



Ministry of  
Transportation  
and Infrastructure

## Pattullo Bridge Replacement Project

### Cost Report

January 2018

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## 1 PURPOSE

This document details the preliminary cost estimate for the Pattullo Bridge Replacement Project (the Project). The purpose of the estimate is to provide input to the Project business case, including risk quantification, value for money analysis, funding and procurement analyses.

## 2 BASIS FOR THE ESTIMATE

### 2.1 SCOPE OF THE WORKS

The capital cost estimate for the Project is based on a scope of work that comprises replacement of the existing bridge with a new four lane bridge up-stream of the existing bridge, which meets current Ministry of Transportation and Infrastructure (Ministry) standards,. In addition, the work includes street modifications in New Westminster to provide improved access to and from the new bridge, improvements to multi-use trails, tie-ins to roadworks in Surrey, a direct connection from the new bridge to Highway 17 and a grade separation between Highway 17 and Old Yale Road. The new bridge design will not preclude a potential expansion to a six-lane bridge in the future, if required.

### 2.2 SCOPE OF CAPITAL COSTS

The estimate includes both the owner's and the constructor's costs necessary to implement the project. The estimate assumes that all the work is carried out as one single project, delivered using a Design, Build, Finance (DBF) procurement model, and covers Project costs including:

- Project management;
- Preliminary design and technical investigations;
- Engagement and consultation;
- Procurement;
- Detailed design;
- Construction;
- Risk and contingencies;
- Interest during construction; and
- Existing bridge removal.

### 2.3 DUE DILIGENCE REVIEW OF THE ESTIMATE

A due diligence review of the capital cost estimate was conducted, which confirmed that the budget currently carried is reasonable to design and construct the replacement bridge with its associated roads and structures, including the removal of the existing structure.

## 3 PROCESS AND METHODOLOGY

### 3.1 KEY ASSUMPTIONS

The capital cost estimate was developed based on preliminary sketches, analysis and reports, as well as input and assumptions from subject-matter experts across multiple disciplines.

The estimate has been prepared with the use of unit rates calculated from anticipated construction methods required to carry out the work, historical knowledge of similar projects and current market conditions.

The estimate covers all costs associated with the implementation of the Project from January 2018 until the existing bridge is demolished and removed, following the new bridge, bridge approaches, and associated roadworks being open to traffic.

The construction, design and management costs included in the estimate assume a Project schedule as follows:

- Issue RFQ spring 2018;
- Issue RFP summer 2018;
- Financial Close summer 2019;
- Replacement bridge and associated network connections complete and open in 2023; and
- Existing bridge removal 2023/24.

Risk values and timing, retained by the owner and transferred to the contractor, are calculated as set out in the *Risk Report*. Risk values are reflected as a portion of overall contingencies. Therefore, Project contingency values, apportioned to each of the contractor and the owner, are risk-adjusted values.

The contractor's estimated interest during construction (IDC) is calculated as (1) the interest accrued on the amount of private financing amount calculated using an annual interest rate of 3.56%, plus (2) the up-front arrangement fee, minus (3) interest earned on the drawn but unspent private financing. The owner's IDC is estimated by the Ministry.

### 3.2 PROJECT ELEMENTS

The Project components are assumed to include the elements detailed below.

#### 3.2.1 New Bridge

##### River Crossing

The new bridge is assumed to be a lifeline (vital to regional transportation network integrity in accordance with bridge design standards), four-lane bridge with multi-use paths constructed to Ministry design

standards. The bridge will be designed in a manner so as not to preclude potential future expansion to six lanes and two multi-use paths. The bridge construction cost estimate is assumed to include the following:

- Construction of temporary access to facilitate the works;
- Ground improvement and densification;
- Deep foundations installed in the glacial till underlying the site;
- Allowances for working around railway operations, including flagging and management;
- Scour protection;
- Reinforced concrete abutments;
- Reinforced concrete columns and pylons;
- A supported deck of structural steel and concrete or precast concrete segmental construction, the final choice being the most cost effective and structurally suitable for the proposed design;
- Steel reinforcement;
- Erection gantries;
- Fendering protection of pylons;
- Deck surface;
- Median and edge barriers, and pedestrian deck railing;
- Deck expansion joints, shock transmission devices, and seismic bearings;
- Maintenance gantries, access elevators, lighting, drainage, and line marking; and
- Snow and ice management system.

### Approach Spans

Approach spans in New Westminster and Surrey will be constructed to provide access to the river crossing. Approach spans include the following:

- Superstructures similar to, and compatible with the main span;
- Concrete piers;
- Pile caps and deep foundations;
- Ground improvement as required;
- Multi-use paths;

- Median and edge barriers, and pedestrian deck railing;
- Expansion joints at abutments and bearings; and
- Lighting, drainage, and line marking.

### **3.2.2 Ramps**

The following single lane bridge ramps are included:

- Northbound bridge to eastbound Columbia Street;
- Westbound Columbia Street to southbound bridge; and
- Southbound bridge to westbound Highway 17.

Ramp structures consist of the following:

- Girder-type structures similar to, and compatible with, the main span and approaches;
- Girders supported on columns with pile caps and deep foundations;
- Multi-use paths;
- Edge barriers, and pedestrian deck railing;
- Expansion joints at abutments and bearings
- Lighting, drainage, and line marking.

It is assumed that the southbound bridge to westbound Highway 17 ramp will be completed very shortly after bridge opening, with the last span installed after the existing bridge is closed.

### **3.2.3 Road works and multiuse trails in City of New Westminster & Surrey**

Roadworks are assumed to be constructed to Ministry and TAC standards. The cost estimate includes costs for signage, gantries and associated lighting.

### **3.2.4 Landscaping Allowance**

Landscaping will be carried out as part of the Project.

### **3.2.5 Removal**

The existing Pattullo Bridge will be removed after the new bridge is opened to traffic.

### **3.2.6 Utilities**

Utilities affected by the Project will be relocated and/or protected.

### **3.2.7 Traffic Management**

Traffic management activities will involve temporary signage, temporary diversions, and traffic management crew necessary to carry out the work.

### **3.2.8 Communications**

Communications, engagement and community relations activities will be carried out throughout the Project.

### **3.2.9 Site Management and Establishment**

The Contractor's management of the design, engineering, and construction of the Project includes general management by the contractor's staff and consultants for the duration of the Project construction. This will include overall management, planning, procurement, cost and schedule control, commercial management, estimating, quality assurance, environmental control, safety monitoring and control, environmental monitoring, general administration, and offices for site based Project staff. The estimate is based on the current construction schedule

### **3.2.10 Contractor's Design and Engineering**

The estimate includes design of the new bridge, its approaches and roadworks, and associated work carried out by the Contractor necessary to complete the Project, including engineering, architectural, and civil works.

### **3.2.11 Bonding and Insurance**

The estimate includes overall Project insurance and bonding covering all construction and professional liability insurance together with bonding.

### **3.2.12 Head Office Overhead Contribution and Profit**

The estimate includes the general contractor's head office overhead contribution and profit. Sub-contractor's overhead and profit allowances are also included.

### **3.2.13 Owner's Management and Engineering**

Project management services for the Project include the general management by Project staff and consultants for the Project from January 2018 to completion of the bridge and removal of the existing bridge. This will include overall management, planning, procurement, systems integration, cost and schedule control, estimating, quality assurance, environmental control, offices, and operational costs. Initial planning costs incurred prior to January 2018 are not included.

### **3.2.14 Procurement**

The estimate includes procurement and legal work necessary to procure the Project as a DBF.

### **3.2.15 Pile Tests**

The estimate includes pile tests following contract award by the Contractor to assist the pile design for the Project.



### **3.2.16 Environmental, Archaeology, and First Nations**

The estimate includes environmental work necessary to obtain the environmental certificates, and the monitoring during construction required to ensure all environmental requirements are met.

### **3.2.17 Independent Engineer**

The services of an independent engineer are required to monitor and certify payment to the contractor, and to certify Project completion.

### **3.2.18 Public Consultation**

Community relations include public notifications, public information events and open houses, press liaison, and publications.

### **3.2.19 Property**

Cost for property purchase requirements is included.

### **3.2.20 Contingencies**

An allowance for specific contingencies has been set against each element of work dependent upon design development and risk to cover risks and contingency events, associated with alignment refinement, design development, unforeseen ground conditions, utilities, co-ordination with third parties, commercial risk, procurement and tendering risk, contract reserve during construction, and schedule risk.

**4 CAPITAL COST ESTIMATE**

The total estimated nominal Project cost is \$1.377 billion. Of this amount, the DBF contract is expected to be valued at approximately [REDACTED], while owner’s project management, technical program, environmental and consultation process, and procurement are estimated at approximately [REDACTED]. Capital costs are summarized in Table 1.

**Table 1 – Project Cost Estimate Summary (Nominal Dollars)**

Cost Estimate Detail	Total	Contractor Costs	Owner Costs
New Bridge			
New Bridge Ramps			
New Westminster Roadworks			
Surrey Roadworks			
Landscaping			
Utilities			
Traffic Management			
Systems Gantries			
Community Relations			
Signage and Systems			
Site Management And Establishment			
Contractor's Design And Engineering			
Bonding And Insurance			
Head Office Overhead Contribution And Profit			
Existing Bridge Demolition Costs			
Pile Tests			
Owner's Management And Engineering			
Environmental, Archaeology, Aboriginal Engagement			
Independent Engineer			
Public Consultation			
Procurement			
Property			
Interest During Construction			
Bid Development and SPV Costs			
Contingencies and Risk			
<b>Total Cost Estimate</b>	<b>1,377,000,000</b>		

Cash flow expectations during planning, procurement and implementation of the Project are summarized in Table 2. These estimates highlight anticipated non-eligible costs on an annual basis by fiscal year ending March 31. Risk adjusted contingencies are shown to accrue through construction and be

reconciled toward the end of the construction period. This presentation is consistent with experience on prior projects. Transferred and retained risk values are also summarized.

**Table 2 – Project Cash Flow Summary (Nominal Dollars)**

Cash Flow (FY ending March 31)	Total Nominal	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Contractor Costs								
Transferred Risks								
Bid Development and SPV Costs								
Risk-adjusted Contingency (Contractor)								
Interest During Construction (Contractor)								
<b>Sub-total Contractor</b>								
Owner Costs								
Retained Risks								
Non-eligible Costs (excluding IDC)								
Risk-adjusted Contingency (Owner)								
Interest During Construction (Owner)								
<b>Sub-total Owner</b>								
<b>Total Cost Estimate</b>	1,377,000,000							