



THE CORPORATION OF THE CITY OF COURTENAY

## STAFF REPORT TO COUNCIL

**To:** Council  
**From:** Chief Administrative Officer  
**Subject:** 5<sup>th</sup> Street Bridge Rehabilitation Project

**File No.:** 5335-20 / 5400-02  
**Date:** June 24, 2019

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### PURPOSE:

This report is intended to describe for Council the scope and costs of near-term rehabilitation of the 5<sup>th</sup> Street Bridge so as to restore it to its intended functional condition and achieve an updated useful life lasting until at least the year 2040.

This report also contains supplementary information on a potential level of service increase and capital upgrade to the 5<sup>th</sup> Street Bridge as an alternative to constructing a new Pedestrian Bridge at a 6th St location, should Council choose to consider such an unfunded capital upgrade or new capital construction.

### BACKGROUND:

Built in 1960, the 5<sup>th</sup> Street Bridge acts as a gateway to downtown Courtenay and requires rehabilitation to maintain the level of service for various modes of transportation. Over the years, multiple engineering assessments of the bridge have identified the need for structural repairs and re-coating to slow normal deterioration during service. Routine maintenance and periodic rehabilitation is important to ensure the asset's intended level of service and life-cycle can be achieved.

In 2016, the City engaged Hatch Mott Macdonald (HMM) and Urban Systems to complete a scoping study to determine the rehabilitation requirements. A field investigation and evaluation report recommended that the City repair several structural deficiencies, refurbish the bridge decking and recoat the bridge steel within the next five to seven years. The Class D estimate provided at that time was \$2.94M less \$1.96M from a successful New Building Canada Fund – Small Communities Fund (NBCF-SCF) grant application.

Urban Systems Technical Memorandum dated January 22, 2019 "5<sup>th</sup> Street Bridge Rehabilitation - Project Cost Escalation Summary" (Attachment 1) provides a 20-year chronology of rehabilitation needs, options and costs as they have evolved since 1999. For reasons provided below, the most recent estimate to meet the same intended scope of work and level of service until at least 2040 as well as continue to meet the existing grant approvals is \$6.3M. This estimate was received in November 2018 and reconfirmed in March 2019. Furthermore, repeated inquiries of the granting authority have confirmed that additional funding to accommodate cost escalations(s) are not available.

The detailed scope of work and funding options to achieve the planned rehabilitation are provided below in the body of this report.

Aside: while not yet presented to nor adopted by Council, staff can indicate that the draft Transportation Master Plan (TMP) identifies opportunities to improve east-west connectivity and safety for people who bike and walk. One, for example, is to consider an upgrade to the 5<sup>th</sup> Street Bridge by installing 3.0 metre cantilevered multi-use pathways on both sides of the existing bridge structure. Alternatively, construction of a new pedestrian-cycling bridge could be considered at 6th Street in future. Either option would require additional analysis and substantially more funding (see Financial Considerations below). As the former is an upgrade and the latter new construction, neither is included within the current scope of 5<sup>th</sup> Street Bridge rehabilitation nor may the City expend approved NBCF-SCF grant funding on these prospective initiatives.

These opportunities are included in the Options available to Council, but are not recommended for reasons provided below related to Asset Management principles suggesting mindfulness of unanticipated capital costs and the lack of full life-cycle cost information within an organization-wide context.

**CAO RECOMMENDATION:**

That based on the June 24<sup>th</sup>, 2019 staff report “5<sup>th</sup> Street Bridge Rehabilitation Project” Council approve OPTION 1 and OPTION 4:

OPTION 1 - That Council direct staff to proceed with the associated next steps to rehabilitate the 5<sup>th</sup> Street Bridge within its original scope including development of detailed traffic management and public engagement plans, and report back to Council no later than September 16, 2019; and

That staff simultaneously prepare a supporting draft Borrowing Bylaw for Council consideration.

OPTION 4 - That staff bring forward a report providing options for exploring a 6<sup>th</sup> Street multi-use pedestrian-bike bridge as an alternative to an upgrade to the 5<sup>th</sup> Street Bridge of adding cantilevered multi-use pathways; and

That a decision to explore and report on further development of a 6<sup>th</sup> Street multi-use pedestrian-bike bridge be subsequent to Council’s receipt and adoption of the forthcoming Transportation Master Plan.

Respectfully submitted,



David Allen, BES, CLGEM, SCLGM  
Chief Administrative Officer

**DISCUSSION:**

**Original Project Scope:**

For more than a decade the scope of rehabilitation of the 5<sup>th</sup> Street Bridge has been to repair structural deficiencies, refurbish the bridge decking and recoat the bridge steel within the next five to seven years. Specifically:

- Removal of the lead-based paint and application of new coating;
- Steel repairs to the end of the deck beams underneath the bridge;
- Recoating the steel (4,200 m<sup>2</sup>);
- Removal of the hand rails and hot dip galvanizing the railings and rub rails;
- Removal of existing concrete overlay;
- Deck concrete removal to a partial depth;
- Placement of a new concrete overlay; and
- new road markings.

In March 2018, a conceptual design investigation was completed confirming the previous scope of work remains accurate. However, the investigation noted that the deck requires more extensive repair than earlier anticipated. Due to the deteriorated condition of the deck, two full-scale improvements were considered: cathodic protection or full deck replacement.

Cathodic protection is a well-proven technique originating in the marine environment used to protect metal from corrosion. By making the protected metal the cathode in a small DC electrical circuit, with sacrificial metal blocks added to the exterior of the structure to act as an anode causing the softer metal anodes to corrode while the cathode – the structural steel of a ship – does not. Though its application to reinforcing steel embedded in the concrete structure of the 5<sup>th</sup> Street Bridge is more complex, the intended technique will yield the same benefit. Therefore, cathodic protection is preferred to full deck replacement as it will protect the deck from further corrosion for the remaining life of the bridge. While only a partial deck replacement is immediately necessary (~\$240K), the life-cycle costs of cathodic protection are far less expensive than a full deck replacement that will very likely be required early in the intervening 20 years.

The project team has reviewed several other bridge projects on Vancouver Island, in particular the recent bridge rehabilitation projects in Campbell River and Duncan. Figure 1 highlights the recent Campbell River bridge rehabilitation which also required “wrapping” the steel structure for recoating which allowed the bridge to remain open to traffic. Understanding market conditions and drawing on these recent experiences has informed our thinking on the options, estimates and alternatives for our own project. However, when considered within the context of the City’s needs for maximizing the life of the bridge, traffic management and community impacts, and the original grant requirements, many alternatives explored to date are not considered feasible.

Therefore, the updated budget for deck rehabilitation includes cathodic protection (rather than full or partial deck replacement) and traffic management costs to ensure the bridge remains open to single lane traffic throughout the approximate six month construction period. To protect the marine environment from the lead paint removal process, the bridge will be wrapped during construction, which may reduce the access height of the bridge, but a detailed traffic management plan will be developed to mitigate traffic impacts where possible. The traffic management plan will review the current crossing and alternate routes and recommend strategies for addressing safety and traffic flow amongst all transportation modes and types of vehicles. Although temporary closures may be required at scheduled times, a full closure of the bridge is no longer being contemplated.

### **Cost escalation:**

Since 2016, construction cost estimates for the original proposed scope of rehabilitation have increased significantly.

The original cost estimate of \$2.9 million contemplated cost-sharing of \$1.96 million (Province/Federal) and \$0.94 million (City of Courtenay) from the City’s reserve funds. The new cost estimate is \$6.3 million. This figure was received in November 2018 and reconfirmed in March 2019.

Representatives with the New Build Canada – Small Communities Fund have confirmed that the original grant amount of \$1.96 million would not be increased due to cost escalation. As a result, the City’s portion of the budget to rehabilitate the bridge (with no new pedestrian or cycling amenities) has increased to \$4.3 million.

Despite numerous cost estimates prepared over the last 20 years, which informed the grant application, the cost escalations over the last four years has been significant. The largest cost escalations occurred between 2014 and 2018, which have been record years for the value of construction on Vancouver Island,

increasing the cost of many municipal projects. Therefore, the cost impacts are in addition to conventional escalation (e.g. inflation), which is typical of construction trends, in combination with continuing deterioration of the bridge deck that requires a more intensive repair than originally estimated.

### **Opportunities for multi-modal amenities**

The draft City of Courtenay Transportation Master Plan recommends a number of strategies for improving pedestrian and cycling connectivity across the Courtenay River. While a network of trails and access routes exist on the east and west sides of the 5<sup>th</sup> Street Bridge, the existing 1.5 metre sidewalks on the bridge are limited in their ability to accommodate travellers and respond to expected growth in walking and cycling. Cyclists crossing the bridge are currently required to either use the centre of the vehicle lane or walk their bike on the sidewalk. The TMP outlined two options for improving connectivity across the River: an upgrade to the 5<sup>th</sup> Street Bridge by adding cantilevered multi-use pathways on both sides of the bridge or the construction of a new, dedicated pedestrian and cycling bridge at 6<sup>th</sup> Street.

*Cantilevered Multi-Use Pathway:* As part of the rehabilitation project, 3.0 metre multi-use pathways can be cantilevered on both sides of the bridge to improve the level of service for people who walk and bike across the bridge. Cost estimates for the cantilevered pathway are preliminary, as the extent of trail and pathway upgrades in the vicinity of the bridge have not been studied, preventing development of full life-cycle cost estimates. Preliminarily, the cost for cantilevered pathways is \$2 million including tie-ins to existing pathways. However, further study would be required to refine estimates and maximize cross-river connectivity. Also, undertaking this capital upgrade will extend the duration of the rehabilitation project by several months and introduce new risk due to these unknown design and cost uncertainties.

*Dedicated Multi-Use Bridge at 6<sup>th</sup> Street:* The draft TMP also explores the concept of a dedicated pedestrian-cyclist bridge at 6<sup>th</sup> Street as an alternative to upgrading the 5<sup>th</sup> St Bridge with cantilevered multi-use pathways. This proposal was also referenced in the draft Parks and Recreation Master Plan (PRMP). Preliminary cost estimates for this facility are \$2 million - \$4 million. Urban Systems Technical Memorandum dated January 31, 2019 "6th Street Pedestrian and Cycling Bridge Cost Comparison Summary and Analysis" (Attachment 2) provides further details.

Should this be a preferred option, further analysis including level of service and full life-cycle costs for detailed design, maintenance, extent of pathway tie-ins, environmental considerations, approach improvements for access around 6<sup>th</sup> Street, and other Asset Management implications of a new, unfunded and unanticipated capital asset will need to be explored. Choosing this option will not affect the 5<sup>th</sup> Street Bridge rehabilitation project as long as they are not undertaken simultaneously.

### **FUNDING**

Table 1 summarizes the original project estimate prepared in 2015 for the grant as well as the revised project costs in 2019 dollars.

**Table 1: 5<sup>th</sup> Street Bridge Rehabilitation – 2015 vs. 2019 Project Costs**

|  |
|--|
| 2015 Project Cost Estimate: \$2.9 million  |
| <ul style="list-style-type: none"><li>• Provincial/Federal Funding (grant): \$1.96 million</li><li>• City reserves: \$0.94 million</li></ul> |
| 2019 Project Cost Estimate: \$6.3M   |
| <ul style="list-style-type: none"><li>• Provincial/Federal Funding (grant): \$1.96 million</li></ul>   |

- City reserves \$0.94 million
- City Borrowing amount: \$3.4 million

**Table 2: Rehabilitation elements and associated costs**

| Rehabilitation Element                                   | COST (2019 \$)       |
|--|----------------------|
| Removal and replacement of Protective Coating            | \$4.1 million        |
| Cathodic Protection System to Extend Life of Bridge Deck | \$1.05 million       |
| Structural Improvements                                  | \$0.8 million        |
| Traffic Management                                       | \$0.35 million       |
| <b>Total</b>   | <b>\$6.3 million</b> |

A contingency is built into the project budget for costs such as engineering, communications, project financing, construction capital costs, inspection and contract administration.

### **OPTIONS**

Four options are presented below for Council consideration and are summarized in the following table:

| Project Element                            | 1) Original Scope<br>-<br>Rehabilitation  | 2) Rehabilitation<br>+ Cantilevers  | 3) Defer Project  | 4) New 6 <sup>th</sup> St.<br>Pedestrian<br>Bridge                       |
|--|---|---|---|--|
| <b>Outcome</b>                             | Rehabilitated crossing with 20-year updated useful service life with full utilization of the grant and cathodic protection versus deck replacement. | A rehabilitated crossing with extended service life that provides improved cycling and walking amenities, with full utilization of the grant. | Further deterioration and related liability of an important infrastructure asset. | Dedicated multi-use pedestrian-cyclist bridge at 6 <sup>th</sup> Street. |
| <b>Duration</b>                            | 6 months  | 8 months  | N/A   | N/A  |
| <b>Bridge Recoating &amp; Deck Renewal</b> | \$4.1 million   | \$4.1 million   | TBD   | N/A  |
| <b>Structural and Traffic</b>              | \$2.2 million   | \$2.2 million   | TBD   | TBD  |
| <b>Cantilever Pathway</b>                  | n/a   | \$2 million   | TBD   | N/A  |
| <b>Total</b>                               | \$6.3 million   | \$8.3 million   | TBD   | \$2 million to \$4 million   |
| <b>Reserves</b>                            | \$0.94 million  | \$0.94 million  |   |  |
| <b>City Borrowing Amount</b>               | \$3.4 million   | \$5.4 million   | N/A   | ALL  |
| <b>Borrowing Costs*</b>                    | \$233,300   | \$370,550   | N/A   | N/A  |
| <b>Tax Impact**</b>                        | 1%  | 1.6%  | N/A   | N/A  |

\* Borrowing costs calculated at standard MFA 20 year rate of 3.14%

\*\* Tax Impact calculated based on 2019 tax rates.

### **FINANCING IMPLICATIONS**

Project costs beyond grant funding and use of reserve funds would need to be financed as per municipal borrowing procedures for capital works (Municipal Finance Authority 3.14%, 20 year amortization). If Option 1 is chosen – the original scope of work – it would require borrowing \$3.4M and result in an estimated annual servicing cost of @\$233,000 per year, equaling approximately a 1% increase to the debt levy for property taxation purposes beginning in 2021 when the first payments would be due.

In order for the City to be included in the Fall 2020 long term borrowing issued through the Municipal Finance Authority, the borrowing process must begin no later than October 31, 2019. Steps to complete this process include bylaw preparation and three readings by Council, review and approval by the Province, elector approval, final adoption by Council with a one month quashing period, then issuance of a certificate of approval by the Province. The process can take up to eight months before funds are received.

### **ADMINISTRATIVE IMPLICATIONS**

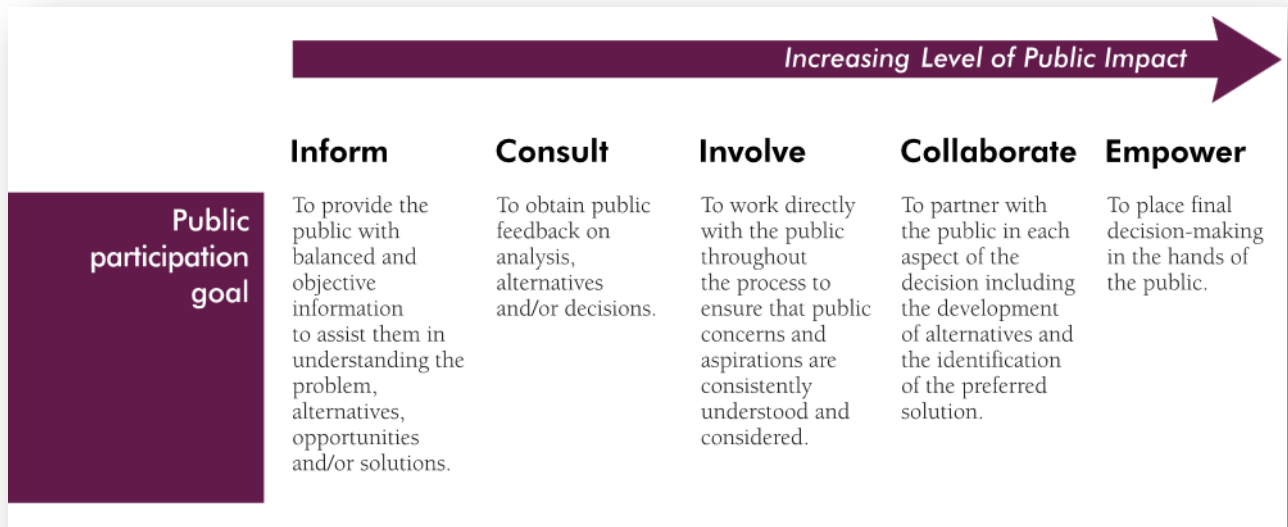
This will vary substantially depending upon the Option chosen, the method of project management and other factors that will be identified in the follow-on report of September 16, 2019.

### **PUBLIC ENGAGEMENT**

The 5<sup>th</sup> Street Bridge is a critical community asset which affects and supports a variety of stakeholders and users. There is a need for extensive engagement amongst residents, businesses, river users, recreational groups, commercial drivers, and transit service providers, among others.

Proactive communications efforts about the scope and timing of the project, the implications to traffic and pedestrian/cycling movements and the travel alternatives that can be utilized to limit delays during periods of construction is essential to supporting the community. A detailed engagement plan for the lead-up period, ongoing during construction and reporting out to the public on completion will be prepared for Council consideration once an Option has been selected by Council.

The levels of public engagement based on the IAP2 Spectrum of Public Participation will likely vary for each phase of the project.



## ASSET MANAGEMENT IMPLICATIONS

These are yet to be determined until an Option has been chosen.

## STRATEGIC PRIORITIES, OCP AND TMP REFERENCE

### Strategic Priorities 2019 - 2022

As part of the Strategic Priorities for 2019 – 2022 the following are relevant to the 5<sup>th</sup> Street Bridge Rehabilitation project:

#### **We proactively plan and invest in our natural and built environment**

- Focus on asset management for sustainable service delivery
- ▲ Look for regional infrastructure solutions for shared services
- ▲ Advocate, collaborate and act to reduce air quality contaminants
- ▲ Support social, economic and environmental sustainability solutions

#### **We plan and invest in methods of multi-modal transportation**

- Move forward with implementing the City's Transportation Master Plan
- ▲ Collaborate with regional and senior government partners to provide cost-effective transportation solutions

## Transportation Master Plan

In relation to the working draft of the TMP the following transportation vision was stated:

*The City of Courtenay supports a transportation network that prioritizes connectivity and access to daily destinations and, through a balanced approach to transportation planning, provides all road users safe choices in their mode of transportation.*

The supporting values to achieve the transportation vision include:

### Values

1. Sustainability, livability & health
2. Safety + efficiency

3. Economic Prosperity
4. Connectivity
5. Affordability
6. Sustainable Land Use

### **Official Community Plan**

In regards to the Official Community Plan for Courtenay, the following goals of Section 5.0 Transportation are relevant:

#### **5.2 Goals**

1. integrate land use changes with transportation planning to coordinate changes and increases to traffic patterns.
2. development of a transportation system that provides choices for different modes of travel including vehicle, transit, pedestrian, cycling and people with mobility impairments.
3. protect the integrity of the road classification system to facilitate the purpose and function of the specific road types.
4. support an integrated transportation system that works towards reducing travel distances and congestion.
5. support a transportation system that recognizes the importance of the character and overall appearance of the City.
6. provide an effective transportation system that facilitates the movement of vehicles throughout the community and the Comox Valley to major regional services such as the Little River Ferry System and the Comox Valley Airport.

### **CONCLUSION**

Given the need for rehabilitation and the increasing cost escalation that will continue should work be delayed, City staff recommend that Council direct staff to proceed with Option 1 and the associated next steps to rehabilitate the 5<sup>th</sup> Street Bridge, including developing a traffic management plan that maintains single lane vehicles access during construction, and comprehensive public engagement strategy. Staff also recommend that a draft Borrowing Bylaw for Council be prepared for Council consideration and staff will report back to Council in September 2019.

### **OPTIONS**

#### **Option 1 & Option 4 (Recommended):**

Option 1 - That Council direct staff to proceed with the associated next steps to rehabilitate the 5<sup>th</sup> Street Bridge within its original scope including development of detailed traffic management and public engagement plans, and report back to Council no later than September 16, 2019; and

That staff simultaneously prepare a supporting draft Borrowing Bylaw for Council consideration.

Option 4 - That staff bring forward a report providing options for exploring a 6<sup>th</sup> Street multi-use pedestrian-bike bridge as an alternative to an upgrade to the 5<sup>th</sup> Street Bridge of adding cantilevered multi-use pathways; and

That a decision to explore and report on further development of a 6<sup>th</sup> Street multi-use pedestrian-bike bridge be subsequent to Council's receipt and adoption of the forthcoming Transportation Master Plan.



Option 2:

That Council direct staff to proceed with the associated next steps to rehabilitate the 5<sup>th</sup> Street Bridge including the upgrade of adding cantilevered multi-use pathways plus development of detailed traffic management and public engagement plans, and report back to Council no later than September 16, 2019; and

That staff simultaneously prepare a supporting draft Borrowing Bylaw for Council consideration.

Option 3:

That Council direct staff to defer the 5<sup>th</sup> Street Rehabilitation Project to a future date of their choosing.

Prepared by:



Ryan O'Grady, P.Ag., P.Eng.  
Director of Engineering Services

Prepared by:



David W. Love, CD, BA, LGM(Dip), MM, PE, PCAM  
Senior Advisor, Strategic Initiatives

**ATTACHMENTS (2):**

1. Urban Systems Technical Memorandum dated January 22, 2019 "5<sup>th</sup> Street Bridge Rehabilitation - Project Cost Escalation Summary".
2. Urban Systems Technical Memorandum dated January 31, 2019 "6<sup>th</sup> Street Pedestrian and Cycling Bridge Cost Comparison Summary and Analysis"

**APPENDIX A: FIGURES (2)**

1. Fully Wrapped Bridge Accommodating Traffic
2. Conceptual Plan View of Cantilever-Pathway and Network

# MEMORANDUM

Date: January 22, 2019  
To: Adam Pitcher, Engineering Technologist  
Cc: Ryan O'Grady, Director of Engineering Services  
From: Eric Sears  
File: 3222.0045.02  
Subject: 5th Street Bridge Rehabilitation – Project Cost Escalation Summary

The City of Courtenay is undertaking design and implementation of a number of required rehabilitation components for the 5<sup>th</sup> Street Bridge. Current construction cost estimates for the proposed works are significantly higher than the project costs requested in the grant funding that has been secured for the project. The grant funding received was \$2,947,400, which was based on previous estimates that have been prepared in various reports for the City over the past 20 years.

The purpose of this memo is to provide the City with a summary and timeline of previous reports and corresponding cost estimates regarding the required rehabilitation of the 5<sup>th</sup> Street Bridge.

This memo is presented in chronological order dating from a 1999 *Repainting of the Fifth Street Bridge* report to the 2015 *New Building Canada Fund - Small Communities Fund (NBCF-SCF)* grant application. Reports ranged from full bridge assessments and rehabilitation recommendations to basic costing updates.

The following reports were considered and summarized below:

1. October 1999 – *Repainting of Fifth Street Bridge, McElhanney Consulting Services Ltd.*
2. December 2002 – *5th Street Bridge Inspection, Watermain Installation Feasibility & Repainting Analysis, McElhanney Consulting Services Ltd.*
3. December 2008 – *Bridge Condition and Life-Cycle Cost Evaluation Report – 5th Street Bridge, McElhanney Consulting Services Ltd.*
4. February 2013 – *5th Street Bridge Rehabilitation Project – 2013 Status Update, McElhanney Consulting Services Ltd.*
5. *5th Street Bridge Cost Estimates – 2015 Dollars, McElhanney Consulting Services Ltd.*
6. February 2015 – *NBCF-SCF Grant Application.*

## REPAINTING OF FIFTH STREET BRIDGE – OCTOBER 1999

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The 1999 report included a structural assessment of the bridge, which was noted to be in “excellent structural condition” at the time. The majority of the original bridge coating was intact and bonding well to the steel. Corrosion was primarily limited to areas of physical damage to the coating. The condition of the superficial green vinyl paint was variable and visibly flaking of in some areas.

Two surface preparation methods were proposed: localized cleaning and paint removal using high pressure power washing, and abrasive sandblasting to remove all paint on the structure. Though the abrasive blasting was the preferred method, as it would result in complete removal of all hazardous lead containing paint, but localized high pressure power washing was ultimately recommended at the

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time to reduce costs. For consistency, the cost estimate for the complete abrasive removal of the existing coating was considered for cost comparisons in this memo.

The total presented cost of the coating upgrades was \$660,000 in 1999 dollars. Cost estimates appear to be thorough, utilizing detailed quantity take-offs and contractor quotes.

## 1999 Report Summary

| Year | Scope of Repairs                                   | Costs     | Changes in Scope from Previous Estimate | Cost Escalation from Previous Estimate | Apparent Development of Cost Estimates |
|------|--|-----------|---|--|--|
| 1999 | Complete removal of existing coating and recoating | \$660,000 | N/A                                     | N/A                                    | Detailed cost estimate                 |

## 5<sup>TH</sup> STREET BRIDGE INSPECTION, WATERMAIN INSTALLATION FEASIBILITY & REPAINTING ANALYSIS – DECEMBER 2002

The 2002 report expanded on the 1999 report with a more detailed structural analysis. A slight increase in corrosion was noted when compared to the 1999 analysis; however, the bridge was still designated to be in good condition. Immediate remediation of the bridge was not recommended, but it was noted that recoating would significantly prolong the life of the structure.

Four levels of coating treatment were proposed: complete recoating, removal of loose paint and corroded steel and overcoating, no action, or aesthetic overcoating. It was recommended that complete recoating of the bridge be completed, unless the bridge was replaced within the next 15 years.

The total presented cost of the complete coating upgrades was \$950,000. Cost estimates again appear to be thorough and include various options from several contractors.

## 2002 Report Summary

| Year | Scope of Repairs                                   | Costs     | Changes in Scope from Previous Estimate | Cost Escalation from Previous Estimate | Apparent Development of Cost Estimates |
|------|--|-----------|---|--|--|
| 2002 | Complete removal of existing coating and recoating | \$950,000 | No change                               | +/- 13% per year for three years       | Detailed cost estimate                 |

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## BRIDGE CONDITION AND LIFE CYCLE COST EVALUATION REPORT – 5TH STREET BRIDGE – DECEMBER 2008

The 2008 report featured an in-depth Life Cycle Cost (LCC) analysis of the 5<sup>th</sup> Street Bridge from 2008 to the eventual replacement of the bridge. As part of the LCC analysis, a complete bridge inspection, including structural assessment, was conducted. The condition of the steel was once again noted to be in generally good to excellent condition, with a few small areas of corrosion where the coating had completely failed. Overall, the coating was noted to be in its “mid to late stages of useful life.”

Seven scenarios were considered, four of which evaluated bridge recoating. The four recoating scenarios varied in the timing of recoating work across the remaining lifecycle of the bridge. The recommended scenario included recoating of the splash zone in year 5 of the lifecycle, with the remainder of the recoating and any touch-ups to be completed in year 11. The scenario utilized for cost comparison in this memo considers the complete recoating of the surface at one time, without returning for touch-ups.

This report contains the first mention of the deteriorating condition of the bridge decking. In addition to the recoating, general bridge rehabilitation and replacement of the deck overlay was included in the recommendations. The recommendations included replacement of deck joints, partial removal and patching of the bridge deck and sidewalk concrete surface, sealing of the deck and sidewalk surface, birds nest protection and steel rail straightening.

The total presented costs were broken out as \$2,256,276 for the recoating of the bridge structure and \$222,344 for the deck rehabilitation, for a total of \$2,478,620 in 2008 dollars. The bridge structure recoating was prepared based on an estimate from a coating specialist of \$1,837,262 plus a contingency of 25%.

### 2008 Report Summary

| Year        | Scope of Repairs   | Costs  | Changes in Scope from Previous Estimate | Cost Escalation from Previous Estimate                  | Apparent Development of Cost Estimates |
|-------------|--|--|---|---|--|
| <b>2008</b> | Complete removal of existing coating and recoating<br><br>Deck repairs | \$2,256,276<br>Coating Costs<br><br>\$222,344 for Deck Repairs | Addition of deck repairs                | +/- 15.5% per year over 6 years for coating costs only. | Detailed cost estimate                 |

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## 5TH STREET BRIDGE REHABILITATION PROJECT – 2013 STATUS UPDATE – FEBRUARY 2013

The City of Courtenay completed maintenance to the bridge in 2012, including some items from the general bridge rehabilitation work that was recommended in the 2008 report. These minor repairs allowed for further inspection of the bridge in locations not previously accessible, such as the below deck structure. “Moderate to heavy corrosion” was noted at the ends of the deck beams. It was also noted in the report that “repairs will be needed at the ends of the main deck beams, prior to recoating the bridge”. The condition of the bridge was downgraded to fair, and it was noted that a complete recoating would be required.

Costs developed as part of the 2008 report were updated and modified to reflect observations made in 2012. Recoating cost estimates were increased to \$2,405,000. The recoating costs utilized the 2008 cost estimate plus minor allowances for traffic control and mobilization. It appears that the base cost of the coating as presented in 2008 (\$2,256,276) was not updated or increased in the 2013 cost estimates.

The deck rehabilitation estimate was increased to \$231,900, due to a \$14,000 increase in the “Remove Existing Overlay” line item. Deck concrete removal, new concrete overlay, and line painting costs were not adjusted from 2008 costs.

\$125,000 was added to the estimate for the structural repairs to the deck beams for a total project cost of \$2,761,900.

### 2013 Report Summary

| Year | Scope of Repairs  | Costs                            | Changes in Scope from Previous Estimate          | Cost Escalation from Previous Estimate   | Apparent Development of Cost Estimates                     |
|------|---|----------------------------------|--|--|--|
| 2013 | Complete removal of existing coating and recoating          | \$2,405,000 Coating Costs        | Addition of structural repairs to the deck beams | No escalation or inflation costs were considered. Cost increases were due to addition scope. | Use of previous cost estimates plus additional allowances. |
|      | Deck repairs  | \$231,900 for Deck Repairs       |  |  |  |
|      | Structural repairs of deck beams on underside of the bridge | \$125,000 for Structural Repairs |  |  |  |

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## 5TH STREET BRIDGE – COST ESTIMATES – 2015

The 5<sup>th</sup> Street Bridge Cost Estimate – 2015 document contains an updated cost estimate not accompanied by a report. The document contains an update to cost estimate tables for recoating of the bridge and rehabilitation of the concrete decking.

Complete recoating and structural repair cost estimates were increased to \$2,631,000. The deck rehabilitation estimate was increased to \$241,200 for a total of \$2,716,900. The unit costs noted in the document are a 4% increase to the 2013 costs.

### 2015 Report Summary

| Year | Scope of Repairs  | Costs                            | Changes in Scope from Previous Estimate | Cost Escalation from Previous Estimate | Apparent Development of Cost Estimates              |
|------|---|----------------------------------|---|--|---|
| 2015 | Complete removal of existing coating and recoating      | \$2,501,200 Coating Costs        | none                                    | 4% increase from 2013 costs.           | Use of previous estimates plus an inflation factor. |
|      | Deck repairs  | \$241,200 for Deck Repairs       |   |  |   |
|      | Structural repairs of deck beams on underside of bridge | \$130,000 for Structural Repairs |   |  |   |
|      |   |                                  |   |  |   |

## NBCF-SCF GRANT APPLICATION – FEBRUARY 2015

The grant application submitted in February 2015 for the bridge retrofit utilized costs from the “5<sup>th</sup> Street Bridge Cost Estimate – 2015 Dollars” document. The total project costs noted in the funding request is the value of the 2015 estimate, with an additional \$75,000 included under Design/Engineering Costs. This addition is assumed to be for a scope review exercise that was noted in the application document. The scope of repair work presented in the grant application includes:

- Bridge recoating:
  - Steel repairs to the end of the deck beams underneath the bridge (20 ea)
  - Recoating of all the steel (4,200 m<sup>2</sup>)
  - Removal of the handrails and hot dip galvanizing the railings and rub rails
- Deck re-surfacing
  - Removal of existing overlay
  - Deck concrete removal, partial depth
  - New concrete overlay
  - Line painting

The scope in the grant application is consistent with the scope of work presented in previous reports.

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## 2018 PROJECT SCOPE AND COSTING

The project scope currently includes all items included in the 2015 grant application noted above. In 2017, there was a scope confirmation exercise performed by the Urban Systems team to reconfirm the needs of the repairs. This review did not reveal any new deficiencies on the bridge but did acknowledge that the concerns are getting worse.

The concept for the deck repairs was recommended to be changed from a full deck replacement to a cathodic protection system that will provide future protection to the deck for the life of the bridge. This concept was chosen due to the lifecycle costs and lower traffic impacts, but does come at a slight cost premium over the originally proposed concrete deck removal concept.

### 2018 Report Summary

| Year        | Scope of Repairs  | Costs   | Changes in Scope from Previous Estimate                        | Cost Escalation from Previous Estimate   | Apparent Development of Cost Estimates   |
|-------------|---|---|--|--|--|
| <b>2018</b> | Complete removal of existing coating and recoating<br><br>Deck repairs<br><br>Structural repairs of deck beams on underside of the bridge | \$4,800,000 for Coating and structural repairs<br><br>\$1,500,000 for Deck Rehabilitation | Increased traffic management and new deck replacement concept. | +/- 30% per year over 3 years from grant funding request date.<br><br>+/- 9.9% per year over 10 years from 2008 Costs. | Detailed costs estimate and comparison based on similar projects on Vancouver Island |

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## CONCLUSIONS

The table below provides a summary of the scope and costs presented in the reports above.

Bridge Remediation Cost Summary

| Year | Scope of Repairs   | Costs   | Changes in Scope from Previous Estimate                        | Cost Escalation from Previous Estimate  | Apparent Development of Cost Estimates                                    |
|------|--|---|--|---|---|
| 1999 | Complete removal of existing coating and recoating           | \$660,000.00  | N/A  | N/A   | Detailed Cost Estimate  |
| 2002 | Complete removal of existing coating and recoating           | \$950,000.00  | None   | Approximately 13% per year for three years  | Detailed Cost Estimate  |
| 2008 | Bridge recoating and deck rehab                              | \$2,478,620.00  | Addition deck rehabilitation                                   | Approximately 15.5 % for 6 years  | Detailed Cost Estimate  |
| 2013 | Bridge recoating and deck rehab                              | \$2,761,900.00  | Addition of structural repairs to the deck beams.              | Cost increases were due to additional scope; no escalation costs were included from 2008 costs.             | Updates to 2008 Costs   |
| 2015 | Bridge recoating and deck rehab                              | \$2,872,400.00  | None   | 2.1% per year for 2 years   | Updates to 2013 Costs   |
| 2015 | Grant application  | \$2,947,400.00  | None   | N/A   | 2013 values plus an additional \$75,000 for scope confirmation activities |
| 2018 | Recoat all steel, structural repairs and deck rehabilitation | \$4,800,000 for Coating and structural repairs<br>\$1,500,000 for Deck Rehabilitation | Increased traffic management and new deck replacement concept. | Approximately 30% for 3 years from grant funding request<br>Approximately 9.9% for 10 years from 2008 costs | Detailed Cost estimate based on similar projects on Vancouver Island      |



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Based on the information presented above we can make the following conclusions:

- Cost estimates for the bridge have been prepared numerous times over the past 20 years, and cost escalation from previous estimates have been significant.
- Prior to the 2018 detailed estimate, the last detailed estimate was performed in 2008.
- From 2008 to 2015, when the grant was submitted, the cost increases were minimal and mostly associated with small inflation factors and small additions to the scope of the work. The base costs for the coating replacement and the deck repair work were not increased between 2008 and 2015.
- In 2014/2015 when the grant was prepared, the construction market on Vancouver Island was variable. Between 2014 and 2018, there have been record years for the value of construction on Vancouver Island, which has escalated costs significantly for many municipal projects.
- The costs presented previously did not consider major traffic shutdowns, and minimal traffic management costs were carried in the estimates. This implies that a full bridge shutdown was anticipated. The costs presented in 2018 include a concept of maintaining a single lane, alternating traffic pattern. This concept comes at a cost premium to the overall project costs.

Regards,

A handwritten signature in blue ink, appearing to read "E. Sears".

Eric Sears, P. Eng.  
Project Leader  
/eds

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# MEMORANDUM

Date: January 31, 2019  
To: Adam Pitcher, Engineering Technologist  
cc: Ehren Lee, P.Eng  
From: Eric Sears, P.Eng  
File: 3222.0049.01  
Subject: 6th Street Pedestrian and Cycling Bridge Cost Comparison Summary and Analysis

## 1. Introduction

In 2014, the 6<sup>th</sup> Street Bridge Steering Committee prepared a report outlining a conceptual design for a pedestrian and cycling bridge across the Courtenay River located at the foot of 6<sup>th</sup> Street which would connect to Simms Millennium Park. The report outlined a preferred design, community impact, constraints, opportunities, and costing information for a proposed 6<sup>th</sup> Street pedestrian bridge.

The cost presented in the 2014 report estimated \$1.3 million to \$1.5 million for the bridge construction, \$300,000 for engineering and construction management soft costs, and an allowance of \$150,000 for landscaping, a timber gateway feature, and lighting. A contingency of approximately 15% was also included to present a total cost estimate for the project of approximately \$2.0 million.

The concept of the 6<sup>th</sup> Street pedestrian bridge has recently been brought up as part of discussions around the potential scope of work for the 5<sup>th</sup> Street Bridge and the Transportation Management Plan regarding pedestrian and cycling connections across the river. In a presentation to council on November 26<sup>th</sup>, 2018 we noted that the expected costs for a pedestrian crossing could be \$3.5 to \$4.0 million.

## 2. Cost Estimate Discussion

Cost estimates prepared during the conceptual design stage are typically classified as Class D or Order-of-Magnitude cost estimates. Class D cost estimates typically carry a 35% to 50% contingency due to the level of uncertainty with the design and potential project risks during the conceptual design stage. Major factors that lead to this uncertainty is project scope, geotechnical considerations and market fluctuation. At the conceptual design phases, these items have not been confirmed and can fluctuate greatly by the time of construction.

All cost estimates, including Class D, should provide unit prices and/or allowances included for the project scope with the contingency applying to the total amount. Engineering and construction management fees are included at this stage at typically 15-20% of the construction budget (including contingency) to cover the detailed design, contract administration and inspection labour.

## 3. 2014 Concept Design and Cost Estimate

The 6<sup>th</sup> Street Steering Committee prepared a conceptual design report outlining the type of bridge, bridge deck width, and landscaping and urban design treatments for the 6<sup>th</sup> Street pedestrian and cycling bridge. The concept design of the bridge was well developed and a cable stayed type bridge was selected as the preferred design due to the expected relatively low cost and the iconic nature of the type of bridge. The

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steering committee reached out to a bridge engineer to provide a conceptual cost estimate for the construction of the bridge, engineering and construction management. The costs discussed in the report are approximately \$2,000,000 for the project which includes the bridge, allowances landscaping and entry features along with engineering and contingency allowances. The cost estimate developed for the 2014 concept design report was provided with very little details so there is no way to review the unit costs used during the preparation of the cost estimate. A 15% contingency and allowances for Engineering Costs were included in the project costs.

Cost for bridge structures are often presented based on a price per m<sup>2</sup> of the structure. In 2014 the base bridge cost was presented at approximately \$4,600/m<sup>2</sup> assuming a 5m wide structure spanning 65 m. This would be for the construction of the bridge structure only at \$1,500,000.

#### 4. 2019 Cost Considerations

Urban Systems has reviewed the previous costs for the 6<sup>th</sup> Street Pedestrian Bridge along with other pedestrian bridges that have been constructed on Vancouver Island in the past couple of years. Two highway pedestrian crossings in Victoria have recently been constructed at costs between \$3,000 and \$4,500 per m<sup>2</sup>. Based on the comparison of these two projects we would expect the 6<sup>th</sup> Street Bridge to be costlier than these two bridge costs. Costs will be higher in Courtenay compared to Victoria and working across the River will add to the complexity of the project. Geotechnical considerations are also a major unknown at the location of the 6<sup>th</sup> Street crossing.

Based on the information in the 2014 design report there may be also a number of items that might not have been included in the cost estimates. These would include:

- Clearing, grubbing and stripping;
- Pathways tying into existing infrastructure;
- Bridge lighting;
- Landscaping;
- Environmental;
- Retaining Structures outside of bridge; and
- Associated roadworks upgrades.

#### 5. Summary Discussion

Construction costs are usually expected to increase by 3% to 5% each year due to standard inflation and price escalation. However, over the past 5 years on Vancouver Island construction has increased dramatically with unit rates for standard construction material closely following. The Vancouver Island Construction Association release reports every year about the state of construction on Vancouver Island. The year 2014 according to these reports was a bit of a lull in the construction industry while the year 2018 was amongst the busiest years for construction on the Island. Prices tend to increase for construction work during boom years which would suggest a significant increase for the 6<sup>th</sup> Street Pedestrian and Cycling bridge from 2014.

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Based on the above, If the City were to proceed with constructing a pedestrian bridge at 6<sup>th</sup> Street we would expect that a complete bridge structure with connections at either end of the span could be completed for \$3.5 to \$4.0 million, including contingencies, engineering and other associated costs.

In order to refine these costs and reduce potential risks, further preliminary design considerations, including geotechnical reviews would need to be prepared.

Sincerely,

**URBAN SYSTEMS LTD.**

A handwritten signature in blue ink, appearing to read "E. Sears", with a stylized flourish at the end.

Eric Sears, P.Eng  
Municipal Engineer

/eds

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*Figure 1: Fully Wrapped Bridge Accommodating Traffic*



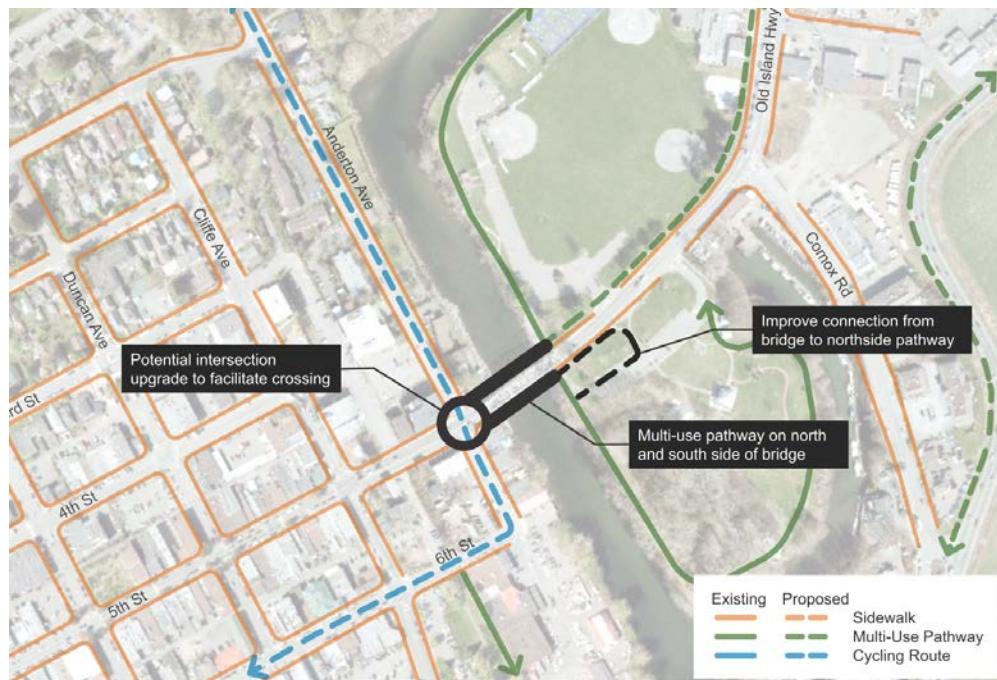


Figure 2: Conceptual Plan View of Cantilever-Pathway and Network