

HALIFAX

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 15.1.1
Halifax Regional Council
September 24, 2019

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed by 
Jacques Dubé, Chief Administrative Officer

DATE: August 21, 2019

SUBJECT: Increase to Contract, RFP-18-306 Consulting Services – BR041- Lucasville Bridge Rehabilitation Design

ORIGIN

This report originates from a need to increase the cost for RFP No. 18-306 Consulting Services – BR041- Lucasville Bridge rehabilitation design and estimate beyond 20% and \$20,000 of its original award.

LEGISLATIVE AUTHORITY

Under the HRM Charter, Section 79A (1) Subject to subsections (2) to (4), the Municipality may only spend money for municipal purposes if

- (a) the expenditure is included in the Municipality's operating budget or capital budget or is otherwise authorized by the Municipality;

Appendix B of 2016-005-ADM, the Procurement Administrative Order, provides that contract amendments that exceed the greater of 20% of the original award amount or \$20,000, must be approved by Council for funds to be issued.

RECOMMENDATION

It is recommended that the Halifax Regional Council approve an increase to contract with Harbourside Engineering Consultants (Purchase Order No. 2070790796) for additional work from the original scope in the amount of **\$38,794** (net HST included) with funding from Project Account CR180003– Bridges as outlined in the Financial Implications section of this report.

BACKGROUND

The Lucasville Bridge is a concrete girder structure which carries Lucasville Road (North-South) over the Sackville River. It is a single span concrete girder structure, approximately 21.5 meters in length with overall bridge width of 13.4 meters. In 2017, HRM retained the services of CBCL Limited to complete a Level 2 inspection for 106 bridge structures including BR041- Lucasville Bridge. The structure is showing signs of deterioration and is performing to a lower level than originally intended. Some components of the structure are becoming deficient. Based on the structural conditions and service life of the bridge, CBCL recommended some rehabilitation of the structure.

The approved 2018/19 Capital Budget included funds for the detailed rehabilitation design of Lucasville Bridge. In accordance with the terms and conditions of RFQ 17-063, cost proposals were collected from different consultants. Based on a competitive evaluation of received bids, Project Planning and Design Services awarded the project to Harbourside Engineering for \$27,126 (Net HST included) in April 2018, to provide Consulting Engineering Services and to complete a rehabilitation design of BR041- Lucasville Bridge.

DISCUSSION

As a part of the rehabilitation design, on May 30, 2018, Harbourside Engineering completed a detailed site inspection of the bridge and identified additional scope of work over and above that requested in the RFP 18-306.

To justify Harbourside's findings, staff engaged Hatch Corporation for a third review and to verify the additional scope of rehabilitation work on October 19, 2018. In April 2019, Hatch submitted their final inspection report which recommended similar rehabilitation strategies as identified by Harbourside Engineering. The consultants also recommended completing the additional rehabilitation work as it will potentially extend the design life of the bridge.

Additional scope of work includes design of scour rehabilitation of the bridge abutment, replacement of failed bridge bearings, elimination of bridge joints, address the effects of the alkali aggregate reactivity, site survey, environmental permitting, design drawings, specifications and cost estimates.

As a result of the above additional scope, the cumulative increase of consultant design fees is \$38,794 (net HST included). A summary of the changes are as follows:

Contract Award (Net HST included)	\$ 27,126
Current Request for Increase (net HST included)	\$ 38,794
Cumulative Increase to Date (net HST included)	\$ 38,794
New Contract Value (Net HST included)	\$ 65,920

This request for increase \$38,794 (Net HST included) represents a cumulative increase of 143% to the original contract of \$27,126.

A copy of the change request is attached to this report.

FINANCIAL IMPLICATIONS

Funding in the amount of \$37,200 plus net HST of \$1,594 for a net total of \$38,794, is available from Project Account No. CR180003 – Bridges. The budget availability has been confirmed by Finance.

Budget Summary: **Project Account No. CR180003– Bridges**

Cumulative Unspent Budget	\$2,104,112
Less: Increase to RFP No. 18-306	<u>\$ (\$38,794)</u>
Balance	\$2,065,318

The balance of funds will be used to implement the remaining 2019/20 Bridge projects approved by Council.

RISK CONSIDERATION

There are no significant risks associated with the recommendations in this report. However, additional design time could delay the project construction. To reach this conclusion, consideration was given to financial, legal and compliance, and service delivery risks.

ENVIRONMENTAL IMPLICATIONS

Design will consider minimizing environmental impact to fish and fish habitat near the project limits.

ALTERNATIVES

The Halifax Regional Council could choose not to increase the budget for this contract. This is not recommended by staff as the additional work is required to complete Lucasville Bridge rehabilitation.

ATTACHMENTS

A1: Harbourside Engineering change requests

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

Report Prepared by: Abdullah Mofarrah, P. Eng., Design Engineering Team Lead, Project Planning and Design, 902.490.5019

Report Approved by: Original Signed
Nick Dearman, A/Manager, Project Planning and Design, 902.490.6859

Procurement Review: Original Signed
Stephen Terry for Jane Pryor, Manager, Procurement, 902.490-4200

Report Approved by: Original Signed
Taso Koutroulakis, P.Eng., A/Director, Transportation and Public Works 902.490.6206

July 17, 2019

SUBJECT: ADDITIONAL SERVICES FOR REHABILITATION
BASED ON ACTUAL INSPECTION RESULTS: BR041 LUCASVILLE BRIDGE

Dear. Mr. Abdullah Mofarrah:

The following information is based on HEC's understanding of the required additional scope of work over and above that requested in RFP 18-306. The scope of additional services outlined below is based on our hands-on site assessment at the bridge May 30, 2018. The actual condition of the bridge was different from that outlined in the Level II inspection report provided with the RFP documents.

Original Scope of Services based on RFP 18-306

The original scope of services for the rehabilitation of the Lucasville Bridge included the following items:

1. Repair of the exterior deck soffit with specific areas of degradation noted at the north and west corners of the deck soffit;
2. Approach/wearing surface pothole repairs;
3. Cleaning of deck drains;
4. Barrier railing sleeve connections;
5. Concrete repairs to east and west sidewalks/curbs;
6. Cleaning of the abutment beam seat;
7. Concrete repairs to the barrier parapet walls; and
8. Joint seals in need of replacement or repair.

Based on our inspections, we generally agree with the items listed above and in the original RFP as needing to be completed. The concrete repairs to the deck soffit and the joint work are the most important items listed in the original RFP. It should be noted, that based on our inspections, it will not be possible to simply replace the glandular seal portion of the joints. The edge angles and joints are so damaged, that the entire joint will need to be replaced including breaking out of the concrete either side. A metre long piece of a corroded nosing angle removed from the existing joint configuration was found near the north east wingwall of the bridge and discussion with HRM maintenance crew at the site revealed that the joint has been patched over and possibly filled with concrete for portions to get the road back into service. This will impact the longevity of the bridge if it is not addressed. It was not possible to directly inspect the majority of the joint as it has been paved over with asphalt, but it is in need of replacement based on the available information.

Additional Scope of Services Based on HEC Inspections

To properly remediate the Lucasville Bridge for HRM to benefit from its full design life (with the potential for extending the design life if properly maintained), the additional items listed below should be addressed:

1. **Scour Rehabilitation** to address the ongoing potential for scour of the bridge abutment footings. We anticipate the extent of repair work for this item to be sandbagging the river to divert the flow away and filling of the existing scour holes around the footings. Additional effort will be required for obtaining the proper permits to conduct this work. Timing of obtaining permits and getting in the water would favour waiting to address this problem until next construction season (2020). Harbourside will prepare a repair design along with undertaking required permitting. Water control would be a design-build item by the contractor.
2. **Replacement of failed bridge bearings** to raise girders off the abutments and to properly support the load of the superstructure dead and live loads. This item will require the bridge to be jacked to gain access to the bearings, as well as the removal of a portion of the beam seat under each girder to allow the placement of a properly tapered sole plate and bearing below each girder. A dead and live load analysis will need to be carried out by Harbourside to determine bearing loads, rotations etc., along with checks completed to confirm the capacity of the structure to support jacking loads. In keeping with local industry practice for bearing replacement, we propose that Harbourside would provide theoretical jacking loads and locations with the contractor responsible to design the jacking system.
3. **Elimination of bridge joints** for longevity (to ensure/extend design life) and low maintenance by turning the abutment/superstructure joints into semi-integral. This item would be carried out at the same time as the bearing replacement and would move the bridge joints off of the bridge and onto the approaches, which would greatly simplify future maintenance and minimize further damage from water leaking down onto the back wall, beam seat and abutment. Harbourside will prepare drawings outlining the work required to complete this joint transformation.
4. **Address the effects of the alkali aggregate reactivity (AAR)** that is present throughout the abutment walls, wingwalls, and curbs/parapets. As the full extent of repairs will not be known until the AAR investigation is completed by Wilbert Langley, Harbourside can not provide a fee for repair design. At this stage, the current fees include only the investigation component.

In order to accomplish the additional remediation, the following supporting services and activities are needed:

1. **Development of Accurate As-Built Condition CAD Drawings** of surface and key elevations combining quantitative field measurements and historic design drawing information to produce bridge drawings for complex geometry for accurate quantities and delineation of semi-integral repairs and bearing repairs. The geometry is very complicated on this bridge, with a curve, superelevation, longitudinal vertical curve, and different skew angles for each abutment. Harbourside has allowed for field survey along with site hand measurements.
2. **Concrete assessment** to determine extent of AAR. The most effective way to do this is to do a testing program where the current condition of the AAR reaction would be assessed through gel fluorescence testing and a concrete coring program, with recommendations to follow regarding the extent of repairs required. Note that detailed repair design is not included in the current fee as the scope of work required is unknown until the investigation is complete.

- 3. Environmental permitting** work. The original proposal based on the RFP did not have extensive requirement for environmental permitting. With the need to address the scour issue at the bridge, a full permitting program is required. The differential cost between what was needed for the original RFP work (liaison only with Sackville River Association) and the full permitting program required for the complete rehabilitations has been included in the additional scope of work costs.

Key Harbourside Personnel

Paul Burke, P.Eng., M.Sc.Eng. - Project Manager, HEC

Mr. Burke has 10+ years of progressive design experience in structural engineering including bridge, marine, and construction and building projects. Since 2009, Mr. Burke has worked with HEC developing significant design experience progressing into a project management and senior design role. Mr. Burke has designed and managed multiple bridge projects and also has unique experience in the design of bridge erections and demolitions bringing a unique perspective on constructability to all of his new bridge designs. In addition to his design experience, Mr. Burke has completed multiple bridge inspections including the last 5 Annual Inspections of the MacKay and Macdonald Bridge; two of the largest bridge structures in Atlantic Canada.

Mr. Burke will act as the key point of contact for HRM and will monitor project progress including cost and schedule. Should any issues arise Mr. Burke will act quickly to address and return the project to a successful path. In addition, Mr. Burke will provide technical guidance to the project team as required.

Mark Reynolds, P.Eng. - Senior Engineer, HEC

Mr. Reynolds is a Structural Engineer with 20+ years of progressive experience in the design, rehabilitation and construction of bridge, municipal infrastructure, marine, buildings, manufacturing, mining, offshore and industrial projects. Mr. Reynolds project experience has included: preliminary design, detailed design, project management, construction engineering, construction inspection and supervision. Since 1997, Mr. Reynolds has developed extensive design and management expertise. His project management experience includes small projects involving a single discipline, to large multi-discipline projects with construction budgets up to \$35 million. His past experience also includes managing a multi-discipline team of twenty eight Engineers, Technologists, Technicians and Administration staff. Other examples of Mark's bridge experience include: QA/QC for Strandherd Armstrong Bridge Project, Wright Avenue Overpass (Dartmouth, NS), Precast Concrete Rigid Frame Bridge (Gaspereau, NS), Modular Steel Panel Bridge (Canadian Salt Company Ltd., Pugwash, NS) as well as Portable Steel Forestry Bridges and Precast Concrete Box Culverts (Various Locations, NS).

Mr. Reynolds will act as the Senior technical advisor overseeing project quality. Mr Reynolds will review all design and design documents and provide technical guidance throughout project delivery.

Riccardo Ciccarelli, P.Eng. - Intermediate Structural Engineer, HEC

Mr. Ciccarelli is an Intermediate Structural Engineer with 6 years of experience providing consulting structural engineering services, as well as heavy-civil project management services, for a variety of projects. Since 2013, Mr. Ciccarelli has been involved in the design of multiple bridge and construction projects. While working with senior structural engineers, his duties have

included: preliminary and detailed design of structural members; load development; existing structure evaluations, and review of various structural steel and reinforcing steel shop drawings. Since 2015, Mr. Ciccarelli has been involved on the MacDonald Bridge Redecking Project, otherwise known as “The Big Lift”, providing site services for the owner, HHB. He has had the unique experience to have conducted structural inspections of the individual deck segments during the fabrication process as well as on site, during the erection and installation of the deck segments. Through the Big Lift and other inspection based projects, Mr. Ciccarelli has developed a practical knowledge of various destructive and non-destructive testing methods for steel and concrete structures.

Mr. Ciccarelli will carry out analysis, design, and liaison work and will prepare design documents for review by Senior Harbourside Engineers prior to submission to HRM.

Sub-consultants

Annabelle Singleton, B.Sc. (Environmental Analyst, Singleton Environmental Consulting)

Annabelle Singleton is the sole-proprietor of SEC, created in 2010, building on 9 years of previous experience as an Environmental Analyst with CBCL Limited Consulting Engineers. Annabelle has extensive experience in federal environmental regulatory permitting associated with bridge and highway infrastructure projects, including *Fisheries Act*-HADD Authorizations, *Navigation Protection Program* Permits, Environmental Impact Assessments under the *Canadian Environmental Assessment Act (CEAA)*, Environmental Effects Determination Reports under *CEAA 2012* as well as Water Rights and Beaches/Crown Land permits provincially. Project experience includes environmental regulatory lead since 2010 on the Big Lift - Angus L. Macdonald Bridge Deck Replacement Project; Parks Canada and Public Works and Government Services Canada on the replacement of the Black and Warren Brook Bridge Replacement Projects in the Cape Breton National Park and with NSTIR on the replacement of over twenty bridge projects since 2010.

Ms. Singleton will spearhead the environmental liaison work with agencies and the Sackville River Association (as required), and the production of the environmental mitigation drawing.

W.S. Langley Concrete and Materials Technology Ltd. (Concrete Materials Specialist)

Mr. Langley will visually assess the extent of Alkali Aggregate Reactivity (AAR) and will perform gel fluorescence testing to determine the state of the reaction within the concrete. Mr. Langley will assist with determination of the extent of repair required (e.g. injection with epoxy vs. removal and replacement of damaged concrete and to what extent).

Level of Effort / Proposed Fee for Additional Scope (In addition to original proposal):

The proposed number of hours and associated fee (excluding HST) for the additional rehabilitation design for each team member and each sub-consultant is shown in the table given in the attached table. These fees are over and above the fees from the current contract. A second table is attached with projected construction management fees for the additional work associated with the bearing replacement, semi-integral conversion, and concrete repairs. An assumption of part-time inspection over three months has been made, however, this is open to discussion and the actual requirements will be determined by HRM.

HEC appreciates the opportunity to provide a proposal for this assignment. HEC's significant experience in the design of bridge structures and support of construction phase work will provide HRM with the expertise required to properly design and provide all detail necessary for tendering, permitting, and archaeological requirements with due consideration throughout the project to cost and schedule. Should you have any questions or concerns, feel free to contact the undersigned at your convenience.

H a r b o u r s i d e
Engineering Consultants

Regards,
Regards,

Original signed by:

Paul Burke, M.Sc.Eng., P.Eng.
Senior Structural Engineer, Partner
Harbourside Engineering Consultants

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DESIGN HRM Lucasville Bridge Rehabilitation Design ADDITIONAL SCOPE	Engineering Project Manager	Senior Structural Engineer	Intermediate Structural Engineer	Structural Drafting	Sub Total Fees
	0.0	0.0	0.0	0.0	
1. Scour Rehabilitation (Assessment and Design)					\$
- Site Work and Follow Up to Assess Scour Problem Including Quantitative Measurements			6.0		\$
- Design of Scour Protection Measures		2.0	12.0	16.0	\$
2. Existing Bridge Drawing Production (As Built Field Measured)					\$
- Quantitative Field Measurement of Bridge Elements Existing Condition			8.0		\$
- Structural Drafting of As Built Condition of Bridge as Starting Point for Additional Scope Rehab Design				32.0	\$
3. Replacement of Failed Bridge Bearings (Assessment and Design)					\$
- Field Measurement of Bearings where accessible			8.0		\$
- Bearing Replacement Analysis (Estimates of bearing loading and movements, jacking confirmation for existing diaphragms, reduction of beam seat to accommodate proper bearing, development of specific design details)		6.0	44.0	32.0	\$
4. Elimination of Bridge Joints for Longevity and Low Maintenance					\$
- Quantitative Field Measurements			8.0		\$
- Semi-integral Abutment Analysis and Design (including temperature effects, movement restraint, design details, reinforcing and concrete design)		6.0	16.0	32.0	\$
TOTAL DOLLARS	0.0	14.0	102.0	112.0	
Cost Summary:					
Harbourside Engineering Consultants Personnel Cost:	\$				
Harbourside Engineering Consultants Expenses:	\$				
Survey:	\$				
Concrete Testing Program/Abutment Coring (W.S. Langley Concrete and Materials Technology Ltd.):	\$				
Environmental - Full Permitting for In Water Work (Singleton Environmental Consulting):	\$				
Total Fee Excluding Sales Tax:	\$37,200.00				

(Additional Enviro Cost above Original Proposed Fee - see Note 2)

Notes:

1. Fees exclude HST.
2. Environmental cost for permitting with in water work now required for scour remediation given in table above is the differential between what was originally proposed and the actual cost for the real condition of the scour at the bridge (full permitting required)

CONSTRUCTION MANAGEMENT - Part time (4 hours per day over 3 month construction period assumed) HRM Lucasville Bridge Rehabilitation Design ADDITIONAL SCOPE					Sub Total Fees
	Engineering Project Manager	Intermediate Structural Engineer	Construction Supervision	Structural Drafting	
1. Construction Phase Services					
- Shop drawing reviews (1 round assumed)		12.0			
- Construction supervision (240 hours = 12 weeks x 20 hours), and review of contractors bill of quantities/invoices for payments.	6.0		240.0		
- Produce As-Built Drawings based on Contractor red-line markups (provided by others)		4.0		8.0	
- Visual construction certification at end of project and deficiency list		4.0			
	6.0	20.0	240.0	8.0	
TOTAL DOLLARS					
Cost Summary:					
Harbourside Engineering Consultants Personnel Cost: \$					
Harbourside Engineering Consultants Expenses: \$					
Total Fee Excluding Sales Tax: \$33,180.00					

Notes:

1. Fees exclude HST.
2. Testing services (concrete, asphalt etc) are not included in the above fees and expenses.