fraser municipalities have experienced the greatest rate of growth within the GVRD over the past 10 years. The communities that Highway 99 runs through have experienced the highest rate of growth in the South of Fraser Area. This trend is expected to continue over the next twenty years. Table 2.1 and Figures 2.1 and 2.2 illustrate growth in population and employment for these areas from 2001 to 2031.

Table 2.1
GVRD and South of Fraser Population and Employment (2001 to 2031)

GVRD	**2001**	**2006**	**2021**	**2031**
Population	1,987,000	2,117,000	2,540,400	2,900,000
Employment	1,062,000	1,145,000	1,351,100	1,541,000
South of Fraser				
Population	573,564	628,000	832,764	950,000
Employment	234,000	256,400	378,000	408,000
South Surrey				
Population	58,710	79,500	80,000	175,000
Employment	21,175	25,410	27,800	71,000
White Rock				
Population	18,250	18,755	33,760	43000
Employment	4,745	4,876	9,000	13000
Semihamoo Peninsula South Surrey/White Rock				
Population	76,960	98,255	113,760	218,000
Employment	25,920	30,286	36,800	84,000

Source: South of Fraser Area Transportation Study, TransLink, City of Surrey

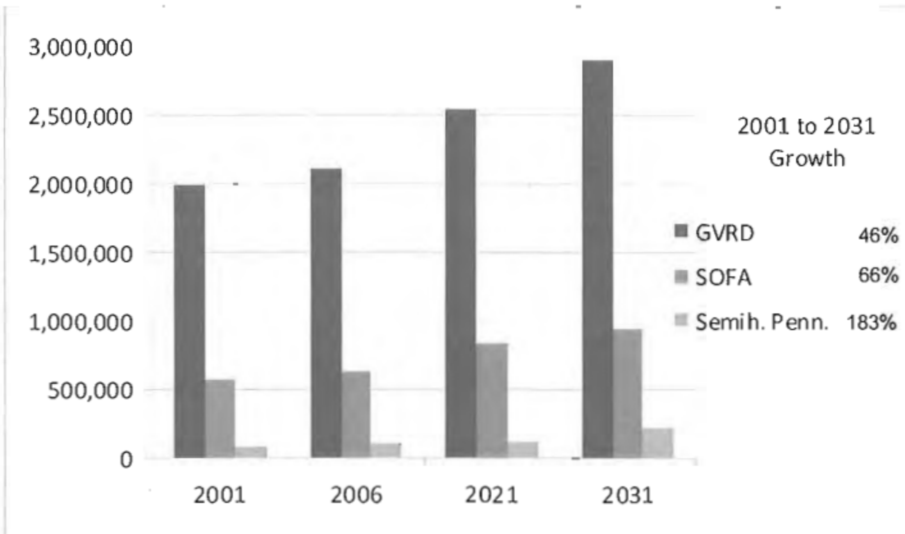


Figure 2.1 – GVRD and South of Fraser Population (2001 to 2031)

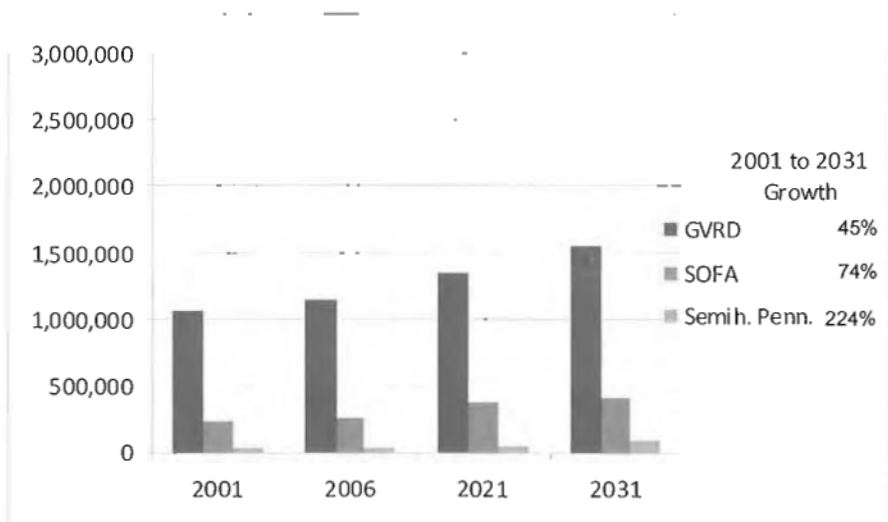


Figure 2.2 – GVRD and South of Fraser Employment (2001 to 2031)

3.0 HIGHWAY 99 CONFIGURATION

The portion of Highway 99 under discussion is configured as an urban freeway with cross sections that range from 4 and 6 lanes. Figure 3.1 describes the corridor laning in detail while Figure 3.2 illustrates the various cross-sections of this portion of the corridor.

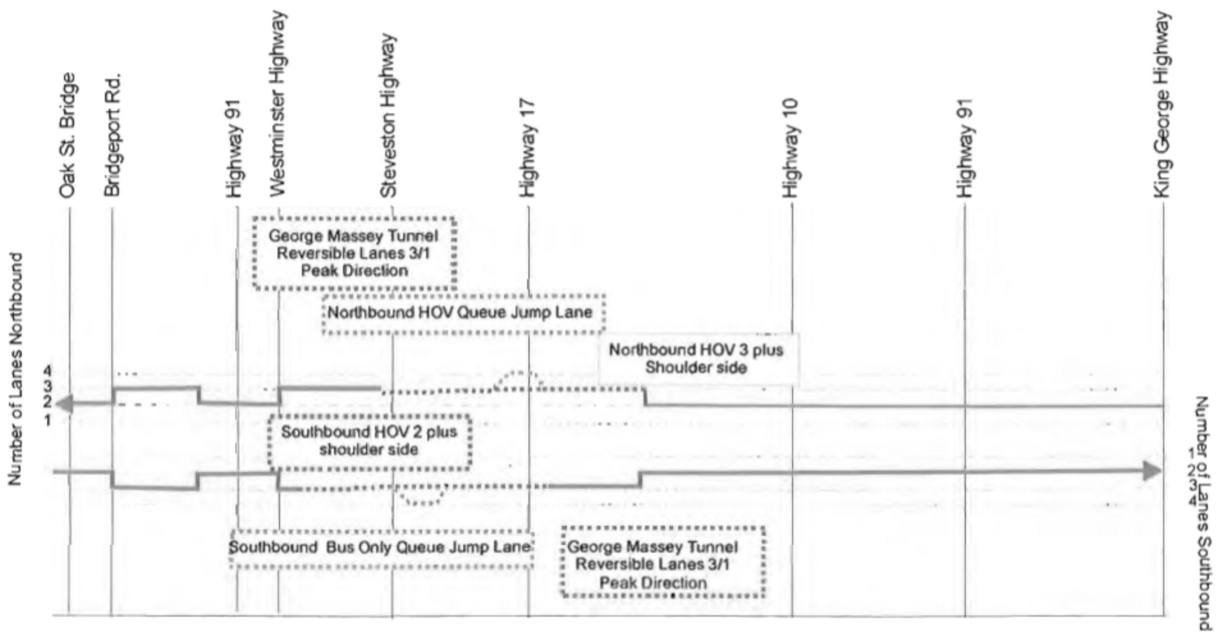


Figure 3.1 - Highway 99 Lane Allocation by Direction

The George Massey Tunnel approaches operate under a signalized lane allocation system which re-organizes the physical two northbound and southbound tunnel lanes such that three peak direction lanes and one off-peak direction lane are made available during peak periods.

As well, there are northbound and southbound HOV lanes at the George Massey Tunnel approaches. Northbound HOV eligibility was originally established as plus 6 persons in 1998 but has been successively reduced to plus 3 since. Similarly, the southbound HOV eligibility was also established at plus 6 and has also been successively reduced to plus 2. A northbound HOV queue jump was also implemented in 1998. This queue jump begins at the signalized intersection of the Highway 99 northbound off-ramp signal and Highway 17 with an HOV only pre-emptive signal phase that allows HOV vehicles priority access to a northbound HOV lane leading to the tunnel. The HOV only lane terminates just prior to the George Massey Tunnel portal where HOV traffic must merge with general purpose (GP) traffic. A southbound transit only queue jump was implemented in 2008. This queue jump begins at the Steveston interchange and proceeds south using a decommissioned Ministry truck inspection area. TransLink buses bypass southbound tunnel queues and re-enter GP travel lanes at the tunnel entrance.

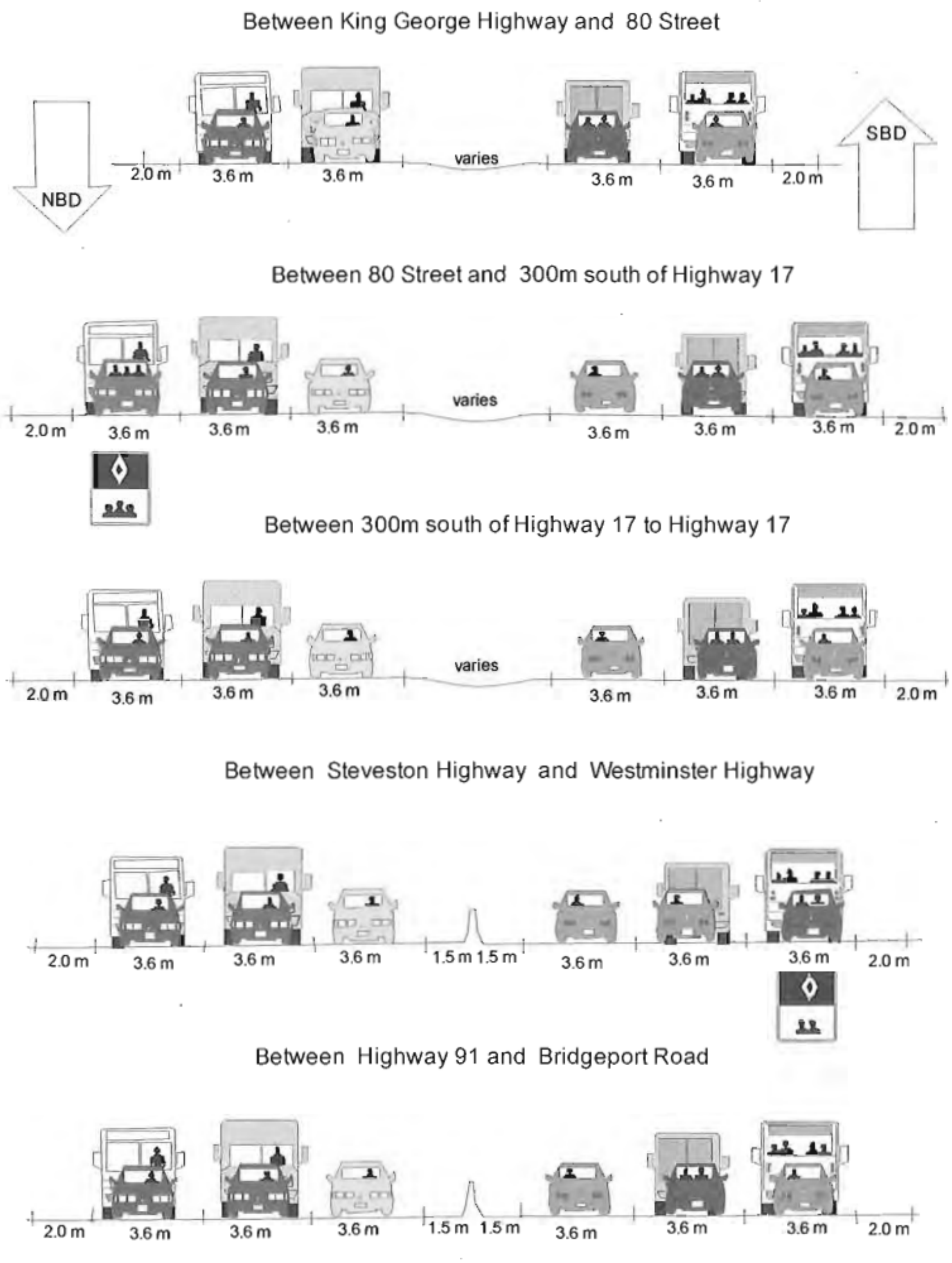
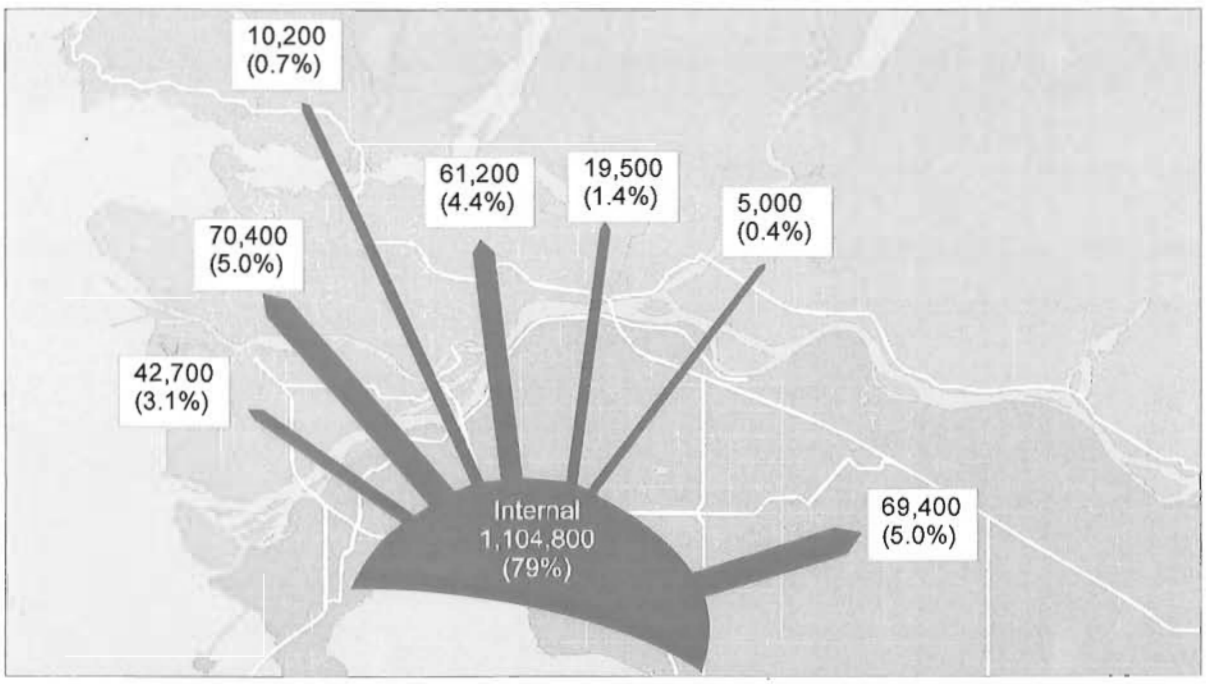


Figure 3.2 – Highway 99 Cross-Sections

The shoulder widths along the corridor narrow to 0.5 meters at most bridge and interchange structures. In locations where there is no median barrier the median width varies from 8 to 12 meters.

4.0 HIGHWAY 99 TRAVEL DEMAND

Figure 4.1 describes the typical weekday 24 hour trip generation from the Surrey, Delta, White Rock Area (including US border traffic). As can be seen approximately 120,000 daily trips are destined to Richmond, Vancouver and the North Shore. Approximately 50% of this demand of this demand is served by Highway 99.



Source: South of Fraser Transit Plan, TransLink

Figure 4.1 – Surrey, Delta, White Rock 24 Hour Trip Destinations

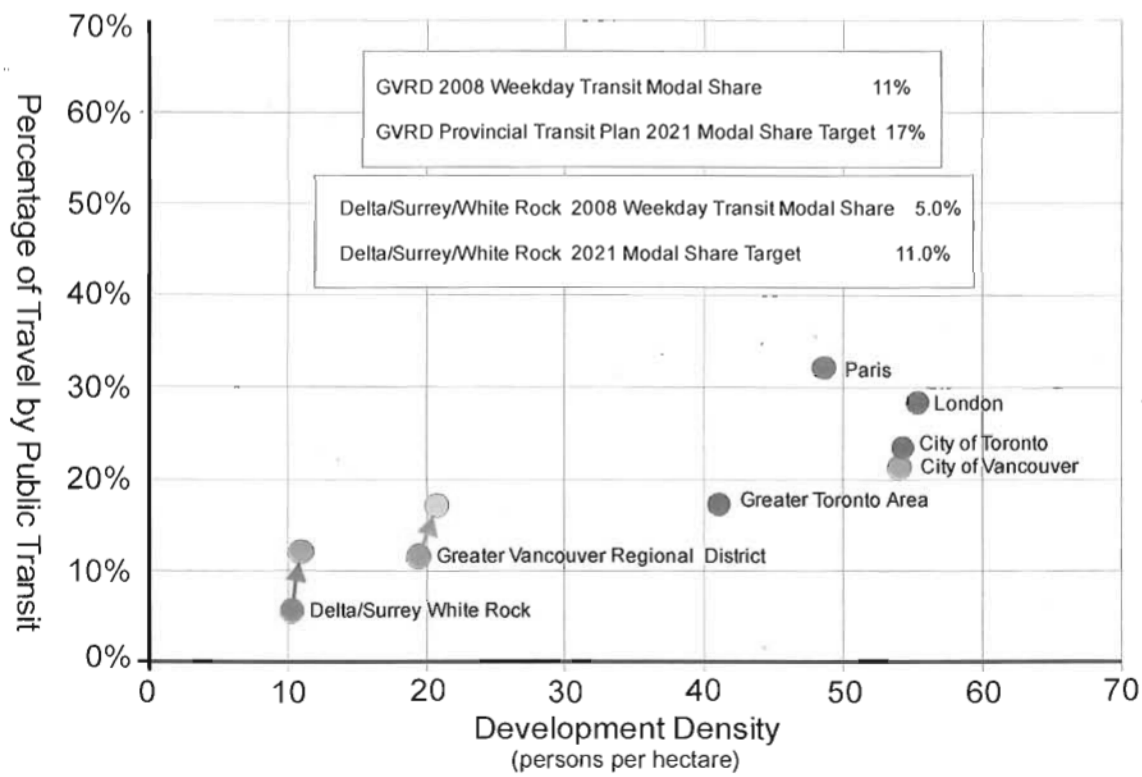
The two way Highway 99 corridor AADT ranges from 8,800 vehicles at the US border and peaks at the George Massey Tunnel with 94,600 vehicles. Table 4.1 provides a summary of total AADT's and SADT's at various corridor locations.

Table 4.1 Highway 99 Total AADT's and SADT's

	2008 AADT	2008 SADT
North of US Border	8,800	11,900
North of 32 Ave	51,000	54,000
North of Highway 91	48,400	51,200
George Massey Tunnel	94,600	99,700
Bridgeport Road	44,000	46,500

Source: BC Ministry of Transportation and Infrastructure

The Delta, Surrey, White Rock portion of the GVRD currently has a transit modal share of approximately 5%. Figure 4.2 describes modal shares for this area, the GVRD, City of Vancouver and other major jurisdictions.

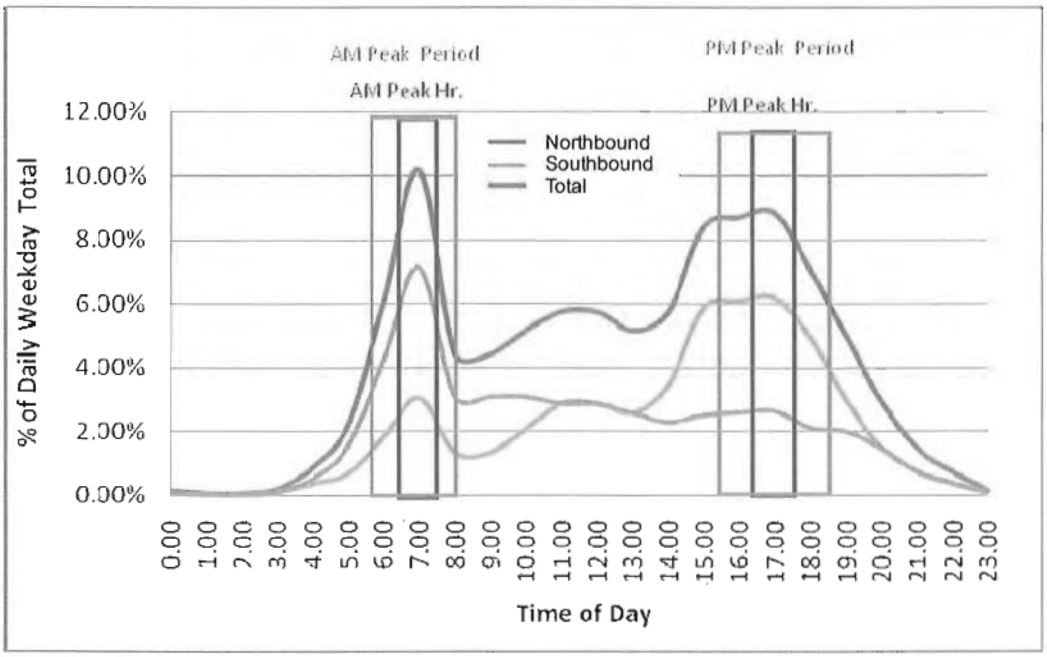


Source: South of Fraser Transit Plan

Figure 4.2 – Percentage of Travel by Transit in the GVRD and other Jurisdictions

The recently completed Provincial Transit Plan (PTP) has set a goal for increasing the modal share target of the GVRD from 11% to 17% by 2021. In order to achieve the regional modal share target the South of Fraser Area will have to increase its modal share form 5% to 11%.

Figure 4.3 describes the weekday hourly distribution of southbound, northbound and total vehicular demand on Highway 99, as well as the weekday AM and PM peak periods and peak hours. The peak periods account for approximately 50% of total daily demand.



Source: TransLink 2006 Travel Diary

Figure 4.3 - Highway 99 Weekday Hourly Vehicle Demand Distribution

The corridor serves auto, truck and transit modes. Truck demand ranges between 7% and 12%. The corridor supports the operation of the 10 TransLink bus routes shown in Figure 4.4. The bus routes generate 40 buses per hour at the peak load point (Bridgeport Road) in the peak direction.

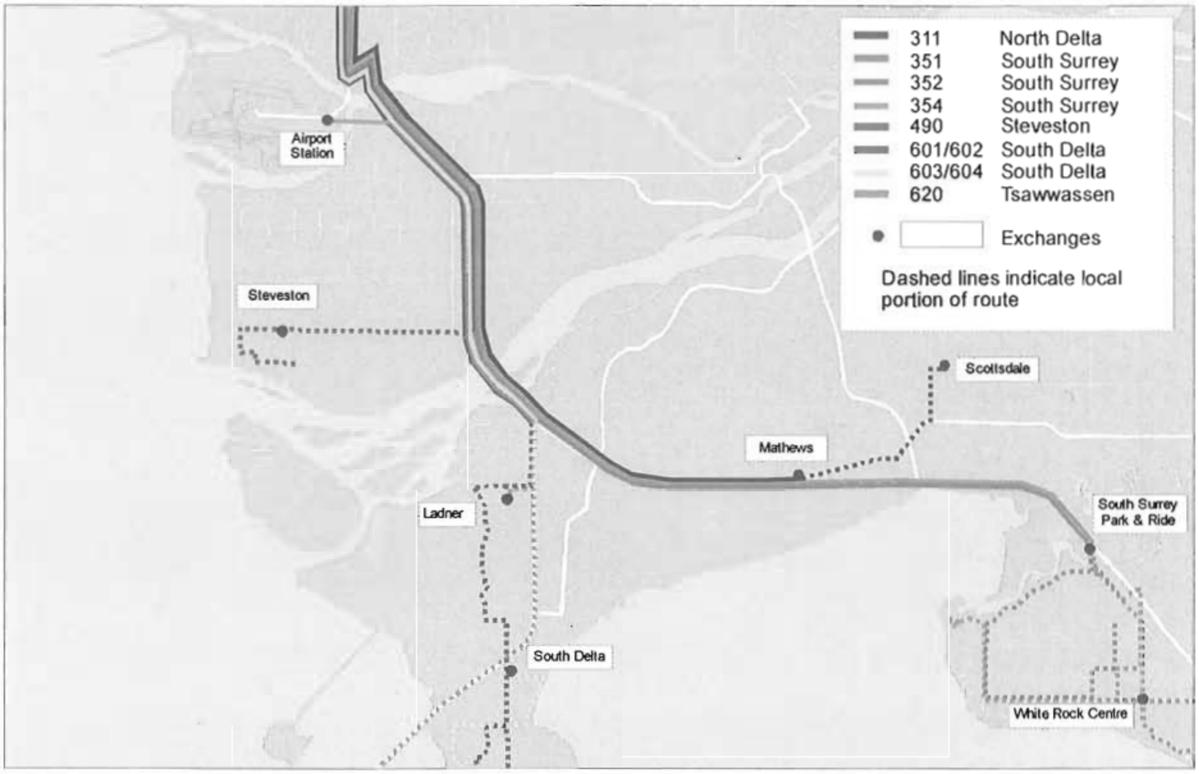


Figure 4.4 – TransLink Bus Routes Using Highway 99

All of the bus routes operating on Highway 99 circulate through their respective service areas as local buses and then operate as express buses on the Highway. There are only two stop locations on the highway in both eastbound and westbound directions; at the Mathews Exchange at Highway 10 and the Steveston Highway. In both instances buses leave and re-enter the highway via interchange ramps.

This portion of Highway 99 does not support cycling. This is primarily because of physical constraints posed by the Massey Tunnel (no shoulders through the tunnel) as well as the complexity induced by the tunnel lane control system. Buses operating on Highway 99 are equipped with bus racks.

Figures 4.5 and 4.6 describe the 2008 AM and PM corridor peak hour vehicular demand by mode in the peak direction of travel.

Figures 4.7 and 4.8 describe the 2008 AM and PM corridor peak hour person demand for auto/truck and transit modes in the peak direction of travel.

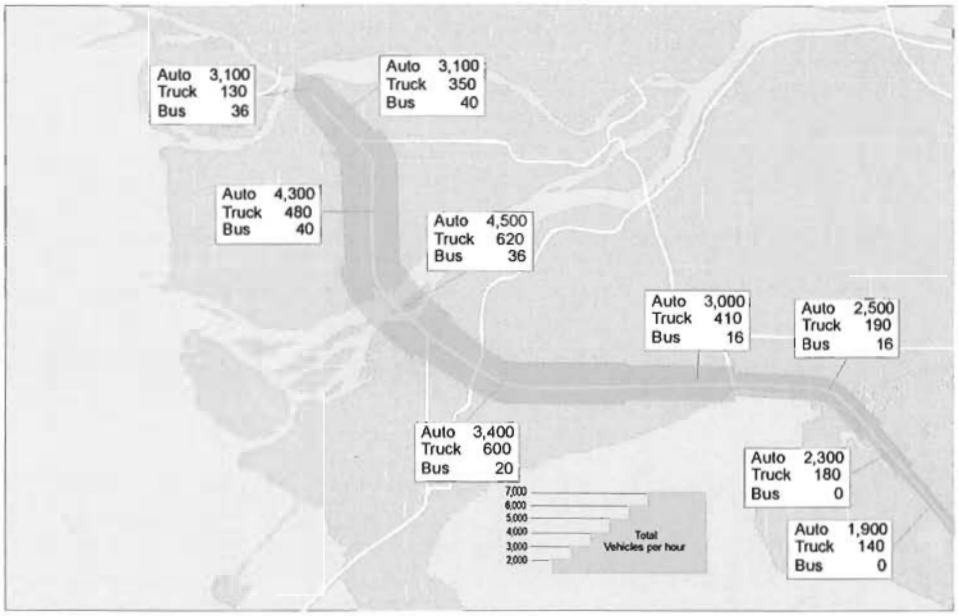


Figure 4.5 – Northbound AM Peak Hour Vehicular Demand on Highway 99

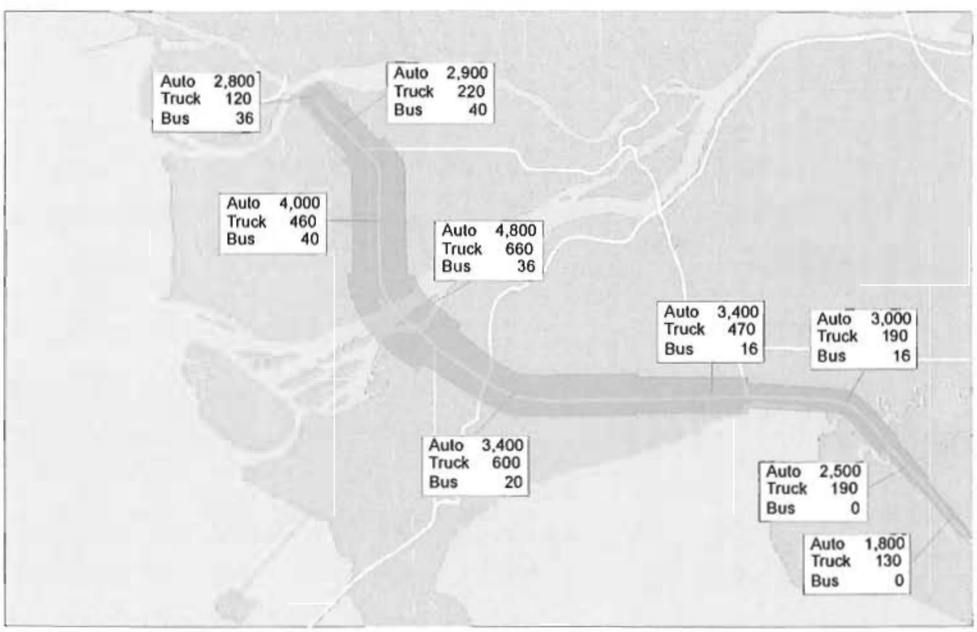


Figure 4.6 – Southbound PM Peak Hour Vehicular Demand on Highway 99

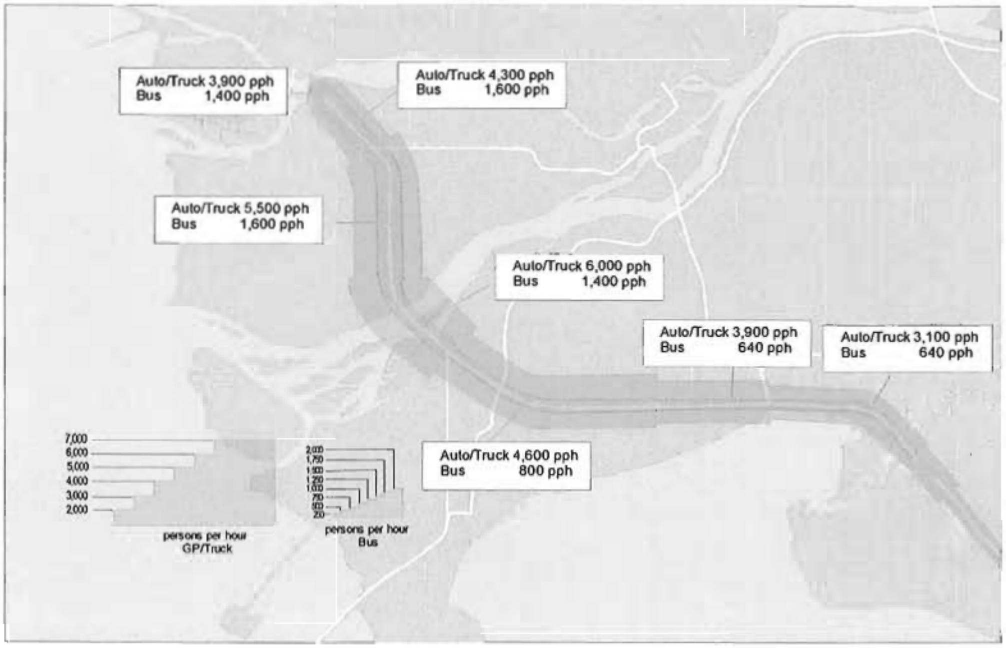


Figure 4.7 – Northbound AM Peak Hour Person Demand on Highway 99

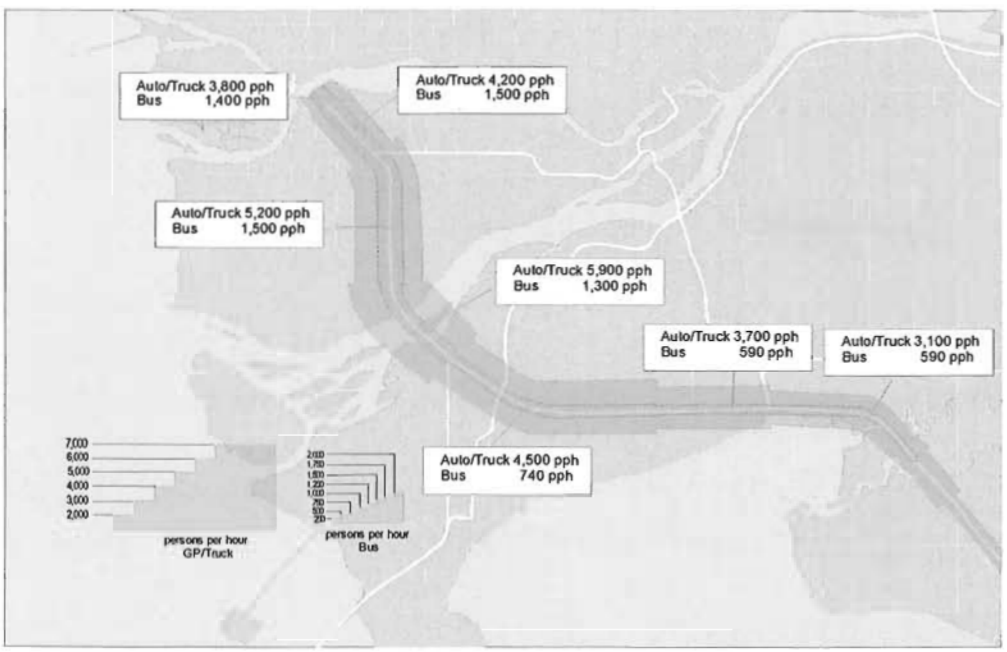


Figure 4.8 – Southbound PM Peak Hour Person Demand on Highway 99

It is interesting to note that although the numbers of buses on the corridor represent less than 1% of the vehicular demand, the person demand accommodated by buses on the highway ranges from 17% to 26%.

5.0 QUALITY OF SERVICE AND SAFETY PERFORMANCE

The quality of service on "free flow" facilities is described by the speed flow relationship that ascribes level of service based on the density of the traffic flow and the resultant speed achievable. Figure 5.1 describes the speed flow curve calibrated to BC Lower Mainland highway conditions.

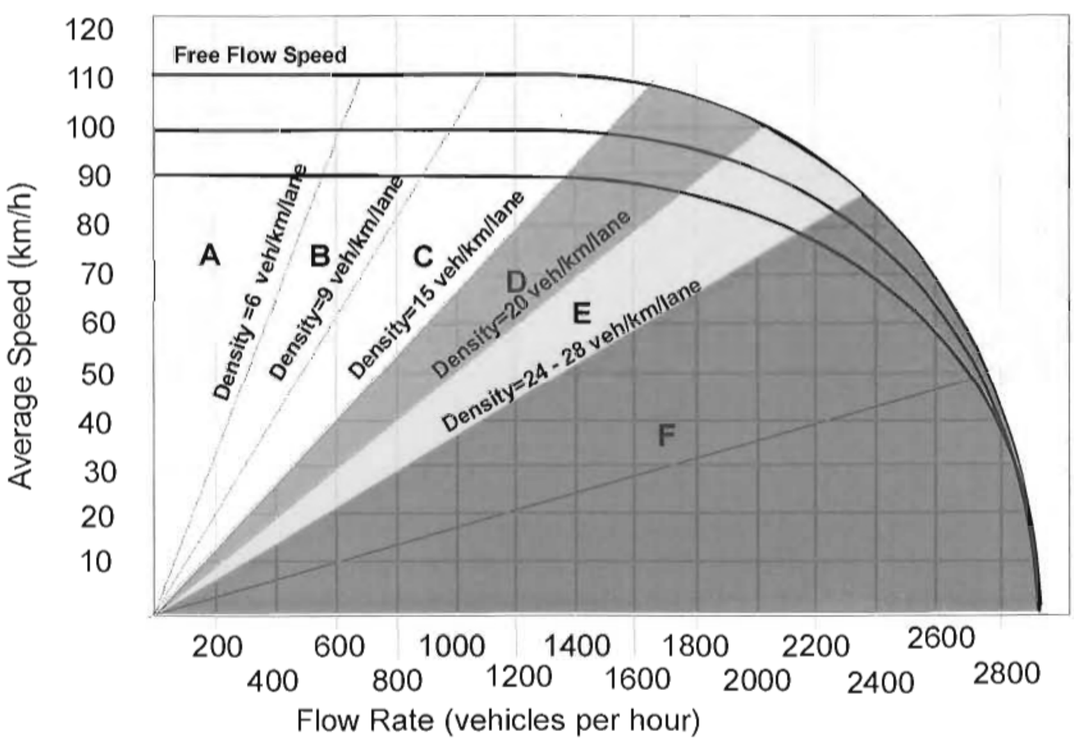


Figure 5.1 – Speed, Flow Rate, and Service Levels

Figures 5.2 and 5.3 describe the range of speeds in the peak direction of travel along Highway 99 from King George Highway to the Oak St. Bridge in the weekday AM and PM peak periods. The Figures also show the average peak hour speeds for GP traffic and transit buses.

The northbound speed variation during the AM peak period, between the King George Highway and Highway 91 is caused by peak demands which result in vehicle densities that can drop speeds to 30 km/h for short intervals. There is a significant "off-load" to Highway 91 which reduces vehicular density and thereby reduces the speed variation to more typical ranges. With the addition of southbound demand from Highways 91, 10, and 17 the peak period demand significantly exceeds the available tunnel capacity. This results in speeds dropping to 10 km/h at the tunnel approaches. These effects rebound as far back as 80th St. Average bus speeds between King George Highway and 80th St. drop below GP speeds because buses must exit for passenger exchange at Highway 10. From this point to the tunnel average transit speeds are faster than GP speeds because of northbound HOV accommodation.

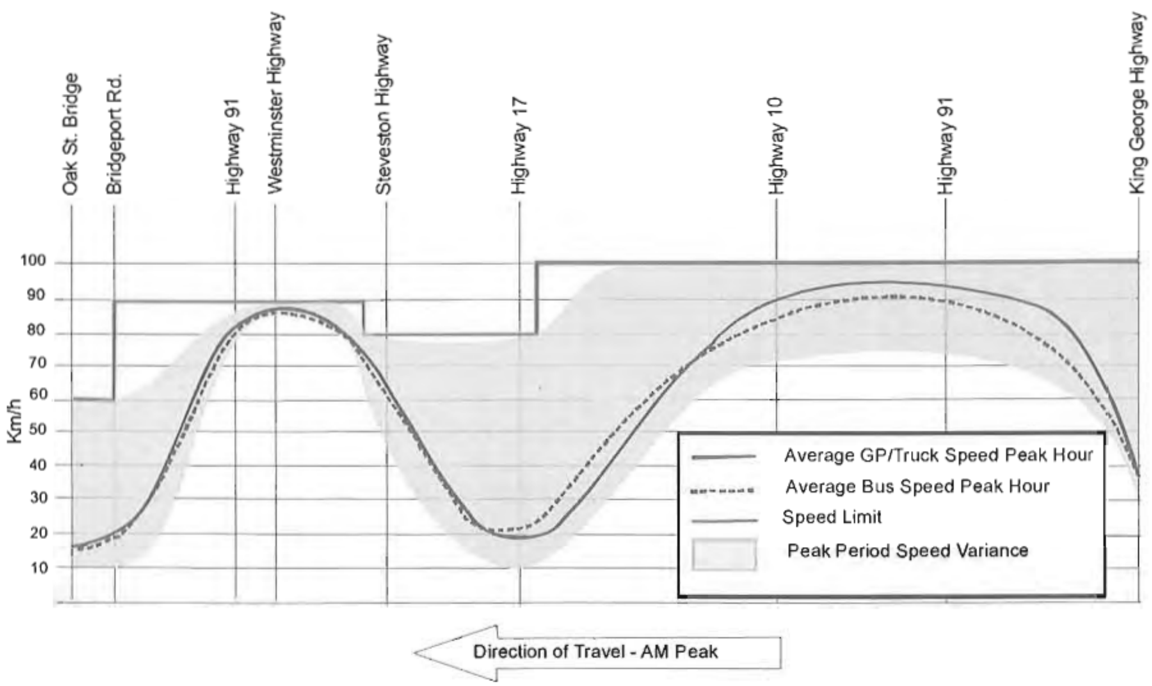


Figure 5.2 – Northbound AM Peak Period Speeds on Highway 99

Northbound through the tunnel transit and GP speeds increase to near posted speeds. Transit average speeds drop slightly because buses must exit and re-enter the Highway for passenger exchange at the Steveston Highway. Northbound buses and GP buses maintain the posted speed (90 km/h) to the Westminster Highway. Capacity constraints north of the Oak St. Bridge result in a significant increase in vehicle density which induce speeds as low as 10 km/h for buses and GP traffic. The impact of this capacity constraint is felt as far back as Westminster highways during the AM peak period.

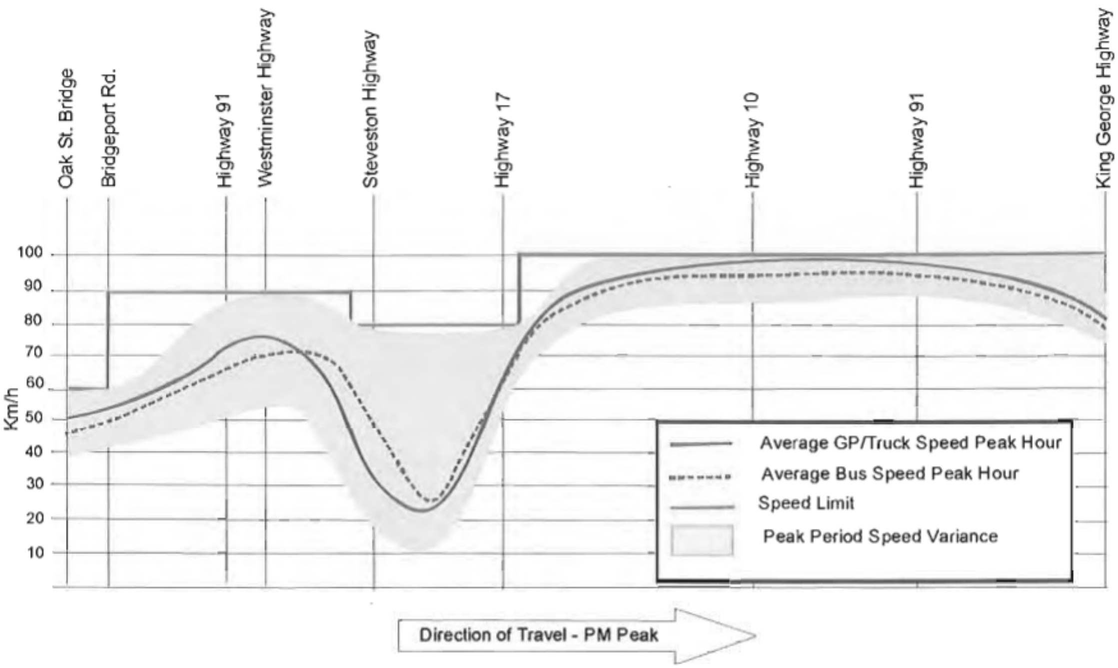
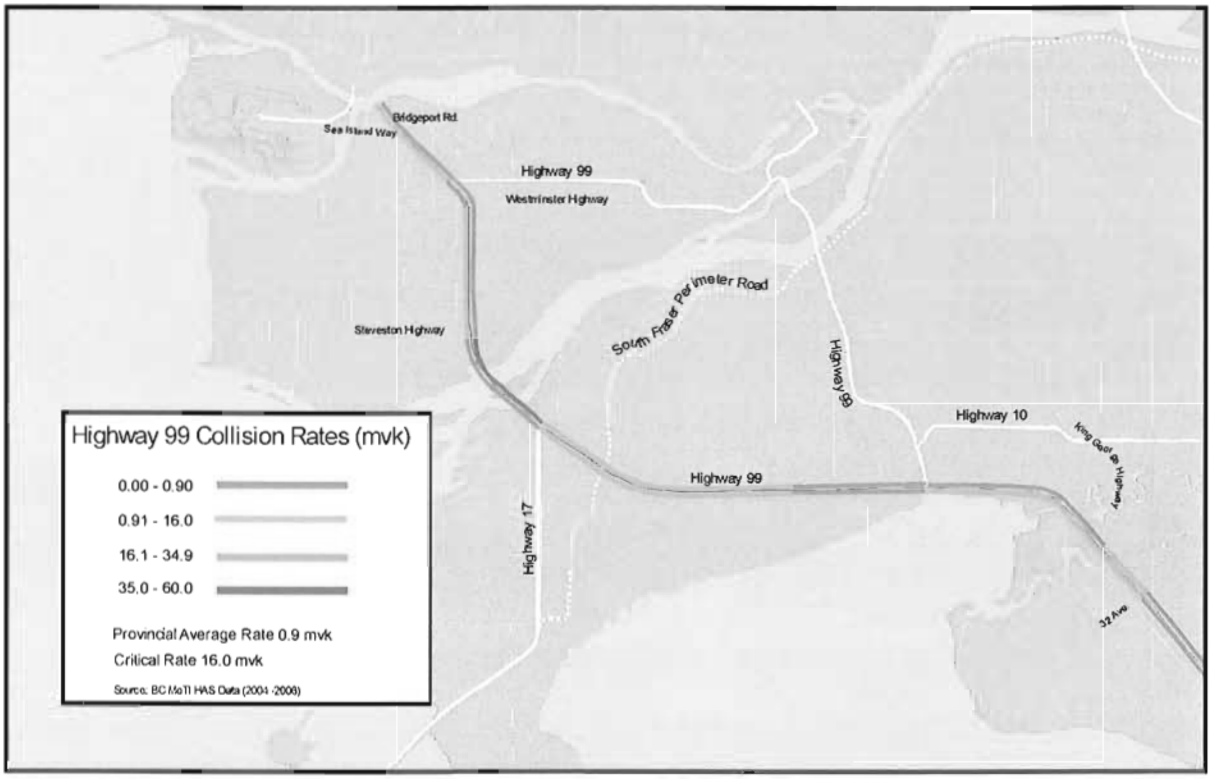


Figure 5.3 – Southbound PM Peak Period Speeds on Highway 99

In the southbound direction during the PM peak period buses and GP traffic experience relatively modest speed variation between the Oak St. Bridge and Westminster Highway. Transit and GP traffic achieve average speeds slightly lower than the posted speeds on this portion of the highway. South of Westminster Highway the effects of congestion at the George Massey Tunnel begin to affect bus and GP average speeds. With the addition of southbound demand from Highway 91 and Westminster Highway the southbound demand significantly exceeds the capacity available at the George Massey Tunnel. This results in similar speed variation to those experienced in the southbound direction in the AM peak period. Southbound buses achieve higher average speeds from Westminster Highway to Highway 17 as a result of the southbound HOV lane and George Massey Tunnel Queue jump lane. From Highway 17 to the Highway 91 speed variation for southbound buses and GP traffic is relatively low with average speeds very near the posted speed limit. Buses have slightly lower average speeds than GP traffic because buses must leave and re-enter the highway for passenger exchange at Highway 10. Between Highway 91 and King George Highway the peak period highway density increases to levels where average speeds for buses and GP traffic can drop 70 km/h for short durations.

Figure 5.4 illustrates the safety performance of the corridor in terms of collision rates (collisions per million vehicle kilometres). Figure 5.5 describes the various causes of these collisions.



Source: BC Ministry of Transportation and Infrastructure HAS System (2006 data)

Figure 5.4 – Highway 99 Collision Rates

Source: BC Ministry of Transportation and Infrastructure HAS System (2006 data)

Figure 5.5– Highway 99 (Oak St. Bridge - King George Highway) Collision Types

Between 32 Ave. and King George Highway in South Surrey the collision rate exceeds the provincial average rate. The majority of collisions are "rear end" and "off road right". This collision profile is typical for vehicle density levels that this portion of the highway experiences. Between the King George Highway and Highway 10 both directions of travel are generally within the average provincial rate. From Highway 10 to Highway 17 both directions of travel exceed the provincial average rate. This is again attributable to peak period vehicle density. Between Highway 17 and the Steveston Highway (George Massey Tunnel section) the collision rates significantly exceeds the provincial average rate. This results from head on collisions in the contra flow lanes of the tunnel as well as very high vehicle densities. Various locations on this segment rank 38th and 56th on the list of provincial critical safety locations. Between Steveston Highway and the Oak St. Bridge virtually the entire section of highway in both directions exceeds the provincial average rate, the northbound direction being more critical. The collision rates in this segment are consistent with the peak period vehicle densities that occur.

6.0 TRANSIT SERVICE LEVELS

From a capacity perspective, the allowed passenger load on a bus (set by policy) constrains the number of people that a given number of buses can carry. From a passenger's perspective, loading reflects the comfort level of the on-board portion of a bus trip—both in terms of being able to find a seat and in overall crowding levels within the bus. From a transit operator's perspective, liability concerns and the desire to provide every customer with a seat for high-speed or long-distance services may cause the operator to set the allowed loading at levels lower than what riders might tolerate.

The *passenger load* is simply the number of passengers on a single transit vehicle. The occupancy of the vehicle relative to the number of seats, defines the load factor. A factor of 1.0 means that all of the seats are occupied. The importance of vehicle loading varies by the type of service. In general, bus transit provides load factors below 1.0 for long-distance commuter trips and high-speed, mixed-traffic operations such as those on Highway 99.

In an effort to manage crowding, while at the same time run an efficient and effective transit service, TransLink worked with area municipalities on the development of service design guidelines. In June 2004, the GVTA approved new *Transit Service Guidelines* that provide objective rationale for the allocation of transit resources. As the title suggests, these guidelines are used as "tools" for evaluating system conditions and making decisions on the provision of new services as well as adjustments to the design of existing services. Although many of the guidelines are set as minimum or maximums to achieve desired "optimum" conditions for the customer and operator, they are not treated as rigid standards. In other words, the guidelines are typically used by transit planners and operators to best manage the system on behalf of all interests. The guidelines are designed with the flexibility to achieve the following:

- Form a consistent basis for service planning;
- Evaluating and monitoring the performance of individual routes and making adjustments as necessary;
- Developing annual budgets to provide service that support the guidelines; and
- Providing transparency to transit customers, the general public and decision makers on the expected levels of service and performance.

Table 6.1 describes Transit Service Design Guidelines with respect to vehicle passenger loads for buses allocated to the South of Fraser Bus routes.

Table 6.1 TransLink Transit Service Guidelines
Passenger Loads

Bus Type	Peak 15 minutes In AM & PM Peak periods	Peak 30 minutes In AM & PM Peak periods	Weekday Midday & Evening, Weekends Peak 60 minutes
Maximum Number of Passengers On-Board (standees in brackets)			
12 m Highway Coach (47 Seats)	50 (3)	47 (0))	47(0)
18 m Low Floor Articulated Coach (54 seats)	85 (31)	75(21)	65(11)

These guidelines are for the highest passenger loads averaged for all bus trips on a route within the busiest 15 minutes and 30 minutes in peak periods and over 60 minutes in off-peak. Passenger loads on some individual bus trips may exceed the guidelines.

The bus allocation to each South of Fraser route currently results in a spare peak period capacity of 20% for each routes It is assumed that TransLink will continue the provision of bus capacity on the same basis in the future.

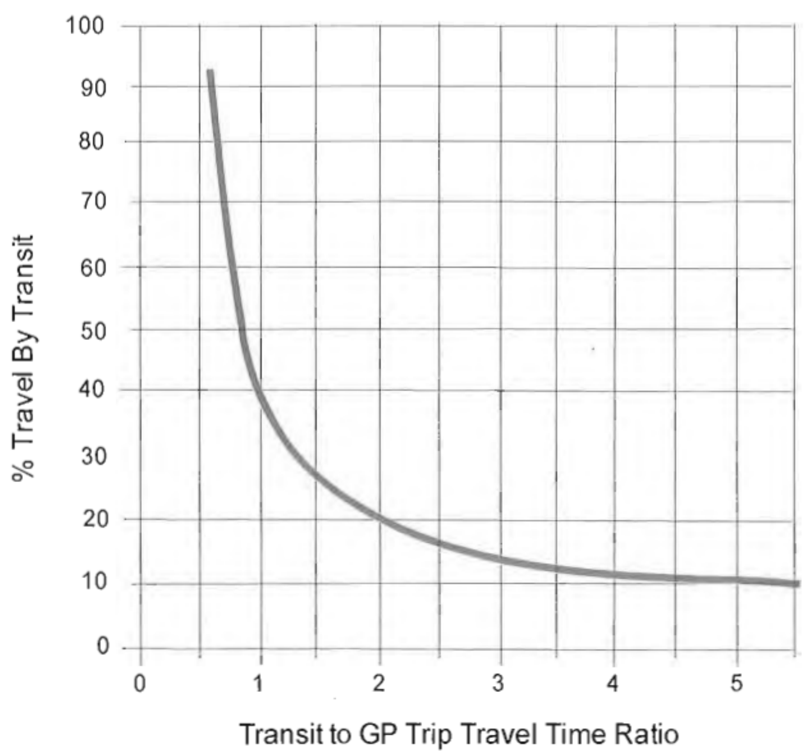
7.0 ISSUES

The congested peak period conditions on the Oak St. Bridge and Massey Tunnel approaches and the resultant safety performance pose the most significant service quality and safety issues along the corridor. Bus services and higher occupancy vehicles on the corridor experience slightly better operating conditions than single occupant GP traffic as a result of HOV and bus accommodations provided. However transit operations in terms of schedule reliability and operating efficiency, are particularly affected by the dramatic variance in average operating speeds along the corridor. The collision and incidence frequency further erodes transit schedule reliability. Goods movement along the corridor experience similar effects. With the Delta Port using a just in time truck reservation system truckers are adjusting to the reliability issue by arriving earlier and then parking on Highway 17.

8.0 FUTURE CONDITIONS

Based on projected land use changes it is expected that travel demand on the Highway 99 corridor will increase 36% by 2021 and another 50% from 2021 to 2031. Given that there are no current plans to expand the capacity of Highway it is unlikely that such growth could occur without a major shift to the transit mode. To effect such a shift transit operations on the corridor would have to be significantly improved in terms of reliability and efficiency and transit would have to perform significantly better than GP based travel.

Figure 8.1 describes the relationship between transit and auto based travel times and resultant mode splits for work trips (includes school trips). Travel times are total times from trip origin to trip destination for each mode.



Source: Metropolitan Transportation Planning (John W. Hickey, Robert C. Stewart, Richard D. Walker)

Figure 8.1– Modal Shares Associated with Transit to GP Travel Time Ratios

Given that the majority of travel in the AM peak hour is work related the applicability of the curve shown in Figure 8.1 can be confirmed. The current total travel time averages by bus and car (derived from 2008 AM Peak travel surveys) from White Rock/South Surrey to the Vancouver CBD are estimated to be: 83 minutes and 125 minutes respectively. This produces a transit to GP travel time ratio of 1.51. Figure 8.1 predicts a transit/GP mode split outcome of 25% with such a travel time differential. The current peak hour mode split at the peak load point is measures at 24% indicating that the relationship is valid for this highway corridor.

Based on this relationship it is estimated that the Transit to GP ratio needed to effect a doubling in mode split is 0.80. This implies a significant increase in transit travel time as well as a significant deterioration in GP travel times.

8.1 Canada Line Integration

In Augustl of 2009 the new Canada Line Rapid Transit Line will initiate services between Richmond, the Vancouver International Airport, and Downtown Vancouver. The Bridgeport Canada Line Station intercepts the Highway 99 Corridor near the Oak St. Bridge. Given the limited opportunity for transit accommodation on Vancouver north-south arterial roadways including those that are utilized by South of Fraser buses, TransLink determined that the most effective transit delay mitigation for South of Fraser routes was to terminate the routes at the Bridgeport Canada Line Station and transfer passengers to the Canada Line to complete Vancouver portions of their trip. This would provide significant delay reductions for passengers continuing their trip to Vancouver destinations. Table 8.1 provides a comparison of travel times associated with this a strategy. Figure 8.1 describes the proposed re-routing of South of Fraser Bus routes.

Table 8.1 Travel Time Comparisons For Terminated South of Fraser Bus Routes

Weekday AM Peak Period		
	Former Bus Only	Bus/Canada Line
Southbound Average Run Time (min)	66	58
run time variation (min)	13	3
Weekday PM Peak Period		
	Former Bus Only	Bus/Canada Line
Southbound Average Run Time (min)	78	64
run time variation (min)	21	16

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Figure 8.1 South of Fraser /Canada Line Transit Service Integration

Times are in minutes and reflective of buses travelling between Burrard Station in the Vancouver CBD and the South Surrey Park& Ride. The Bus/Canada Line Trip Assumes a 5 minute transfer time once buses reach the Canada Line Station. This strategy by itself will reduce peak direction transit travel times from South Surrey and the Vancouver CBD by 8 and 14 minutes in the AM and PM peak periods. Bus run time variance is reduced by 77% and 25% in the AM and PM peak periods.

The northbound AM peak period bus delay is affected by congestion on Highway 99 approaching Bridgeport Road and traffic signal delays along Bridgeport Road. In order to further reduce AM peak period delay the Ministry of Transportation and Infrastructure is constructing a northbound shoulder bus lane from Highway 91 to Bridgeport Rd. The construction of a NBD transit only lane between Westminster Highway and Bridgeport Rd. off-Ramp will save an additional 4 minutes in AM peak direction transit delay.

The signal delay along Bridgeport Road and Seas Island Way will be mitigated by provision of transit signal priority (TSP) on Bridgeport Road and Sea Island Way. Figure 8.2 describes the signalized intersections that will provide transit signal priority. Table 8.2 describes the time savings achievable with the implementation of the Bridgeport Rd./Sea Island Way TSP.

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Figure 8.2 – Bridgeport Rd. /Sea Island Way Transit Signal Priority Intersections

Table 8.2
2009 Bridgeport Station Access Times

Scenario	AM Peak		PM Peak	
	Inbound	*Outbound*	*Inbound*	*Outbound*
Canada Line Open No TSP	2:25	2:35	3:00	3:45
Canada Line With TSP	1:50	2:00	2:05	2:25

Times represent minutes and seconds

As can be seen the TSP will reduce peak period station access times by South of Fraser buses by about a minute in the peak direction of travel.

Table 8.3 provides comparisons of bus only and bus/Canada Line transit travel times with northbound transit shoulder bus lane and Bridgeport Rd. /Sea Island Way TSP implemented.

Table 8.3 Travel Time Comparisons For Terminated South of Fraser Bus Routes With 2009 Transit Accommodation

Weekday AM Peak Period		
	Former Bus Only	Bus/Canada Line
Southbound Average Run Time (min)	66	53
run time variation (min)	13	2
Weekday PM Peak Period		
	Former Bus Only	Bus/Canada Line
Southbound Average Run Time (min)	78	64
run time variation (min)	21	16

The AM and PM peak direction travel time differences of 13 minutes and 14 minutes provide travel time reductions of 20% and 18% respectively.

9.0 MAINTAINING THE STATUS QUO

Although the South of Fraser bus route termination strategy resolves delay issues from the Oak Street north, deterioration in bus travel times and reliability remain to be resolved south of the Oak St. Bridge. Figures 9.1 and 9.2 describe AM and PM peak Hour GP and transit travel times for 2008, 2021, and 2031 under a "maintain status quo" scenario. (no change in Highway 99 capacity and no additional transit accommodation).

Maintaining the status quo is predicted to increase the Highway 99 portion of 2021 AM and PM peak direction transit and GP travel times by 11 and 10 minutes, while 2031 AM and PM peak direction travel times are predicted to increase by 22 and 33 minutes. Table 9.1 provides estimates of total AM peak period origin to destination travel times between White Rock/South Surrey and The Vancouver CBD for bus and GP modes.

Table 9.1
AM Peak Periods Bus and GP Total Travel Times
(White Rock/South Surrey to Downtown Vancouver)

	AM Peak Hour		
	NBD		
	BUS	GP	Bus to GP Travel Time Ratio
2008	125	83	1.51
2021	145	103	1.41
2031	180	135	1.34

Travel times are in minutes

The transit accommodations that will be in place by the fall of 2009 will provide some mitigation for travel time delay mitigation under future demand. Figure 9.3 identifies the forecast Highway 99 mode splits that could be expected with these modal travel times. The mode splits are predicted to shift by 5% by 2031. The Provincial Transit Plan and South of Fraser Transit Plan Goals of doubling the South of Fraser modal share would require a shift in Highway 99 mode split to move from the current 25% to 50%.

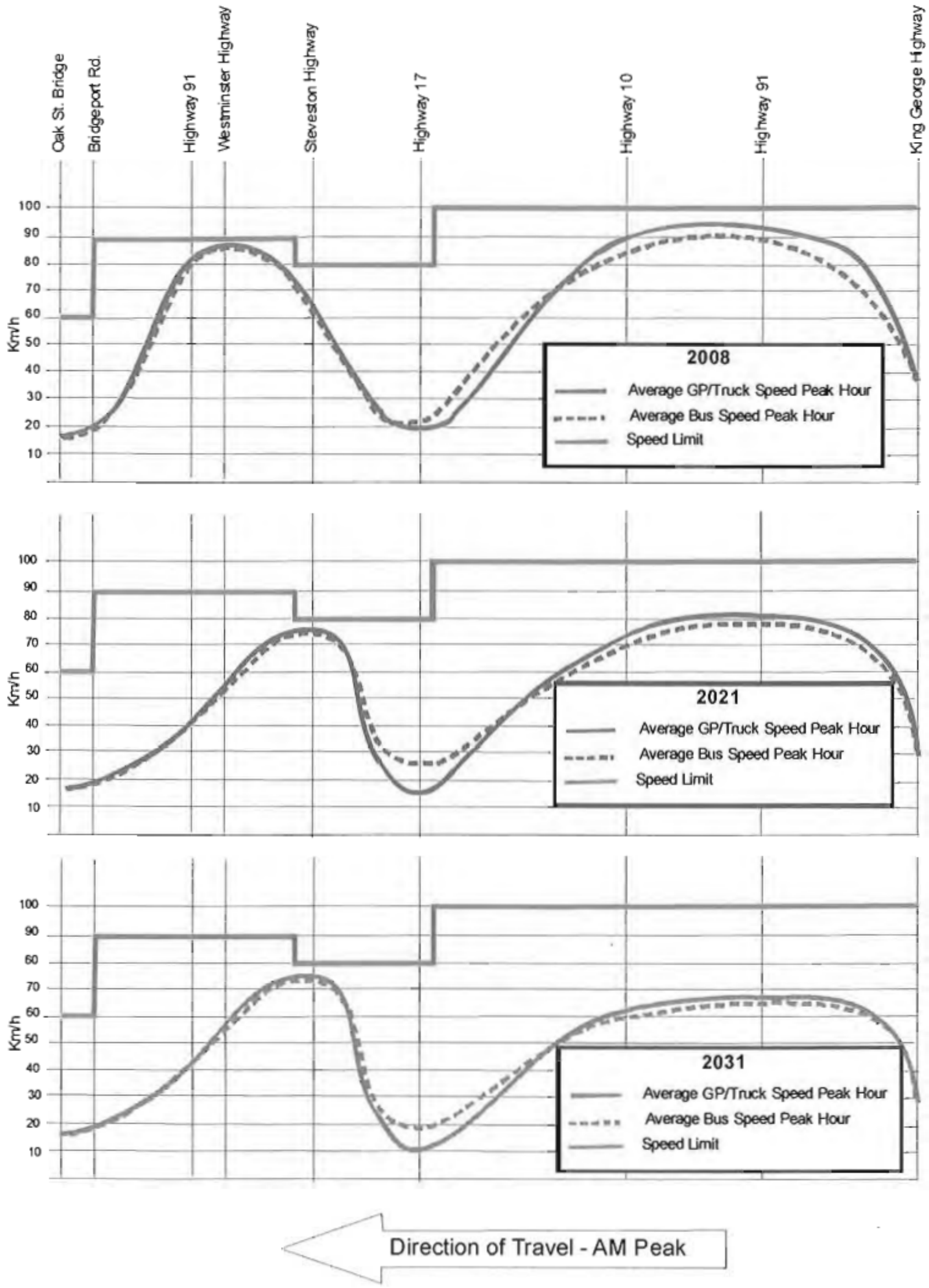

Figure 9.1 – AM Peak Hour Northbound GP & Transit Average Transit Travel Time Changes

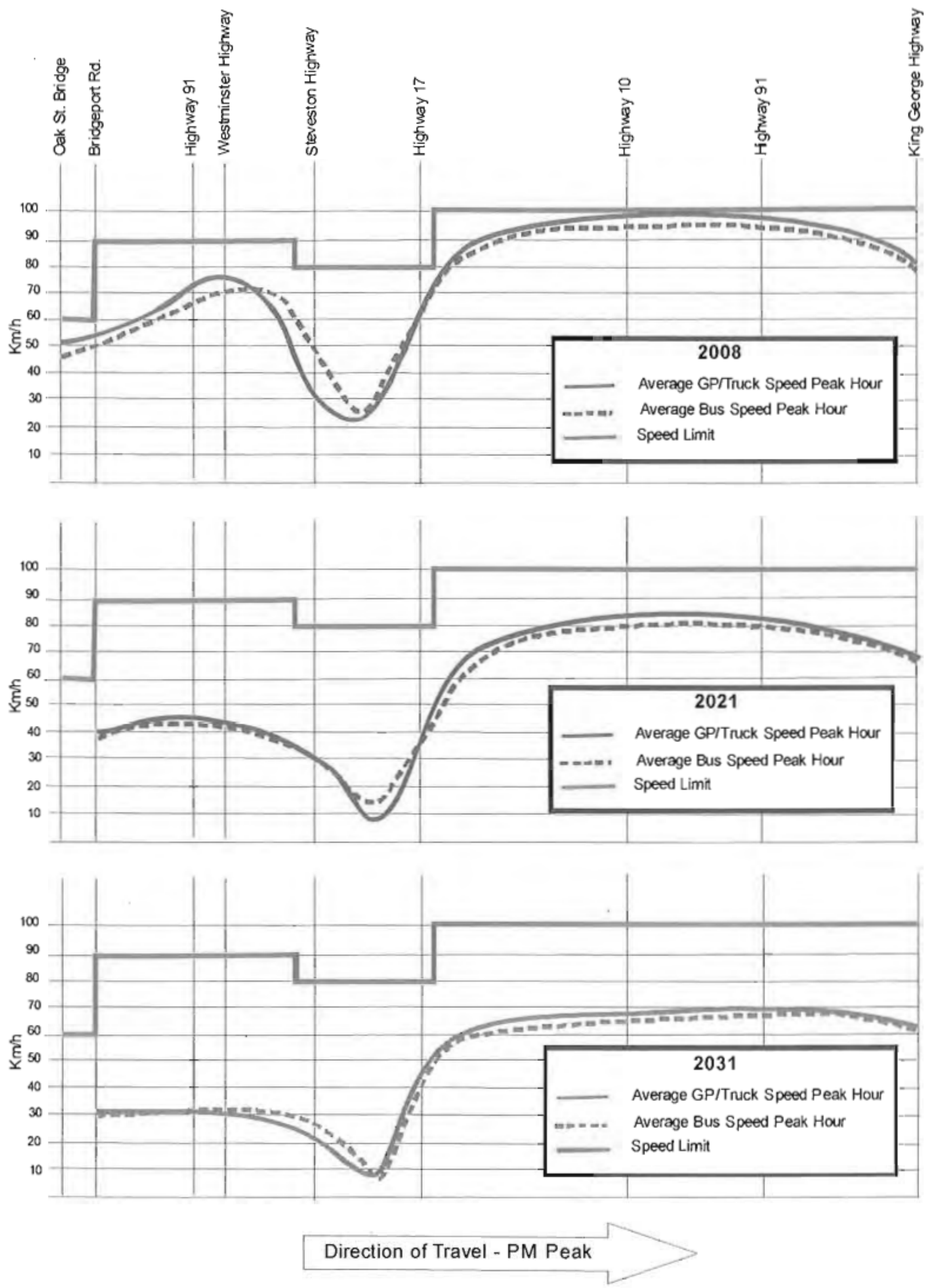

Figure 9.2 – PM Peak Hour Southbound GP & Transit Average Transit Travel Time Changes

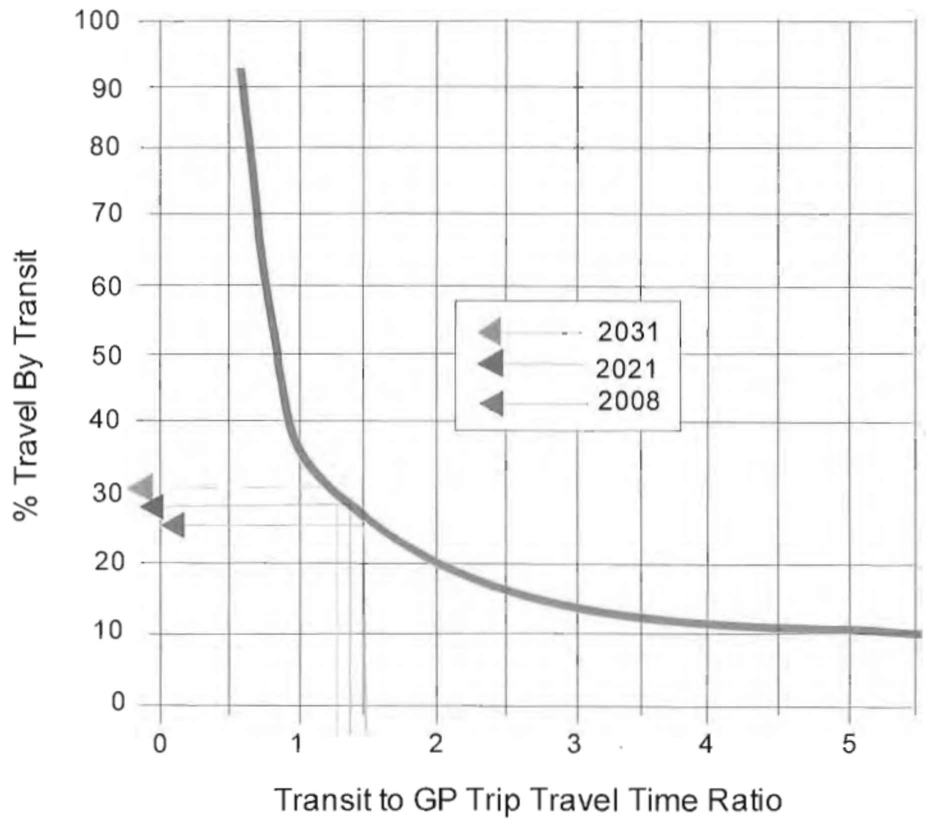

Figure 9.3 – Status Quo Mode Splits on Highway 99 (2021 & 2031)

10.0 DEGREE OF TRANSIT ACCOMODATION REQUIRED

Figures 10.1 and 10.2 describe the AM and PM peak hour travel time savings achievable if buses were accommodated in some form of dedicated lane on sections of Highway 99 that currently have no form of accommodation. Table 10.1 describes the Bus and GP traffic trip times in both the AM and PM peak hour that would result with such additional transit accommodation.

Table 10.1
Predicted Peak Hour Bus And GP Travel Times on Highway 99
(South Surrey Park & Ride to Bridgeport Off-Ramp)

	AM Peak Hour		PM Peak Hour	
	NBD		SBD	
	GP	Bus	GP	Bus
2008	32	44	36	50
2021	34	55	37	60
2031	36	66	39	83

Travel times are in minutes

Table 10.2 provides comparative bus /GP total origin to destination time estimates for AM peak travel from the White Rock /South Surrey Area to downtown Vancouver.

Table 10.2
AM Peak Periods Bus and GP Total Travel Times With Enhanced Transit Accommodation
(White Rock/South Surrey to Downtown Vancouver)

	AM Peak Hour		
	NBD		
	BUS	GP	Bus to GP Travel Time Ratio
2008	125	83	1.51
2021	93	103	0.9
2031	98	135	0.8

Travel times are in minutes

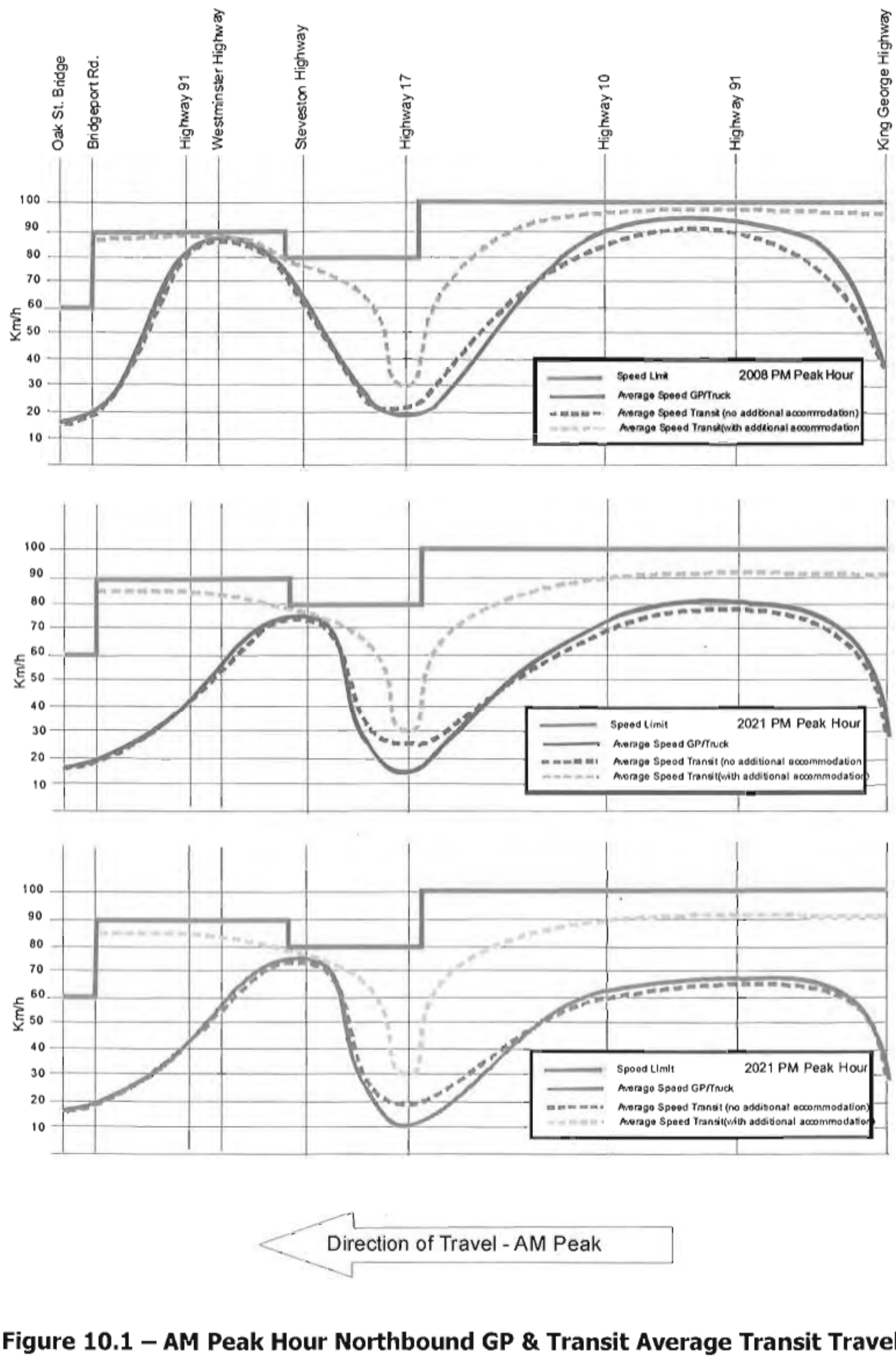

Figure 10.1 – AM Peak Hour Northbound GP & Transit Average Transit Travel Time Changes With Additional Transit Accommodation on Highway 99

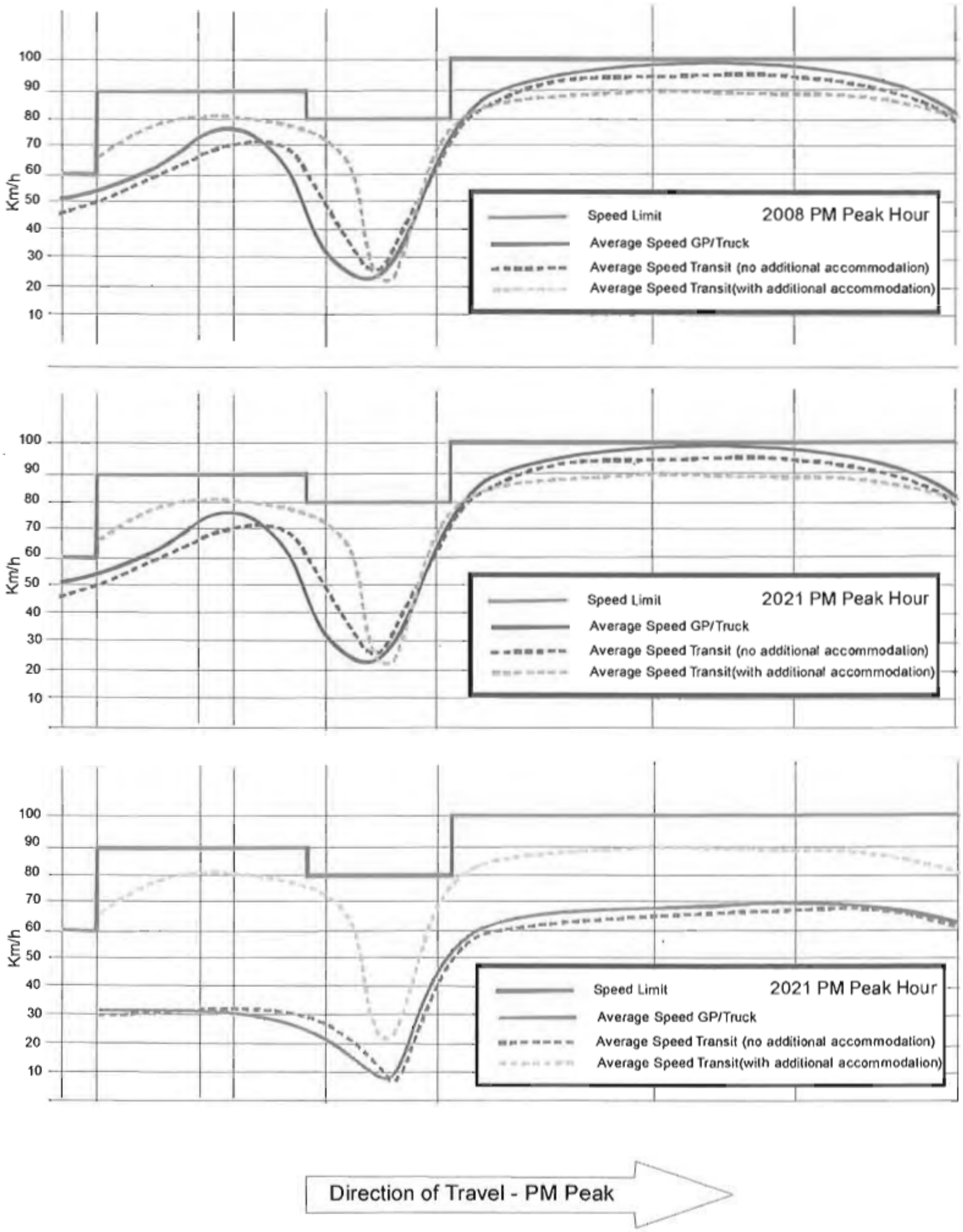

Figure 10.2 – PM Peak Hour Northbound GP & Transit Average Transit Travel Time Changes With Additional Transit Accommodation on Highway 99

Figure 10.3 describes the projected modal splits for Highway 99 assuming the Bus to GP total travel time ratios in Table 10.1.

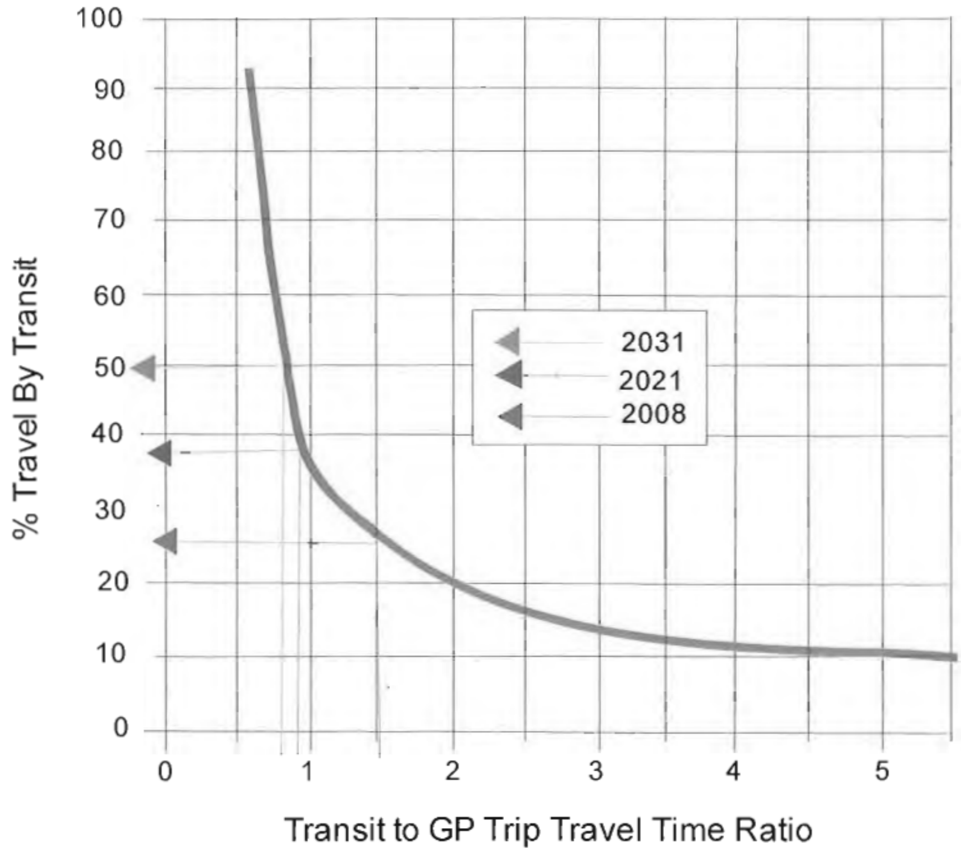

Figure 10.3 – Predicted Mode Splits Assuming Enhanced Transit Accommodation on Highway 99 (2021 & 2031)

The predicted mode splits are consistent with the Goals of the Provincial Transit Plan and South of Fraser Transit Plan.

Figure 10.4 describes the speed ranges and average speeds for GP and Bus vehicles traveling the Highway 99 corridor in the peak direction in the AM and PM peak periods in 2021 assuming the availability of enhanced transit accommodation.

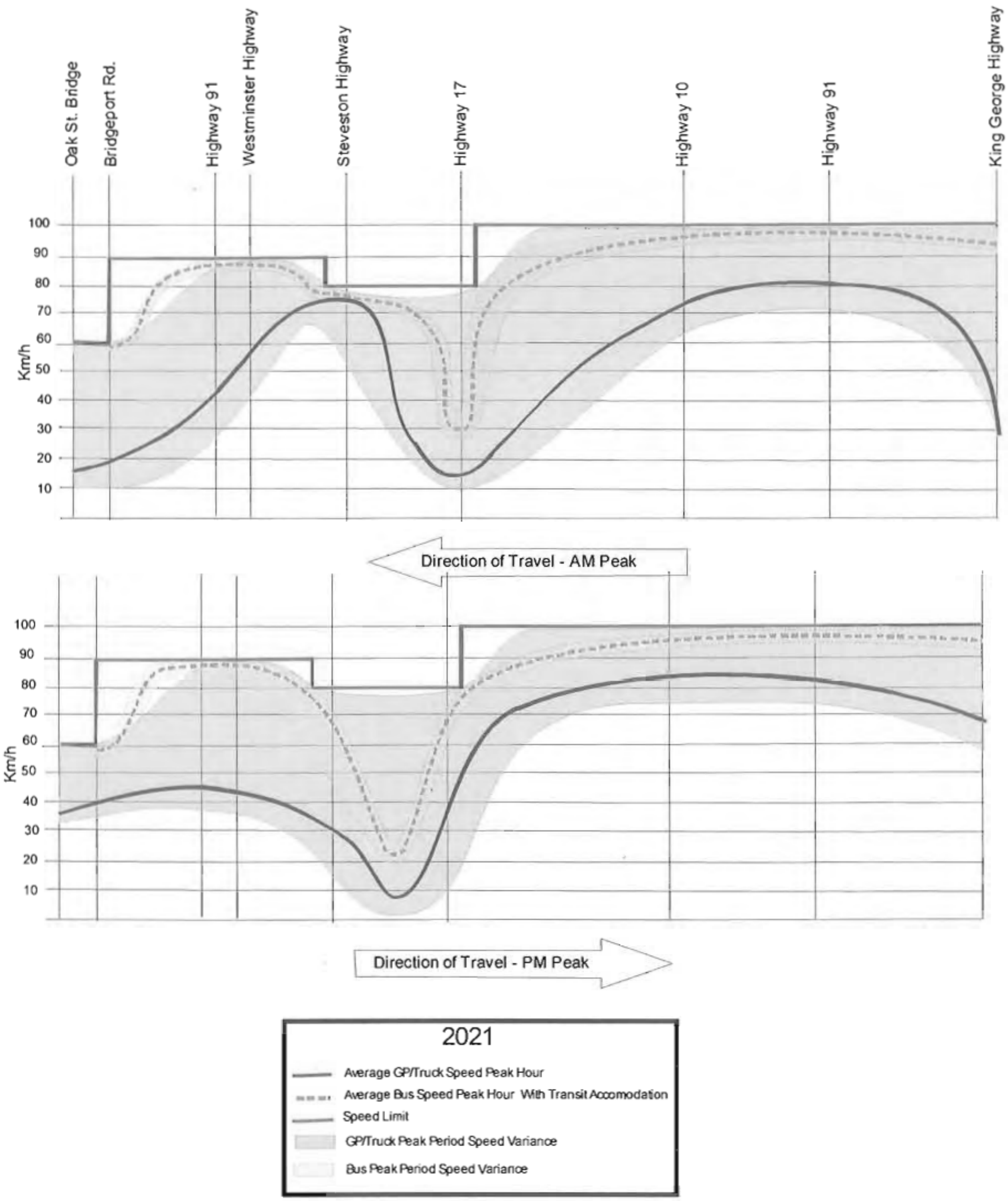

Figure 10.4 – 2021 AM & PM Peak Hour Average GP/Truck & Transit Travel Times and Peak Period Speed Variation Assuming Transit Accommodation on Highway 99

11.0 OPTIONS FOR PROVISION OF ENHANCED TRANSIT ACCOMODATION

Existing HOV Accommodation

It is assumed that the existing Northbound HOV lane will be converted to an occupancy eligibility of plus 2. This will match the southbound HOV eligibility that was recently amended. The current northbound HOV lane has a low utilization and there is a continuing public desire to decrease eligibility given the growing northbound delays at the Massey Tunnel approaches. It is expected that the plus 2 eligibility should provide adequate transit accommodation until 2013 to 2015. At this time occupant eligibility can be increased or dedicated transit lanes constructed. The northbound HOV queue jump should also be sustainable until the 2013 to 2015 time period. When additional transit accommodation is necessary occupancy eligibility can be modified or dedicated transit lanes constructed. Between 2013 and 2021) the northbound queue jump will have to revert to transit only usage similar to the current southbound queue jump.

Location of Priority Lanes

Conventional practice for placement of HOV/Bus lanes in highway environments is median side. This works well if buses do not have to move from the lane for the duration of the highway trip. In some cases HOV interchange ramps to facilitate HOV exit and entry from the median side lanes can be considered. This is generally avoided because of costs and complexity of operation. In the Highway 99 environment where buses must move to the curb to leave and re-enter the highway for passenger exchange the median lanes cannot practically be utilized, particularly in the highly congested portions of the corridor such as those approaching the George Massey Tunnel or Oak St. Bridge. The construction of interchange ramps required for median side lanes would exceed the entire cost of constructing shoulder side lanes through the entire corridor. Given that the passenger exchange being accommodated is less than 5 passengers per bus run and given that the existing shoulder side HOV have no operational issues, median side priority lanes were not considered further. Figure 11.1 depicts existing Highway 99 cross sections with shoulder side HOV lanes.

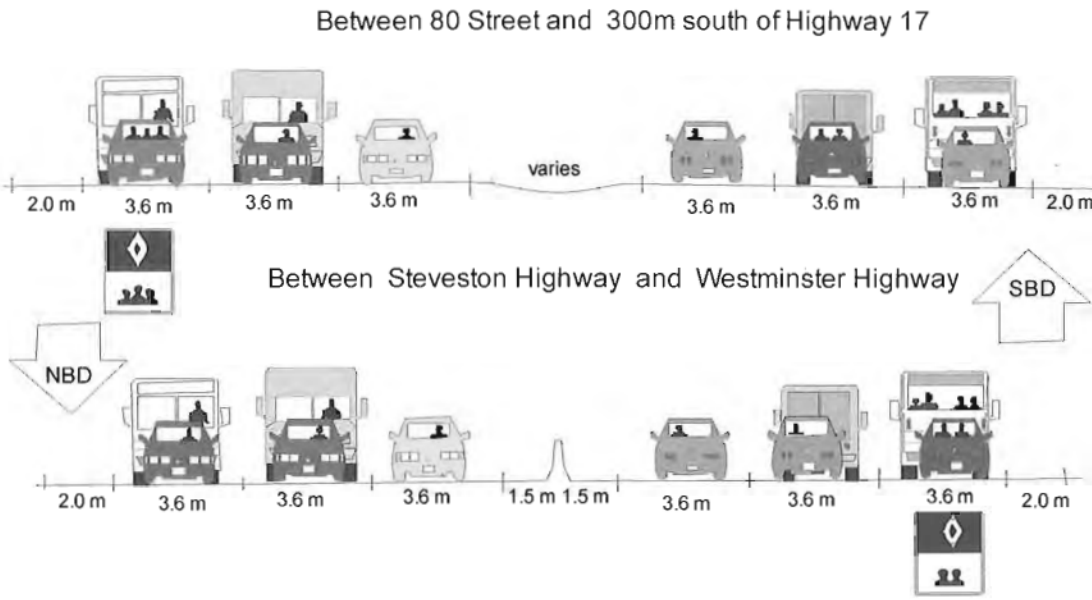

Figure 11.1 – Highway 99 Cross Sections with HOV lanes

Additional Priority lanes

Additional priority lane accommodation (for highway segments that currently have no accommodation is achievable in a number of ways. The determination of which is the most applicable approach for Highway 99 was determined through a comparisons of the following evaluation criteria:

- Transit operational feasibility;
- GP traffic effects – Quality of Service and Safety;
- Transit effects – Quality of Service and Safety;
- Acceptability and Enforcement support required;
- Capital costs; and
- Resultant Mode Split Shift.

Option 1 – Convert Existing GP Lanes to Bus Only Use

Exclusive bus priority lanes would be created by converting existing GP lanes to bus only usage (Figure 11.2). The effects of this option would be as follows.

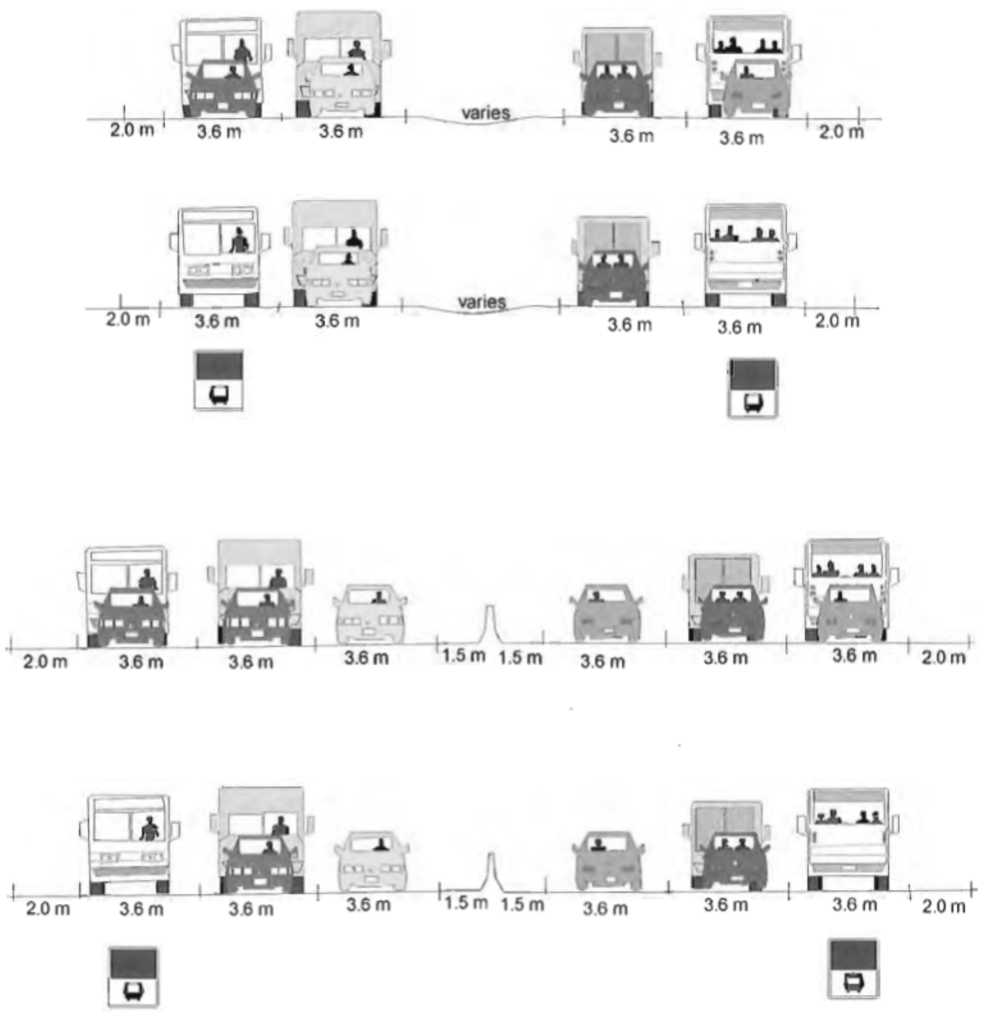

Figure 11.2 – Highway 99 Cross Sections with GP lanes Converted to Exclusive Bus lanes

Transit operational feasibility – Assuming that GP traffic utilization of the converted lane could be kept to a minimum this option would present no feasibility issues form a transit perspective.

GP traffic effects - Peak period GP lane demand would be increased to more than 3000 vph. This would drop GP average speeds to less than 30 km/h or less along the entire corridor. The corridor would experience a dramatic increase in rear end collisions at these vehicle density levels.

Transit effects – Transit speeds would theoretically be maintained at speeds close to the posted speed. The bus/GP speed differential would pose significant safety issues as GP traffic would continually intrude into the bus only lane.

Acceptability and enforcement support required – This strategy would required full time dedicated enforcement along the entire corridor as GP traffic users would not accept the resultant operating environment when the bus only lane would appear relatively empty. This phenomena has seen the reduction of existing HOV eligibility gradually reduced from plus 6 to plus 2 over a 10 year period.

Capital costs – The lane conversion would require pavement marking modifications and additional regulatory signage. This is estimated to cost $15,000 per km for each direction.

Resultant Mode Split – This strategy would result in a Bus to GP total peak hour travel time ratio of 0. 5 or less. This would result in modal splits on Highway 99 that significantly exceed 50%.

Given the significant impacts to GP traffic, the hourly bus demand (between 75 to 100 buses per Hour), and the level of enforcement required keep GP vehicles out of the bus lane this option is not considered feasible.

Option 2 – Construct New Bus Only Lanes

Exclusive bus lanes would be constructed on the shoulder side of Highway 99 (Figure 11.3).

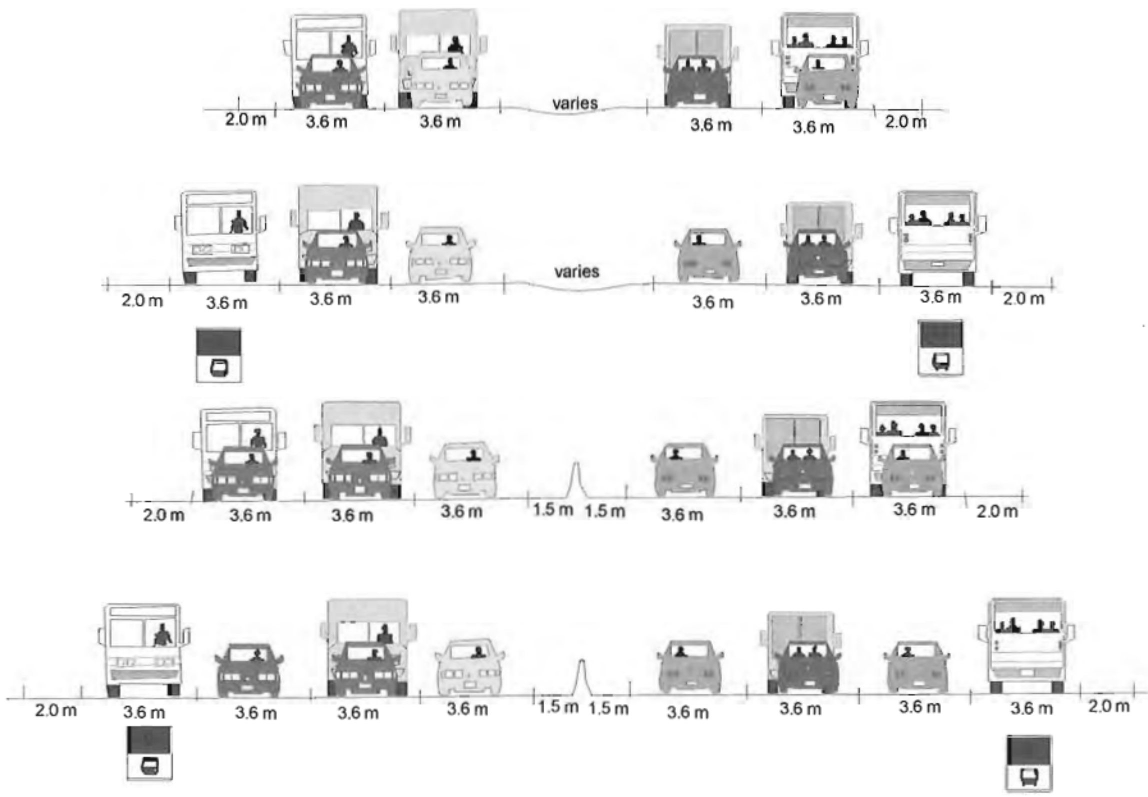

Figure 11.3 – Highway 99 Cross Sections with New Exclusive Bus lanes

The effects of this option would be as follows.

Transit operational feasibility – This option is not expected to have any transit operation issues as the bus lane configuration is identical to the current HOV lanes that buses operate in on Highway 99.

GP traffic effects - Peak period GP lane demand would remain unchanged and therefore quality of service and safety performance for GP vehicles would be unaltered

Transit effects – Transit speeds would theoretically be maintained at speeds close to the posted speed other than at the George Massey Tunnel. Bus safety would be enhanced given that much lower vehicle density of the bus lane.

Acceptability and enforcement support required – This strategy would require dedicated enforcement as GP traffic users would view the bus only lane as being relatively under-utilized in relation to GP vehicular lane demand. (Approximately of 75 buses per hour). The Canadian experience is that it is virtually impossible to maintain exclusive bus lanes on congested corridors when bus demands fall below 90 to 100 buses per hour.

Capital costs – The construction of dedicated bus lanes could be done within existing highway rights of way. The highway widening required to provide exclusive bus lanes would require extensive bridge and overpass modifications (including seismic upgrades of virtually all structures). This is estimated to cost $7.5 million per km for each direction.

Resultant Mode Split – This strategy would result in a Bus to GP total peak hour travel time ratio of 0.8. This would result in doubling the current modal splits on Highway 99 from 25% to 50%.

This option is considered feasible.

Option 3 – Construct New HOV Lanes

In response to the "empty lane syndrome' associated with exclusive bus lanes that have an hourly demand that is less than 90 to 100 buses, most North American highway jurisdictions have developed HOV lanes that accommodate vehicles with occupancy levels higher than 1. In the South Coast Region it has not been possible to maintain occupancy eligibility levels higher than plus 2 without constant calls for eligibility reductions. Figure 11.4 describes newly constructed HOV lane cross sections appropriate to Highway 99.

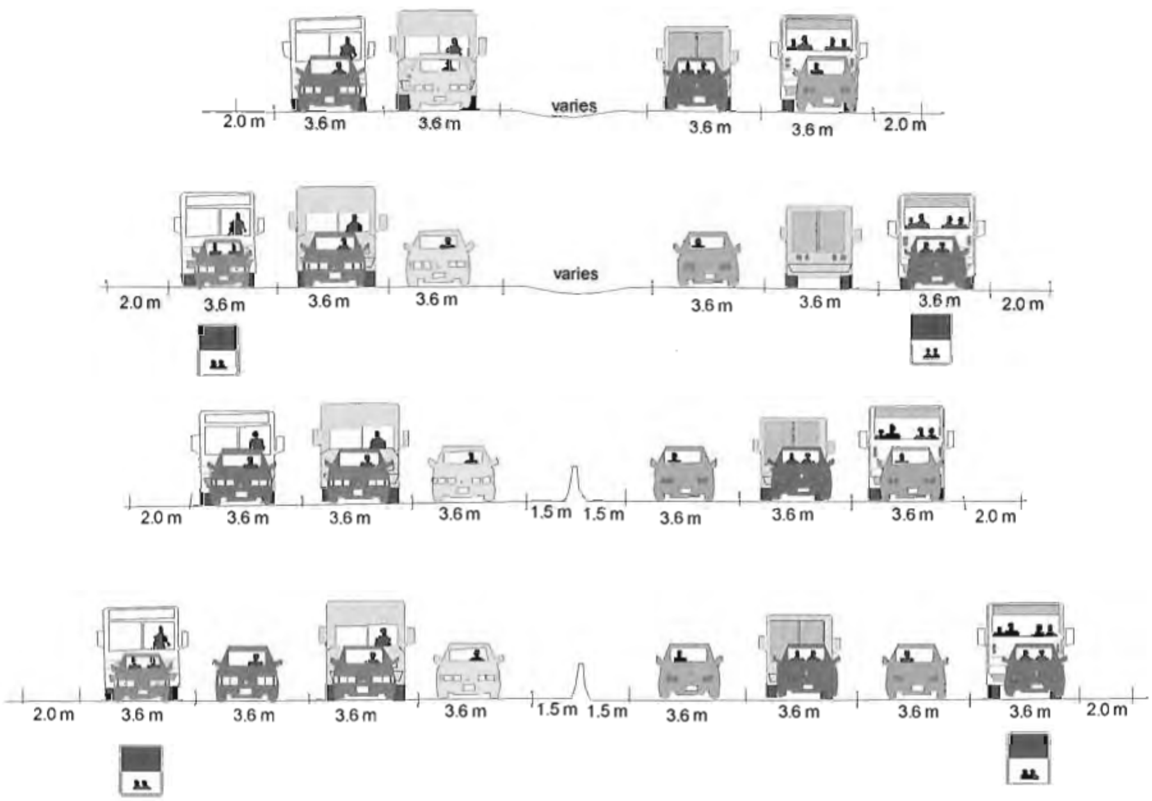

Figure 11.4 – Newly Constructed HOV lanes on Highway 99 (plus 2 eligibility)

The effects of this option would be as follows.

Transit operational feasibility – This option is not expected to have any transit operation issues as the new HOV lanes would be identical to the current HOV lanes that buses operate in on Highway 99.

GP traffic effects - In the South Coast Region HOV lanes with plus 2 eligibility generally accommodate between 600 to 800 vehicles per hour in peak periods. This reduces GP Peak period lane demand slightly and therefore GP quality of service and safety performance would be slightly enhanced.

Transit effects – In the South Coast Region HOV lane demand is usually 50% to 60% of GP lane demand in peak periods. This provides HOV traffic with modest travel time advantages over GP traffic. Transit speeds would improve slightly but would still be maintained at speeds that are within 10 km/h of GP vehicle speeds. Bus safety performance would improve slightly because buses are operating in traffic densities that are lower than those on GP lanes.

Acceptability and enforcement support required – This strategy would require a greater level of enforcement than is provided on existing HOV lanes on the corridor as current enforcement efforts result in high violation rates which reduce the effectiveness of the HOV lanes.

Capital costs – The construction of the new HOV lanes is the same as the cost of constructing new dedicated bus lanes ($7.5 million per km for each direction).

Resultant Mode Split – This strategy would result in a Bus to GP total peak hour travel time ratio greater than one which means the model split could not increase beyond 30%

This option is considered feasible.

Option 4 – Construct New Bus and Truck Only Lanes

In order to reduce the number of vehicles using the HOV facility while still increasing the utilization of eh lane (combat "empty lane syndrome") an option whereby only Trucks and Buses are permitted use of the HOV lane was also considered. (Figure 11.5)

The effects of this option would be as follows.

Transit operational feasibility – For two thirds of the corridor buses in the HOV lane would be operating in lane densities similar to GP traffic as the passenger car equivalent for trucks is 2.5. Because truckers are also professional drivers this would result in fewer operational issues than would be expected while operating in GP lanes. The portion of the corridor between Highway 91 and King George Highway would experience an improved operating environment (slightly better than on existing HOV lanes.

GP traffic effects – With the removal of 200 to 600 trucks per hour from existing GP lanes both quality of service and safety performance would be improved.

Transit effects – The number of buses operating in the peak direction during peak periods ranges from 200 to 600 trucks per hour. This is the equivalent of 500 to 1500 passenger car vehicles per hour. This level of truck activity would result in no improvements to transit service levels or safety performance on two thirds of the corridor. Between Highway 91 and King George Highway HOV lane densities would be similar to current HOV service quality and safety. (Improves service quality and safety performance over GP lane operation).

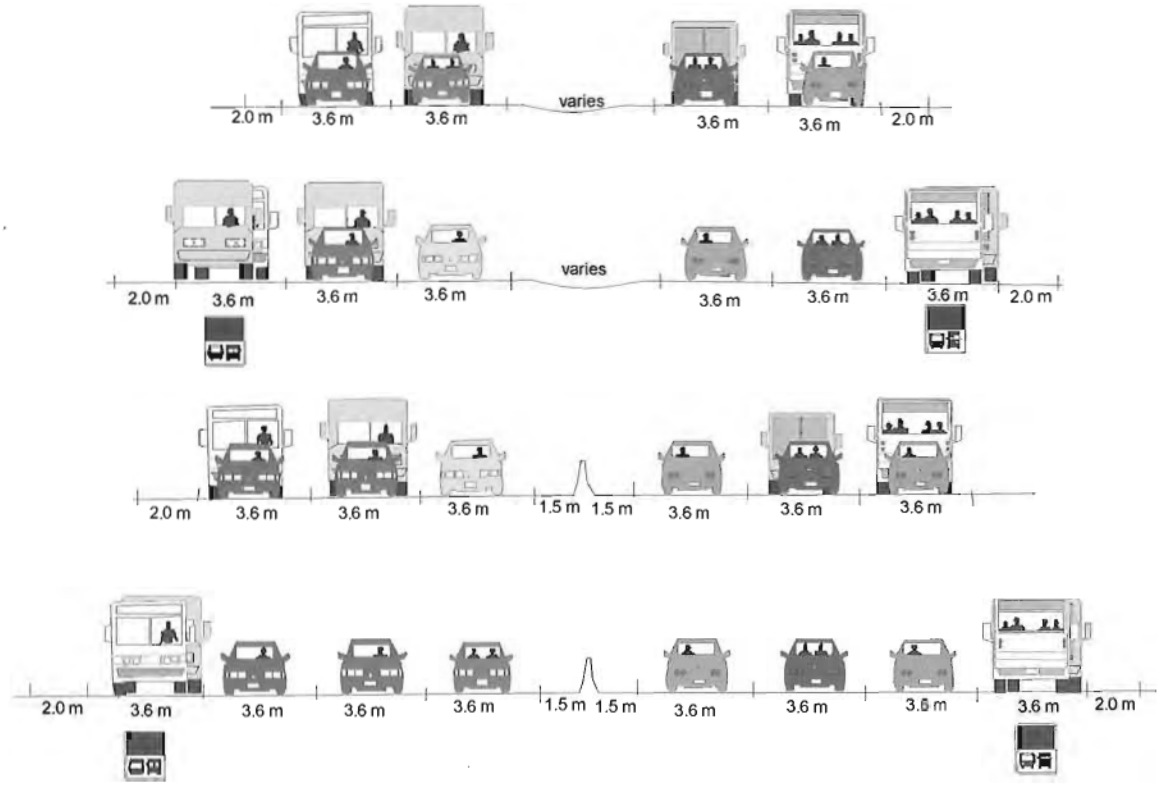

Figure 11.5 – HOV Lanes with Bus and Truck Eligibility Only

Acceptability and enforcement support required – This strategy would require a greater level of enforcement than is provided on existing HOV lanes on the corridors this would be a new form of HOV lane operation in the lower mainland.

Capital costs – The construction of the new HOV lanes is the same as the cost of constructing new dedicated bus lanes ($7.5 million per km for each direction).

Resultant Mode Split – This strategy would result in a Bus to GP total peak hour travel time ratio greater than one which means the model split could not increase beyond 30%

This option is considered feasible.

Option 5 – Reconstruct Highway Shoulder to Accommodate Bus Usage

In response to the issue of "empty lane syndrome" the Ministry of Transportation in Ontario introduced the concept of shoulder bus lanes in the Ottawa area some 20 years ago. OC Transpo buses were given permission to use widened shoulders of Highway 17. Only buses and emergency vehicles were extended this privilege (the rationale was that the operating environment was difficult therefore only trained supervised bus operators could be granted usage permission). This implementation was much more favourable received than traditional bus only lane provision as shoulder bus lanes did not result in "empty lane syndrome" as most drivers are conditioned to view the shoulder with virtually no vehicle activity. Based on these findings Ontario expanded the OC Transpo shoulder lanes and other North American jurisdictions have successfully implemented shoulder bus lanes in their jurisdictions as well. The BC Ministry of Transportation and Infrastructure is constructing a pilot shoulder bus lane northbound on Highway 99 between Westminster Highway and Bridgeport Road. Figure 11.6 describes the cross sections appropriate for operation of shoulder bus lanes on Highway 99.

The effects of this option would be as follows.

Transit operational feasibility – Based on the successful operation of this type of transit accommodation no transit operational issues are anticipated..

GP traffic effects - Peak period GP lane demand would remain unchanged and therefore quality of service and safety performance for GP vehicles would be unaltered

Transit effects – Transit speeds would theoretically be maintained at speeds close to the posted speed other than at the George Massey Tunnel. Bus safety would be enhanced given that much lower vehicle density of the shoulder bus lane.

Acceptability and enforcement support required – Canadian and US highway and transit agencies experience report that shoulder bus lanes have a high degree of public acceptance even ion very congested corridors. Enforcement agencies indicate that only minimal enforcement efforts are required to keep GP traffic form operating on the shoulder bus lanes. It is expected that the BC experience will be similar to that of other jurisdictions.

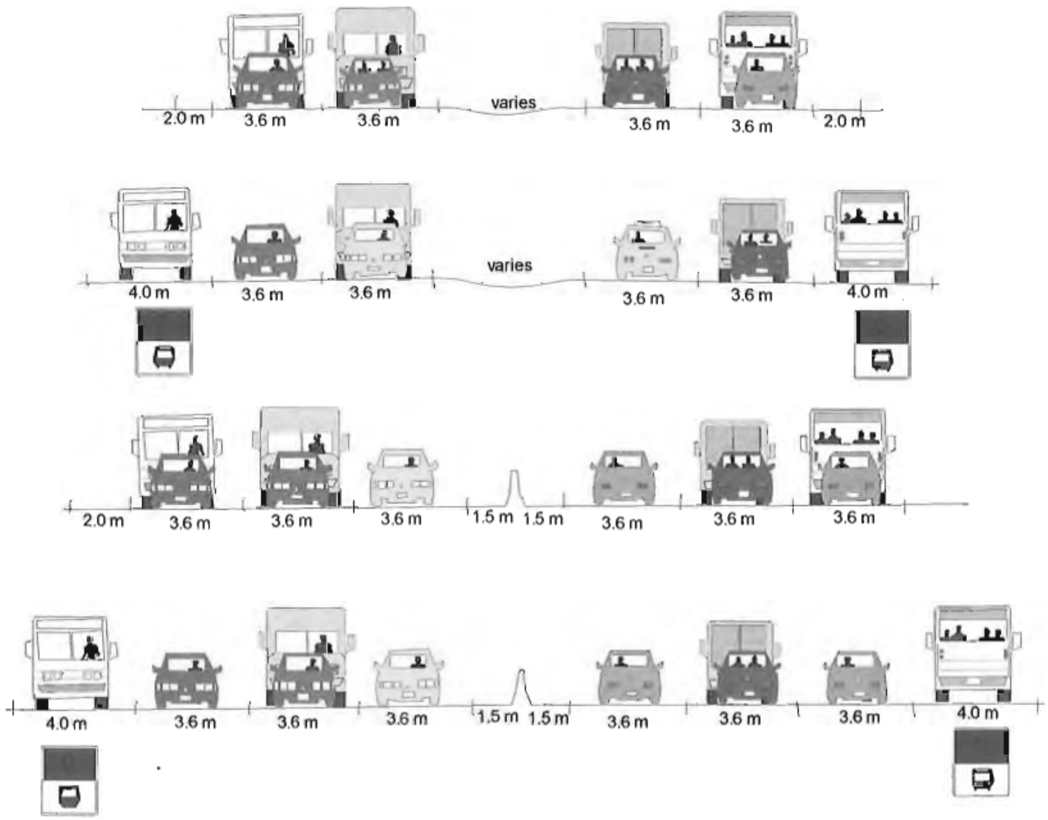

Figure 11.6 – Shoulder Bus Lane Cross Sections Appropriate To Highway 99

Capital costs – The construction of dedicated bus lanes can be done within existing highway rights of way. The highway widening required to provide shoulder bus lanes will require bridge and overpass modifications. This is estimated to cost $2.5 million per km for each direction.

Resultant Mode Split – This strategy would result in a Bus to GP total peak hour travel time ratio of 0.8 by 2031. This would result in doubling the current modal splits on Highway 99 from 25% to 50%.

This option is considered feasible.

12.0 PREFERRED HIGHWAY 99 TRANSIT ACCOMODATION

Tabl1 12.1 summarizes the evaluation criteria adherence associate with maintaining the status quo (no additional accommodation of highway modifications) and the five following priority lane accommodation strategies:

- Convert existing GP lanes to bus only lanes;
- Construct new bus only lanes;
- Construct new HOV lanes;
- Construct new Bus and Truck only lanes; and
- Reconstruct shoulders to accommodate bus usage.

Table 12.1 Option Evaluation Summary

	Transit Accommodation Options					
Evaluation Criteria	Status Quo	GP lanes to Bus Only Lanes	New Bus Only Lanes	New HOV Lanes	New Bus And Truck Lanes	New Shoulder Bus Lanes
Transit Operational Feasibility						
GP Traffic Effects						
Transit Effects						
Acceptability & Enforcement Required						
Capital Costs						
Resultant Modal Shift						

High Preference **Medium Preference** **Low Preference**

No Effect

Based on this assessment the preferred form of lane priority for buses on Highway 99 between King George Highway and Bridgeport Road is 4.0 m shoulder bus lanes. Disable vehicles, emergency response vehicles, and qualified inter-city buses are the only other vehicles that would be permitted use of the shoulder bus lanes. Usage protocols that detail permitted and prohibited behaviours appropriate to Highway 99 will have to be developed jointly between Ministry staff and Transit Operating agencies.

A more detailed assessment of costs and benefits associated with the preferred options was undertaken to ascertain preliminary investment feasibility. Table 12.2 provides a summary of the financial performance of the preferred option. The benefit-cost (B/Cs) ratios for the cumulative development of bus shoulder lanes goes is over 1.45 for all scenarios, and is at a high of 7.0 for the segment between the tunnel and Sea Island Way. Further, the net present values for the project range from between approximately $17.9 million for the entire project through to over $30 million for the segment north of the tunnel. These results indicate that although the northern section of the shoulder bus lane project certainly generates the highest benefit relative to the project costs, the complete project between King George Highway and Sea Island Way/Highway 91 would be effective investments.

Table 12.2
Financial Performance Assessment
(Highway 99 Northbound Bus Priority Lane)

Account	Criteria	Measurement	Corridor Segment		
			Tunnel to Sea Island/ Hwy91	**Hwy 10 to Sea Island/ Hwy91**	**KGH to Sea Island/ Hwy91**
Financial	Capital Cost	($mil)	$5.350	$14.200	$49.010
	Capital Cost	Present Value ($mil)	$4.761	$12.638	$43.619
	Maintenance Cost	Present Value ($mil)	$1.184	$2.368	$4.736
	Salvage Value	Present Value ($mil)	$0.952	$2.528	$8.724
	Total Incremental Cost	Present Value ($mil)	**$4.993**	**$12.478**	**$39.631**
Customer Service	Travel Time Savings	Value of Travel Time ($mil)	$29.378	$35.113	$47.930
	Vehicle Operating Costs	Value of Operating Costs ($mil)	$5.863	$7.023	$9.577
	Total Incremental Benefits	Value of Operating Costs ($mil)	**$35.241**	**$42.136**	**$57.507**
Economic Summary	NPV	Present Value ($mil)	**$30.248**	**$29.658**	**$17.876**
	B/C Ratio	Ratio	**7.058**	**3.377**	**1.451**

Note: In 2008 dollars based on discount rate of 6 percent over a 25 year planning period.

The preferred options ability to effect significant modal shift in this corridor also implies that GHG reduction benefits can be expected.

Annual vehicle emission reductions have been calculated based on the decline in operating speeds with increasing congestion without any changes to the corridor. One of the key greenhouse gases produced is vehicular carbon dioxide (CO_2) (approximately 99.9 percent). The more fuel that is burned, the more CO_2 emissions are produced. The project is expected to reduce greenhouse gas or CO_2 emissions by approximately 290 tonnes per year over the 25 year planning period, and significantly more through the southern sections of the corridor. This reduction accounts for steady state bus travel of the bus priority lane as it would consume less fuel when compared to a stop-and-go scenario and potential modal shift from auto mode to transit.

Highway Segment	***Average Annual Reduction CO2 Emissions***
Tunnel to Sea Island/Hwy 91	290 tonnes
Hwy 10 to Sea Island/Hwy 91	575 tonnes
KGH to Sea Island/Hwy 91	765 tonnes

13.0 IMPLEMENTATION

As illustrated in Table 12.2 the project can be implemented in ten individual stages in order of highest rate of return.

Table 12.2
Project Cost Estimate By Stage (Year of Construction $)
(Assumes Annual Inflation of 6%)

Elements	Budget (Year of Construction $)	Completion
Construct NBD shoulder bus lane from Westminster Highway to Bridgeport Rd. Implement transit signal priority along Bridgeport Rd., Great Canada Way, & Sea Island Way	$7.0M	August 2009
Construct SBD shoulder bus lane from Sea Island Way to Westminster Highway.	$10.6M	2009-2010
Construct NBD shoulder bus lane from Steveston Highway to Westminster Highway	$1.7M	2010-2011
Construct NBD shoulder bus lane from South Surrey Park & Ride to Highway 91.	$16.4M	2011-2013
Construct SBD shoulder bus lane from River Road to 80th Street.	$21.0M	2013-2015
Construct NBD shoulder bus lane from Highway 91 to Highway 10.	$6.2M	2015-2016
Construct NBD shoulder bus lane from Highway 1 to 80th St.	$4.0M	2016-2017
Construct SBD shoulder bus lane from 80th Street to Highway 10 to Westminster Highway	$6.0M	2017-2018
Construct SBD shoulder bus lane from Highway 10 to Highway 91.	$6.8M	2018-2019
Construct SBD shoulder bus lane from Highway 91 to South Surrey Park & Ride.	$26.6.0M	2019-2020

Critical TransLink and Municipal Support Measures

The accommodation of transit on Highway 99 is only one of a number of critical success factors in converting the existing limited stop express services into Rapid Bus conformance and ensuring the necessary modal shift from auto to transit by 2021. Additional actions by both TransLink and the municipalities served by transit routes operating on Highway 99 will be needed.

TransLink

It is assumed that TransLink will continue to monitor the need for additional buses and add additional rolling stock as growth and modal shifts occur over the next 12 year period. As utilization exceeds the transit service guideline thresholds it also assumed that TransLink will add rolling stock to restore bus occupancies to confirm with the service design guidelines. From 2008 to 2021 it is estimated that as many as 25 additional vehicles per hour will be required.

The growth in demand as well as conversion of existing services service to RapidBus BC may also require modification to stops and terminal infrastructure. This could require modifications to allow all door loading, automated fare equipment, enhanced shelters, and schedule status display equipment. It is assumed that TransLink would assume responsibility for this.

Given that the Bridgeport Station is brand new it is not anticipated that this terminal will require any modifications for servicing South of Fraser services. The South Surrey Park & Ride Facility although less than five years old is nearing capacity. TransLink will have to assess expansion options as soon as possible in order to expand capacity within the next three years.

Most to the buses that operate on Highway 99 also operate on roadways that form part of the major road network on the municipal portions of their respective routes. Given the importance of Bus to GP travel time from Origin to destination in effecting modal shift, TransLink in cooperation with municipalities will have to ensure that adequate transit accommodation is also made available on MRN roadways.

Municipalities

The degree of modal share shift required to meet the PTP targets (doubling of modal shares in South Surrey by 2021) will also require land use intensification. It is assumed that municipalities and TransLink will ensure that municipal OCP's will focus on ensuring the transit supportive land use policies and zoning are incorporated.

Portions of bus routes that operate on municipal roadways that are not part of the TransLink MRN may also require the implementation of transit accommodation measures. These could include such things as parking restrictions, control signage, or transit signal priority. It is assumed that such accommodation will take place on an as need basis. The identification and development of measures would take place through existing processes established between Coast Mountain Bus Company, TransLink and TransLink member communities.

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The Corporation of Delta

George Massey Tunnel Transportation Study

Final Report

November 2012

George Massey Tunnel Transportation Study

Final Report

Report

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APPENDICES

1 Introduction

Background

1.1 Steer Davies Gleave was commissioned by the Corporation of Delta to conduct a transportation study on the George Massey Tunnel. The study includes the following tasks:

- Summarizes a number of past studies completed relating to the George Massey Tunnel;
- Reviews current and future tunnel traffic demand;
- Reviews cost of congestion research; and
- Provides an estimate of the cost of congestion on the Massey Tunnel.

Data Sources

1.2 This study has reviewed a number of the following reports, plans, data sources and other material including:

- Lower Mainland Truck Freight Study, TransLink (July 2000)
- Improving Roads and Bridges: Program Definition Report, Gateway Program (January 2006)
- The Cost of Urban Congestion in Canada, Transport Canada (March 2006)
- Cost of Non-Recurrent Congestion in Canada, iTRANS Consulting Inc (December 2006)
- Bridging the Infrastructure Gap, Get Moving BC (September 2008)
- 2008 Metro Vancouver Dangerous Goods and Truck Classification Survey, Transport Canada, MoT & TransLink (November 2008)
- Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)
- Ministry of Transportation and Infrastructure (MoTI) traffic count data for Massey Tunnel (count site reference: P16-16-4NS)[1]

1.3 Summary of the literature review is included in Appendix A.

Report Structure

1.4 Following this introduction, the report covers the following areas:

- Chapter 2 describes the current traffic conditions;
- Chapter 3 presents the future traffic demand and impacts;
- Chapter 4 presents indicative costs of congestion; and
- Chapter 5 summarizes the study findings.

[1] http://www.th.gov.bc.ca/trafficdata/tradas/inset5.asp

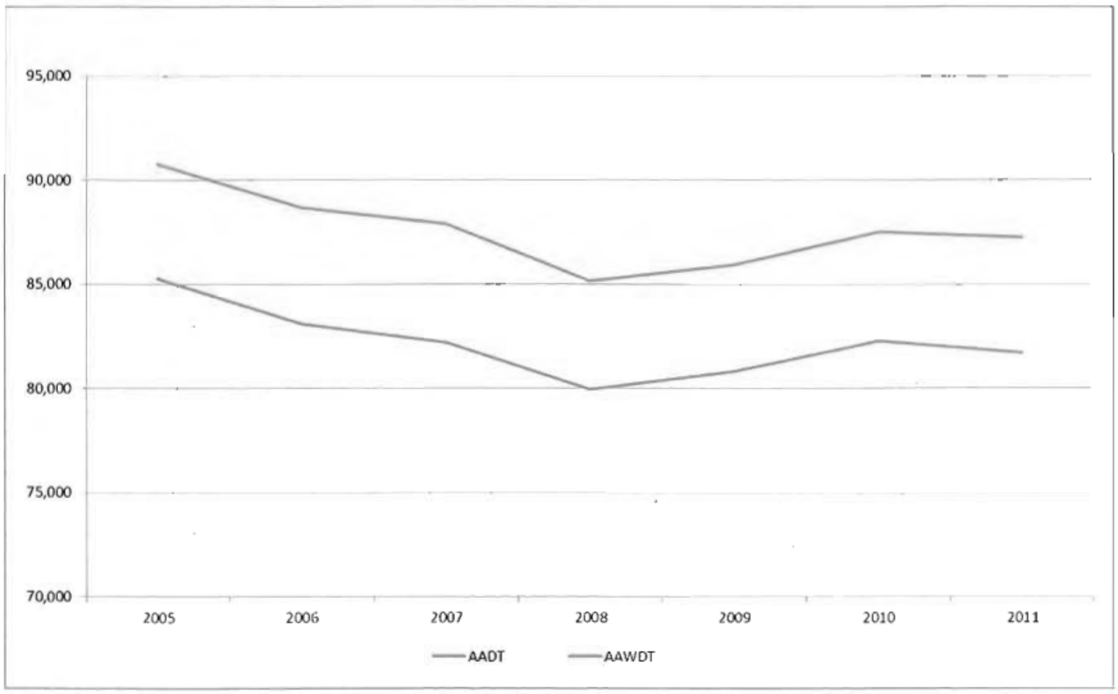
2 Current Traffic Conditions

Traffic Demand

Traffic Growth

2.1 Traffic count data from MoTI's permanent traffic counter at the Massey Tunnel was extracted from 2005-2011 and is shown in Figure 2.1[2]. The Figure shows a 2011 Annual Average Daily Traffic (AADT) count of 81,729 and an Annual Average Weekday Traffic (AAWDT) estimate of 87,240. The trend over the last 7 years is relatively stable, with the highest figures in 2005, the lowest in 2008 and a slight increase in the past three years.

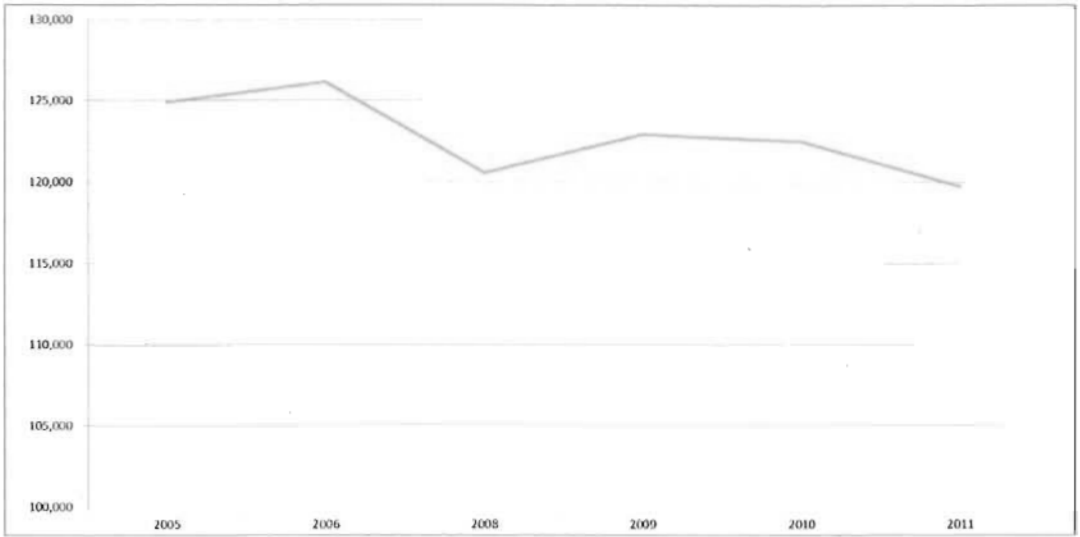
FIGURE 2.1 GEORGE MASSEY TUNNEL TRAFFIC (2005-2011)



2.2 The slight overall reduction in traffic since 2005 is likely to have been caused by the economic recession and oil price spike in the summer of 2008 and this is a pattern observed in other crossings in the region. Figure 2.2 shows the growth at Second Narrows Bridge where 2011 traffic levels are below those observed in 2008 while the Massey Tunnel is showing increases in traffic.

[2] Permanent count traffic figures have been compared to 2008 TransLink regional screenline data and counts carried out by Corporation of Delta and this comparison shows that the MoTI permanent counters provide an accurate estimate of traffic levels.

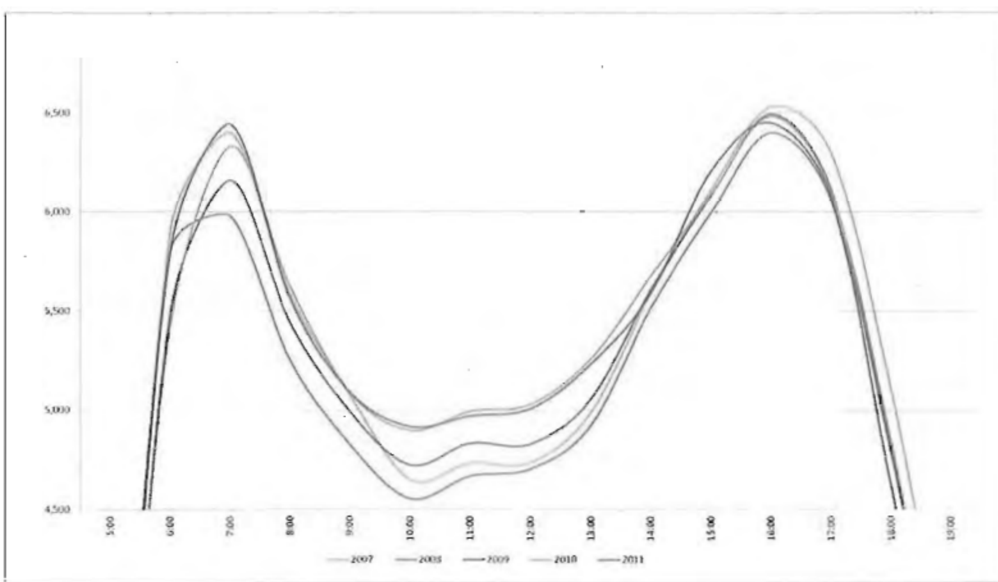
FIGURE 2.2 SECOND NARROWS BRIDGE AAWDT (2005-2011)



Traffic Profile

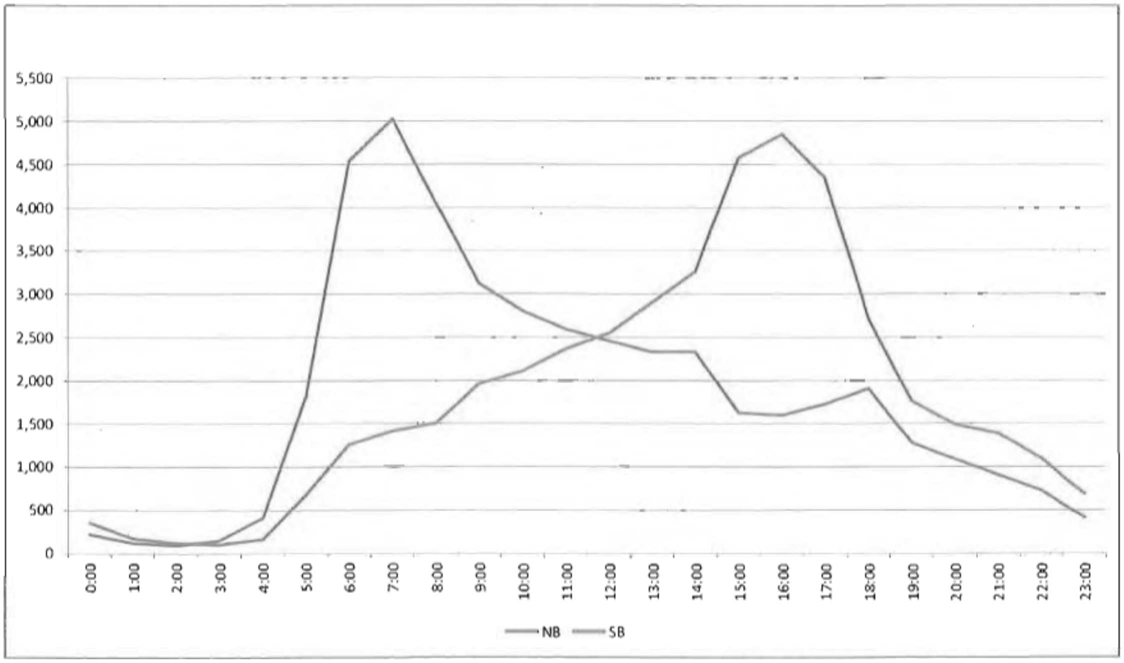
2.3 As shown in Figure 2.3, the daily pattern shows clear AM and PM peaks with the tunnel operating close to capacity in the peak direction. There has been limited growth overall but Figure 2.3 shows some peak spreading occurring in the tunnel along with some growth in the inter-peak period (between 10:00 and 13:00) with traffic levels during the off-peak increasing by up to around 500 vehicles per hour.

FIGURE 2.3 GEORGE MASSEY TUNNEL DAILY PROFILE (2007-2011)



2.4 The directional flows are shown in Figure 2.4 and display clear patterns of travel with the AM peak in the northbound direction and the PM peak in the southbound direction. It should be noted that these large differences in directional flows are primarily the result of the use of 'reversible' lanes in the weekday peak-periods (i.e. 3 lanes northbound in the AM and 3 lanes southbound in the PM peaks respectively.

FIGURE 2.4 GEORGE MASSEY TUNNEL DIRECTIONAL PROFILE (2011)



2.5 Figure 2.5 reveals that the tunnel shows quite a high level of seasonal variations, with the highest demand in the summer months (May to October are higher than the annual average), linked to increased leisure travel such as cross-border and ferry trips. This is reflected in the summer daily profile presented in Figure 2.6 which shows higher inter-peak and evening traffic, while the AM and PM peak flows remain at a relatively similar level. Note that the peak-period flows are unable to rise due the facility typically operating at full capacity during these time periods.

FIGURE 2.5 GEORGE MASSEY TUNNEL ANNUAL PROFILE (2009)

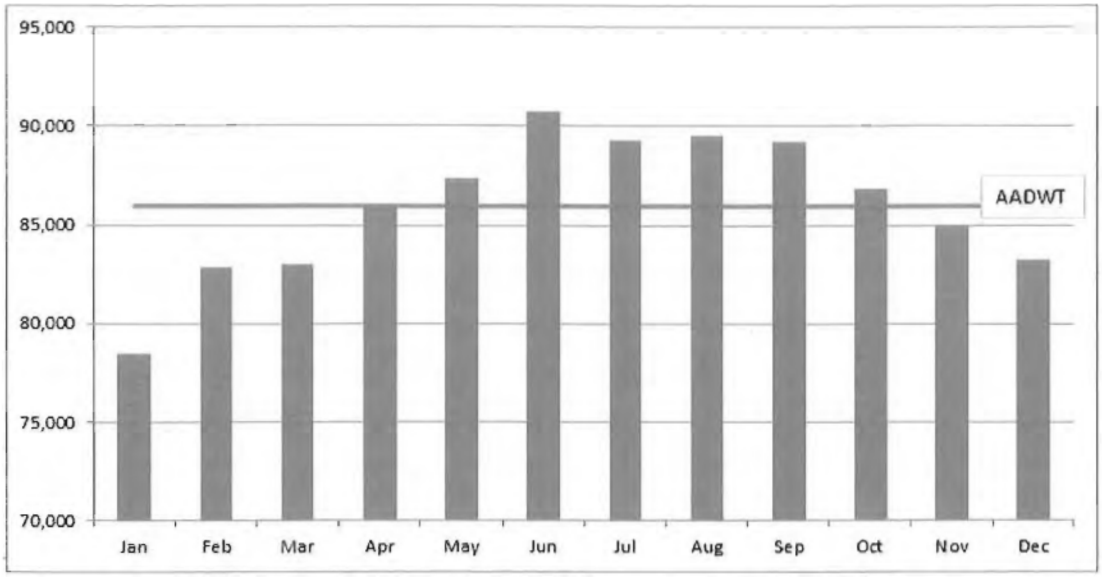
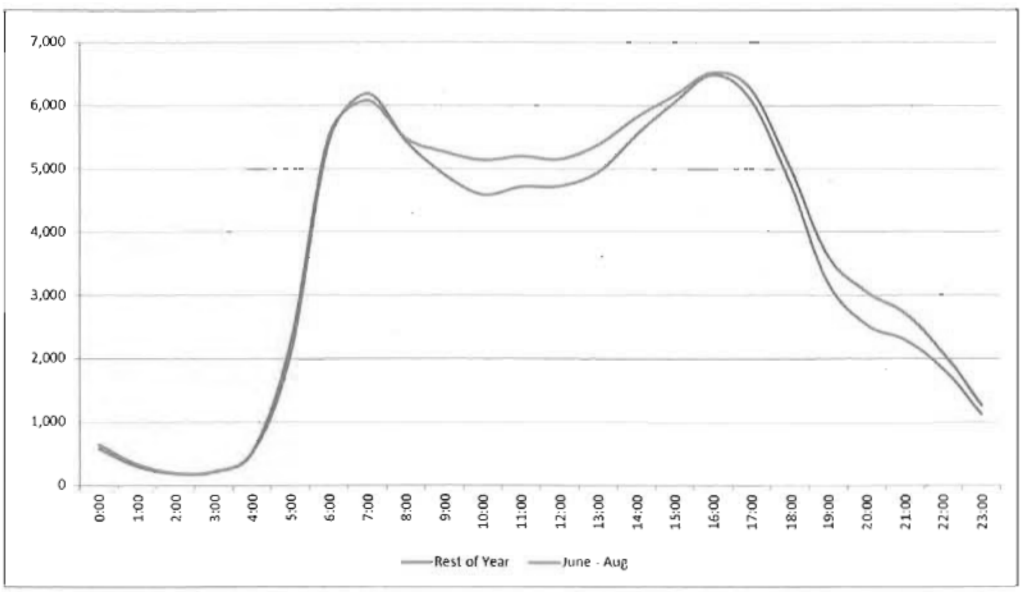


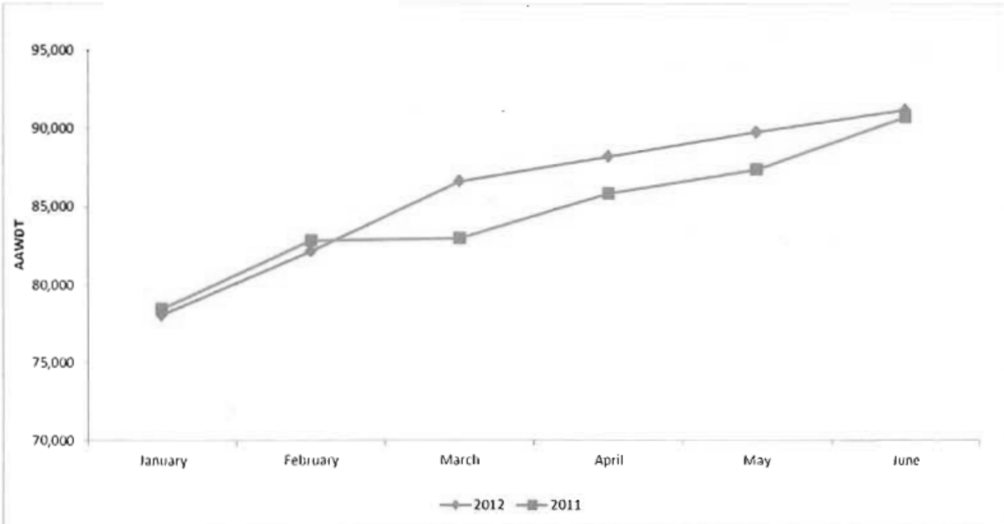
FIGURE 2.6 GEORGE MASSEY TUNNEL DAILY SUMMER PROFILE (2009)



Recent Traffic Growth

2.6 Finally, data from 2012 has been collected to understand the tunnel's most recent traffic demand and Figure 2.7 below shows a slight increase in 2012 over 2011, especially between March and May.

FIGURE 2.7 RECENT TRAFFIC PATTERNS (AAWDT)



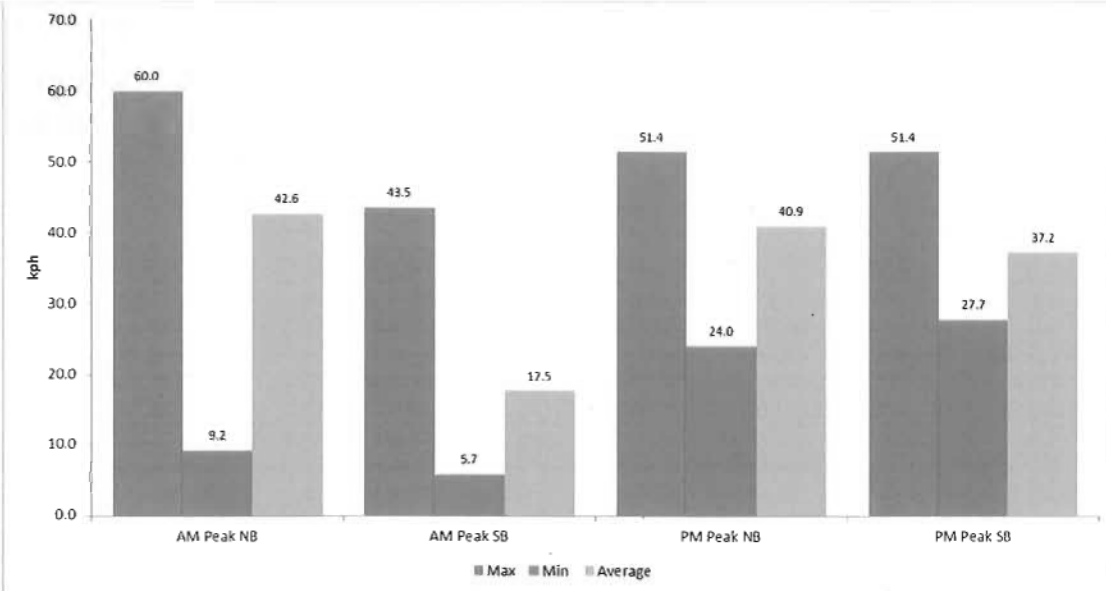
Traffic Speed

2.7 Peak period traffic speed data was collected in August 2012 as part of this study and the results are shown in Table 2.1 and Figure 2.8. The table shows that traffic speeds can be as low as 6 km/hr (speed limit of 80km/hr) when approaching the George Massey Tunnel and there is a very wide variance in the speed in both directions.

TABLE 2.1 GEORGE MASSEY TUNNEL SPEED (AUGUST 2012)

Speed (Kph)	Northbound			Southbound		
	Max	Min	Average	Max	Min	Average
AM Peak	60.0	9.2	42.6	43.5	5.7	17.5
PM Peak	51.4	24.0	40.9	51.4	27.7	37.2

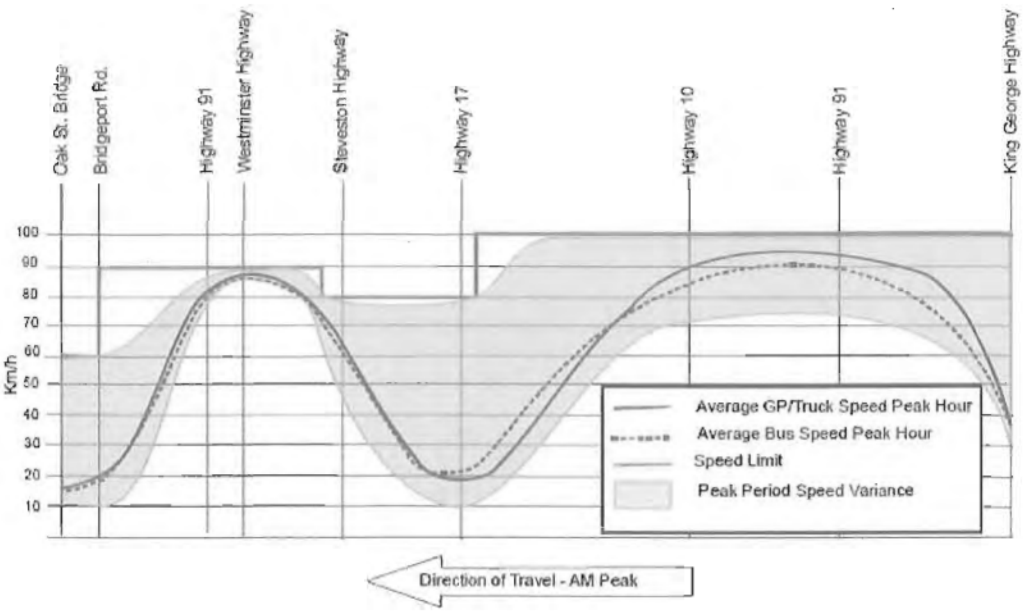
FIGURE 2.8 GEORGE MASSEY TUNNEL SPEED (AUGUST 2012)



2.8 This speed data was compared to MoTI's Highway 99 findings (see figures below) and MoTI's report showed considerably slower average speeds in the tunnel with 20 kph in the northbound AM peak (43 kph in the August 2012 survey) and 25 kph in the southbound PM peak (37.2 kph in the August 2012 survey). Limited information was available on the MoTI survey results but we understand it includes a higher sample rate. The data highlights the following:

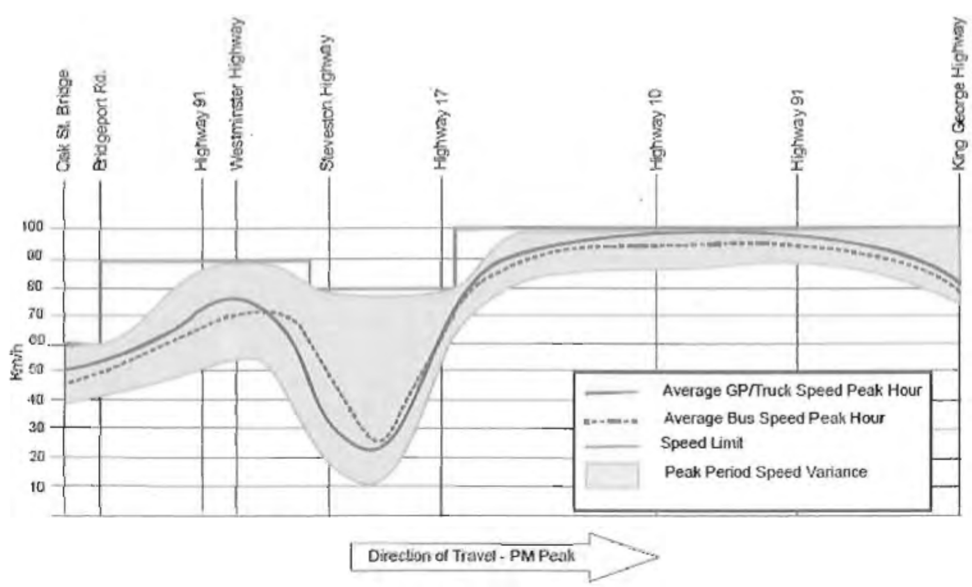
- Wide variance in tunnel speed which suggests a high degree of unreliability;
- Unreliability in the tunnel is linked to the tunnel operating at capacity during peak periods; and
- Important to collect speed on a consistent basis to better understand the traffic to travel speed relationship.

FIGURE 2.9 NORTHBOUND AM PEAK PERIOD SPEED (2008)



Source: Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)

FIGURE 2.10 SOUTHBOUND PM PEAK PERIOD SPEED (2008)

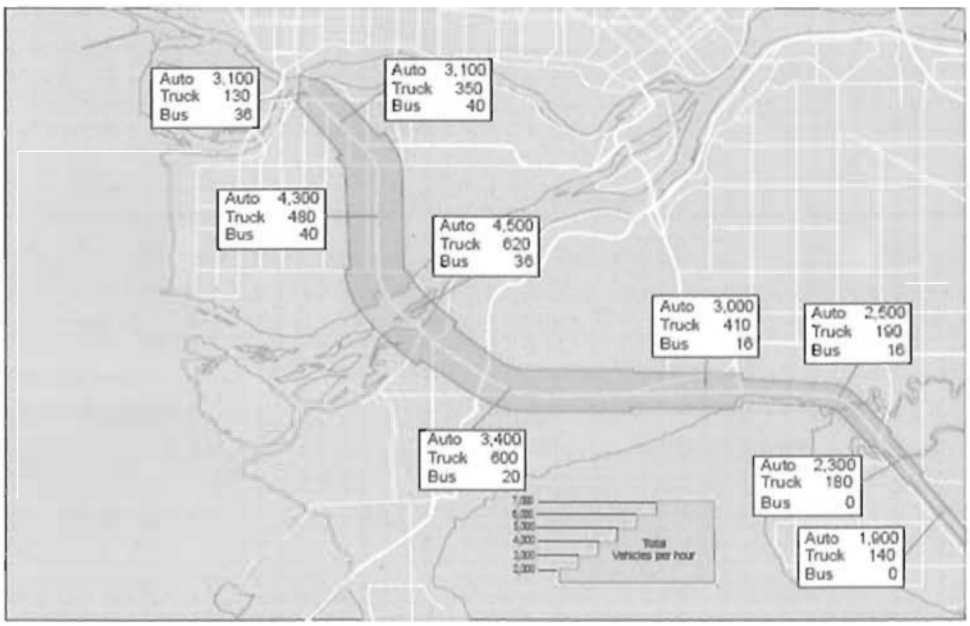


Source: Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)

Traffic Composition

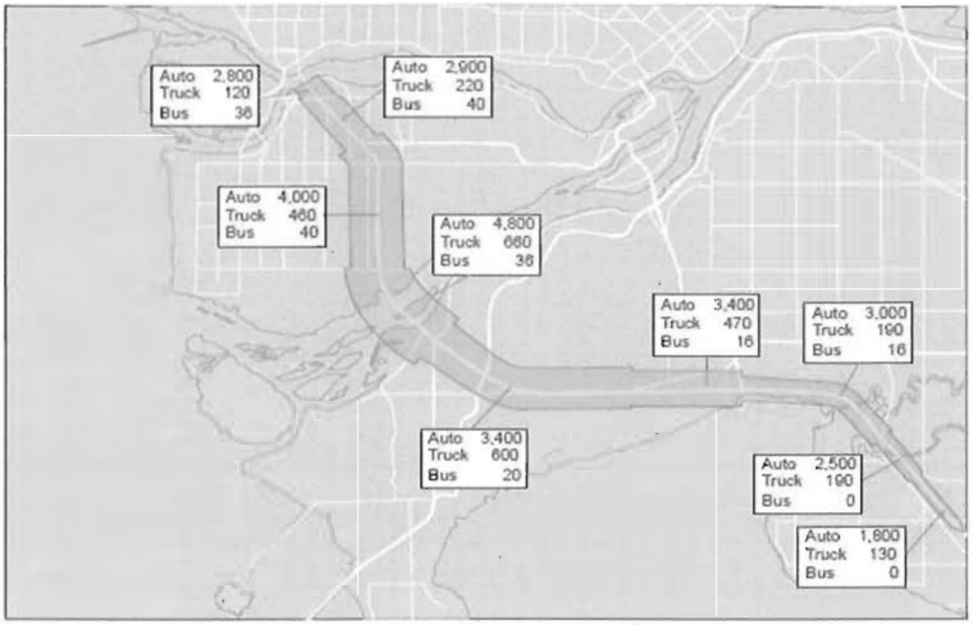
2.9 Figures 2.11 and 2.12 show traffic composition on the tunnel and along Highway 99 with heavy trucks representing around 12% of peak hour traffic on the tunnel. This is proportionately quite high (Second Narrows Bridge carries only 4% of heavy trucks) and has an impact on traffic circulation by reducing overall speed and on capacity as result of the large size of the vehicles.

FIGURE 2.11 HIGHWAY 99 AM PEAK HOUR TRAFFIC (2008)



Source: Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)

FIGURE 2.12 HIGHWAY 99 PM PEAK HOUR TRAFFIC (2008)



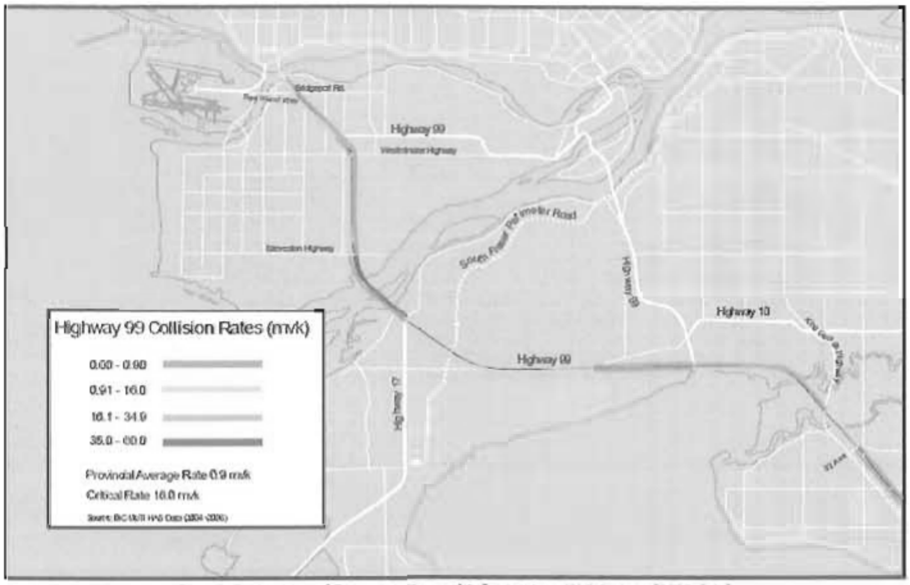
Source: *Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)*

Safety

2.10 MoTI's Highway 99 assessment identified the Massey Tunnel as the location where the majority of the collisions occur on the section of Highway 99 reviewed (see Figure 2.13) and significantly exceeding the provincial average rate of 0.9 collisions per million vehicle kilometres (mvk). This arises from 'head-on' collisions in the contra-flow lanes of the tunnel and the very high vehicle densities. Various locations on this segment rank 38th and 56th on the list of provincial critical safety locations.

2.11 Because the tunnel does not have hard shoulders for stalled or otherwise disabled vehicles to move to, this means that collisions or incidents (which are well above the provincial average) can have a very significant effect on tailbacks and congestion, further compounding the unreliability of travel time.

FIGURE 2.13 HIGHWAY 99 COLLISION RATES (2006)



Source: BC Ministry of Transportation and Infrastructure HAS System (2006 data)

Source: Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)

Traffic Congestion Observations

2.12 A number of data sources were reviewed to obtain further information on traffic conditions at the tunnel. Peak period queue length data was collected in the southbound direction (where the bridge enabled observations to be made) in August 2012 and the results are shown in Figures 2.14 and 2.15. The Figures show that there is consistent queuing throughout the peak period. The data also shows that there is a large degree of variability in queuing which is linked to high vehicle flows, the facility often operating at capacity and the impact that any minor incident can have on the tunnel.

FIGURE 2.14 QUEUE LENGTH (SB AM PEAK)

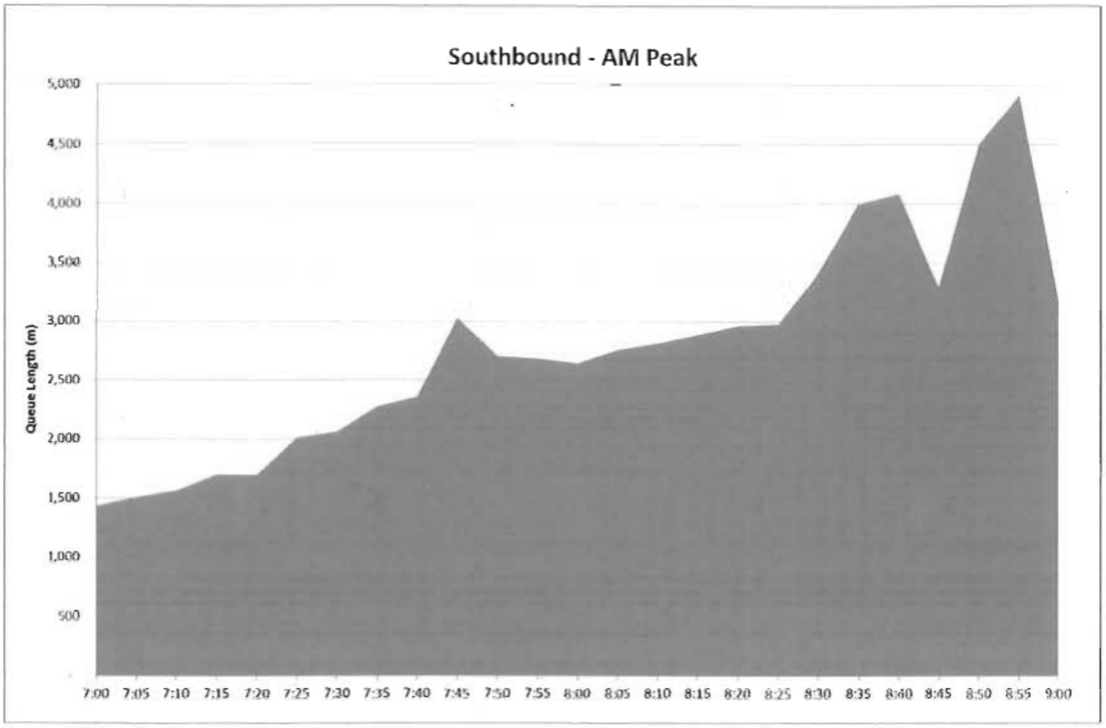
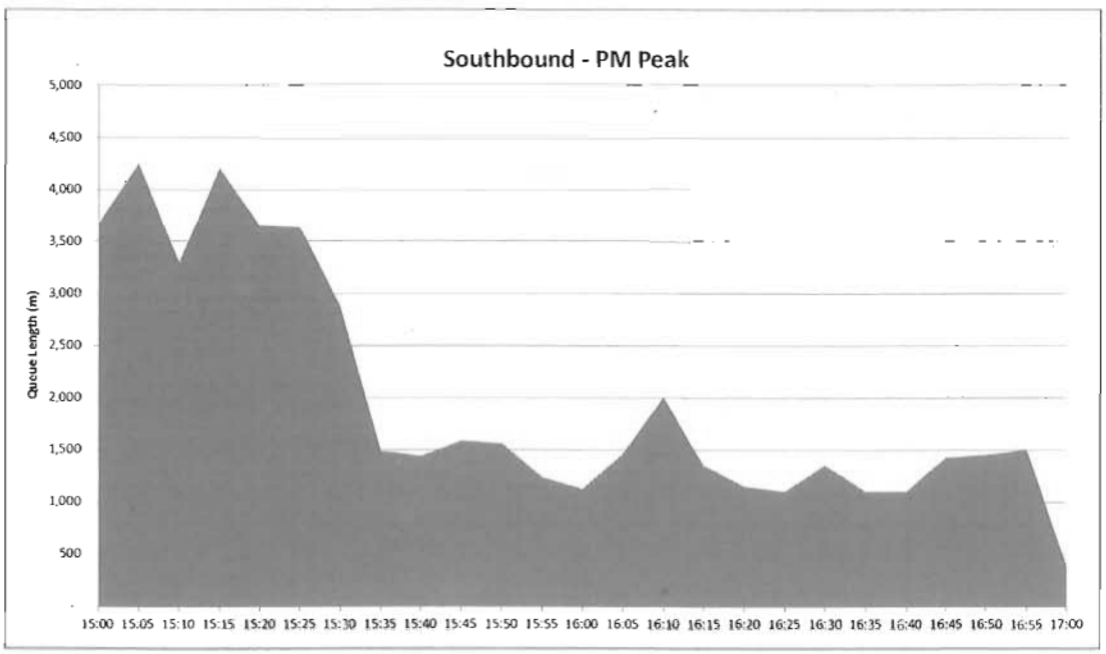


FIGURE 2.15 QUEUE LENGTH (SB PM PEAK)



2.13 The DriveBC.ca website was also examined and, as illustrated in the figures below, it showed considerable queuing in the northbound direction (the non-peak direction) as result of the tunnel operating with one lane only in that direction. Additional photos of the tunnel are included in Appendix B.

FIGURE 2.16 HIGHWAY 99 SB EXITING TUNNEL

FIGURE 2.17 HIGHWAY 99 NB APPROACHING TUNNEL

3 Future Traffic Conditions

3.1 This section includes the forecasting of demand and the examination of possible future demand drivers in the tunnel and on Highway 99.

Regional Transportation Forecasting Model

3.2 The regional model which was used for traffic forecasting is a four-stage EMME multi-modal forecasting model representing the Metro Vancouver region. It is an AM peak hour (7:30-8:30) model calibrated to local traffic and transit data with 2021 and 2041 forecast years. Future year population and employment forecasts used in the EMME model are derived from the current Regional Growth Strategy (RGS) as developed by Metro Vancouver in consultation with all municipalities.

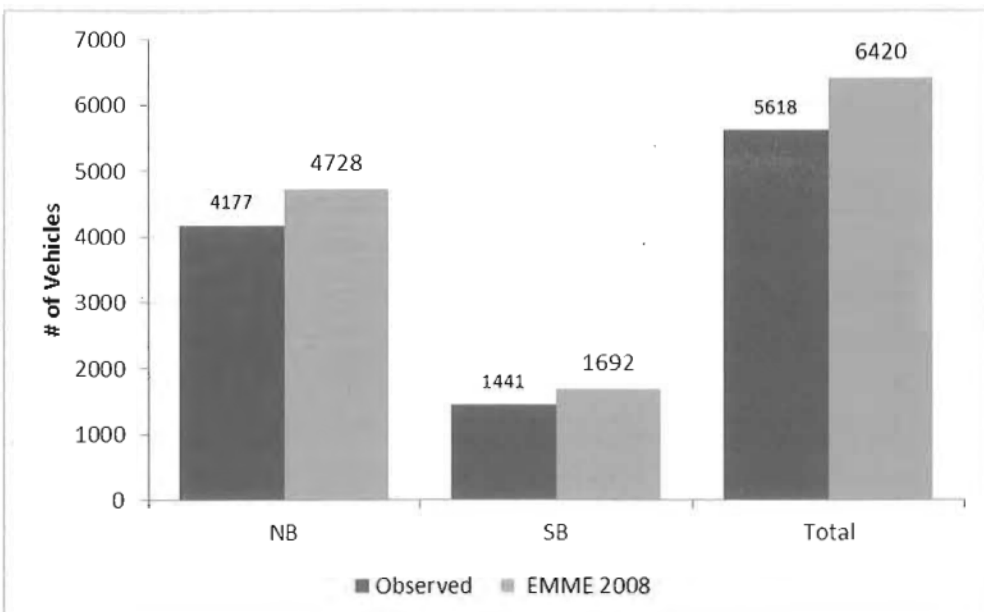
3.3 The model simulates the road and transit network of Metro Vancouver region and model outputs include traffic demand and travel time statistics.

Future Traffic Demand Forecasts

EMME Model

3.4 Figure 3.1 presents the AM peak hour EMME model forecasts and compares them to the observed tunnel flows and it shows how the EMME model provides an accurate estimate of traffic levels (within 5%).

FIGURE 3.1 EMME VS OBSERVED DATA - MASSEY TUNNEL (2008 AM PEAK HOUR)



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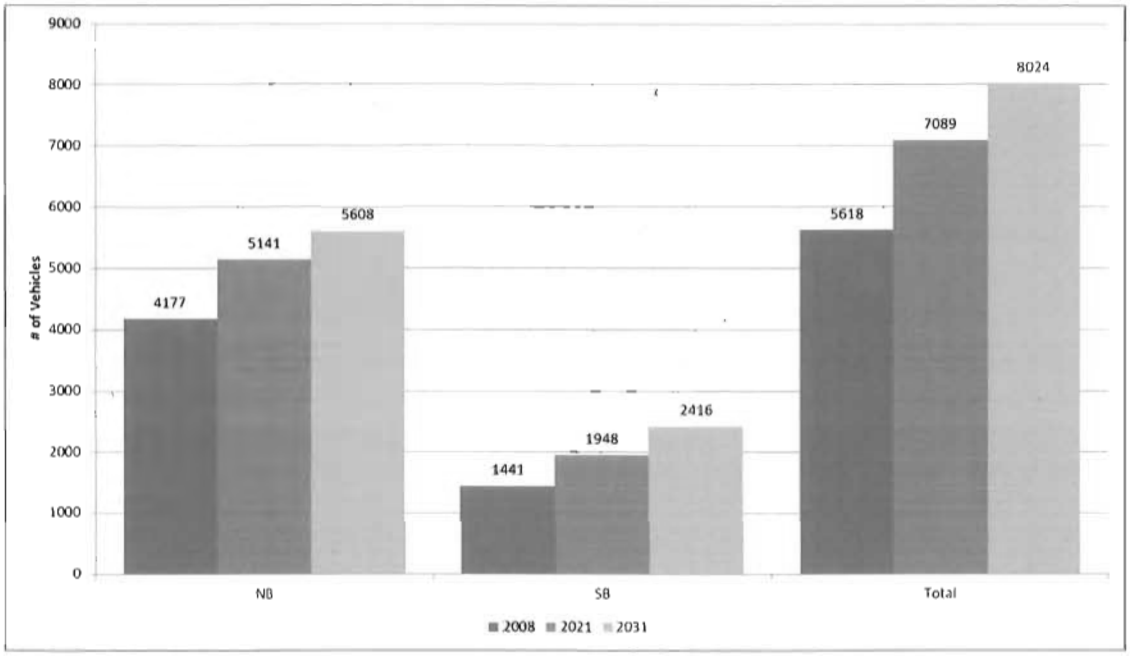
3.5 Figure 3.2 shows the EMME model forecasts continued traffic growth in the tunnel as result of increased population and employment in the region. However the model is <u>not capacity constrained</u> (i.e. it assumes that all the trips that may wish to made during the rush-hour can be made). However we know that the tunnel is operating at capacity already so these forecasts represent *potential demand* rather than *actual demand* that can be accommodated on the tunnel.

FIGURE 3.2 MASSEY TUNNEL TRAFFIC FORECASTS (AM PEAK HOUR)



3.6 In addition to the model traffic estimates, there are a number of other developments which are currently being planned in the vicinity of the tunnel. These are not considered in the EMME model land use forecast due to their planning status but it is important to highlight their potential impact on demand and the variability of demand. It should also be noted that many of these factors are not controlled by either Delta or Metro Vancouver.

Tsawwassen First Nation (TFN) Development

3.7 The Tsawwassen First Nation plans to develop a "mega-mall" and other commercial and residential units in south Delta. All data has been extracted from the traffic impact study carried out by Bunt & Associates[3].

[3] - https://delta.civicweb.net/Documents - *1220-20/TFN/TRAN Form*

TABLE 3.1 TFN DEVELOPMENT POTENTIAL IMPACT ON TUNNEL (VEHS PER HOUR)

	TFN AM Trip Generation	TFN PM Trip Generation	% demand to tunnel	TFN AM trips using tunnel	TFN PM trips using tunnel
Total TFN (2015)	1,700	4,700	20%	340	940
Total TFN (2031)	3,600	7,100	20%	710	1,420

Source: SDG analysis based on TFN Traffic Impact Study data[3]

3.8 This suggests a potential demand for an additional 710 trips in the tunnel in the AM peak and 1,420 trips in the PM peak, even though the tunnel is already operating at full capacity at these times.

3.9 Note that trip generation on a Saturday is forecast to be considerably higher as result of the retail component in the development. However tunnel capacity is less of an issue on weekends as discussed earlier in Chapter 2, with AAWDT being higher than AADT.

Deltaport Terminal Expansion

3.10 The Deltaport expansion project[4] is expected to be completed by 2014 with estimates that 35% of trucks will use the George Massey Tunnel. Table below highlights the likely impact on the tunnel. While the number of additional trucks is relatively small, it should be noted that the operating characteristics of trucks, which are typically large and slow to accelerate, can be disproportionately higher than their numbers may suggest.

TABLE 3.2 DELTAPORT POTENTIAL IMPACT ON TUNNEL

	Daily Truck Trips (2 way)	Daily Vehicle Trips (2 way)	AM Truck Trips on tunnel	AM Vehicle Trips on tunnel
2010 (actual)	3,038	1,426	78	36
2014 (projected)	3,435	1,586	88	40
2014 Incremental	**397**	**160**	**10**	**4**
2017 (projected)	4,769	2,130	122	54
2017 incremental	**1,334**	**544**	**34**	**14**

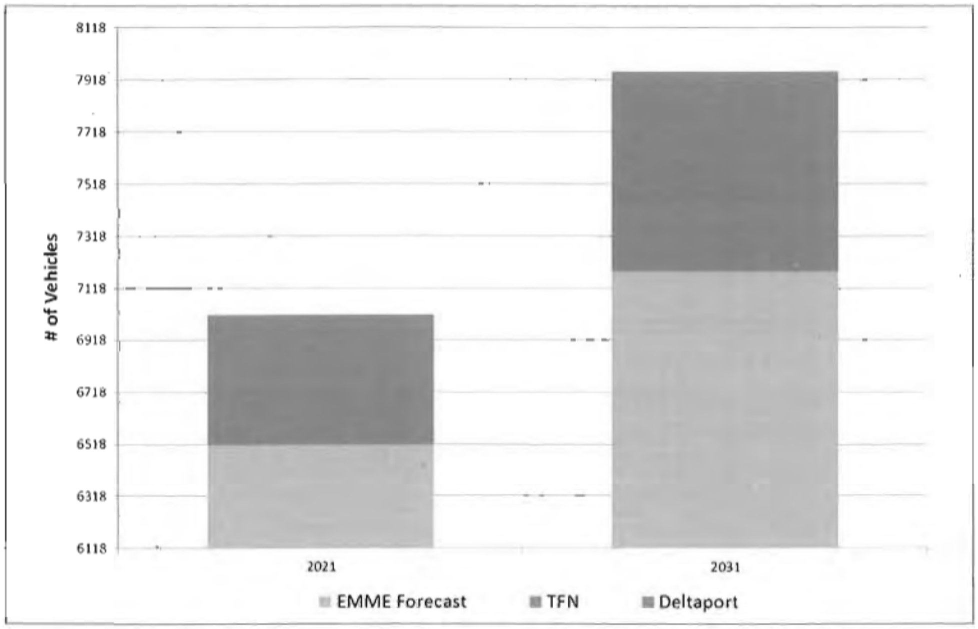
Source: SDG analysis based on Port Metro Vancouver data

[4] *Port Metro Vancouver's Deltaport Terminal, Road and Rail Improvement Project: Canadian Environmental Assessment Act Screening report* http://www.portmetrovancouver.com/en/projects/OngoingProjects/DTRRIP/Environment.aspx

Total Traffic Demand

3.11 Figure 3.3 shows the potential future tunnel demand forecast based on the analysis presented above. As discussed previously, this represents the potential demand and if these demand patterns materialized it would lead to a number of effects, including peak spreading (travelling at a different time), trip re-distribution (select a different destination) or trip re-assignment (choose a different route - in this case the Alex Fraser Bridge which also congested and therefore an unlikely effect).

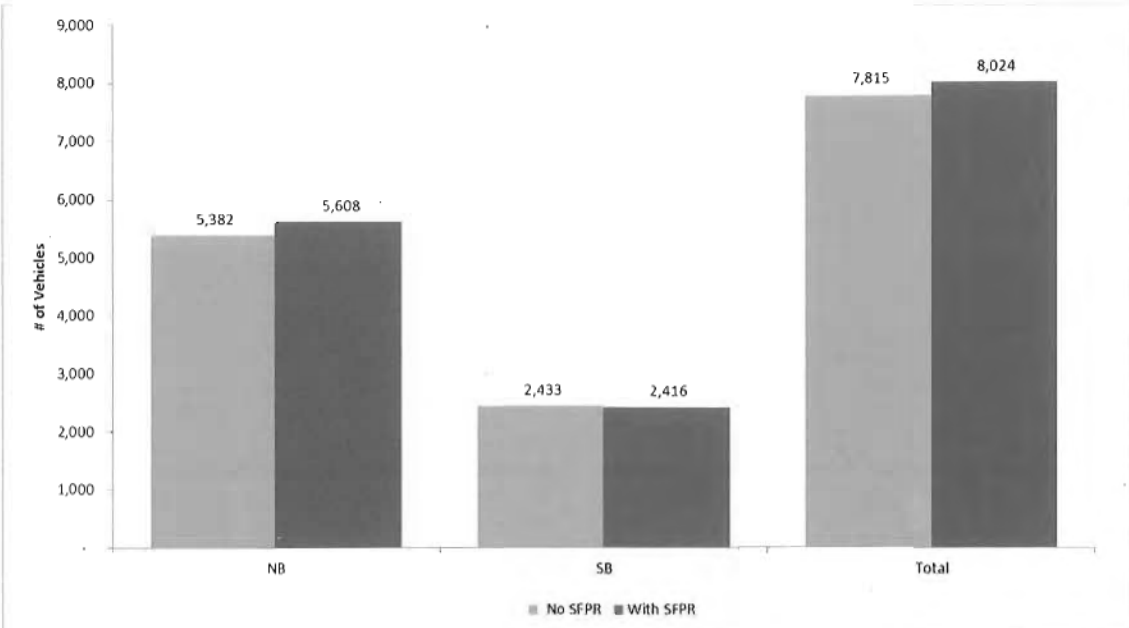
FIGURE 3.3 INCREMENTAL TRAFFIC DEMAND OVER 2008 (AM PEAK HOUR)



SFPR Impact

3.12 The completion of the South Fraser Perimeter Road (SFPR) will provide the region with an additional link providing improved east-west connectivity. However its introduction will lead to traffic increases on the Massey Tunnel. An assessment on the impact of the SFPR on the Massey Tunnel was undertaken by removing the link from SFPR to Highway 99 in the EMME model. Work showed a slight increase (3%) in tunnel demand as a result of the introduction of SFPR by 2031. Worth reinforcing , as indicated earlier, that EMME forecasts represent *potential demand* i.e. all the trips that wish to be made during the rush-hour can be made, and therefore SFPR increases the level of potential demand as the tunnel is already operating at capacity.

FIGURE 3.4 SFPR IMPACT ON GEORGE MASSEY TUNNEL (2031 AM PEAK)



Capacity Increase Implications

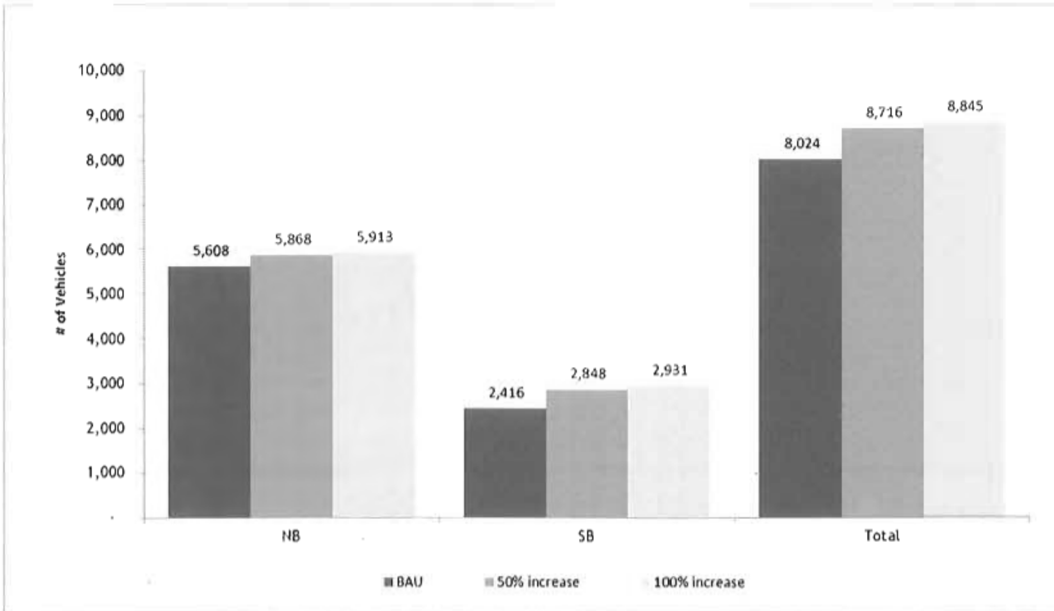
3.13 Delta requested that two tests were undertaken to understand the impact of tunnel capacity increases. The tests assumed:

- Increase capacity by 50% by adding a traffic lane in either direction of travel (4 lanes NB and 2 lanes SB in the AM peak-period)
- Increase capacity by 100% by adding 2 lanes in each direction (5 lanes NB and 3 lanes SB in the AM peak-period)

3.14 The analysis shows limited impact from capacity increases which is caused by EMME model limitations because it is not capacity constrained, as described previously. The model estimates *potential demand* i.e. those who want to travel regardless on whether the road network can accommodate them, and therefore the majority of this *potential demand* has already been captured in the base model estimates. Taking this into account, when capacity is doubled to 8 lanes on the tunnel peak direction demand is 18% over the current tunnel capacity of 5,000 vehicles.

3.15 Note that these two tests are illustrative and assume increases in tunnel capacity based on the same road network configuration. In reality any increase in capacity would require a new bridge or tunnel being built but lacking any design concept the approach taken was considered sufficient.

FIGURE 3.5 CAPACITY INCREASE IMPLICATIONS (2031 AM PEAK)



4 Cost of Congestion

Background

4.1 Transport Canada has reviewed the cost of congestion in a number of studies as identified in Chapter 1. These make a clear distinction between:

- Recurrent congestion that occurs mainly during peak periods and reflects too many vehicles wanting to use the road at the same time; and
- Non-recurrent congestion that occurs as result of random incidents on the road and because their randomness they are challenging to predict.

4.2 This report has focussed on recurrent congestion where the most common measurement of congestion is all traffic delay beyond "free-flow" or unimpeded conditions i.e. the estimation of the travel cost differential between observed and "free-flow" conditions. This is also the approach used by the Texas Transportation Institute (TTI) in their annual 'Urban Mobility Report' which provides annual congestion statistics for major US cities.

4.3 The most commonly congestion cost quoted for Metro Vancouver is the $740m-$1.01 billion a year (2000$) estimated by Transport Canada where recurrent and non-recurrent costs are estimated at similar levels ($380m-$600m for recurrent delay costs).

Cost of Congestion Estimate

4.4 This study of the cost congestion on the Massey Tunnel has estimated recurrent congestion costs based on same method as the Transport Canada analysis by focussing on the difference between observed and "free-flow" speeds in the tunnel. Non-recurrent costs have been estimated on Transport Canada data.

4.5 Table 4.1 presents the various assumptions applied.

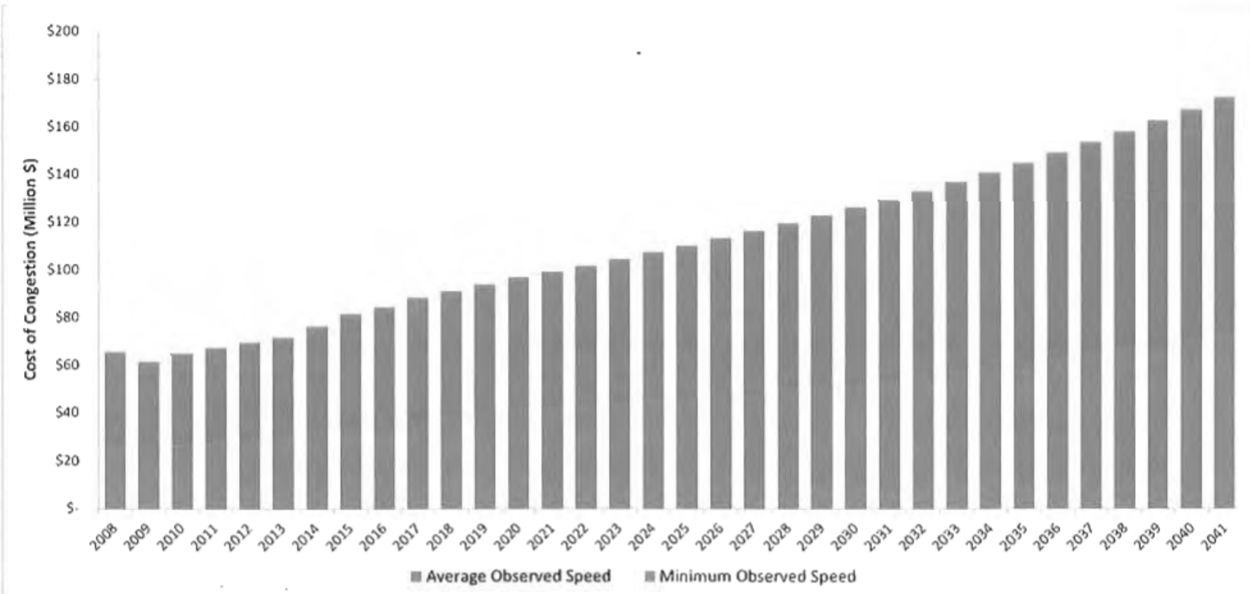
TABLE 4.1 COST OF CONGESTION ASSUMPTIONS

Input	Value	Source
Annualisation Conversion Factors		
AM Peak to Peak Period	4	Tunnel traffic data
Peak Period to Annual	343	
Congestion Length		
Average queue length	2.8 km	August 2012 survey
Tsawwassen First Nation (TFN) Development		
Trip Distribution to Massey Tunnel	20%	Estimated from TFN development Transportation Impact Assessment
DeltaPort		
Trip Distribution to Massey Tunnel	35%	Estimated from Port Metro Vancouver data
Delay		
Free-flow Speed	80km/hr	Posted speed limit
Average Peak speed	20 km/h	MoTI observed speed
Minimum Peak speed	10 km/h	
% of Work-Trips	48%	Transport Canada Cost of Congestion study
% of Non-Work Trips	52%	
Cost of Work Trips (2008$)	$32.81/hour/vehicle	
Cost of Non-Work Trips (2008$)	$10.22/hour/vehicle	
CPI	2%	Bank of Canada assumption
Vehicle Operating Cost		
Fuel Consumption (L/Km)	0.069	Transport Canada Fuel Consumption Guide[5]
Non-Recurrent Cost		
Proportion of non-recurrent to recurrent costs	70%	Transport Canada Cost of Congestion study

[5] http://www.tc.gc.ca/eng/programs/environment-fcp-fcguide-629.htm

4.6 Based on the assumptions above, EMME model forecasts and speed statistics we have estimated the cost of congestion and presented in figure below. The figure provides a range of values based on different speed assumptions.

FIGURE 4.1 TOTAL COST OF CONGESTION BY YEAR ($MILLIONS)



4.7 Note the following issues with the analysis presented:

- This is a conservative estimate as it is applied to potential (rather than actual) demand. If all demand materialized in the tunnel the speeds would drop more and therefore cost would increase considerably;
- This high level estimate has been based on sources of data which are readily available. More extensive speed data would be useful to understand the traffic to travel speed relationship and its evolution;
- The cost of non-recurrent congestion has been based on Transport Canada's study results rather than specific Massey Tunnel data due to very limited data on incident severity and frequency. With the system running at capacity, any minor impact will have large impacts on tunnel traffic and effect on tunnel could be higher than the values estimated in this report.

5 Summary

5.1 This report has reviewed Massey Tunnel previous studies and traffic data available and shows Annual Average Daily Traffic (AADT) of 82,000 vehicles and Annual Average Weekday Traffic (AAWDT) of 87,000 with some traffic growth since 2008.

5.2 The tunnel is operating at capacity during peak periods and there has been some peak spreading in the inter peak period over the last few years.

5.3 Tunnel use shows some seasonal variations with more traffic using the tunnel during the summer months (likely linked to leisure travel) and around 12% of the traffic is made up by heavy goods vehicles.

5.4 The forecast peak-hour demand is significantly higher than what the tunnel is able to accommodate - EMME model forecasts suggest that the excess unmet demand is around 1,500 vehicles per hour (23% over capacity) by 2031.

5.5 Tunnel traffic flows show significant levels of unreliability as shown by highly variable speeds (almost 55 kph difference between minimum and maximum speed in the peak periods), high accident rates (and subsequent impact of no hard shoulders on tunnel) and extensive (and variable) queuing.

5.6 Based on the data available we have estimated the cost of congestion on the tunnel ranges $27 million-$66m in 2008 increasing to $74m-$173m by 2041 accounting for different peak period speeds and current and potential demand. Further speed and incident data on the tunnel would be very useful to refine this estimate and understand better the traffic to speed relationship and incident severity and frequency.

5.7 It is also important to reinforce the unique nature of demand on the tunnel which makes it quite distinctive from other crossings in the region as it is driven by a variety of current and future demand drivers, including:

- Ferry demand - surge demand dictated by their schedule;
- Delta Port Development - driven by international trade patterns and with development led by the Port itself;
- FTN development - outside the planning remit of Delta, Metro Vancouver or the provincial government;
- Cross-border trips - currently driven by currency differential and recent impacts on CBSA duty allowance changes.

5.8 Furthermore the tolling of the Port Mann Bridge and potentially Pattullo Bridge will potentially add to the tunnel's demand profile and increase the travel uncertainty and impact on the reliability of the bridge.

5.9 The issue of regional tolling has been discussed in the region recently and would provide a potential method to dampen demand and improve the tunnel's reliability although this is an issue with extensive political, public and regional implications.

APPENDIX

A

LITERATURE REVIEW

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memo

To	The Corporation of Delta		
Cc			
From	Dan Gomez-Duran/Joseph Chow		
Date	16 July 2012		
Project	George Massey Tunnel Transportation Study	**Project No.**	22484601

Subject Literature Review

Introduction

1.1 Steer Davies Gleave have been commissioned by the Corporation of Delta to conduct a transportation study on the George Massey Tunnel. A summary of traffic data collected has been provided previously and this document summarizes past studies completed relating to the George Massey Tunnel, reviews cost of congestion research and provides a suggested methodology to estimate the cost of congestion on the Massey Tunnel.

1.2 The George Massey Tunnel carries an Annual Average Weekday Traffic (AAWDT) of 87,000 vehicles and Annual Average Daily Traffic (AADT) of 82,000 vehicles in 2011. This translates to an AM peak hour flow of 5,000 vehicles in the northbound direction and PM peak hour flow of 4,900 in the southbound direction. The tunnel peak hour demand has been stable since 2005 suggesting that the tunnel is operating at capacity and it is both volume of potential demand above these levels as well as minor incidents which can have major impacts on delays and congestion.

Documents Reviewed

1.3 This memo has reviewed the following documents:

- Lower Mainland Truck Freight Study, TransLink (July 2000)
- Improving Roads and Bridges: Program Definition Report, Gateway Program (January 2006)
- The Cost of Urban Congestion in Canada, Transport Canada (March 2006)
- Cost of Non-Recurrent Congestion in Canada, iTRANS Consulting Inc (December 2006)
- Bridging the Infrastructure Gap, Get Moving BC (September 2008)
- 2008 Metro Vancouver Dangerous Goods and Truck Classification Survey, Transport Canada, MoT & TransLink (November 2008)
- Highway 99 Corridor Assessment, Ministry of Transportation and Infrastructure (January 2009)

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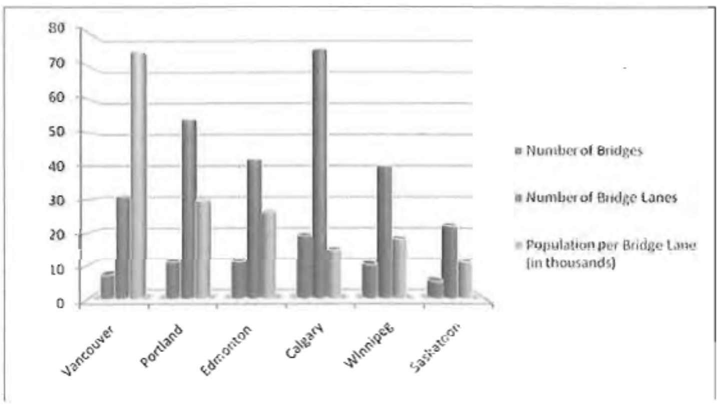
1.4 The main findings of these documents are included below.

Metro Vancouver Traffic

Fraser River Crossings

1.5 In 2008, 'Get Moving BC', a lobby group for improved transportation infrastructure, reviewed the river crossings in 4 western Canadian cities (Calgary, Edmonton, Winnipeg, Saskatoon) and Portland and compared them with Fraser River crossings in Metro Vancouver. The report concluded that Metro Vancouver's river crossings demand greatly exceeded capacity when compared with the other cities. Metro Vancouver supports a population of 2.3 million people with seven main crossings (31 bridge lanes). This equals to approximately 74,000 people per lane (ppl), 54,000 more than the average of other cities measured in the study as shown in figure below.

FIGURE 1 ROAD CROSSING CAPACITY COMPARISONS



Metro Area		Population	Bridges	Lanes		Pop./Lane
Vancouver	*Fraser River*	2.3 million	7	31	(baseline)	74,194
Portland	Willamette River	1.6 million	11	54	75% more lanes	29,630
Edmonton	North Saskatchewan River	1.1 million	11	42	35% more lanes	26,190
Winnipeg	Red River	720,000	10	40	31% more lanes	18,000
Calgary	Bow River	1.1 million	19	75	140% more lanes	14,667
Saskatoon	South Saskatchewan River	240,000	5	22	(not applicable)	10,909

Source: Bridging the Infrastructure Gap, Get Moving BC

1.6 However these statistics did not take into account Golden Ears Bridge which added 6 lanes or Port Mann Bridge (in 2008 still at planning stages) which scheduled to open in 2012 and ultimately expanded to 10 lanes. This would bring the total number of bridge lanes to 47 lanes reducing the ratio of population to bridge lane to approximately 49,000.

1.7 While interesting, it is important to note that care should be applied to any benchmarking exercise. Comparisons will not reflect differences in the geography of the cities, the type of road on the bridge (highway, arterial, local) or its location in the network. Moreover the location of 'special generators' such as ports, industrial areas, etc. can also greatly influence the demands on crossings.

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1.8 Nonetheless the study did show that Vancouver crossings do carry higher daily traffic volumes per lane (based on 2006 data) when compared to other cities, with Massey Tunnel as one of the highest with almost 22,000 daily vehicles per lane.

TABLE 1 RIVER CROSSING VOLUME/LANE RELATIONSHIP (2006)

	Bridge	City	River	Lanes	Volume/Lane	AAWT[16]
1	Port Mann Bridge	Vancouver	Fraser River	5 lanes	24,949	124,745
2	Knight Street Bridge	Vancouver	Fraser River	4 lanes	24,919	99,677
3	George Massey Tunnel	Vancouver	Fraser River	4 lanes	21,864	87,455
4	Deerfoot/Bow River	Calgary	Bow River	6 lanes	21,833	131,000
5	The Interstate Bridge (I-5)	Portland	Columbia River	6 lanes	21,217	127,300
6	Arthur Laing Bridge	Vancouver	Fraser River	4 lanes	21,199	84,796
7	Queensborough Bridge	Vancouver	Fraser River	4 lanes	21,062	84,247
8	Ironworkers Bridge	Vancouver	Burrard Inlet	6 lanes	21,029	126,174
9	Pitt River Bridge	Vancouver	Pitt River	4 lanes	20,000	80,000
10	Glenmore Trail SW	Calgary	Elbow River	7 lanes	20,000	140,000
11	Oak Street Bridge	Vancouver	Fraser River	4 lanes	19,850	79,399
12	Quesnell Bridge (Hwy 2)	Edmonton	North Saskatchewan	6 lanes	18,667	112,000
13	Pattullo Bridge	Vancouver	Fraser River	4 lanes	18,650	74,600
14	Alex Fraser Bridge	Vancouver	Fraser River	6 lanes	18,520	111,122
15	Marquam Bridge (I-5)	Portland	Willamette River	8 lanes	17,675	141,400
16	Crowchild Trl/Bow River	Calgary	Bow River	6 lanes	17,500	105,000
17	Glenn L. Jackson Memorial Bridge	Portland	Columbia River	8 lanes	17,350	138,800
18	George Abernethy (I-205) Bridge	Portland	Willamette River	6 lanes	16,667	100,000
19	Deerfoot/Bow River	Calgary	Bow River	6 lanes	15,500	93,000
20	Fremont Bridge (I-405)	Portland	Willamette River	8 lanes	14,175	113,400

Source: Bridging the Infrastructure Gap, Get Moving BC

George Massey Tunnel

Traffic volume

1.9 Highway 99 study by MoTI showed 2008 AADT of 94,600 vehicles on the tunnel (and 99,700 for Summer Annual Daily Traffic - SADT). However a comparison against data collected by SDG from traffic counters suggests lower demand levels with AADT of 80,000 (and 85,000 AAWDT) which in line with TransLink 2008 screenline showing daily traffic of 85,000.

1.10 The figures below show how traffic builds up towards the George Massey Tunnel and how it reduces north towards the Oak Street Bridge and south towards Highway 91.

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FIGURE 2 NORTHBOUND HIGHWAY 99 AM PEAK HOUR TRAFFIC (2008)

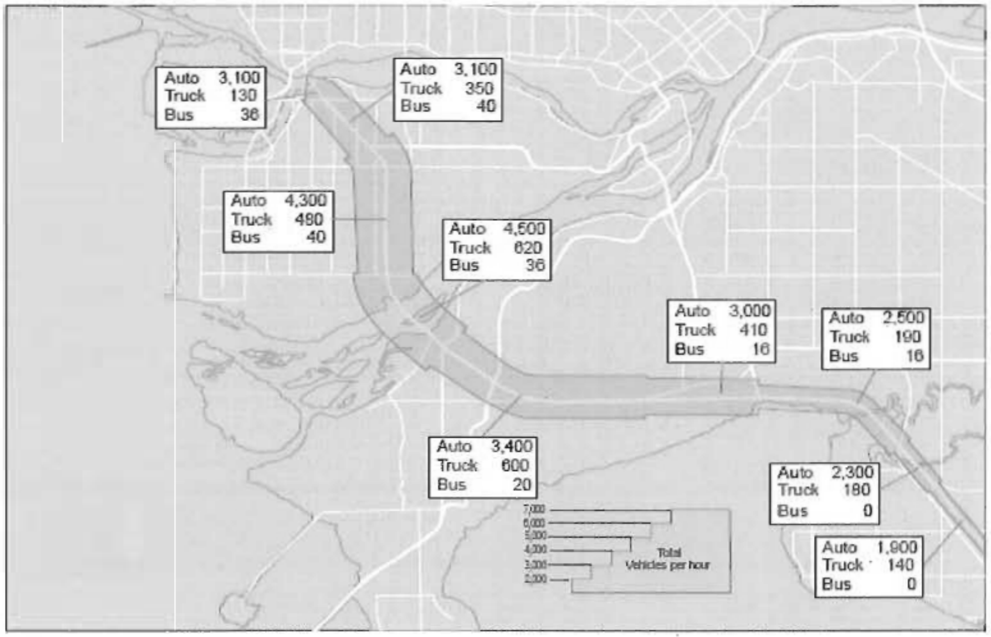
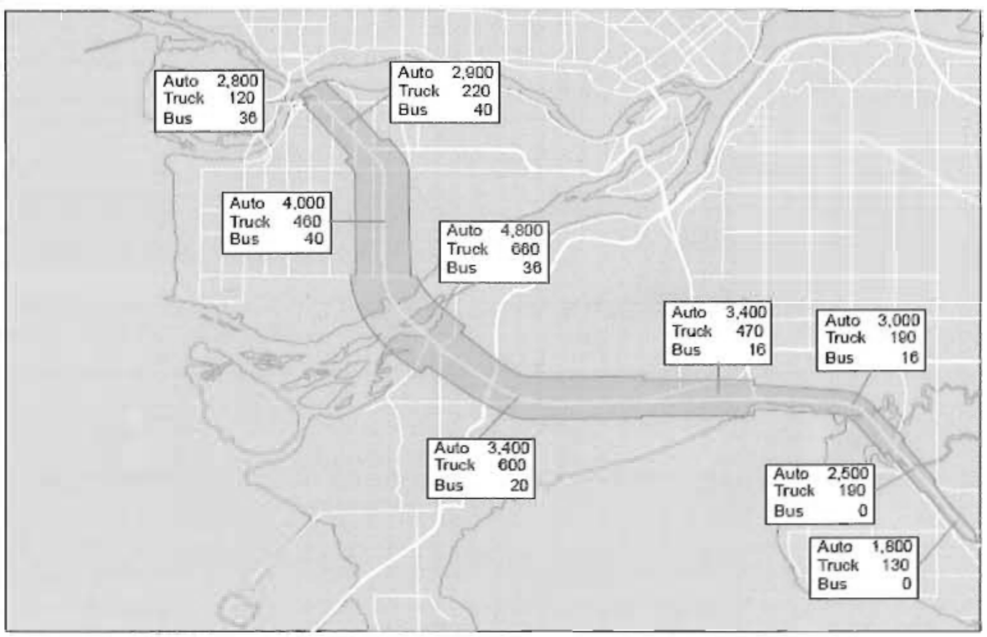


FIGURE 3 SOUTHBOUND HIGHWAY 99 PM PEAK HOUR TRAFFIC (2008)



Source: Highway 99 Corridor Assessment, BC MoTI

1.11 The figures show trucks represent around 12% of peak hour traffic.

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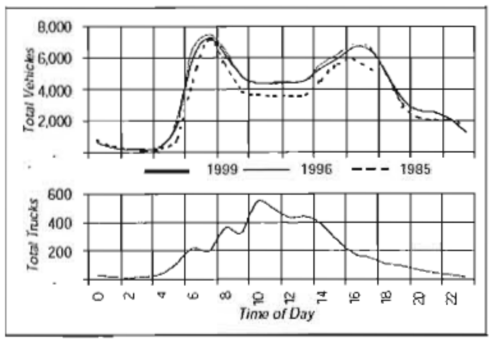
Truck Traffic

1.12 TransLink's Lower Mainland Truck Freight Study examined the trucking industry and goods movement in the Metro Vancouver region but its age (published in 2000 from 1999 data) means that limited data is presented in this memo.

1.13 The graphs below show the change of the traffic profile on the George Massey Tunnel between 1985 to 1999. As shown, the majority of truck trips through the tunnel travelled during the inter-peak period when traffic is lowest. Furthermore it shows peak spreading occurring with inter-peak growth between 1985 and 1999 (although this effect is not apparent in more recent data).

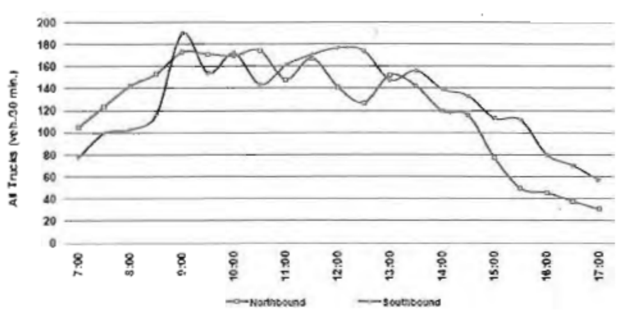
FIGURE 4 MASSEY TUNNEL TRAFFIC DATA (1985-1999)



Source: Lower Mainland Truck Freight Study

1.14 A more recent study ('Metro Vancouver Dangerous Goods and Truck Classification Survey' in 2008) reveals higher truck volumes through the George Massey Tunnel. The graph shows truck volumes per half-hour with the peak hour occurring between 10 and 11am with 660 trucks though the tunnel, an increase of around 20%.

FIGURE 5 MASSEY TUNNEL TRUCK TRAFFIC (2006)



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Time Beginning	Northbound		Southbound		TWO-WAY TOTAL		
	Non-DG	DG	Non-DG	DG	Non-DG	DG	TOTAL
7:00	105	0	78	1	182	1	183
7:30	124	0	99	1	223	1	223
8:00	142	1	102	1	244	1	245
8:30	153	1	116	0	269	1	269
9:00	172	1	190	0	362	1	362
9:30	171	0	154	1	325	1	325
10:00	169	1	172	0	341	1	342
10:30	174	0	143	1	317	1	318
11:00	148	0	161	1	309	1	309
11:30	167	0	171	0	338	0	338
12:00	141	0	177	0	318	0	318
12:30	127	0	173	1	300	1	301
13:00	152	0	148	0	300	0	300
13:30	142	0	156	0	298	0	298
14:00	119	1	140	0	259	1	259
14:30	116	0	133	0	249	0	249
15:00	77	1	113	0	190	1	190
15:30	50	0	111	1	161	1	161
16:00	46	0	80	1	125	1	126
16:30	38	0	70	0	108	0	108
17:00	31	0	57	0	88	0	88
TOTAL	2559	3 (0.1%)	2740	5 (0.2%)	5299	8 (0.2%)	5307

'Non-DG' refers to Non Dangerous Goods vehicles and 'DG' to Dangerous Goods vehicles
Source: Metro Vancouver Dangerous Goods and Truck Classification Survey

1.15 These truck estimates appear considerably lower than in the 2009 MoTI study which showed 660 trucks in the peak northbound and 620 trucks in the southbound as shown in Figures 2 and 3. This could be an issue regarding truck classification and is in line with the higher tunnel counts reported by MoTI and discussed previously.

1.16 Finally, the Canadian Environmental Assessment Act screening report for Port Metro Vancouver's Deltaport Terminal, Road and Rail Improvement Project estimated that the port expansion project could result in an additional 1,300 truck trips per day, for a total of 4,700 trucks into and out of the port, once the terminal reaches capacity in 2017.

1.17 A Delta staff report noted of those trips, about 35% (or another 450 trucks) would use the tunnel, bringing to 1,700 the daily total of two-way average truck trips using the crossing.

Speed

1.18 Traffic speeds are reduced to around 20 km/hr (speed limit of 80km/hr) when approaching the George Massey Tunnel from/to a speed of 80 to 100 km/hr (speed limit of 90-100 km/hr) as shown in figures below. Furthermore there is a very wide variance in the speed in both directions which suggests a high degree of unreliability in the tunnel. This is largely the result of the unstable nature of traffic flows when a facility is operating at capacity.

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FIGURE 6 NORTHBOUND AM PEAK PERIOD SPEED (2008)

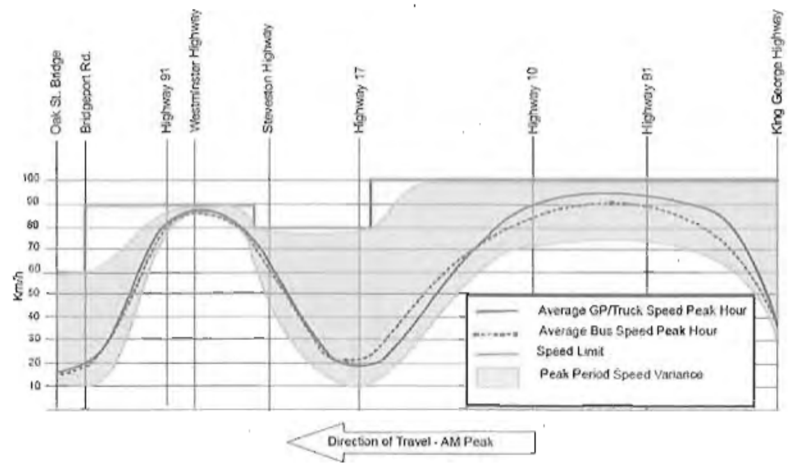
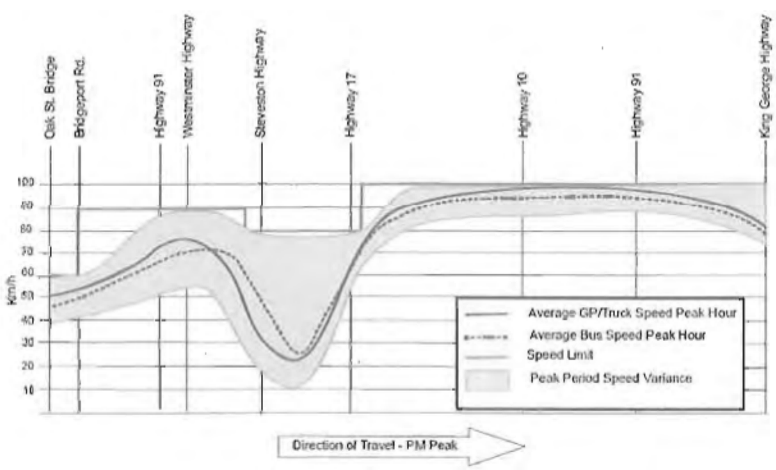


FIGURE 7 SOUTHBOUND PM PEAK PERIOD SPEED (2008)



Source: Highway 99 Corridor Assessment, BC MoTI

Safety

1.19 The Highway 99 assessment identified the Massey Tunnel as the location where the majority of the collisions occur on that section of the highway (see Figure 8) and significantly exceeding the provincial average rate of 0.9 collisions per million vehicle kilometres (mvk).

1.20 Majority of these collisions arise from 'head-on' collisions in the contra-flow lanes of the tunnel as well as other collissions arising from the very high vehicle densities. Various locations on this segment rank 38th and 56th on the list of provincial critical safety locations.

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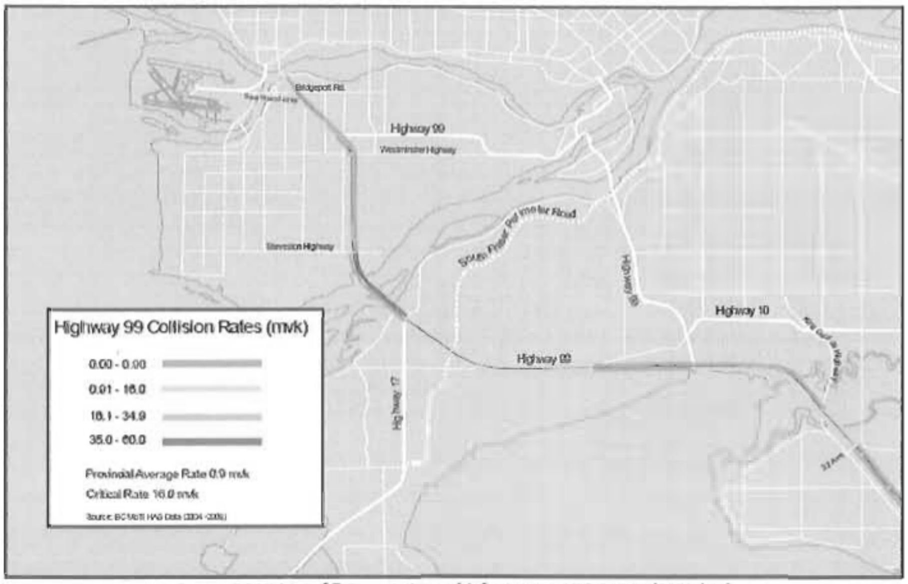
1.21 As the tunnel does not have hard shoulders for disabled vehicles to move to, it also means that collision or incidents (which are well above the provincial average) have a significant effect on tailbacks and congestion.

FIGURE 8 HIGHWAY 99 COLLISION RATES (2006)



Source: BC Ministry of Transportation and Infrastructure HAS System (2006 data)

NOTE: 'mvk' refers to Million Vehicle Kilometres

Cost of Congestion

1.22 The BC Trucking Association estimated in 1998 that goods movers are stopped or slowed in the Lower Mainland traffic 75% of the time, and approximates the current cost of congestion to goods movers at $500 million per year.

1.23 However congestion is difficult to measure and even the BC Trucking Association admits that quantifying the cost of cost of congestion are "not an exact science", "complicated" and "ball park estimates".

1.24 The most commonly congestion cost quoted is the $1.5 billion a year (2007$) estimated by Transport Canada in 2006 in their study the "The Cost of Urban Congestion in Canada" (as $1.08 billion in 2000$). The study accounted for the following factors in their estimate of the cost of congestion:

- Delay - distinguishing between two types of delay according to their generic causes: recurrent congestion and non-recurrent (incident) congestion
- Wasted fuel
- Greenhouse Gas emissions

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1.25 It is generally estimated that delay represents the greatest component of the cost of congestion (greater than 80%) and can be based on business and non-business trips purposes to ascertain a more accurate estimate.

1.26 Non-recurrent congestion reflects the delays caused by random incidents, such as stalled vehicles, accidents, truck spills, inclement weather, construction (scheduled and non-scheduled) and seasonal maintenance (e.g., snowploughing or street cleaning). Its randomness makes it difficult to predict the occurrence, and severity, of incidents.

1.27 Furthermore the fundamental challenge in analyzing non-recurrent congestion is the general lack of data on the day-to-day (or hour-to-hour) variation in travel times at microscopic levels (second-by-second measurements), and the associated traffic volumes and information.

Cost Calculation

1.28 Transport Canada study reviewed recurrent congestion measurements and the most common measurement of congestion includes all traffic delay beyond "free-flow" or unimpeded conditions. This is the approach used by the Texas Transportation Institute (TTI) in their annual 'Urban Mobility Report' which provides annual congestion statistics for major US cities. However the Transport Canada recognized that these methods could not be applied for their cross-Canada study because of the lack of common nation-wide data with which to make comparative analyses.

1.29 The Transport Canada approach to estimate costs of congestion assumed that users expect and accept congestion in peak hours on their normal routes, but that a threshold exists beyond which it becomes "unacceptable". For practical estimation purposes, the study chose a threshold of 60 percent of the posted speed limit i.e. 60 km/h for highways or expressways with posted limits of 100km/h and the study estimated congestion delays and costs by comparing speeds in the networks with these thresholds.

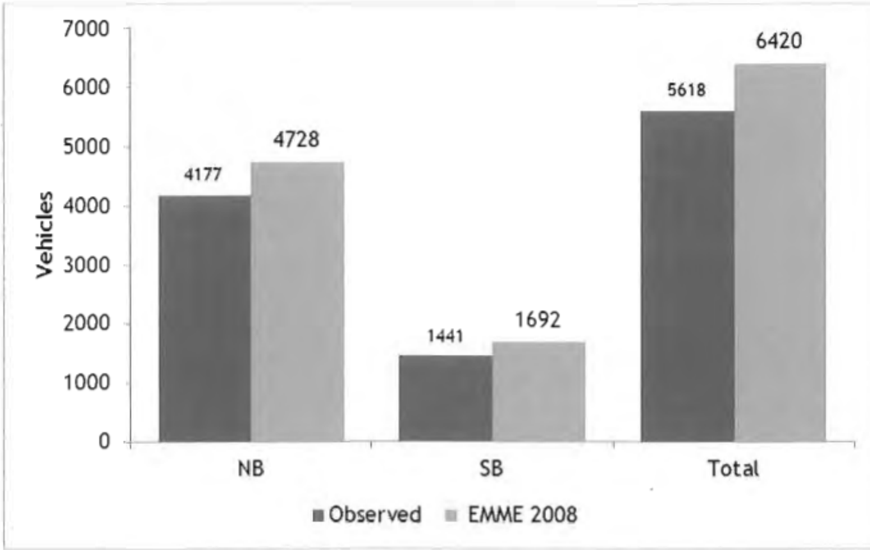
1.30 The study did acknowledged the choice of threshold was somewhat subjective because it took into account local perceptions of congestion but it understood to give a more sustainable target for congestion reduction than free-flow.

EMME Regional Model Output

1.31 Traffic volume during the AM peak hour (7:30-8:30) was extracted from the EMME Regional Model and compared to the observed flows on the tunnel and is shown in figure below.

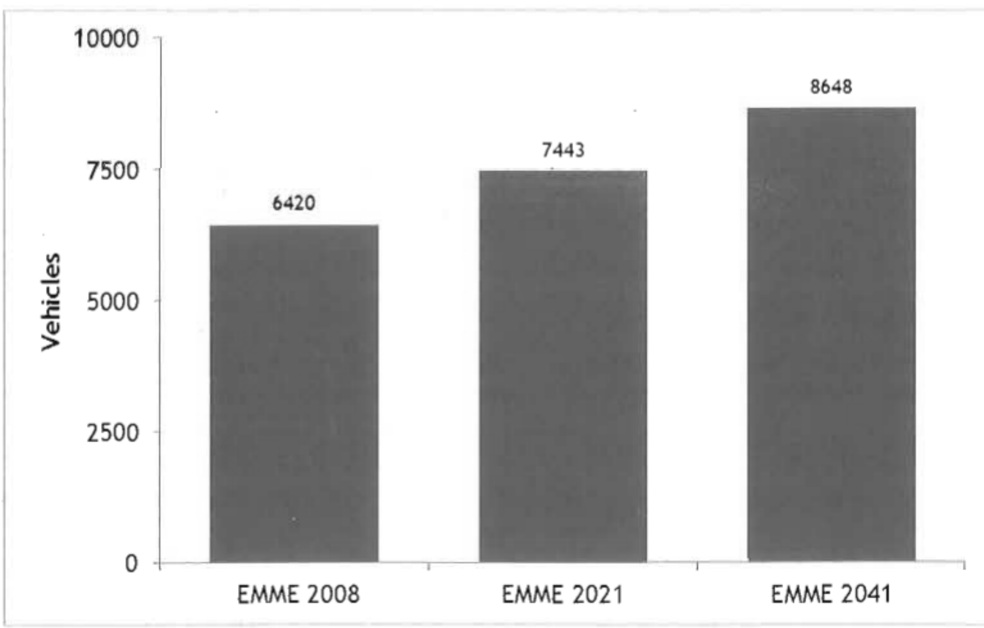
steer davies gleave

FIGURE 9 2008 MASSEY TUNNEL TRAFFIC VOLUMES (AM PEAK HOUR)



1.32 The figure shows that the EMME model currently overestimates Massey Tunnel demand (by 13% in the northbound, 17% in the southbound and 14% in both directions). Forecast growth is shown in Figure 10.

FIGURE 10 MASSEY TUNNEL TRAFFIC GROWTH (AM PEAK HOUR)



steer davies gleave

1.33 Model shows there is an 16% increase of traffic from 2008 to 2021 and another 16% increase from 2021 to 2041 on the tunnel. Note that while the model takes into account the impact of congestion in the trip assignment, the model is unconstrained and therefore EMME flows represent total potential demand and reason why they show continued growth even though model assumes static capacity.

Cost of Congestion Estimation

1.34 The Highway 99 study identified the tunnel as the main section on Highway 99 where reduced speeds so calculations will be applied to traffic on that section and applying the Transport Canada study threshold of 60 percent of the posted speed limit i.e. 60 km/h for highways with posted limits of 100km. Analysis will be concentrated on the peak hours.

APPENDIX

B

MASSEY TUNNEL PHOTOS

APPENDIX FIGURE B.1 SB HIGHWAY 99 APPROACHING TUNNEL (29TH AUGUST 2012)

APPENDIX FIGURE B.2 SB HIGHWAY 99 APPROACHING TUNNEL (29TH AUGUST 2012)

Final ReportFinal Report

APPENDIX FIGURE B.3 SB HIGHWAY 99 APPROACHING TUNNEL (29TH AUGUST 2012)

APPENDIX FIGURE B.4 SB HIGHWAY 99 APPROACHING TUNNEL (29TH AUGUST 2012)

CONTROL SHEET

Project/Proposal Name	George Massey Tunnel Transportation Study
Document Title	Final Report
Client Contract/Project No.	Click here to enter text.
SDG Project/Proposal No.	22484601

ISSUE HISTORY

Issue No.	Date	Details
1	31-August-2012	Draft report
2	18-September-2012	Final Draft Report
3	30-November-2012	Final Report

REVIEW

Originator	Dan Gomez-Duran	
Other Contributors	Joseph Chow, Clive Rock	
Review by:	Print	Dan Gomez-Duran
	Sign	

DISTRIBUTION

Client:	Corporation of Delta
Steer Davies Gleave:	

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Figure 1: Photo Rendering of the New Bridge

Attachment C
1 of 4

Figure 2: Photo Rendering of the New Bridge Looking North

Attachment C
2 of 4

Figure 3: Photo Rendering of the New Bridge Lane Cross Section

Attachment C
3 of 4

Figure 4: Photo Rendering of the New Bridge Looking South

Scenario 2: Replace Existing Tunnel with New Bridge

DESCRIPTION:

This scenario involves constructing a new bridge over the existing tunnel to provide additional capacity for all users. The existing tunnel would be decommissioned and removed.

KEY FEATURES:

1. **Build New Bridge** – A new bridge would be constructed above the existing tunnel with access for transit, cyclists and pedestrians:
   - **Multi-Use Path** – A multi-use path for pedestrians and cyclists would connect to existing networks on either side of the bridge.
   - **Dedicated Transit and HOV Lanes** – The bridge would provide for an extension of transit and HOV lanes.
2. **Remove Existing Tunnel** – The existing tunnel would be decommissioned and removed once the new bridge is complete.
3. **Rice Mill Road** – Rice Mill Road would be modified and local access would be maintained. The existing Rice Mill Road bridge would be removed as it would no longer be required.
4. **Deas Slough Bridge** – The Deas Slough Bridge would be removed as it would no longer be required.
5. **Steveston Interchange** – The Steveston interchange would be replaced to improve functionality and earthquake protection. The design would be based on the results of technical analysis currently underway.
6. **Highway 17 Interchange** – The Highway 17 interchange would be replaced to improve functionality and earthquake protection. The design would be based on the results of technical analysis currently underway.
7. **Highway 99 Corridor Improvements** – Corridor-wide improvements from Bridgeport Road in Richmond to the Canada/U.S. border would be considered.

Please tell us what you think

See question 4 on your feedback form

THE CORPORATION OF DELTA

From the office of:

The Mayor,
Lois E. Jackson

COPY

March 28, 2012

RECEIVED
MINISTER'S OFFICE
MINISTER OF TRANSPORTATION
APR 02 2012
203044
DRAFT REPLY ☐ FYI ☐ FILE ☐

The Honourable Kevin Falcon
Minister of Finance and Deputy Premier
PO Box 9048, Stn Prov Govt
Victoria, BC V8W 9E2

Dear ~~Minister~~, Kevin

Re: Delta Transportation Issues

It was a pleasure to meet with you at yesterday's South Asian Business Community luncheon. As we discussed, I am enclosing the information that was presented to Minister Lekstrom during our March 22, 2012 meeting – specifically, Highway 99 right-in/out at 80th Street, dredging local navigation channels and South Delta transportation issues related to the George Massey Tunnel.

I appreciate your interest and consideration of these important issues.

If you have any questions or comments, please do not hesitate to contact my office directly at (604) 946-3210.

Yours truly,

Lois E. Jackson
Mayor

Enclosure

cc: The Honourable Blair Lekstrom, Minister of Transportation & Infrastructure
Dave Hayer, MLA, Surrey-Tynehead

4500 Clarence Taylor Crescent, Delta, British Columbia, Canada V4K 3E2
Tel: 604 946-3210 Fax: 604 946-6055 E-mail: mayor@corp.delta.bc.ca

Funding for Dredging the Secondary Navigation Channels Around Ladner Harbour

March 2012 Update

There is an urgent need to undertake dredging of the secondary navigation channels around Ladner Harbour. Sediment has been accumulating in these channels during the last twenty years since the cessation of regular maintenance dredging by Public Works Canada.

Since 2009, the Corporation of Delta has been working with Port Metro Vancouver and other stakeholders to develop a dredging strategy and identify funding sources in order to **promote economic and environmental revitalization of the harbour and waterfront for the benefit of businesses, local residents and the community as a whole.** The objectives are:

1. Provide clear, safe navigation channels for fishing vessels, commercial boats and recreational craft and restore unimpeded access to waterfront businesses and residences.

2. Protect existing business activity and stimulate new economic investment in the Ladner waterfront commercial and residential areas.

3. Maintain the heritage character of Ladner village and promote tourism related to activities in the commercial/waterfront core, and eco-tourism related to river-based and wildlife-viewing activities.

4. Protect inter-tidal habitat for the benefit of fish and wildlife.

5. Reduce vulnerability to extreme weather and tidal events that may cause flooding.

Several steps have been made towards achieving these goals:

1. A **technical study**, which accurately maps and describes the sediment dynamics within the local channels, is complete. This study, which was funded by Port Metro Vancouver, forms the basis of the dredging plan.

2. An **economic impact assessment**, which will identify the economic impacts associated with continued non-dredging, is being prepared by InterVistas and is expected to be complete by April 2012. This will form the basis of a business case for dredging.

3. A **dredging plan**, which identifies priority channels for dredging and sediment disposal options, is being prepared by Delta in conjunction with Port Metro Vancouver, Fraser River Pile & Dredge and the Ladner Sediment Group.

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4. A **funding proposal** has been prepared. The cost to dredge the channels back to 1990s conditions is in the order of $8 million:

- Port Metro Vancouver has committed $2.3 million
- The Corporation of Delta has committed $2 million

These funding commitments are a reflection of the level of concern there is regarding this issue and of the desire to see the situation resolved.

The Corporation of Delta is seeking commitments from the provincial and federal governments to provide financial assistance to undertake critical channel dredging in the secondary navigation channels and to develop a program of annual funding for maintenance dredging of the local channels.

Attachment:
Mayor Lois E. Jackson's presentation to the Select Standing Committee on Finance and Government Services (September 2010)

The Corporation of Delta
4500 Clarence Taylor Crescent
Delta, BC V4K 3E2
604.946.4141
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September 16, 2010

Presentation to the Legislative Assembly of British Columbia
SELECT STANDING COMMITTEE ON FINANCE AND GOVERNMENT SERVICES

Funding for Local Channel Dredging in the Lower Fraser River

The Fraser River is British Columbia's largest river, flowing 1,400 km and draining one quarter of the landscape. It also carries 20 million tonnes of sediment annually into the Fraser delta, most of it during the spring freshet.

Historically, dredging of the Fraser River was the responsibility of the Canadian Coast Guard and funded by the Federal Government. In late 1998, federal funding ceased, and responsibility for dredging the deep-sea shipping channels was passed onto what is now Port Metro Vancouver.

Also at that time, Transport Canada placed engineered structures at key locations in the lower Fraser River to divert most of the flow into the main channel. While this was successful in reducing the need for dredging the main channel, it was to the detriment of the local navigation channels where flow was reduced by as much as 70%, thereby accelerating the deposition of sediment.

Since the cessation of the federal dredging program, there has been over 10 years of sediment accumulation in the lower Fraser's local navigation channels. Recent bathymetric analyses have determined that 1.2 million cubic meters of sediment needs to be removed to return the channels to pre-1990 conditions. Sediment loads are expected to increase as a result of the massive deforestation and soil erosion caused by the mountain pine beetle.

The potential impacts of continued non-dredging of the local channels in the Lower Fraser include:

Increased flood risk – failure to adequately dredge local channels contributes to rising river bottom levels and a greater likelihood of high spring freshet river flows overtopping the dyke system, particularly when coupled with winter storm conditions.

Vulnerability to climate change – a recent research project undertaken by Natural Resources Canada identified the Fraser Delta as being highly vulnerable to the effects of climate change, increasing storm severity and sea-level rise. Dyke reinforcement and river dredging are key components in the mitigation strategy.

Impacts on the provincial and local economy – in 2008, the Fraser River carried over 33 million tonnes of cargo, generating $4.6 billion in GDP and $9.6 million in economic output. Dredging costs are decreasing the economic viability of the port. On a local scale, numerous communities along the lower Fraser River from Delta and Richmond up to Mission are being negatively impacted by the lack of dredging. Economic losses totalling millions of dollars include property devaluation, relocation of industries, loss of property taxes, impacts on local marinas, local fisheries and float home communities.

In Delta, the impacts of sedimentation are most apparent in the channels around Ladner Harbour. A local community group, the Ladner Sediment Group, has recently received funding from Port Metro Vancouver to undertake a study of the sedimentation and river flow processes in the Ladner area. The goal is to develop a long-term sustainable sediment management plan for the area – a plan that does not necessarily rely on annual dredging to solve the problem. Computer modelling of various flow diversion scenarios is underway and the results are expected by the end of 2010.

The Corporation of Delta is also preparing a grant application to the Provincial Flood Protection Program of Emergency Management BC for funding to assist in implementing the Ladner Harbour sediment management program once it has been developed.

This issue of local channel dredging has been raised at numerous times with the Federation of Canadian Municipalities, the Union of British Columbia Municipalities, and presentations have been made to the House of Commons Standing Committee on Finance, to Federal and Provincial Ministers, and to the BC Federal Conservative Caucus. So far, no government agency has been willing to commit to funding this essential service.

In summary, there is an immediate and urgent need to establish a long-term, sustainable dredging program for the secondary navigation channels of the lower Fraser River. Delta is therefore requesting that the Provincial Government, with or without federal support, contribute annual funding for local navigation channel dredging in the lower Fraser River.

Thank you.

Lois E. Jackson
Mayor
The Corporation of Delta

September 16, 2010

SELECT STANDING COMMITTEE ON FINANCE AND GOVERNMENT SERVICES

Funding for Local Channel Dredging in the Lower Fraser River

EXECUTIVE SUMMARY:

The Fraser River is British Columbia's largest river, flowing 1,400 km and draining one quarter of the landscape. It also carries 20 million tonnes of sediment annually into the Fraser delta, most of it during the spring freshet.

Historically, dredging of the Fraser River was the responsibility of the Canadian Coast Guard and funded by the Federal Government. In late 1998, federal funding ceased, and responsibility for dredging the deep-sea shipping channels was passed onto what is now Port Metro Vancouver.

Also at that time, Transport Canada placed engineered structures at key locations in the lower Fraser River to divert most of the flow into the main channel. While this was successful in reducing the need for dredging the main channel, it was to the detriment of the local navigation channels where flow was reduced by as much as 70%, thereby accelerating the deposition of sediment.

Since the cessation of the federal dredging program, there has been over 10 years of sediment accumulation in the lower Fraser's local navigation channels. Recent bathymetric analyses have determined that 1.2 million cubic meters of sediment needs to be removed to return the channels to pre-1990 conditions. Sediment loads are expected to increase as a result of the massive deforestation and soil erosion caused by the mountain pine beetle.

The potential impacts of continued non-dredging of the local channels in the Lower Fraser include:

- Increased flood risk – failure to adequately dredge local channels contributes to rising river bottom levels and a greater likelihood of high spring freshet river flows overtopping the dyke system, particularly when coupled with winter storm conditions.

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In summation, there is an immediate and urgent need to establish a long-term, sustainable dredging program for the secondary navigation channels of the lower Fraser River. Delta is therefore requesting that the Provincial Government, with or without federal support, contribute annual funding for local navigation channel dredging in the lower Fraser River.

BACKGROUND:

The Fraser River, flowing more than 1,400 km and draining an area one-quarter of the area of the province, is the largest river in British Columbia. Annually, more than 20 million tonnes of sediment is carried from the upper Fraser River in the interior and deposited in the lower Fraser River delta. The mass tree loss caused by the mountain pine beetle is contributing to soil runoff and increased sediment loads in the river. In order to keep shipping channels open, maintenance dredging must be undertaken. Without dredging, key deep sea shipping and domestic navigational channels on the lower Fraser would become too shallow for commercial and domestic vessels to safely access port facilities.

For nearly 100 years, dredging of the Fraser River was the responsibility of the Canadian Coast Guard (CCG) and funded by the Federal Government. In the early 1990's, Transport Canada placed diversions at critical locations along the river to divert more water into the deep-sea shipping and the domestic navigational channels. The intention of this diversion was to increase flow into these channels, and reduce the reliance on dredging. This project was successful in that it saved millions of dollars in dredging expenditures; however, it came at the expense of the local channels which were inundated with additional silt that has dramatically reduced water depths.

In late 1998, federal funding stopped, CCG ceased dredging and since then the local port authority, Port Metro Vancouver (PMV), has undertaken regular maintenance dredging of primarily the main channel of the lower Fraser. Funding to conduct their dredging activities came from a $15 million settlement from the CCG for early termination of their dredging agreement. Between 1999 and 2002 the port authority dredged some local navigation channels; but the settlement funding has since been depleted and scheduled maintenance dredging of local navigation channels had to stop. Since the cessation of the dredging program, there has been approximately 10 years of sediment accumulation in the lower Fraser's local navigation channels. Recent bathymetric analyses have determined that 1.2 million cubic meters of sediment needs to be removed.

PORT METRO VANCOUVER:

Port Metro Vancouver currently dredges the lower Fraser River for navigation purposes where commercially viable. Since undertaking this task in 1999, they have focused the majority of their efforts on maintaining and improving the main channels only. However, Port Metro Vancouver recognizes the significant economic and local community and industry benefit from ensuring that smaller users can still safely access the local navigation channels. In an effort to create sustainable long-term certainty around access to these sites, the Port is assisting users with the development of user-based, long-term maintenance plans. Port Metro Vancouver has already conducted some preliminary studies to determine the costs to undertake local navigation channel dredging. The results of the study indicate that restoring the channels to pre-1998 conditions will cost an estimated $5 million as a onetime expenditure and $500,000 annually as an on-going maintenance dredging expenditure.

To assist with these costs, PMV has developed a 10-year *Local Channel Dredging Contribution Program* that will provide financial support for riverfront communities to undertake their own dredging activities beyond deep sea and domestic shipping channels. The contribution program will support long-term community-based plans and has been budgeted at up to $7 million over 10 years but shall not exceed $500,000 per local channel over a 10-year period. Port Metro Vancouver is providing $125,000 for Ladner Sediment Group (user group in Delta) to retain a consultant to undertake a Ladner Harbour Sedimentation Study to assess how the group can use other tools, not just dredging, to reduce the amount of sediment build-up in the local navigation channels.

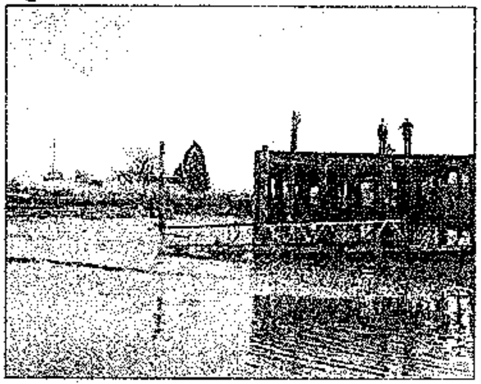
While a benefit to long-term sustainable planning initiatives the Port contributions are completely inadequate to maintain local channels at a safe and acceptable depth. Therefore, Delta is requesting that the Provincial Government provide adequate long term funding to implement a local navigation channel dredging program on the Fraser River.

IMPACTS OF LOCAL NAVIGATION CHANNEL INFILLING:

LADNER SEDIMENT GROUP

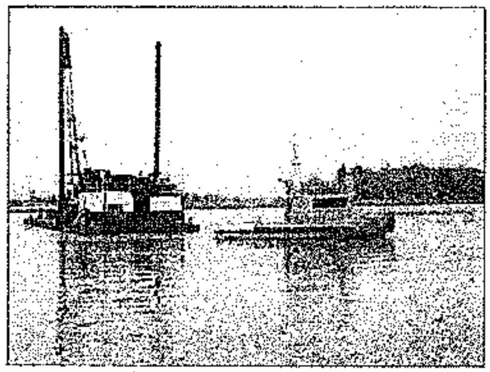
There are many and varied local navigation channel users groups in Delta. Many are represented by the Ladner Sediment Group. The Ladner Sediment Group consists of water lot owners, local business owners and local channel users. This group is serving as a catalyst to deliver the message of the impacts of the neglect of the local channels. They understand their responsibility to keep water lots clean and free of silt. But it is currently an effort in futility when the channel is silted in. When water lots are dredged at significant costs to individuals they become lower than the river's local navigation channels. This causes silt from the local channel to slough back into the hole. In the past, water lot dredging typically lasted 4 to 5 years. Today, it is fortunate to keep an adequate draft for 4 to 6 months. Float homes, docks, boats and other structures are now regularly and dangerously being lifted out of the water by local channel river sediment. Figures 1 and 2 provide good examples of this regular occurrence.

Figure 1



This dock used to receive large vessels but has been inaccessible for 5 years.

Figure 2



A tug and barge stuck in the middle of a local channel.

The local navigation channels are silting in at an alarming rate. Where there was 20 ft of water at low tides there are now many areas that are only 2 to 3 feet deep. This has resulted in the channels becoming a hazard to navigate, water lease lot owners experiencing their floating homes and vessels tied to docks going aground at low tide, at times causing damage to the structure, commercial and residential boat owners can no longer safely access areas when there is insufficient water to navigate, and substantial private expenditures are being incurred to keep floating structures out of the mud.

FISHERIES AND OCEANS CANADA'S SMALL CRAFT HARBOURS:
Fisheries and Oceans Canada's Small Craft Harbours (SCH) program is responsible for ensuring core fishing harbours are kept open and in good repair. Of the 1170 small craft harbours owned by DFO, approximately 750 are considered to be core harbours – those which are considered critical to the fishing and aquaculture industries are managed by Harbour Authorities. Ladner Small Craft Harbour, managed by the Ladner Harbour Authority is one of these core harbours. The Ladner Small Craft Harbour is accessible via a local navigation channel of the Fraser River and is located in the municipality of Delta. This vital economic, cultural and community harbour is often only accessible at high tides. It is not uncommon to see vessels stranded and run aground in the centre of the local channel trying to navigate to the larger channels. Boats, docks and other structures in this harbour are regularly seen sitting askew as the tide drains to leave them sitting on the river bed. It is essential that this important channel remain open and accessible.

ECONOMIC IMPORTANCE OF LOCAL NAVIGATION CHANNELS:
Industries and urban areas along the Fraser River account for 80% of the provincial and 10% of the national gross domestic product. In 2003, DFO commissioned a study to assess the economic impacts of the SCH network of fishing harbours in British Columbia. According to this study, in 2001-2002, the province's 101 fishing harbours generated upwards of $800 million in economic activity (including commercial fishing, marine recreation, and other activities such as aquaculture). This was directly translated into an estimated $485 million in annual gross domestic product, $245 million in annual labour income (wages plus benefits), and 6,135 person-years of annual employment. In addition to fishing harbours, in 2003, the Fraser River Port – one of three ports amalgamated to

create Port Metro Vancouver directly generated 16,100 jobs, and $3.7 billion in local economic output.

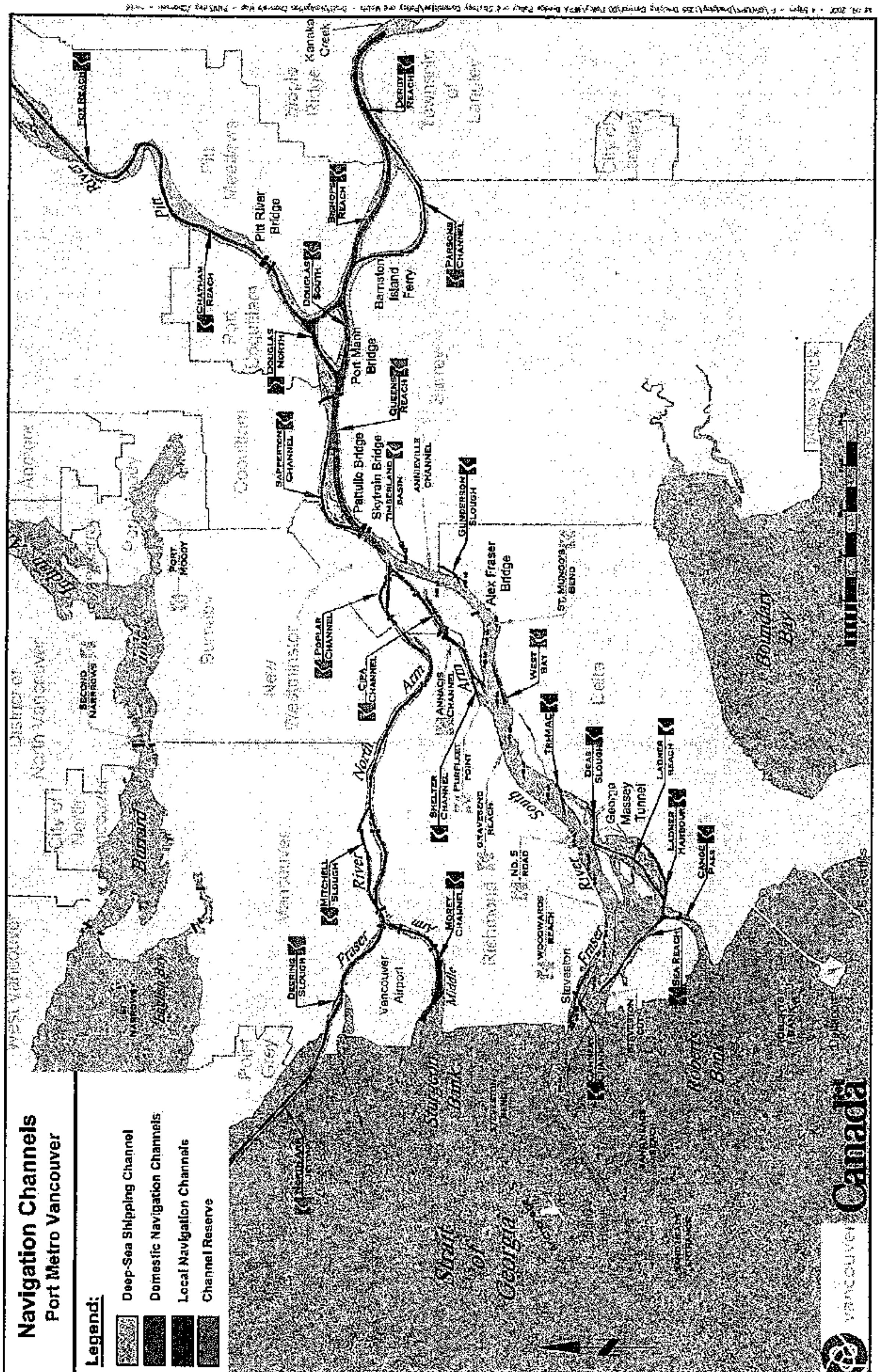
A CASE FOR FUNDING – ST. LAWRENCE RIVER ICE-BREAKING:

The local navigation channels of the St. Lawrence River require ice-breaking to maintain open and safe navigation channels in this important sea way. While dredging is not as major an issue as for the Fraser River, cold winter temperatures create a different kind of obstacle for those using the river and its channels. Unlike the Fraser River's, these local navigation channels continue to receive funding for ice-breaking services in order to keep those channels open and safe for navigation. In fact out of a national annual budget of $6.9million, 80% or $5.5million are designated for the St Lawrence. It is important that the significant economic, social and cultural benefit of the lower Fraser River is recognized similarly to that of the St. Lawrence and that it is receives the same level of federal commitment , to ensure all reaches of the river are accessible throughout the year.

CONCLUSION:

The almost complete cessation of the local navigation channel dredging program in the lower Fraser River has implications for the safety and accessibility of marine traffic, fish boats and float homes. This impacts the economic, social and cultural viability of the Fraser River delta water corridor. It is important that long term funding be provided to Port Metro Vancouver to ensure that local navigation channels along the Fraser River are deep enough for navigation purposes, and for ongoing commercial operation of the river port. We are asking the Select Standing Committee on Finance and Government Services to allocate funding for local navigation channel dredging in the lower Fraser River. This program would involve a onetime expenditure of $5 million dollars to bring the channels back to a similar condition of 15 years ago and an ongoing annual maintenance dredging allotment of $500,000.

Attachment:
Map of Lower Fraser River



Navigation Channels
Port Metro Vancouver
Legend:
Deep-Sea Shipping Channel
Domestic Navigation Channels
Local Navigation Channels
Channel Reserve
Pitt River Bridge
Barnston Island Ferry
Port Mann Bridge
Pattullo Bridge
Skytrain Bridge
Alex Fraser Bridge
George Massey Tunnel
Vancouver Airport
Steveston
Strait of Georgia
Boundary Bay
Canada