

# **ANNEX A: TERMS OF REFERENCE**

## **OWNER'S LABORATORY**

**Sampling, Testing, Analysis, Investigation  
and Other Services Upon Request  
(2015-2021)**

**For the  
NEW BRIDGE FOR THE ST. LAWRENCE CORRIDOR  
PROJECT**

**PROJECT N° 7016**

**May 25, 2015**



**Infrastructure  
Canada**

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APPENDICE A	Graphical Representation of the Project Area
APPENDICE B	Other Potential Quality Control and Laboratory Services
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## 1. DEFINITIONS/ ABBREVIATIONS

The following definitions are applicable for purposes of the present Request for Proposals and Contract.

A10:	The federal portion of Highway 10 at the site.
A15:	The federal portion of Highway 15 at the site.
A20:	The federal portion of Highway 20 at the site.
ACLE:	<i>Association des consultants et laboratoires experts</i>
Authority or Canada:	Her Majesty the Queen in Right of Canada, as represented by either the Minister of Infrastructure, or the Minister of Public Works and Government Services Canada.
Commencement Date:	The date of the PPP financial close/of the formal PPP contract award.
Consultant:	The firm retained as the Owner's Laboratory, under this Contract.
Contract:	This Contract for the services of Owner's Laboratory, as described in these Terms of Reference.
Good Industry Practice:	The exercise of that degree of skill, diligence, prudence and foresight that would ordinarily and reasonably be expected from a skilled and experienced person engaged in a project with a scope and complexities comparable to that of the Project and under similar circumstances and conditions.
IdS:	<i>Île des Sœurs</i> (Nuns' Island).
Independent Engineer	The firm retained as Independent Engineer, as described in Section 3.5 <i>Independent Engineer</i> of these Terms of Reference.
Independent Engineer Agreement:	The agreement between the Independent Engineer and the Private Partner.
INFC:	Infrastructure Canada or any other department called upon to perform functions similar to those currently performed by it.
IRI	International Roughness Index
JCCBI:	The Jacques Cartier and Champlain Bridges Incorporated.
MDDELCC:	<i>"Ministère du Développement durable, Environnement et Lutte contre les changements climatiques"</i> of Quebec
NBSL:	The New Bridge for the St. Lawrence, meaning the new bridge across the St. Lawrence that will be designed and constructed by the Private Partner to replace the existing Champlain Bridge.
NBSLC:	The New Bridge for the St. Lawrence Corridor.
Project Agreement	The PPP contract between the Authority and the Private Partner.

Payment Item:	Pricing item, as described in Section 11 <i>Description of Payment Items</i> of these Terms of Reference, in accordance with the Price Table.
PPP:	Public-Private Partnership.
Project:	The NBSLC project.
PWGSC:	Public Works and Government Services Canada or any other department called upon to perform functions similar to those currently performed by it.
SLSMC:	The St. Lawrence Seaway Management Corporation.

## 2. REQUIREMENTS

The Authority (Canada) requires the services of an Owner's Laboratory (herein after referred to as "Consultant"), to carry out sampling, testing and various laboratory services, as well as auditing support in quality assurance and quality control. These services related to work involving, without being limited to, concreting, asphalt paving and waterproofing, precasting, fabrication of steel elements, paint work, roadway foundation systems, excavation of contaminated soil, environmental monitoring and other construction work performed by the Private Partner. The Owner's Laboratory shall carry out sampling, testing and laboratory services on an as needed basis only, at the request of the Authority. The Consultant shall provide all the personnel, equipment, material and resources required to perform the services described in these Terms of Reference.

It should be noted that the NBSLC Project is delivered through a public-private partnership, to design, build, finance, operate and maintain the new crossing over the St. Lawrence River. As such, the Private Partner will work with its own laboratory services to oversee the quality of construction materials on a full-time/permanent basis. Consequently, the laboratory services described in these Terms of Reference do not involve full-time/permanent oversight of the Project's construction quality control. These services are rather provided on an "ad hoc" basis, often with the objective of validating, verifying or auditing the work undertaken by the Private Partner or its laboratory. These services can also include additional surveys, on-site or laboratory testing, analyses or inspections as deemed appropriate by the Authority, all on an occasional basis over the period of this Contract.

## 3. BACKGROUND

### 3.1 General

On October 5, 2011, the Government of Canada announced that it will proceed with the construction of a new crossing to replace the Champlain Bridge and associated highway infrastructure. The New Bridge for the St. Lawrence Corridor (NBSLC) Project is a corridor-wide project located between the Island of Montreal and the City of Brossard.

In addition to the main bridge namely the New Bridge for the St. Lawrence (NBSL), the NBSLC will include work on the South Shore, the Island of Montréal, Nuns' Island (Île des Sœurs) and the demolition and reconstruction of the IdS Bridge.

The NBSLC Project includes the design, construction, financing, maintenance and operation (including life cycle refurbishment and toll installation and collection) of the New Bridge for the St. Lawrence Corridor (NBSLC) including the IdS Bridge and all related works in the corridor. The NBSLC Project covers approximately 8 km of highway. Three major highways use this corridor, identified as A15, A10 and A20.

At its western extent, the Project site begins near Pitt Street between the De la Vérendrye and Atwater Interchanges on the Island of Montréal. The NBSLC Project follows the existing A15 across the IdS Bridge, passes through the northern part of IdS, and then crosses the St. Lawrence River just downstream of the existing Champlain Bridge to end, at its eastern extent, near Pelletier Boulevard in the City of Brossard. This portion of the highway is approximately 3.6 km in length and currently offers two lanes of traffic in each direction on Montréal Island and three lanes in each direction on IdS and the existing IdS Bridge. The existing Champlain Bridge, which links Brossard to IdS and Montréal, is approximately 3.4 km in length and carries 6 lanes of traffic separated by a median. At its eastern end, the connection between Champlain Bridge and Brossard which lies on federal territory is approximately 1 km in length and has 3 lanes in each direction.

## **3.2 NBSLC Components**

The NBSLC Project includes the main components described below and illustrated in Appendix A *Graphical Representation of the Project Area*. These activities are under Private Partner responsibility.

### **3.2.1 New Bridge for the St. Lawrence**

Design, build, finance, operate and maintain an approximately 3.4 km long new bridge across the St. Lawrence River to replace the existing Champlain Bridge. The new bridge will span the St. Lawrence River from IdS to Brossard, immediately downstream from the existing Champlain Bridge. The new bridge will include a three-corridor design, including two three-lane corridors for vehicular traffic and a two-lane transit corridor capable of accommodating a planned light rail transit system. The new bridge will also include a multiple-use path for pedestrians and cyclists. This bridge is required to have a 125-year design life. This component must be operational by December 1, 2018. Full deconstruction of the existing Champlain Bridge is not included in the PPP contract.

### **3.2.2 New IdS Bridge**

Design, build, finance, operate and maintain an approximately 470 m long new bridge linking IdS to the Verdun borough to replace the existing IdS Bridge. It is expected that the new bridge will be built in the current alignment of the existing bridge. The new bridge will include two three-lane corridors for vehicular traffic as well as a multi-use path. Integration of a public transit corridor linking IdS to the Verdun borough is also under consideration, pending a decision from the Government du Québec on its preferred public transit concept. Demolition of the existing IdS Bridge is included in the Project. The new bridge is required to have a 125-year design life. This component must be operational by December 1, 2020.

### **3.2.3 Reconstruction and Widening of A15 on the Island of Montréal**

Design, build, finance, operate and maintain an approximately 3 km long highway linking the IdS Bridge to the Québec-owned section of A15. This component will include the reconstruction of the

existing A15 and its widening from two to three lanes in each direction. This component will not include a public transit corridor, but will include the reconstruction of 7 existing overpasses on the Island of Montréal. The overpasses and other major structures forming this component are required to have a 75-year design life and must be operational by December 1, 2020.

#### 3.2.4 Reconstruction of A15 on IdS

Design, build, finance, operate and maintain an approximately 1 km long highway linking the New Bridge for the St. Lawrence to the IdS Bridge. This component will include two three-lane corridors for vehicular traffic and a two-lane transit corridor capable of accommodating either a planned light rail transit system or a bus transit system and will include a multiple-use path for pedestrians and cyclists. These components are required to have a 75-year design life and must be operational by the end of 2020.

#### 3.2.5 Related Minor Components

Design, build, finance, operate and maintain (or some components thereof) connecting interchanges, overpasses and other works.

#### 3.2.6 Tolling Infrastructure and Intelligent Transportation Systems

Design, build, finance, operate and maintain an open road tolling system including signage, signaling, tolling collection and communications. This component is expected to be implemented in stages once the other components become operational.

#### 3.2.7 Interim Operation and Maintenance

Operation and maintenance of portions of A15 on IdS and Montreal Island will begin shortly after the Commencement Date. Accordingly, this will imply maintenance and operations of existing infrastructure. However, JCCBI will continue to operate and maintain the existing Champlain Bridge.

### 3.3 NBSLC Project Office

The Authority has created an NBSLC Project Office. The NBSLC Project Office includes resources responsible for managing the technical, environmental and logistical aspects of the NBSLC Project. The Project Office is responsible for executing all Project activities in all periods until the NBSL and the entire corridor are operational. The Authority also intends to have an on-site office, to be located within one km of the Project site. The Consultant will be able to use this office space as needed, on an occasional basis, for the purposes of this Contract.

### 3.4 Owner's Engineer

The Authority has retained the services of the Owner's Engineer to provide technical advice and to help manage the Project. The Owner's Engineer is accountable only to the Authority, and will also verify the compliance, quality and impartiality of the Independent Engineer's work.

### 3.5 Independent Engineer

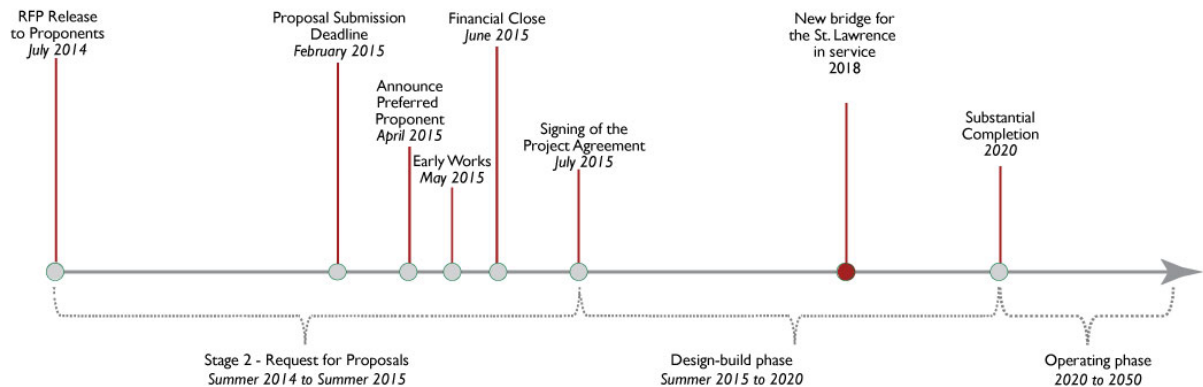
The Private Partner will retain the services of the Independent Engineer to provide monitoring, auditing reporting and quality control services for the Project.

The Authority acts as “intervener” to the contract between the Private Partner and the Independent Engineer (herein referred to as the “Independent Engineer Agreement”). However, the Independent Engineer answers to the Authority as well as the Private Partner.

The Independent Engineer is fully independent and impartial in exercising its role.

## 4. NBSLC PROJECT SCHEDULE

The NBSLC Project’s master schedule starting from the release of Request for Proposal (RFP) for PPP is illustrated below:



Project milestones: the milestones for the NBSLC Project are summarized below:

Milestone	Approximate Date
Commencement of Early Work Agreement	May 2015
Early Works by Private Partner	May 2015 to June 2015
Commencement Date of Project Agreement	July 2015
Construction period for NBSL	August 2015 to December 2018*
Construction period for A15 and IdS Bridge	August 2015 to December 2020*

\*Date subject to change with respect to the Private Partner’s actual schedule.

## 5. REFERENCE DOCUMENTS AVAILABLE FOR CONSULTATION

The following table is a list of Project-related documents (reference information and reports) that are available to the Proponents for consultation.

REFERENCE DOCUMENTATION		
	DOCUMENT DESCRIPTION	LOCATION
1.	NEW BRIDGE FOR THE ST. LAWRENCE - PRE-FEASIBILITY STUDY CONCERNING THE REPLACEMENT OF THE EXISTING CHAMPLAIN BRIDGE	Available On Project's Website <a href="http://www.infrastructure.gc.ca/nbsl-npsl/prestudy-etudepre-eng.html">http://www.infrastructure.gc.ca/nbsl-npsl/prestudy-etudepre-eng.html</a>
2.	NEW BRIDGE FOR THE ST. LAWRENCE – FEDERAL ENVIRONMENTAL ASSESSMENT	Available on Project's Website <a href="http://www.infrastructure.gc.ca/nbsl-npsl/env-eng.html">http://www.infrastructure.gc.ca/nbsl-npsl/env-eng.html</a>
3.	NEW BRIDGE FOR THE ST. LAWRENCE – REQUEST FOR QUALIFICATIONS	Available on Project's Website <a href="http://www.infrastructure.gc.ca/nbsl-npsl/rfq-pres-ddq-20140303-eng.html">http://www.infrastructure.gc.ca/nbsl-npsl/rfq-pres-ddq-20140303-eng.html</a>
4.	REQUEST FOR PROPOSALS – OWNER'S ENGINEER	Available on the following Website: <a href="https://buyandsell.gc.ca/procurement-data/tender-notice/PW-MTP-350-12947">https://buyandsell.gc.ca/procurement-data/tender-notice/PW-MTP-350-12947</a>
5.	REQUEST FOR PROPOSALS – INDEPENDENT ENGINEER, INCLUDING SCHEDULE 37 OF THE PROJECT AGREEMENT – FORM OF INDEPENDENT ENGINEER AGREEMENT	Available on the following Website: <a href="https://buyandsell.gc.ca/procurement-data/tender-notice/PW-MTP-350-13063">https://buyandsell.gc.ca/procurement-data/tender-notice/PW-MTP-350-13063</a>

## 6. SCOPE OF WORK

The services that the Authority may request the Consultant to carry out are described in the following sections of these Terms of Reference, and include but are not limited to the following:

- Services relating to concrete work
- Services relating to prestressing work
- Services relating to bituminous pavement and waterproofing membrane work
- Services relating to the fabrication and assembly work of steel components (including non-destructive testing, galvanizing and other corrosion mitigation measures)
- Services relating to surface preparation and painting work
- Services relating to pile driving and foundation drilling
- Services relating to pavement foundation systems
- Services relating to the environmental quality of soils and sediments
- Services relating to the environmental quality of water
- Services relating to air quality
- Services relating to the sound environment
- Services relating to the monitoring of vibrations
- Services relating to other site investigations, quality control and laboratory services

The extent of any of the above services will depend on the Private Partner's design and construction methods.

Consultant services shall generally be planned in advance based on the Private Partner's weekly Project work schedule and plans. A schedule for the Consultant's services shall be agreed upon on a case by case basis when requests are submitted by the Authority.

#### 6.1.1 Services relating to concrete work

The Consultant services relating to concrete work consist generally in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) verifying compliance of the Private Partner's cement concrete mix with the provisions of the design and specifications;
- c) performing quality controls on concrete delivered to the job site, including but not limited to the following tests:
  - a. measuring slump and slump loss on freshly mixed concrete;
  - b. measuring entrained air in new concrete and repair concrete;
  - c. measuring the temperature of freshly mixed concrete;
  - d. site trial batch testing for repair concrete;
  - e. measuring the spread diameter of self-levelling/self-consolidating concrete;
  - f. all other relevant tests;
- d) performing visual quality control at the job site;
- e) examining surfaces and works prior to concrete placement;
- f) collecting samples at the construction site/fabrication facility, at the Private Partner's supplier facility or at any other location as determined by the Authority for laboratory testing;
- g) among other tasks, collecting at the construction site/fabrication facility six (6) cylindrical samples of concrete for laboratory compression testing. In general terms, compression testing of cylindrical concrete samples will be conducted as follows:
  - a. two (2) tests within three (3) days after sample collection;
  - b. two (2) tests within seven (7) days after sample collection;
  - c. two (2) tests within twenty-eight (28) days after sample collection;
  - d. or as requested by the Authority;
- h) performing cube tests for grouts and mortars:
  - a. compressive strength on samples collected prior to placement;
- i) monitoring the placement and finishing of concrete:
  - a. the Consultant shall observe and report on the degree to which the work is performed in accordance with the Private Partner's design and specifications and Good Industry Practice;
- j) after each visit, delivering a report to the Authority describing the services performed at the site by the Consultant;
- k) sending a written report to the Authority on each test, in a timely manner.

#### 6.1.2 Services relating to prestressing work

The Consultant services relating to prestressing work generally consist in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) performing appropriate testing on injection grout of post-tensioning ducts;
- c) performing tensile testing on the prestressing wires and strands including machining of samples and other preparatory works;
- d) performing tensile testing of the anchorage system;
- e) sending a written report to the Authority on each test completed in a timely manner;
- f) attending testing of post-tensioning anchorage systems on test-blocks.

#### 6.1.3 Services relating to bituminous pavement and waterproofing membrane work

The Consultant services relating to bituminous pavement and waterproofing membrane work generally consist in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) verifying compliance the Private Partner's bituminous mix formula with the provisions of the design and specifications;
- c) performing in-situ measurement of membrane thickness;
- d) performing adhesion tests on the waterproofing membrane and bituminous pavement system;
- e) performing quality control tasks on job site work;
- f) collecting samples for evaluation of the compaction and thickness of bituminous pavement and waterproofing membrane;
- g) after each visit, delivering a report to the Authority describing the services performed at the site by the Consultant;
- h) performing complete analysis of samples of freshly mixed bituminous concrete and determining the grade of bitumen;
- i) performing gyratory shear press tests;
- j) performing rutting resistance tests on bituminous pavement;
- k) sending a written report to the Authority on each test completed in a timely manner.

#### 6.1.4 Services relating to the fabrication and assembly work of steel components

The Consultant services relating to the fabrication and assembly of steel components generally consist in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) performing tensile and shear tests on high-strength bolts provided;
- c) performing relevant physical tests on steel components identified by the Authority from a lot supplied by the Private Partner, unless steel test certificates are provided for all parts in stock;
- d) performing relevant non-destructive tests on steel components identified by the Authority from a lot supplied by the Private Partner;
- e) performing visual inspection and physical (non-destructive) weld tests on steel components identified by the Authority;



- f) measuring the tightening torque on bolts belonging to steel components identified by the Authority;
- g) reviewing the bolt tightening procedure/protocol and verifying the application of the bolt tightening (turn-of-nut tightening, etc.) as per the requirements of CAN/CSA S6 *Canadian Highway Bridge Design Code*;
- h) performing relevant non-destructive testing (visual, liquid penetrant, magnetic particle, radiographic and ultrasound inspections) on steel assembly welds identified by the Authority;
- i) verifying the conformity of galvanized and metal-coated components;
- j) provide comments on the corrosion protection system's suitability for friction connections as per the requirements of CAN/CSA S6 *Canadian Highway Bridge Design Code*;
- k) performing dynamic analysis of pile driving;
- l) sending a written report to the Authority on each test performed in a timely manner.

#### 6.1.5 Services relating to surface preparation and painting work

The Consultant services relating to surface preparation and painting work generally consist in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) collecting samples of and analyzing the composition and granulometry of the abrasive used for cleaning by abrasive;
- c) at the plant or job site, performing controls on the steel surfaces to be prepared and on the application of paint on steel elements identified by the Authority;
- d) validating the conformity of ambient conditions during painting operations;
- e) performing spot checks of coating thickness (wet film and/or dry film);
- f) sending a written report to the Authority on each test performed in a timely manner;
- g) providing technical assistance as requested during the execution of construction work by the Private Partner and submitting relevant reports as applicable.

#### 6.1.6 Services relating to pile driving and foundation drilling

The Consultant services relating to pile driving (piles, micro piles, tubular piles) and foundation drilling (caissons and other deep foundations) generally consist in but are not limited to the following:

- a) attending coordination meetings and discussions with the Authority as requested;
- b) during pile driving, performing of piles and monitoring the number of strokes for specified increments of pile-driving until refusal is reached;
- c) inspection of bored piles installed, no more than 24 hours before they are concreted;
- d) performing visual inspection of the bored piles to confirm that the drilled shaft rock socket starts below any weathered (non-competent) bedrock;
- e) ensuring that there is no significant anomalies in the wall of the anchorage hole, such as open joints (shear joints), altered rock, soils, dykes, unstable blocks, faults, etc.;
- f) quick inspection (summary) of the whole rock anchorage hole, including socket in competent bedrock, socket formed below weathered bedrock and base fully clean of loose material;

- g) inspection of the base of bored piles;
- h) performing visual and filmed inspection of the contact between the steel tube and the rock using a video camera (recordable);
- i) performing visual and filmed inspection of the full height of the stratigraphic profile of the bored piles in at least two (2) places, 180 degrees apart from each other;
- j) delivering a written report to the Authority on each survey and results in a timely manner.

#### 6.1.7 Services relating to pavement foundation systems

The Consultant services relating to pavement foundation systems generally consist in but are not limited to the following:

- a) verifying the compaction of granular borrow material against the construction specifications during backfilling operations;
- b) verifying the compaction of granular sub-base or base course material against the construction specifications during foundation work;
- c) collecting samples of crushed aggregate and verifying the granulometry against the construction specifications during the base course work;
- d) performing visual quality control at the job site;
- e) examining the finished surfaces listed below before the start of placement of materials in the subsequent course:
  - a. compacted loose soil;
  - b. compacted borrow material;
  - c. compacted crushed aggregate, for the sub-base and base courses.

#### 6.1.8 Services relating to environmental quality of soils and sediments

The Consultant services relating to the environmental quality of soils and sediments, including the excavation of contaminated soils and sediments by the Private Partner, generally consist in but are not limited to the following:

- a) informing itself of site conditions by reading existing contaminated soil assessment reports relating to the Project area, a list of which will be provided to the Consultant after the Contract is awarded;
- b) monitoring as requested the excavation and storage/disposal of contaminated soils and sediments and ensuring that the work is carried out in accordance with the soil management plan prepared by the Private Partner;
- c) collecting samples and performing the laboratory chemical analysis of samples of contaminated soils and sediments excavated from the excavation site as appropriate;
- d) delivering a written report to the Authority on each test performed in a timely manner;
- e) producing reports as requested relating generally to job site issues. Analyzing the options and making recommendations in the form of a brief study report on the issues concerned.

#### 6.1.9 Services relating to the environmental quality of water

The Consultant services relating to the analysis of the environmental quality of water generally consist in but are not limited to the following:

- a) collecting samples and performing the laboratory and/or on-site chemical analysis of water from the St. Lawrence River or other appropriate water course (such as Canal de l'Aqueduc), at different water depths;
- b) collecting samples and performing the laboratory and/or on-site chemical analysis of samples of groundwater from the excavation site as appropriate;
- c) installation of monitoring and sampling wells and measurement of groundwater levels;
- d) delivering a written report to the Authority on each test performed in a timely manner;
- e) producing reports as requested relating generally to job site issues. Analyzing the options and making recommendations in the form of a brief study report on the issues concerned.

#### 6.1.10 Services relating to air quality

The Consultant services relating to air quality monitoring generally consist in but are not limited to the following:

- a) collecting air quality samples on the outskirts of the Project area, in general near the construction zone in order to determine the construction works' impact on air quality;
- b) delivering a written report to the Authority on each survey and analysis performed, in a timely manner.

#### 6.1.11 Services relating to sound environment

The Consultant services relating to sound environment generally consist in but are not limited to the following:

- c) undertaking sound surveys on the outskirts of the Project Area, in general near the construction zone in order to determine the construction works' contribution in sound;
- d) delivering a written report to the Authority on each survey and analysis performed, in a timely manner.

#### 6.1.12 Services relating to the monitoring of vibration

The Consultant services relating to the monitoring of vibration generally consist in but are not limited to the following:

- a) undertaking the collection of vibration data near the construction works or near the Project site;
- b) delivering a written report to the Authority on each survey and analysis performed, in a timely manner.

### 6.1.13 Services relating to other investigations, quality control and laboratory services

The Authority may, at its discretion, request that the Consultant perform other investigations, quality control and laboratory services. These other services are not necessarily identified in these Terms of Reference and will be agreed upon between the Authority and the Consultant as needed. The Consultant services relating to other investigations, quality control and laboratory services could consist in, but are not limited to the following:

- a) geophysical investigation work such as seismic surveys and investigations with Ground Penetrating Radar;
- b) investigations to locate and identify buried structures, underground works and public or private utilities;
- c) investigations to determine and/or evaluate the condition of underground works and any other works, such as surveys and visual inspections of the Roberge Collector;
- d) verifications and testing in relation to the bridge's cable stays;
- e) services relating to soil improvement techniques;
- f) investigations relating to the quality of new pavements including measurement of the international roughness index (IRI);
- g) any other investigation deemed necessary, as requested by the Authority.

A non-exhaustive list of other laboratory and on-site tests and analyses that could be requested by the Authority is provided in Appendice B *Other Potential Quality Control and Laboratory Services*, for information purposes.

## 6.2 Sampling and chemical analyses

Sampling and conservation of soils, sediments, waste, groundwater, surface water, gases and free-phase hydrocarbons, where applicable, shall be done in accordance with Good Industry Practice and the directives specified in the various documents ("*cahiers*") of the MDDELCC's "*Guide d'échantillonnage à des fins d'analyses environnementales*". All materials sampled shall be recovered, and any portions not used for chemical analyses shall be kept in separate containers for future reference or use. The Consultant shall retain all samples for a period of twelve (12) months or until the Authority provides written authorization to dispose of them. Specific individual descriptions of all samples shall be provided in a report. Unless indicated otherwise, the descriptions shall be written following the prescriptions of ASTM D2488-09a, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, using the standard terminology for component proportions (Burmister classification system). For boring on solid ground, the Consultant shall clearly indicate in each case the proportion of waste in each sample, where applicable. Each sample shall be numbered.

The chemical analyses shall be performed by a laboratory accredited for the parameters analyzed by the MDDELCC, in accordance with Regulation respecting hazardous materials (R.R.Q., Q-2, r.32) of the MDDELCC and in accordance with the "*Règlement 2008-47 sur l'assainissement des eaux de la Communauté métropolitaine de Montréal*" for disposal in rainwater sewers.

The chemical analyses shall be done in accordance with the MDDELCC's "*Liste des méthodes suggérées pour la réalisation des analyses en laboratoire*", and the chosen laboratory shall apply an internal quality assurance program in accordance with the MDDELCC's "*Programme d'assurance qualité et de contrôle de la qualité*", including quality control with blanks or other appropriate method

agreed upon with the Authority. The analysis certificates shall be signed by a chemist who is a member of the "*Ordre des chimistes du Québec*".

Generally, a report relating to sampling and chemical analyses shall include, without being limited to, the weather conditions of the previous day and of the day of the sampling; the in situ physico-chemical parameters such as the temperature, the turbidity, the pH and the water column value (thickness); photographs of the sampling site, of the activities and of samples, in particular those that present particular characteristics during the sampling; qualitative information such as, without being limited to, odour, colour and presence of organisms.

### **6.3 Collaboration with Authority**

Unless otherwise specified, the Consultant shall work under the direction of the Authority, and all reports, certificates and other documents prepared by the Consultant concerning technical matters shall be submitted directly to the Authority. The Consultant at all times shall give his or her complete collaboration to the Authority.

## **7. RESOURCES REQUIRED**

### **7.1 Titles and qualifications**

When calculating the number of years of relevant experience for the positions listed below, years devoted to acquiring a post-graduate master's or doctoral degree relevant to the Contract may be included, up to a maximum of one (1) year for a master's degree and two (2) years for a doctoral degree.

#### **7.1.1 Senior Engineer**

The Senior Engineer has at least fifteen (15) years of pertinent experience and a university degree in his/her specialization or any combination of training and experience that is at least equivalent. He or she is a member in good standing or holds a temporary permit delivered by the *Ordre des ingénieurs du Québec* at the time the services are rendered. He or she has the knowledge and skills required to prepare, approve and coordinate work plans so as to satisfy cost, quality and scheduling objectives. He or she exercises direct supervision over other engineers or specialists and is able to assume responsibility for complex and difficult assignments.

#### **7.1.2 Intermediate Engineer**

The Intermediate Engineer has at least seven (7) years of pertinent experience and is a member in good standing or holds a temporary permit delivered by the *Ordre des ingénieurs du Québec* at the time the engineering services are rendered. He or she has the knowledge and skills to perform various types of work in keeping with pre-determined procedures. He or she conducts independent studies to guide his or her decisions and must use the information available judiciously. He or she refers decisions of an unusual or complex nature to the Senior Engineer.

### 7.1.3 Junior Engineer

The Junior Engineer is a graduate of a recognized university and should be either a member in good standing or eligible for certification with the *Ordre des ingénieurs du Québec*. The experience required is minimal; he or she prepares drawings, reports and calculations under close supervision so as to ensure that the tasks he or she performs comply with the prescribed procedures.

### 7.1.4 Senior Technician

The Senior Technician has at least ten (10) years of pertinent experience and a post-secondary collegial diploma in his or her field of specialization or an at least equivalent combination of education and experience. He or she plans, organizes and coordinates a part of a project requiring the application of extensive technical knowledge.

### 7.1.5 Intermediate Technician

The Intermediate Technician has at least five (5) years of pertinent experience and a post-secondary collegial diploma in his or her field of specialization or an at least equivalent combination of education and experience. He or she performs various tasks and conducts various studies, of limited complexity, under the supervision of a senior technician or engineer. He or she makes decisions as part of established procedures and practices (on site and/or in laboratory).

### 7.1.6 Environmental Expert

The Environmental Expert has at least fifteen (15) years of pertinent experience and a recognized university degree in environmental science or a related scientific discipline or any combination of training and experience that is at least equivalent. He or she has the knowledge and skills required to prepare, approve and coordinate work plans so as to satisfy cost, quality and scheduling objectives. He or she exercises direct supervision over other environmental specialists or technicians and is able to assume responsibility for complex and difficult assignments.

### 7.1.7 Environmental Agent

The Environmental Agent has at least five (5) years of pertinent experience and a post-secondary collegial diploma in his or her field of specialization (environmental field) or an at least equivalent combination of education and experience. He or she performs various tasks and conducts various studies, of limited complexity, under the supervision of an environmental expert, senior technician or engineer. He or she makes decisions as part of established procedures and practices (on site and/or in laboratory).

## 7.2 Consultant Resources

The Consultant shall supply all the human resources required to execute the Contract. In general, the resources shall be accredited and certified to perform the laboratory testing, analyses and other related activities described in these Terms of Reference in accordance with applicable regulations, standards and Good Industry Practice.

For the purposes of this Contract, the following are considered by the Authority to be key resources. The Consultant shall propose a single candidate for each key resource position and shall ensure that the proposed candidate possesses the minimal qualifications for the positions as described in these Terms of Reference:

- Project Engineer
- Assistant Project Engineer
- Senior Engineer – Concrete
- Senior Engineer – Roadway
- Senior Engineer – Steel
- Senior Engineer – Geotechnical
- Environmental Expert – Contaminated Soils
- Senior Engineer – Sound Environment (Acoustic)

The Consultant shall not propose the same candidate for the positions of Project Engineer and Assistant Project Engineer. The Project Engineer and Assistant Project Engineer must be employed by the Consultant (i.e. cannot be sub-contracted or employed by a sub-consultant).

#### 7.2.1 Project Engineer

Generally, the Project Engineer bears full responsibility for delivery of the Consultant services. The Project Engineer is the only person authorized to represent the Consultant; all reports, certificates and other documents prepared by the Consultant in execution of the Contract shall bear his or her signature.

The Project Engineer also shall be authorized to receive, on behalf of the Consultant, any notice, authorization, order, directive, decision or other communication which may be given to the Consultant under the Contract.

The Project Engineer shall have the following qualifications at a minimum:

- a) be a Senior Engineer having at least fifteen (15) years of experience in the supervision and in quality assurance on relevant construction works;
- b) have the knowledge and ability required to adequately assume the responsibilities and obligations entailed in executing the Contract.

The Project Engineer has to be rapidly reachable to resolve technical and administrative problems requiring immediate attention.

#### 7.2.2 Assistant Project Engineer

Under the direct supervision of the Project Engineer, the Assistant Project Engineer is responsible for the day-to-day coordination of the delivery of the Consultant services.

The Assistant Project Engineer shall assist the Project Engineer in all technical and administrative activities under the Contract. However, the Assistant Project Engineer cannot be substituted for the Project Engineer, who is the only person authorized to engage in official communication with the Authority. The Assistant Project Engineer nonetheless may act as Senior Engineer, irrespective of the field or fields of specialization.

The Assistant Project Engineer shall have the following qualifications at a minimum:

- a) be an Intermediate Engineer, having at least five (5) years of relevant experience in the supervision and in quality assurance on relevant construction works;
- b) have the knowledge and ability required to adequately assume the responsibilities and obligations entailed in executing the Contract.

#### 7.2.3 Senior Engineer - Concrete

The Senior Engineer – Concrete assigned to auditing, quality assurance and quality control for concrete work and related matters shall be a Senior Engineer who is a concrete and related materials specialist with relevant experience in concrete materials and qualified to perform the services described in clause 6.1.1 *Services relating to concrete work*, including but not limited to verifying concrete mix formulas, supervising the collection of samples and core samples, analysing reports, interpreting test results and providing technical advice and recommendations.

#### 7.2.4 Senior Engineer – Roadway

The Senior Engineer – Roadway assigned to auditing, quality assurance and quality control for pavement foundation systems, bituminous pavement, waterproofing membranes and related matters shall be a Senior Engineer who is a pavement, roadway foundations and other related materials specialist, has relevant experience in this field and is qualified to perform the services described in clause 6.1.3 *Services relating to bituminous pavement and waterproofing membrane* and clause 6.1.6 *Services relating to pavement foundations*, including but not limited to verifying bituminous mix formulas and waterproofing membranes, verifying the degree of compaction of foundation materials, verifying granulometry and water content in samples of crushed aggregate, supervising the collection of samples and core samples, analysing reports, interpreting results and providing technical advice and recommendations.

#### 7.2.5 Senior Engineer - Steel

The Senior Engineer – Steel assigned to auditing, quality assurance and quality control for the fabrication and assembly of steel elements and related matters shall be a Senior Engineer who is a steel and related materials specialist, has relevant experience in this field and is qualified to perform the services described in clause 6.1.4 *Services relating to the fabrication and assembly of steel components*, including but not limited to verifying the tensile, compressive and shear characteristics of steel elements, material properties (resilience/notch toughness, weldability, corrosion resistance) analysing reports, interpreting results and providing technical advice and recommendations.

#### 7.2.6 Senior Engineer – Geotechnical

The Senior Engineer – Geotechnical shall be a Senior Engineer who is a geotechnical specialist, has relevant experience in this field for the construction bridges and roadways and is qualified to provide expert review, advice and recommendations on geotechnical issues related to, without being limited to, excavation, slope stability, soil settlements and foundation works.



#### 7.2.7 Environmental Expert – Contaminated Soils

The Environmental Expert – Contaminated Soils assigned to auditing, quality assurance and quality control for the environmental quality of soils and sediments shall be an Environmental Expert, who is a specialist in contaminated soils and sediments, including investigation and remediation of contaminated sites which contain waste materials and hazardous waste materials, with relevant experience in this field, and is qualified to perform the services described in clause 6.1.8 *Services relating to the environmental quality of soils*, including but not limited to analyzing the characteristics of toxic and leachable substances, supervising the collection of soils samples, evaluating quantities and categories of contaminated soil types, analysing reports, interpreting results and providing technical advice and recommendations in this field.

#### 7.2.8 Senior Engineer – Sound Environment (Acoustic)

The Senior Engineer – Sound Environment (Acoustic) assigned to works relating to the sound environment shall be a Senior Engineer, who is a specialist in sound environment, with relevant experience in this field in the context of construction works, including in the collection and analysis of outdoor noise data in the context of infrastructure construction, and qualified to perform the services described in clause 6.1.10 *Services relating to noise measurements*.

#### 7.2.9 Other Resources

Other resources may be proposed by the Consultant or the Authority as seen fit by the Authority to better achieve the Contract's and Project's objectives, as may be required in the future.

This may include, without being limited to, resources that are qualified in the fields of:

- Surface preparation, paint work and protective coatings
- Prestressing and post-tensioning works
- Specialized non-destructive testing of steel, including testing the quality of welds
- Subsurface investigation using ground penetrating radar or other methods to locate underground utilities and anomalies
- Specialized investigation of roadways (IRI, rutting, cracking, falling weight deflectometer, etc.)
- Pile driving, foundation drilling and inspection of deep foundations
- Air quality
- Environmental quality of groundwater and surface water
- Vibration monitoring

### 7.3 Logistics

The Consultant shall supply all the physical resources required to perform the Contract. These physical resources include but are not limited to the following:

- a) all apparatus and equipment required to perform the services at the job site, plant, laboratory or other location;
- b) all accessory apparatus and equipment required, such as drilling equipment, generators, coring equipment, saws, scales, etc.;
- c) all products, materials and consumables used in the performance of the services;

- d) all vehicles and other means required for the transport, loading and offloading of apparatus, equipment, samples, core samples, cylinders, materials, devices and other items;
- e) all vehicles and other means required for transporting personnel;
- f) all cellular telephones and other communication devices required by the Consultant's personnel to perform the services;
- g) all equipment and materials needed for the safety of its personnel and the public and for compliance with the requirements of applicable safety laws and regulations.

## **7.4 Format of deliverables**

The format of reports and other deliverables will be subject to approval by the Authority.

All electronic documents submitted must be prepared in the 2010 or more recent version of the software MS Word, MS Excel, MS Project, Adobe Acrobat (PDF), AutoCAD or other.

Unless otherwise indicated by the Authority, PDF documents shall be generated from the original document (Word, Excel or others).

## **7.5 Accreditation**

The Consultant and its subcontractors shall be certified under the latest version of ISO 9001:2008 standard and shall hold all certificates of registration, accreditation and authorization and others as required to perform the inspections, sample collections, analysis and tests required under the Contract in accordance with the specified standards.

## **7.6 Permits, Orders and Regulations**

The Consultant shall comply with all federal, provincial and other legislation, ordinances, codes and regulations that govern these professional services and shall assume responsibility for any breach of such legislation, ordinances, codes and regulations.

The Consultant shall obtain all of the permits, licenses and authorizations required to perform these professional services.

## **7.7 Applicable and prescribed standards**

Unless otherwise indicated by the Authority, for purposes of carrying out the services and regardless of the versions of standards prescribed in these Terms of Reference, the applicable versions of standards shall be those in force on March 31<sup>st</sup>, 2014, pursuant to the terms and conditions indicated in the Project Agreement. However, if a new version of a standard is published after that date, the parties to the Project Agreement may agree to apply the new version. In such case, the Authority will inform the Consultant when a new version of a standard is to be used.

## 7.8 Traffic control

Generally, no traffic lane will be made available for the Consultant's work. On-site work by the Consultant will generally be undertaken in construction zones for which the Private Partner will bear responsibility for the traffic control activities, if any.

Notwithstanding the preceding, in the event that a traffic lane must be closed for the Consultant's work, the Consultant shall inform the Authority at least seven (7) calendar days before such work is to commence so that the Consultant and the Authority can confirm such need and make appropriate arrangements. If traffic control activities by the Consultant are required, the Authority will provide the Consultant with additional information relating to the specific requirements for traffic control in the Project area.

The Consultant shall coordinate traffic management activities and shall comply at all times with the traffic management requirements of the Private Partner, the Authority and any other party responsible for a site which is affected by the Consultant's work.

## 7.9 Consultant's Responsibilities

If, during the execution of its services, the Consultant observes damages or anomalies that require an urgent intervention, it shall immediately inform the Authority verbally and confirm this discussion to the Authority by email within the next twenty-four (24) hours.

The Consultant shall assume entire responsibility for all damage resulting from the rendering of these professional services and the performance of the Contract, including the damage caused following the negligence, carelessness or lack of skill of its representatives, employees, agents, sub-contractors, suppliers or any other person for which it is responsible.

## 7.10 Services provided by the Authority

The Authority will not provide to the Consultant any labour, materials, equipment or tools.

## 8. CONSULTANT SERVICES SCHEDULE

The Consultant's services are required approximately from the Commencement Date until 1 year after the new corridor is in operation. The preliminary schedule for the Consultant's services is as follows:

Milestone	Approximate Date**
Owner's Laboratory RFP publication	May 2015
Owner's Laboratory Contract Award	July 2015, after the award of the Independent Engineer contract by the Private Partner
End of Owner's Laboratory Contract	December 2021

\*\*These dates are approximate and hence subject to change.

The Consultant shall commence provision of its services on the day following receipt of written notice of the award of the Contract by the Authority, or when requested by the Authority, whichever comes later.

Upon request of the Authority, the Consultant shall be available to provide services at any time of the day or night and on any day of the week (including weekends) during the Contract's period.

## **9. SUPPLEMENTARY CONDITIONS**

### **9.1 Safety measures**

Without restricting in any way the requirements prescribed by manufacturers of materials and by the various codes and laws governing workplace health and safety, the Consultant shall supply all protective and safety devices and take all actions necessary to safeguard its employees and those of the Authority, the Private Partner, any other persons involved in the Project Work as well as the public.

The Consultant shall comply with all applicable provisions of the provincial Code and the Canada Labour Code (health and safety) relating to workplace health and safety.

The Consultant shall inquire about the regulations, directives and safety restrictions that apply to boats, floating devices, nautical safety equipment and accessories that may have an impact on the performance of sampling activities in a water course, including, without limitation, the safety restrictions, regulations and directives issued by Transport Canada and by the CSST such as providing rescue boats or any other measures required for the purposes of nautical safety.

Before commencing performance, the Consultant shall be aware of the accident prevention practices in effect on any work site, and shall enforce those practices which apply to the professional services to which this document relates.

At the job site, the Private Partner will provide quality control and will assume the responsibility of principal contractor within the meaning of the Act respecting occupational health and safety of Quebec. The Consultant shall, with respect to the delivery of its own services, comply with the Private Partner's workplace health and safety and accident prevention program. The Consultant however may be required to perform services outside the job site, in which case it shall comply with the applicable prevention and safety program.

If a worker is required to work in what can be considered a closed area or confined space within the meaning of the Safety code for the construction industry of Quebec (R.R.Q., c. S-2.1, r.6, section 3.2.1 – Work in a closed area) and the Canada Occupational Health and Safety Regulations, Part XI – Confined spaces, the Consultant shall so advise the Authority in advance and provide him or her with information concerning work procedures, contaminant monitoring and emergency procedures. Personnel required to work in a closed area/confined space shall have received the relevant training and certification prior to the inspection.

- The Consultant shall submit to the Authority for review its own procedure for work in closed areas/confined spaces prior to the commencement of work and shall provide all equipment prescribed in its procedure.
- The Consultant shall prepare and ensure the enforcement and continuance of a prevention and safety program and the enforcement of the procedures for work in closed areas/confined spaces.

The Consultant shall ensure that no damage is caused to the Authority's property or to public or private property.

Employees of and visitors to the Consultant are prohibited from parking private vehicles on the Project Site except in places designated by the Authority or the Private Partner.

## **9.2 Environmental protection**

The Consultant shall comply with all applicable federal, provincial, municipal or other laws, regulations, codes, orders, directives and policies respecting environmental protection. The Consultant shall also comply with all applicable requirements of the Private Partner in relation to environmental protection.

The Consultant shall take all measures necessary to protect the environment and to avoid all forms of pollution.

## **9.3 Protecting existing utilities and equipment**

Various utilities are installed in the areas where the Project Work will take place. The Consultant shall at all time take the measures required to adequately protect utilities and equipment in or near its work area from damage, loss or service outage.

Any damage, loss or service outage arising out of or resulting from the Consultant's activities or a lack of protection shall be immediately repaired or replaced by the owner of said facilities or by the Authority at the expense of the Consultant.

## **9.4 Requests for information**

All requests for information concerning the Contract or the Project work from any print or electronic media or from persons not involved in the Project work shall be forwarded to the Authority without delay.

## **9.5 Signs**

With the exception of signs for identification purposes as required by legislation or by the Contract, the Consultant shall not be permitted to post any sign, advertisement or poster on the Project premises without the prior written authorization of the Authority.

## **9.6 Advertising**

All Consultant advertising associated with the NBSLC Project shall be submitted to the Authority for prior approval. Without restricting the generality of the foregoing, this requirement applies to all advertising media, such as radio, television, Web, social networks, newspapers, magazines and other print media, on the work site or elsewhere. It also applies to NBSLC Project site visits and website presentations.

## 10. METHOD OF REMUNERATION

Unless otherwise stated, payment of the professional services provided by the Consultant may be remunerated on a fixed fee basis, on a time-based fee basis (for the number of hours actually worked), on the basis of reimbursement of the actual cost or on the basis of reimbursement of the actual cost plus a mark-up. The Consultant shall refer to the Price Table to determine the remuneration method that applies to each of the Payment Items.

Unless otherwise stated, any aspect of “labour” that constitutes a Payment Item or portion of a Payment Item shall include without limitation:

- a) the employee's base pay;
- b) any increases in base pay, if applicable;
- c) any premiums, compensations, and allowances, including an increased rate of pay for overtime;
- d) social benefits;
- e) fringe benefits (or any benefits having a pecuniary value) including costs of group insurance and supplemental pension plans;
- f) lost or unproductive time, including travel time, waiting time, and time spent on failed tests;
- g) costs for supplying, operating and maintaining equipment, apparatuses, tools, instruments, accessories, clothing, safety devices and the like used by staff to deliver services;
- h) staff travel expenses within 50 km radius from the Champlain Bridge former toll plaza located on Nuns' Island (Île des Sœurs);
- i) insurance costs including insurance for general civil liability, motor vehicle liability, marine liability (if applicable), professional liability and work accidents;
- j) costs related to use by staff of computers and related equipment and software to deliver services;
- k) administrative costs, including for secretarial services for the preparation of reports, reproduction of documents and communication costs;
- l) all other costs for delivery of the Contract services by the Consultant's staff, including worksite overhead;
- m) equipment, tools, clothing and materials needed by the Consultant's staff to deliver the Contract services;
- n) local project office, other than that supplied by the Private Partner or the Authority;
- o) profit.

Unless otherwise stated, any aspect of “equipment” that constitutes a Payment Item or portion of a Payment Item shall include, without limitation:

- a) the costs of loading, unloading, transportation, installation, dismantling, cleaning etc., regardless of where such costs are incurred;
- b) any fuel (or other form of energy) or lubricant required to operate the equipment;
- c) calibration of equipment and specialized devices and obtaining certificates for these calibrations;
- d) any repairs that must be made to the equipment to keep it in good repair and working order;

- e) the cost of replacing broken or worn parts, including normal wear;
- f) the cost of providing operators for equipment;
- g) the cost of any loss of or damage to equipment;
- h) equipment insurance costs;
- i) all local, municipal, provincial and federal taxes, levies and duties on equipment during the period of use under this Contract;
- j) worksite overhead costs;
- k) administrative costs;
- l) profit.

Unless otherwise stated, any aspect of “materials” that constitutes a Payment Item or portion of a Payment Item shall include without limitation:

- a) the purchase price of the materials;
- b) all local, municipal, provincial and federal taxes, levies and duties on materials;
- c) the cost of loading, unloading, transporting, packing, etc.;
- d) the cost of any loss of or damage to materials;
- e) insurance costs;
- f) worksite overhead costs;
- g) administrative costs;
- h) profit.

## 10.1 Fixed Fees

In the case of a remuneration method based on a “fixed fee” in the form of a lump sum, the price tendered must include, without limitation, the following:

- a) any resources and labour required to provide the professional services indicated in the Payment Item concerned, specifically including: salaries, fringe benefits, bonuses and insurance;
- b) costs for computer equipment, including the software applications required to provide the professional services;
- c) communication costs (telephones, fax machines, email, cellular telephones, radios, etc.) including the cost of the equipment and user fees;
- d) reproduction and delivery costs of drawings, CADD files, review comments and other documents necessary to satisfy the Consultant’s obligations specified in the Contract as applicable to the Consultant’s services;
- e) standard office expenses such as any photocopying, computer costs, Internet, cellular phone costs, long distance telephone and fax costs, including those between the Consultant’s offices and Authority, or any other party involved in the Project;
- f) courier and delivery charges for deliverables as applicable to the Consultant’s services;
- g) plotting;
- h) presentation material;

- i) parking fees;
- j) taxi charges;
- k) travel time;
- l) travel expenses within a 50 km radius from the Champlain Bridge former toll plaza located on Nuns' island (Île des Sœurs), and
- m) local project office, other than that made available (on an occasional basis) by the Authority.

## 10.2 Time-based fee

In the case of a remuneration method based on a "time-based fee" (hourly rate), the following terms are applicable:

- a) Staff approved by the Authority shall be paid at the hourly rate specified in the Price Table;
- b) Travel time during normal working hours, that is related to the Project and authorized by the Authority, shall be chargeable as time worked. Travel time outside normal working hours, that is related to the Project and authorized by the Authority, shall be chargeable up to a maximum of three hours per day, unless otherwise authorized;
- c) The maximum amount(s) that apply to the provision of the Consultant's services at time rates shall be as specified in the Price Table, which amount(s) shall not be exceeded without the prior authorization of the Authority.

The rates to be inscribed in Column 6 of the Price Tables shall include without limitation all costs for labour, equipment, materials, report writing, material resources and incidental expenses, as well as costs for travel, meals and accommodation required to deliver all the services set out under the Payment Items concerned in accordance with Good Industry Practice and with this Contract, unless a specific Payment Item is provided for such costs.

## 10.3 Actual cost

For the purpose of this Contract, the definition of the "actual cost" is the cost reasonably and properly incurred by a supplier to acquire a specific product or service for resale to the Authority. This includes the supplier's invoice price (less trade discounts), plus any applicable charges for incoming transportation, foreign exchange, customs duty and brokerage, but excludes the Goods and Services Tax and the Harmonized Sales Tax. The actual cost also means the amount, not including any mark-up (example: profit, overhead, etc.), which was in fact paid out for materials and direct labour costs.

## 10.4 Actual cost plus mark-up

In the case of a means of remuneration based on the "actual cost plus a mark-up", the following provisions apply:

- Unless otherwise indicated, the fees will be payable on the basis of the actual cost plus a mark-up for administration costs and profit;
- Actual costs plus a mark-up are subject to a limitation of expenditures.



The Consultant shall at all times be able to demonstrate to the Authority that any cost it has made is justified and that the price paid is fair and reasonable, by soliciting competitive quotes in an appropriate manner, taking into account the amount of the cost and the particular circumstances.

## **10.5 Remuneration for additional services**

The Consultant shall submit to the Authority for approval the price of any new category of work not identified on the Price Table before undertaking such new service.

The Consultant shall be remunerated according to the same terms as those already set out in these Terms of Reference.

## **11. DESCRIPTION OF PAYMENT ITEMS**

The professional services covered by the Payment Items described below are payable on a lump sum basis, on an hourly rate basis, on an actual cost basis (allowance) or on an actual cost plus mark-up basis (allowance), as outlined in the Price Table.

The Payment Items for this Contract are described below.

### **11.1 Items A1 – Resources**

#### **11.1.1 Item A1.1 – Project Engineer**

This item shall be remunerated based on an hourly rate for the number of hours actually worked by the Project Engineer assigned to the Contract as required by the Authority.

The hourly rate bid for this item shall include all elements required for the performance of the duties of the Project Engineer, including but not limited to the following:

- costs for secretarial services for the preparation of reports and forms;
- the time for travel of the Project Engineer if not reimbursed under other items;
- travel expenses of the Project Engineer, subject to Item C1.3 – *Remote travel expenses*.

The work of the Project Engineer, as required by the Authority, includes but is not limited to attending meetings, preparing studies and reports, providing technical opinions, preparing weekly and monthly forms, and submitting all reports to the Authority as required. The Project Engineer shall also coordinate the technical personnel assigned to the job site or to the plant, as well as the laboratory tests.

#### **11.1.2 Item A1.2 – Assistant Project Engineer**

This item shall be remunerated based on an hourly rate for the number of hours actually worked by the Assistant Project Engineer assigned to the Contract as required by the Authority.

The hourly rate bid for this item shall include all elements required for the performance of the duties of Assistant Project Engineer, including but not limited to the following:

- costs for secretarial services for the preparation of reports and forms;
- the time for travel of the Assistant Project Engineer if not reimbursed under other items;
- travel expenses of the Assistant Project Engineer, subject to Item 77 – *Remote travel expenses*.

The work of the Assistant Project Engineer, as required by the Authority, includes but is not limited to assisting the Project Engineer. Accordingly, the Assistant Project Engineer, as required by the Authority, shall be required to attend meetings, aid in preparing studies and reports, aid in providing technical opinions, and aid in preparing weekly and monthly forms and other reports to be submitted to the Authority. The Assistant Project Engineer also shall participate in the coordination of the technical personnel assigned to the job site or to the plant, as well as the laboratory tests.

#### 11.1.3 Item A1.3 – Senior Engineers

This item shall be remunerated based on an hourly rate for the number of hours actually worked by Senior Engineers assigned to the Contract as required by the Authority, including but not limited to the Senior Engineer – Concrete, the Senior Engineer – Roadway, the Senior Engineer – Steel, the Senior Engineer – Geotechnical and the Senior Engineer – Sound Environment (Acoustic).

The hourly rate bid for this item shall include all elements required for the performance of the duties of Senior Engineers, including but not limited to the following:

- costs for secretarial services for the preparation of reports and forms;
- the time for travel of the Senior Engineers if not reimbursed under other items;
- travel expenses of the Senior Engineers, subject to Item C1.3 – *Remote travel expenses*.

The work of the Senior Engineers, as required by the Authority, includes but is not limited to preparing studies and reports, undertaking site or plant visits and providing technical opinions on matters related to cement concrete, bituminous pavement, characteristics of metals, geotechnical matters and other fields applicable to this Contract.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.4 Item A1.4 – Intermediate Engineers

This item shall be remunerated based on an hourly rate for the number of hours actually worked by Intermediate Engineers assigned to the Contract as required by the Authority.

The hourly rate bid for this item shall include all elements required for the performance of the duties of Intermediate Engineers, including but not limited to the following:

- costs for secretarial services for the preparation of reports and forms;
- the time for travel of the Intermediate Engineers if not reimbursed under other items;
- travel expenses of the Intermediate Engineers, subject to Item C1.3 – *Remote travel expenses*.

The work of the Intermediate Engineers, as required by the Authority, includes but is not limited to preparing studies and reports, undertaking site or plant visits and providing technical opinions on

matters related to cement concrete, bituminous pavement, characteristics of metals, geotechnical matters and other fields applicable to this Contract.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.5 Item A1.5 – Junior Engineers

This item shall be remunerated based on an hourly rate for the number of hours actually worked by Junior Engineers assigned to the Contract as required by the Authority.

The hourly rate bid for this item shall include all elements required for the performance of the duties of Junior Engineers, including but not limited to the following:

- costs for secretarial services for the preparation of reports and forms;
- the time for travel of the Junior Engineers if not reimbursed under other items;
- travel expenses of the Junior Engineers, subject to Item C1.3 – *Remote travel expenses*.

The work of the Junior Engineers, as required by the Authority, includes but is not limited to preparing drawings, studies and reports, undertaking site or plant visits and providing technical opinions on matters related to cement concrete, bituminous pavement, characteristics of metals, geotechnical matters and other fields applicable to this Contract under close supervision of an Intermediate Engineer or Senior Engineer.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.6 Item A1.6 – Senior Technicians

This item shall be remunerated based on an hourly rate for the number of hours actually worked by Senior Technicians assigned to the Contract as required by the Authority.

The hourly rates bid for this item shall include all elements required for the performance of the duties of Senior Technicians, including but not limited to the following:

- the provision of instruments required to inspect the quality of work and to prepare or collect samples, such as thermometers, aerometers, slump test cones and other instruments as required;
- the time for travel of the Senior Technicians if not reimbursed under other items;
- travel expenses of the Senior Technicians, subject to Item C1.3 – *Remote travel expenses*;
- the equipment and materials required.

The work of the Senior Technicians, as required by the Authority, includes but is not limited to inspecting the quality of work by means of inspections or tests at the job site or plant, preparing or collecting sample at the job site of plant, drafting services or other tasks that they are assigned to.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.7 Item A1.7 – Intermediate Technicians

This item shall be remunerated based on an hourly rate for the number of hours actually worked by Intermediate Technicians assigned to the Contract as required by the Authority.

The hourly rates bid for this item shall include all elements required for the performance of the duties of Intermediate Technicians, including but not limited to the following:

- the provision of instruments required to inspect the quality of work and to prepare or collect samples, such as thermometers, aerometers, slump test cones and other instruments as required;
- the time for travel of the Intermediate Technicians if not reimbursed under other items;
- travel expenses of the Intermediate Technicians, subject to Item C1.3 – *Remote travel expenses*;
- the equipment and materials required.

The work of the Intermediate Technicians, as required by the Authority, consists in but is not limited to inspecting the quality of work by means of tests at the job site or plant, preparing or collecting sample at the job site of plant, drafting services or other tasks that they are assigned to.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.8 Item A1.8 – Environmental Experts

This item will be remunerated based on an hourly rate for the number of hours actually worked by Environmental Experts assigned to the Contract for environmental quality of soils, environmental quality of water and other related environmental services as requested by the Authority.

The hourly rates bid for this item shall include all elements required for the performance of the duties of Environmental Experts, including but not limited to the following:

- costs for secretarial services for the preparation of reports and related documents;
- the time for travel of the Environmental Experts if not reimbursed under other items;
- travel expenses of the Environmental Experts, subject to Item C1.3 – *Remote travel expenses*.

The work of the Environmental Experts, as required by the Authority, includes but is not limited to preparing studies and reports and providing technical opinions on matters related to environmental quality of soils, environmental quality of water and related fields.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

#### 11.1.9 Item A1.9 – Environmental Agents

This item will be remunerated based on an hourly rate for the number of hours actually worked by Environmental Agents assigned to the Contract for environmental quality of soils, environmental quality of water and other related environmental services as requested by the Authority.

The hourly rates bid for this item shall include all elements required for the performance of the duties of Environmental Agents, including but not limited to the following:

- the provision of basic instruments and equipment required for site visits, monitoring of on-site activities, preparing or collecting samples on site and related activities;
- the time for travel of the Environmental Agents if not reimbursed under other items;
- travel expenses, subject to Item C1.3 – *Remote travel expenses*.

The work of the Environmental Agents, as required by the Authority, includes but is not limited to undertaking site supervision services, site visits, sampling activities, taking notes on ongoing site activities and providing general monitoring services on matters related to environmental quality of soils, environmental quality of water and related fields.

This item does not include the services (labour, etc.) which are already covered by other items relating to specific tests and analyses in the Price Table.

## **11.2 Items B1 – Concrete and related items**

### **11.2.1 Item B1.1 – Test of compressive strength of a cylindrical concrete specimen**

Tests of the compressive strength of a cylindrical concrete specimen shall be measured for payment purposes according to the number of tests, for the number of compression tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of the compressive strength of a cylindrical concrete specimen in accordance with CAN/CSA A23.2-9C, *Compressive strength of cylindrical concrete specimens*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- supplying the standard mould;
- curing of the cylindrical specimen;
- preparing the cylinder for testing;
- time and travel expenses to pick up the cylindrical specimen at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

### **11.2.2 Item B1.2 – Preservation of a cylindrical concrete specimen for subsequent testing (as required)**

Preservation of a cylindrical concrete specimen for subsequent testing (as required) shall be measured for payment purposes based on the number of cylindrical specimens (unit) preserved.

The preservation period of a cylindrical concrete specimen shall vary from one (1) to forty-eight (48) months.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to preserve the specimen;

- supplying the standard mould;
- curing of the cylindrical specimen;
- time and travel expenses to pick up the cylindrical specimen at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*.

#### 11.2.3 Item B1.3 – Test of compressive strength of a concrete core sample

Tests of the compressive strength of a concrete core sample (extracted from works) shall be measured for payment purposes based on the number of tests, for the number of compression tests performed under the Contract.

The unit price bid for this shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of the compressive strength of a concrete core sample in accordance with CAN/CSA A23.2-14C, *Obtaining and testing drilled cores for compressive strength testing*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the ends of the core sample, by sawing, for testing;
- time and travel expenses to pick up the core sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.4 Item B1.4 – Compression testing of a set of three (3) mortar cubes

Compression testing of a set of three (3) mortar cubes shall be measured for payment purposes based on the number of sets of compression tests on three (3) mortar cubes, for the number of sets of compression tests on three (3) mortar cubes performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of the compressive strength of a set of three (3) mortar cubes in accordance with ASTM C109 / C109M-13 *Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Samples)*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the set of three (3) cubes of mortar for testing;
- curing the set of three (3) cubes of mortar;
- time and travel expenses to pick up the set of three (3) cubes of mortar at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.5 Item B1.5 – Brass mould with plates and securing devices for collecting cubes of mortar

Supply of a brass mould with plates and securing devices for collecting cubes of mortar shall be remunerated based on the number of months, for the number of months during which the brass mould with plates and securing devices was actually used at the job site.

The unit price bid for this item shall include but shall not be limited to:

- supplying a brass mould and all the accessories required to collect cubes of mortar at the job site. The mould shall be in good condition and shall conform to the applicable standards.

#### 11.2.6 Item B1.6 – Determination of the relative density and absorptivity of coarse aggregate

Determination of the relative density and absorptivity of coarse aggregate shall be measured for payment purposes based on the number of analyses, for the number of analyses of relative density and absorptivity of coarse aggregate performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory analysis of the relative density and absorptivity of a sample of coarse aggregate in accordance with LC 21-067, *Granulats – Détermination de la densité et de l'absorption du gros granulat*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.2.7 Item B1.7 – Chloride ion penetration test

Tests of chloride ion penetration shall be measured for payment purposes based on the number of tests, for the number of penetration tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of chloride ion penetration in accordance with ASTM C1202-12, *Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for chloride ion penetration testing;
- time and travel expenses to pick up the sample at the job site or the plant, subject Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.8 Item B1.8 – Determination of water-soluble chloride ion content in hardened grout or concrete

Determination of water-soluble chloride ion content in hardened grout or concrete shall be measured for payment purposes based on the number of tests, for the number of tests of water-soluble chloride ion content performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of the water-soluble chloride ion content in hardened grout or concrete in accordance with CAN/CSA-A23.2-4B, *Sampling and determination of water-soluble chloride ion content in hardened grout or concrete*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for the determination of water-soluble chloride ion content;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.9 Item B1.9 – Compression testing of an epoxy capsule

Compression testing of an epoxy capsule shall be measured for payment purposes based on the number of tests, for the number of compression tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all work required to perform the compression test on an epoxy capsule (cylindrical container 3 cm in diameter and 5 cm in length, such as a cylindrical 35 mm photographic film container);
- all labour, equipment and materials required to perform the compression test on a mortar/epoxy capsule in accordance with ASTM D695-10, *Standard Test Method for Compressive Properties of Rigid Plastics*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- curing the sample, which shall be kept in a humid environment from removal from the job site until the test;
- time and travel expenses to pick up the capsule at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.10 Item B1.10 – Test of core samples by tensile load (concrete, mortar and grout)

Tests of core samples by tensile load (concrete, mortar and grout) shall be measured for payment purposes based on the number of tests, for the number of tensile load tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all work required to perform the tensile load test on core samples (concrete, mortar and grout);
- all labour, equipment and materials required to perform the tensile load test on core samples (concrete, mortar and grout) in accordance with CAN/CSA A23.2-6B, *Determination of bond strength of bonded toppings and overlays and of direct strength of concrete, mortar and grout*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- curing the sample, which shall be kept in a humid environment from the time of removal from the job site until the test;
- time and travel expenses to pick up the core sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;



- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.11 Item B1.11 – Determination of the petrographic number of aggregates

Determination of the petrographic number of aggregates shall be remunerated based on an hourly rate for the number of hours actually worked by the resource assigned to determine petrographic numbers.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory tests to determine the petrographic number of aggregates in accordance with CAN/CSA A23.2-15A, *Petrographic examination of aggregates*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses to pick up the aggregate at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.12 Item B1.12 – Resistance of concrete or mortar to rapid freeze/thaw cycles

Testing the resistance of concrete or mortar to rapid freeze/thaw cycles shall be measured for payment purposes based on the number of tests, for the number of resistance tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to test the resistance of concrete or mortar to rapid freeze/thaw cycles in accordance with ASTM C666/C666M-03(2008), *Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing (1 prism, 300 cycles)*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses to pick up the prism at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.13 Item B1.13 – Scaling resistance of concrete surfaces to de-icing salts

Testing the scaling resistance of concrete surfaces to de-icing salts shall be measured for payment purposes based on the number of tests, for the number of resistance tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform tests of the scaling resistance of concrete surfaces to de-icing salts (50 cycles per test sample) in accordance with ASTM C672/C672M-12, *Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals*, or in accordance with BNQ NQ 2621-900/2002 – Annexe

B – *Détermination de la résistance à l'écaillage du béton soumis à des cycles de gel-dégel en contact avec des sels fondants*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;

- time and travel expenses to pick up the test sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.2.14 Item B1.14 – Microscopical determination of parameters of the air-void system in hardened concrete

Microscopical determination of parameters of the air-void system in hardened concrete shall be measured for payment purposes based on the number of tests, for the number of microscopical determination tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the microscopical determination of parameters of the air-void system in a specimen, plate or core sample of hardened concrete in accordance with ASTM C457/C457M-12, *Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the concrete specimen, plate or core sample, including sawing, polishing and testing;
- time and travel expenses to pick up the specimen, plate or core sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

### 11.3 Items B2 – Pavement and related items

#### 11.3.1 Item B2.1 – Testing core sample of bituminous concrete (gross relative density and thickness measurement)

Tests on core samples of bituminous concrete (gross relative density and thickness measurement) shall be measured for payment purposes based on the number of tests, for the number of tests on core samples of bituminous concrete performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of core samples of bituminous concrete (gross relative density and thickness measurement) in accordance with LC 26-040, *Détermination de la densité brute et de la masse volumique des enrobés à chaud compactés*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses to pick up the core sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the core sample for testing;
- preparing the test report;

- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.3.2 Item B2.2 – Complete analysis of (type I) bituminous concrete mix

Complete analyses of (type I) bituminous concrete mix shall be measured for payment purposes based on the number of analyses, for the number of complete analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the complete laboratory analysis of (type I) bituminous concrete mix in accordance with LC 26-006 *Détermination de la teneur en bitume par ignition* (or LC 26-100 *Détermination de la teneur en bitume* and LC 26-110 *Réduction en laboratoire d'échantillons en vue d'essais*), LC 26-007 *Analyse granulométrique des granulats d'extraction*, LC 26-040 *Détermination de la densité brute et de la masse volumique des enrobés à chaud compactés*, LC 26-045 *Détermination de la densité maximale*, and LC 26-060 *Méthode Marshall de détermination de la résistance à la formation d'éprouvettes*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays. The analysis shall include sieve analysis, bitumen content, percentage of filler, maximum and bulk density, Marshall stability, and viscosity;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.3.3 Item B2.3 – Analysis of grade of bitumen used in bituminous concrete

Analyses of the grade of bitumen used in bituminous concrete shall be measured for payment purposes based on the number of analyses, for the number of analyses of bitumen grade performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory analysis of the grade of bitumen used in bituminous concrete and for determining the Continuous Grading Temperatures and Continuous Grades for PG Graded Asphalt Binders in accordance with ASTM D7643-10 *Standard Practice for Determining the Continuous Grading Temperatures and Continuous Grades for PG Graded Asphalt Binders*, during regular workings hours and overtime hours on Saturday, Sunday or holidays;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.3.4 Item B2.4 – Tests for rutting resistance

Tests to determine the rutting resistance of bituminous concrete shall be measured for payment purposes based on the number of tests, for the number of rutting resistance laboratory tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of a sample of bituminous concrete in accordance with AFNOR P 98-253-1, *Déformation permanente des mélanges hydrocarbonés; Partie 1: Essai d'orniérage* and AFNOR P 98-250-2, *Préparation des mélanges hydrocarbonés; Partie 2: Compactage des plaques*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for testing;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.3.5 Item B2.5 – Testing bituminous concrete mixture with gyratory shear tester (LC 26-003)

Tests of bituminous concrete mixture with a gyratory shear tester (LC 26-003) shall be measured for payment purposes based on the number of tests, for the number of tests using a gyratory shear tester performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of a sample of bituminous concrete using a gyratory shear tester, including measurement of maximum density, in accordance with LC 26-003 *Détermination de l'aptitude au compactage des enrobés à chaud à la presse à cisaillement giratoire*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for testing;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.3.6 Item B2.6 – Testing adhesion of waterproofing membrane and bituminous concrete system

Testing the adhesion of a waterproofing membrane and bituminous concrete system shall be measured for payment purposes based on the number of tests, for the number of adhesion tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all equipment and materials required at the job site, including materials to be installed prior to the placement of the waterproofing membrane and bituminous concrete, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- all labour, equipment and materials required to perform adhesion tests on the waterproofing membrane and bituminous concrete system in accordance with ASTM

D7105-06(2013) *Standard Test Method for Determining the Adhesive and Cohesive Strength Between Materials in Roofing or Waterproofing Membranes and Systems*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;

- time and travel expenses to go to the job site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

## 11.4 Items B3 – Soils, aggregates and related items

### 11.4.1 Item B3.1 – Laboratory testing of soil compaction characteristics

Laboratory tests of soil compaction characteristics shall be measured for payment purposes based on the number of tests, for the number of compaction tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory testing of soil compaction characteristics in accordance with ASTM D698-12e1, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays.
- determining a reference curve (maximum dry density) for each test;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

### 11.4.2 Item B3.2 – Determination of water content of aggregate by drying

The determination of water content of aggregate by drying shall be measured for payment purposes based on the number of analyses, for the number of analyses of water content performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory testing for the determination of water content in aggregate (on receipt) by drying in accordance with LC 26-201, *Granulats – Détermination de la teneur en eau par séchage*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the analysis report to the Authority in a timely manner.

#### 11.4.3 Item B3.3 – Nucleodensimeter

Use of a nucleodensimeter for on-site determination of the degree of compaction for base, sub-base material as well as bituminous concrete shall be remunerated based on the number of days during which the nucleodensimeter was actually used on site.

The unit price bid for this item shall include but shall not be limited to the supply of a nucleodensimeter and all accessories required to perform tests at the job site, during regular working hours and overtime hours on Saturdays, Sundays or holidays.

#### 11.4.4 Item B3.4 – Determination of compaction and water content of soils on site

The determination of compaction and water content of soils on site shall be measured for payment purposes based on an hourly rate for the number of hours of on-site testing actually performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to determine the compaction and water content of soils on site in accordance with ASTM D7830 / D7830M, *Standard Test Method for In-Place Density (Unit Weight) and Water Content of Soil Using an Electromagnetic Soil Density Gauge*, including the provision of a moisture density gauge and all accessories required to perform tests at the job site during regular working hours and overtime hours on Saturdays, Sundays or holidays.
- determination of values of maximum dry density and water content for each test ;
- time and travel expenses to perform the tests on site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.4.5 Item B3.5 – Grain size distribution analysis of sub-base or base material

Grain size distribution analyses of sub-base or base material shall be measured for payment purposes based on the number of analyses, for the number of grain size distribution analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory analysis of grain size distribution on a sample of sub-base or base material in accordance with ASTM D422-63 (2007)e2, *Standard Test Method for Particle-Size Analysis of Soils*, during regular working hours and overtime hours on Saturdays, Sundays or holidays;
- determining a grain size curve for each grain size analysis;
- time and travel expenses to pick up the sample at the job site or at the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.4.6 Item B3.6 – Grain size analysis of borrow material

Grain size analyses of borrow material shall be measured for payment purposes based on the number of analyses, for the number of grain size analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory analysis of grain size distribution on a sample of borrow material in accordance with ASTM D422-63 (2007)e2, *Standard Test Method for Particle-Size Analysis of Soils*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- determining a grain size curve for each grain size analysis;
- time and travel expenses to pick up the sample at the job site or the plant, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.5 Items B4 – Steel and related items

#### 11.5.1 Item B4.1 – On-site tensile testing of steel anchor bars/dowels or other devices anchored to concrete

On-site tensile testing of steel anchor bars/dowels or other devices anchored to concrete shall be measured for payment purposes based on the number of tests, for the number of tensile tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform tensile testing of bars/dowels/devices anchored to concrete at the job site in accordance with Annex D of CAN/CSA-A23.3-14, *Design of Concrete Structures*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses to perform the tests at the job site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.5.2 Item B4.2 – Elongation testing of structural steel and reinforcing steel

Elongation testing of structural steel and reinforcing steel shall be measured for payment purposes based on the number of tests, for the number of elongation tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all work required to prepare sample for steel elongation testing. Steel pieces shall be 25 mm or less in thickness, and reinforcing steel bars shall be size 25M or smaller;

- all labour, equipment and materials required to perform steel elongation testing (determination of ultimate tensile strength, elastic limit and percentage elongation) in accordance with CAN/CSA G30.18-09, *Carbon Steel Bars for Concrete Reinforcement*; ASTM A370-14, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*; CAN/CSA G40.20/G40.21-13, *General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel*; ASTM E8/E8M13a, *Standard Test Methods for Tension Testing of Metallic Materials*; and ASTM A615/A615M-14, *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- interpreting the results and preparing tables of test results, including photographs of the sample;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

Unless other arrangements are made, the pieces of steel to be tested will be delivered to the Consultant's premises by the personnel of the Authority.

#### 11.5.3 Item B4.3 – Elongation testing of prestressing steel

Elongation testing of prestressing steel shall be measured for payment purposes based on the number of tests, for the number of tests actually performed under this Contract.

The unit price bid for this item shall include but is not limited to:

- all the work required to prepare and machine the sample for elongation testing of the steel;
- all the labour, equipment and materials required to perform the elongation testing of the prestressing steel (determination of the tensile strength, elastic limit and percentage of elongation) in accordance with ASTM A416/A416M-12a, *Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- interpreting the results and preparing tables of test results, including photographs of the sample;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

Unless other arrangements are made, the pieces of steel shall be delivered to the Consultant's premises by the personnel of the Authority.

#### 11.5.4 Item B4.4 – Tensile testing on the post-tensioning anchorage system

Tensile testing on the post-tensioning anchorage system shall be measured for payment purposes based on the number of tests, for the number of tensile tests actually performed under the Contract.

The unit price bid for this item shall include but is not limited to:

- all the work required to prepare the anchorage system for the tensile testing;
- all the labour, equipment and materials required to perform the tensile testing on the post-tensioning anchorage system, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;



- interpreting the results and preparing tables of test results, including photographs of the anchorage;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

Costs for the fabrication of specimens or special “mock-ups”, as well as costs for the use of special equipment for the type of anchorage are not covered under this item. Such costs are payable in accordance to the provisions of Item C1.1 - *Incidental Expenses*.

#### 11.5.5 Item B4.5 – Resilience (Charpy) testing of a steel plate sample

Resilience (Charpy) tests of a steel plate sample shall be measured for payment purposes based on the number of tests, for the number of resilience tests performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, materials and equipment required to perform in laboratory resilience (Charpy) testing on a steel plate sample in accordance with ASTM E23-12c, *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials* and ASTM A370-14, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- calibration;
- preparing the sample for testing;
- time and travel expenses to go to the job site or plant and collect the sample, subject to Item C1.3 – *Remote travel expenses*;
- preparing the test report;
- sending the initial test report and the final test report to the Authority in a timely manner.

#### 11.5.6 Item B4.6 – Chemical analysis of a steel plate sample

Chemical analyses of a steel plate sample shall be measured for payment purposes based on the number of analyses, for the number of chemical analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, materials and equipment required to perform the laboratory chemical analyses on a steel plate sample in accordance with ASTM E415-14, *Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry* and ASTM E350-12, *Standard Test Methods for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- calibration;
- preparing the sample for analysis;
- time and travel expenses to go to the job site or plant and collect the sample, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.5.7 Item B4.7 – Dynamic analysis of pile driving

Dynamic analysis of pile driving shall be measured for payment purposes based on the number of days, for the number of days during which dynamic analysis of pile driving has been performed under the contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, materials and equipment required to perform the on-site dynamic analysis of pile driving in accordance with ASTM D4945, *Standard Test Method for High-Strain Dynamic Testing of Deep Foundations*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- supply and installation of equipment;
- time and travel expenses to go to the job site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

The analysis report shall contain tabular as well as graphical presentation of the dynamic test results versus depth, and shall include but shall not be limited to the following:

- date of testing and date of pile installation;
- pile identification number and location;
- length of pile below commencing surface;
- total length of pile, including projection above commencing surface at time of test;
- length of pile from instrumentation position to tip;
- hammer type, drop, and other relevant details and maximum force applied to the pile head;
- the maximum pile head velocity;
- the maximum energy imparted to the pile;
- the assumed soil damping factor and wave speed;
- static capacity estimate;
- the maximum compressive and tensile forces in the pile, stroke, and capacity versus penetration depth;
- pile integrity and location of damage, if any;
- temporary compression;
- force/velocity versus time trace;
- force/velocity match curve;
- resistance distribution along the pile;
- blows per inch;
- stroke;
- summary results of pile driving analysis from selected blow analyzed using signal matching techniques and software.

## 11.6 Items B5 – Environmental and chemical analyses of abrasives, soils, sediments, aggregates and related items

### 11.6.1 Item B5.1 – Chemical analysis of sand or abrasives

Chemical analysis of sand or abrasives shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all the labour, materials and equipment required to perform the laboratory chemical analysis of a sample of sand or abrasive, during regular workings hours and overtime hours on Saturdays, Sundays or holidays; the analysis shall be performed in accordance with the *Règlement sur les matières dangereuses*, L.R.Q. (Q-2, r.32) for the characteristics of toxic and leachable materials;
- preparing the sample for analysis;
- time and travel costs for the pick-up of the sample at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.6.2 Item B5.2 – Solvent detection analysis in paint

Solvent detection analysis in paint shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all the labour, materials and equipment required to perform the laboratory solvent detection analysis of a paint sample in accordance with CAN/CGSB – 1-GP-71 No. 73-96, *Methods of Testing Paints and Pigments: Beilstein Test for Chlorinated Solvents*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparation of the sample for analysis;
- Time and travel costs for the pick-up of the sample at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.6.3 Item B5.3 – Determination of C<sub>10</sub>-C<sub>50</sub> petroleum hydrocarbon content in soils/sediments

Determination of C<sub>10</sub>-C<sub>50</sub> petroleum hydrocarbon content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine C<sub>10</sub>-C<sub>50</sub> petroleum hydrocarbon content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.4 Item B5.4 – Determination of F<sub>1</sub>-F<sub>4</sub> petroleum hydrocarbon content in soils/sediments

Determination of F<sub>1</sub>-F<sub>4</sub> petroleum hydrocarbon content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine F<sub>1</sub>-F<sub>4</sub> petroleum hydrocarbon content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial and final analysis report to the Authority in a timely manner.

#### 11.6.5 Item B5.5 – Determination of polycyclic aromatic hydrocarbon (PAH) content in soils/sediments

Determination of polycyclic aromatic hydrocarbon (PAH) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine polycyclic aromatic hydrocarbon (PAH) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.6 Item B5.6 – Determination of metal content (Ag, As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Se, Sn and Zn) in soils/sediments (group of 14 metals)

Determination of metal content (Ag, As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Se, Sn and Zn) in soils/sediments (group of 14 metals) shall be measured for payment purposes based on the number of analyses, for the number of analyses on a group of 14 elements performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of metal content (Ag, As, Ba, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Se, Sn and Zn) in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

11.6.7 Item B5.7 – Determination of metal content (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) in soils/sediments (individual element)

Determination of metal content (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) in soils/sediments (individual element), shall be measured for payment purposes based on the number of analyses to determine the content of one (1) of the metal elements, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of metal content (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

11.6.8 Item B5.8 – Determination of monocyclic aromatic hydrocarbon (MAH) content in soils/sediments

Determination of monocyclic aromatic hydrocarbon (MAH) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of monocyclic aromatic hydrocarbon (MAH) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.9 Item B5.9 – Determination of chlorinated aliphatic hydrocarbons (CAH) content in soils/sediments

Determination of chlorinated aliphatic hydrocarbons (CAH) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of chlorinated aliphatic hydrocarbons (CAH) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.10 Item B5.10 – Determination of non-chlorinated phenolic compounds (NCPC) content in soils/sediments

Determination of non-chlorinated phenolic compounds (NCPC) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine non-chlorinated phenolic compounds (NCPC) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.11 Item B5.11 – Determination of polychlorinated biphenyl (PCB) in soils/sediments

Determination of polychlorinated biphenyl (PCB) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine polychlorinated biphenyl (PCB) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;

- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.12 Item B5.12 – Determination of asbestos content in soils/sediments

Determination of asbestos content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform laboratory analyses to determine asbestos content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.13 Item B5.13 – Determination of volatile organic compound (VOC) content in soils/sediments

Determination of volatile organic compound (VOC) content in soils/sediments shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of volatile organic compound (VOC) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.6.14 Item B5.14 – Analyses of samples of waste materials for characteristics of toxic and leachable materials

Determination of metals (As, Ba, B, Cd, Cr, Hg, Pb, Se), total fluorides, nitrates (N) + nitrites (N), and nitrites (N-NO<sub>2</sub>-) content shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of metals (As, Ba, B, Cd, Cr, Hg, Pb, Se), total fluorides, nitrates (N) + nitrites (N), and nitrites (N-NO<sub>2</sub>-) content in soils/sediments, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;

- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

## 11.7 Items B6 – Environmental and chemical analyses of water and related items

### 11.7.1 Item B6.1 – Water samples analysis (package option)

Determination of content of ammoniacal nitrogen, of suspended matter, of mineral oils and greases, of polycyclic aromatic hydrocarbons (PAH), of metals (Al, Ag, As, Ba, Cd, Cr, Co, Cu, Sn, Fe, Mn, Mo, Ni, Pb, Se, Zn), of chlorides, as well as the pH, the hardness and the turbidity in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of the content of ammoniacal nitrogen, of suspended matters, of mineral oils and greases, of polycyclic aromatic hydrocarbons (PAH), of metals (Al, Ag, As, Ba, Cd, Cr, Co, Cu, Sn, Fe, Mn, Mo, Ni, Pb, Se, Zn), of chlorides, and the pH, hardness and turbidity in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.7.2 Item B6.2 – Determination of ammoniacal nitrogen content in water

Determination of ammoniacal nitrogen content in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of ammoniacal nitrogen content in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.7.3 Item B6.3 – Determination of suspended matter content in water

Determination of suspended matter content in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.



The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of suspended matter content in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the analysis report to the Authority in a timely manner.

#### 11.7.4 Item B6.4 – Determination of mineral oils and greases content in water

Determination of mineral oils and greases in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of mineral oils and greases in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.7.5 Item B6.5 – Determination of polycyclic aromatic hydrocarbons (PAH) content in water

Determination of content of polycyclic aromatic hydrocarbons (PAH) content in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of polycyclic aromatic hydrocarbons (PAH) content in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.7.6 Item B6.6 – Determination of metals (Al, Sb, Ag, As, Ba, Cd, Cr, Co, Cu, Mn, Mo, Ni, Pb, Na and Zn) content in water (group of 15 metals)

Determination of metals (Al, Sb, Ag, As, Ba, Cd, Cr, Co, Cu, Mn, Mo, Ni, Pb, Na and Zn) content in water (group of 15 metals), for which one (1) analysis is considered to be the determination of all 15 metals, shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of metals (Al, Sb, Ag, As, Ba, Cd, Cr, Co, Cu, Mn, Mo, Ni, Pb, Na and Zn) content in water (group of 15 metals), during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

11.7.7 Item B6.7 – Determination of metals (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) content in water (individual elements)

Determination of metals (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) content in water (individual elements), for which one (1) analysis is considered to be the determination of one (1) of the above noted metals, shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of metals (Al, Ag, As, Ba, Be, B, Bi, Ca, Cd, Co, Cr, Cu, Fe, Sn, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Ti, Tl, V or Zn) content in water (individual elements), during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

11.7.8 Item B6.8 – Determination of chlorides content in water

Determination of chlorides content in water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory determination of chlorides content in water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.7.9 Item B6.9 – Determination of pH, hardness and turbidity of water

Determination of pH, hardness and turbidity of water shall be measured for payment purposes based on the number of analyses, for the number of analyses performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to perform the laboratory or on-site determination of pH, hardness and turbidity of water, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the sample for analysis and time and travel expenses to pick up the sample at the job site, subject to Item C1.3 – *Remote travel expenses*;
- characterizing the sample and preparing the analysis report;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.7.10 Item B6.10 – Supply and installation of a monitoring well with screen

The supply and installation of a monitoring well with screen shall be measured for payment purposes based on the number of monitoring wells (unit) with screen, for the number of monitoring wells with screen actually supplied and installed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to supply and install a monitoring well with screen, meeting the requirements of the MDDELCC's *Cahier 3, Guide d'échantillonnage à des fins d'analyses environnementales*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- time and travel expenses, subject to Item C1.3 – *Remote travel expenses*.

### 11.8 Items B7 – Monitoring of air quality, sound environment, vibrations and related items

#### 11.8.1 Item B7.1 – Air quality measurement surveys

Air quality measurement surveys shall be remunerated based on the number of hours, for the number of hours during which measurement of continuous air quality sampling events actually occurred under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to carry out the air quality measurement survey in accordance with the Environment Canada's guidelines for the National Air Pollution Surveillance Program (NAPS) for PM<sub>2.5</sub> and PM<sub>tot</sub>, during regular workings hours and overtime hours in the evening or night and on Saturdays, Sundays or holidays;
- preparation and calibration of the equipment for the survey;
- time and travel expenses to proceed with the air quality monitoring survey at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;

- if air quality thresholds are exceeded, notifying the in a timely manner;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.8.2 Item B7.2 – Monitored noise measurement surveys

Monitored noise measurement surveys shall be remunerated based on the number of hours, for the number of hours during which measurement of noise levels actually occurred under the Contract.

Surveys shall be monitored (i.e. including the presence of a Consultant's resource during the entire survey) and the following observations, without limitation, shall be noted for the purpose of analysing the results:

- meteorological conditions, such as cloud cover, precipitation, humidity, temperature, wind (speed and direction);
- ongoing construction activities;
- any other element that may have an impact on the interpretation and analysis of the collected sound data.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to collect the noise measurement data under monitoring in accordance with the methodology established by the *Ministère des transports du Québec's* Environmental Department, *Méthodologie – Étude de pollution sonore pour des infrastructures routières existantes*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparation and calibration of the equipment for the survey;
- time and travel expenses to proceed with the measurements at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- if noise thresholds are exceeded, notifying the Authority within two (2) hours of the survey;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.8.3 Item B7.3 – Unmonitored noise measurement surveys

Unmonitored noise measurement surveys shall be remunerated based on the number of hours, for the number of hours during which measurement of noise levels actually occurred under the Contract.

Contrary to the previous item, a Consultant's resource should not remain at the site to note observations during the collection of noise data.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to carry out the noise measurement survey (no monitoring) in accordance with the methodology established by the *Ministère des transports du Québec's* Environmental Department, *Méthodologie – Étude de pollution*

*sonore pour des infrastructures routières existantes*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;

- preparation and calibration of the equipment for the survey;
- time and travel expenses to proceed with the noise measurement survey at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- if noise thresholds are exceeded, notifying the Authority in a timely manner;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

#### 11.8.4 Item B7.4 – Monitoring of vibrations surveys

Monitoring of vibrations surveys shall be remunerated based on the number of hours, for the number of hours during which the collection of vibration data actually occurred under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour, equipment and materials required to carry out the collection of vibration data during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparation and calibration of the equipment for the survey;
- time and travel expenses to proceed with the collection of vibration data at the site, subject to Item C1.3 – *Remote travel expenses*;
- preparing the analysis report;
- if vibration thresholds are exceeded, notifying the Authority in a timely manner;
- sending the initial analysis report and the final analysis report to the Authority in a timely manner.

### 11.9 Items B8 – Other related expenses

#### 11.9.1 Item B8.1 – Additional cost for mobilization and demobilization specific to sampling activities on a water course

Mobilization and demobilization specific to sampling activities on a water course, such as the St. Lawrence River or the Canal de l'Aqueduc, for sampling of water or sediments, shall be remunerated based on the number of mobilization and demobilization events, actually executed at the Authority's request. One event includes both the mobilization and demobilization.

The unit price bid for this item shall include but shall not be limited to, all labour, materials, equipment, resources and travel costs (subject to Item C1.3 – *Remote travel expenses*) for the following activities:

- obtaining all required permits and authorizations;
- implementing an appropriate worksite accident prevention plan and safety measures;
- mobilization and demobilization of boats and other required vessels on site;
- storing machinery, equipment, materials, accessories and tools at an appropriate place at the site.

For clarity, the following activities are not payable under this item:

- nautical safety activities ;
- the sampling activities themselves, as they are payable under other items specific to sampling, analyses and testing.

#### 11.9.2 Item B8.2 – Crew and equipment for drilling in soils

The crew and equipment for drilling in soils shall be remunerated based on the number of 8-hour days at the job site, for the number of 8-hour days during which the crew and equipment for drilling in soils assigned to the job site actually worked at the request of the Authority.

The unit price bid for this item shall include but shall not be limited to the following:

- all labour required, including but not limited to the operator and his or her helper;
- supplying a drill with truck, drill rods and all accessories required (including generator and diamond drills) to take soil samples of soil at the job site, to a depth not exceeding 5 m, during regular workings hours and overtime hours on Saturdays, Sundays or holidays;
- preparing the drilling report;
- sending the initial drilling report and the final drilling report to the Authority in a timely manner.

#### 11.9.3 Item B8.3 – Concrete core drilling machine

Supply of a concrete core drilling machine shall be measured for payment purposes based on the number of hours, for the number of hours during which the core drilling machine was actually used.

The unit price bid for this item shall include but shall not be limited to, supplying the concrete core drilling machine, core drill rods and all accessories required (including generator and diamond drills) to take core samples of concrete at the job site in accordance with CAN/CSA-A23.2-14C, *Obtaining and testing drilled cores for compressive strength testing*, during regular workings hours and overtime hours on Saturdays, Sundays or holidays.

#### 11.9.4 Item B8.4 – Calibration of an aerometer

Calibration of an aerometer shall be measured for payment purposes based on the number of calibrations, for the number of calibrations actually performed under the Contract.

The unit price bid for this item shall include but shall not be limited to the following:

- all the labour, equipment and materials required to perform the laboratory calibration of an aerometer in accordance with the manufacturer's instructions and CAN/CSA A23.2-4C, *Air content of plastic concrete by the pressure method*;
- delivery and pick-up of the aerometers at the laboratory by the Consultant;
- preparation of the calibration report;
- sending the initial calibration report and the final calibration report to the Authority in a timely manner.

#### 11.9.5 Item B8.5 – Vibrator and generator

Supply of a vibrator and generator shall be measured for payment purposes based on the number of days, for the number of days the vibrator and generator were actually used on site.

The unit price bid for this item shall include but is not limited to the supply of a vibrator, of a generator and of all accessories required to perform tests at the site during regular workings hours and overtime hours on Saturdays, Sundays or holidays.

### 11.10 Items C1 – Allowances

#### 11.10.1 Item C1.1 – Incidental expenses

This item is intended for the reimbursement of expenses incurred by the Consultant for labour, equipment, materials and subcontractors, with the approval of the Authority, to perform services which are accessory to its services and which are not covered by any of Items A and Items B (B1 to B8). Examples include the temporary use of an excavator or hydraulic breaker, minor job site formwork and concrete placement, preparing or collection of control or trial specimens, installing plates or equipment anchors at the job site, etc. The following activities are also covered under this item:

- costs for traffic control activities in the event that these are required for the Consultant to perform services, including without limitation the labour and the supply, rental (if applicable), transport and installation;
- costs related to locating and protecting public and private utilities and equipment;
- costs related to nautical safety;
- supplying access devices which are not provided by the Private Partner to access the works.

Payment of these expenses will be at actual cost plus a 10% markup. The markup covers overhead, administration, profit and coordination.

All requests for reimbursement shall include the relevant substantiating documents.

An allowance of \$100,000 is provided by the Authority for this item. This allowance may be used in whole or in part.

#### 11.10.2 Item C1.2 – Disbursements

The following disbursements reasonably incurred by the Consultant, that are related to the Consultant's services, authorized in advance and approved by the Authority, shall be reimbursed to the Consultant at actual cost:

- reproduction and delivery costs of drawings, CADD files, opinions, comments, technical notes and other technical documentation additional to that specified in these Terms of Reference as applicable to the Consultant's services;
- transportation costs for material samples and models additional to that specified in these Terms of Reference as applicable to the Consultant's services;

- translation costs for the preparation of reports, notes and other documents in the second official language;
- other disbursements made with the prior authorization and approval of the Authority.

Disbursements shall be Project-related and shall not include expenses that are related to the normal operation of the Consultant's business.

An allowance of \$25,000 is provided by the Authority for this item. This allowance may be used in whole or in part.

#### 11.10.3 Item C1.3 – Remote travel expenses

Expenses for travel of the Consultant's employees beyond a 50-km radius from the former Champlain Bridge toll station, authorized in advance and approved by the Authority, shall be reimbursed to the Consultant at actual cost.

The expenses eligible for reimbursement under this item include all expenses incurred by a member of the Consultant's personnel when, as required and authorized by the Authority, that member travels to a place located outside a 50-km radius from the former Champlain Bridge toll station.

Unless authorized in advance by the Authority (for example, for special cases such as the validation of testing or analysis results by a second laboratory), travel expenses for the transportation of samples to a laboratory or testing facility located outside a 50-km radius from the former Champlain Bridge toll station associated with the testing and analyses services covered under item B (items B1 to B8) are not payable under this item. Such expenses shall be included in the price tendered for said services under item B (items B1 to B8).

These expenses shall be reimbursed in accordance with current National Joint Council Travel Directive. Excluded from this provision are the time spent by the employee in the said travel as well as expenses for travel between the job site and the permanent offices of the Consultant.

An allowance of \$50,000 is provided by the Authority for this item. This allowance may be used in whole or in part.

#### 11.10.4 Item C1.4 – Services by other resources

Services by resources that are not already covered by any other item in the Price Table, that are required to carry out any of the services requested by the Authority, shall be payable under this item.

An allowance of \$75,000 is provided by the Authority for this item. This allowance may be used in whole or in part.

#### 11.10.5 Item C1.5 – Other on-demand laboratory, investigation and inspection services

The Consultant may be required by the Authority to supply various other laboratory, investigation and inspection services on an on-demand basis. These services are not necessarily detailed in these Terms of Reference, but they can include, without being limited to:



- inspections of the Roberge Collector;
- inspections of water pipes using specialized non-destructive testing methods;
- inspection of the water tightness of underground electrical ducts;
- a variety of tests and analyses such as those included in the ACLE's *Guide de rémunération* in relation to soils, materials, and the environment;
- reviewing and commenting the Private Partner's quality assurance plan.

An allowance of \$500,000 is provided by the Authority for this Payment Item. This allowance may be used in whole or in part.

Reports prepared by the Consultant concerning this Payment Item shall be submitted to the Authority in a timely manner, to be agreed upon between the Authority and the Consultant.

The Consultant shall at all times be able to demonstrate to the Authority that any expense incurred is justified and that the price paid is fair and reasonable, notably by calling for competitive bids as appropriate, given the amount of the expense and the circumstances. In addition, the *Guide de rémunération – Ingénierie des sols et des matériaux, géoenvironnement, toiture et étanchéité* of the ACLE lists many services, tests and analyses that the Authority may request the Consultant to deliver. When applicable for additional services requested by the Authority, it is expected that the price on which the Consultant and Authority will agree will be similar to, or less than, the price listed in the latest available version of the ACLE's *Guide de rémunération* at the time the services are rendered..

The specific tests performed for this Payment Item shall enable the Consultant to submit results, failing which the tests shall not be invoiced and will not be paid for.

Whenever additional services by the Consultant will be sought under this Payment Item, the Authority and the Consultant will agree on the conditions of payment of these additional services and determine whether a lump sum or limitation of expenditure is to apply before the services are rendered.

## 11.11 Invoicing

The Consultant shall, on a monthly basis during this Contract, prepare and submit to the Authority work progress reports of the costs incurred and expenditures, based on the example provided in Appendice C *Sample Progress Claim and Progress Estimate Form*. Progress reports shall include but shall not be limited to the following:

- A descriptive text about work progress, reporting on the status of all of the activities underway and those planned for the next two weeks;
- A report on the situation of the costs incurred and the estimates of the forecasted costs, along with a detailed report for each item in the Price Table;
- A progress claim and progress of work report, including a statement that the amounts and quantities for which payment is requested meet the requirements of the Contract and are accurate.;
- Supporting documentation such as timesheets detailing the Consultant's work on the site, including but not limited to:
  - The name and classification (ex: Senior Technician, Environmental Expert, etc.) of the resource that provided services on site or at a plant;
  - The date, start time, end time and duration of the site or plant visit/services;
  - A brief description of the services provided on site or at a plant.



# **APPENDICE A**

## **GRAPHICAL REPRESENTATION OF THE PROJECT AREA**

(11 Pages – off-pagination document)

**APPENDICE B**

**OTHER POTENTIAL QUALITY CONTROL AND LABORATORY  
SERVICES**

(2 Pages)

## OTHER POTENTIAL QUALITY CONTROL AND LABORATORY SERVICES

The following is a list of other potential quality control and laboratory services that the Authority could request the Consultant to carry out, at its discretion and without limitation:

SERVICE / TEST / ANALYSIS	STANDARD
<b>Rock, soils</b>	
Water content in soils/granular materials	LC 21-200
Liquid limit and plasticity of soils (Casagrande apparatus)	BNQ 2501-90
Uniaxial compression strength on rock core samples	ASTM D 7012
Compression tests on rock core samples with modulus of elasticity measurements	ASTM D 3148
Petrographic examination on core rock or granular material (including 1 thin section)	ASTM C 295
Shrinkage limit of soils	ASTM D 4943
Specific gravity of soils	ASTM D 854
Amount of material in soils finer than the 80 micron	LC 21-040
Laboratory compaction characteristics and moisture-density relationship of base materials	
Laboratory compaction characteristics and moisture-density relationship of subgrade, embankment soils and backfill materials	
Field method for determining in-place density of soils and base materials	LC 22-002
Measuring the resistivity of soil materials	ASTM G 57
Triaxial compression	ASTM D 4767
Determining sulfate content in soils- colorimetric method	CSA A23.2-7A
Standard compaction Proctor	BNQ 2501-250
Modified compaction Proctor	BNQ 2501-255
California bearing ratio (CBR), natural soil	ASTM D 1883
Field CBR	ASTM D4429
Sand equivalent test	ASTM D 2419
Compression tests on rock core samples – Uniaxial compression strength	ASTM D 7012
Permeability - Sample mounted in triaxial cell	ASTM D 5084
Permeability - Sample mounted in an oedometer	LC 22-320
Sieve analysis by hydrometer	NQ 2501-025
Organic content	LC 31-228
Consolidation (oedometer) for 50 mm to 63,5 mm diameter samples with initial curve and decompression	ASTM D 2435
Swelling potential of aggregates by hydration (including non-reactive control)	ASTM D4792
Direct shear test (3 points)	ASTM D 3080
<b>Bituminous mixtures</b>	
Specific gravity and water absorption of aggregates	LC 21-065, LC 21-067
Sand equivalent test	LC 21-260
Asphalt content of bituminous mixtures by extraction	LC 25-001
Elasticity recovery	LC 25-005
Softening point (ring and ball)	ASTM D 36
Particle charge	ASTM D 244
Sieve test	ASTM D 244
Distillation	BNQ 2100-020

Penetration	NQ 2300-270
Ductility	ASTM D 113
Distillation of road tar and water by volume	
Specific gravity	BNQ 2100-010
Viscosity	NQ 2300-600
Bitumen content of recycled materials	LC 26-100
<b>Aggregates and Concrete</b>	
Sieve analysis of fine and coarse aggregate	LC 21-040
Petrographic number of sand or gravel of crushed stone	CSA A23.2-15A
Sampling stone, gravel, sand and mineral aggregates	LC 21-010
Saturated surface-dry specific gravity and absorption of aggregates	LC 21-065, 067
Unit weight of aggregates (normal proctor)	BNQ 2501250
Unit weight of aggregates (modified proctor)	BNQ 2501255
Material finer than 80 µm sieve in mineral aggregates	BNQ 2501250
Organic impurities in fine aggregate for concrete	LC 31-228
Abrasion of coarse aggregate using the Los Angeles machine	LC 21-400
Soundness of aggregate using $\text{MgSO}_4$ or $\text{Na}_2\text{SO}_4$ solution (5 cycles)	CSA A23.2-9A
Quantity of clay lumps and friable particles in natural aggregates	CSA A23.2-3A
Volumetric mass and water absorption on sample of concrete	CSA-A23.2-11C
Splitting tensile strength of concrete	ASTM C-469
Alkali aggregate reactivity on coarse and fine aggregates	CSA-A23.2-25A
Compressive strength on 50 mm cubes of mortar/grouts capsule	CSA A3004-C2
Compressive strength of grouts cubes	CSA A3004-C2
Flexural test of a concrete beam, central or 1/3 loading	CSA A23.2-8C
Fragmentation (percentage of fractured particles of coarse aggregate)	LC 21-100
Fine or coarse aggregate angularity	ASTM D 5821
Flat and elongated particles	LC 21-265

**APPENDICE C**

**SAMPLE PROGRESS CLAIM AND PROGRESS ESTIMATE  
FORM**

(2 Pages)

[illegible]



FACTURATION MENSUELLE PROGRESSIVE - MONTHLY PROGRESS INVOICING												New Bridge for the St. Lawrence Corridor Project, Owner's Laboratory Sampling, Testing and Analysis Services Upon Request (2015-2021)											
Instructions:												CONSULTANT TO INVOICER ONLY YELLOW CELLS											
Progress Claim																							
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12												
Item	Task/Description	Measurement Unit	Unit Price	Authorized Quantity - Total	Quantity - Current Period	Quantity - Previous Periods	Quantity - Remaining	Total Claimed - Current Period	Total Claimed - Previous Periods	Total Claimed - To Date	Total Residual Amount from Authorized Total												
RESOURCES																							
1	Project Engineer	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
2	Assistant Project Engineer	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
3	Senior Engineers	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
4	Senior Technicians	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
5	Intermediate Technicians	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
6	Environmental Experts	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
7	Environmental Agents	Hour (Biliable hourly rate)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
CONCRETE AND RELATED ITEMS																							
8	Test of compressive strength of a cylindrical concrete specimen	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
9	Preservation of cylinder for subsequent testing (as required)	Cylinder			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
10	Test of compressive strength of concrete core samples	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
11	Compression testing of a set of three mortar cubes	Testing on set of 3 grout cubes			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
12	Brass mould with plates and securing devices for collecting cubes of mortar	Mould			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
13	Determination of the relative density and absorptivity of coarse aggregate	Analysis			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
14	Chloride ion penetration test	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
15	Determination of water-soluble chloride ion content in hardened grout or concrete	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
16	Compression testing of mortar/epoxy capsule	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
17	Test of core samples by tensile load (epoxy and mortar)	Test			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
...					0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
...					0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
ALLOWANCES																							
	Incidental expenses	Allowance (actual cost + markup)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
	Disbursements	Allowance (actual cost)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
	Remote travel expenses	Allowance (actual cost)			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
	Services by other resources	Allowance			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
	Other on-demand laboratory, investigation and inspection services	Allowance			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
	Indexation of costs	Allowance			0.00	0.00	0.00	\$ -	\$ -	\$ -	\$ -												
GRAND TOTAL																							
Sous-total												A: \$ -											
TPS												B: \$ -											
TVQ												C: \$ -											
Total												D: (A + B + C) \$ -											