



Ministry of
Transportation
and Infrastructure

Pattullo Bridge Replacement Project

Procurement Options Report

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EXECUTIVE SUMMARY

PURPOSE AND CONTEXT

The capital planning guidelines set out in the Capital Asset Management Framework (CAMF), Ministry of Finance Core Policies and Procedures, and Partnerships BC processes support the development of a procurement strategy that offers the best opportunity to successfully deliver the Pattullo Bridge Replacement Project (the Project) in keeping with the procurement objectives and provide the best value to taxpayers.

A key element of a procurement strategy involves identifying the optimal procurement option(s) from among the full range of feasible options that could be adopted to deliver the Project. The purpose of this report is to identify a full range of feasible procurement alternatives and then narrow that range to two options to be examined and/or analyzed in detail for the business case. These include:

- one option representing a traditional public sector delivery model; and
- one option representing a partnership model with private finance.

APPROACH

A total of seven procurement options were identified as feasible for delivering the Project, given specific assumptions and positions developed through the engagement of project specialists and from experience gained on other major transportation projects in BC and other jurisdictions.

Three options were identified for procurement under a traditional public sector approach:

- PSC#1 – Three distinct DB contracts (one for the new bridge and removal of the existing bridge; one for the North Approach and Columbia Street Interchange; and one for the South approach and Scott Road Interchange and adjacent 124 Street improvements),
- PSC#2 – Two distinct DB contracts (one DB for the new bridge, removal of the existing bridge and the North Approach and Columbia Street Interchange; and one DB for the South Approach and Scott Road Interchange and adjacent 124 Street improvements), and
- PSC#3 – One DB contract combining all major Project scope elements.

Two options were identified for procurement under a construction period-only partnership model with private finance:

- SB#1 – One DBF contract for bridge, North Approach and Columbia Street Interchange and existing bridge removal plus one DB contract for the South approach and Scott Road Interchanges and adjacent 124 Street improvements, and

- SB#2 – One DBF contract combining all major Project scope elements.

Two options were identified for procurement under a long term partnership model with private finance:

- SB#3 – One DBFOM contract for all construction period and all operating period, including lifecycle, scope elements related to the new infrastructure including the removal of the existing Pattullo Bridge; and
- SB#4 – One DBFM contract for all construction period and lifecycle rehabilitation during the operating period related to all new infrastructure including the removal of the existing Pattullo Bridge.

With reference to the procurement objectives, and considering key risks, coordination requirements and timing issues related to the Project, the full list of procurement options was analyzed and compared by application of a procurement options assessment matrix found in Appendix A. The assessment matrix required that Project team members consider the relative merits of each procurement option in terms of clearly articulated qualitative criteria.

RECOMMENDATION

Procurement options analysis, in support of the business case recommendation of a preferred procurement approach for the Project, should focus on the following delivery models:

- PSC#3 - One DB contract combining all major Project scope elements.
- SB#2 - One DBF contract for all construction period scope elements related to the new infrastructure, including the removal of the existing Pattullo Bridge.

Table 1: Qualitative Assessment Summary

Qualitative Assessment Criteria	PSC#3 (DB)	SB#2 (DBF)
Stakeholder concerns and commitments are addressed	✓✓✓	✓✓✓
Key Project risks are managed and mitigated	✓✓	✓✓
Competition, providing innovation and efficiencies, is maximized	✓✓	✓✓
Corridor service quality and full life asset performance are maximized	✓✓	✓✓

Qualitative Assessment Criteria	PSC#3 (DB)	SB#2 (DBF)
Cost, schedule certainty and affordability are maintained over the full life of the asset	✓	✓✓½
Ability to implement changes during the life of the asset (construction and operations) in the most cost effective manner	✓✓✓	✓✓✓

Through the business case process, each of these options will be further defined in the context of the Project, specifically with consideration of the technical specifications and commercial positions being considered by the Project team in the development of the procurement documents. The procurement options analysis carried out for the business case will provide the substantive basis for recommending the model most appropriate for the procurement of the Project.

1 INTRODUCTION

1.1 BACKGROUND

Opened in 1937, the Pattullo Bridge is one of the oldest bridges in the Lower Mainland. It serves primarily as a connection between Surrey and New Westminster and is a critical transportation link for the movement of people, goods and services. Before tolls were removed from the Port Mann and Golden Ears Bridges, the bridge carried, on average, 77,000 vehicles per day, approximately seven per cent of which were trucks. The bridge sidewalk serves a small volume of pedestrians and cyclists.

The challenges associated with the aging existing bridge include a delaminating deck; river scour around the foundations; piers not designed to withstand significant collisions with marine vessels; seismic and wind load thresholds that do not meet current standards for new structures; horizontal curves, travel lanes and sidewalk widths that do not meet current standards for new structures; and the absence of safety features such as median barriers and shoulders.

The Ministry, TransLink, the City of Surrey, and the City of New Westminster have explored more than 25 alternatives to rehabilitate or replace the existing Pattullo Bridge, encompassing alternative routes, number of bridge lanes, and community connections. In its 2014 *Regional Transportation Investments: a Vision for Metro Vancouver*, the Mayors' Council on Regional Transportation recommended that the replacement bridge should be a new, four-lane bridge, designed in a manner to not preclude potential future expansion to six lanes.

The Project will be designed to meet modern seismic, structural, and roadway geometry standards. It will improve safety for drivers, cyclists and pedestrians.

1.2 PURPOSE

This report identifies a broad range of feasible procurement alternatives that could be adopted to deliver the Project and then narrows that range to two options deemed most appropriate for a more detailed analysis. The recommendations of this report form the basis for a more comprehensive procurement options analysis, which compares the preferred traditional and preferred partnership procurement options. The more comprehensive analysis includes a risk analysis and quantification, market sounding, multiple criteria analysis and financial modeling.

In keeping with current capital planning practices, and appreciating the unique characteristics of this Project, the procurement models to be examined and/or analyzed in detail for the business case should include:

- one option representing a traditional public sector delivery model; and

- one option representing a partnership delivery model with private finance.

1.3 STUDY APPROACH

The Project will be planned and procured in a manner consistent with the guidelines set out in the CAMF, Ministry of Finance Core Policies and Procedures, and Partnerships BC processes, incorporating lessons learned on other major transportation projects in British Columbia.

These guidelines require the development of a procurement strategy that offers the best opportunity to successfully deliver the Project in keeping with the procurement objectives; and that provides the best value to taxpayers. A key element of developing the procurement strategy involves identifying the optimal procurement option(s) from a range of feasible options that could be adopted to deliver the Project.

In arriving at the recommended procurement options for detailed analysis, the following activities were carried out:

- **Project Scope Elements** – Identification and review of key Project scope elements, in terms of how components might reasonably be separated and/or combined for the purposes of procurement.
- **Risks and Assumptions** – Identification and review of key Project risks, as well as timing, coordination and other relevant considerations for procurement and project delivery, including determination of those scope elements to be delivered as advance works, outside the ultimate contract.
- **Procurement Options** – Identification of a full range of feasible procurement options for project delivery.
- **Procurement Objectives and Requirements** – Development of procurement objectives for the Project and a set of criteria to guide the assessment of which procurement options are most appropriate for project delivery.
- **Assessment of Options** – Application of the assessment criteria to evaluate and rank the full range of procurement options, drawing on recent experience planning and implementing comparable large scale transportation projects in British Columbia.

All of these activities involved engagement with key specialists and senior Project personnel. Details of these activities and results are described in this report.

1.4 PROCUREMENT OPTIONS FOR PROJECT DELIVERY

Procurement options for project delivery are determined based on the anticipated scope of project activities carried out by the contractor or consortium.

Traditional public sector procurement options, including design-bid-build (DBB) and design-build (DB), are commonly adopted for the delivery of transportation infrastructure. A typical DBB project would involve an owner developing a final design and requesting bids from contractors to construct the infrastructure according to detailed specifications. Under a DB structure, the contractor would have the responsibility of designing and constructing the project, according to performance requirements set out by the owner.

Under either of these models, the owner retains some responsibilities and risks related to construction-period activities, and all responsibilities and risks related to operating-period activities. Typically these models are most advantageous for projects of low complexity and for which there are limited opportunities to realize value from contractor innovations and/or risk transfer during the operating period, including rehabilitation. However it should be noted that there is a significant difference in risk profiles between the DB and DBB procurement models. Under a DB model several risks related to design, traffic staging and performance of the asset are transferred to the private partner.

Risk transfer is improved with the addition of private finance. The inclusion of an operating period allows for an even greater risk transfer, including short term and long term asset performance. Partnership procurement options, including design-build-finance (DBF), design-build-finance-operate (DBFO), design-build-finance-operate-maintain (DBFOM), and design-build-finance-maintain (DBFM), are more commonly adopted for the delivery of large and complex transportation infrastructure. These options provide the opportunity to transfer efficiently more risks to the private partner and secure this risk transfer with the inclusion of private finance at-risk during construction and, in the case of a DBFM, DBFO and DBFOM, the 25-35 year concession period.

For a large and complex project such as the Project, there are numerous ways to split or combine specific scope elements into one or more procurement packages. There are advantages and disadvantages associated with each approach. A broad range of options is explored, analyzed and narrowed in this report.

2 PROJECT DESCRIPTION

The Project includes a new four-lane bridge, designed in a manner to not preclude potential future expansion to six lanes, that meets current seismic and road design standards, and provides a safe and reliable crossing for vehicles, pedestrians and cyclists, network connections in Surrey and New Westminster and the removal of the existing bridge.

2.1 SCOPE ELEMENTS

The key scope elements that are anticipated to comprise the Project are depicted in Appendix B, and encompass the broadest scope of potential works considered in the *Strategic Options Analysis Report*.

In summary, they are:

- **New bridge** – design and construction of a new four-lane bridge from the north shore of the Fraser River, across to the south shore of the river which will replace the existing four-lane bridge and road infrastructure.
- **North Approach and Columbia Street Interchange** – The current interchanges, designed and constructed to interface with the lanes, grades and traffic flow of the existing bridge, will need to be replaced with new infrastructure that connects to the new bridge and improves traffic flow in adjacent communities.
- **Road improvements** – 124th Street between King George Boulevard and Highway 17 will need to be widened with additional lanes added to interface with the new infrastructure. The Highway 17 and 124th Street Interchange will be widened to accommodate longer on and off ramps.
- **South Approach and Scott Road Interchange** – The current interchanges, designed and constructed to interface with the lanes, grades and traffic flow of the existing bridge, will need to be replaced with new infrastructure that connects to the new bridge and improves traffic flow in adjacent communities.
- **Existing bridge removal** – The existing bridge will be removed once the new infrastructure is operational. The scope of the removal will include the removal of the in water piers and approach structures.
- **Operations and maintenance (O&M) of the new bridge, interchanges and roadway improvements** – Once complete, there will be operations, maintenance and lifecycle rehabilitation requirements in relation to the new infrastructure on an ongoing basis.
- **Property acquisitions** – Depending on the final design, minor property requirements are anticipated to accommodate new interchanges and alignment.

3 KEY RISKS AND ASSUMPTIONS

3.1 PROCUREMENT CONSIDERATIONS

Given the range of scope elements discussed above, there are several ways in which the Project could be separated or combined so as to be delivered by one or more contractors under one or more contracting structures.

To guide the development of a range of feasible procurement options for this Project, the Project team identified the key risks associated with each scope element, as well as timing and construction coordination considerations for Project delivery that will influence the approach to procurement.

3.1.1 Risks

Key considerations in relation to risk analysis include how best to mitigate the expected quantum of a particular risk and how best to allocate risks between an owner and the contractor through the procurement strategy.

The size and complexity of this Project means that there is a range of significant risks to cost, schedule, and other commitments to the public that require appropriate management and mitigation. These include:

- **Utility relocations and protections** – The complexity of the work and coordination requirements present risks to both cost and schedule. Some exploratory work has been carried out to determine the location and ownership of the utilities along the existing and new alignments, however there is still risks of the unknown.
- **Geotechnical risks** – There are considerable geotechnical complexities associated with the Project. Key geotechnical risks include:
 - Complex foundation design due to soft soil conditions;
 - New bridge construction and existing bridge removal in proximity to the existing rail bridge; and
 - Roadway settlement due to soft soil conditions.
- **Traffic management during construction** – King George Boulevard and McBride Boulevard are busy corridors with high traffic volume, major interchanges and an active railway. Minimizing traffic disruptions along this section of the corridor during construction is a key objective of the Project and a key risk to be managed.

- **Hydrology and sedimentation** – based on experience with existing bridges, the new asset's impacts to the hydrology of the Fraser River and the potential increase in sedimentation around the new piers is a risk that has operational impacts for a long period.
- **Latent defects** – this risk primarily focuses on fabrication and construction quality of work. Although the risk is highest within the first few years of the assets operating phase, in a traditional or short term partnership procurement model, the owner's risk is highest after the warranty period has lapsed.
- **Unavailability of the asset** – although this risk is more prevalent under a tolling scenario, the loss of travel lanes particularly during peak hours due to operators slow response to events or poorly planned maintenance operations can cause reputational damage to the owner.

3.1.2 Coordination

Coordinating design and construction among the key scope elements is important, not only to ensure compatibility in design and effective interfacing among bridge, interchange and road construction elements, but also to ensure effective construction staging and traffic management through all sequences and activities.

The scope of the North Approach and Columbia Street Interchange is intricately linked with the bridge such that, in the reference concept, the northbound off-ramp to the interchange commences along the northern bridge approach.

Coordination between bridge construction and existing bridge approach removal is critical to best mitigating and managing the traffic risks that link these two scope elements.

Due to the location of the new bridge in relation to the existing crossing, the removal of the existing main span portion of the bridge does not need to be coordinated with the construction of the new bridge. However the design of the in water piers for the new crossing must take into account any changes in the river hydrology once the existing in water piers are removed.

3.1.3 Schedule

In order to meet the overall construction schedule, any scope elements that do not require sequencing will be constructed concurrently. Bridge construction, with an estimated duration of four years, is effectively on the critical path in terms of meeting Project delivery timing commitments.

In terms of sequencing, a number of utility relocations and protections must occur in order for the construction of the major components of the Project to proceed.

In order to best mitigate settlement risks and ensure there is sufficient time in the overall schedule for soil compaction, certain road preload activities may need to commence well ahead of design and construction, and most likely prior to contract award. In addition, property acquisitions will need to be initiated prior to the start of procurement.

3.2 PROVINCIAL ADVANCE WORKS

Risk and timing considerations in relation to a few key Project activities provide a strong rationale for initiating these scope elements as advance works, to be carried out by the Province, ahead of procuring the main scope elements. These activities are:

- **Select utility relocations and protections** – The Province is well positioned to mitigate the risk of potential construction delays associated with utility works by commencing certain relocation and protection works before the main contractor is engaged. Utility work not required until prior to removal of the existing bridge could be included among the main contractor’s responsibilities.
- **Property acquisition** – The Province has legal rights to acquire property as may be required for the Project, and can initiate any necessary acquisitions in advance of engaging the main contractor.
- **Demolition of structures on acquired land** – several parcels of land that will be acquired for the new right of way have existing structures that will need to be demolished. The Province will carry out an environmental investigation of these lands and structures to document any contamination or hazardous materials present. In some cases these structures will need to be demolished in order to complete the advance works such as utility relocations, preload and temporary detours.
- **Preload and temporary works** – The Province is also well positioned to mitigate traffic management related risks during construction and potential construction delays by preparing for detours and commencing preload works before the main contractor is engaged. In addition, the Province can source sand and other necessary materials that may be in short supply depending on the number and scale of other construction projects underway in the region at the same time.

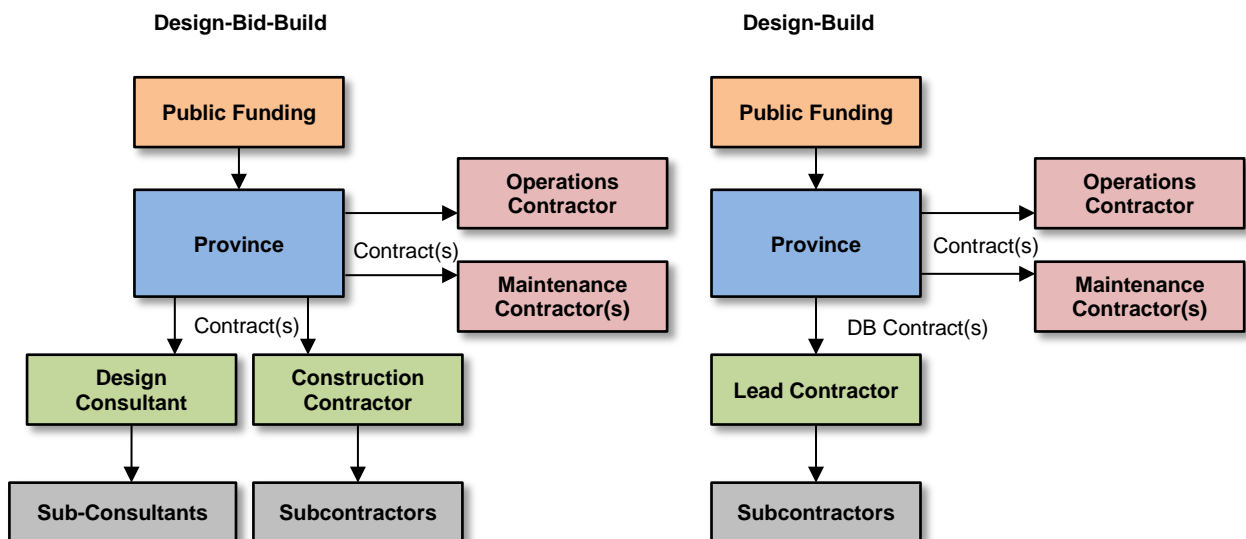
4 PROCUREMENT OPTIONS

4.1 TRADITIONAL PUBLIC SECTOR DELIVERY MODELS

As indicated in Section 1.3 of this report, the detailed procurement options analysis for this Project will include one procurement option representing a traditional public sector delivery model. This option will be identified as the Public Sector Comparator (PSC).

The PSC models considered included delivery through either a DBB, DB or a combination of these contract arrangements. Figure 1 below depicts the typical contracting structure for these types of delivery models.

Figure 1: DBB and DB contract structures



Typically, the Province will enter into a DBB or DB contract with one or more private sector contractors to deliver the design and/or construction. The contractor will have the responsibility of designing (in the case of a DB) and/or building (in the case of both) a project, and will typically subcontract where necessary to acquire capability and expertise. The Province will pay the contractor as agreed in the contract, either as progress payments or as key milestones are achieved. The Province will then enter into a separate contract(s) for the delivery of operations and maintenance services during the operating period. Rehabilitation risk remains with the Province.

In determining the PSC, the Project team considered, drawing on experience procuring other major transportation projects in BC and other jurisdictions, how the construction period scope elements

(excluding Province works) might be isolated or combined for the purposes of procurement under a traditional model. The Project team included, among the range of scope combinations, as many options as might reasonably be considered for this Project.

4.1.1 Key Assumptions and Positions

The main assumptions and positions underpinning the list of PSC options included that:

- Several components of the existing bridge are at the end of their design life and others do not meet current standards in vehicle travel safety, ship collision or seismic requirements, therefore the model that delivers the Project sooner (including procurement) and with schedule certainty is more desirable;
- The size and complexity of the Project provides significant opportunity for innovation and risk transfer by combining design and construction responsibilities, even if the Project were broken up into multiple contracts;
- For reasons of logistics, risk transfer and efficiencies, the main bridge design and construction would be, at the very least, a single contract and would not be broken up into any smaller contracts;
- The North Approach and Columbia Street Interchange (combined with immediately adjacent McBride Boulevard improvements) could be procured separately from the South Approach and Scott Road Interchange (combined with immediately adjacent King George Boulevard improvements) since these two scope elements can be delivered independent of one another in terms of design, geotechnical conditions, traffic management, access and construction staging;
- Improvements to 124 Street between King George and Highway 17 along with lengthening of the Highway 17 and 124 Street on and off ramps, could be separated from the South Approach scope, as these more traditional, low risk municipal roadworks can be delivered independent in terms of design, traffic management, schedule, access and construction staging, and
- Due to the separation of the new and existing bridges by the rail bridge, there is little risk to the new bridge due to removal of the existing bridge. However based on the sequence of construction, a portion of the new bridge crossing (Hwy 17 onramp, minor works at the south abutment) can not be completed until after the completion of the demolition, therefore this scope of work can not be separated from the construction of the new bridge.

4.1.2 PSC Procurement Models

The Project team identified three options, determined to be the most feasible, for procurement under a traditional model. In all cases, there is no private finance at-risk nor do the contractors have any operating period responsibilities beyond the approximate two years warranty period.

PSC#1 – 3 DB contracts

This option would see the new and existing bridge scope elements combined into a single DB contract. The north approach and south approaches with adjacent 124 Street works would be procured as two separate DB contracts. Due to the proximity of the 124 Street municipal roadworks and efficiencies that can be gained by having one contractor deliver these works, the Project team determined that this scope be combined with the south approach works.

PSC#2 – 2 DB contracts

This option would see the new bridge construction and existing bridge removal scope elements and the North Approach works combined into a single contract. The south approaches with adjacent 124 Street works would be combined into a single DB contract.

PSC#3 – 1 DB contract

The third option identified would involve combining all construction period scope elements into a single DB contract.

These three PSC procurement models are summarized in Table 1 below.

Table 2: Traditional Public Sector Comparator (PSC) Procurement Models

PSC#1 –3 DB Contracts:	PSC#2 – 2 DB Contracts:	PSC#3 – 1 DB Contract:
DB: Bridge construction & existing bridge removal DB: North Approach Interchange and road works north of the bridge DB: South approach and Scott Rd Interchange and road works south of the bridge, combined with 124st roadworks, and Hwy 17 Interchange improvements Province: All operations, maintenance, rehabilitation	DB: Bridge construction & existing bridge removal <u>combined with the North Approach</u> Interchange and road works north of the bridge DB: South approach and Scott Rd Interchange and road works south of the bridge, combined with 124st roadworks, and Hwy 17 Interchange improvements Province: All operations, maintenance, rehabilitation	DB: All interchange, road and bridge construction, as well as bridge removal in one contract Province: All operations, maintenance, rehabilitation

4.1.3 Design-Bid-Build

The Project team gave a lot of consideration to the incorporation of a DBB element into the project. There are several considerations given to this type of procurement, the key reasons for eliminating DBB as a procurement option are:

- The Province has successfully delivered major capital infrastructure project of this size as DB's and would not revert to a DBB, in part as it would not have the internal capacity immediately

available to develop or manage the design or deliver this Project under the current timeline using such a procurement model;

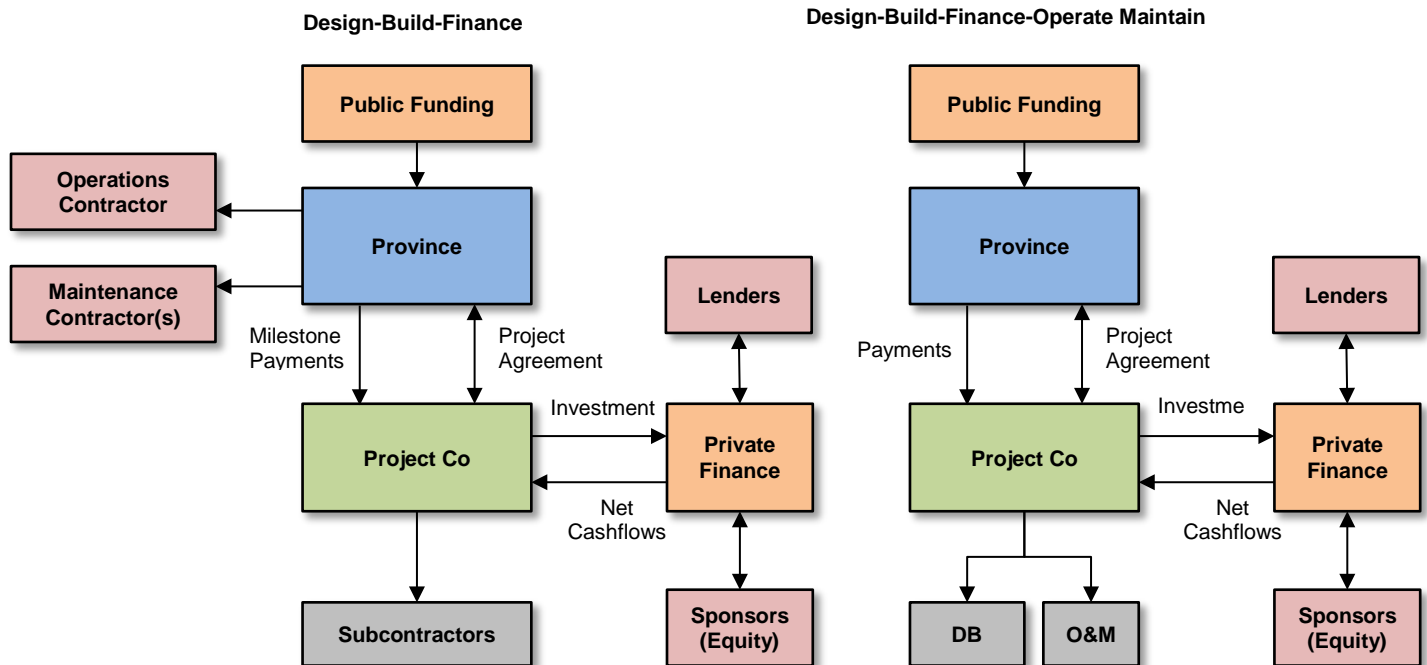
- The current condition of the existing bridge, and the cost of ongoing maintenance and required major capital rehabilitation investment, favours project delivery models with faster overall schedules (planning, procurement, construction) and with greater track record of on time delivery; and
- Limited funding resources and inability to raise funds outside the potential federal and committed provincial amounts, favours project delivery models with greater cost certainty during construction and operations.

4.2 PARTNERSHIP DELIVERY MODELS

The detailed procurement options analysis for this Project will examine one procurement option representing a construction period-only partnership delivery model, or one long term partnership delivery model. One of these options will be identified as the Shadow Bid (SB) since the modeling carried out during detailed procurement options analysis is intended to mimic the behaviour of contractors in their bids. The assessment will determine whether the construction period-only partnership model or the long term partnership model is identified as the SB and analyzed in detail in the business case analysis.

The SB models considered included delivery through DBF, in the case of construction period-only contracts, and DBF plus a number of operating period responsibilities, such as operations, maintenance and rehabilitation (DBFOM, DBFM) in the case of long term partnership agreements. Figure 2 below depicts the typical contracting structure for these types of delivery models.

Figure 2: Partnership contract structures



Under a partnership delivery model, the Province would enter into a Project Agreement (PA) with a private sector partner (Project Co). Project Co would be required to design, build, and (where applicable) operate, maintain and/or rehabilitate the Project over the life of the PA. Project Co would enter into a series of contracts as required with service providers for design, construction, operations, maintenance and/or rehabilitation, and would finance the design and build costs through a combination of equity, debt and/or other forms of finance raised from sponsors and third party lenders. Project Co will be paid as set out in the PA at substantial completion or key milestones during construction and regularly during operations within the life of the PA for long term partnerships.

As with the identification of traditional procurement options, the Project team drew extensively on experience procuring other major transportation projects in BC and other jurisdictions. Scope elements relevant to the operating period were considered in terms of procuring long term partnerships. As many options as might reasonably be considered for this Project were identified.

4.2.1 Key Assumptions and Positions

The main assumptions and positions underpinning the list of SB options included that:

- the same assumptions regarding how scope elements might be combined under a traditional procurement approach would also apply under a partnership delivery model approach;
- the value of including private financing in a contract is realized where finance at-risk can be effective for securing the transfer of key Project risks, and where traditional forms of security may not be adequate; and
- if a long term partnership were considered, it is likely that the PA would include at least some asset rehabilitation scope to ensure effective risk transfer.

4.2.2 SB Construction Period-Only Partnership Models with Private Financing

The Project team identified two options for procurement under a construction period-only partnership model. Following from the options identified for the PSC, this exercise considered whether and how the inclusion of private financing could provide value to the Project.

SB#1 – 1 DBF contract and 1 DB contract

This option involved combining the high risk scope elements into a single DBF contract. The bridge construction, the North Approach, and the existing bridge removal activities involve considerable interdependent complexities and risks such that the Province would likely realize value from combining them in a single contracts that includes the security of private financing.

In addition to the bridge, North Approach and removal combination under a single DBF contract, the south approach and Scott Road Interchange and 124 Street related road works could reasonably be procured as a single contract. The Project team considered that the risks associated with these activities are within a normal acceptable range for a DB applying conventional forms of security such that there is likely to be little if any value in adding private financing to either contract.

SB#2 – 1 DBF contract

The second option identified involved combining all construction period scope elements into a single DBF contract.

The two construction period-only SB procurement models identified for further consideration are summarized in Table 2 below.

Table 3: Shadow Bid (SB) Construction Period-Only Partnership Models

SB#1 – 1 DBF and 1 DB Contracts	SB#2 – 1 DBF Contract
DBF: Bridge construction and removal combined with the North Approach and Columbia Street	DBF: All interchange, road and bridge construction, as well as removal in one contract

<p>Interchange and road works north of the bridge DB: South Approach and Scott Road Interchange and 124 Street road works and Highway 17 on & off ramp improvements</p> <p>Province: All operations, maintenance, rehabilitation</p>	<p>Province: All operations, maintenance, rehabilitation</p>
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4.2.3 SB Long-Term Partnership Models

The Project team identified two options for long term partnership models. In all cases, there is private finance at-risk for the full length of the contract term, which is assumed to be 25 to 35 years after construction is complete.

For this type of delivery approach, it was determined that there would realistically be only a single contract procured for the works related directly to the new river crossing, and that the range of options would reflect the possible range of operating period scope elements that might be included.

SB#3 – 1 DBFOM contract

This option identified involved combining the full scope of the Project into a single DBFOM contract. This model would theoretically secure, through private financing, the transfer of the maximum amount of design, construction, operations, maintenance and rehabilitation risk to Project Co for the term of the contract.

SB#4 – 1 DBFM contract

This option contemplated removing the operations responsibilities from the contractors' scope and retaining those with the owner. Based on prior experience, the Project team determined that the procurement options identification exercise should examine the implications of doing so, including considering whether and how Project Co would then interface with the Province's operations service contractor during the contract term. It is anticipated that, in addition to routine quality audits by the owner, Project Co would monitor the operations service contractor's work and measures would be established to ensure any identified issues are addressed and do not affect the contractor's obligations.

The two long term partnership SB procurement models identified for further consideration are summarized in Table 3 below.

Table 4: Shadow Bid (SB) Long Term Partnership Models

SB#3 – 1 DBFOM Contract	SB#4 – 1 DBFM Contract
<p>DBFOM: All interchange, road and bridge construction; existing bridge removal; operations and maintenance; rehabilitation of full scope of the Project for an appropriate term</p> <p>Province: None</p>	<p>DBFM: All interchange, road and bridge construction; removal of existing bridge; Operations activity oversight (of the Province's contractor); rehabilitation of full scope of the Project for an appropriate term;</p> <p>Province: Operations of full scope of the Project</p>

5 PROCUREMENT OBJECTIVES AND REQUIREMENTS

5.1 PROJECT AND PROCUREMENT OBJECTIVES

In keeping with the approach taken to developing procurement objectives for other major transportation projects in BC, the Project team considered three broad questions corresponding to three categories of objectives. They were:

Category 1 – Operational Effectiveness: Why should the Project be undertaken?

Category 2 – Implementation Effectiveness: How should the Project be implemented?

Category 3 – Transactional Effectiveness: How should the Project be procured?

5.1.1 Project Objectives

The Project objectives are:

- 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.

During the procurement option assessment these objectives were re-examined and where applicable, were incorporated in the procurement objectives and more specifically the Category 1 objectives.

5.1.2 Operational Effectiveness

As referenced in the previous section, the Project team developed procurement objectives based on the objectives developed to select the technical solution. The procurement approach should support the following objectives :

- **Improved safety** - Improve pedestrian, cyclist and vehicle traffic safety, as well as seismic stability and the ability of the bridge to withstand ship impacts;
- **Reliability** – Reduce congestion and improve travel time predictability and reliability for all modes and users, as compared with 2013 measured levels;

- **Accessibility** – Accommodate cyclists and pedestrians by providing a barrier-separated multi-use pathway on the new bridge to connect cycling and pedestrian corridors in Surrey and New Westminster;
- **Environmental enhancement** – Minimize emissions of greenhouse gases and pollutants and minimize impacts to the natural environment, through improved traffic flow, and faster response and resolution of major traffic disruptions.

These objectives are also summarized in Table 4.

5.1.3 Implementation Effectiveness

The procurement approach should support the effective implementation of the Project. The Project team drew on experience procuring and delivering other major transportation projects to identify the following desired outcomes in relation to implementation:

- **Meaningful public and stakeholder communications** – Include meaningful dialogue with the public and stakeholders in design, construction, operations and aesthetics.
- **Timely project delivery** – Provide certainty in terms of the Project implementation schedule. The shortest overall timeline (planning through to service commencement) for delivery of the Project is important as the existing bridge structure is nearing its end of life, and the annual maintenance and rehabilitation costs are escalating significantly.
- **Cost effective implementation (design and construction)** – Provide the most cost effective method to deliver the Project, in terms of budget certainty, including utilization of the owner's resources, and funding contribution cash-flow.
- **Minimize impacts during construction** – Minimize the extent to which the Project affects commercial activities, commuters, the public and the environment. Impacts may include traffic (marine, rail, municipal) inconvenience, construction noise or lighting during evening and night work activities, and environmental.
- **Allocate key risks to the party best able to manage and mitigate them** – Ensure key Project risks are allocated in the most cost-effective way to the party that is best suited to manage them.
- **Effective change mechanism during the operating life of the Project** – Provide a mechanism for addressing potential future changes in the most cost effective and timely manner. An effective change mechanism will ensure the Project procurement approach is consistent with the Mayors' Vision.
- **Effective asset performance throughout the life of the asset** – Ensure best value in terms of balancing capital and lifecycle rehabilitation costs. Effective implementation will involve design

influenced long term performance, including an increased probability that the asset will achieve the design service life, be serviceable after a design event, and have effective and efficient serviceability even after a lesser event.

- **Efficient delivery of operations and maintenance services** – Ensure best value and efficiency in terms of balancing capital and ongoing operations and maintenance services such as sweeping, landscaping, and snow removal.

These objectives are also summarized in Table 5.

5.1.4 Transactional Effectiveness

This category of procurement objectives focuses on the ultimate transaction, including the structure of the transaction and the process of getting to contract award. These objectives are highly consistent from one project to another.

The overarching desired outcome is to lock-in as many benefits as possible during the bid stage. The key to understanding and meeting these objectives will be the detailed analysis undertaken for the business case, the determination of the procurement process (RFQ/RFP documentation) and the determination of key positions set out in the Project contract (DB Agreement or Project Agreement).

The Project team identified the following procurement objectives in support of transactional effectiveness:

- **Achieve value for money** – Provide the best value to taxpayers. Value during construction and operations in this sense includes consideration of qualitative and quantitative aspects such as costs, risks, quality, timeliness and efficiencies; most of which are achieved through innovation.
- **Attractive, marketable and bankable transaction** – Ensure a transaction that is fair, transparent and attracts national and international firms with a keen interest to participate and the capability to deliver a project of this size and complexity.
- **Attainable within fiscal constraints** – Ensure the approved budget is not exceeded and the Project can be delivered within affordability constraints. Public infrastructure approvals are based on cost estimates developed through comprehensive business case analysis.

These objectives are also summarized in Table 5.

Table 5: Project Procurement Objectives

Pattullo Bridge Replacement Project – Procurement Objectives	
Category 1: Operational Effectiveness	
1.1	Safety
1.2	Reliability
1.3	Accessibility
1.4	Environmental enhancement
Category 2: Implementation Effectiveness	
2.1	Meaningful public and stakeholder communications
2.2	Timely project delivery
2.3	Cost effective implementation
2.4	Minimize impacts during construction
2.5	Allocate key risks to the party best able to manage and mitigate them
2.6	Effective change mechanism during the operating life of the Project
2.7	Effective asset performance throughout the life of the asset
2.8	Efficient delivery of operations and maintenance services
Category 3: Transactional Effectiveness	
3.1	Value for money
3.2	Attractive, marketable and bankable transaction
3.3	Attainable within fiscal constraints

6 ASSESSMENT OF OPTIONS AND RESULTS

6.1 ASSESSMENT CRITERIA

In narrowing the full range of procurement options described in Section 4, the Project team developed and applied a procurement options assessment template, which sets out assessment criteria based on the procurement objectives for the Project detailed in Section 5. The assessment criteria and corresponding objectives are summarized in Table 6.

Table 6: Options Assessment Matrix

Assessment Criteria	Relevant Project Procurement Objectives
Stakeholder concerns and commitments are addressed <i>Consistency and thoroughness in communications and addressing stakeholder commitments.</i>	1.4 Environmental enhancement 2.1 Meaningful public and stakeholder communications
Key Project risks are managed and mitigated <i>Key Project risks are allocated to the party best able to manage and mitigate them.</i>	2.5 Allocate key risks to the party best able to manage and mitigate them
Competition, providing innovation and efficiencies, is maximized <i>Attractiveness, marketability and bankability of the project opportunity that brings innovation, efficiencies and value to taxpayers.</i>	3.1 Value for money 3.2 Attractive, marketable and bankable transaction
Corridor service quality and full life asset performance are maximized <i>Project objectives related to safety, reliability and access are achieved, construction impacts on traffic are minimized, and the asset performs effectively during operations.</i>	1.1 Safety 1.2 Reliability 1.3 Accessibility 2.4 Minimize impacts during construction 2.7 Effective asset performance throughout the life of the Project 2.8 Efficient delivery of operations and maintenance services
Cost, schedule certainty and affordability are maintained over the full life of the asset <i>Project is delivered on time and on budget within fiscal and cash flow constraints.</i>	2.2 Timely project delivery 3.3 Attainable within fiscal constraints 2.3 Cost effective implementation
Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner <i>Implementation of changes in service scope or future capital investment in the asset can be achieved in the most cost effective and efficient manner.</i>	2.6 Effective change mechanism during the operating life of the Project

The assessment template required that Project team members consider the relative merits of each procurement option in terms of these qualitative criteria. All seven procurement options identified by the Project team as feasible alternative approaches for delivering the Project were assessed in relative terms.

6.1.1 Assessment Scale

An assessment scale was applied to represent the extent to which each option addresses each criterion, with reference to the specific procurement objectives associated with each category. The following scoring framework provided the basis for the qualitative assessment:

x	Poor	Mode fails to meet basic requirements of the program.
✓	Low	Minimally meets requirements of the program.
✓✓	Medium	Adequately meets the requirements of the program.
✓✓✓	High	Provides a highly efficient and effective delivery solution for the program.

6.1.2 Scoring and weighting

Partnerships BC does not recommend weighting and scoring the criteria numerically for the following reasons:

- Numerical scoring is not sufficiently flexible to allow for consideration of situational nuances in what is essentially a qualitative exercise. The assessment scale is heavily supported by the qualitative discussion and notes set out in Appendix A;
- The procurement options assessment is developed in a workshop format, with key positions and assumptions explicitly noted in this report. A numerical result may be interpreted with a false level of precision; and
- Weighting the relative importance of the criteria removes flexibility in decision making from the decision makers. Decision makers likely have different priorities and the procurement options assessment process should be sufficiently flexible to allow decision makers to evaluate the relative importance of the criteria on their own.

6.2 KEY POSITIONS AND ASSUMPTIONS

The following key positions and assumptions underpinned the comparison and assessment:

- **Fewer contracts are preferred to multiple contracts** – Coordination and schedule risks, inconsistencies among contractors in addressing stakeholder communications requirements, and traffic management risks are negatively impacted by having multiple contractors whose activities must interface with one another. In addition, interface risks associated with multiple simultaneous contracts will need to be managed by the Province, drawing heavily on internal management resources.
- **The transfer of key Project risks is effectively secured by including private finance, both during construction and over the operating term of the contract** – Construction period procurement options that include private finance benefit from the discipline imposed by private lenders, including schedule certainty. The benefits of securing operating period Project risks with private finance include improved asset quality and performance over the long term.
- **The involvement of large national or international contractors, improves competition** – A larger and stronger pool of contractors with the capacity and experience needed to deliver a project of this scope and scale benefit the competitiveness of the procurement process by bringing innovation and efficiencies in staging, resources, mobilization, construction methodology and innovations in design and implementation. The involvement of large contractors will provide subcontracting opportunities for capable local contractors.
- **Traffic flow and asset safety performance and service quality (availability) are improved by including operating period responsibilities and disincentives in the contract** – performance based operations contracts with disincentives tied directly to service changes and loss of availability provides a better performing asset during the operating phase of the PA. Project Co and the O&M contractor are incentivised to meet key performance indicators with relation to traffic incidents, weather events and minor maintenance works such as crack repairs and potholes.
- **Long-term partnerships with O&M and lifecycle responsibilities incentivizes greater quality product** – Warranties on major transportation assets can be relatively short (1-2 years) with construction period only contracts. Including O&M responsibilities in the contract incentivizes Project Co to consider these aspects in design and construction. Long term partnerships incentivize Project Co and their design-builder to take a long term view of asset quality and performance during design and construction.
- **Including operations and maintenance (O&M) responsibilities in the contract supports lifecycle performance of the asset** –The quality of O&M activities undertaken on the bridge and other components of the Project will have a direct impact on rehabilitation requirements and, accordingly, the service life of the asset. By transferring both O&M and rehabilitation risk to the

contractor, there is an optimal alignment of interests supporting a full life cycle view of the Project and assure that assets are fully funded through the term of the contract.

- Flexibility to make changes to the Project at all stages is greater under traditional and short term partnership delivery models than under long term partnership delivery models**
 - The inclusion of private finance and operating period responsibilities in the contract make any post-procurement changes to the Project more complex and costly. In the case of the Project, this is a significant risk as the change that is contemplated is the potential future expansion of the bridge from four lanes to six lanes. This change could be in the order of magnitude from \$50-\$150 million dollars depending on the final design. Although under a long term partnership model this change would be contemplated and contract language developed around it, the cost premium and risk of implementing such a change cannot be quantified.

6.3 SUMMARY OF RESULTS

The results of the procurement options assessment exercise are detailed in Appendix A, and summarised Table 7 and Table 8 below. The qualitative assessment for the PSC options is carried out independently of the SB options, and although the options were assessed against the same criteria, the results should not be viewed comparatively. A further qualitative assessment will be carried out as part of the business case analysis which will compare the preferred procurement options listed in Section 6.3.1 and 6.3.2 below.

Table 7 Summary of PSC Assessment Results

Assessment Criteria	PSC #1 (3 DB)	PSC #2 (2 DB)	PSC #3 (1 DB)
Stakeholder concerns and commitments are addressed	✓	✓✓	✓✓✓
Key Project risks are managed and mitigated	✓	✓	✓✓
Competition, providing innovation and efficiencies, is maximized	✓	✓	✓✓
Corridor service quality and full life asset performance are maximized	✓	✓	✓✓
Cost, schedule certainty and affordability are maintained over the full life of the asset	X	X	✓
Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner	✓✓	✓✓	✓✓✓

Table 8 Summary of SB Assessment Results

Assessment Criteria	SB #1 (1 DBF; 1 DB)	SB #2 (1 DBF)	SB #3 (1 DBFOM)	SB #4 (1 DBFM)
Stakeholder concerns and commitments are addressed	✓✓	✓✓✓	✓✓✓	✓✓✓
Key Project risks are managed and mitigated	✓	✓✓	✓✓✓	✓✓
Competition, providing innovation and efficiencies, is maximized	✓	✓✓	✓✓✓	✓✓½
Corridor service quality and full life asset performance are maximized	✓	✓✓	✓✓✓	✓✓
Cost, schedule certainty and affordability are maintained over the full life of the asset	✓✓	✓✓½	✓✓✓	✓✓½
Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner	✓✓	✓✓✓	✓	✓

The following procurement options are recommended for detailed procurement options analysis in the business case.

6.3.1 Preferred Traditional Public Sector Delivery Model

The assessment highlighted PSC#3, a single DB contract encompassing the full scope of design and construction activities, as the preferred public sector comparator. Under this model, the Province would be responsible for all operating period activities (O&M).

Relative to the other two PSC options, this option scored equal or better against all assessment criteria. Efficiencies are expected in terms of coordinating and responding to stakeholder concerns, traffic management, risk management and cost management. This model would also be expected to benefit from efficiencies associated with allowing the contractor controlled access to the works from both north and south of the bridge.

6.3.2 Preferred Partnership Delivery Model

6.3.2.1 DBF

Based on this assessment the DBF is the preferred partnership delivery model. The DBF model scored moderate to high across all criteria categories, particularly in regards to the ability to implement changes during the life of the Project in the most cost effective manner.

The implementation of change criteria, in comparison to the other procurement criteria listed in Section 6.1 Assessment Criteria, has been identified by decision makers as critical to the long term success of the Project. For the Project, the contemplated change entails a significant capital investment and the cost premium, although not quantified as part of this assessment, is anticipated to be significant based on experience with earlier concession contracts. Furthermore, there is a potential delay element in procuring/implementing the change due to lengthy negotiations with the concessionaire who are not incentivized to meet the owner's schedule.

Long term partnership models, which take a whole life view of an asset in terms of risk transfer, have demonstrated to offer value for money on many large and complex transportation projects. However, the Project's O&M and rehabilitation scope is limited to the main bridge crossing (abutment to abutment) which reduces significantly the amount of operating period risk being transferred.

Although innovation, cost and schedule certainty, and full life asset performance are not maximized under a DBF procurement model primarily due to the absence of the O&M providers involvement, typically the majority of benefits are achieved and the risks are alleviated during the construction period, while others can be managed through the specification.

6.3.2.2 DBFOM

The assessment highlighted SB#3, a single DBFOM contract encompassing the full scope of design and construction activities plus private financing, and operations, maintenance and rehabilitation of the bridge, interchanges and road works, as the preferred partnership model. Relative to all other partnership options, this option scored the same or better consistently across all criteria, with the exception of allowing for changes to the Project scope. All long term partnership models scored lowest against this criterion given the long term fixed price nature of these contracts and the need to involve third party lenders in change discussions.

A long term partnership model adds complexity and cost to changes implemented during the operating phase of the Project. The complexity and cost are typically related to the overall value of the change and the potential impact to the risk profile of the original project scope. The Project could potentially face a large change if expanded from four to six lanes within the duration of a typical concession agreement of 25 to 35 years.

6.3.2.3 DBFM

SB#4, which excludes operations from the contractor's scope, was seen to diminish long term asset performance and quality resulting from a potential misalignment of operating period interests by separating out operations responsibilities from the main contract.

7 RECOMMENDATION

The two preferred procurement options identified in this report are recommended to be analyzed in detail through risk quantification, financial modeling and other procurement options assessment activities described in the business case:

- PSC#3 - One DB contract combining all major Project scope elements.
- SB#2 - One DBF contract for all construction period scope elements related to the new infrastructure, including the removal of the existing Pattullo Bridge.

Table 9: Qualitative Assessment Summary

Assessment Criteria	PSC#3 (DB)	SB#2 (DBF)
Stakeholder concerns and commitments are addressed	✓✓✓	✓✓✓
Key Project risks are managed and mitigated	✓✓	✓✓
Competition, providing innovation and efficiencies, is maximized	✓✓	✓✓
Corridor service quality and full life asset performance are maximized	✓✓	✓✓
Cost, schedule certainty and affordability are maintained over the full life of the asset	✓	✓✓ ^{1/2}
Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner	✓✓✓	✓✓✓

Through the business case process, each of these options will be further defined in the context of the Project, specifically with consideration of the technical specifications and commercial positions being considered by the Project team in the development of the procurement documents. The procurement options analysis carried out for the business case will provide the substantive basis for recommending the model most appropriate for the procurement of the Project.

APPENDIX A – DETAILED PROCUREMENT OPTIONS ASSESSMENT

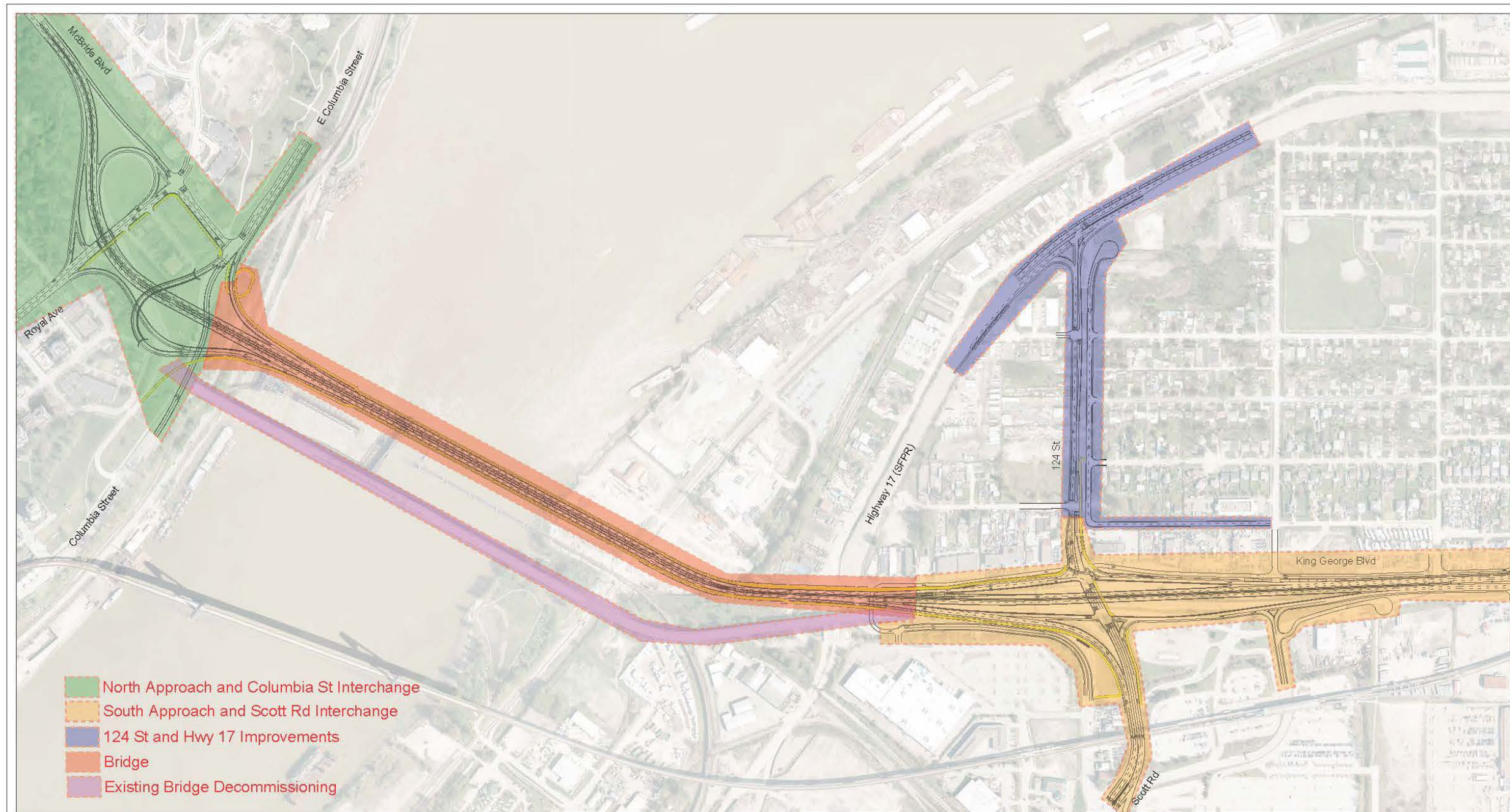
Assessment Criteria	PSC#1 – 3 DB	PSC#2 – 2 DB	PSC#3 – 1 DB
Stakeholder concerns and commitments are addressed <i>Consistency and thoroughness in communications and addressing stakeholder commitments.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met. the Province will need to coordinate with three contractors to ensure stakeholders concerns are addressed Increase in traffic disruptions during construction due to the need for coordination among multiple contractors 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met. the Province will need to coordinate with two contractors to ensure stakeholders concerns are addressed Increase in traffic disruptions during construction due to the need for coordination among multiple contractors Temporary traffic, rail and transit disruptions as well as detour staging for construction of the North Interchange and the North Approaches of the new bridge will be better coordinated with a single contractor 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met A reduced risk of traffic disruptions during construction by having a single contractor
Key Project risks are managed and mitigated <i>Key Project risks are allocated to the party best able to manage and mitigate them.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, the interchanges, and municipal roadworks are assigned to three separate contracts Interface risk between the bridge and the interchanges is managed by the Province Coordination of traffic management between the contractors is managed by the Province O&M risks are retained by the Province. Latent defects risk is retained by the Province. 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, and the North Interchange are combined into a single contract Interface risk between the bridge and the south interchange is managed by the Province Coordination of traffic management between the contractors is managed by the Province O&M risks are retained by the Province. Latent defects risk is retained by the Province 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, interchanges and municipal roadworks are combined into a single contract Interface risk between the bridge and the interchanges is managed by a single contractor Coordination of traffic management by a single contractor. O&M risks are retained by the Province. Latent defects risk is retained by the Province.
Competition, providing innovation and efficiencies, is maximized <i>Attractiveness, marketability and bankability of the project opportunity that brings innovation, efficiencies and value to taxpayers.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Local contractors would have experience and qualifications to effectively compete for the North and South Interchange packages May not to attract large national or international contractors for the construction of the North and South Approaches and Interchanges, because of the small scope Large national or international contractors would have experience and qualifications to effectively compete for bridge works - local contractors would likely be subcontractors Limited innovation and efficiencies to be realized with multiple contract arrangements, some elements would have to be prescriptive to ensure the interconnection of the three designs Lack of O&M integration could require more prescriptive specifications 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Local contractors would have experience and qualifications to effectively compete for the South Interchange. Large national or international contractors would have experience and qualifications to effectively compete for the bridge works - local contractors would likely be subcontractors. Some innovation and efficiencies gained by combining the bridge and North Interchange works into one contract Lack of O&M integration could require more prescriptive specifications 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Large national or international contractors partnered with local subcontractors would have experience and qualifications to effectively compete Further innovation and efficiencies gained by combining all Project construction elements into one contract Contract size is not so large as to restrict the market's ability to participate. Some efficiencies gained by allowing contractor controlled access to the works from both north and south Lack of O&M integration could require more prescriptive specifications
Corridor service quality and full life asset performance are maximized <i>Project objectives related to safety, reliability and access are achieved, construction impacts on traffic are minimized, and the asset performs effectively during operations.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> the Province to manage and coordinate traffic management among multi-contractor activities during construction Long term asset performance risk rests with the Province. Lack of incentive for long term asset performance Existing O&M contract continues with the relevant negotiated change order Lack of long term integration/concern over keeping lanes open 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> the Province to manage and coordinate traffic management among multi-contractor activities during construction Long term asset performance risk rests with the Province. Lack of incentive for long term asset performance Existing O&M contract continues with the relevant negotiated change order Lack of long term integration/concern over keeping lanes open 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Improved traffic management with one contractor during construction Long term asset performance risk rests with the Province Lack of incentive for long term asset performance Existing O&M contract continues with the relevant negotiated change order Lack of long term integration/concern over keeping lanes open

Assessment Criteria	PSC#1 – 3 DB	PSC#2 – 2 DB	PSC#3 – 1 DB
<p>Cost, schedule certainty and affordability are maintained over the full life of the asset <i>Project is delivered on time and on budget within fiscal and cash flow constraints.</i></p>	<p style="text-align: center;">X</p> <ul style="list-style-type: none"> • Schedule coordination challenging with multiple contracts underway simultaneously with coordination risk retained by the Province • Cost implications of efficiencies not realized by combining contracts could challenge fiscal constraints • Absence of a long term partnership may impact contractor's view of construction costs and could increase O&M costs during operations • the Province management resources stretched in management of multiple contractors • Incentive for on time delivery is limited to liquidated damages 	<p style="text-align: center;">X</p> <ul style="list-style-type: none"> • Schedule coordination challenging with multiple contracts underway simultaneously with coordination risk retained by the Province • Cost implications of efficiencies not realized by combining contracts could challenge fiscal constraints • Absence of a long term partnership may impact contractor's view of construction costs and could increase O&M costs during operations • the Province management resources stretched in management of multiple contractors • Incentive for on time delivery is limited to liquidated damages 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> • Single point of accountability and coordination increases probability of on time and on budget delivery of construction • Absence of a long term partnership may impact contractor's view of construction costs and could increase O&M costs during operations • Efficiencies in the Province's utilization of management resources by reducing the oversight to a single contractor and transferring the majority of the construction interface coordination to the contractor • Incentive for on time delivery is limited to liquidated damages
<p>Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner <i>Implementation of changes in service scope or future capital investment in the asset can be achieved in the most cost effective and efficient manner.</i></p>	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> • As the Province has assumed all responsibilities for maintenance and rehabilitations of the asset, there are no approvals required from the initial contractor or designer to implement any changes during operations. • Changes during operations can be competitively priced • Changes during operations affecting the O&M can be priced without external influences such as 3rd party lenders • Change to one DB contract during construction could have implications to one or both of the other DB contracts 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> • As the Province has assumed all responsibilities for maintenance and rehabilitations of the asset, there are no approvals required from the initial contractor or designer to implement any changes during operations • Changes during operations can be competitively priced • Changes during operations affecting the O&M can be priced without external influences such as 3rd party lenders • Change to one DB contract during construction could have implications to the other DB contract 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> • As the Province has assumed all responsibilities for maintenance and rehabilitations of the asset, there are no approvals required from the initial contractor or designer to implement any changes during operations • Changes during operations can be competitively priced • Changes during operations affecting the O&M can be priced without external influences such as 3rd party lenders

Assessment Criteria	SB#1 – 1 DBF & 1 DB	SB#2 – 1 DBF	SB#3 – 1 DBFOM	SB#4 – 1 DBFM
Stakeholder concerns and commitments are addressed <i>Consistency and thoroughness in communications and addressing stakeholder commitments.</i>	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met the Province will need to coordinate with two contractors to ensure stakeholders concerns are addressed Increase in traffic disruptions during construction due to the need for coordination among multiple contractors 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met A reduced risk of traffic disruptions during construction by having a single contractor 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met A reduced risk of traffic disruptions during construction by having a single contractor 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Stakeholder activities led by the Province, including environmental, aesthetics, communications ensuring commitments are met A reduced risk of traffic disruptions during construction by having a single contractor
Key Project risks are managed and mitigated <i>Key Project risks are allocated to the party best able to manage and mitigate them.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, and the North Interchange are combined into a single contract Interface risk between the bridge and the South Interchange is managed by the Province. Benefits of private financing during construction are not likely sufficient to overcome interface risks associated with multiple contracts (PSC#3 preferable to SB#1) Coordination of traffic management between the contractors is managed by the Province O&M risks are retained by the Province Latent defects risk is retained by the Province 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, interchanges and municipal roadworks are combined into a single contract Interface risk between the bridge and the interchanges is managed by a single contractor the Province is not required to manage and coordinate traffic management among contractors Construction period risks secured by private financing O&M risks are retained by the Province Latent defects risk is retained by the Province 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, interchange, municipal roadworks and all operating period activities (O&M) combined in single contract the Province is not required to manage and coordinate traffic management among contractors Construction and operating period risks secured by private financing 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Key interdependent risks among bridge construction, bridge removal, interchange, municipal roadworks and all rehabilitation activities combined in single contract the Province is not required to manage and coordinate traffic management among contractors Operations (post-completion) to be performed by existing operations contractor Construction and some operating period risks secured by private financing the Province would have to manage two contracts over the long term and the required coordination and potential conflicts
Competition, providing innovation and efficiencies, is maximized <i>Attractiveness, marketability and bankability of the project opportunity that brings innovation, efficiencies and value to taxpayers.</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Large national or international contractors would have experience and qualifications to effectively compete for the bridge works - local contractors would likely be subcontractors Local contractors would have experience and qualifications to effectively compete for the South Interchange works Some innovation and efficiencies gained by combining bridge and North Interchange works into one contract Lack of O&M integration could require more prescriptive specifications 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Large national or international contractors and local subcontractors would have experience and qualifications to effectively compete Further innovation and efficiencies gained by combining all project elements into one contract Lack of long term lifecycle risk dis-incentivises contractor from developing the most efficient and innovative design with the whole life of the asset in mind Lack of O&M integration could require more prescriptive specifications 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Large national or international contractors and local subcontractors would have experience and qualifications to effectively compete Innovation and efficiencies gained by combining all design and construction elements into one contract Some innovation and efficiency expected by combining O&M and construction by bringing O&M knowledge and innovation to the design development process Value for money gained by transferring latent defects risk 	<p style="text-align: center;">✓✓½</p> <ul style="list-style-type: none"> Large national or international contractors and local subcontractors would have experience and qualifications to effectively compete Innovation and efficiencies gained by combining all design and construction elements into one contract Operations provided and coordinated by the Province through existing operations contract (post-completion) Value for money gained by transferring latent defects risk Lifecycle costs and expected benefits from innovations may be impacted by poorly performing Operations contractor with which DBFM partner has limited control or influence
Corridor service quality and full life asset performance are maximized <i>Project objectives related to safety, reliability and access are achieved, construction impacts on traffic</i>	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> The Province to manage and coordinate traffic management among multi-contractor activities Long term asset performance risk rests with the Province 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Improved traffic management with one contractor Long term asset performance risk rests with the Province 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Greater contractor incentive for long term asset quality and performance for all Project elements Traffic management and coordination under one contract during construction, incident 	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Greater contractor incentive for long term asset quality for all Project elements Traffic management and coordination under one contract during construction only

Assessment Criteria	SB#1 – 1 DBF & 1 DB	SB#2 – 1 DBF	SB#3 – 1 DBFOM	SB#4 – 1 DBFM
<p><i>are minimized, and the asset performs effectively during operations.</i></p>	<ul style="list-style-type: none"> Lack of incentive for long term asset performance Existing O&M contract continues with the relevant negotiated change order Lack of long term integration/concern over keeping lanes open 	<ul style="list-style-type: none"> Lack of incentive for long term asset performance Existing O&M contract continues with the relevant negotiated change order Lack of long term integration/concern over keeping lanes open 	<p>response, maintenance works and rehabilitation cycles</p> <ul style="list-style-type: none"> Optimal alignment of operating period interests by including O&M with rehabilitation requirements High incentive for traffic management 	<ul style="list-style-type: none"> Existing O&M contract continues with the relevant negotiated change order. O&M performance by 3rd party to the agreement could reduce full life cycle efficiency impacting long term quality and performance of asset Some incentive for long term traffic management during rehabilitation cycles
<p>Cost, schedule certainty and affordability are maintained over the full life of the asset <i>Project is delivered on time and on budget within fiscal and cash flow constraints.</i></p>	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> Schedule coordination challenging with multiple contracts underway simultaneously with coordination risk retained by the Province and a high cost of delay due to the financing aspect of the DBF Cost implications of efficiencies not realized by combining contracts could challenge fiscal constraints Private financing added to major scope elements (bridge and North Interchange) adds third party financial discipline and increases probability of on time and on budget delivery of these elements, but not overall Project Private financing of the DBF elements will be a driver for the amount of liquidated damages imposed on the DB contract to incentivise on time delivery Absence of a long term warranty may impact contractor's view of construction costs and could increase O&M costs during operations the Province management resources stretched in management of multiple contractors 	<p style="text-align: center;">✓✓½</p> <ul style="list-style-type: none"> Single point of accountability and coordination increases probability of efficiencies and on time and on budget delivery Private financing adds third party financial discipline and increases probability of on time and on budget delivery of the overall Project Absence of a long term partnership may impact contractor's view of construction costs and could increase O&M costs during operations Efficiencies in the Province's utilization of management resources by reducing the oversight to a single contractor and transferring the majority of the interface coordination to the contractor 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> Single point of accountability and coordination increases probability of delivery on time and on budget Private financing adds third party financial discipline and increases probability of on time and on budget delivery of overall Project Private financing under this model allows for long term cost certainty including O&M and rehabilitation costs over the life of the concession Efficiencies in the Province's utilization of management resources by reducing the oversight to a single contractor and transferring the majority of the interface coordination to the contractor 	<p style="text-align: center;">✓✓½</p> <ul style="list-style-type: none"> Single point of accountability and coordination increases probability of delivery on time and on budget Private financing adds third party financial discipline and increases probability of on time and on budget delivery of overall Project Private financing under this model allows for long term cost certainty for rehabilitation costs over the life of the concession, but not operations Efficiencies in the Province's utilization of management resources by reducing the oversight to a single contractor and transferring the majority of the interface coordination to the contractor
<p>Ability to implement changes during the life of the asset (construction and operating phases) in the most cost effective manner <i>Implementation of changes in service scope or future capital investment in the asset can be achieved in the most cost effective and efficient manner.</i></p>	<p style="text-align: center;">✓✓</p> <ul style="list-style-type: none"> As the Province has assumed all responsibilities for maintenance and rehabilitations of the asset, there are no approvals required of the initial contractor or designer to implement any changes during the operation phase Changes during operations can be competitively priced Changes during the construction period that could impact schedule or risk profile will involve approval by 3rd party lenders, this could include change to the DB contract if there are potential impact to the DBF contract Changes affecting the O&M can be priced without external influences such as 3rd party lenders 	<p style="text-align: center;">✓✓✓</p> <ul style="list-style-type: none"> As the Province has assumed all responsibilities for maintenance and rehabilitations of the asset, there are no approvals required of the initial contractor or designer to implement any changes Changes during operations can be competitively priced Changes during the construction period that could impact schedule or risk profile will involve approval by 3rd party lenders Changes affecting the O&M can be priced without external influences such as 3rd party lenders 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Changes affecting the physical asset will require the involvement of the concessionaire and can impact the efficiency and cost of the change Changes affecting the O&M and rehabilitation cannot be priced without external approvals such as 3rd party lenders Major change such as at the future expansion could incur a significant cost premium for the concessionaire and lenders involvement based on the size of the capital investment 	<p style="text-align: center;">✓</p> <ul style="list-style-type: none"> Changes affecting the physical asset will require the involvement of the concessionaire and can impact the efficiency and cost of the change Changes affecting the O&M and rehabilitation cannot be priced without external approvals such as 3rd party lenders and must ensure not change to the risk profile Major change such as at the future expansion could incur a significant cost premium for the concessionaire and lenders involvement based on the size of the capital investment

APPENDIX B – KEY PROJECT SCOPE ELEMENTS (MAP)



- North Approach and Columbia St Interchange
- South Approach and Scott Rd Interchange
- 124 St and Hwy 17 Improvements
- Bridge
- Existing Bridge Decommissioning

PARSONS

SCALE
1:6000

DATE
07/11/2014

Pattullo Bridge Adaptable Bridge Concept

Initial Four Lane Bridge Configuration

EXHIBIT
3.1