Pattullo Bridge Replacement Project

Strategic Options Analysis

January 2018

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1 INTRODUCTION

The Pattullo Bridge, which spans the Fraser River between the City of Surrey (Surrey) and the City of New Westminster (New Westminster), was built in 1937 and is near the end of its useful life. It is vulnerable to seismic events, high winds, marine collisions and river scour[1], and many bridge components have surpassed their useful lives. The bridge does not meet current roadway design guidelines, including lane widths and road curvatures.

The Pattullo Bridge corridor is a key link in the Metro Vancouver transportation network, connecting provincial and regional routes with municipalities north and south of the Fraser River. The corridor also supports Metro Vancouver's role as one of Canada's Asia Pacific Gateways by linking key regional activity centres with Gateway activity centres. In combination with Highway 17, the bridge provides important goods movement and trade linkages on both sides of the Fraser River.

Strategically located between the Port Mann and Alex Fraser/Queensborough provincial highway network crossings of the Fraser River, the Pattullo Bridge provides a direct connection between the cities of New Westminster and Surrey. The Pattullo Bridge corridor connects King George Boulevard, Scott Road and Highway 17 in Surrey with McBride Boulevard, Columbia Street, Royal Avenue and Highway 1 in New Westminster.

The Pattullo Bridge Replacement Project (the Project) will replace this aging asset with a new bridge that meets current seismic and road design standards, providing a safe and reliable crossing for vehicles, pedestrians and cyclists and improved network connections. The Project also includes network connections in Surrey and New Westminster as well as the removal of the existing bridge.

1.1 PURPOSE AND APPROACH

This Strategic Options Analysis (SOA) summarizes the analysis undertaken to identify a preferred option to replace the Pattullo Bridge. The SOA provides an overview of studies carried out between 2013 and 2017 and includes a review of the potential replacement options, the decision criteria applied to evaluate the options as project planning evolved, and the preferred option carried forward for analysis in the business case.

The SOA was carried out in a manner consistent with provincial capital planning policy and requirements, including British Columbia's Capital Asset Management Framework (CAMF) and the Ministry of Transportation and Infrastructure (the Ministry) guidelines for transportation infrastructure planning. Accordingly, options have been identified and evaluated so as to ensure that public interest objectives are appropriately considered and the recommended option is supported by quantitative and qualitative analysis.

[1] River scour occurs as water flow changes the riverbed and removes sediment and rocks from around the bridge piers.

1.2 MULTIPLE ACCOUNT EVALUATION

The Ministry's guidelines for business cases recommend that multiple account evaluation (MAE) be used to evaluate service delivery options for transportation projects. Guidance regarding the development and application of an MAE framework and evaluation process are provided in both Appendix 4 of the Ministry's business case guidance document and in the Ministry's guidance for benefit cost analysis.

An MAE process provides for the evaluation of both quantitative and qualitative factors across options in terms of five different accounts: customer service, financial, economic development, environmental and social and community. Each account is represented by one or more metrics which represent the important implications of each option and demonstrate the trade-offs involved in selecting one option in relation to the others. The MAE analysis considers the costs, benefits and other impacts of each option in relation to a Base Case, which is the most likely solution in the event none of the alternative strategic options moves forward.

This SOA presents the MAE analysis undertaken for the Project.

2 CONTEXT

2.1 HISTORIC ANALYSIS

2.1.1 Strategic Review Process

More than 25 alternatives to rehabilitate or replace the existing Pattullo Bridge have been explored over a number of years through technical study and stakeholder discussions. A Pattullo Bridge Strategic Review Process, led by TransLink, was conducted from 2012-14 to examine and assess these options through broad consultation and technical review. The Strategic Review Process was co-sponsored by TransLink, the City of New Westminster and the City of Surrey with participation from the Ministry and Metro Vancouver. A set of nine objectives were established and the public and stakeholders provided input through an extensive public consultation process. The options were evaluated in terms of how well each addressed the identified objectives.

The alternatives included rehabilitation of the existing bridge and replacement (with either a new bridge or tunnel) along three alignments (existing location; Surrey-Coquitlam; and Tree Island (Richmond-Burnaby)), with various lane configurations. These alternative alignments are shown in Figure 1 below.

Figure 1 - Alternative Alignments Considered for Pattullo Bridge Replacement

The following options were examined at the existing alignment:

- Remove and do not replace the existing bridge;
- Remove the existing bridge and replace it with a pedestrian and cycling bridge;
- Rehabilitate the existing structure to create a two-lane, three-lane or four-lane bridge;
- Replace the existing bridge with a new four-lane, five-lane, six-lane or eight-lane bridge; or

- Replace the existing bridge with a four-lane tunnel.

Based on technical analysis and public and stakeholder consultation, the Strategic Review partners narrowed the list of options to six, all of which involved a multi-modal transportation connection. The removal of the bridge without a replacement link was not deemed acceptable, and options involving a tunnel were rejected on the grounds of capital cost. The alternative crossing locations did not adequately support local and regional land use plans because they did not provide a direct multi-modal connection between Surrey and New Westminster town centres so were not considered further.

The six shortlisted options were: (1) a three-lane rehabilitated bridge at the current location; (2) a four-lane rehabilitated bridge at the current location; (3) a four-lane replacement bridge at the current location; (4) a five-lane replacement bridge at the current location; or (5) a six-lane replacement bridge at the current location; and (6) a new four-lane bridge between Surrey and Coquitlam combined with a rehabilitated three-lane Pattullo Bridge.

These options were evaluated against identified project objectives, based on technical and financial considerations. The evaluation is summarized in Appendix A.

Two viable options were identified: a new four-lane bridge and a new six-lane bridge, both at the existing crossing location. The four-lane option scored better than the six-lane option in terms of a cost-effective solution, supporting the regional goal of moving people out of cars, and reducing emissions, whereas the six-lane option scored better in terms of transportation reliability and supporting economic development.

2.1.2 Mayors' Council Vision 2014

In early 2014, the Metro Vancouver Mayors' Council on Regional Transportation (the Mayors' Council) established a Subcommittee on Transportation Investment to define its vision, establish spending priorities and recommend new funding mechanisms capable of supporting those priorities.

The work of the Subcommittee considered established regional and community plans, including Metro Vancouver's Regional Growth Strategy and TransLink's Regional Transportation Strategy, and in the case of the Pattullo Bridge replacement, considered the results of the Pattullo Bridge Strategic Review process.

The Mayors' Council recognized the differing goals of the cities of Surrey and New Westminster with respect to the Project. Surrey's priority was to reduce congestion in their local road network and increase the efficiency of movement over the bridge; New Westminster's priority was to retain the urban context of their community and encourage the use of other modes of transportation, such as transit, cycling and walking. With the concurrence of the mayors from both communities, the Mayors' Council agreed that the preferred Pattullo Bridge replacement should be a new four-lane bridge, designed in a manner to not preclude a potential future expansion to six lanes.

2.1.3 Network Improvements

The Ministry initiated a technical due diligence review in March 2017. The review focused on possible network improvements on the north and south sides of the river required to support the new four-lane Pattullo Bridge on opening day.

As a result of this review the Ministry, in consultation with TransLink, identified a number of options for connections that are described and analyzed in this SOA. Each of these options is summarized Section 3.3.

3 CURRENT SITUATION, PROJECT GOALS AND OBJECTIVES, AND STRATEGIC OPTIONS

3.1 PROJECT GOALS AND OBJECTIVES

There are three overarching goals for the Project:

- **Provide a structurally sound bridge crossing** to maintain a critical local and regional connection;
- **Improve safety for all users** with modern lane widths, road curvature, centre median and separated pedestrian and cyclist facilities; and
- **Improve connectivity, reliability and modal choice** while supporting environmental objectives.

These goals reflect various objectives established as part of the Strategic Review and related public consultation feedback.

The following Project objectives have evolved since the Strategic Review:

- Provide a river crossing for all modes that is structurally sound, and meets current standards for withstanding seismic and ship impacts;
- Support local and regional land use plans and economic development;
- Provide reliable access and predictable travel times for all modes;
- Minimize single-occupancy vehicle use and vehicle kilometers travelled;
- Move toward the regional goal that, by 2040, half of all trips will be by walking, cycling or transit;
- Minimize emissions of greenhouse gases and pollutants;
- Minimize impacts to the natural environment; and
- Support neighbourhood livability by minimizing and mitigating impacts, including during construction.

The Project goals and objectives informed the development of criteria for evaluating strategic options for the Project in this SOA. These criteria are outlined in detail in Section 4. Table 1 below shows how the evaluation criteria are linked to the Project goals and objectives.

Table 1: Project Goals, Objectives and Evaluation Criteria

Goals	Project Objectives	Evaluation Criteria
Provide a structurally sound bridge crossing to maintain a critical local and regional connection.	Provide a river crossing for all modes that is structurally sound and meets current standards for withstanding seismic and ship impacts.	Travel Time Savings Vehicle Operating Savings Travel Time Reliability Collision Cost Savings Improved Seismic Resiliency

Goals	Project Objectives	Evaluation Criteria
	Support local and regional land use plans and economic development.	Regional Network Connectivity (completeness of connectivity between major activity centres and corridors, all vehicles, trucks) Improved Local Access (access to and from the local road network) Future Development Potential (commercial and residential; industrial with good access and proximity to regional routes) Goods Movement Impact
Improve safety for all users with modern lane widths, road curvature, centre median and separated pedestrian and cyclist facilities.	Provide reliable access and predictable travel times for all modes.	Reliable Access (redundancy in connections; minimize bridge closures)
	Minimize single-occupancy vehicle use and vehicle kilometers travelled.	Community connectivity of transit, pedestrians and cyclists
Improve connectivity, reliability and modal choice while supporting environmental objectives.	Move toward the regional goal that by 2040, half of all trips will be by walking, cycling or transit.	Vehicle Kilometers Travelled
	Minimize emissions of greenhouse gases and pollutants.	Regional GHG Emissions
	Minimize impacts to the natural environment.	On-Land Environmental Effects (at-risk wildlife and habitat; native vegetation) On-land Environmental Effects (archaeological and heritage resources) In-River Environmental Effects (Fraser River hydrology and morphology; fish and fish habitat)
	Support neighbourhood livability by minimizing and mitigating impacts, including during construction.	Alignment with Regional Plan Alignment with Community Plans Residences impacted Business impacted Residence takings (partial/full) Business takings (partial/full)

3.2 CURRENT SITUATION

3.2.1 Current Operating Conditions

The existing bridge has a number of challenges and does not meet current design guidelines. It is located within the highly urbanized New Westminster and Surrey communities, and connects the arterial roads between the two cities (King George Boulevard and McBride Boulevard). During rush hours, the movement of people, goods and services is constrained by congestion and unreliable travel times. The level of traffic congestion and queueing on municipal roads causes increased traffic infiltration onto local and residential roads, affecting the livability of adjacent neighbourhoods.

The current sub-standard lane widths and curvature cause large trucks to straddle lanes, effectively reducing bridge capacity and resulting in longer queues on the bridge approaches and unreliable travel times. During the AM peak period in Surrey, queues back up along King George Boulevard past 132nd Street and also along Bridgeview Drive to the Highway 17 intersection.

Before tolls were removed, the Pattullo Bridge corridor carried approximately 77,000 vehicles per average day, of which 7% were trucks. Data collected over the month of September 2017 indicates that there may be about a 12% reduction in average daily traffic on the bridge as a result of removing the tolls on the Port Mann Bridge and the Golden Ears Bridge. Average peak hour traffic volumes on the existing bridge in September 2017 are shown in Table 2 below. The capacity of the bridge, which is the maximum throughput of traffic able to cross the bridge in each direction, is approximately 3100 to 3200 vehicles per hour (vph) during the peak period. While the peak period typically has a duration of approximately three hours in each of the AM and PM rush hours, the peak hour is generally the busiest hour within that period. As indicated in Table 1, actual traffic throughput can be less than bridge capacity during the peak hour due to increased congestion.

The number of vehicles wanting to cross the bridge (the demand) is estimated at 3,800 today, exceeding the peak period capacity by about 600 to 700 vehicles, thus resulting in traffic queueing on the various approaches to the bridge. A modern four-lane bridge with standard lane widths and design should have a capacity in the range 3500 to 3600 vph per direction.

Table 2: Average Peak Hour Throughputs

September 2017 Average	Northbound (vph)	Southbound (vph)	Total (vph)
AM Peak	2881	1883	4764
PM Peak	2363	2843	5206

To mitigate the impacts of the existing narrow lanes, the centre lanes are now closed in evenings when vehicle collisions are the highest. In New Westminster, the on-ramp from westbound Columbia to the bridge is closed during the PM peak period due to sub-standard merge conditions onto the bridge. The daily closure of this ramp causes additional traffic to infiltrate residential neighbourhoods.

In addition to concerns with the bridge structure, the narrow cross section of the bridge deck also introduces a poor transition between the bridge approaches where the travel lanes are wider. The existing on- and off-ramps on the New Westminster side also appear to be tight for the prevailing speed, causing significant speed differentials between vehicles, making this portion of the bridge more collision-prone.

3.3 STRATEGIC PROJECT DELIVERY OPTIONS

3.3.1 Base Case – Three-lane rehabilitated bridge

In accordance with MAE guidelines, an SOA should include a Base Case scenario against which each alternative option can be compared. In the absence of a new bridge, the existing structure would need to be rehabilitated for three lanes of traffic to extend its useful life. Given technical and safety considerations, including lane widths and pier foundation constraints, it would not be possible to rehabilitate the existing bridge for a four-lane configuration. The Base Case option is unlikely to be a long term solution and has not been subject to detailed technical analysis

The Base Case option involves the structural seismic retrofit and rehabilitation of the existing bridge while reducing the existing four-lane configuration (at sub-standard lane widths) to three lanes with modern lane-widths. The centre lane is intended to be a counter-flow lane that changes direction depending on the flow of peak period traffic. At a high level, the retrofit program is expected to include strengthening of structural elements such as piers and the superstructure, improvements at bridge foundations, additional scour protection and marine vessel impact protection, and a full deck rehabilitation.

3.3.2 Network Options

Four network connection options in conjunction with a new four-lane bridge have been analyzed, all of which include improved pedestrian and cycling facilities and connections across the new bridge, with the new bridge designed to modern standards able to withstand a 1 in 2475 year seismic event. Scope maps representing work proposed in relation to the Base Case and the four strategic options are provided in Appendix B.

Option 1 – Minimum network improvements

This option replaces the existing bridge with a new four-lane bridge with only minor changes to effectively connect to adjacent road networks at both sides of the crossing.

In New Westminster: a new off-ramp to eastbound E. Columbia Street will be provided along with other geometric and roadway realignments to connect to the new bridge. The existing westbound E. Columbia Street loop on-ramp configuration will be retained.

In Surrey: the bridge will connect to King George Boulevard similar to the existing configuration, with minor intersection improvements at the Bridgeview/King George Boulevard intersection to improve traffic operations. Minimal bike and pedestrian improvements are envisioned beyond those on the new bridge.

Option 2 – Moderate (A) network scope with emphasis on New Westminster and Surrey roads

This option provides greater connectivity between the new bridge and adjacent road and multi-modal networks.

In New Westminster: in addition to the scope within Option 1, improved pedestrian facilities along Royal Avenue and an additional grade separated multi-use path connecting Victoria Hill to downtown will be provided. The existing westbound E. Columbia Street on-ramp will also be replaced with an improved on-ramp to the bridge for improved geometry.

In Surrey: In addition to improved traffic-separated bike and pedestrian connections, a new partial interchange will be constructed to provide free flow traffic movements between Scott Road, King George Boulevard, and the new bridge. No direct connections to/from Highway 17 are provided. Similar to Option 1, minor intersection improvements will be made to the Bridgeview/King George Blvd intersection to improve traffic operations.

Option 3 – Moderate (B) network scope with emphasis on New Westminster roads and Highway 17 connections

This option is the same as Option 2 on the New Westminster side of the crossing, but provides a different focus for connectivity on the Surrey side.

In Surrey: in addition to the scope within Option 1 (minimum scope), a direct southbound ramp from the bridge is provided to connect to westbound Highway 17. The existing at-grade signalized intersection at Highway 17 and Old Yale Road will also be grade-separated, in addition to improvements to Bridge Road.

Option 4 – Full network scope encompassing New Westminster and Surrey roads and Highway 17 connections

This option encompasses the most extensive scope of network connectivity works.

In New Westminster: the scope is the same as Options 2 and 3.

In Surrey: In addition to improved traffic separated bike and pedestrian connections, a new interchange will be constructed to provide free flow traffic movements between Scott Road, King George Boulevard, the new Bridge, and to the new Scott Road Extension. Full movement connections to Highway 17 will be provided via the new Scott Road Extension, and the direct southbound ramp from the bridge to connect to westbound Highway 17. The existing at-grade signalized intersection at Highway 17 and Old Yale Road will also be grade separated, in addition to improvements to Bridge Road. Collectively, these works are intended to more efficiently manage traffic flow in both communities.

3.4 STRATEGIC OPTIONS – CAPITAL COSTS AND OPERATIONAL CONSIDERATIONS

3.4.1 Strategic Option Key Metrics

- The capital cost and operational performance of each of the options is described in this section and provides background to the Multiple Account Evaluation (MAE) presented in Section 4. Capital cost: capital cost of each option in nominal dollars (excluding risk adjustments and Interest During Construction)
- Traffic demand on Opening Day (2023) and long term planning horizon (2045), shown in AM and PM peak hour demand on the bridge (vehicles per hour) and Average Annual Daily Traffic (AADT, vehicles per day)
- Vehicle Hours Travelled (VHT) – this metric represents the summation of the travel time for all vehicles using the modelled road network over the simulation period. A lower travel time represents a more efficient road network, since a similar traffic demand will be applied to all evaluated options.
- Bridge Throughput – this metric reports the amount of traffic crossing the new Pattullo Bridge. Ideally, traffic volumes should be in the range of 3500 to 3600 vph. Throughput below this range would suggest some operational issues exist that are reducing the capacity of the bridge.
- Vehicle Kilometres Travelled (VKT) – this metric represents the summation of the distance travelled for all vehicles using the modelled road network over the simulation period. Since a similar demand will be applied to all evaluated options, a lower VKT may indicate the availability of more direct connections, or less rerouting occurs in the option.
- Route Travel Time – this metric provides the average travel time for individual routes (point to point within the traffic operations model) using the Pattullo Bridge – during the peak hour of the simulation period. For an aggregate analysis, the weighted average travel times per vehicle per direction are shown as an indication of average travel time across the network.
- Queue Length Estimation – direct outputs from the traffic operations model are provided to illustrate the extent of queuing within the modelled road network.

Traffic forecast and key performance metrics are shown in Tables 3 and 4 below.

Table 3: Strategic Options – Summary of Traffic Demand (2023 and 2045)

	Option 1 (Minimum)	Option 2 (Moderate A)	Option 3 (Moderate B)	Option 4 (Full Scope)
AADT (veh/day)				
2023	77,000	76,000	78,000	80,000
2045	83,000	81,000	85,000	87,000

Table 4: Strategic Options Key Metrics (2023 AM Peak Northbound)

	Option 1 (Minimum)	Option 2 (Moderate A)	Option 3 (Moderate B)	Option 4 (Full Scope)
Capital Cost (nominal)				
Peak Hr Demand (veh/hr) (Actual Throughput)	4200 (3400)	4200 (3500)	4200 (3450)	4200 (3450)
Vehicle Hours Travelled (VHT)	4,700	4,400	4,600	4,500
Vehicle Kilometres Travelled (VKT)	139,000	138,000	137,000	138,000
NB Weighted Travel Time (min)	22.0	20.7	21.2	21.9
SB Weighted Travel Time (min)	8.1	8.5	8.1	8.2

Traffic demand is most concentrated during peak hours. When demand exceeds available capacity, queueing occurs as traffic waits to cross the bridge. The flow of peak traffic during the AM peak is north into New Westminster. Therefore, queueing occurs on Surrey roads during this time. Traffic modeling shows queueing during the AM peak on opening day for all four options. Option 4, which includes a Scott Road extension with new access to Highway 17, is expected to result in unacceptable queueing onto Highway 17 during the AM peak. Further study is required to better understand traffic patterns in Surrey following the removal of point tolls from Fraser River crossings.

4 MULTIPLE ACCOUNT EVALUATION

4.1 EVALUATION ACCOUNTS

Multiple account evaluation (MAE) is a multi-criteria decision support tool intended to provide a balanced view of options to decision makers, which highlights relative advantages, disadvantages and trade-offs.

This analysis utilizes the five accounts used to evaluate transportation projects. Each is described below, including the qualitative and quantitative measures chosen to best reflect the goals and objectives of this Project (see Table 2). Where possible, quantitative measures are used; however, many of the accounts include important effects of the strategic options that can only be captured qualitatively.

Customer Service

This account includes both quantitative and qualitative measures of the benefits to road users of each option. The quantitative measures include estimates of the incremental economic values associated with:

- Regional travel time savings (NPV ($M)) ;
- Traffic Impacts During Construction (NPV ($M));
- Collision cost savings (NPV ($M));
- Vehicle operating savings (NPV ($M));
- Travel time reliability- standard deviation of travel time (NPV ($M)); and
- Improved seismic resiliency (bridge) (NPV ($M)).

Qualitative benefits are assessed relative to the Base Case in terms of each option's:

- Flexibility to add capacity (widen from four to six lanes) in the future;
- Regional network connectivity;
- Improved local road network access; and
- Reliable access to and from the bridge.

Financial

This account measures the net present value cost of each option and encompasses capital, operating, maintenance, and rehabilitation of all capital works.

The ratio of quantified benefits to project costs, on a net present value, incremental basis, provides the benefit-cost ratio (BCR) for each option.

Economic Development

Given the importance of this crossing for moving goods and people not only within the region but through to key gateway connections, including Vancouver port terminals, the airport and international road and rail connections, the nature and scope of network connectivity is expected to have important economic development implications, although these cannot all be predicted using quantitative methods. Measures identified as most relevant to the MAE analysis include the extent to which the option facilitates:

- Development potential of commercial, industrial and residential land with proximity to regional routes (assessed qualitatively); and
- Goods movement benefits (NPV ($M)).

Environment

This account assesses the relative nature, degree and mitigation of environmental impacts associated with each option. Quantitative measures include:

- Greenhouse gas emissions (GHG) (tonnes); and
- Regional vehicle kilometers travelled (VKT) savings (km).

Qualitative measures include potential:

- On-land environmental effects for at-risk wildlife, habitat and native vegetation;
- On-land environmental effects for archaeological and heritage resources;
- In-river environmental effects for hydrology and morphology and fish and fish habitat; and
- Noise and vibration near residential areas.

Social/Community

This account captures the potential external effects of each option on the communities impacted, including their values, goals and specific group needs. For this project, those effects are understood in terms of a number of quantitative and qualitative measures. Quantitative measures include:

- Number of residences and businesses whose access is impacted (#); and
- Number of residential and business property takings required, both partial and full (#).

Qualitative measures include:

- Alignment with both regional and community plans; and
- Community connectivity and modal integration for transit, pedestrians and cyclists.

4.2 MAE RESULTS

The MAE analysis results are detailed in Appendix C and summarized in this section. It is important to note that the MAE compares the options to the Base Case (a rehabilitated three-lane bridge), not the current condition.

4.2.1 Customer Service

Option 3 (Moderate B) provides the highest value of quantified benefits to road users, while Option 4 (Full Scope) is most advantageous in terms of qualitative criteria, given the extent of improvements to connections in Surrey. However, Option 4 attracts more demand to the bridge, and thus has less Travel Time Reliability Savings as compared to the other new-bridge options.

This comparison does not consider impacts on network demand resulting from changing traffic patterns following the removal of point tolls on Fraser River crossings. Further traffic analysis is required to better understand these impacts. Preliminary traffic analysis indicates the Scott Road extension, included in Option 4, will result in unacceptable queuing onto Highway 17 during the AM peak. Under

existing traffic modeling assumptions, a comparison of options among individual criteria includes the following:

- **Collision Cost Savings**: All the new bridge options are expected to result in fewer collisions than the Base Case due to wider bridge lanes and improved road geometry, which in turn results in cost savings for travelers. The increased traffic volumes result in lower collision cost savings across all four options.

- **Regional Travel Time Savings**: All new bridge options are expected to result in significant travel time savings relative to the Base Case. Option 4 and Option 3 offer the highest travel time savings because improved connections, particularly the direct off-ramp to Highway 17 westbound, attract more demand to the bridge, including longer distance trips that would save time over other alternative routes.

- The **traffic disruption during construction** criteria is intended to measure the economic and social impacts on travel time during the construction period as incremental to the Base Case. The Base Case is anticipated to have significant impacts on traffic during construction due to frequent lane closures and full bridge closures. To estimate the increased travel time and vehicle operating costs during the 3-lane Rehab project, it is assumed that the existing bridge will operate as a two-lane bridge (one lane closed per direction) for a two year period. Using similar assumptions as the Pattullo Bridge Rehab Project in 2016, the traffic disruption dis-benefit is estimated at $64 million in NPV for the Base Case. For the other scope options for the new bridge, it is assumed that the traffic disruption impacts will be zero since the project will impose a contractual requirement such that the contractor will need to maintain current traffic operations throughout the construction period and that any special traffic management activity would be of a short duration with minimal overall impacts to traffic operations. Since all options are shown as incremental benefits or costs to the Base Case, the value is demonstrated as a positive amount of $64M.

- **Vehicle Operating Savings**: Vehicle operating costs savings result from traveling shorter distances and less idling while in congested traffic. All new bridge options have vehicle operating savings over the Base Case. Option 3 offers the most savings, due to some longer distance trips diverting from alternative routes to Pattullo Bridge to benefit from improved connections, particularly the direct off-ramp to Highway 17 westbound.

- **Travel Time Reliability**: Assesses the user benefits resulting from the reduced variability in travel time due to the replacement bridge and enhanced connections. Travel demand in the peak hours has the largest influence on travel time reliability, since the higher the demand, the more potential variance in how long it will take to travel from point A to point B. All new bridge options have travel time reliability improvements over the Base Case, and they all perform similarly with minor differences due to level of demand in the peak hours. Option 4 (with the full municipal connections) results in higher traffic demand in the peak AM and PM periods, so the potential variability in the travel time is greater, thus a lower travel time reliability savings amount. Option 1 (Minimum) has lower demands during peak hours, so the potential travel time variability is lower, thus a higher travel time reliability savings amount.

- **Flexibility to add capacity (six-lanes only) in the future**: Not precluding the ability to add capacity to the four-lane bridge in the future was an important element of the Mayors' Council's decision

on the replacement bridge. The Base Case scenario does not easily allow for future expansion (unless an additional bridge and road connections are built). All new bridge options will include a four-lane bridge designed in a manner to not preclude a potential future expansion to six lanes. This is done by building the superstructure to allow future bridge deck and multi-use pathway modifications/improvements to accommodate six lanes of traffic. Option 4 includes the most extensive road connections to accommodate a six lane bridge in the future, thus reducing expected future investment and disruption. Each of Option 1, Option 2 (Moderate A) and Option 3 require that property needs for expansion be secured at a later date. Further approvals and technical work will be required to determine the broader road network improvements needed to support any potential future expansion of the bridge.

- **Regional Network Connectivity**: Assesses how well each option improves the regional transportation network by connecting key roads (arterial routes to arterial and/or provincial routes, for example) and improving the completeness of connectivity between major activity centres and corridors. The Base Case, Option 1 and Option 2 do not provide any new arterial road connections. Option 4 scores the best since it follows the hierarchy of roads by connecting the bridge (an arterial route) to both directions of Highway 17 (a provincial route) and completes the Scott Road connection to Highway 17 through the Scott Road Extension. Option 3 provides a new connection between the bridge southbound to Highway 17 westbound.

- **Improved Local Connectivity**: Assesses new and/or improved local road connections provided by each option. The Base Case, Option 1 and Option 2 do not provide any new local connections. Option 4 scores the best because it provides new local road connections in the Bridgeview industrial area, provides a new Bridge Rd connection, and grade separates Old Yale Rd from Highway 17. Option 3 provides the new Bridge Rd connection and grade separation of Old Yale Road.

- **Reliable Access:** Assesses the improvement in the reliability of access to and from the bridge through the provision of additional routes. The Base Case, Option 1 and Option 2 do not provide any new connections that could ensure reliable access to and from the bridge. Option 4 scores best because it provides additional connections from Highway 17 to the bridge through Scott Road Extension and the direct westbound off-ramp from the bridge. Option 3 is better than the Base Case because it provides a second connection from the bridge to westbound Highway 17 through the direct off-ramp (first connection is via Scott Road to Tannery Road), which provides redundancy if there are traffic incidents on Scott Road or Tannery Road.

- **Improved Seismic Resiliency (bridge):** The improved seismic resiliency criterion reflects the safety and societal benefits provided by a replacement bridge through its ability to better survive a major seismic event as compared to the Base Case. All new bridge options score the same and are better than the Base Case because of the provision of a new bridge that meets modern seismic guidelines which meets a 1 in 2475 year seismic event.

4.2.2 Financial

The benefit/cost analysis of the four options is summarized in Table 5 below. The project benefits and costs are shown as incremental values in net present value (NPV) compared to the Base Case (3-Lane Rehabilitated Bridge).

Table 5: Financial Account Summary (Four-Lane Bridge)

Financial Account	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Scope
Benefits (NPV, $M)				
Collision Cost Savings	44	48	42	45
Travel Time Savings	52	58	87	91
Traffic Disruption During Construction	64	64	64	64
Vehicle Operating Savings	25	27	34	30
Travel Time Reliability	50	41	32	8
Improved Seismic Resiliency	188	188	188	188
Goods Movement Benefits	76	76	76	76
Total Benefits (NPV,$M)	**499**	**502**	**523**	**502**
Costs (NPV, $M)				
Capital Cost	[redacted]			
Maintenance/Rehab				
Salvage				
Base Case				
Total Costs (NPV,$M)	**206**	**292**	**260**	**385**
Benefit/Cost Ratio	**2.42**	**1.72**	**2.01**	**1.30**
NPV (B-C, $M)	**293**	**210**	**263**	**117**

A comparison of options among individual criteria includes the following:

- **Capital Cost Estimate (less salvage):** The capital cost estimates for the four new bridge scope options are presented in Table 5 (in present value 2017 dollars). Option 4 has the highest capital cost of all options because it has the most scope in municipal road connections. Options 2 and 3 are similar in terms of capital cost. Option 4 also has the highest salvage value at the end of the analysis period due to the additional new infrastructure compared to the other three options.
- **Maintenance/Rehab Costs:** All new bridge options will have higher operations, maintenance and rehab (OMR) costs than the Base Case. Option 4 includes the most lane kilometers of new roads and new structures. Therefore, the OMR costs are slightly higher than the other options.

4.2.3 Economic Development

Option 4 performs the best under the Economic Development Account, particularly with respect to land development potential.

A comparison of options among individual criteria includes the following:

- **Development Potential:** Assesses the change in the potential for future commercial and residential development in the project area. The Base Case and Option 1 do not provide any change in potential development in the project area. Option 4 and Option 2 reduce the footprint of the Scott Road and King George Boulevard intersection, which could allow for transit oriented development around Scott Road station. Option 4 provides improved internal access in the Bridgeview industrial area with new local roads, and provides better access to Highway 17 and Scott Road, which could allow for higher value use in the Bridgeview industrial area. Option 4 and Option 3 include potential development benefits for the South Westminster industrial neighbourhood (in Surrey) through the provision of the off-ramp from the bridge to westbound Highway 17 and the new Bridge Road connection. Overall, Option 4 scores the best in this criterion.

- **Goods movement impact:** Assesses the economic impact of changes in truck travel times, particularly the operating costs of logistics and shipping companies. Reductions in operating costs driven by reductions in congestion delays helps facilitate and/or expand economic activity due to increased competitiveness and market access. All options have the same estimated benefits to goods movement of $76 million.

4.2.4 Environment

Given the urban and industrial context for the existing bridge and proposed options, minimal incremental environmental impacts are anticipated across all options. For the most part, these impacts are expected to be mitigated through commitments set out in the Environmental Assessment Certificate. In addition, while all new bridge options require in-water works, retaining the existing structure in the Base Case would also require in-water works to strengthen structural elements.

A comparison of options among individual criteria includes the following:

- **Regional GHG Emissions Reduction:** Greenhouse Gas (GHG) emissions are estimated using regional VKT statistics and congestion in the regional network. Options with significant reductions in VKT could potentially see a reduction in GHG emissions as well. However, options with higher demand may experience more emissions due to an increase in congestion. All options attract more traffic to the bridge than the three-lane Base Case. All options result in higher GHG emissions due to the higher VKT and congestion in all approaches. However, the incremental difference between the options and the Base Case is insignificant.

- **Regional Annual VKT Savings:** Regional vehicle kilometres travelled (VKT) is estimated using the EMME regional transportation model. VKTs will increase across all options compared to the Base Case, due to the higher traffic volumes expected on the bridge approaches and connecting roads.

- **On-Land Environmental Effects (at-risk wildlife and habitat; native vegetation):** Assesses the potential effects of the options on land-based at-risk wildlife and habitat, as well as native vegetation. Given the urban and industrial context and considering commitments to mitigate, minimal environmental impacts are anticipated across all options.

- **On-land Environmental Effects (archaeological and heritage resources):** Assesses the potential effects of the options on land-based archaeological and heritage resources. Both bridge head areas on either side of the river have been important geographic locations for settlement for millennia, and the likelihood of uncovering artifacts is high along the river banks. The Base Case is expected to have the least impact because the existing bridge structure will remain where it is, thus not requiring ground disruption. All options that include a new bridge will have the potential to impact archaeological and/or heritage resources. Road works beyond the bridge head have a similar likelihood of uncovering artifacts.

- **In-River Environmental Effects (Fraser River hydrology and morphology; fish and fish habitat):** Assesses the potential effects of the options on Fraser River elements, such as hydrology, river bed morphology, fish and fish habitat. Rehabilitation work associated with the Base Case is anticipated to impact the Fraser River elements through the structural elements such as piers. Construction associated with all new bridge options and removal of the existing bridge has the potential to change Fraser River hydrology, morphology and potentially impact fish and fish habitat. On balance, and considering commitments to mitigate, all options are comparable to the Base Case.

- **Increase in Noise and Vibration close to residential areas:** Assesses the incremental change in noise and vibration close to residential areas as compared to the Base Case. Option 1, Option 2 and Option 3 are not expected to increase noise of vibration close to residential areas, thus they score the same as the Base Case. Option 4 does have the potential to increase noise and vibration due to an increase in commercial traffic using the Scott Road Extension on the north side of Bridgeview residential neighbourhood; therefore, is scores the worst against all options.

4.2.5 Social and Community

Overall, Option 4 scores the best in terms of alignment with regional and community plans and benefits to the community due to the improved road connections and pedestrian and cyclist facilities, but also involves the most property impacts. All options that include a new bridge perform well against the Base Case due to the location of the bridge, size of the bridge and improved pedestrian and cyclist facilities on the bridge. Option 2 and Option 3 support the Mayors' Vision, the Regional Growth Strategy, the Regional Transportation Strategy, Regional Goods Movement Strategy, and the Gateway Program, but do not fully support Surrey's community plans.

A comparison of options among individual criteria includes the following:

- **Alignment with Regional Plans:** Assesses the alignment of the options with regional plans. Guiding regional plans include the: Mayors' Council Vision (Vision), Regional Growth Strategy (RGS), Regional Transportation Strategy (RTS), Regional Goods Movement Strategy (RGMS). The Mayors support the construction of a new four-lane bridge that does not preclude a potential future expansion to six lanes. Therefore, alignment with this direction is a key indicator in this criterion. The Base Case does not align with the Mayors' Vision or the RGMS, but the location supports the RGS and RTS. Option 1, Option 2 and Option 3 all score better than the Base Case, as the new bridge supports the Mayors' Vision, but the road connections only partially support the RGS, RTS, and RGMS. Comparatively, Option 4 performs the best by fully supporting the Mayors'

Vision, RGS, RTS, and RGMS, and connects the bridge to Highway 17, increasing the amount of industrial land with good access and proximity to regional routes.

- **Alignment with Community Plans:** Assesses the alignment of the options with the community plans of New Westminster and Surrey. The Base Case does not support the community plans except in terms of the location of the bridge. Option 1, Option 2 and Option 3 all score slightly better than the Base Case because they support New Westminster's community plans, but they do not fully support Surrey's community plans in terms of improved road, pedestrian and cyclist connections. Option 4 performs the best by fully supporting both communities' plans through the bridge location, size and connection improvements for road users as well as pedestrians and cyclists. Option 4 supports the Surrey Official Community Plan (OCP) land use and density goals for Frequent Transit Corridors and Rapid Transit Station Areas (Scott Rd SkyTrain Station area qualifies as such). Option 4 also supports Surrey's priority to provide safe, convenient and universally-accessible pedestrian and cycle access from adjacent neighbourhoods to bus stops and transit stations. Option 4 also supports New Westminster's OCP, particularly in the balance of respecting heritage assets and ensuring that transportation facilities are properly integrated into the community.

- **Community connectivity of transit, pedestrians and cyclists:** Assesses the change in community connectivity through the provision of improved pedestrian and cyclist connections within the community and to transit. The Base Case provides no improved pedestrian or cyclist facilities or connections. Option 1 and Option 3 provide improved pedestrian and cyclist facilities on the new bridge, but no improvements to connections or facilities in Surrey. Option 2 and Option 4 perform the best with improved grade-separated connections to the BC Parkway, pedestrian access to Scott Road Station, improved grade-separated connection between Bridgeview residential neighbourhood and Scott Road station, and a new connection to the Highway 17 pedestrian overpass.

- **Property Impacts:** Residential and business impacts and takings (purchases) are minimal for Options 1, 2 and 3 (1 partial and 2 full residence takes, and 1 business impact). Property impacts are highest for Option 4, primarily due to the proposed Scott Road Extension between King George Boulevard and Highway 17. Many properties affected by this road extension are currently under a mixed residential/industrial zoning. The City of Surrey has indicated a desire to rezone this area for higher-value industrial usage after the proposed Scott Road Extension construction. Potential property impacts to federal, provincial and municipal lands are excluded in this evaluation.

4.3 MAE SUMMARY

Below is a summary table of the overall results of the MAE. Details of the evaluation under each account are presented in the full MAE table in Appendix C.

Table 6: MAE Summary Results (4-Lane Bridge)

MAE Account	Option 1: Minimum Scope	Option 2: Moderate Scope A	Option 3: Moderate Scope B	Option 4: Full Scope
Customer Service	Somewhat better	Somewhat better	Somewhat better	Significantly better
Financial: Benefit Cost Ratio	2.42	1.72	2.01	1.30
Economic Development	Neutral (same as Base Case)	Somewhat better	Somewhat better	Significantly better
Environment	Neutral (same as Base Case)	Neutral (same as Base Case)	Neutral (same as Base Case)	Somewhat worse
Social and Community	Somewhat better	Somewhat better	Somewhat better	Significantly better

Significantly worse | Somewhat worse | Neutral (same as Base Case) | Somewhat better | Significantly better

Overall, Option 3 offers the highest quantified user benefits, as shown in Table 5, and the highest BCR among the options encompassing network enhancements on both sides of the crossing.

Option 1 has the highest BCR but does not adequately address road network connectivity challenges on either side of the bridge; therefore it offers the lowest quantified user benefits. While Option 4 offers advantages in relation to qualitative measures represented by other MAE accounts, preliminary traffic analysis conducted following the removal of point tolls on Fraser River crossings indicates that proposed connections involving Scott Road and Highway 17 result in unacceptable queuing onto Highway 17 during the AM peak. Further traffic analysis is required to better understand these impacts.

5 SENSITIVITY ANALYSIS

5.1 SENSITIVITY ANALYSIS

The Mayors' Council supports a four-lane bridge which does not preclude a potential future expansion to six lanes. As such, sensitivity analysis was conducted on Option 3 (Moderate B Scope) to review the anticipated operations and impact to the MAE should any potential future expansion of the new bridge to six lanes occur. The BCR for the option was also subjected to sensitivity analysis related to changes in the discount rate, costs and traffic-related benefits.

5.1.1 Future Expansion to Six Lanes

Sensitivity analysis was performed to review the network resiliency for Option 3 (Moderate B) should expansion to six lanes occur on the new bridge. The purpose of this sensitivity analysis was to demonstrate how the road connections will operate through analysis of anticipated queue formations, if a decision is made in the future to expand the bridge.

The high level six-lane analysis was tested with forecasted traffic demands at the 2045 horizon. Queueing analysis was conducted for the Moderate B Option under the 2045 scenario in the Surrey side during the AM peak period. Queues are expected to be longer than today on most connections, as the peak hour traffic demand is expected to greatly exceed the bridge capacity, even at six lanes.

5.1.2 Moderate B Option Sensitivity Analysis

A sensitivity analysis on the Benefit Cost Analysis for the Moderate B Option was conducted using six, eight and ten per cent discount rates, and +/- 25 per cent in capital costs. The table below shows the results of this analysis

Table 7: Moderate B Option Sensitivity Analysis

Financial Account	Discount Rate=6%	Discount Rate=8%	Discount Rate=10%	Costs +25% (Discount Rate = 6%)	Costs -25% (Discount Rate = 6%)	Traffic Related Benefits +25%	Traffic Related Benefits -25%
Collision Cost Savings	42	32	25	42	42	42	42
Travel Time Savings	87	66	51	87	87	109	65
Traffic Disruption During Construction	64	62	61	64	64	64	64
Vehicle Operating Savings	34	25	20	34	34	43	26
Travel Time Reliability	32	25	20	32	32	40	24
Improved Seismic Resiliency	188	139	105	210	166	188	188
Goods Movement Benefits	76	55	41	76	76	76	76
Total Benefits (NPV,$M)	**523**	**404**	**323**	**545**	**501**	**561**	**485**
Capital Cost							
Maintenance/Rehab							
Salvage							
Base Case							
Total Costs (NPV,$M)	**260**	**264**	**255**	**323**	**194**	**221**	**221**
Benefit/Cost Ratio	**2.01**	**1.53**	**1.27**	**1.69**	**2.58**	**2.54**	**2.19**
NPV (B-C, $M)	**263**	**140**	**68**	**222**	**307**	**340**	**264**

With respect to the sensitivity analysis on traffic-related benefits, it should be noted that the future traffic growth was not estimated using an annual growth rate. Instead, the traffic analysis and the estimate of the various traffic related benefits (Travel Time Savings, Vehicle Operating Savings, and Travel Time Reliability) have been based on traffic demand generated from the Regional Transportation Model (RTM). The RTM generates traffic demand based on land use, population and employment forecasts for 2030 and 2045 that have been prepared as part of the official Regional Growth Strategy for Metro Vancouver. The traffic analysis therefore responds to the official land use plan for the region and the Official Community Plans (OCPs) of the various municipalities.

In relation to all sensitivities tested, the benefit cost ratio of Option 3 does not fall below 1.27.

6 RECOMMENDATION

In consideration of the full range of evaluation criteria across all five MAE accounts, on balance given costs, benefits, impacts and trade-offs amongst the four options evaluated, Option 3 (Moderate B Scope), involving key road connections and improvements on either side of the new four-lane bridge, is the recommended option.

APPENDIX A: SUMMARY EVALUATION OF STRATEGIC REVIEW OPTIONS (2013)

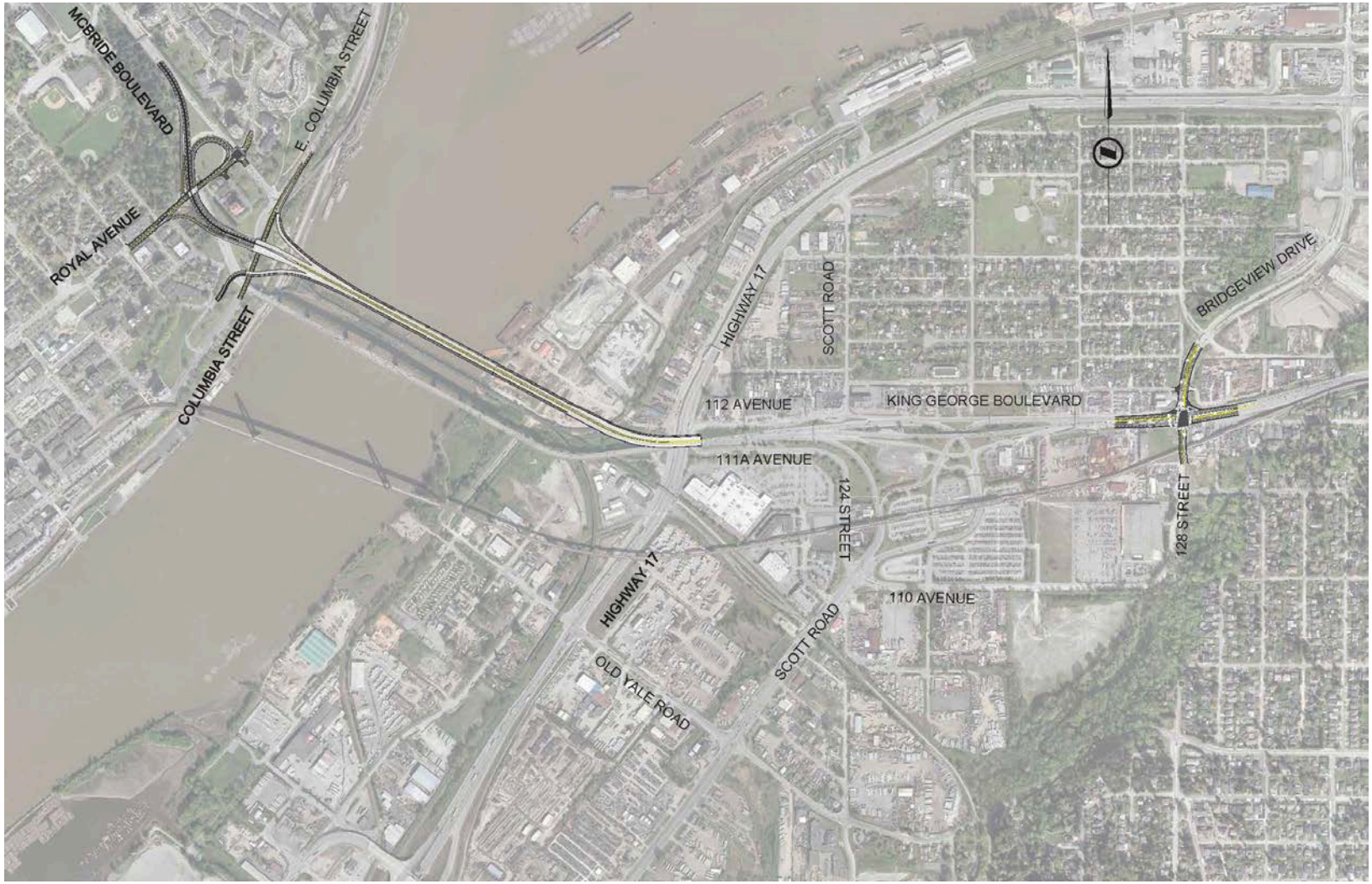
Objectives for Evaluating Alternatives	Rehabilitated 3 Lane Pattullo Bridge	Rehabilitated 4-Lane Pattullo Bridge	New 4-Lane Pattullo Bridge	New 5-Lane Pattullo Bridge	New 6-Lane Pattullo Bridge	New 4-Lane Surrey-Coquitlam Bridge*
Provides a safe crossing for all modes, is structurally sound, and meets current standards for seismic and ship impacts.						
Supports local and regional land use plans.						
Provides reliable access and predictable travel times for all modes and users.						
Minimizes single-occupant vehicle use and vehicle kilometres travelled.						
Moves towards the regional goal that most trips will be by walking, cycling and transit.						
Minimizes emissions of greenhouse gases (GHGs) and pollutants.						
Minimizes impact to the natural environment.						
Is capable of supporting neighbourhood livability by minimizing and mitigating impacts, including during construction.						
Supports economic development.						
Is cost-effective.						

Favourable Somewhat Favourable Neutral Somewhat Unfavourable Unfavourable

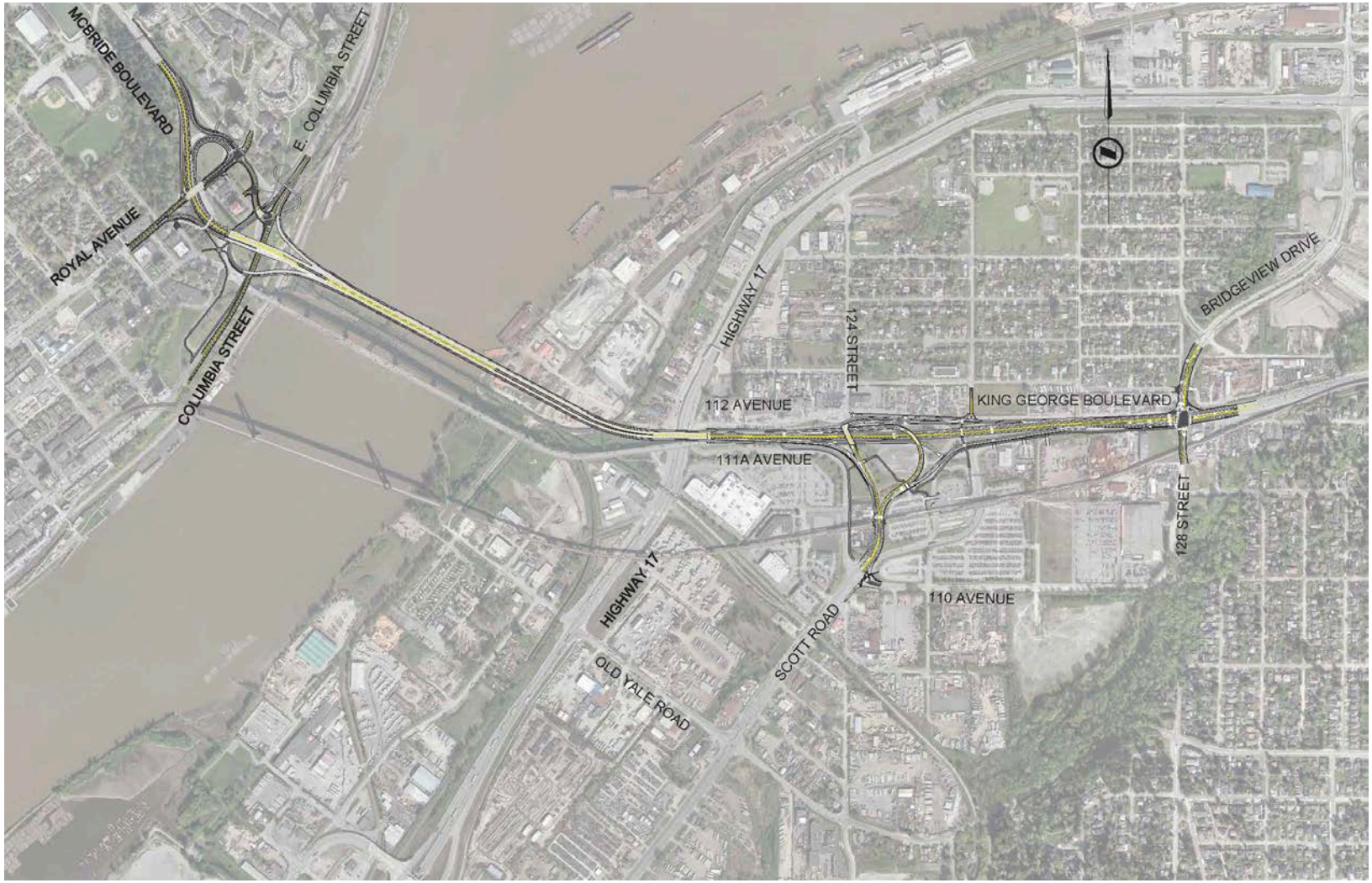
** With a rehabilitated 3-lane Pattullo Bridge*

APPENDIX B: STRATEGIC OPTIONS - SCOPE MAPS

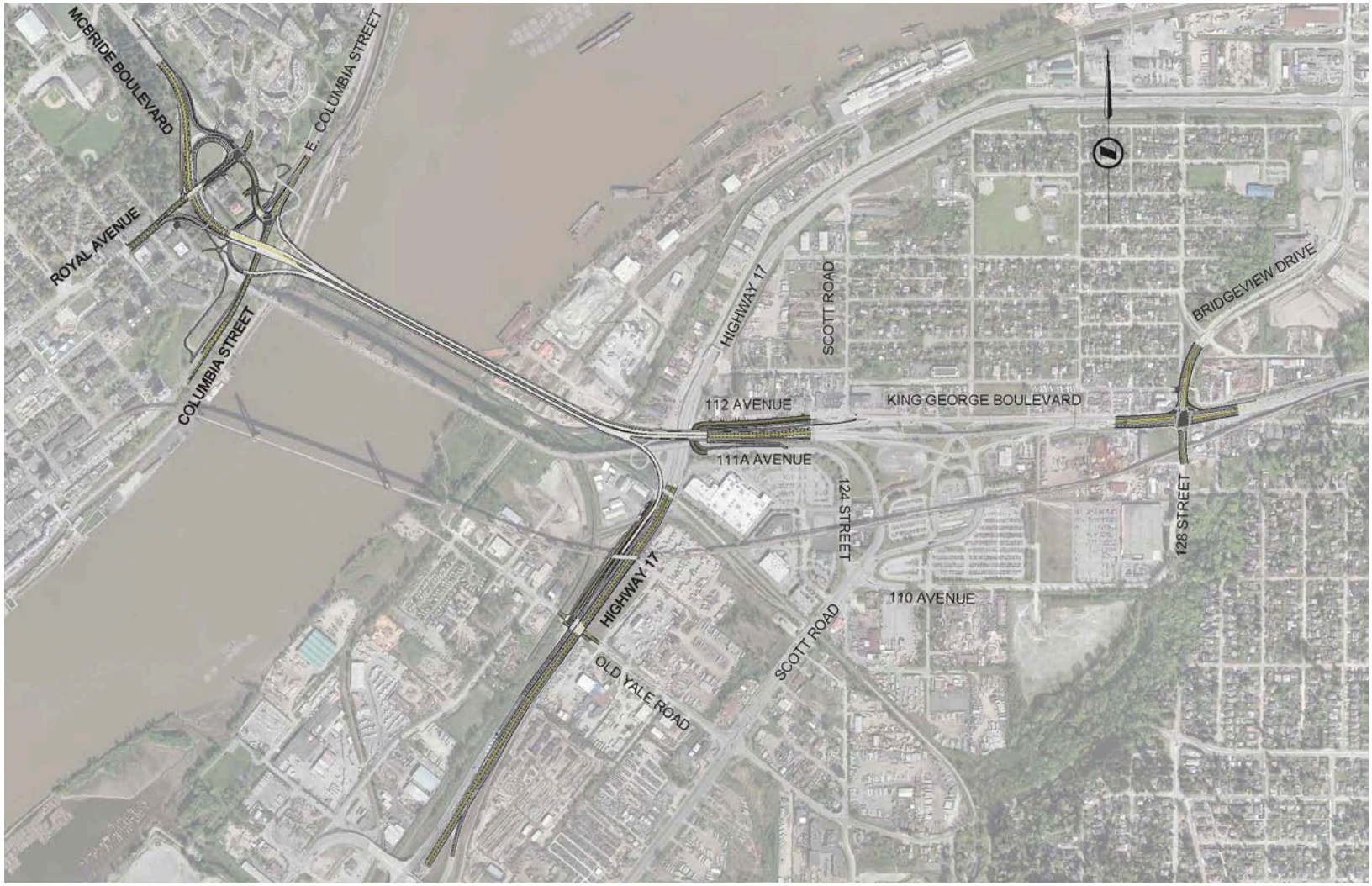
Option 1: Minimum Scope



Option 2: Moderate Scope A



Option 3: Moderate Scope B



Option 4: Full Scope

APPENDIX C: MULTIPLE ACCOUNT EVALUATION - STRATEGIC OPTIONS (2018)

Account	Criteria	Base Case: 3 lane rehab	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Connection Scope
Customer Service (road users)	Collision cost savings ($M)	-	44	48	42	45
	Regional Travel Time Savings ($M)	-	52	58	87	91
	Traffic Impact During Construction	-	64	64	64	64
	Vehicle Operating Savings ($M)	-	25	27	34	30
	Travel Time Reliability (Standard deviation of travel time, $M)	-	50	41	32	8
	Improved Seismic Resiliency ($M))	-	188	188	188	188
	Flexibility to add capacity (6-lanes only) in the future	○ Does not allow for 6 lane expansion	◔ Does not preclude a potential future expansion to 6 lanes if needed	◔ Does not preclude a potential future expansion to 6 lanes if needed	◔ Does not preclude a potential future expansion to 6 lanes if needed	● Connecting roads in Surrey will be built to accommodate expansion to 6 lanes if needed
	Regional Network Connectivity (completeness of connectivity between major activity centres and corridors)	○ Provides no new regional connections	○ Provides no new regional connections	○ Provides no new regional connections, only an improvement of existing connections at KGB and Scott Rd	◔ Provides half of the improved connection to SFPR, and no other new regional network connections	● Connects the bridge (regional route) to both directions of SFPR (a provincial route) and improved KGB and Scott Rd connections (regional routes)
	Improved Local Connectivity (new connections to and from the local road network)	○	○	○	◔	●

Account	Criteria	Base Case: 3 lane rehab	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Connection Scope
		No new local connections	No new local connections	No new local connections	New Bridge Rd connection, grade separating Old Yale, improves local connection	Provides new local road connections in Bridgeview industrial area, enabling better access to Bridgeview residential neighbourhood and other local destinations
	Reliable Access (redundancy in connections)	○ No new connections	○ No new connections	○ Provides no new connections	◔ Provides a second connection from the bridge to westbound SFPR through the direct off-ramp	● Provides a second connection from westbound and eastbound SFPR to the bridge through Scott Rd Extension; provides a second connection from the bridge to westbound SFPR through the direct off-ramp
Financial	Capital Cost Estimate ($M)	[redacted]				
	Salvage Value ($M)					
	O&M costs (new-existing) ($M)					
	Rehab/resurfacing costs (new-existing) ($M)					
	Base Case Rehab ($M)					

Account	Criteria	Base Case: 3 lane rehab	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Connection Scope
Economic Development	Development potential (commercial and residential; industrial with good access and proximity to regional routes)	Does not provide potential development benefits (neutral)	Does not provide potential development benefits (neutral)	Reduced footprint of the Scott Rd and KGB intersection allows for transit oriented development around Scott Rd station	Includes potential development benefits for South Westminster neighbourhood industrial area	Same as Option 2 and Option 3, as well as improved Bridgeview industrial area access and connections allow for higher value use in that area
	Goods movement impact ($M)	-	76	76	76	76
Environment	Regional GHG change in emissions (Tonnes)	-	+100,000	+57,000	+88,000	+215,000
	Regional change in VKT (Year 2045, km)	-	+14 Million	+8 Million	+12 Million	+23 Million
	On-Land Environmental Effects (at-risk wildlife and habitat; native vegetation)	Retaining the existing structure will have limited impacts on vegetation, wildlife and habitat	Impact on vegetation, wildlife and habitat from Construction and demolition of bridge structures will be minimal	Same as Option 1	Same as Option 1	Same as Option 1
	On-land Environmental Effects (archaeological and heritage resources)	Rehab work is anticipated to have little impact on arch and heritage resources	Construction of new bridge and demolition of existing bridge have the potential to impact arch and heritage resources	Construction of new bridge and limited roadworks, and demolition of existing bridge have the potential to impact arch and heritage resources	Same as Option 2	Same as Option 2, with additional but limited impact potential with the construction of the Scott Rd Extension
	In-River Environmental Effects (Fraser River hydrology and morphology; fish and fish habitat)	Rehab work on piers has the potential to change Fraser river hydrology, morphology	Construction and demolition have the potential to change Fraser river hydrology,	Same as Option 1	Same as Option 1	Same as Option 1

Account	Criteria	Base Case: 3 lane rehab	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Connection Scope
		and potentially impact fish and fish habitat	morphology and potentially impact fish and fish habitat			
	Increase in Noise and Vibration close to residential areas	○ Does not increase noise or vibration close to residential areas	○ Same as Base Case	○ Same as Base Case	○ Same as Base Case	● Increases commercial traffic moving past the north side of Bridgeview residential neighbourhood
Social / Community	Alignment with regional plans	○ Does not support the RGMS or Mayors' Vision	● Partially supports the Mayors' Vision, RGS, RTS, RGMS	● Partially supports the Mayors' Vision, RGS, RTS, RGMS and the Gateway Program	● Same as Option 2	● Supports the Mayors' Vision, RGMS, the RGS, the RTS, and the Gateway Program
	Alignment with community plans	○ Bridge size and no road improvements do not support the OCPs	● Bridge size and road improvements do not fully support Surrey's OCP but does support New West's OCP	● Bridge size and road improvements partially support Surrey's OCP and fully supports New West's OCP	● Bridge size and road improvements partially support both communities' OCP	● Bridge size and road improvements support both communities' OCP
	Community connectivity of transit, pedestrians and cyclists	○ Provides no improved transit/ped/bike connections	● Bridge facilities are improved, but no improvements to connections on both sides of the crossing	● Provides most of the improvements planned in Option 4	● Same as Option 1	● Provides improved connections to the BC Parkway, pedestrian access to Scott Rd station, improved connection between Bridgeview residential neighbourhood and Scott Rd station, and connection to the SFPR ped bridge
	Residences impacted	0	0	0	0	0

Account	Criteria	Base Case: 3 lane rehab	Option 1: Minimum	Option 2: Moderate A	Option 3: Moderate B	Option 4: Full Connection Scope
	Business impacted	0	1	1	1	1
	Residence takings (partial)	0	1	1	1	4
	Residence takings (full)	0	2	2	2	9
	Business takings (partial)	0	0	0	0	5
	Business takings (full)	0	0	0	0	6