



PARKS CANADA

**Realization of plans and specifications for the
repair of three (3) bridges and for the
rehabilitation of one (1) culvert
La Mauricie National Park
Project: 45353174**

TECHNICAL SPECIFICATIONS (For Tender)

**FILE: 131-121559-09
DATE: May 15th 2015**

GENERAL REQUIREMENTS

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La Mauricie National Park
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TECHNICAL SPECIFICATIONS General Requirements (For Tender)

**FILE: 131-121559-09
DATE: May 15th 2015**

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SUMMARY OF WORK

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1.0 GENERAL

1.1 *Related Requirements*

This document must be consulted in conjunction with the drawings issued for tenders for the four (4) structures covered by this contract:

- Arch bridge at km 3.8 – Route Promenade: Series 100;
- Culvert at km 18.44 – Route Promenade: Series 200
- Curved bridge at km 58.3 – Route Promenade: Series 300;
- Steel-wood bridge No. 3.4 – Rivière-à-la-Pêche: Series 400.

This section addresses performance of work that may be affected by the following sections:

Section 01 14 00 Work Restrictions

1.2 *Work Covered by Contract Documents*

Work covered by this Contract includes the rehabilitation of three (3) bridge structures and one (1) culvert, all located within the Mauricie National Park.

Work on the structures shall include: work preparations and construction site mobilization, environmental protection measures, maintaining traffic and work zone signage during the work, design, supply and implementation of temporary structures and of structure access components, work to shore existing structures on the access roads leading to work zones when necessary, maintaining traffic lanes, snow removal when necessary on roads leading to the different structures where work is taking place, site organization, permanent road signage and site restoration.

Work required for the four (4) structures are as follows:

Structure 1

Work at arch bridge at km 3.8 – Route Promenade includes the following, but is not limited to:

- Activities relating to signage and work sequencing;
- Partial demolition of the structure (areas of damaged concrete);
- Removing pavement from the bridge and cleaning of the bridge deck;
- Installation of a new waterproofing membrane and paved wearing surface;
- Replacement of guardrails on the approaches;
- Installation of rip-rap on drainage slopes on the approaches;
- Repair of concrete without excessive thickness;
- Injection of cracks

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- Waterproofing and sealing of concrete surface;
- Permanent signs and marking;
- Any incidental work.

Structure 2

Work on the culvert at km 18.44 – Route Promenade includes the following, but is not limited to:

- Activities relating to work zone signs
- Installation of coffer dams and a pumping system in order to perform the work in the dry
- Insertion of a pipe inside an existing culvert and filling the voids with self-placing concrete;
- Installation of protective rip-rap at the culvert inlet and outlet and on slopes;
- Addition of corrugated galvanized steel guardrail on the approaches and on the structure of the culvert;
- Dismantling of temporary structures (coffer dams);
- Any incidental work.

Structure 3

Work at curved bridge at km 58.3 – Route Promenade includes the following, but is not limited to:

- Activities relating to signage and work sequencing;
- Excavation/backfill at the two (2) bridge approaches;
- Partial demolition of the structure (backwall, piers and approach spans);
- Removal of pavement on the bridge and approaches
- Cleaning of the bridge deck;
- Installation of a new waterproofing membrane and paved wearing surface;
- Reconstruction of the two (2) bridge approaches;
- Replacement of guardrails on the approaches;
- Placement of rip-rap and protection on slope;
- Repair of concrete on/under the deck without excessive thickness;
- Replacement of expansion joints;
- Replacement of bearing devices, including sequence of replacement;
- Addition of caissons and modification of deck drains;
- Permanent signs and marking;
- Any incidental work.

Structure 4

Work at steel-wood bridge No. 3.4 – Rivière-à-la-Pêche includes the following, but is not limited to:

- Activities relating to work zone signs
- Partial demolition of the structure (girders and central steel column, wood deck and wood caissons);
- Temporary shoring of the five (5) bridge structures located on the access road leading to the work zone, in order to allow for safe transport of materials and equipment;
- Concrete abutment repairs;
- Construction of a new concrete pier and steel casing;
- Manufacturing and installation of steelwork for the new deck;
- Construction of wood caissons and ballasting of both abutments;
- Construction of new decking, curbs and wooden safety railings;
- Construction of removable steel barriers on the bridge;
- Correction of the approaches' profiles and ballast;
- Addition of a wood safety barrier on the approaches;
- Any incidental work.

The Contractor shall be responsible for shoring the five (5) structures affected by material and equipment transportation. To that end, Contractor shall present a transportation plan illustrating the routing of materials and equipment on the Parks Canada territory, at least fifteen (15) days before heavy equipment is transported. Along with this plan, the Contractor shall submit the shoring plans for each of the Parks Canada structures found along the supply route. Shoring plans shall be stamped and signed by an engineer who is a member of the OIQ.

1.3 Contract Type

This work shall be the subject of a lump sum contract; certain elements shall be paid separately by unit price, allowing for quantities to be adjusted as work is completed.

1.4 Work by Others

Contractor shall co-operate with other contractors in carrying out their respective works and carry out instructions from the Parks Canada Representative.

Contractor shall also co-ordinate work with that of other contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Parks Canada Representative, in writing, any defects which may interfere with proper execution of work.

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Work of project which will be executed during or after completion of work of this Contract, and which is specifically excluded from this Contract:

- Restoration of pavement on Route Promenade from kilometre 0 to 6;
- Installation of rip-rap on the banks of the Saint-Maurice River, at kilometre 3.0 on Route Promenade;
- Replacement of culvert at km 4 on Route Promenade.

1.5 Work Sequence

Contractor shall construct work in stages to accommodate Owner's continued use of premises.

Contractor shall also construct work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of work will provide alternate usage.

Required Stages

- Work to take place during the summer;
 - Phased work on arch bridge at km 3.8 – Route Promenade
 - Concrete work on the pier on the steel-wood bridge at No. 3.4 – Sentier No. 3;
 - Phased work on curved bridge at km 58.3 – Route Promenade;
 - Shoring work preparation of structures located on Sentier No. 3.
- Work to take place during the autumn;
 - Steel and wood work on bridge 3.4 – Rivière-à-la-Pêche;
 - Rehabilitation work on culvert at km 18.44 – Route Promenade.

Work during the summer shall be performed from May 15, 2015 to October 9, 2015. Work in autumn shall be performed from October 13, 2015 to December 18, 2015.

During the work, the Contractor shall maintain fire/access control and provide means of fighting fires on the various construction sites.

Contractor shall also provide snow removal services for the access roads servicing curved bridge at km 58.3 – Route Promenade for any work performed after November 1st. Snow removal shall start at the Saint-Mathieu check station.

1.6 Owner Occupancy

Contractor shall cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.7 Contractor Use of Premises

The construction site may be used in accordance with the restrictions set forth in section 01 14 00 – “Work Restrictions”, until substantial completion of the work.

Use of premises is restricted within the areas necessary for performing the work, in order to also allow for public use.

Contractor shall coordinate use of premises under direction of Parks Canada Representative.

Contractor shall also obtain and pay for use of additional storage or work areas needed for operations under this Contract.

Contractor shall not impose nor require imposition to any part of a structure whatsoever, a weight or constraint that could possibly compromise the integrity and safety of users.

As soon as the Contractor has undertaken work in an area, it shall be responsible for maintenance of the entire length and width of this area, including any sidewalks, bicycle paths, until such time as the work is complete. Maintenance includes any work necessary to keep the lanes in clean condition and ensure fluid and safe vehicle, pedestrian and cyclist circulation.

Moreover, the Contractor is responsible at all times for cleaning and collecting debris resulting from the work it performs.

Contractor shall promptly remove ice and snow from the work site and access roads, to ensure work is not interrupted and remains safe at all times.

1.8 Public Occupancy

Public shall occupy premises during entire construction period for execution of normal operations.

Contractor shall cooperate with Parks Canada Representative in scheduling operations to minimize conflict and to facilitate public usage.

1.9 Modifications, Additions or Repairs to Existing Structure

During work to repair existing structures, Contractor shall:

- Remove or alter existing work, taking any precautions necessary to prevent injury or damage to portions of existing work which remain.
- Repair or replace, according to Parks Canada Representative's guidelines, portions of existing work that have been altered during construction operations to match existing or adjacent work.
- Upon completion of work, existing work to be in condition equal to or better than that which existed before new work started.

1.10 Existing Utilities

The Contractor must obtain a survey of the location of the public utility services by a specialized company, at its own expenses.

Notify Parks Canada Representative and utility companies of intended interruption of services and obtain permissions required beforehand.

Where work involves breaking into or connecting to existing services, give Parks Canada Representative forty-eight (48) hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out work at times directed by governing authorities with minimum disturbance to current operations.

Provide alternative routes for pedestrians, cyclists and vehicular traffic, as necessary.

Before commencing work, establish location and extent of service lines in area of work and notify Parks Parks Canada Representative of findings.

Submit schedule to and obtain approval from Parks Canada Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

Provide adequate bridging over trenches and waterways that cross sidewalks, bicycle trails or roads to permit normal traffic.

Where unknown services are encountered, immediately advise Parks Canada Representative and confirm findings in writing.

Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner pre-approved by authorities having jurisdiction.

Record locations of maintained, re-routed and abandoned service lines.

1.11 Documents Required

Maintain, at job site, one copy of each document as follows:

- Contract drawings, issued for construction
- Specifications
- Addenda
- Reviewed shop drawings
- List of outstanding shop drawings
- Change orders
- Other modifications to contract
- Field test reports
- Copy of approved work schedule
- Health and Safety Plan and other safety-related documents
- Environmental Protection Plan
- Environmental Emergency Plan
- Plan for transporting materials and equipment at Mauricie National Park
- Other documents as specified

END OF SECTION

WORK RESTRICTIONS

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1.0 General

1.1. *Related Requirements*

This section addresses work that may be performed in conjunction with all sections in these specifications.

1.2. *Site Access*

Contractor shall design, construct and maintain temporary access to construction site, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial, federal and other regulations.

Contractor shall be responsible for snow removal associated with access to the various sites, from the Rivière-à-la-Pêche service centre to km 60. Snow removal costs shall be at the Contractor's expense.

When planning work, Contractor shall take into account that Route Promenade will be completely closed from October 19 through November 20, 2015 inclusively, to replace a culvert at km 4.

1.3. *Use of Site and Facilities*

Contractor shall perform work with least possible interference or disturbance to normal use of premises. To that end, Contractor shall make necessary arrangements with Parks Canada Representative to facilitate execution of work.

Contractor shall maintain existing services to building and provide for personnel and vehicle access.

Where security is reduced by work, provide temporary means to maintain personal, public and property security.

Parks Canada Representative shall not install sanitary facilities for use by Contractor's personnel. These facilities shall be provided and maintained by the Contractor, who shall also ensure their removal at the end of work.

1.4. Existing Services

Contractor shall notify Parks Canada Representative and public utility companies of intended interruption of services and obtain required permission.

Where work involves breaking into or connecting to existing services, give Parks Canada Representative forty-eight (48) hours of notice for necessary interruption of mechanical or electrical services. Keep duration of interruptions to a minimum. Carry out interruptions after occupants' normal working hours, preferably on weekends.

Provide alternative routes for pedestrians and vehicular traffic.

Construct or install protective barriers to prevent public access to the various work areas.

1.5. Special Requirements

Carry out noise-generating work Monday to Friday from 8 a.m. through 5 p.m., or on Saturday and Sunday between 9 a.m. and 4 p.m.

Submit work schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts.

Ensure Contractor's personnel employed on site become familiar with and obey regulations including fire safety, traffic and occupational safety regulations.

Keep within limits of work and avenues of ingress and egress.

Traffic lanes shall permit users to circulate at all times.

Contractor shall comply with Parks Canada's special requirements regarding OHS and the environment. In that regard, Contractor shall receive all documentation relating to special site requirements prior to start of work.

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1.6. Workers' Skills

Without limiting the requirements of the General Conditions of this Contract, Contractor shall hire a project manager, superintendents, foremen and workers who are competent, have relevant work experience, and sufficient training that enables them to easily understand the specifications and drawings. These employees shall direct, organize and perform the work so as to achieve results that are compliant with the Contract. These conditions also apply to the Contractor's engineers and technicians and the subcontractors.

The aforementioned persons shall also have the required skills regarding occupational health and safety, environmental protection, temporary traffic signs and traffic control.

1.7. Condition and Capacity of Equipment and Tools

Contractor shall use appropriate equipment and tools with sufficient capacity and in sufficient quantity so that the work may be performed within contractual deadlines. Equipment and tools shall be in good working condition and pose no danger to workers or the public, in accordance with the laws in force.

1.8. Security

Where security has been reduced by work of Contract, provide temporary means to maintain security.

Security clearances:

- Personnel employed on this project shall be subject to a security check.
- Obtain requisite clearance, as instructed, for each individual required to enter premises.
- Workers and personnel will be checked daily at start of work shift, and a list of personnel and respective work locations shall be established.
- The daily list shall be cross-checked as the workers leave to ensure that no team member remains alone on the site.
- The work team shall be composed of a minimum of two (2) members at all times.
- Contractor shall provide a radio communication system consisting of at least one device per work site.

1.9. Smoke-Free Environment

Smoking at Mauricie National Park is not permitted.

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1.10. Work Planning

If work progress is falling behind the detailed work schedule deemed to be compliant by the Parks Canada Representative and that, as a result of this delay, the Parks Canada Representative believes there is a risk that work will not be able to be completed within the contractual deadlines, Contractor shall undertake whatever measures necessary to catch up by increasing workforce, equipment, facilities or by modifying work methods as appropriate, at no additional cost to Parks Canada.

In every case where work is behind schedule, Contractor shall notify the Parks Canada Representative of its strategy to catch up, and the Parks Canada Representative may, if deemed necessary, require the Contractor to partially or totally revise the initial detailed work schedule. The Parks Canada Representative shall establish the time frame.

END OF SECTION

MEASUREMENT FOR PAYMENT

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1.0 GENERAL

1.1 *Measurement for Payment*

Prices tendered for the items in the pay items table shall include labour, equipment and materials necessary to perform work according to drawings and specifications and the Parks Canada Representative's guidelines, and shall include, without being limited to, the following:

- Coordination of work, adjustments and corrections necessary on-site, performance of engineering and technical work required to ensure work is performed in accordance with rules of good practice and provisions set forth in the specifications
- All traffic control and signaling measures necessary to ensure Contractor's equipment and vehicles travelling on Route Promenade can circulate safely.

When quantities are to be used to calculate payment, quantities shall be established according to measurements from surveys conducted jointly with the Parks Canada Representative. It is the Contractor's responsibility to order these surveys at an opportune time, and within a reasonable time frame. Quantities calculated for payment shall be established in accordance with the schedule defined in this section.

Contractor's administrative costs, profit and any direct or indirect costs associated with the Contractor shall be included in the prices tendered for the items in the pay items table. Any costs incurred to perform work in cold weather shall also be included in the prices tendered for items in the pay items table.

Elements included in the pay items table in parentheses are for informational purposes only. They are included non-exclusively and do not relieve the Contractor of the responsibility to include all elements described in the drawings and specifications.

Contractor shall also note that certain payment items are provisional. No financial compensation will be given in the event where work relating to these items is not performed.

The term "Parks Canada Representative" refers to the engineer's representative on the site and/or work supervisor.

1.1.1 Penalties Imposed for Late Payment

Contractor is liable to complete work on the structures as described on the drawings and specifications, within the following time frames:

- Structure 1
Arch bridge at km 3.8 – Route Promenade before October 13.
- Structure 2
Culvert at km 18.44 – Route Promenade before November 30.
- Structure 3
Curved bridge at km 58.3 – Route Promenade before November 30.
- Structure 4
Steel-wood bridge 3.4 – Rivière-à-la-Pêche, before July 31 for concrete work on the pier in the river, and before November 30 for all work.

Non-compliance with the delivery schedule for article 1.1.1 shall result in a penalty of two thousand dollars (2 000 \$) per working day, per structure for which delivery is past due, and shall be applied directly to the request for payment for work in progress.

1.1.2 Item 01 – Construction Site Organization**1.1.1.1 Item 01.1 – Construction Site Organization**

Construction site organization shall be payable on a lump sum basis, per structure.

Price tendered for this item shall include, without however being limited to:

- Obtaining any permits or authorizations required, as well as applicable insurances and surety bonds;
- Supply of all contractual and professional documents required by virtue of the contract, including, without however being limited to, the detailed work schedule and updates, statutory declarations, signed and stamped drawings, various procedures, certificates of compliance and certifications not specifically included in other payment items, as well as the forms and manifests relating to disposal of hazardous residual materials or special wastes;
- Laboratory fees that the Contractor must assume;
- Services of a project manager and superintendent;
- Compliance with all safety requirements;
- Location and protection, where applicable, of all public utility services and other facilities belonging to Parks Canada or third parties within the work area;
- Performance of all stakeout survey work, other than those specifically listed in the pay items table, the layout work required to perform the work, as well as the supply of electronic files of the topographic surveys for approval by the Parks Canada Representative;
- Supply of temporary structures required for construction and inspection of

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- structures during construction;
- All elements necessary to perform work according to the drawings and specifications, regardless of whether or not such items are mentioned in the specifications or illustrated on the drawings;
- Storage of machinery, material, equipment, accessories and tools in an appropriate location on the construction site;
- Hauling materials to and from the construction site, and which is not specifically included in any other payment items;
- Supply of the Contractor's construction site facilities;
- Supply of a field office for the Parks Canada Representative, as well as means of communicating with the Parks Canada Representative;
- All temporary services and connections required by the Contractor such as water, electricity and sanitary facilities;
- Supply of portable chemical toilets, including handling and transportation to and from the construction site as well as any maintenance required throughout the work;
- Supply of guards, fencing and other security measures necessary to protect machinery, labour, materials, equipment, accessories, tools, walkways, platforms, scaffolding, enclosures, temporary supports, coffer dams, access devices and any other suspended or floating installation;
- Supply of fencing necessary to enclose work and work and storage areas;
- Construction site and work area maintenance, cleanliness, cleaning and restoration;
- Inspection of each work sequence;
- Removal and disposal of waste materials not specifically included in other payment items such as refuse, debris and pieces of demolished concrete, to a location off-site designated for this purpose and in accordance with the specifications, including, at end of works, removal and disposal of waste materials such as refuse, debris and pieces of demolished concrete;
- Pumping or diversion of water courses if the normal flow must be stopped in order to proceed with the work;
- Snow removal of work areas and access roads on Parks Canada's territory, if required;
- Performance of all other work stipulated in these specifications and illustrated on the drawings, which are not included in payment items 1.1 to 3.3 below;
- All environmental protection and erosion control measures including supply, hauling, installation, maintenance, dismantling and disposal of materials;
- Supply of all end of contract documents required, including, without being limited to, final statutory declarations, "as-built" drawings and all other documents required by Parks Canada to complete the contract, which are not specifically included in any other payment item.

Lump sum amount for work stipulated in this item is payable according to the following terms and conditions:

- An initial amount corresponding to 30% of the tendered amount for this item is payable when general mobilization is complete;
- A second amount corresponding to 50% of the tendered amount for this item is payable pro-rated based on construction progress for items 01 to 34 described hereafter;
- The balance of the tendered amount for this item shall be payable when general demobilization is complete.

Lump sum amount for work stipulated in this item shall be broken down upon request from the Parks Canada Representative.

If the Contractor does not provide a Work Schedule to the satisfaction of the Parks Canada Representative as specified in these specifications, the Parks Canada Representative shall withhold part or all of the payments for work already performed, until the said schedule is submitted to the Parks Canada Representative for review and accepted.

1.1.2.2 Item 01.2 – Traffic Control

Special procedures - Traffic control shall be payable on a lump sum basis, according to the provisions set forth in the following section:

Section 01 35 00.06 –Special Procedures – Traffic control

1.1.3 Item 01.3 – Environmental Protection

Environmental protection work shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 01 35 43 – Environmental protection

1.1.4 Item 02 – Existing Conditions

1.1.4.1 Item 02.1 – Demolition

Demolition works shall be payable on a lump sum basis according to the provisions set forth in the following sections:

Section 02 41 13 – Selective Site Demolition

Section 02 41 13.14 - Removal of Asphalt Pavement

Section 02 41 16 – Structure Demolition

Payment for this line item shall be pro-rated according to progress.

1.1.5 Item 03 – Concrete

1.1.5.1 Item 03.1 – Cast-in-Place Concrete

Cast-in-place concrete works shall be payable on a lump sum basis according to the provisions set forth in the following sections:

Section 03 30 00 – Cast-in-Place Concrete

Payment for this line item shall be pro-rated according to progress.

1.1.5.2 Item 03.2 – Repairs without Added Thickness

Work relating to repairs without excessive thickness shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 03 30 00 – Cast-in-Place Concrete

Payment for this line item shall be pro-rated according to progress.

1.1.5.3 Item 03.3 – Slab Surface Repairs

Work relating to slab surface repairs shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 03 30 00 – Cast-in-Place Concrete

Payment for this line item shall be pro-rated according to progress.

1.1.5.4 Item 03.4 – Injection of Cracks

Work relating to injection of cracks shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 03 30 00 – Cast-in-Place Concrete

Payment for this line item shall be pro-rated according to progress.

1.1.5.5 Item 03.5 – Surface Sealant and Waterproofing

Surface sealant and waterproofing work shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 03 30 00 – Cast-in-Place Concrete

Payment for this line item shall be pro-rated according to progress.

1.1.6 Item 05 – Metals

1.1.6.1 Item 05.1 – Structural Steel for Bridges

Work relating to structural steel for bridges shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 05 12 33 – Structural Steel for Bridges

Payment for this line item shall be pro-rated according to progress.

1.1.6.2 Item 05.2 – Bearing Devices

Work relating to bearing devices shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 05 12 33 – Structural Steel for Bridges

Payment for this line item shall be pro-rated according to progress.

1.1.6.3 Item 05.3 – Deck Joint

Work relating to deck joints shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 05 12 33 – Structural Steel for Bridges

Payment for this line item shall be pro-rated according to progress.

1.1.7 Item 06 – Wood, Plastic and Composite

1.1.7.1 Item 06.1 – Wood Structure

Wood structures shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 06 10 00 – Rough Carpentry

Payment for this line item shall be pro-rated according to progress.

1.1.7.2 Item 06.2 – Wood Foundations

Wood foundation work shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 06 10 00 – Rough Carpentry

Payment for this line item shall be pro-rated according to progress.

1.1.7.3 Item 06.3 – Insertion of steel pipe

Work relating to insertion of steel pipe shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 33 42 13 – Pipes for Culverts

Payment for this line item shall be pro-rated according to progress.

1.1.8 Item 07 – Waterproofing Membrane

1.1.8.1 Item 07.1 – Waterproofing Membrane

Work pertaining to waterproofing membrane shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 07 13 52 – Modified Bituminous Sheet Waterproofing

Payment for this line item shall be pro-rated according to progress.

1.1.9 Item 31 – Earthwork

1.1.9.1 Item 31.1 – Excavation and Backfill

Excavating and backfilling shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 31 24 13 – Roadway Embankments

Payment for this line item shall be pro-rated according to progress.

1.1.9.2 Item 31.2 – Rip-Rap

Rip-rap work shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 32 15 40 – Crushed Stone Surfacing

Payment for this line item shall be pro-rated according to progress.

1.1.10 Item 32 – Earthwork

1.1.10.1 Item 32.1 – Asphalt Pavement

Work pertaining to asphalt pavement shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 32 12 16 – Asphalt Pavement

Payment for this line item shall be pro-rated according to progress.

1.1.10.2 Item 32.2 – Pavement Marking

Work relating to pavement marking work shall be payable per linear meter of marking and the supply and installation of the permanent signage is payable on a lump sum basis according to the provisions set forth in the following section:

Section 32 17 23 – Pavement Marking

Payment for this line item shall be pro-rated according to progress.

1.1.11 Item 34 – Transportation

1.1.11.1 Item 34.1 – Road Safety - Semi-rigid Corrugated Galvanized Steel Guardrail on Approaches

Work pertaining to semi-rigid corrugated galvanized steel guardrail on approaches shall be payable on a lump sum basis according to the provisions set forth in the following section:

Section 34 71 13.25 – Road Safety – W-Beam Guardrail

Payment for this line item shall be pro-rated according to progress.

MEASUREMENT FOR PAYMENT

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1.1.11.2 Item 32.2 – Permanent Signage

Work relating to permanent signage shall be payable per linear meter and the supply and installation of the permanent signage is payable payable on a lump sum basis according to the provisions set forth in the following section:

Section 32 17 23 – Pavement Marking

Payment for this line item shall be pro-rated according to progress.

END OF SECTION

PROJECT MEETINGS

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PROJECT MEETINGS

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1.0 GENERAL**1.1 *Administrative Terms and Conditions***

Project meetings shall be held every two (2) weeks at the request of the Parks Canada Representative, who is in charge of them.

Contractor shall provide a room or other space for these meetings. Foreman shall be present at all site meetings.

Contractor's foreman shall be present at all project meetings.

Contractor, Subcontractor and supplier representatives attending meetings will be qualified and authorized to act on behalf of party each one represents.

1.2 *Pre-construction Meeting*

Within five (5) days after Contract award, organize a start-up meeting to discuss administrative procedures and define each party's responsibilities.

Parks Canada Representative, Contractor and Contractor's foreman, major Subcontractors, field inspectors and supervisors shall be in attendance.

Meeting shall be held at the Mauricie National Park site, in a location determined by the Parks Canada Representative. Time and location of meeting shall be confirmed at least two (2) days before meeting.

Contractor shall submit the following documents at the start-up meeting:

- List of participants' and subcontractors' official representatives
- Work schedule, in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Charts
- Site layout drawing showing offices, storage sheds and facilities, utilities and fences in accordance with Section 01 52 00 - Construction Facilities
- Schedule for submission of shop drawings, product and colour chip samples, in accordance with Section 01 33 00 - Submittal Procedures
- Signage plates and traffic maintenance, in accordance with Section 01 35 00.06 – Special Procedures for Traffic Control

- Drawings for temporary structures such as work platforms, support for excavation, coffer dams, etc.
- Delivery schedule of specified equipment and materials
- Prevention program in accordance with Section 01 35 29.06 – Health and Safety
- Environmental Protection Plan and Environmental Emergency Plan, in accordance with Section 01 35 43 - Environmental Procedures
- Traffic management plan for machinery, hauling materials and equipment
- All other documents required by these specifications

Certain documents may be submitted when necessary as work progresses.

1.3 Progress Meetings

Meetings shall be held every two (2) weeks as work progresses, and until completion.

Owner, Parks Canada Representative, Contractor and Contractor's foreman, major Subcontractors, field inspectors and supervisors shall be in attendance.

Primary points of discussion are as follows:

- Review, approve minutes for previous meeting
- Review work progress since previous meeting
- Field observations, problems, conflicts
- Problems that impede construction schedule
- Review of off-site fabricated product delivery schedules
- Corrective measures and procedures to regain projected schedule
- Construction schedule revision
- Review progress schedule, during succeeding work period
- Review submittal schedules: expedite as required
- Maintenance of quality standards
- Review proposed changes and their possible effect on construction schedule and completion date
- Other miscellaneous items

1.4 Special Meetings

Contractor and all stakeholders involved with the project shall be present at special meetings held to coordinate sensitive tasks. These special meetings shall be planned prior to carrying out the following activities:

- Installation of temporary supports for replacement of bearing devices
- Partial/Complete structure demolition;
- Pouring self-placing concrete
- Installation of the steel pipe in the culvert at km 18.44 - Route Promenade
- Erection of steelwork on the steel-wood bridge No. 3.4 – Rivière-à-la-Pêche

Contractor shall submit the following documents relevant to the applicable activity, prior to the meetings:

- Work method for replacement of bearing devices
- Concrete design mix and placement methods
- Lifting plan for the culvert piping and steelwork
- Equipment list for the various activities, including technical data sheets
- Drawings and work methods shall be signed and stamped by an engineer

Owner, Parks Canada Representative, Contractor and Contractor's foreman, major Subcontractors, field inspectors and supervisors shall be in attendance. For activities that require concrete placement, laboratory representatives shall also be in attendance.

These meetings shall be held at least seven (7) days prior to performing the work involved at the different construction sites. Following these meetings and if required, Contractor shall make necessary corrections or modify the work methods so that tasks can be performed according to the site constraints, rules of good practice, and with the health and safety of the workers, users and all others in mind.

END OF SECTION

**CONSTRUCTION PROGRESS SCHEDULES -
BAR (GANTT) CHARTS.**

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**CONSTRUCTION PROGRESS SCHEDULES -
BAR (GANTT) CHARTS.**

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**CONSTRUCTION PROGRESS SCHEDULES -
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1.0 GENERAL

1.1 *Related Requirements*

This section addresses work that may be performed in conjunction with all sections in this document.

1.2 *Definitions*

Activity: Element of work performed during course of project. Activity normally has expected duration, expected cost and expected resource requirements. Activities can be subdivided into tasks.

Bar Chart (GANTT Chart): Graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally a Bar Chart should be derived from a commercially-available computerized project management system.

Baseline: Original approved plan (for project, work package, or activity), plus or minus approved scope changes.

Construction work week: Monday to Friday, inclusive, will provide five (5) day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

Duration: Number of work periods (not including holidays or other non-work periods) required to complete activity or other project element. Usually expressed as working days or work weeks.

Master plan: Summary-level schedule that identifies major activities and key milestones.

Milestone: Significant event in project, usually completion of major deliverable.

Work schedule: Planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to achieve project milestones. Monitoring and control process involves using work schedule in execution and control activities; used as basis for decision making throughout project life cycle.

Project planning, monitoring and control system: Overall system managed by the Contractor used to monitor project work in relation to established milestones.

**CONSTRUCTION PROGRESS SCHEDULES -
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1.3 Requirements

Ensure master plan and work schedule are practical and comply with delivery deadlines set forth in the specifications. (Refer to article 1.1.1 in Section 01 29 00 - Paiement.)

Master plan shall provide for completion of work in accordance with prescribed milestones and within agreed deadlines.

Limit activity durations to maximum of approximately ten (10) working days, to allow for progress reporting.

Ensure that it is understood that contract award or work start date, rate of progress, issuance of Interim Certificate and Final Certificate are defined project steps and are an essence of this contract.

Bar chart shall clearly illustrate critical path.

1.4 Action and Informational Submittals

Submittals in accordance with Section 01 33 00 - Submittal Procedures.

Within ten (10) working days of contract award, submit the Bar (GANTT) Chart to be used as master plan for planning, monitoring and reporting of construction progress to the Parks Canada Representative.

Submit work schedule to Parks Canada Representative within five (5) working days of master plan acceptance.

1.5 Project Milestones

Project milestones form interim targets listed on Project Schedule.

- Work to rehabilitate arch bridge at km 3.8 – Route Promenade shall be carried out during the summer. This work shall begin no more than fifteen (15) working days after contract award.
- Work to rehabilitate culvert at km 18.44 – Route Promenade shall be carried out during the fall. This work shall be started on October 13, 2015.
- Work to rehabilitate curved bridge at km 58.3 – Route Promenade shall be carried out during the summer. This work shall begin no more than fifteen (15) working days after contract award.

**CONSTRUCTION PROGRESS SCHEDULES -
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- Construction work on the concrete pier on steel-wood bridge No. 3.4 – Rivière-à-la-Pêche shall be carried out during the summer. This work shall begin no more than fifteen (15) working days after contract award.
- All rehabilitation work on steel-wood bridge No. 3.4 – Rivière-à-la-Pêche shall be carried out during the fall. This work shall be started on October 13, 2015.
- Interim certificate (substantial completion) for work shall be delivered no later than December 18.

1.6 Master Plan

Structure schedule to allow orderly planning, organizing and execution of Work according to Bar Chart (GANTT).

Parks Canada Representative shall review and return revised schedules to Contractor within five (5) working days.

Contractor shall revise schedule deemed incomplete, imprecise or impractical and resubmit within five (5) working days. For every working day that the revised schedule is submitted late, a penalty of one hundred dollars (\$100) shall be applied.

Accepted revised schedule shall become master plan and be used as baseline for updates.

1.7 Work Schedule

It is the Contractor's sole responsibility to perform the work, providing direction and supervision to ensure it is performed in accordance with contract documents.

Unless otherwise indicated, Contractor is solely responsible for the construction means, methods, sequences and procedures, as well as for coordinating the various portions of the works.

Contractor shall prepare a detailed work schedule for each structure in this project, based on the master plan.

Contractor shall establish work schedules such that all work provided for in this Contract is performed and completed according to the conditions and phases indicated in the various specifications sections, as well as on the drawings.

**CONSTRUCTION PROGRESS SCHEDULES -
BAR (GANTT) CHARTS.**

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Ensure detailed work schedule includes at least the following steps, corresponding to the activities below:

- Contract award
- Preparation of shop drawings and samples
- Work site mobilization
- Installation of work zone signs and implementation of work sequences
- Excavation and temporary support
- Backfilling
- Structure demolition (partial)
- Concrete formwork set-up
- Concrete reinforcement installation
- Concrete placement (including curing time)
- Bearing device installation
- Deck joint installation
- Steelwork erection
- Construction of deck and other wood components
- Membrane applications (including time between the various cleaning steps)
- Paving
- Waterproofing and surface coating (including time between the various cleaning steps)
- Injection of cracks
- Approach guardrail installation (corrugated, galvanized steel guardrail)
- Rip-rap work
- Site restoration

1.8 Work Progress Reports

Update Project Schedule once every two (2) weeks to show activity changes and completion, as well as activities currently in progress.

Include as part of work schedules, narrative report identifying work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

**CONSTRUCTION PROGRESS SCHEDULES -
BAR (GANTT) CHARTS.**

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1.9 *Project Meetings*

Discuss work schedule at regular site meetings; identify activities that are behind schedule and provide measures to catch up. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

Weather-related delays and remedial measures shall also be discussed and negotiated.

END OF SECTION

SUBMITTAL PROCEDURE

Section 01 33 00

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1.0 GENERAL**1.1 *Related Requirements***

This section addresses work performed in conjunction with all sections of the specifications.

1.2 *References*

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG)

1.3 *Administrative Terms and Conditions*

The Contractor shall deliver to Parks Canada Representative an exhaustive list of all samples to be submitted for review by Parks Canada Representative.

Submit to Parks Canada Representative submittals listed for review. Submit promptly and in pre-established sequence to not cause delay in work. Failure to submit within ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

Do not proceed with work affected by submittal until review is complete.

Present shop drawings, product data, samples and mock-ups in SI Metric units.

Where items or information is (are) not produced in SI Metric units, converted values are acceptable.

Review submittals prior to submitting them to Parks Canada Representative. This review represents that necessary requirements have been or will be determined and verified, and that each submittal has been checked and co-ordinated with requirements of work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

Notify Parks Canada Representative in writing at time of submission, identifying deviations from requirements of Contract Documents, stating reasons for deviations.

Verify that field measurements and affected adjacent work are co-ordinated.

Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Parks Canada Representative's review.

Keep one reviewed copy of each submission on site.

1.4 Shop Drawings and Data Sheets

The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data to be provided by Contractor to illustrate details of a portion of work.

Submit drawings stamped and signed by a professional engineer registered or licensed in Province of Quebec, Canada.

Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of work. Where articles or equipment attach or connect to other articles or equipment, indicate on the drawings that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

Allow five (5) working days for Parks Canada Representative's review of each submission.

Adjustments made on shop drawings by Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Parks Canada Representative prior to ordering materials or proceeding with work.

Make changes in shop drawings as Parks Canada Representative may require, consistent with Contract Documents. When resubmitting, notify Parks Canada Representative in writing of revisions other than those requested.

Accompany submissions with transmittal letter, in duplicate, containing:

- Date
- Project title and number
- Contractor's name and address
- Identification and quantity of each shop drawing, product data and sample
- Other pertinent data.

Submissions include:

- Date and revision dates
- Project title and number
- Name and address of:
 - Subcontractor
 - Supplier
 - Manufacturer.
- Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

- Details of appropriate portions of work as applicable:
 - Fabrication
 - Layout, showing dimensions, including identified field dimensions, and clearances
 - Setting or erection details
 - Capacities
 - Performance characteristics
 - Standards
 - Operating weight
 - Wiring diagrams
 - Single line and schematic diagrams
 - Relationship to adjacent work.

After Parks Canada Representative's review, distribute copies of shop drawings and data sheets.

Submit three (3) printed copies and one (1) electronic copy (PDF format) of shop drawings for each requirement requested in specification Sections and as Parks Canada Representative may reasonably request.

Submit one (1) electronic file (PDF format) of product data sheets or brochures for requirements requested in specification Sections and as requested by Parks Canada Representative when shop drawings will not be prepared due to standardized manufacture of product.

Submit one (1) electronic copy (PDF format) of test reports for requirements requested in specification Sections and as requested by Parks Canada Representative.

- Report signed by authorized official of testing laboratory that material, product or system, identical to material, product or system to be provided, has been tested in accordance with specified requirements.
- Testing must have been within three (3) years of date of contract award for project.

Submit one (1) electronic copy (PDF format) of certificates for requirements requested in specification Sections and as requested by Parks Canada Representative.

- Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- Certificates must be dated after award of project contract complete with project name.

Submit one (1) electronic copy (PDF format) of manufacturer's instructions for requirements requested in specification Sections and as requested by Parks Canada Representative.

- Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

Submit one (1) electronic copy (PDF format) of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Parks Canada Representative.

Submit one (1) copy of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Submit one (1) electronic copy (PDF format) of Operational and Maintenance Data for requirements requested in specification Sections and as requested by Parks Canada Representative.

Delete information not applicable to project.

Supplement standard information to provide details applicable to project.

If upon review by Parks Canada Representative, no errors or omissions are discovered or if only minor corrections are made, printed copies shall be returned and fabrication and installation of work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of work may proceed.

The review of shop drawings by Parks Canada Representative is for sole purpose of ascertaining conformance with general concept.

- This review shall not mean that Parks Canada Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
- Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and corroborated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of work of sub-trades.

1.5 Samples

Submit samples in duplicate for review, as requested in respective specification Sections. Label samples with origin and intended use.

Deliver samples prepaid to Parks Canada Representative's business address.

Notify Parks Canada Representative, in writing at time of submission, of deviations in samples from requirements of Contract Documents.

Where colour, pattern or texture is criterion, submit full range of samples for approval.

Adjustments made on samples by Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Parks Canada Representative prior to ordering materials and proceeding with work.

Make changes in samples that Parks Canada Representative may require, consistent with Contract Documents.

Reviewed and accepted samples shall become standard of workmanship and material against which installed work will be verified.

1.6 Drawings for Temporary Structures

"Drawings for Temporary Structures" indicates the drawings for shoring, for scaffolding, enclosures, walkways and other access devices, drawings for temporary pier access, support and coffer dam structures, drawings for environmental protection measures, drawings for lane closures, verification procedures for dock loads, drawings for road signage, jacking drawings, work methods and design calculations, charts and any other documents required for execution of the work, based on specifications and drawings and site conditions.

Submit drawings for temporary structures and annexed documents stamped and signed by a professional engineer registered or licensed in Province of Quebec, Canada.

Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of work. Where articles or equipment attach or connect to other articles or equipment, indicate on the drawings that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

Allow five (5) working days for Parks Canada Representative's review of each submission. The documents shall be submitted and reviewed in compliance with the same procedure described in Article 1.4 "Shop Drawings and Data Sheets" in this section.

After construction of a temporary structure, a certificate of conformity shall be issued by an engineer confirming that the structure may be used for its intended purpose.

1.7 Mock-ups

Construct mock-ups in accordance with Section "01 45 00 - Quality Control".

1.8 Certificates and Transcripts

Immediately after Contract award, submit workers' Compensation Board status.

Submit transcription of insurance immediately after award of Contract.

END OF SECTION

SPECIAL PROCEDURES FOR TRAFFIC CONTROL

Section 01 35 00.06

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

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1.0 GENERAL**1.1 Section Content**

This section specifies requirements pertaining to maintaining traffic, and to work zone signs used during the work to repair three (3) bridges and rehabilitate one (1) culvert in the Mauricie National Park.

Parks Canada's requirements with respect to traffic control and temporary signs take into account the Ministère des Transports du Québec's (MTQ) standards on traffic control devices. Their aim is not to repeat these standards, but to define Parks Canada's specific requirements for traffic control and signs on its property. The objective of the requirements is to minimize the risk of accidents or incidents during work and to reduce user inconvenience.

The works consist in, without being limited to, supplying and installing necessary temporary traffic signs for maintaining traffic and protecting workers and users during the work taking place at the different construction sites.

The Parks Canada Representative may request that additional temporary traffic sign work be performed to ensure the safety of workers and road users or to improve traffic flow. If that is the case, the Contractor shall be able to provide these services.

Contractor shall fully cooperate and no additional amount may be claimed for any inconvenience or lost time that it may incur as a result of these additions or modifications. Contractor shall take this into account in its tendered prices.

The term "Traffic Management and Control Plan" in this section indicates everything related to traffic control and traffic control devices that the Contractor shall provide and the work it shall perform under the terms of the Contract.

1.2 Related Requirements

Section 01 11 00	Summary of Work
Section 01 14 00	Work Restrictions
Section 01 32 16.07	Construction Progress Schedules - Bar (GANTT) Charts
Section 01 33 00	Submittals
Section 01 35 29.06	Health and Safety

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1.3 Description of Works

The work mentioned in this article is a non-exhaustive list. The Contractor shall design, provide, set up, move as necessary according to work sequences, and maintain all necessary temporary traffic control devices in order to properly guide vehicular, pedestrian and cyclist traffic at all times on the work site. Contractor shall also take into account nautical vessels traveling in the vicinity of the work areas when performing work above a waterway.

Contractor shall protect roadway traffic against all damages which may result from work and shall assign flagmen if required (including, in particular, when trucks are entering and exiting the worksite).

Contractor shall remain responsible at all times for the temporary traffic control devices on the work site.

In the event of an accident or incident on or in the vicinity of the various construction sites, the Contractor shall immediately contact Mr. Marc-Olivier Caron at (819) 536-3180, inform the dispatcher of the situation on the site and also inform the Parks Canada Representative.

Temporary traffic lanes shall be a minimum of 3.5 m wide for areas where traffic will alternate directions, using the same lane.

The various construction site locations are provided in Appendices 1 and 2 to this section.

Traffic lights shall be positioned according to stopping sight distance; and work areas shall be clearly marked over a sufficient length to be visible from a distance of 140 metres, according to table 4.3-1. (Refer to Appendix 3.)

Primary work covered by this section is as follows, for each structure:

Arch bridge at km 3.8 – Route Promenade

Closure of one (1) out of two (2) lanes, with traffic alternating in direction, for each work sequence (Series 100 drawings):

- Installation of work zone signs;
- Temporary pavement marking and stop lines;
- Lowering of posted speed limit from 70 km/h to 50 km/h on construction site approaches;
- Alternating closure with flagmen (according to DN V-4-TLD 005) for installation of signs and concrete barriers;
- Installation of signs according to DN V-4-TLD 004;

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- Installation of concrete construction site barriers to secure the work area
- Installation of traffic lights and signs for alternating traffic direction according to DN V-4-TLD 004;
- Erasing of temporary pavement marking and application of new permanent marking;
- Dismantling at end of works.

Culvert at km 18.44 – Route Promenade

Work performed after the Mauricie National Park closes; only authorized vehicles permitted (Series 200 drawings):

- Complete closure of Route Promenade, according to DN V-4-TLD 010;
- Installation of “Bridge Closed” signs
- Physically close the road using concrete construction site barriers outside of working hours.

Curved bridge at km 58.3 – Route Promenade

Closure of one (1) out of two (2) lanes, with traffic alternating in direction, for each work sequence (Series 300 drawings):

- Installation of work zone signs;
- Temporary pavement marking and stop lines;
- Lowering of posted speed limit from 70 km/h to 50 km/h on construction site approaches;
- Alternating closure with flagmen (according to DN V-4-TLD 005) for installation of signs and concrete barriers;
- Installation of signs according to DN V-4-TLD 004
- Installation of concrete construction site barriers to secure the work area
- Installation of traffic lights and signs for alternating traffic direction according to DN V-4-TLD 004
- Erasing of temporary pavement marking and application of new permanent marking;
- Dismantling at end of works.

Steel-Wood Bridge No. 3.4 – Rivière-à-la-Pêche

Work performed after the Mauricie National Park closes (Series 400 drawings):

- Complete closure of trail No. 3 according to DN V-4-TLD 010
- Installation of “Bridge Closed” signs
- Physically close the road using concrete construction site barriers outside of working hours.

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1.4 Measurement for Payment

Price tendered shall cover, most particularly, sign plans, traffic control devices, labour, transportation, lane marking with road cones, supply for the duration of the work and installation of sign panels, ballasts, traffic lights, commissioning, use of impact attenuator equipped vehicles, work relating to traffic lane closure and re-opening, modifications necessary during work, sign covering and uncovering, maintaining access to shoreline properties, dismantling, regular maintenance of traffic lanes, as well as all incidental expenses.

Price tendered shall also include compensation for the person responsible for signage and his representatives, personnel assigned to signaling and traffic maintenance required as a result of the Contractor's or its subcontractors' activities, required equipment, travel, signage adjustments by the sign crew, and all incidental expenses.

1.5 References

Ministère des Transports du Québec:

- Signalisation routière, Tome V – Signalisation routière – Volumes 1, 2 et 3 (Ministère des Transports du Québec: Road Signs, Tome V – Road Signs – Volumes 1, 2 and 3)
- Cahier des charges et devis généraux (CCDG)

An Act Respecting Occupational Health and Safety, R.S.Q., c.S-2.1 (Current edition) - Updated 2005

1.6 Submittals

As the general contractor, the Contractor is responsible for the safety of users traveling through the construction site as well as the health and safety of its employees and all workers on site; the Contractor shall therefore provide a detailed and complete traffic management and control plan for the entire Contract term. This plan shall include drawings showing all traffic control device details planned for each traffic management scenario under consideration by the Contractor, for each work sequence, and each construction site where such work is required. The Traffic Management and Control Plan shall account for vehicular, pedestrian and cyclist traffic and if applicable, nautical traffic.

The Traffic Management and Control Plan shall include:

- Drawings of temporary signs for each of the various work sequences at the different construction sites involving lane closures (for vehicles, bicycles or pedestrians), indicating the panels, visual markers, concrete construction site barriers, traffic control and other types of devices, pavement markings added or removed, permanent devices removed or temporarily hidden, as well as the minimum lane width requirements.

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- Coordination with related construction sites, as well as securing the signaling when required
- Closure protocol for lane closures (dates, schedules and sequence of operations) and re-openings as well as implementation of traffic signs, markings and traffic control devices

The Contractor's Traffic Management and Control Plan shall be established jointly and in coordination with Parks Canada. This plan shall be submitted to the Parks Canada Representative at least seven (7) days prior to the start of each work sequence on each of the Contractor's construction sites.

Preparation of Temporary Traffic Control Drawings

The drawings for temporary road signs shall be designed to:

- Indicate danger.
- Ensure the proper minimum stopping sight distance required on each end of the lane closure.
- Ensure the safety of users in the lanes affected by the work as well as those on lanes adjacent to the work.
- Ensure the safety of workers during performance of work.
- Provide users with all relevant indications and information.
- Take into account local characteristics (including, but not limited to, geometry and actual vehicle speed).
- Comply with standardized drawings (DN) found in tome V, chapter 4 of the Normes du Ministère des Transports du Québec (Ministère des Transport du Québec's Standards).

For every necessary configuration, submitted drawings shall contain, but are not limited to, the following information:

- A diagram showing the geometry and profile of the structure affected
- Identification of the planned work area
- Implementation (position, distances, alignment) and symbols for traffic signs and other devices in accordance with the DN
- Position of temporary traffic lights
- Location of vehicle parking areas and construction site access
- Sequential grouping of devices according to the order in which they will be installed and removed
- All necessary explanatory notes required for a thorough understanding of the proposed implementation
- Implementation (position, distance, alignment) of temporary marking

The Contractor's temporary traffic control device drawings shall be designed and prepared by an engineer specialized in the field who is a member of the Ordre des ingénieurs du Québec and has at least three (3) years of relevant experience. All drawings (and specifications if required) shall be signed and stamped by the engineer.

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The Contractor shall submit, to the Parks Canada Representative, the drawings relating to temporary signs that the Contractor intends to install on and in the vicinity of the construction site. The Parks Canada Representative reserves a seven (7) day period to issue comments. The Contractor shall correct the drawings according to the comments. No traffic sign installation may be carried out by the Contractor before written authorization is issued by the Parks Canada Representative.

The Contractor shall place construction traffic signs so that the work zone delineation and tapers do not begin at a horizontal curve or a vertical curve, such as the apex of a bridge.

Tapers shall begin only on a straight segment where visibility is at least two hundred (200) metres in all directions.

1.7 *Person Responsible for Traffic Control*

The Contractor shall appoint, before the first site meeting, a person in charge of traffic control, who thereby becomes the Contractor's sole representative authorized to have signage installed and make changes to it. This person responsible for traffic control shall be present at all site meetings.

He shall also have a cellular phone that remains operational at all times, as well as voicemail service. His cellular phone number shall remain the same throughout the entire contract term.

Once road signage works are complete (at the beginning of each new work sequence or any time there is traffic disruption), the person responsible for traffic control shall inspect the road signage. He shall also perform a nighttime inspection to verify that panels are properly aligned, and there is no glare or any other visible defects; he shall then notify the Parks Canada Representative that the installations are compliant.

At the beginning of each work sequence, the person responsible for traffic control shall accompany the Parks Canada Representative during the road signage inspection, performed in order to obtain written authorization to begin work.

The person responsible for traffic control shall be present full-time on the construction site during each installation phase, change of phase, as well as during dismantling and marking in order to coordinate road signage work, until such time as it has been approved. His full-time presence is no longer required after approval has been received.

The person responsible for traffic control shall visit, at least once daily, any site where traffic disruption is maintained to inspect road signage and make necessary adjustments.

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1.8 On-Call Availability of Person Responsible for Traffic Control

If a traffic control situation is deemed to be deficient according to the Highway Safety Code, or if damage is caused to road signs following an accident, the person responsible for traffic control must be able to be reached by telephone by the Parks Canada Representative or a police officer at all times (twenty-four (24) hours per day, seven (7) days per week), within no more than thirty (30) minutes. After the person responsible for traffic control has received this call, he has two (2) hours to rectify the situation by making the necessary corrections.

1.9 Protection of Traffic

Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or under which it is necessary to carry out work or haul materials or equipment.

The Contractor is authorized to close one (1) lane out of two (2), with traffic alternating directions, for work sequences performed on Route Promenade, for the entire duration of the work. Contractor shall use concrete construction site barriers to protect work areas where long-term work (more than 24 hours) is taking place. T-RV-7 cone markers are only authorized for short-term work (less than 24 hours), most particularly when waterproofing membrane and paving work takes place on the two (2) bridges involved.

When working on or in the vicinity of a travelled way:

- Place equipment in position to minimize interference and hazard to travelling public, and outside the lateral buffer space (refer to article 1.8) when unprotected.
- Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
- Do not leave equipment on travelled way overnight.
- Do not park vehicles in work areas or tapers.

Before closing a lane to traffic, install appropriate signs in accordance with the standards in effect and drawings that were submitted to and approved by the Parks Canada Representative. Contractor shall request authorization from Parks Canada Representative for a lane closure, at least five (5) days in advance. Do not close any lanes of road without Parks Canada Representative's approval.

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Contractor is responsible for maintaining traffic lanes in the work zone at each construction site. Keep travelled way graded, free of pot holes and of sufficient width for safe use by required number of lanes of traffic.

- Maintain work area and traffic lanes so that there are no dust emissions.
- Ensure proper drainage of roadways
- Clean paved areas where traffic is maintained and keep them free of liquid or solid debris.
-

1.10 Site Access

Contractor shall clearly mark, identify, control and secure every construction site access. Access locations shall be approved by Parks Canada Representative to ensure adequate visibility by road users.

Each construction site access gate shall be clearly identified with a T-170-4 panel. All accesses, when not in use, shall be kept closed by T-RV-7 visual markers placed at intervals of not more than two (2) meters. During work, the access can be kept open to facilitate the entrance and exit of authorized vehicles. However, the Contractor shall under no circumstances carry out work close to these site accesses. When work does need to be performed near a site access, Contractor shall close off the access using concrete barriers to ensure the safety of workers and road users.

The Contractor and its subcontractors shall employ a sufficient number of flagmen for site access operations. These entering and exiting operations shall be safe and executed so as to ensure complete protection to workers and road users.

1.11 Obstacles

Contractor shall perform work so as to provide a safe perimeter around an obstacle within the lateral buffer space located on the edge of traffic lanes used throughout the duration of the work. Most specifically, it is forbidden to park and store, outside of working hours (in the evening, at night, on weekends and holidays), machinery, tools or materials within the lateral buffer space, unless they are effectively protected by a safety barrier.

An obstacle may be a fixed object, excavation, Contractor equipment, or any other type of obstacle. The lateral buffer space is a safety distance measured perpendicularly to the traffic lane, and which must be free of any obstacles.

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Contractor shall determine proper lateral buffer space using Table 1 – Lateral Buffer Space.

Table 1: Lateral Buffer Space

Posted Speed ¹ (km/h)	Lateral Buffer Space (m)
100	9.0
90	7.5
80	6.0
70	5.0
50 or less	3.0

- 1- If speed obtained using the table for determining speed limits for long-term work on divided highways and on rural or suburban roads is realistic given the environment of the construction site, this speed limit, displayed on signs with an orange background, may be mounted on construction site impact attenuators.

1.12 Informational and Warning Devices

Provide and maintain panels, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work that require road user response.

Supply and erect panels, TB-2 barricades and other warning devices in accordance with the standards in force.

Place signs and other devices in locations recommended by standards in effect.

Meet with Parks Canada Representative prior to commencement of work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Parks Canada Representative.

Temporary traffic signs shall:

- Be bilingual (French and English) on all of Parks Canada’s territory
- Be uniform, homogeneous and completely integrated with adjacent road signs
- Attract attention
- Be perfectly visible and legible at required standardized distances
- Be easily understandable
- Be adapted to the dangers and specific situations to identify.

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Installation of construction site traffic control devices shall:

- Meet the sign and traffic management requirements outlined in this section in order to ensure the safety of users and workers
- Be executed according to well-defined procedures agreed upon by the stakeholder involved, more specifically the Parks Canada Representative

Continually maintain traffic control devices in use:

- Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
- Remove or cover signs that do not apply to conditions that vary from day to day.
- Reposition or replace any element that was accidentally moved or damaged.
- Ensure daily that power supplies for illuminated arrows and traffic lights are working and battery units are properly charged.

1.13 Traffic Control

Work that is not included in the sequence of work for the different work phases shall be inserted in the work flow in a manner that will minimize impact on traffic flow. The Parks Canada Representative may reject work sequencing that unduly penalizes users when other alternatives exist.

Phasing, change in lane configurations from Phase 1 to Phase 2 and demobilization for work on Route Promenade shall be performed during special closures after 6 p.m.

Provide competent flagmen, trained and equipped in accordance with the standards in force, for the following situations:

- When traffic is required to pass working vehicles or equipment that block all or part of travelled roadway
- When it is necessary to close one lane and institute traffic in alternating directions in a construction zone;
- When workers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning
- Where temporary protection is required while other traffic control devices are being erected or taken down
- For emergency protection when other traffic control devices are not readily available
- In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices
- At each end of restricted sections where pilot cars are required

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1.14 Navigation Control on Wapizagonke Lake

For the entire term of the Contract, navigation shall be maintained on Wapizagonke Lake. Contractor shall obtain authorization from the Parks Canada Representative before performing work that affects navigation on, or safety of, the waterway.

Contractor shall also plan to maintain a navigable canal that is ten (10) metres in width to allow small vessels (kayaks, canoes and small boats) to pass, throughout the duration of the work required on the piers and under the deck. Contractor shall supply and install adequate marine traffic signals.

Contractor shall install, for the entire duration of the work, bilingual sign panels (French and English) approximately 250 metres upstream and downstream from the bridge work zone, in order to warn waterway users of the work ahead (8 panels required). These panels shall be 900 mm x 1200 mm with a yellow background and retroreflective band around the perimeter of the panel, along with the following messages in black writing: "ATTENTION PONT EN CONSTRUCTION PROCÉDEZ AVEC PRUDENCE" and "BEWARE BRIDGE UNDER CONSTRUCTION PROCEED WITH CAUTION".

Contractor shall install lateral buoys on the navigable canal to guide navigation and indicate the obstacles to avoid. They shall comply with Transport Canada's Marine Transportation standards, regulations and laws.

Buoys serve to identify the obstacles and canal to follow, with a visible height so that vessels can identify them. Buoys shall feature retroreflective elements so that they are visible at night. Buoys used to identify obstacles shall have the message "DANGER OBSTACLE" printed on an orange diamond-shaped sign, affixed to the buoy.

Contractor shall also:

- Ensure all devices installed are clean so that no debris or material falls into the water.
- Install these devices in a manner to ensure navigation is not hindered.
- Define, at water level, a safety distance and ensure it is maintained, using buoys, markers or other nav aids; if navigation safety requires it, provide flagmen in boats.
- In conjunction with the Parks Canada Representative, coordinate all work above water level and obtain necessary authorizations.
- Remove any debris or material resulting from the work that is on the water bed or surface.
- If the Contractor intends to use marine equipment, obtain the necessary authorizations from Parks Canada and use such equipment in accordance with their guidelines.

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1.15 Free Standing Fence at the Request of the Parks Canada Representative

At the request of the Parks Canada Representative, the Contractor shall provide and install free standing fence sections to control and protect access to the site, as well as regulate pedestrian and cyclist traffic. At the end of the work, the Contractor shall recover the fence sections installed at the site.

The Contractor is responsible for the installation, maintenance, dismantling and, if necessary, replacement of free standing fence sections.

The free standing fence sections installed shall meet the following requirements:

- The sections shall have a height of 1.8 metres.
- The sections shall have a length of 2.4 metres.
- The sections shall be linked together to form an effective barrier to control pedestrian access.
- The sections shall be free standing and not require an anchoring system.
- The fence shall have an openwork design and shall not act as a screen, except near demolition zones where there is a risk of projected objects.

Fences shall be required for the curved bridge at km 58.3 – Route Promenade to secure access to lake shores located near the abutments.

1.16 Traffic Management in Winter

For all the work carried out during the winter between November 15 and April 15, the Contractor shall be responsible for snow removal on the roads and work site access roads, at its own cost.

2.0 CONSTRUCTION SIGNAGE

2.1 Signage Installation and Dismantling

The initial installation of signs is a perilous activity, both for the personnel assigned to performing the work, as well as for the users.

During the installation process itself, operations shall be considered to be a work site, and be signaled as such using “short-term” type signage for example. Dismantling is subject to the same requirements.

The sign crew shall be composed of at least two (2) people equipped with a vehicle. Personnel assigned to signaling shall meet the requirements stipulated in article 10.3.3 of the CCDG.

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2.2 Visual Markers

Lane marking shall comply with article 10.3.5 of the CCDG. Visual Markers T-RV-7 may be used provided that they are made of lightweight and flexible material that deforms on impact. Metal markers and concrete weights are not permitted. The use of cones is forbidden.

Visual markers shall be covered with a type VII fluorescent orange retroreflective film and type III white film. Film shall comply with requirements set forth in "Normes – Ouvrages routiers – Tome VII Matériaux" (Standards – Road Work – Tome VII, Materials).

All visual markers shall be weighted with a minimum of two (2) stabilizers (weights) totalling a minimum of 20 kg. If site conditions require it, additional stabilizers (weights) may be added to provide additional marker stability. Bags filled with sand or other miscellaneous substances shall not be used as stabilizers or weights under any circumstances.

For a continuous section on a site, a single type of visual markers with identical reflective film shall be used. Non-compliant, damaged or dirty visual markers shall not be tolerated.

The space between visual markers (variable E defined in Chapter 4 "Signalisation routière" (Roadwork Signing), Volumes 1 and 2 of the MTQ's "Normes - Ouvrages routiers - Tome V, Signalisation routière" (Standards - Road Work - Tome V, Roadwork Signing")) shall be no more than ten (10) metres. The space between visual markers in the tapers shall be no more than five (5) metres.

In the deviation zone, the Contractor shall install direction chevron signs at ten (10) metre intervals in curves. The height of the chevrons, measured from the road surface to the lower edge, shall be one thousand two hundred millimeters (1200 mm).

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As a general guide, Table 2 summarizes the spacing required for posted speeds of 50 km/h and 70 km/h.

Table 2 - Parks Canada's Requirements for Spacing

	Posted Speed	
	50 km/h	70 km/h
D (Lane width)	3.5 m	3.5 m
L (Taper length)	75 m	150 m
E (Visual marker spacing – Lanes)	10 m	10 m
E (Visual marker spacing – Tapers)	5 m	5 m
E _c (Visual marker spacing in contraflow lanes)	10 m	10 m
B (Sign spacing)	75 m	125 m

2.3 Temporary Pavement Markings and Erasing

The Contractor shall design, supply, install, maintain and remove temporary pavement markings on the roadway as required in order to properly direct traffic at all times.

Before the start of the marking work, the Contractor shall provide drawings, stamped and signed by an engineer who is a member of the Ordre des ingénieurs du Québec, of the lane markings for all traffic configurations planned for traffic control. The lane marking drawings shall comply with the standards in effect.

When temporary pavement marking is necessary, existing markings shall be removed and replaced by the necessary marking required for the work. Upon completion of the work, the temporary marking shall be removed and replaced with the appropriate permanent markings before reopening lanes to traffic. Removal of the marking shall be done by sandblasting, high-pressure water jet or steel shotblasting.

The Contractor shall use water-based paint compliant with the MTQ's standard 10204 for temporary pavement markings.

Erasing the existing marking or temporary marking shall be performed so as to leave no visible trace of paint. Paint masking is prohibited. The method used shall not damage or create depressions on the pavement surface, whether it be concrete or asphalt pavement. In the case of asphalt pavement, the method used shall not loosen aggregates from their bituminous paste.

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Masking of temporary or permanent marking with black paint or black marking tape is not allowed.

2.4 Illuminated Arrows and TB-2 Barriers

Contractor shall install illuminated arrows behind TB-2 barriers. All illuminated arrows shall be operational at all times throughout duration of the work.

Illuminated arrows shall be mounted on a trailer and comply with article 4.37 of "Normes – Ouvrages routiers, Tome V : Signalisation routière" (Standards – Road Structures, Tome V: Road Signs"). Power supply for each arrow shall be by solar-powered battery. Any arrow that is out-of-service or that does not meet required specifications shall be replaced.

Every lane closed to traffic shall have a signal arrow and TB-2 barrier.

2.5 Work Zone Signs

All panels and supports used for work zone signs shall be clean and in new condition. Site signage shall be, at all times, compliant with articles 10.3.1 and 10.3.5 of the CCDG, the specific requirements set forth in these specifications, as well as the laws and regulations in force.

When required, the Contractor shall provide appropriate signing for cyclists and pedestrians.

Work zone signs shall be installed as soon as they are required and any necessary corrections shall be made without delay. They shall meet the following requirements:

- Minimum dimensions of 750 mm x 750 mm
- Covered with type VII fluorescent film (standard 14101 from the "Normes – Ouvrages routiers, Tome VII : Matériaux" (Standards – Road Work, Tome VII: Materials)
- In new condition;
- Bilingual (French and English);
- Pictograms shall be favoured over lettering
- Panels shall be driven in the ground.

Signage plans shall be submitted to the Parks Canada Representative for approval prior to installing the panels and equipment. If required, plans shall be re-submitted with corrections reflecting the Parks Canada Representative's comments prior to installing the panels and equipment.

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In addition to the advance warning requirements set out in Tome V – “Signalisation routière de la collection Normes – Ouvrages routiers du Ministère des Transports” (Road Signs from the Standards – Ministère des Transports Road Work Collection), the Contractor shall also provide advance warning according to the following specifications:

- Addition “Construction Ahead” panel (T-20) at 2 km
- Addition of speed reduction sign to 50 km/h at the work site approach with (T-70-1) panels and “Advance signal sign” panels (T-70-2).

2.6 Concrete Construction Site Barriers

The concrete construction site barriers shall comply with standardized drawings VIII-5-001 and VIII-5-002 in “Normes – Ouvrages routiers, Tome VIII, Dispositifs de retenue” (Standards – Road Work, Tome VIII, Safety Barriers).

Mini-markers shall be installed on the upper portion of the barrier, on every other section. Mini-markers shall comply with requirements associated with type T-RV-11 visual markers. Mini-markers installed on the same chain of barriers shall be of the same type, dimensions and made with the same film.

All barriers shall be in new condition. Barriers damaged during handling, as a result of an accident, or otherwise deemed unusable by the Parks Canada Representative shall be repaired or replaced by the Contractor and at its own cost. Acceptance criteria are, without being limited to, the following:

- Free of cracks that extend from one end of the barrier to the other;
- Provide connections without any detachment at the ends.

These barriers shall be continuous and connected to one another when they are installed and throughout the entire duration of use, in order to prevent displacement upon impact by a vehicle. Any barrier that does not meet the aforementioned requirements shall not be installed on the construction site, and no exceptions shall be made.

Contractor shall ensure not to damage the roadway when handling the concrete construction site barriers. Contractor shall ensure management and cover costs of any concrete construction site barrier re-location as a result of the different work phases. All planned work area accesses are subject to approval from the Parks Canada Representative and shall be at the Contractor’s expense. At each end of a chain of concrete construction site barriers that represent an obstacle to traffic, the Contractor shall install a construction site impact attenuator.

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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2.7 Construction Site Impact Attenuator

At each end of a chain of concrete construction site barriers that represent an obstacle to traffic, the Contractor shall install a level TL-3 construction site impact attenuator. Contractor shall use an impact attenuator certified by the Ministère des Transport du Québec (MTQ) that can withstand impact at a speed of 100 km/h.

It shall not be anchored to the surface on which it is installed and shall cover the end of the chain, without impeding the traffic lane or adjacent shoulder. A type VII chevron made of film, shall be installed on the front of the impact attenuator. Installation shall be subject to a certificate of compliance, stamped and signed by an engineer who is a member of the Ordre des Ingénieurs du Québec. This certificate shall be submitted to the work supervisor when the device is put into service. Following impact against one of the impact attenuators, the Contractor shall have twenty-four (24) hours to restore or replace it with a fully functional impact attenuator.

2.8 Construction Site Traffic Lights

Contractor shall supply and install a construction site traffic light system. The characteristics of this system and additional requirements set forth below are in addition to those stipulated in section 4.35 “Feux de circulation pour travaux” (Construction Site Traffic Lights) of Tome V – Signalisation routière (Road Signs) from the Ministère des Transports du Québec’s “Normes – Ouvrages routiers” (Standards – Road Work):

- Charge indicator on all batteries
- Three-digit numerical display
- Numerical display shall not indicate duration of green and yellow intervals.

END OF SECTION

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

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**APPENDIX 1
Map of Mauricie National Park – East Sector**

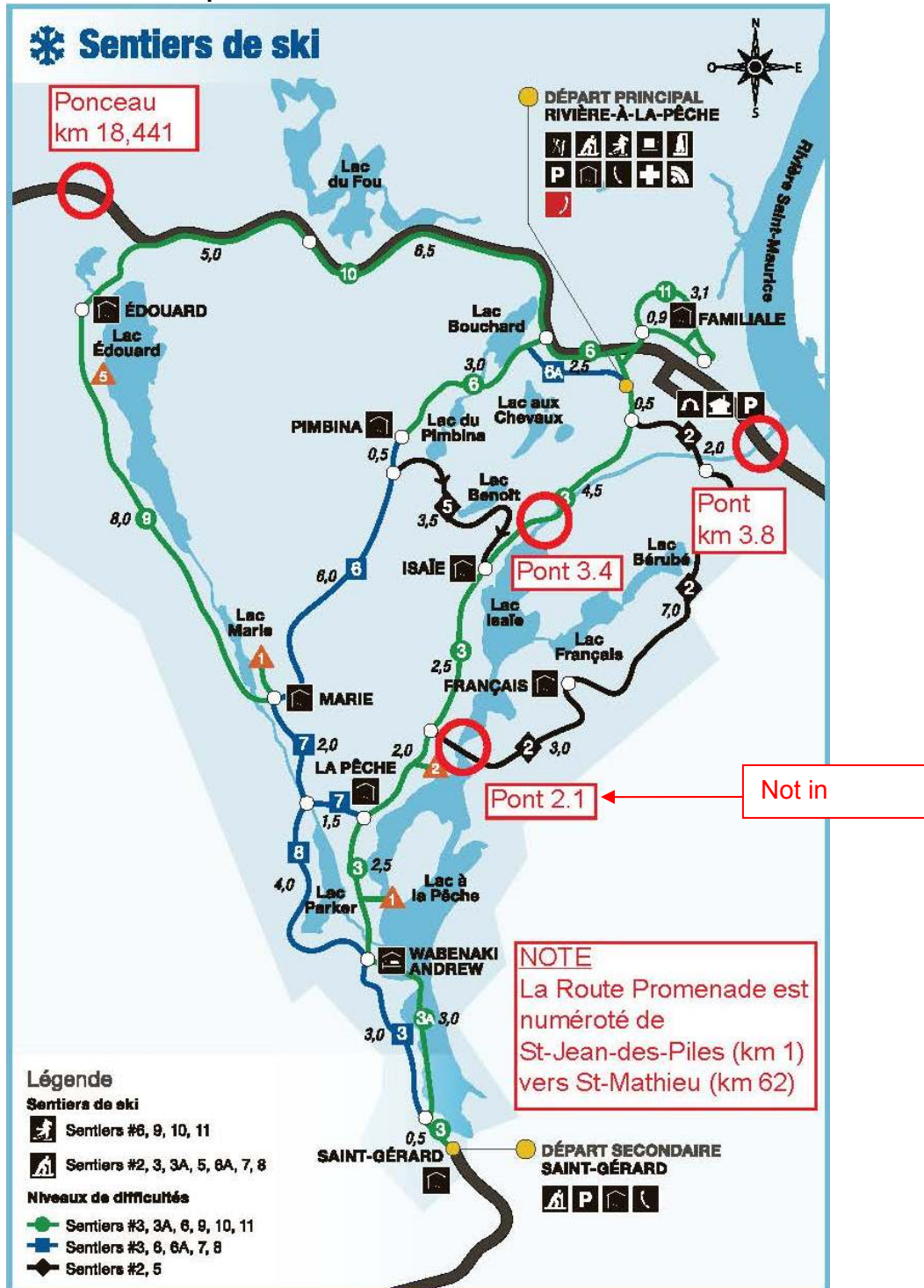
**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
Mauricie National Park

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Map of Mauricie National Park – East Sector



**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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V/REF.: 45353174

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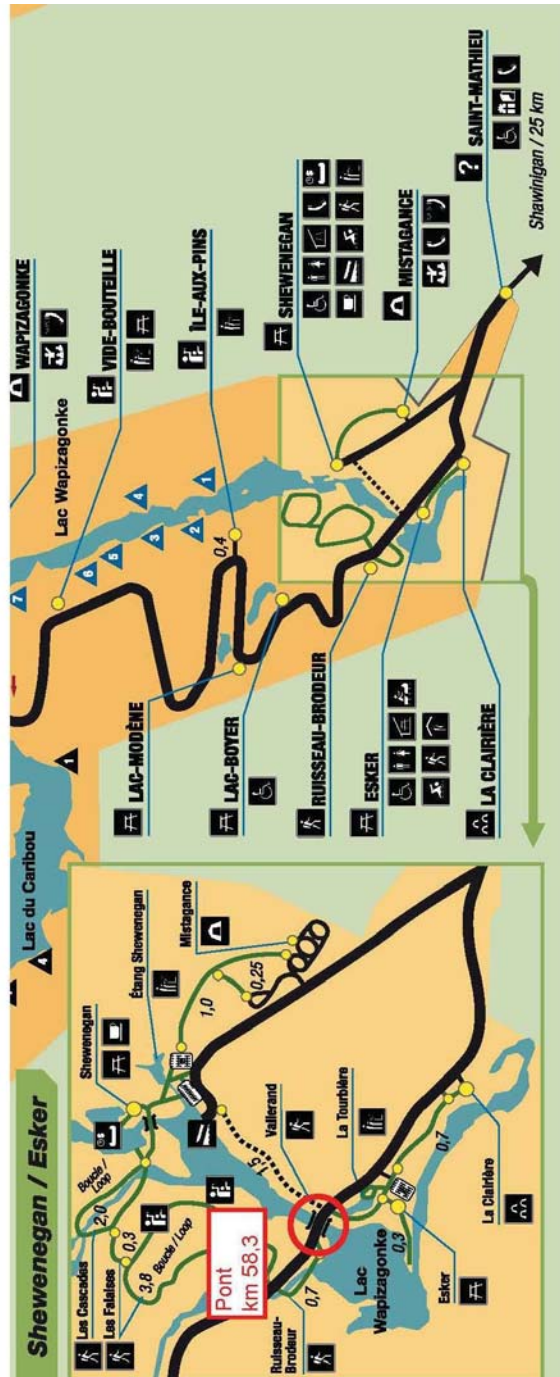
**APPENDIX 2
Map of Mauricie National Park – West Sector**

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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Map of Mauricie National Park – West Sector



NOTE
La Route Promenade est numéroté de
St-Jean-des-Piles (km 1) vers St-Mathieu (km 62)

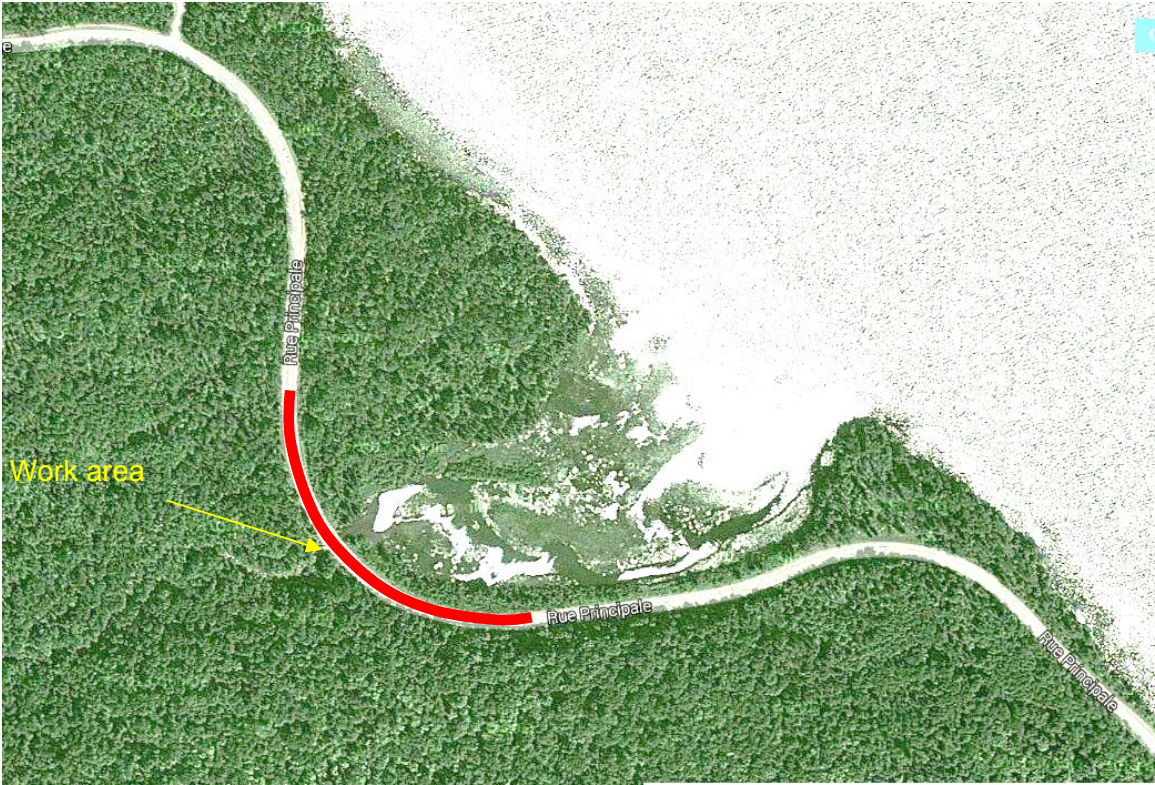
**APPENDIX 3
Work Area Locations**

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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Work Area Location
Arch bridge at km 3.8 – Route Promenade



Work Area Location
Curved bridge at km 58.3 – Route Promenade



Work area refers to the space where the work is being carried out (tapers not included), as illustrated on figure 4.3-1.

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
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Work area shall be delineated over a sufficient length so that it is visible from the distance indicated on table 4.3-1.

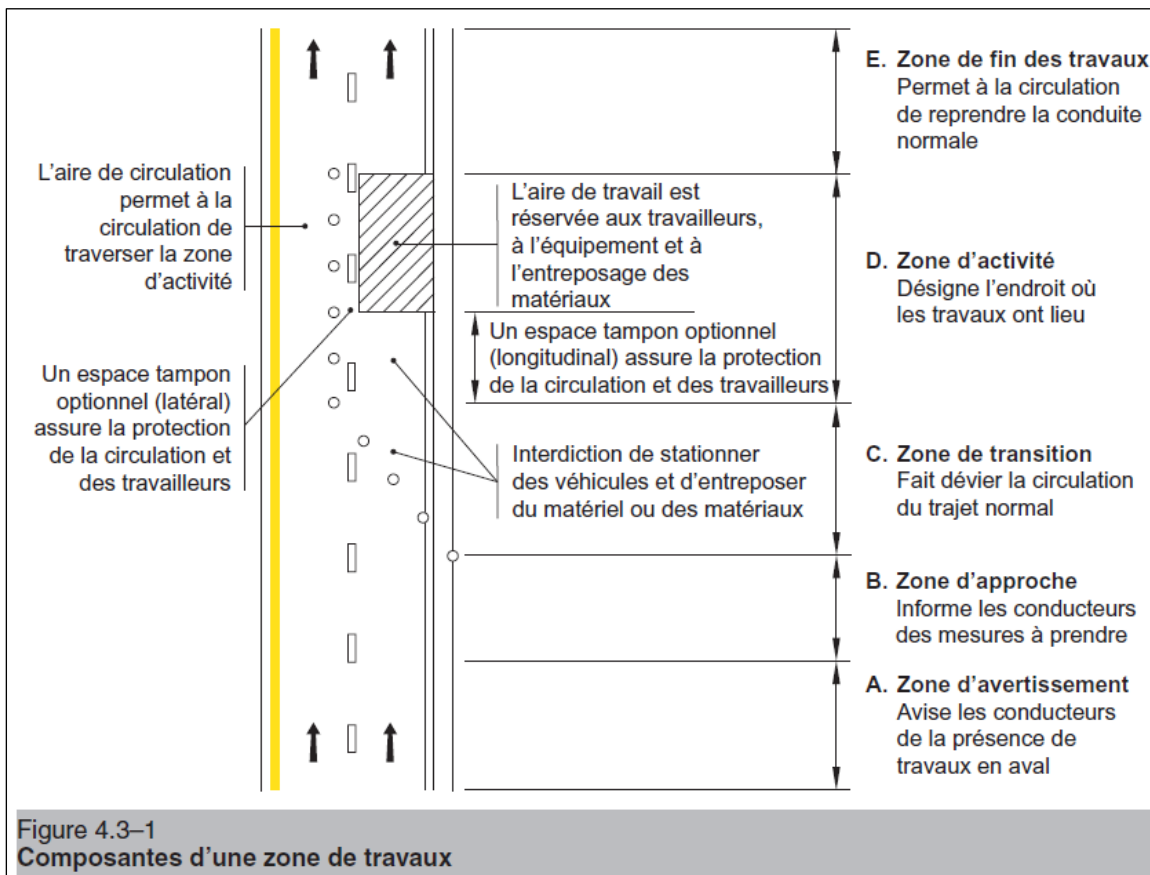


Figure 4.3-1
Composantes d'une zone de travaux

Tableau 4.3–1
Distance minimale de visibilité d’arrêt

Vitesse de base⁽¹⁾ (km/h)	40	50	60	70	80	90	100	110
Distance minimale de visibilité d’arrêt (m)	45	65	85	110	140	170	200	240

1. Vitesse de base = vitesse indiquée sur le panneau à fond blanc « Limite de vitesse » (P-70) plus 10 km/h.

Ref: Tome V “Signalisation routière”, Normes du Ministère des Transports du Québec (Tome V, “Road Signs”, Ministère des Transport du Québec’s Standards), chapter 4.

**APPENDIX 4
Standardized Drawings VIII-5-001 and VIII-5-02
Concrete Construction Site Barriers**

**SPECIAL PROCEDURES
FOR TRAFFIC CONTROL**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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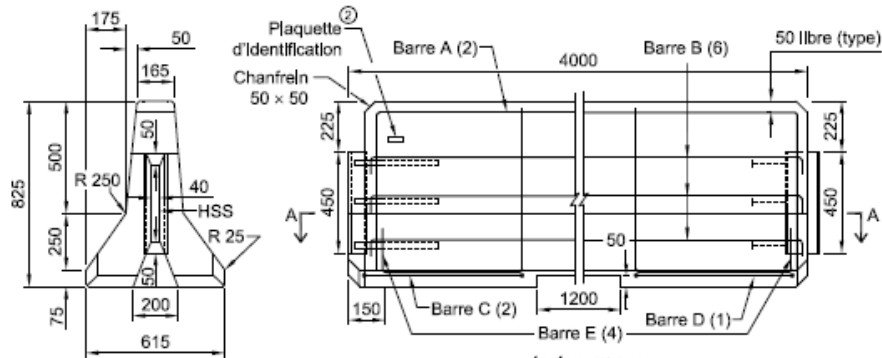


NORME

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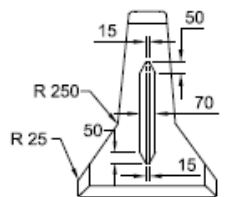
**GLISSIÈRE EN BÉTON
POUR CHANTIER –
UNITÉ CONVENTIONNELLE**

Tome	VIII
Chapitre	5
Numéro	001
Date	2013 09 30

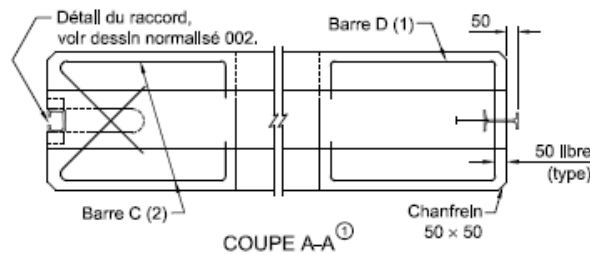


EXTRÉMITÉ FEMELLE

ÉLEVATION



EXTRÉMITÉ MÂLE

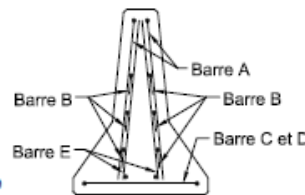


COUPE A-A

- ① Les barres B et E ne sont pas dessinées dans la coupe A-A.
- ② La plaquette d'identification est décrite à la section 5.6.1.3 « Plaquette d'identification ».

Notes :

- sauf indication contraire, toutes les arêtes doivent être chanfreinées de la façon suivante : 15 x 15 mm;
- les barres d'armature peuvent être remplacées en tout ou en partie par du treillis métallique de résistance équivalente dans chaque direction;
- le diamètre des barres d'armature est 15M;
- les cotes sont en millimètres.



PROFIL

MATÉRIAUX — NORMES APPLICABLES

Armature, type W, limite élastique minimale 400 MPa	Tome VII, norme 5101	Béton, types IV, V, V-P et XIV-C	Tome VII, norme 3101
Aciers de construction, type W, limite élastique minimale 300 MPa	Tome VII, norme 6101	Goujons, type B	CAN/CSA W59

**SPECIAL PROCEDURES
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Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
Mauricie National Park
V/REF.: 45353174

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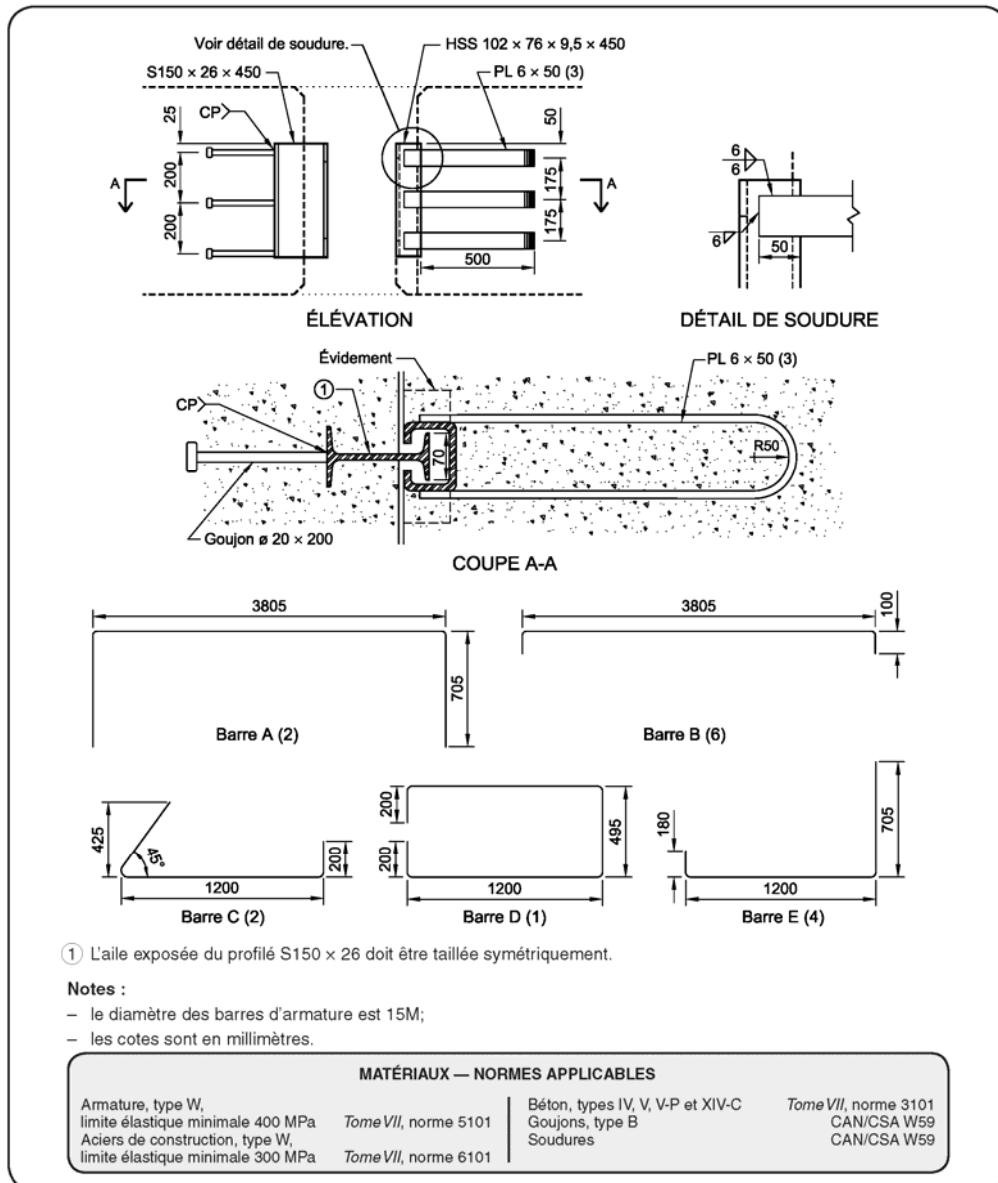
Tome VIII
Chapitre 5
Numéro 002
Date 2011 10 30

DESSIN NORMALISÉ

**GLISSIÈRE EN BÉTON
POUR CHANTIER –
DÉTAIL DU RACCORD EN I**



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**APPENDIX 5
STANDARDIZED ROAD SIGN DRAWINGS**

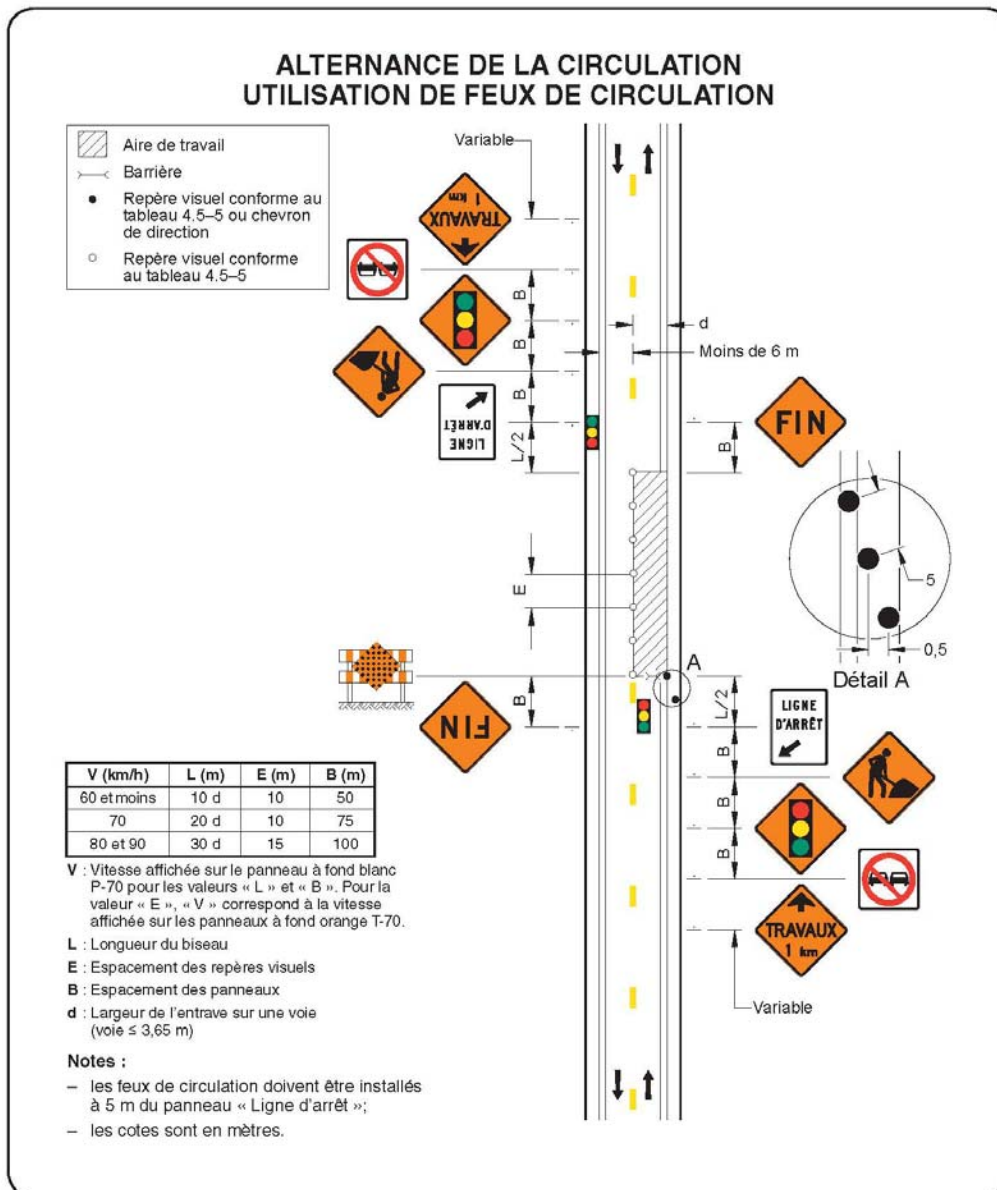
Tome V
Chapitre 4
Numéro TLD 004
Date Déc. 2014

DESSIN NORMALISÉ

**SIGNALISATION DE TRAVAUX
DE LONGUE DURÉE
ROUTE À DOUBLE SENS
DE CIRCULATION**



NORME





DESSIN NORMALISÉ

SIGNALISATION DE TRAVAUX
DE LONGUE DURÉE
ROUTE À DOUBLE SENS
DE CIRCULATION

Tome
V

Chapitre
4

Numéro
TLD 005A

Date
Déc. 2014

NORME

ALTERNANCE DE LA CIRCULATION
UTILISATION D'UN SIGNALEUR

- Aire de travail
- Barrière
- Repère visuel conforme au tableau 4.5-5 ou chevron de direction
- Repère visuel conforme au tableau 4.5-5

V (km/h)	L (m)	E (m)	B (m)
60 et moins	10 d	10	50
70	20 d	10	75
80 et 90	30 d	15	100

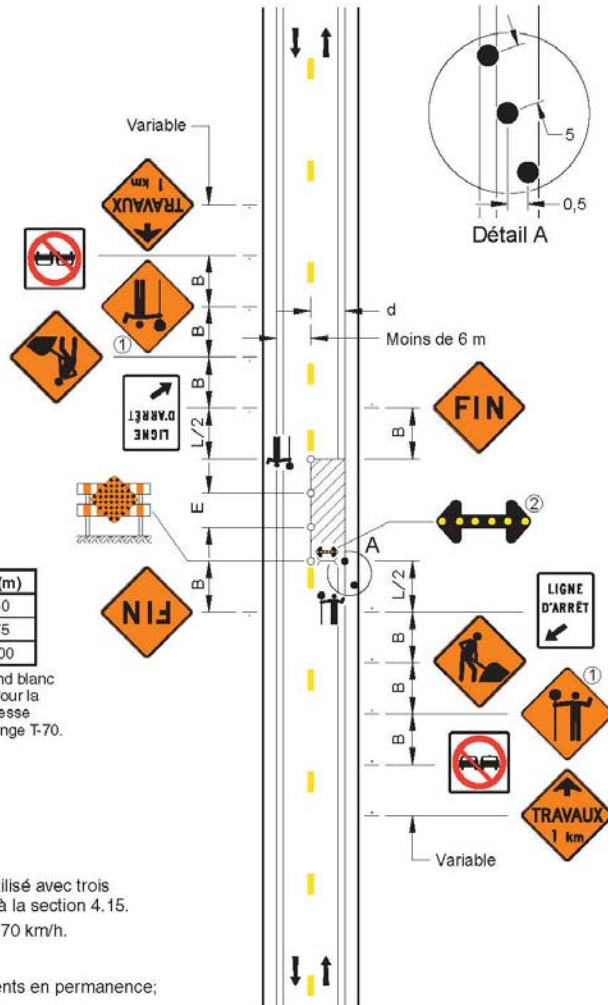
V : Vitesse affichée sur le panneau à fond blanc P-70 pour les valeurs «L» et «B». Pour la valeur «E», «V» correspond à la vitesse affichée sur les panneaux à fond orange T-70.

L : Longueur du biseau
E : Espacement des repères visuels
B : Espacement des panneaux
d : Largeur de l'entrave sur une voie (voie ≤ 3,65 m)

- ① Ce panneau doit toujours être utilisé avec trois drapeaux, comme il est indiqué à la section 4.15.
- ② Requis sur les chemins où $V \geq 70$ km/h.

Notes :

- les signaleurs doivent être présents en permanence;
- les cotes sont en mètres.





DESSIN NORMALISÉ

SIGNALISATION DE TRAVAUX
DE LONGUE DURÉE
ROUTE À DOUBLE SENS
DE CIRCULATION

Tome
V

Chapitre
4

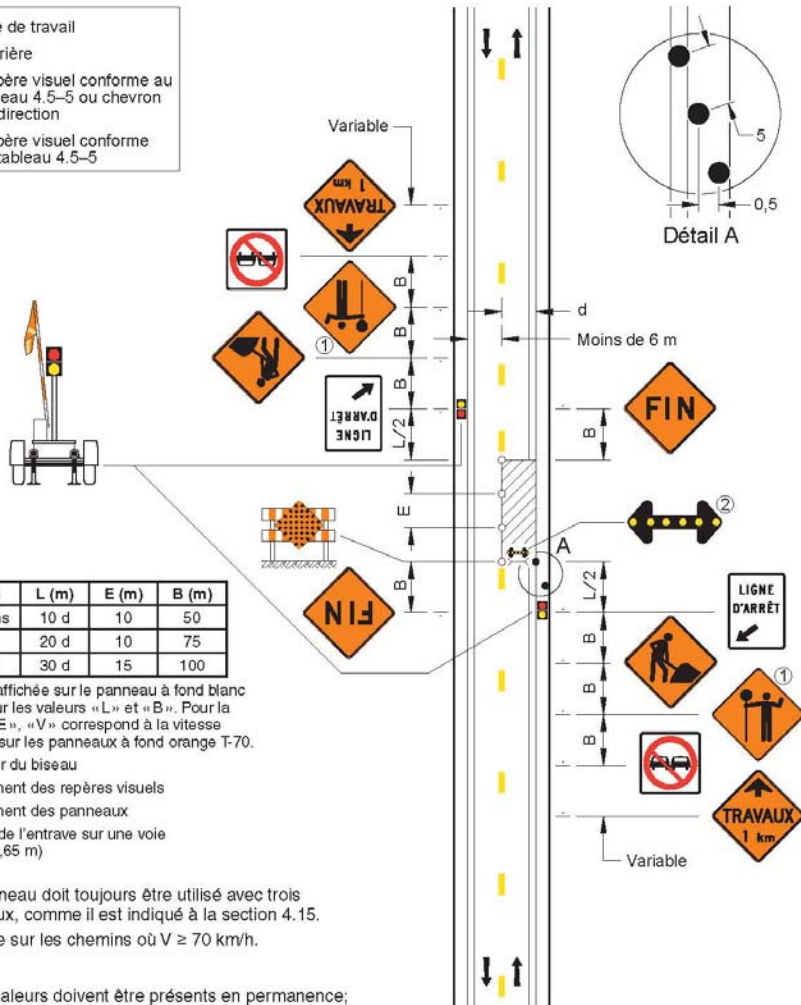
Numéro
TLD 005B

Date
Déc. 2014

NORME

ALTERNANCE DE LA CIRCULATION
UTILISATION D'UNE BARRIÈRE POUR SIGNALEUR

- Aire de travail
- Barrière
- Repère visuel conforme au tableau 4.5-5 ou chevron de direction
- Repère visuel conforme au tableau 4.5-5



V (km/h)	L (m)	E (m)	B (m)
60 et moins	10 d	10	50
70	20 d	10	75
80 et 90	30 d	15	100

V : Vitesse affichée sur le panneau à fond blanc P-70 pour les valeurs « L » et « B ». Pour la valeur « E », « V » correspond à la vitesse affichée sur les panneaux à fond orange T-70.

L : Longueur du biseau
E : Espacement des repères visuels
B : Espacement des panneaux
d : Largeur de l'entrée sur une voie (voie ≤ 3,65 m)

- ① Ce panneau doit toujours être utilisé avec trois drapeaux, comme il est indiqué à la section 4.15.
- ② Requis sur les chemins où V ≥ 70 km/h.

Notes :

- les signaleurs doivent être présents en permanence;
- les cotes sont en mètres.

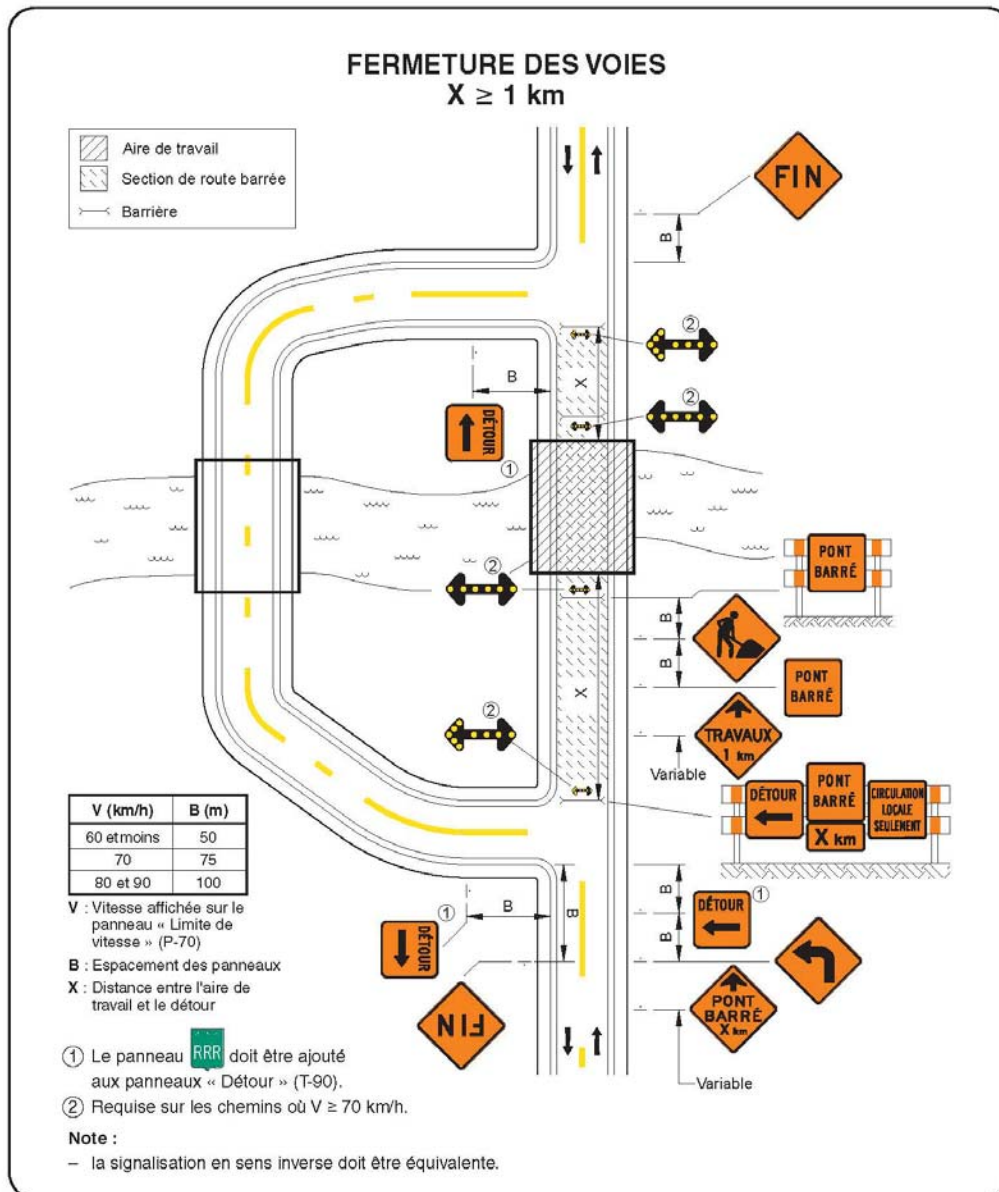
Tome V
Chapitre 4
Numéro TLD 010
Date Déc. 2005

DESSIN NORMALISÉ

**SIGNALISATION DE TRAVAUX
DE LONGUE DURÉE
ROUTE À DOUBLE
SENS DE CIRCULATION**



NORME



HEALTH AND SAFETY

Section 01 35 29.06

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1.0 GENERAL

1.1 Section Content

This sub-section addresses requirements pertaining to occupational health and safety. The purpose is to protect workers assigned to the work site, users of Mauricie National Park structures, as well as the general public.

1.2 *Related Requirements*

Section 02 41 16	Structure Demolition
Section 03 10 00	Concrete Forming and Accessories
Section 03 20 00	Concrete Reinforcing
Section 03 30 00	Cast-in-Place Concrete
Section 05 12 33	Structural Steel for Bridges
Section 06 10 00	Rough Carpentry
Section 33 42 13	Pipes for Culverts

1.3 *References*

- Canada Labour Code Part II, Canada Occupational Health and Safety Regulations
- An Act Respecting Occupational Health and Safety, R.S.Q., c.S-2.1 (Current edition) - Updated 2005
- Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- Material Safety Data Sheets (MSDS)

1.4 *Compliance with Laws and Regulations*

Contractor shall be solely responsible for preventing workplace accidents on the construction site. Contractor shall protect the health, safety and physical integrity of its employees, its subcontractors' employees and any other person assigned to performing work on the construction site, as well as people present on the construction site, in accordance with federal and provincial regulations as well as all other applicable legislation and Contract requirements.

The word "Law" includes any law, code or regulation relating to occupational health and safety, most specifically the Canada Labour Code (Part II - Occupational Health and Safety) as well as An Act Respecting Occupational Health and Safety (R.S.Q. C. S-2.1) and all industry policies and guides, all of which may be modified from time to time.

Contractor shall assume, for the purposes of the Quebec Act Respecting Occupational Health and Safety, the role and responsibility of general contractor, and shall undertake every means necessary to protect its personnel, supervisory personnel, equipment and structures.

Prior to commencing works, Contractor shall review the accident prevention practices in effect for all Parks Canada properties, and apply these practices to the present work.

1.5 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Submit site-specific Health and Safety Prevention Plan within five (5) days after date of Notice to Proceed and prior to mobilization of labour. Prevention plan must include:

- Results of site-specific safety hazard assessment for each construction site.
- Results of health and safety risk or hazard analysis for each site task and operation found in work plan and/or schedule.

Submit one (1) copy of Contractor's authorized representative's work site health and safety inspection reports to Parks Canada Representative daily or at agreed frequency.

Submit copies of reports or guidelines issued by federal and provincial health and safety inspectors.

Submit copies of incident and accident reports.

Submit WHMIS Material Safety Data Sheets (MSDS).

Parks Canada Representative shall review Contractor's site-specific prevention plan and provide comments to Contractor within two (2) days after receipt of plan. Contractor shall revise plan as appropriate and resubmit to Parks Canada Representative within two (2) days after receipt of comments from Parks Canada Representative.

Parks Canada Representative's review of Contractor's final Health and Safety Prevention Plan shall not be construed by Contractor as approval of the plan and does not reduce the Contractor's overall responsibility regarding construction health and safety.

The Health and Safety Prevention Plan shall include an emergency response plan containing standard operating procedures to be implemented during emergency situations on the construction site.

1.6 *Preparation of Notice of Project*

File Notice of Project with provincial authorities prior to start of work.

Contractor shall be responsible and assume the role of Principal Contractor for each work area location, but not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with three (3) weeks of contract award. Contractor to submit written acknowledgement to CSST along with Ouverture de Chantier Notice.

Work area locations include:

- Arch bridge at km 3.8 – Route Promenade
- Culvert at km 18.44 – Route Promenade
- Curved bridge at km 58.3 – Route Promenade
- Steel-wood bridge No. 3.4 – Rivière-à-la-Pêche

Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.7 *Risk/Hazard Assessment*

Contractor shall perform site-specific risk/hazard assessment related to project.

1.8 *Meeting*

Contractor shall organize and lead a health and safety meeting with Parks Canada Representative prior to commencement of work. Contractor shall also hold meetings with its personnel and subcontractors every two (2) weeks for accident prevention updates. Parks Canada Representative shall attend these meetings.

Contractor shall prepare and submit an agenda and attendance sheet, which has been signed by all those present. The Contractor's project manager, superintendent and the Parks Canada Representative are required to attend these meetings.

1.9 Site/Implementation Conditions

Personnel assigned to the work sites shall be exposed to the following:

- Existing structures with various structural deficiencies
- Presence of wild animals and wild animal droppings (bear or other)

1.10 General Requirements

Contractor shall prepare a site-specific Health and Safety Prevention Plan based on risk/hazard assessment prior to beginning site work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Prevention Plan shall take into account specificities of the projects at each work site.

Parks Canada Representative may respond in writing, where deficiencies or concerns with the prevention plan are noted and may request re-submission with correction of deficiencies or concerns.

Contractor shall undertake all measures necessary to ensure safety of workers against falls, and to ensure that no worker walks in a lane open to traffic.

Contractor shall implement every precaution and means necessary to prevent objects of any nature from falling from structures, access devices, scaffolding, catwalks or other.

Equipment, access devices, scaffolding, catwalks and construction materials shall not be accessible to the public.

Road, pedestrian and bicycle traffic shall be protected from materials and equipment at all times.

1.11 Responsibility

Contractor shall assume responsibility for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by work.

Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code, for performance solely of its scope and areas of work as defined and described these specifications.

Contractor shall comply with and enforce employee compliance with safety requirements set forth in contract documents, applicable federal, provincial and local statutes, regulations, and ordinances, as well as the site-specific Health and Safety Plan.

1.12 *Lifting Equipment*

Lifting equipment such as cranes, hoists or other equipment used for lifting purpose shall comply with the applicable provisions in the Canada Labour Code (Part II - Occupational Health and Safety) and the Code de sécurité pour les travaux de construction du Québec (Government of Quebec's Safety Code for the Construction Industry), most specifically the provisions set forth in article 2.15, Appareils de levage (Lifting Equipment).

Lifting equipment operators shall be qualified and a copy of appropriate competency cards or certifications shall be submitted to the Parks Canada Representative.

1.13 *Digging, Excavating and Trenching*

Contractor shall ensure that the walls of an excavated area or trench comply with articles 3.15.1 to 3.15.10 of the Safety Code for Construction Works pertaining to digging, excavating and trenching.

Parks Canada Representative may, at any time, suspend work if a labourer has to work in non-compliant excavations and trenches. Contractor shall comply with notice issued by Parks Canada Representative.

1.14 *Floating Devices*

Marine equipment used to perform work (if required), as well as any personnel working on board such equipment shall comply with the provisions of the Canada Shipping Act, 2001 (c. 26), as well as all related regulations.

Boats and other floating devices, related accessories as well as nautical safety equipment (such as personal flotation devices and life jackets) shall be certified by Transport Canada - in accordance with the Canada Shipping Act, 2001, as well as the Small Vessel Regulations.

At least seven (7) days prior to date when the boat or floating device is scheduled to be used, a copy of the letter of compliance for each boat, floating device, floatation accessory and equipment shall be submitted to the Parks Canada Representative.

1.15 *Unexpected Risks/Hazards*

When unexpected or peculiar safety-related factors, hazards, or conditions occur during performance of work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the relevant province and advise Parks Canada Representative verbally and in writing.

1.16 Health and Safety Coordinator

Contractor shall, at its own cost, hire and assign to the work a competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator shall:

- Have practical experience specific to activities associated with work to rehabilitate engineering structures.
- Have working knowledge of occupational safety and health regulations.
- Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform work.
- Discuss health and safety requirements during work progress meetings on the work site.
- Immediately notify Parks Canada Representative of any accident or incident on the work site.
- Be responsible for implementing, enforcing daily and monitoring the Contractor's site-specific Health and Safety Prevention Plan.
- Be on site during execution of work and report directly to, and be under direction of site supervisor.

1.17 Posting of Documents

Contractor shall ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of the relevant province, and in consultation with Parks Canada Representative.

1.18 Correction of Non-compliance

Contractor shall immediately implement whatever measures necessary to correct situations deemed to be non-compliant and/or unsafe by authority having jurisdiction and/or Parks Canada Representative, with regard to the Health and Safety Prevention Plan, as well as the regulations and laws in force.

Contractor shall also provide Parks Canada Representative with written report of action taken to correct non-compliance of Health and Safety issues identified.

Parks Canada Representative may stop work if non-compliance of Health and Safety regulations is not corrected.

1.19 Work Stoppage

Contractor shall give precedence to health and safety of public and site personnel and protection of environment over cost and schedule considerations for work.

END OF SECTION

ENVIRONMENTAL PROTECTION

Section 01 35 43

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1.0 GENERAL

1.1 Section Content

This section describes the environmental protection requirements that shall apply to the Contractor's activities in order to minimize impacts on the environment.

The environmental impacts from the Contractor's activities can be minimized through diligent preventive management before, during and after the work period. The Contractor shall comply with the practices described in the following articles in addition to other specific requirements found in other sections of these specifications.

The Contractor shall take all appropriate measures to protect the environment and to avoid emitting all types of pollution or contamination.

The Contractor shall disseminate to its employees all relevant environmental protection information, including the measures required in this Contract.

Failure by the Contractor to comply with the requirements of the present section will result in the application of damages and interest specified in the contract.

1.2 *Related Requirements*

Section 02 41 16 – Structure Demolition

Section 03 10 00 – Concrete Forming and Accessories

Section 03 20 00 – Concrete Reinforcing

Section 03 30 00 – Cast-in-Place Concrete

Section 33 42 13 – Pipes for Culverts

1.3 Measurement for Payment

The required environmental protection measures as well as temporary environmental protection structures, except for coffer dams, shall be paid as a lump sum for each site where the work set forth in this Contract is performed. The overall price tendered shall include, but is not limited to, supply, transportation and installation of materials according to the various measures implemented to mitigate the impact on the environment, maintaining them throughout the course of the work, dismantling, and site restoration once work has been completed. Price tendered shall also include preparation of an environmental protection plan and environmental emergency plan, as well as any revisions required as requested by the Parks Canada Representative; it shall also include all incidental expenses.

Coffer dams are paid as a lump sum. The price shall include, most specifically, supply, transportation, installation and removal of the coffer dam at the end of work, temporary structure drawings and all incidental expenses.

1.4 **References**

Definitions:

- Environmental pollution and damage: Presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- Environmental protection: Prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

References:

- Ministère des Transports du Québec:
 - Cahier des charges et devis généraux (CCDG)
 - Tome II Construction routière (chapitre 9 – Mesures d’atténuation environnementales temporaires), Normes du Ministère des Transports du Québec (Tome II – Road Construction (Chapter 9 – Temporary Environmental Mitigation Measures), Ministère des Transport du Québec’s Standards)
- Fisheries and Oceans Canada’s “Guidelines for the Design of Stream Crossings in Quebec”
- Canadian Environmental Protection Act (1999) (S.C. 1999, c.33)
- Navigable Waters Protection Act (R.S.C. (1985), c.N-22)
- Environment Quality Act (CQLR, c. Q-2)
- An Act respecting the Conservation and Development of Wildlife (R.S.Q., c.C-61.1)

1.5 **Action and Informational Submittals**

Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan and Environmental Emergency Plan for review and approval by Parks Canada Representative.

Four (4) copies of the Prevention Program and Environmental Emergency Plan approved by the relevant authorities shall be submitted to the Parks Canada Representative.

1.5.1 Environmental Protection Plan

The Contractor's Environmental Protection Plan shall demonstrate how the Contractor intends to comply with, or take into consideration, the objectives stated in these specifications. The Contractor shall also demonstrate in its protection plan how it intends to implement the requirements of these specifications to prevent damage to the environment. This protection plan shall be submitted to the Parks Canada Representative for approval seven (7) days prior to the commencement of work.

At least seven (7) days prior to the commencement of work at the site, the Contractor shall also submit the name and qualifications of the Contractor's environmental representative to the Parks Canada Representative. This representative shall be responsible for any questions pertaining to the environment and shall be responsible at all times, throughout the performance of the work at the site, to ensure the implementation of and compliance with measures contained in this section.

Environmental Protection Plan shall include the following elements:

- Identification of the Contractor in environmental matters (site communication organization chart)
- Reception of workers and information
- Prediction of areas to be renaturalized without delay and to be covered with wood fiber or straw mattresses
- Drawings for temporary structures (settling tanks, concrete mixer cleaning areas, etc.)
- Drawings showing locations of proposed field offices, parking areas, temporary excavations, stream access areas, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials, including methods to control runoff and contain materials on site.
- Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
- Work Area Plan indicating proposed activity in each area and identifying areas of limited use or non-use. Ensure plan includes measures for identifying boundaries of usable areas and methods for protecting features to be preserved within authorized work areas.

- Non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- Air Pollution Prevention Plan detailing provisions to ensure that dust, debris, materials, and trash are contained on project site.
- Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site, intended actions to prevent introduction of such materials into air, water, or ground, and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- Wastewater Management Plan identifying methods and procedures for management and/or discharge of wastewaters directly derived from construction activities, such as concrete curing water, clean-up water, water from dewatering.
- Measures to control noise and dust
- Methods of site restoration to prevent erosion
- And all other related work.

This prevention plan shall be presented in a sufficiently detailed manner for review. It shall be presented in the form of proposed working methods, procedures and sketches of site facilities (related to environmental protection) using, among others things, reduced-size construction drawings (or any other equivalent document) describing the location.

1.5.2 Environmental Emergency Plan

At least seven (7) days prior to starting work, Contractor shall prepare and submit an Environmental Emergency Plan to the Parks Canada Representative for review, which shall be used in the event of spills, an environmental incident or a fire on the site. The Contractor shall implement these when necessary.

The Environmental Emergency Plan shall include the following:

- Objectives of the emergency plan
- Analysis of the hazards of the work for the environment
- List of situations that could endanger the environment
- Preventive measures related to hazardous situations
- Monitoring and corrective measures of the Prevention Program and Emergency Plan
- Different actions, instructions and procedures to implement in the event of a spill or accident
- Different actions and procedures to be performed during refueling on the different rivers and their embankments
- List of people, companies, organizations or any other authorities to contact in case of emergency or spill, and a description of each person's roles and responsibilities.

1.6 Site Layout

1.6.1 Installation of Work Site Areas

The field offices, outbuildings and parking areas, chemical toilets, and any other temporary facilities necessary for the works, most particularly waste areas, shall be installed or located at a distance of at least 20 metres from the top of the water course embankment.

It should also be noted that no deforestation will be permitted for the installation of work site areas.

The areas for cleaning concrete mixers shall be designed so that the water used and debris are generated inside the perimeter by an elevation of the ground relative to the natural level. The dimensions of the structure must be sufficient to accommodate all the water used for cleaning. In addition, the cleaning area shall be located at least 60 meters from a watercourse. This site shall be authorized beforehand by the Parks Canada Representative.

The Contractor shall install a waterproof membrane that covers the bottom of the cleaning area. The Contractor shall have the membrane approved before set up. The Contractor is authorized to clean only the slide of its mixers in the developed washing area. Cleaning water and debris generated in the sealed tank should rest for at least one (1) hour to allow debris and suspended solids to settle and accumulate at the bottom of the basin. The water can then be pumped out and sent to a water storage tank, and as needed, to an authorized disposal facility.

Concrete debris from cleaning must be removed from the site with other debris from demolition/construction and sent to a site authorized by the Ministère du Développement durable, Environnement et Lutte contre les changements climatiques (MDDELCC). The watertight basin shall be emptied when filled to 50% or when a weather warning for heavy rain is issued. Moreover, it shall also be emptied upon temporary closure of the site as well as the permanent closure.

The Contractor shall not reject any wet concrete or mortar residue or debris into the aquatic environment. All debris introduced into the aquatic environment shall be removed as soon as possible.

1.6.2 Construction Site Cleanliness

The Contractor shall keep the premises clean and pick up work materials as they are generated. At the end of the work, Contractor shall clean the different construction sites, picking up unused materials, waste, scrap, debris, wood, stumps or roots, and demolition debris.

Hazardous materials to be used shall be identified as such. Their methods of use shall conform to the applicable laws and regulations in this regard. Storage areas shall be safe and meet regulations. Such areas should be managed accordingly and equipment for interventions required in case of accidental spillage should be available on the work sites.

Fires or burning of waste, debris, wood or other items is prohibited on the site.

1.7 Protection of Flora and Fauna

Protect trees and plants on site and approaches as directed by Parks Canada Representative.

Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

Minimize stripping of topsoil and vegetation.

Contractor shall obtain approval from Parks Canada Representative before pruning. Where applicable, Contractor shall apply a product approved by the Parks Canada Representative on the wounds resulting from selective branch cutting.

Restrict tree removal to areas designated by Parks Canada Representative.

It is forbidden to set traps, poison or kill animals on the site.

It is forbidden to use herbicides, pesticides and other poisons on the site.

1.8 Protection of Watercourses and Shoreline Stabilization

The Contractor shall ensure that no waterways are contaminated in any way whatsoever as a result of the Contractor's activities.

Work, within a waterway or its embankments, is prohibited under any circumstance without authorization from the Parks Canada Representative.

Work shall be carried out in such a manner that no construction or demolition material, waste or any other object is allowed to fall into waterways. Contractor shall recover, as quickly as possible, any material or equipment that happens to fall or be discharged accidentally into a waterway.

The Contractor, its subcontractors and suppliers as well as their employees are forbidden from using any natural water sources (streams, rivers and bodies of water) within the work site for equipment washing purposes or other work site operations.

Discharge of wastes, oil, chemical products or other contaminants from a construction site into a waterway or wetland is prohibited. The Contractor shall dispose of these wastes and contaminants in accordance with the laws and regulations in force according to the nature of the contaminant.

1.8.1 Drainage during Work

Contractor shall provide temporary drainage and pumping required to keep excavations and site free from water, as well as drainage for wash water and run-off on work platforms along throughout duration of the work. Contractor shall obtain prior authorization from the Parks Canada Representative regarding location of proposed emission point.

It is prohibited to reject, without the appropriate filtration system, any water containing sediments or suspended matter into the water courses, sewer systems or drainage systems. Drainage water from the site and water that may be required during the work shall be collected and processed on or off-site prior to discharge into the natural environment.

The ditches should not be blocked and all debris that hinder the natural flow of surface water shall be removed.

Water course beds, when required, shall be re-shaped to their original profile after work is completed.

1.8.2 Erosion and Sedimentation

Contractor shall take all necessary measures to limit erosion and sedimentation of fill and bare soil resulting from the Contractor's activities.

Contractor shall submit a description of intended erosion and sedimentation control methods to the Parks Canada Representative. These methods shall be described and included in the Environmental Protection Plan.

Any intervention on the site that could cause erosion and migration of sediments to the receiving environment shall be accompanied by sediment capture measures as specified in this section. As required, one or more of the control measures presented shall be implemented.

Slopes and erosion-sensitive lands shall be stabilized as soon as possible as work progresses. To this end, table 9.4-2 from Tome II of the Ministère des Transports du Québec's standards, included in Appendix 1 to this section, outlines the devices to use according to the land to protect.

After the work, the Contractor shall level the ruts and stabilize soils and embankments using appropriate techniques.

1.8.3 Filter Berm and Sediment Trap

Work carried out by the Contractor shall not damage nearby waterways, including ditches. In order to limit sediment migration to these areas, the Contractor shall provide during work, where required, the construction and maintenance of filter berms and sediment traps upstream of these areas.

Contractor shall construct the filter berms and sediment traps, at the start of excavation and drainage works.

When the sediment traps are filled to 50%, sediments shall be removed and, when necessary, the filtering material shall be cleaned or replaced. In addition, a final cleaning shall be undertaken prior to extended temporary site closure and at the end of the work. Preventive cleaning shall also be performed when a weather warning forecasts heavy rainfall or successive days of rain. Sediments shall be managed according to the applicable regulations in force. When the Parks Canada Representative requests cleaning to be performed, Contractor shall do so within 24 hours.

- A filter berm unit consists of three (3) berms: the first, downstream, shall be constructed with stone chips of a minimum caliber of 20-300 mm, containing no more than 5% of fine particles passing through an 80- μ m sieve.

Preliminary positions shall be indicated on the Environmental Protection Plan so that the Parks Canada Representative can validate position and quantity.

1.8.4 Straw Bale Barriers

Contractor shall install straw bale barriers between sectors and across drainage ditches or sewer system to limit sediment emitted into the municipal system or ditches. Straw bales shall be tightly bound and anchored in a trench 100 mm deep, ensuring it is well embedded in it. The anchoring stakes (two per bale) shall be inserted through the straw bale and into the soil. Stakes shall be flush with the top of the bale to prevent workers from being injured.

Bales shall be securely anchored and any damaged bales shall be replaced within twenty-four (24) hours at the Contractor's expense.

Preliminary locations of straw bales shall be indicated on the Environmental Protection Plan so that the Parks Canada Representative can validate the positions and quantities prior to start of work.

1.8.5 Geotextile Membrane Barrier

In order to limit migration of sediment off-site, Contractor shall install geotextile sediment barriers during excavation where required by Parks Canada Representative to prevent sediment from migrating into waterways and ditches. Barrier height shall be 1000 mm. Contractor shall secure the barrier in a trench that is 150 mm wide by 150 mm deep. Contractor shall bury the membrane in the trench and secure it by completely backfilling the trench.

Geotextile membrane shall be Type V (Type V: see MTQ 13101 standard, Table 13101-1). Geotextile barriers shall remain in place and operational until the end of the work. Geotextile shall be taut. Bottom of geotextile shall follow the topography and be firmly held against the ground.

Preliminary locations of geotextile membrane barriers shall be indicated on the Environmental Protection Plan so that the Parks Canada Representative can validate positions and quantities prior to start of work.

1.8.6 Temporary Sediment and Filtration Basins

Contractor shall install temporary sedimentation and/or filtration basins, as soon as work such as drainage, excavation or cleaning begins, in order to avoid sediment from migrating into waterways and ditches.

Water resulting from drying excavations, cleaning and coffer dams shall be discharged to a sedimentation and/or filtration basin, in accordance with the following requirements:

- Sedimentation or filtration tank shall be designed to allow settling and/or to filter the water, depending on the flow to receive and discharge.
- Filtration system shall be adapted to retain sediments.
- Sedimentation basin shall be cleaned when it reaches 50% capacity; preventive cleaning shall also be performed when a weather warning forecasts heavy rainfall or successive days of rain.
- In places where there is a risk of erosion, soil shall be stabilized; if necessary, a pipe, geotextile or rip-rap shall be installed.
- Dismantle temporary sedimentation basins upon completion of work; restore area they occupied.

Preliminary locations of sedimentation or filtration basins shall be indicated on the Environmental Protection Plan so that the Parks Canada Representative can validate positions prior to start of work.

1.9 Cofferdams

Contractor shall determine the type of coffer dam or temporary structure needed, as well as the construction and demolition methods, according to the characteristics of soil encountered and waterways, to ensure environment is not polluted.

1.9.1 Material Selection

Cofferdam materials shall be clean and exempt of any fine materials. Cofferdams built using fine materials (e.g.: clay) are not acceptable, even if the fine materials are contained within a geotextile membrane.

When constructing a coffer dam, embankment base shall be composed of cement blocks placed on a waterproof geotextile membrane. When granular material is used, stones shall not contain any fine particles and shall be placed on a geotextile membrane up to a height of 0.5 metres above normal water level.

1.9.2 Height of Temporary Structures

In order to assess the height of the structures, Contractor shall be able to specify, to the Parks Canada Representative, the probable water levels on the work site. To do so, Contractor shall use existing data or contact the relevant waterway management authorities. Temporary structures (coffer dams, dikes, etc.) shall be designed to protect against a 2-year flood occurrence with an additional height of at least 300 mm for protection.

1.9.3 Excavation Materials and Sediments

Excavated materials shall be stored on the coffer dams and in waterproof fabric (waterproof tarpaulin that also captures stormwater), or outside of the riparian strip.

1.9.4 Pumped Water

If the construction site is isolated by a coffer dam and it is necessary to pump seepage water, the seepage water shall be discharged into a sedimentation basin or revegetation area. Contractor shall also undertake whatever measures necessary to ensure that coffer dam dewatering water discharged into the waterways does not release plumes of suspended materials or increase the waterways' natural turbidity (as compared to the content upstream from the work site). Pumped water discharged into the waterways shall contain less than 25 mg/L of suspended solids (SS).

The Contractor shall provide, on the work site, a second pump to ensure that the pumping continues in case of breakage, especially for work at the site of Culvert km 18.44 on Route Promenade.

Fish caught in the coffer dams shall be released into the waterway as soon they can be caught with a net. Use a screen with a mesh size no larger than 1 cm at the pumping hose inlet in order to prevent entraining fish. Contractor shall follow the "Freshwater Intake End-of-Pipe Fish Screen Guideline" issued by Fisheries and Oceans Canada.

1.9.5 Floating Turbidity Silt Curtains

In order to limit migration of fine particles into waterways, Contractor shall use floating turbidity silt curtains or other effective device to prevent dispersion of turbid water caused by the works. Curtain filtration opening shall be no more than 60 microns. Prior to installation, determine curtain location in corroboration with Parks Canada Representative. Curtain shall be installed so as to ensure free movement of water is not prevented for more than 48 hours, i.e. so as not to create a partial blockage of waterway flow.

1.9.6 Installation and Removal Method

Regardless of the method that the Contractor selects, work shall be performed in accordance with the stipulations set forth in article 10.4 of the CCDG.

Install a geotextile membrane where required to ensure waterproofing.

If Contractor uses sheet piles, they shall be driven using a vibrating hydraulic pile driver rather than a traditional driving technique.

Membrane shall be replaced as necessary during work and removed at the end of work, carefully picking up all accumulated sediment, preventing it from becoming re-suspended.

At the end of the work, structures shall be completely removed to restore waterway to its original cross-section, grade characteristics and profile. During dismantling, no sediment or waste shall be suspended in the waterway. Materials used to construct these structures shall be disposed of in accordance with requirements set forth in the CCDG. No coffer dams may be in the waterway during spring freshet.

1.10 Machinery Traffic, Fuel Equipment and Maintenance

1.10.1 Work Site Traffic

Machinery shall be clean and free of any oil leaks when operating in or in the vicinity of a waterway.

Heavy machinery shall only circulate in the areas where earthwork is planned. Heavy machinery may not circulate outside of the earthwork areas (excavation and backfill) at any time.

Contractor shall avoid using heavy machinery in areas susceptible to surface erosion or landslides. To that end, Contractor shall pay special attention to shoreline and banks, preventing all traffic less than 20 m from the natural high water mark. No machinery shall cross the waterway by circulating on the shoreline.

Contractor shall not allow any machinery inside coffer dams or on floating equipment when the work site is shut down for the night, on weekends, or when it is shut down for extended periods of time.

1.10.2 Machinery Maintenance

Petroleum products, including but not limited to, gasoline, diesel, lubricating oils and grease required for Contractor's operations shall not be stored on the site without authorization from the Parks Canada Representative.

General maintenance, fueling, lubricating, equipment and material cleaning and storage, as well as storage of oil or hazardous products shall be in locations where there is no risk of the hydrous environment being contaminated, and at a distance of at least 20 metres from the top of stream embankments, ditches or wetlands. If it is physically impossible to comply with this distance and with the approval of the Parks Canada Representative, a confined enclosure on absorbent pad shall be created for performing these activities. (The enclosure shall be approved by the Parks Canada Representative.) If necessary, the fuel tanks shall be installed on a waterproof structure with minimum volume equivalent to 150% of the tank capacity to ensure a margin of safety.

All tanks storing petroleum products on the site shall have a double wall (with supporting data sheets). Tanks used shall comply and meet the applicable standards. Tank openings and pumps shall be locked at all times.

Transport vehicles and construction machinery shall be maintained in proper operating condition in order to prevent oil, fuel or other pollutants from leaking and to minimize gaseous emissions and noise.

The Contractor shall prohibit any mobile equipment (e.g.: cranes, elevators, trucks or other) with a hydrocarbon leak (fuel, engine oil or hydraulic oil) from accessing the site. If necessary, equipment shall be repaired in a workshop or service area designated for this purpose before being readmitted to the site. In addition, the Contractor shall supervise fueling of all off-road vehicles on site.

The exhaust system on any vehicle or equipment used in construction shall be maintained in good condition so as not to disturb residents unnecessarily.

The Contractor shall avoid allowing engines to idle unnecessarily, in order to decrease environmental disturbance caused by exhaust gases, smoke, dust or other nuisance. It shall also comply with Mauricie National Park regulations regarding nuisances caused by motor vehicles.

Contractor shall ensure that the emission control systems on vehicles and equipment are operational and comply with regulations relating to air quality.

When transporting materials containing fine particles, tarpaulins shall be securely attached to cover them.

1.11 Accidental Petroleum Product Spills

Contractor shall inform Urgence Environnement and Environment Canada of any accident or spill that could impact the environment. Telephone numbers shall be posted in the site trailer.

ENVIRONMENTAL EMERGENCY

Phone: (866) 694-5454, toll free, 24 hours/day

NATIONAL ENVIRONMENTAL EMERGENCIES CENTER ENVIRONMENT CANADA

Phone: (866) 283-2333, 24 hours/day

Contractor shall keep emergency kits on-site at all times for recovery of petroleum products. The kit shall include enough absorbent rolls to allow confinement of the petroleum products within the perimeter of the machinery in question by building a containment boom. A kit shall be present and available in the vicinity of every waterway and piece of machinery, and shall be readily accessible at all times for quick response. When necessary, a kit shall be accessible on each waterway bank.

This emergency response kit must at least contain, but is not limited to, appropriate equipment and supplies necessary to contain all types of spills so as to minimize risks of contamination spreading due to spilled hydrocarbons, hazardous products or other type of contaminants. This response kit shall be labelled EMERGENCY - ENVIRONMENT and contain:

- One absorbent sock, 3 inches in diameter, 12 feet in length
- One absorbent sock, 3 inches in diameter, 4 feet in length

- Twenty-five absorbent pads
- Two 7-litre absorbent bags (sphagnum moss type)
- One epoxy stick
- Two DANGER signs
- Three plastic collection bags
- TDG self-adhesive stickers (transportation of dangerous goods), class 4.1
- One permanent marker
- Two pairs of rubber gloves
- Two pairs of safety glasses
- Duct tape
- A few tools: cutting pliers and screwdrivers
- Environmental Incident Report declaration forms, supplied by Parks Canada Representative.

1.12 *Pollution Prevention*

Contractor shall maintain temporary erosion and pollution control facilities implemented under this Contract. Contractor shall also control emissions from equipment and plant in accordance with local authorities' emission requirements and prevent sandblasting residue and other extraneous materials from contaminating air and waterways beyond application area.

To this end, Contractor shall include in its Environmental Protection Plan, the measures that will be implemented to manage dust emissions from the site, including dust from construction activities and equipment. Contractor shall be responsible for dust control on the work site throughout the term of this Contract, in areas where materials are stockpiled on site as well as roads providing site access during working hours.

Contractor shall implement the following mitigation measures for dust control:

- Provide temporary enclosures where indicated as directed by Parks Canada Representative.
- Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.13 Noise Protection

Contractor shall control noise level during construction phase by applying the following relevant measures:

- Compliance with Mauricie National Park's regulations regarding hauling materials and using machinery
- Keeping heavy equipment and machinery in good working order (adequate mufflers, regular maintenance, etc.) in order to maintain the lowest possible noise level
- Turning off any motorized machinery when not in use for a certain period of time (e.g.: lunch breaks, etc.)
- Keeping stationary equipment in places far from areas that are sensitive to noise, in order to decrease the impact on ambient sound level
- Contractor shall use noise mitigation devices installed on certain equipment (e.g.: closing the lateral panels on compressors, etc.)

1.14 Notification of Non-compliances and Penalties

The Parks Canada Representative shall notify Contractor in writing of any observed non-compliance with federal, provincial or municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection Plan.

Contractor: After receipt of such notice, inform Parks Canada Representative of proposed corrective actions and then implement those actions upon receipt of approval from Parks Canada Representative.

- Do not take action unless written approval of proposed corrective actions has been received from Parks Canada Representative.

Parks Canada Representative shall issue suspension of work order until satisfactory corrective actions have been implemented. No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Furthermore, when Parks Canada Representative deems that there has been a migration of sediment from construction site, a permanent withholding in the amount of one thousand dollars (\$1000) per day of infraction shall be applied as liquidated damages and interest.

Following emission of notice of non-compliance, failure to comply with each of the articles in this document shall also be subject to a permanent withholding in the amount of one thousand dollars (\$1000) applicable as a penalty for each infraction, by simple findings of fact by the Parks Canada Representative. Any infraction not remedied the following day shall be subject to another withholding of the same amount; the same shall apply for each subsequent day until the anomaly is corrected.

1.15 Site Restoration

As work progresses, Contractor shall clean all work areas and all locations at its disposal. At the end of the Contract, Contractor shall return, in a condition satisfactory to the Parks Canada Representative, land and work site.

END OF SECTION

APPENDIX 1

Methods of Erosion Control

Methods of Erosion Control

Tableau 9.4-2

Grille d'application des principales méthodes de contrôle temporaire de l'érosion¹

Caractéristique \ Méthodes	Paille	Copeaux	Matelas antiérosif	Fossé de dérivation (crête)	Ballots de paille	Géotextile	Trappe à sédiments et berme filtrante	Bassin de sédimentation	Boudin de rétention sédimentaire
Pente douce				s. o.	s. o.	s. o.	s. o.	s. o.	
Pente raide			Canaux et rigoles		s. o.	s. o.	s. o.	s. o.	Si posé en bandes successives
Grande surface à stabiliser		Produits sur place par déchiqueteuse	s. o.		s. o.	s. o.	s. o.	s. o.	
Enlèvement requis à la suite de travaux de stabilisation permanente	s. o.	s. o.	s. o.	s. o.			Note ⁽²⁾	Note ⁽²⁾	Non, sauf à certaines conditions
Installé aux limites du chantier	s. o.	s. o.	s. o.				s. o.	s. o.	
Installé au début des travaux de terrassement	s. o.	s. o.	s. o.						
Installé dans les fossés de drainage	s. o.	s. o.	s. o.	s. o.		s. o.			Si pente et vitesse d'écoulement faibles
Installé près des cours d'eau et nappes d'eau				s. o.					
Installé où les eaux de drainage quittent le chantier	s. o.	s. o.	s. o.	s. o.		s. o.			

1. Le choix se fait également selon les disponibilités locales.

2. Peuvent être laissés en place.

Recommandé
 Acceptable
 s. o.
 Sans objet

Ref.: Tome II "Construction routière" des Normes du Ministère des Transports du Québec (Tome II, "Road Construction", Ministère des Transport du Québec's Standards)

APPENDIX 2

**Installation of Water Control
and Soil Protection Measures**

APPENDIX 2

Installation of Water Control and Soil Protection Measures

(Ref.: Tome II "Construction routière" des Normes du Ministère des Transports du Québec
 (Tome II, "Road Construction", Ministère des Transport du Québec's Standards))

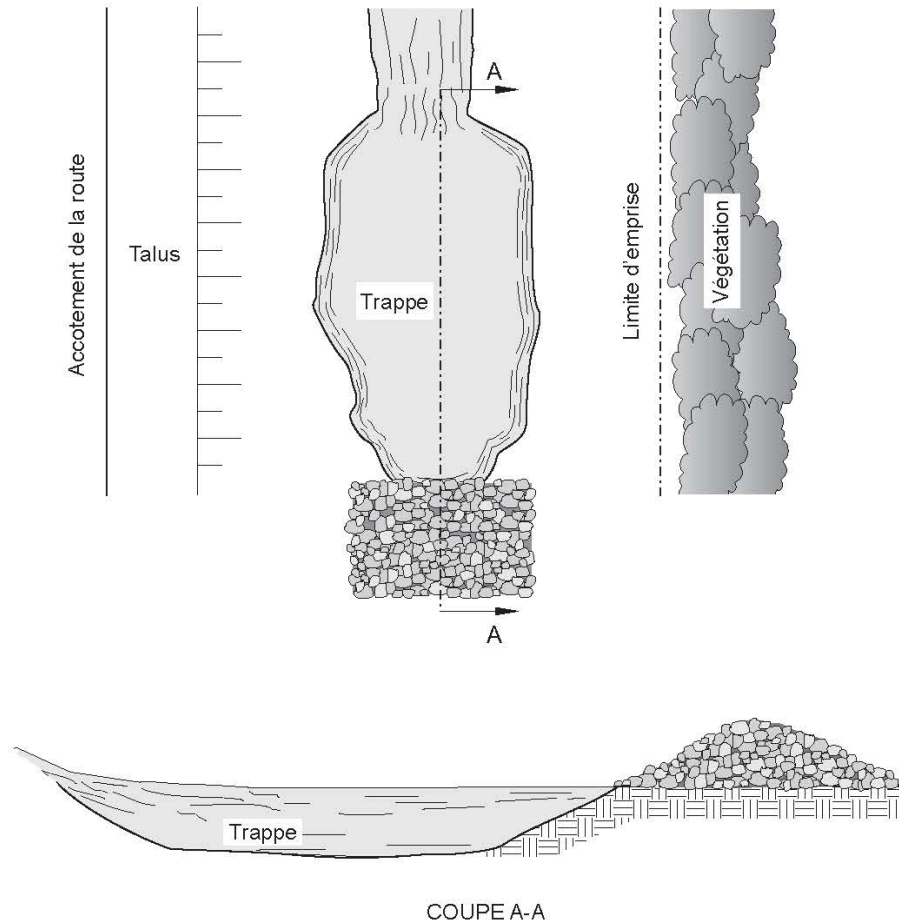


Figure 9.4-3
Trappe à sédiments et berme filtrante érigées dans un fossé routier

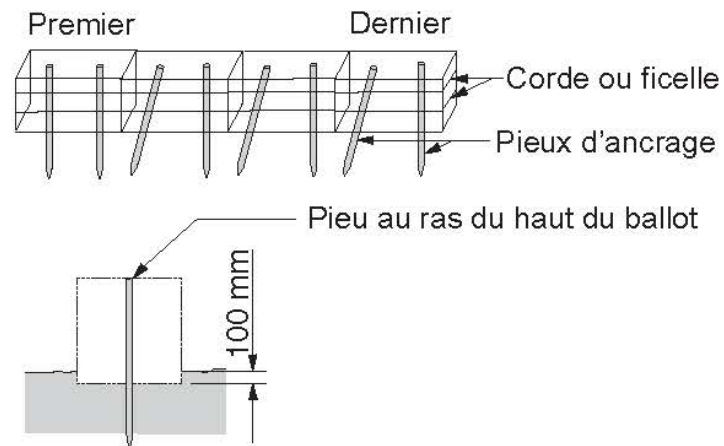
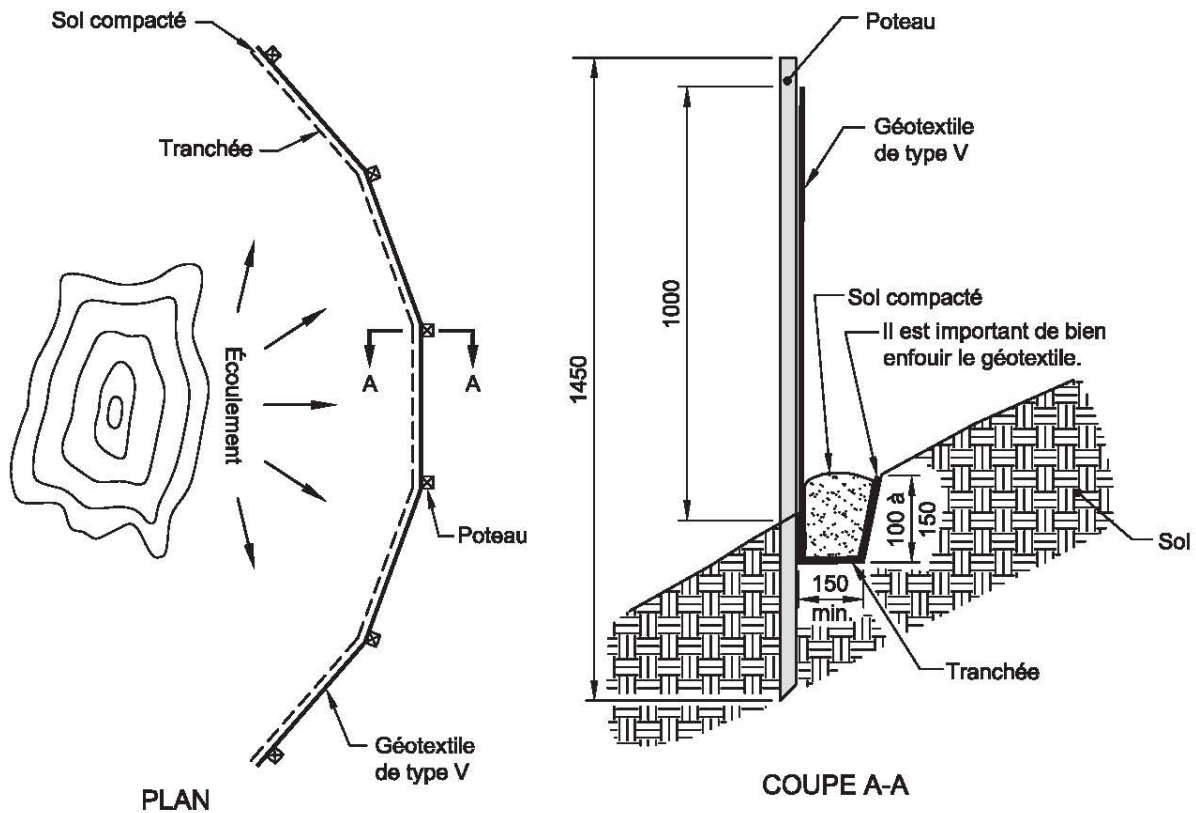


Figure 9.4-1
**Exemple d'ancrage de ballots de paille pour
 disposition en série**

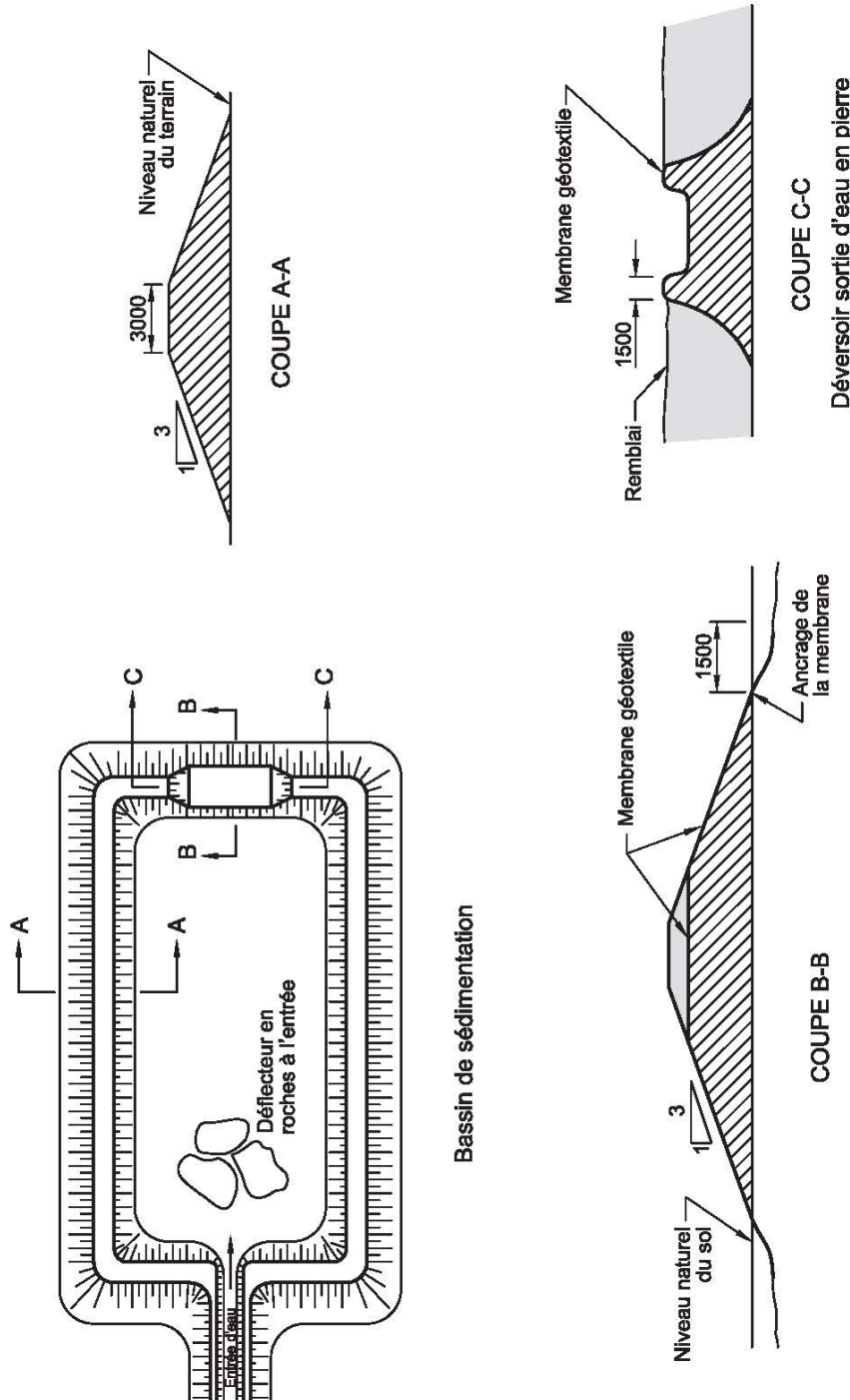


Note :

– les cotes sont en millimètres.

Figure 9.4-2

Installation d'une barrière munie d'un géotextile



Bassin de sédimentation

Notes :

- cet ouvrage doit être planifié et prévu dans les plans et devis;
- l'emprise nécessaire à son installation doit être prévue et acquise à cette fin, le cas échéant;
- les cotes sont en millimètres.

Figure 9.4-4

Bassin de sédimentation

CONSTRUCTION FACILITIES

Section 01 52 00

CONSTRUCTION FACILITIES

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
Mauricie National Park
V/REF.: 45353174

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1.0 GENERAL

1.1 *Action and Informational Submittals*

Submittals in accordance with Section 01 33 00 – Submittal Procedures.

1.2 *Installation and Removal*

Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

Identify areas that have to be gravelled to prevent tracking of mud.

Indicate use of supplemental or other staging areas.

Provide construction facilities in order to execute work expeditiously.

Remove all such equipment from site after use.

1.3 *Scaffolding*

Scaffolding in accordance with CAN/CSA-S269.2.

Provide and maintain scaffolding, access ramps, ladders, platforms and temporary stairs necessary for performance of work.

1.4 *Hoisting Equipment*

Provide, operate and maintain hoists required for moving workers, materials and equipment. Make financial arrangements with subcontractors for use of hoists.

Hoists and cranes to be operated by qualified operator.

1.5 *Onsite Storage / Allowable Loads*

Confine work to area within limits indicated in Contract Documents. Do not unreasonably encumber premises with materials and equipment.

Do not overload or permit overloading of any part of work, thereby compromising its integrity.

1.6 Construction Site Parking

Parking will be permitted on site, provided it does not disrupt performance of work, traffic or normal Parks Canada activities.

Within storage areas authorized by Parks Canada Representative, provide and maintain adequate access to project site.

Clean trails and traffic lanes where used by Contractor's equipment.

1.7 Safety Measures

Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.8 Offices

Provide ventilated office, heated to 22° C, lighted to 750 lx, of sufficient size to accommodate site meetings and equipped with drawing laydown table and at least eight (8) chairs.

Provide marked and fully stocked first-aid case in a readily available location.

Subcontractors to provide their own offices as necessary. Instruct them on where to locate their offices within storage and access areas as shown on the drawings.

Office for Parks Canada Representative and laboratory.

- Provide one (1) temporary office for Parks Canada Representative and laboratory.
- Inside dimensions minimum of 9 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with four (4) 50% opening windows and one lockable door.
- Insulate building and provide heating system to maintain indoor temperature of 22 degrees C when outdoor temperature is -20 degrees C.
- Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
- Install electrical lighting system to provide min 750 lx using shielded commercial fixtures with 10% upward light component.
- Provide private washroom facilities adjacent to office complete with one (1) flush or chemical-type toilet, one (1) lavatory and one (1) mirror, and maintain supply of paper towels and toilet tissue.
- Equip office with one (1) 1 x 2 m table, eight (8) chairs, 6 m of shelving 300 mm wide, one (1) three-(3) drawer filing cabinet, one (1) plan rack and one (1) coat rack and shelf.

- Keep premises in sanitary condition.
- Provide one (1) photocopier that can scan, copy and send documents electronically up to 11" x 17" in size.
- Provide internet service in the office and pay for all costs.

1.9 *Equipment, Tool and Materials Storage*

Provide and maintain, in clean and orderly condition, lockable and weatherproof sheds for storing tools, equipment and materials.

Materials not required to be stored in weatherproof sheds shall be stored on site in manner to cause least interference with work activities.

Storage areas located outside the site limits shall be authorized by Parks Canada Representative at least two (2) weeks before the delivery date.

1.10 *Sanitary Facilities*

Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 *Construction Signage*

Provide and erect one project sign per structure, within two (2) weeks of signing Contract, in the locations designated by Parks Canada Representative.

Construction sign 1.2 m x 2.4 m, with wood frame and plywood construction, painted with exhibit lettering produced by a professional sign painter.

Indicate on sign: Project title, name of Owner, Parks Canada Representative and Contractor; the design style used shall be approved by Parks Canada Representative.

No other signs or advertisements, other than road warning signage and those described in the previous paragraphs are permitted on site.

1.12 *Protection and Maintenance of Traffic*

Provide access and temporary relocated roads as necessary to maintain traffic.

Maintain and protect traffic on municipal roads located near the work zone, except as otherwise specifically directed by Parks Canada Representative.

Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

Protect travelling public from damage to person and property.

Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic. Contractor is responsible for damages caused by rolling stock to trails, paths and traffic lanes. Contractor shall assume all costs for resurfacing damaged areas.

Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for temporary shoring of structures located along the delivery route within the park's limits. Contractor: Responsible for repair of damage to roads caused by construction work.

Construct necessary access and haul roads.

Haul roads and work platforms: Constructed with suitable grades and widths for rolling equipment to be used; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

Dust control: Adequate to ensure safe operation at all times.

Location, grade, width, and alignment of construction and hauling roads: subject to approval by Parks Canada Representative.

Lighting: To ensure full and clear visibility for full width of haul road and work areas during evening and night work shifts.

Provide snow removal during work period.

Once work has been completed, dismantle work platforms, access roads and haul roads and return all areas used during work to their original state. Provide landscaping and renaturalization.

1.13 Clean Up

Remove construction debris, waste materials, and packaging material from work site daily in compliance with Section 01 78 00 - "Clean Up".

Clean dirt or mud tracked onto paved or surfaced roadways.

Store materials resulting from demolition activities that are salvageable.

New or salvaged material not to be stored in construction facilities.

1.14 Temporary Power

Contractor shall provide temporary power required to execute work. Contractor shall be responsible for connection fees, provision and maintaining in good running order of generators and temporary distribution grid.

2.0 EXECUTION

2.1 Temporary Erosion and Sedimentation Control

Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust. These means shall be compliant with the provisions set forth in the requirements of section 01 35 43 – Environmental Protection.

Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

CLEAN UP

Section 01 74 11

CLEAN UP

Preparation of Drawings and Specifications for
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1.0 GENERAL

1.1 *Related Requirements*

Not Used.

1.2 *References*

Not Used.

1.3 *Construction Site Cleanliness*

Maintain Work in tidy condition, free from accumulation of waste products and debris.

Remove waste materials from site at daily regularly-scheduled times or dispose of as directed by Parks Canada Representative. Do not burn waste materials on site.

Keep site access roads free of ice and snow. Pile/stockpile snow in designated areas only.

Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

Provide on-site containers for collection of waste materials and debris generated by the works.

Provide and use marked separate bins for recycling.

Dispose of waste materials and debris at designated dumping areas.

Store volatile waste in covered metal containers, and remove from premises at end of each work shift.

1.4 Final Cleaning

Upon substantial completion of work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.

Remove waste products and debris, and leave premises clean and suitable for occupancy.

Prior to final inspection, remove surplus products, tools, construction machinery and equipment.

Remove waste materials from site at daily, regularly-scheduled times or dispose of as directed by Parks Canada Representative. Do not burn waste materials on site.

Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

Sweep and clean sidewalks and roadways.

Remove snow and ice from site access roads.

Restore all premises used to original condition. Provide landscaping and renaturalization when required.

END OF SECTION

**CLOSEOUT
SUBMITTALS**

Section 01 78 00

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1.0 GENERAL**1.1 *Related Requirements***

Section 03 10 00	Concrete Forming and Accessories
Section 03 20 00	Concrete Reinforcing
Section 03 30 00	Cast-in-Place Concrete
Section 05 12 33	Structural Steel for Bridges
Section 06 10 00	Rough Carpentry
Section 33 42 13	Pipes for Culverts

1.2 *Administrative Terms and Conditions*

Pre-warranty Meeting:

- Convene meeting one (1) week prior to contract completion with Contractor's representative and Parks Canada Representative in accordance with Section 01 31 19 - Project Meetings to:
 - Verify Work requirements;
 - Work to be corrected;
 - Work to be completed.
- Parks Canada Representative to establish communication procedures for:
 - Notifying construction warranty defects;
 - Determining priorities for type of defects;
 - Determining reasonable response time.
- Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
- Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.3 Action and Informational Submittals

Submittals in accordance with Section "01 33 00 – Submittal Procedures".

Submit "as-built" drawings showing all modifications made during the work. Modifications shall be written directly on drawings.

Provide evidence, if requested, for type, source and quality of products supplied.

1.4 Presentation

- Arrange content by material under Section numbers and sequence of Table of Contents.
- Provide tabbed fly leaf for each separate material with typed description of the material.
- Text: manufacturer's printed data, or typewritten data.
- Drawings: provide with reinforced punched binder tab.
 - Bind in with text; fold larger drawings to size of text pages.
- Provide files in .pdf format
- Provide 1:1 scaled CAD files in .dwg format on CD.

1.5 Contents - Project Record Documents

Table of Contents for Each Volume: provide title of project

- Date of submission
- Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
- Schedule of products and systems, indexed to content of volume.

For each material, indicate the following:

- List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

Typewritten Text: as required to supplement product data.

- Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.6 *As-Built Documents and Samples*

Keep as set of the following documents onsite for use by Parks Canada Representative:

- Contract drawings, specifications and addenda
- Change Orders and other modifications to Contract
- Reviewed shop drawings, product data, and samples
- Field test records
- Inspection certificates
- Manufacturer's certificates

Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document, "Project Record" in printed letters.

Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

Keep record documents and samples available for inspection by Parks Canada Representative.

1.7 *Recording Information on Project Record Documents*

Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Parks Canada Representative.

Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

Contract drawings and shop drawings: Mark each item to record actual construction, including:

- Level and alignment of existing conduits
- Level and alignment of inserted conduits
- All other construction details that are different than those shown in the drawings
- Field changes of dimension and detail
- Changes made by change orders
- Details not on original contract documents
- References to related shop drawings and modifications.

Specifications: Mark each item to record actual construction, including:

- Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- Changes made by Addenda and change orders.

Other documents: Maintain manufacturer's certifications, inspection certifications, and field test records, required by individual specifications sections.

Provide digital photos, if requested, for site records.

1.8 *Equipment and Systems*

For each item of equipment and each system include description of unit or system, and component parts.

- Give function, normal operation characteristics and limiting conditions.
- Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

Additional requirements: as specified in individual specifications sections.

1.9 *Materials and Finishes*

Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

Additional requirements: as specified in individual specifications sections.

1.10 *Delivery, Storage, and Handling*

Store materials, equipment and special tools in manner to prevent damage or deterioration.

Store in original and undamaged packaging with manufacturer's seal and labels intact.

Store components subject to damage from weather in weatherproof enclosures.

Store freezable materials in a heated and ventilated room.

Remove and replace damaged or deteriorated products at own expense and submit for review by Parks Canada Representative.

END OF SECTION

SELECTIVE SITE DEMOLITION

Section 02 41 13

SELECTIVE SITE DEMOLITION

Preparation of Drawings and Specifications for
Section 02 41 13

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SELECTIVE SITE DEMOLITION

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1.0 GENERAL

1.1 *Section Content*

Methods and procedures for demolishing, salvaging, recycling and removing sitework structures designated to be removed in whole or in part, and for backfilling resulting trenches and excavations.

1.2 *Related Requirements*

Section 32 11 00	Roadworks
Section 31 22 13	Rough Grading

1.3 *Measurement for Payment*

Demolition of the elements in this section shall be paid in a lump sum, including the following activities according to the pay items tables for the various structures:

- Removal of asphaltic concrete pavement for each thickness specified
- Clearing and grubbing where required
- Removal of existing guardrail on approaches
- Removal of pre-fabricated curbing
- Payment for salvage, stockpiling, disposal, recycling, excavating, backfilling and restoration shall be included in above selective demolition work items.

1.4 *References*

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG)

Canadian Council of Ministers of the Environment (CCME)

- PN1327, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products

Department of Justice Canada (Jus).

- Canadian Environmental Assessment Act (CEAA), 1997, c. 37
- Canadian Environmental Protection Act (CEPA), 199, c. 33

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1.5 **Clearing and Grubbing**

Definitions

- Clearing consists in cutting trees and brush to not more than specified height above grade, and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- Clearing isolated trees consists in cutting designated trees to not more than specified height above grade and disposing of felled trees and debris.
- Underbrush clearing consists in removing undergrowth, deadwood, and trees with trunk diameter smaller than 50 mm from treed areas and disposing of fallen timber and surface debris.
- Grubbing consists in excavating and disposing of stumps, roots, boulders and rock fragments of specified size to not less than specified depth below existing ground surface.

Storage and Protection

- Prevent damage to fencing, wooden stairways and footbridge, trees, landscaping, natural features, bench marks, utility lines, water courses and root systems of trees that are to remain.
- Repair damaged items to approval of Parks Canada Representative, at no cost.
- Replace trees designated to remain, if damaged, as directed by Parks Canada Representative.

1.6 **Action Submittals**

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Shop Drawings

- Drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning, shall be submitted for approval where required by authorities having jurisdiction.

Hazardous Materials

- Provide description of Hazardous Materials and Notification of Filing with authorities having jurisdiction prior to beginning of Work.

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1.7 **Selective Site Demolition**

Quality Assurance

- Regulatory requirements: Ensure work is performed in compliance with CEPA, CEEA, TDGA, and applicable Provincial/Territorial regulations.
- Comply with professional construction occupational health and safety regulations.

Delivery, Storage, and Handling

- Store and manage hazardous materials in accordance with Section 01 35 43 - Environmental Procedures.
- Storage and Protection
 - Protect existing structures designated to remain and structures designated for salvage. In event of damage to such structures, immediately replace or make repairs to approval of Parks Canada Representative.
 - Remove and store materials to be salvaged, in manner to prevent damage.
 - Store and protect in accordance with requirements for maximum preservation of material.
 - Handle salvaged materials as new materials.

FIELD CONDITIONS

Environmental Requirements

- Perform work in accordance with Section 01 35 43 - Environmental Procedures.
- Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- Do not dispose of waste containing volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - Ensure proper disposal procedures of such waste are maintained throughout the project.
- Do not pump water containing suspended materials into watercourses.
- Control disposal of water containing suspended materials or other harmful substances as directed by Parks Canada Representative.
- Protect trees, plants and foliage on site and adjacent properties where indicated.

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Existing Conditions

- Prior to start of demolition work, remove contaminated or hazardous materials from site and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.
- Before beginning to excavate, ensure underground pipes have been located.

2.0 PRODUCTS

2.1 *Selective Site Demolition*

Equipment

- Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2.2 *Clearing and Grubbing*

Waste Site

- Contractor shall provide address of site where waste from clearing and grubbing is disposed. Site shall comply with directives set forth in the Soil Protection and Contaminated Sites Rehabilitation Policy issued by the Ministère du Développement durable, Environnement et Lutte contre les changements (MDDELCC).

3.0 EXECUTION

Preparation

- Inspect site and verify items designated to remain with Parks Canada Representative.
- Locate and protect utility lines; preserve active utilities traversing site in operating condition.
- Notify Parks Canada Representative immediately of damage to utility lines or when unknown existing utility lines are encountered.
- When utility lines to be removed are encountered within area of operations, notify Parks Canada Representative in ample time to minimize interruption of service.
- Notify utility authorities before starting grubbing.
- Keep roads and sidewalks free of dirt and debris.

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Temporary Erosion and Sedimentation Control

- Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. These measures shall comply with requirements of local authorities having jurisdiction.
- Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.1 *Selective Site Demolition*

Removal of Hazardous Wastes

- Materials defined as contaminated or hazardous by authorities having jurisdiction in environmental protection shall be removed from site and disposed of in safe manner; all necessary safety measures shall be taken so as to minimize hazards at site during removal and disposal.

Removal

- Remove specified structures as indicated.
- Do not disturb structures designated to remain in place.
 - Removal of Pavement, Curb and Gutters
 - Square up adjacent surfaces to remain in place by saw cutting or other method approved by Parks Canada Representative.
 - Protect granular materials beneath and adjacent to excavation works.
- During demolition, remove any trees that hinder works.
- Obtain written approval from Parks Canada Representative prior to removal of trees that were not designated for removal.

Disposal of Material

- Dispose of materials not designated for salvage or reuse on site as instructed by Parks Canada Representative at authorized facilities approved in Waste Reduction Workplan.
- Trim disposal areas to approval of Parks Canada Representative.

Stockpiling

- Label stockpiles, indicating material type and quantity.
- Designate appropriate security resources / measures to prevent vandalism, damage and theft.
- Stockpile materials designated for alternate disposal in location that facilitates removal from site and examination by potential end markets, and does not impede disassembly, processing, or hauling procedures.

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Restoration

- Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

Clean Up

- Remove debris, trim surfaces and leave work site clean upon completion of work.

END OF SECTION

ASPHALT PAVING REMOVAL

Section 02 41 13.14

ASPHALT PAVING REMOVAL

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1.0 GENERAL

1.1 *Measurement for Payment*

The various elements addressed in this section shall be paid by lump sum according to the terms set forth in Section 02 41 13 - Selective Site Demolition.

Removal of asphalt pavement includes performing saw cuts to outline the areas to demolish, equipment and labour to remove the pavement, as well as hauling and disposing of the materials off-site at a site authorized by the Ministère du Développement durable, Environnement et Lutte contre les changements climatiques (MDDELCC).

1.2 *References*

Ministère des Transports du Québec:

- Cahier des charges et devis généraux du Ministère des Transports du Québec (CCDG)
- Cahiers des normes, ouvrages routier, Tome II "Construction Routière", dernière édition. (Book of Standards – Road Structures, Tome II, "Road Construction", most recent edition)

2.0 PRODUCTS

2.1 *Equipment*

Use cold milling, grading or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated.

3.0 EXECUTION

3.1 *Preparation*

Prior to beginning removal operation, inspect and verify areas, depths and lines of asphalt pavement to be removed with Parks Canada Representative.

Contractor shall perform a saw cut along the perimeter of area to be demolished, in accordance with the drawings, ensuring that no bridge deck or other structure is damaged in the process. Saw cuts shall be straight.

Protect existing pavement not designated for removal, light units and structures from damage. In event of damage, Contractor shall immediately replace or make repairs to approval of Parks Canada Representative at no additional cost.

Temporary erosion and sedimentation control:

- Use temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust on roadways and adjacent walkways, in accordance with requirements of authorities having jurisdiction.
- Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation is established.
- Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 Removal

Remove existing asphalt pavement to lines and grades as indicated or established by Parks Canada Representative in field.

Equipment used to remove the asphalt pavement shall not decrease concrete cover on reinforcement materials or damage the slab or other structural elements.

Remove asphalt pavement using hand tools in areas mechanical equipment cannot reach, such as concrete shoulders, deck joints, drains, catch basins and manholes, or in locations where there is a risk of damaging elements on the surface of the slab.

After asphalt pavement has been removed and deteriorated surfaces have been repaired, Contractor shall completely clean the surface of the slab using compressed air to remove any traces of the waterproofing membrane, asphalt pavement, disintegrated concrete and other debris

Use equipment and methods of removal and hauling that do not damage or disturb underlying pavement.

Prevent removed asphalt pavement from becoming contaminated by topsoil, underlying gravel or other materials.

Control and eliminate dust generated by removal process.

3.3 Finish Tolerances

Finished surfaces in areas where asphalt pavement has been removed to be within +/-5 mm of grade specified, but not uniformly high or low.

ASPHALT PAVING REMOVAL

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3.4 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up. Leave work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Clean Up.

Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand sweeping as required.

END OF SECTION

STRUCTURE DEMOLITION

Section 02 41 16

STRUCTURE DEMOLITION

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1.0 GENERAL**1.1 Related Requirements**

This section addresses work that may be performed in conjunction with the following sections:

Section 03 10 00	Concrete Formwork
Section 03 20 00	Concrete Reinforcing
Section 33 00 00	Cast-in-Place Concrete
Section 05 12 23	Structural Steel for Bridges
Section 06 10 00	Rough Carpentry

1.2 Measurement for Payment

Include materials and work required under this section in lump sum amount tendered for the « Demolition » packages. This lump sum amount shall include the following:

- Supply of temporary shoring drawings and structure demolition methods;
- Protective measures to prevent debris from falling in waterways;
- Execution and transportation of waste off-site for all complete and partial demolition work;
- Works of section 02 41 13.14 – Asphalt Pavement Removal.

1.3 References

Ministère des Transports du Québec:

- Cahier des charges et devis généraux (CCDG)

Canadian Environmental Protection Act, 1999 (CEPA):

- Forest Act (CQLR, chapter F-4.1) and its regulations, the Regulation Respecting Standards of Forest Management for Forests in the Domain of the State.

CSA International:

- CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

Department of Justice Canada (Jus).

- Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
- Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
- SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
- Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.4 Definitions

Hazardous materials: Hazardous substances, goods, commodities and products include but are not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

Complete demolition: Demolish in its entirety an existing structure or a part of an existing structure. For example, in the case of a slab on girders, demolish the slab entirely in order to rebuild it.

Partial demolition: Demolish a portion of a component in order to repair it. For example, in the case of a slab on girders, demolish half of the thickness of the slab, down to sound concrete in order to concrete just that portion of the slab.

1.5 Administrative Terms and Conditions

Pre-demolition Meetings

- Convene pre-demolition meeting with Contractor's Representative and Parks Canada Representative one week before beginning work for this section in accordance with Section 01 31 19 - Project Meetings, to:
 - Verify Work requirements
 - Verify existing site conditions adjacent to demolition work
 - Co-ordinate work with other subtrades.
 - Environmental protection measures.

Hold project meetings every week.

Ensure Parks Canada Representative, Contractor's Project Manager and Subcontractors' representatives attend.

- Parks Canada Representative shall provide written notification at least 24 hours prior to scheduled meeting to all those involved regarding any change to the meeting schedule established upon contract award.

Scheduling

- Employ necessary means to meet project time lines.
- Inform Parks Canada Representative in writing of any unforeseen delays.

1.6 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

At least seven (7) days prior to starting work, provide a demolition plan. Include the following:

- Drawings, diagrams or details showing sequence of demolition work, structure shoring and underpinning, when required, as well as the components and equipment used to perform the work.
- Submit plan stamped and signed by a professional engineer who is registered or licensed in the province of Quebec, Canada.

1.7 Application Requirements

Environmental protection:

- Ensure work is done in accordance with Section 01 35 43 - Environmental Procedures.
- Ensure work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- Fires and burning of waste or materials is not permitted on site.
- Do not bury refuse or waste materials.
- Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into waterways, storm or sanitary sewers.
 - Ensure proper disposal procedures are maintained throughout project.

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- Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
- Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction or as directed by Parks Canada Representative.
- Protect trees, plants and foliage on site and adjacent properties where indicated.
- Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.8 Existing Conditions

If material resembling spray- or trowel-applied asbestos or other designated substance listed as hazardous is encountered in course of demolition, stop work, take preventive measures, and notify Parks Canada Representative immediately. Do not proceed until written instructions have been received from Parks Canada Representative.

Structures to be demolished are based on their condition on the date that tender is accepted.

Before starting demolition, Contractor shall create a photographic report of the premises with Parks Canada Representative to detect all existing damage and validate the state of existing structure sections to be preserved.

2.0 PRODUCTS

2.1 Equipment

Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

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Complete demolition:

- When replacing or eliminating a deck joint, Contractor shall use a manual compressed air hammer that weighs no more than 30 kg or a hydraulic ram with impact energy per blow that is less than 60 J and is mounted on a carrying vehicle that weighs less than 1000 kg for the joint shoulders and slab. However, for concrete above and below the lower layer of reinforcing steel in the slab located above the girders and diaphragms, Contractor shall use a manual compressed air hammer weighing no more than 7 kg. To demolish the upper part of the backwall that is less than 450 mm thick, Contractor shall demolish down to 100 mm of the concrete to be preserved using a manual compressed air hammer that weighs no more than 30 kg or a hydraulic ram with impact energy per blow that is less than 60 J and is mounted on a carrying vehicle that weighs less than 1000 kg. However, to demolish a backwall that is at least 450 mm thick, Contractor may demolish down to 100 mm of the concrete to be preserved using a hydraulic ram with impact energy per blow that is less than 200 J and is mounted on a carrying vehicle that weighs less than 1500 kg. A manual compressed air hammer weighing no more than 15 kg shall be used to finalize demolition down to the concrete to be preserved on the backwall. For demolition of steel components of a deck joint as well as those incorporated in a curb or sidewalk, Contractor may also use a hydraulic ram with impact energy per blow that is less than 200 J and is mounted on a carrying vehicle that weighs less than 1500 kg.
- For complete demolition of a deck, use of a hydraulic ram with impact energy per blow greater than 1000 J or a hydraulic ram that is mounted on a carrying vehicle that weighs more than 10,000 kg is prohibited.
- When demolition begins, Parks Canada Representative may request at any time that the capacity of authorized demolition equipment be reduced when he deems that the demolition work is causing damage to the reinforcing steel or concrete to be preserved.
- In the case of complete demolition of an engineering structure in a single work phase when no components are being preserved, the equipment characteristics shall be described in the demolition plan.

Partial demolition:

- When demolishing concrete above the first layer of reinforcing steel, Contractor shall use a manual compressed air hammer weighing no more than 15 kg for the girders, diaphragms, posts, seat blocks, pier caps, thick hollow slabs, and other thin and narrow components. For the other bridge components, Contractor shall use a manual compressed air hammer that weighs no more than 30 kg or a hydraulic ram with impact energy per blow that is less than 60 J and is mounted on a carrying vehicle that weighs less than 1000 kg.

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- When demolishing concrete above the first layer of reinforcing steel in the delaminated concrete areas or repairs without excessive thickness of parts of the flange, abutment, piers, walls or thick, solid slabs at least 450 mm thick, Contractor may use a hydraulic ram with impact energy per blow that is less than 200 J and is mounted on a carrying vehicle that weighs less than 1500 kg.
- When demolishing concrete above and below the first layer of reinforcing steel, Contractor shall use a manual compressed air hammer weighing no more than 7 kg for the girders, diaphragms, posts, seat blocks, pier caps, thick hollow slabs, and other thin or narrow components. For other bridge components, Contractor shall use a manual compressed air hammer that weighs no more than 15 kg. However, for demolition of concrete above and below the lower layer of reinforcing steel in the slab located above the girders and diaphragms, Contractor shall use a manual compressed air hammer weighing no more than 7 kg.
- When demolishing concrete located at a depth of more than 10 mm during a repair with formwork and finishing, Contractor shall use a high-pressure water jet (pressure 15 MPa, flow rate 20 L/min, with a round pinpoint nozzle, and a nozzle-to-concrete-surface distance of 150 to 200 mm). Water used shall comply with the Ministère des Transport du Québec's standard 3101 concerning mixing water.
- Hydro-demolition may also be used as another way to demolish any concrete, as long as it gives results comparable to those obtained with authorized compressed air hammers or hydraulic rams.
- When demolition begins, Parks Canada Representative may request at any time that the capacity of authorized demolition equipment be reduced when he deems that the demolition work is causing damage to the reinforcing steel or concrete to be preserved.
- The use of shear-type concrete breakers is not permitted.

3.0 EXECUTION**3.1 Preparation**

Protection of existing structures:

- Work in accordance with Section 01 35 43 - Environmental Procedures, Erosion and Sedimentation Control Plan and Stormwater Pollution Prevention Plan.

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- Prevent movement, settlement or damage of adjacent structures, services, paving, trees, landscaping, and adjacent grades.
 - Provide bracing and shoring as required.
 - Repair damage caused by demolition as directed by Parks Canada Representative.
- Support affected structures. If safety of structure being demolished, adjacent structures or services appears to be endangered, take preventive measures, stop work and immediately notify Parks Canada Representative.
- Prevent debris from blocking surface drainage system, which must remain in operation.

Surface preparation:

- Do not disrupt active or energized utilities traversing premises.

3.2 Demolition

Blasting operations not permitted during demolition.

Demolish the structures according to the requirements shown on the drawings.

Perform demolition work necessary to allow work shown.

Remove existing equipment, services, and obstacles where required for refinishing or restoration of existing surfaces, and replace as work progresses.

At end of each day's work, leave work in safe and stable condition.

Demolish in a way to minimize dusting. Keep materials wet as directed by Parks Canada Representative.

The areas to be demolished shall be outlined by a saw cut 20 mm in depth, perpendicular to the surface on all sides. Depth of saw cut shall be decreased as needed to prevent damaging reinforcement.

The saw cuts shall not meet; demolition of concrete near the points of intersection of two (2) saw cuts shall be done using a manual compressed air hammer weighing 7 kg.

Contractor shall take the necessary precautions to prevent damage to the concrete to be preserved and not bend, cut or damage the reinforcing bars to be preserved. Any bars damaged by the Contractor during the work shall be replaced at the latter's cost taking into account a minimum overlap length of 600 mm and including bar anchoring, when required.

STRUCTURE DEMOLITION

The width of the tip of the stem on demolition hammers shall not exceed the diameter of the stem.

Complete demolition:

- The Contractor shall not completely demolish an existing structure unless it is no longer required for general public traffic. If that is the case, temporary structures shall be constructed and operational before starting demolition work.
- Except for sidewalks, curbs, concrete guardrail and bike paths resting on a slab to be preserved, the Contractor shall provide Parks Canada Representative with the demolition plan that specifically includes the methods, equipment and demolition sequences planned by the Contractor to prevent compromising the structure's overall stability. The plan shall also state the means used to salvage demolition materials to prevent them from spilling into the waterways. The engineer who signed the demolition plan shall be present onsite at the time of the first work shift when demolition of the component covered by the plan begins. The same engineer or another engineer mandated by him shall be present on-site for the remainder of the demolition of the component covered by the plan.
- Use of a hydraulic ram is authorized only if the Contractor provides Parks Canada Representative with the technical data sheet for the ram certifying that the latter's technical characteristics comply with requirements.
- Use of more than one hydraulic hammer within a 5 m radius is prohibited when demolishing a deck slab.

Partial demolition:

- The Contractor shall provide Parks Canada Representative, at least seven (7) days before starting demolition, with a written procedure stating the means used to salvage the demolition materials to prevent them from spilling into the waterways.
- Any sections of ground cover on embankment slopes that hinder work shall be removed and restored once work has been completed.
- Surfaces shall be cleaned frequently during demolition to allow Parks Canada Representative to determine whether demolition should be continued to a greater depth.
- Due to prior repairs, concrete to be demolished may contain steel mesh.
- Unless Parks Canada Representative gives prior written authorization to the contrary, the time between demolition and placement of concrete on a portion of a structure shall not exceed two (2) months.

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- Equipment:
 - Use of a hydraulic ram is authorized only if the Contractor provides Parks Canada Representative with the technical data sheet for the ram certifying that the latter's technical characteristics comply with requirements.
 - Hammers shall be used at a 45° to 60° angle from the demolished surface.
 - Use of more than one hydraulic hammer within a 5 m radius is prohibited.
 - When hydro-demolition is used, surfaces to be preserved shall be cleaned with water after hydro-demolition and before they dry. The Contractor shall take all necessary precautions to prevent pollution of the environment and to protect public or private property adjacent to the work area from any damage resulting from hydro-demolition.
 - Necessary provisions shall be taken to prevent oily material or other substances resulting from demolition materials from contaminating the concrete to be preserved. Defective material shall be replaced and contaminated concrete shall be cleaned or its surface repaired.
- Structural Considerations
 - The Contractor shall plan the demolition of the various parts of a structure to prevent compromising the structure's stability.
- Delineation of Areas
 - The parts of the structure to be demolished are shown on the drawings and specifications and are delineated onsite by Parks Canada Representative.
 - The Contractor shall provide access to the parts of the structure to be demolished to allow Parks Canada Representative to determine the type of repair to be done and to delineate the areas to be repaired.
 - The slab surfaces to be repaired shall be determined only once the pavement has been removed by stripping the slab and doing the initial cleaning necessary for installing the new waterproofing membrane. Repairs to the slab shall begin only after the Parks Canada Representative has completely delineated the surfaces to be repaired.
 - Sound concrete is defined as concrete that is not delaminated, and whose materials remain connected to each other after impact by a mason's or geologist's hammer.
 - The Parks Canada Representative may, at any time, limit demolition of concrete that is not sound, or designate additional surfaces around the areas to be repaired as a result of the demolition work. Sound concrete may often have to be demolished in order to reach the minimum demolition dimensions set forth in the drawings and specifications.

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- Thick Slab, Sidewalk, Bicycle Path, Seat and Top of Flange
 - Demolition of surfaces to repair in the concrete of a thick slab, sidewalk or a bicycle path with excessive thickness over a slab, a seat or the top of a flange of a structure shall be performed according to the following conditions:
 - For a surface repair, the surfaces shall be demolished to the smaller of the following two values: 25 mm below the first reinforcing steel layer (longitudinal and transverse bars) or 60 mm; all concrete located below these depths that is not sound shall be removed. Clear to a depth of 25 mm around all reinforcing steel that is exposed.
 - When the demolition depth necessary to reach sound concrete or to clear reinforcing steel exceeds 120 mm, it is considered to be a deep repair.
- Other Components
 - Concrete surfaces to be repaired with formwork and finishing as well as existing concrete surfaces on which new concrete must be installed shall be demolished to a minimum depth of 10 mm. Concrete located beyond this depth and that disintegrates when sprayed with a high-pressure water jet (15 MPa of pressure) shall be removed. All delaminated concrete shall be removed.
 - Concrete surfaces to be repaired with formwork but without excessive thickness shall be demolished to a minimum depth of 100 mm; all concrete that is not sound located below this depth shall be removed. Clear to a depth of 25 mm around all reinforcing steel that is exposed.

Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

3.3 Clean Up

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

- Leave work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

CONCRETE FORMWORK

Section 03 10 00

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1.0 GENERAL**1.1 Related Requirements**

Section 03 20 00	Concrete Reinforcing
Section 03 30 00	Cast-in-Place Concrete
Section 33 42 13	Pipes for Culverts

1.2 Measurement for Payment

Unless otherwise indicated, costs related to supplying and installing formwork shall be included in the price for elements that require forms to be constructed and for which the payment procedures are set forth in section, 03 30 00 – Cast-in-Place Concrete.

1.3 Description

Primary work covered by this section is as follows:

- Formwork system design
- Preparation of shop drawings illustrating formwork and installation method
- Installation and removal of formwork

Work shall also include all necessary related work to complete these structures in accordance with the drawings and specifications.

1.4 References

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG)

Canadian Standards Association (CSA International)

- CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
- CAN/CSA-A23.3-04 (R2010), Design of Concrete Structures
- CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood
- CSA-0121-08 (R2003), Douglas Fir Plywood
- CSA O151-04, Canadian Softwood Plywood
- CSA O153-M1980 (R2003), Poplar Plywood
- CAN/CSA-O325.0-92 (R2003), Construction Sheathing
- CSA O437 Series-93 (R2006), Standards on OSB and Waferboard
- CSA S269.1-1975 (R2003), Falsework for Construction Purposes

- CAN/CSA-S269.3-M92 (R2003), Concrete Formwork, National Standard of Canada
- CSA S16-09, Design of Steel Structures
- CAN/CSA-S6-06 (S6S2-11), Canadian Highway Bridge Design Code

1.5 Action and Informational Submittals

Submit shop drawings of formwork and falsework no less than seven (7) days prior to start of formwork tasks, in accordance with stipulations set forth in Section "01 33 00 - Submittal Procedures".

Submit drawings stamped and signed by professional engineer licensed in province of Quebec, Canada.

Shop drawings to indicate, illustrate or include construction method, work schedule, methods to implement regarding shoring, formwork removal, materials and locations of joints, ties and embedded parts.

Shop drawings shall indicate, illustrate or include formwork design data such as permissible rate of concrete placement and temperature of concrete in forms.

Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets, most particularly those for form release oils.

1.6 Delivery, Storage, and Handling

Waste Management and Disposal

- Separate waste materials for reuse and recycling.
- Place materials defined as hazardous or toxic waste in designated containers.
- Divert unused wood from landfill to recycling facility as authorized by the Parks Canada Representative.
- Divert unused plastic from landfill to recycling facility as authorized by the Parks Canada Representative.
- Divert unused formwork release material from landfill to an official hazardous material collections site as approved by the Parks Canada Representative.

2.0 PRODUCTS**2.1 *Equipment/Materials*****Formwork Materials**

Construction wood and plywood to CAN/CSA A23.1.

For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series and CSA-O153.

Formwork Tie-Rods

Formwork tie-rods shall consist of steel bars with a diameter greater than 10 mm.

Minimum capacity of vertical formwork ties shall be 40 kN in service; ties shall be 19 mm in diameter (except for high-strength steel ties such as DYWIDAG or equivalent, which must be at least 15 mm). "Snap tie" type tie rods are prohibited. When the reinforcement layer adjacent to the formwork is composed of galvanized steel, the corresponding ends of formwork ties or tie rods shall be made of hot-dipped galvanized steel. Layer of zinc on ties shall be between 50 and 87 µm.

Formwork Tie-Rods

Form release agent: non-toxic, biodegradable, low VOC.

Falsework

Falsework materials: to CSA-S269.1.

3.0 EXECUTION**3.1 *Construction and Assembly***

Fabricate and assemble formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

Fabricate and erect falsework in accordance with CSA S269.1.

Align form joints and make watertight. Keep form joints to minimum.

Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners of formwork joints unless specified otherwise.

Form chases, slots, openings, recesses and expansion joints as indicated.

Build in anchors, sleeves and other inserts required by other Sections. Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes such as a coat of paint.

Before concreting, Contractor's design engineer shall inspect all formwork in the presence of the Parks Canada Representative. Design engineer shall provide and sign a written certificate of compliance testifying acceptance of the complete formwork installation, including cleaning of formwork bottoms.

Obtain Parks Canada Representative's approval for use of earth forms, framing openings or in joints not indicated on drawings.

Clean formwork in accordance with CAN/CSA A23.1 before placing concrete.

3.2 Formwork Removal

Remove forms and supports or bracing when Parks Canada Representative has authorized to do so.

Formwork is considered to be removed when it is loosened and at least a portion thereof is no long in contact with the concrete.

After placing concrete, leave formwork in place for minimum periods of time indicated below.

- Soffit on any structure: formwork to be left in place a minimum of seven (7) days. In addition, compressive strength of new concrete shall have reached a minimum of 75% of specified strength at twenty-eight (28) days.
- Vertical sides of any structure: formwork to be left in place a minimum of three (3) days. In addition, compressive strength of new concrete shall have reached a minimum of 60% of specified strength at twenty-eight (28) days.

Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

3.3 *Surface Finishing*

After removing formwork, carefully grind down rough spots, ridges, edges caused by misalignment of formwork, as well as any concrete droppings or drips around the edge of the surfaces. Remove all plastic cones from formwork ties.

Use bagged cement mortar to fill concrete surfaces with cavities from 6 to 12 mm in depth, as well as any holes left from plastic cone and formwork tie removal. Colour of dry mortar to match colour of surrounding concrete. This colour shall be approved by the Supervisor on an inconspicuous area prior to proceeding with work on entire structure. Minimum temperature of concrete surfaces to correct shall be 5 °C prior to applying mortar.

Allow mortar to cure for three (3) days; then clean concrete surfaces to remove mortar drips around edge of corrected surfaces. Clean all concrete or steel surfaces that were soiled, particularly from mortar or concrete drips or splashes, or from rust. Cleaning shall be performed by high-pressure water jet (pressure: 15 MPa, flow rate 20 L/min, with a round pinpoint nozzle, and a nozzle-to-concrete-surface distance of 150 to 200 mm), and in a manner to ensure surfaces are not altered in any way.

END OF SECTION

CONCRETE REINFORCING

Section 03 20 00

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1.0 GENERAL**1.1 Related Requirements**

Section 02 41 16	Structure Demolition
Section 03 10 00	Concrete Forming and Accessories
Section 03 30 00	Cast-in-Place Concrete
Section 33 42 13	Pipes for Culverts

1.2 Measurement for Payment

Unless otherwise indicated, costs related to supplying and installing reinforcements and anchors shall be included in the price for structures that require reinforcement and anchors, for which the payment procedures are set forth in section, 03 30 00 – Cast-in-Place Concrete.

1.3 References

Ministère des Transports du Québec (MTQ)

- Cahier des charges et devis généraux (CCDG).
- MTQ – Tome VII – Matériaux – Ouvrages routiers (MTQ – Tome VII – Materials – Road Structures)

American Concrete Institute (ACI):

- SP-66-04, ACI Detailing Manual 2004.

American Society for Testing and Materials (ASTM International)

- ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
- ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
- ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
- ASTM A497/A497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
- ASTM A108-07 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- ASTM A615/A615M-12 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

Canadian Standards Association (CSA) / CSA International:

- CSA-A23.1-09/A23.2-09, Concrete: Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
- CAN/CSA-A23.3-04 (R2010), Design of Concrete Structures
- CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement
- CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel
- CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles
- CSA W186-M1990 (R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction
- CAN/CSA-S6-06 (S6S2-11), Canadian Highway Bridge Design Code
- CAN/CSA W48.

Reinforcing Steel Institute of Canada (RSIC):

- RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 Action and Informational Submittals

Submit submittals and technical data sheets in accordance with Section 01 33 00 - Submittal Procedures at least fourteen (14) days prior to start of installation work.

Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.

Shop Drawings

Submit drawings stamped and signed by a professional engineer licensed in Province of Quebec, Canada.

Indicate placing of reinforcement and:

- Bar bending details
- List of reinforcements
- Quantities of reinforcements
- Sizes, spacing, locations of reinforcement and mechanical splices, if approved by Parks Canada Representative, With identifying code marks to permit correct placement without reference to structural drawings.
- Indicate sizes, spacing and locations of chairs, spacers and hangers.

Detail lap lengths and bar development lengths to CAN/CSA-A23.3.

1.5 Quality Assurance

Mill Test Report: Provide Parks Canada Representative with certified copy of mill test report for reinforcing steel, a minimum of fourteen (14) days prior to beginning reinforcing work, indicating the results of the physical and chemical analyses performed on the reinforcing steel.

Contractor shall provide a certificate of compliance for the reinforcing steel and submit in writing to Parks Canada Representative proposed source of reinforcement material to be supplied.

1.6 Delivery, Storage, and Handling**Delivery**

Deliver, store and handle materials in accordance with manufacturer's written instructions.

Delivery and acceptance requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

Storage and Handling

Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

Contractor shall ensure that reinforcing steel is stored in manner to prevent rust, damage to coating and deformation of steel.

When reinforcement is delivered to the site, Contractor shall verify storage conditions, compare steel mill markings with compliance certificate and validate, verify that the steel is weldable (has W marking), verify rebar diameters, yield strength for ordinary steel, stirrup dimensions where applicable, and curvature or bending radii.

Contractor shall also verify that steel was galvanized as stipulated on pay items table, that galvanizing quality and general condition of reinforcement materials are good, and report any non-compliances to Parks Canada Representative.

Contractor shall replace defective or damaged reinforcements with new.

2.0 PRODUCTS**2.1 *Equipment/Materials***

Substitute different size bars only if permitted in writing by Parks Canada Representative.

Rebar

All new rebar shall be high-bond ribbed bars to CAN/CSA G30.18, 400 W grade, unless otherwise noted on the drawings.

Steel rebar shall be bent after galvanization and prior to installation, in accordance with the exact shapes indicated on the drawings. Contractor shall take great care to properly verify the bending measurements and ensure that formwork clearances are followed.

Anchors

Concrete anchors and rock anchors shall be made from high-bond 400W grade galvanized reinforcing steel to CAN/CSA G30.18, with fabrication to CAN/CSA A23.1/A23.2.

Rebar anchored in existing concrete with chemical resins or non-shrink grout shall have a minimum theoretical pull-out strength of 15 kN, or as indicated on the drawings.

Rock anchors to be installed using cement grout.

Wire Ties

All wire ties to be cold-drawn annealed steel to ASTM A82/A82M.

Use galvanized wire ties when used with galvanized reinforcing steel.

Bar Chairs, Spacers, Bar Supports and Support Shims

Bar chairs, spacers, bar supports and support shims to CSA-A23.1/A23.2.

Wood blocks, bricks or stones may not be used as support shims or bar supports.

Mechanical Splices

Mechanical splices shall be subject to Parks Canada Representative's approval, unless otherwise indicated on the drawings.

Protective Coatings

Galvanizing of non-prestressed reinforcement to CAN/CSA-G164, minimum zinc coating 610 g/m².

- Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.
- If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.
 - Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.
- If galvanized steels are at ambient temperature, add sulphuric acid as bonding agent Sulfuric acid at concentration of 0.5% to 1%
 - In this case, no restriction applies to temperature of solution.
- Chromate solution sold for this purpose may replace solution described above, provided it is of equivalent effectiveness.
 - Provide description of proposed product in accordance with Section 01 33 00 – Submittal Procedures.

Straight galvanized reinforcing bars that were factory cut may be delivered to the site under the condition that the cut ends were factory coated by paint brush with a zinc-rich coating (such as “Zinga” or approved equivalent) at least 130 µm thick.

2.2 Fabrication

Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, SP-66 and Reinforcing Steel Manual of Standard Practice, published by the Reinforcing Steel Institute of Canada (RSIC).

Obtain Parks Canada Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

Upon approval by Parks Canada Representative, weld reinforcements as required on drawings, in accordance with CSA W186.

Electrodes used for welding to CAN/CSA W48, classification E480XX.

Ship bundles of reinforcement bars clearly identified in accordance with bar bending details and lists.

3.0 EXECUTION**3.1 Preparation**

Galvanizing of reinforcement bars to include chromate treatment. Duration of treatment to be 1 hour per 25 mm of bar diameter.

Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 *Field Bending*

Do not field bend or field weld reinforcement except where indicated or authorized by Parks Canada Representative.

When field bending is authorized, bend without heat, applying slow and steady pressure.

Replace bars that show evidence of cracks or splits.

3.3 *Placing Reinforcement*

Reinforcing steel to be free of sludge, coating oil or any other substance that could hinder bond to concrete.

Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

Reinforcing bars that intersect must be solidly connected to one another at every intersection if the intersections are spaced more than 300 mm apart, and at every other intersection if spacing is less.

All connectors used to connect reinforcing bars to one another must be folded toward the inside in manner to ensure thickness of concrete cover is not decreased.

Prior to pouring concrete, obtain Parks Canada Representative's approval of reinforcing material and placement.

Ensure cover to reinforcement is maintained during concrete pour.

3.4 *Placing Anchors*

Install anchors using chemical resins or non-shrink grout in accordance with manufacturer's instructions. Anchor bars, drilled holes and resin cartridges to have compatible diameters.

Resin and grout mixtures shall completely fill anchor holes. Take necessary precautions with anchors in overhang to prevent loss of material due to gravity.

The technical data sheets for resins and grout, as well as application method including equipment used shall be submitted to the Parks Canada Representative for review and comments at least fourteen (14) days prior to start of anchor installation work.

When ambient air temperature is less than 5 °C or minimum temperature specified by the manufacturer, store chemical resin or grout cartridges in a heated location so compounds can be installed at a temperature of between 10 °C and 25 °C; pre-heat anchor bars immediately prior to installation.

Drill holes using percussion or rotary drill; diameter to correspond with dimensions specified by anchor manufacturer. Clean drilling debris from holes using compressed air.

Minimum depth of anchor holes to be 200 mm unless otherwise indicated on drawings.

Anchors shall not be exposed to any stress for twenty-four (24) hours following installation and shall not be touched or moved during initial setting of the resin or grout.

If existing reinforcements are cut or damaged by Contractor during work, Contractor shall replace them, adding new reinforcing bars of the same diameter, anchored to the concrete, as instructed by Parks Canada Representative. This work shall be at the Contractor's expense.

3.5 *Placing Rock Anchors*

Drill holes for rock anchor installation before placing concrete for new elements to be constructed.

Anchors must be clean, free from rust, oil, dirt, mud or other debris, and inserted with the help of gravity or by pushing. Mechanical, pneumatic and electric hammers may not be used to install anchors.

Cement grout to Ministère des Transport du Québec's standard 3901, "Coulis cimentaires" (Cement grout).

Inject grout in holes around anchors as soon as possible after anchor is installed, according to manufacturer's recommendations.

3.6 *Field Touch-Ups*

Touch up damaged and cut ends of epoxy-coated or galvanized reinforcing steel with zinc-rich (such as "Zinga" or approved equivalent) to provide continuous coating.

3.7 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 – Cleaning. Leave Work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

END OF SECTION

CAST-IN-PLACE CONCRETE

Section 03 30 00

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1.0 GENERAL**1.1 Related Requirements**

Section 03 10 00	Concrete Forming and Accessories
Section 03 20 00	Concrete Reinforcing
Section 05 12 33	Structural Steel for Bridges
Section 34 42 13	Pipes for Culverts

1.2 Measurement for Payment

Manufacturing, supply and installation of concrete elements are paid as indicated in the pay items table, section « Surface repair », « Repair with no oversize » and « Cast-in-Place Concrete » according to the nature of the work. The price must include all materials and work prescribed in the present section, section 03 20 00 – Concrete reinforcing and Section 03 10 00- Concrete Forming and Accessories, for each of the structures, and in particular cover the following:

- The production of shop drawings and reinforcement assembly drawings and other documents required;
- The provision, manufacture, transport and implementation of all concrete elements, formwork and reinforcement in connection with the repair of slab surface repair, repairs without oversize and cast-in-place concrete;
- The saw cuts, surface preparation, treatment and protection against freezing;
- Any incidental expense.

Slab surface repairs are paid by unit price according to the amount of square meters of repair made on site. The price includes the surface cleaning and preparation, the supply and installation of repair products, the holes drilled into the concrete, the saw cuts, the supply and installation of tie rods, the formwork and reinforcement shop drawings and the plans and working methods as well as any incidental expenses.

Repairs with no oversize are paid by unit price according to the amount of square meters of repair made on site. The price includes the surface cleaning and preparation, the supply and installation of concrete products, the holes drilled into the concrete, the saw cuts, the supply and installation of tie rods, the formwork and reinforcement shop drawings and the plans and working methods as well as any incidental expenses.

The concrete poured on site is paid for on a lump sum basis. The price includes the surface cleaning and preparation, the supply and installation of concrete products, the holes drilled into the concrete, the saw cuts, the supply and installation of tie rods, the formwork and reinforcement shop drawings and the plans and working methods and any incidental expenses.

1.3 Description

Primary work covered by this section is as follows:

- Construction of sidewalks and curbs on various bridges
- Filling of culvert at km 18.4 – Route Promenade with self-placing concrete
- Concrete to repair piers, abutments and bridge deck on curved bridge at km 58.3 – Route Promenade
- Concrete for new backwalls and embankment on curved bridge at km 58.3 – Route Promenade
- Concrete to repair bridge deck on arch bridge at km 3.8 – Route Promenade
- Injection of cracks and waterproofing of surface on arch bridge at km 3.8 – Route Promenade
- Concrete for pier and repair of steel-wood bridge No. 3.4 – Rivière-à-la-Pêche

1.4 Abbreviations and Acronyms

Portland Cement: Hydraulic cement or blended hydraulic cement (where suffix “b” denotes blended product).

- Type GU, GUb or GUL: General use cement.
- Type MS or MSb: Moderate sulphate-resistant cement.
- Type MH, MHb or MHL: Moderate heat of hydration cement.
- Type HE, HEb or HEL: High early-strength cement.
- Type LH, LHb or LHL: Low heat of hydration cement.
- Type HS or HSb: High sulphate-resistant cement.

Fly ash:

- Type F - with calcium oxide content less than 15%.
- Type CI - with calcium oxide content ranging from 15 to 20%.
- Type CH - with calcium oxide greater than 20%.
- Type S: Ground, granulated blast-furnace slag.

1.5 References

Ministère des Transports du Québec:

- Cahier des charges et devis généraux (CCDG).
- MTQ – Normes – Ouvrages routiers – Tome VII Matériaux, Chapitre 3. (MTQ – Standards – Road Structures – Tome VII Materials, Chapter 3)

ASTM International:

- ASTM C 260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
- ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- ASTM C 494/C 494M-10a, Standard Specification for Chemical Admixtures for Concrete.
- ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- ASTM C 171-07, Standard Specification for Sheet Materials for Curing Concrete.
- ASTM C 295-03, Standard Guide for Petrographic Examination of Aggregates for Concrete.
- ASTM C 348-02, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.

(ACI) American Concrete Institute:

- ACI 315-99, Details and Detailing of Concrete Reinforcement.
- ACI 304.2R-96, Placing Concrete by Pumping Methods

Canadian Standards Association (CSA) / CSA International:

- CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
- CAN/CSA-A23.3-04, Design of Concrete Structures
- CSA A283-06, Qualification Code for Concrete Testing Laboratories
- CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005)
- CAN/CSA-S6-06 (S6S2-FII), Canadian Highway Bridge Design Code

Bureau de Normalisation du Québec:

- BNQ 2560-114/2007 Travaux de génie civil – Granulats – Partie IV: Béton de masse volumique normale (Civil Engineering Works – Aggregates – Part IV: Normal Density Concrete)
- BNQ 2621-900/2005 Bétons de masses volumiques normales et constituantes (Normal Density Concrete and Materials)
- BNQ 2621-905/2005 Bétons de ciment de masse volumique normale et constituants – Protocole de certification (Normal Density Concrete and Materials – Certification Protocol)

1.6 Administrative Terms and Conditions

Pre-Installation Meetings

Convene pre-installation meeting one (1) week prior to beginning concrete work to fill culvert at km 18.4 – Route Promenade and repair curved bridge at km 58.3 – Route Promenade, in order to coordinate work methods and mix designs to be used.

Ensure Parks Canada Representative, Contractor, concrete producer and laboratory representatives attend.

1.7 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures at least fourteen (14) days prior to start of concrete work.

Provide testing results and reports for review by Parks Canada Representative and do not proceed without written approval when deviations from mix design or parameters are found.

Parks Canada Representative may request that the Contractor also include samples of admixtures intended to be used.

Include a manufacturer's certificate with all admixture samples, guaranteeing that those used when placing concrete will have the same composition as the samples.

Concrete Batches

Provide accurate records of batched concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in article 3.4 of the FIELD QUALITY CONTROL article of this specifications section.

Concrete Hauling Time

Provide, for review by Parks Canada Representative, deviations exceeding maximum

allowable time of 120 minutes for concrete to be delivered to construction site and discharged after batching.

Submit two (2) copies of WHMIS MSDS in accordance with Sections 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

1.8 Quality Assurance

Provide Departmental Representative with valid and recognized certificate from plant delivering concrete, at least fourteen (14) days prior to starting concrete work.

Contractor shall provide a technical data sheet containing cement concrete mixtures, dated and signed by the manufacturer's quality control representative. Include the following information on the data sheets:

- Mixture designation, number or code
- Fresh concrete density in kg/m^3 of the mixture for air content and slump specified
- Cement mass in kg/m^3 in the mixture
- Quantity of water in L/m^3 in the mixture
- Mass of coarse and fine aggregates in kg/m^3 in the mixture (saturated surface dry)
- Water-to-cement weight ratio, considering that the aggregates are in a saturated surface dry condition
- Specified compressive strength
- Air content and slump limits
- Types of admixtures, product names, manufacturers and proposed quantities
- Type of cement, its origin and name of cement factory
- Report issued within the past three (3) years from a recognized laboratory establishing the following for the mixture: characteristics of the entrained air bubbles system, i.e. air content, air bubble spacing factor, and specific surface
- Intrinsic manufacturing and additional characteristics of the fine and coarse aggregates as well as their origin

CAST-IN-PLACE CONCRETE

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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- Grading, oven-dry rodded bulk density, gross relative density (saturated surface dry), fine and coarse aggregate absorption percentage, as well as fineness modulus and color indicator for fine aggregates
- Report issued within the past three (3) years from a recognized laboratory establishing alkali-carbonate reactivity potential

Mixes shall be examined and accepted by the Laboratory mandated by Parks Canada. The Parks Canada Representative reserves the right to require changes to the mixture to ensure compliance with the specifications.

Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

Submit technical data sheets for curing materials to Parks Canada Representative.

At least fourteen (14) days prior to starting concrete work, provide proposed quality control procedures for review by Parks Canada Representative on following items:

- Falsework erection
- Concrete placement methods
- Location and construction of joints
- Measures employed for cold and hot weather concrete work
- Curing
- Finishing
- Formwork removal
- Surface repairs

In addition to the Contractor's quality control, the concrete and its ingredients shall be inspected and tested by a testing laboratory retained by Parks Canada. In no case shall these inspections and tests reduce or modify the Contractor's obligations pursuant to this Contract.

1.9 Delivery, Storage, and Handling

Delivery and Acceptance

Hauling Time

Deliver concrete to construction site and discharge within no more than 120 minutes after batching.

Do not modify maximum time limit without receipt of prior written consent from Parks Canada Representative and concrete producer, as described in CSA A23.1/A23.2.

Deviations to be submitted for review by Parks Canada Representative.

Concrete Delivery

Ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

2.0 PRODUCTS

2.1 Materials

Cement and Supplementary Cementing Materials

Hydraulic cements to CAN/CSA A23.1 and CAN/CSA A3000 standards.

Use GUb-SF, GUb-S/SF or GUb-F/SF type blended hydraulic cement binder.

Total mass of supplementary cementing materials (fly ash, finely ground granulated blast furnace slag and silica fumes) shall not exceed 30% of the total cement mass.

Silica fumes to CAN/CSA A3000, type U.

When required, fly ash to CAN/CSA A3000, type F requirements, and more specifically, section A3001 – Cementitious Materials for Use in Concrete.

Use of ternary cements is prohibited from October 15 to March 31, unless otherwise indicated.

Water

Water used to mix and cure concrete shall be fresh, clean, potable water free of oil and chemical or organic impurities, and in compliance with provisions set forth in section 4 of CAN/CSA A23.1.

Aggregate Materials

All aggregates shall be clean, durable, free of deleterious materials and meet requirements set forth in CAN/CSA A23.1 that apply to the appropriate exposure class.

Contractor shall submit to Parks Canada Representative for review a statement signed by the qualified person who performed the petrographic testing on the fine and coarse aggregates (in accordance with ASTM C295), certifying that the aggregate materials used in the concrete will not cause excessive expansion and cracks in the concrete due to alkali-carbonate reaction or any other deleterious reaction, as set forth in CAN/CSA A23.1.

Aggregates shall be composed of natural sand, gravel or crushed stone in accordance with requirements of CAN/CSA A23.1 regarding grade size, strength and durability.

Admixtures*Air Entraining Admixtures*

Air entraining admixtures to ASTM C260.

All concrete used by the Contractor shall contain an air-entraining agent. Air-entraining agents shall be compatible with other admixtures and types of cement used.

Chemicals Admixtures

Chemical admixtures to ASTM C494/C494M or ASTM C1017/C1017M. Parks Canada Representative to approve set accelerating or retarding admixtures during cold and hot weather concreting.

Use a polysaccharide colloidal agent or cellulose-based agent in self-placing concrete to prevent concrete from segregating. Minimum proportions as follows:

- Polysaccharide colloidal agent: 1100 mL/100 L of water
- Cellulose-base colloidal agent: 130 mL/100 kg of cement

Curing Compounds

Compounds used to cure concrete shall meet the following requirements: CSA A23.1/A23.2, ASTM C171, ASTM C309 and AASHTO M182.

Cement Grout

Cement grout used to achieve minimum compressive strength of 35 MPa after 28 days.

Provide cement grout technical data sheet to Parks Canada Representative at least fourteen (14) days before use.

2.2 Mix Design

Concrete characteristics and mixtures to be used in the context of this project are defined in the table below.

Type	28-day strength (MPa)	Min. cement mass (kg/m ³)	Type of cement ⁽¹⁾	Max. water/cement ratio or within the interval	Coarse aggregate (mm)	Air content ⁽²⁾ (%)	Slump (mm)		Spread (mm) ± 50	L max (mm)	Max. chloride ion permeability (Coulombs)
							± 20	± 30			
V	35	340	GUb-SF	0.45	5-20	5-8	-	80 ⁽³⁾	-	230	1500
		365	GUb-F/SF, GUb-S/SF								
V-S	35	340	GUb-SF	0.38 to 0.42	5-20	5-8	-	130	-	230	1000
		365	GUb-F/SF, GUb-S/SF								
VI	35	390	GU, MS, MH, HE ⁽⁴⁾	0.40	5-20	5-8	30	-	-	230	-
VII	35	340	GUb-SF	0.45	5-20	5-8	30	-	-	230	-
		350	GUb-F/SF, GUb-S/SF								
XIV-C	35 ⁽⁵⁾	400	GUb-SF	0.45	5-14	6-9	-	-	625	230 ⁽¹²⁾	1000
		420	GUb-F/SF, GUb-S/SF								
XIV-R	35 ⁽⁵⁾	460	GUb-F/SF, GUb-S/SF	0.35 to 0.40 ⁽⁷⁾	2.5-10 ⁽⁸⁾	6-9	-	-	-	-	-
Fill concrete	min. - max. 0.4 1.0	420	GUb-F/SF, GUb-S/SF	-	5-20	5-8	-	-	675	-230	-1000

- (1) GUb-SF type cement must contain at least 8% silica fumes.
GUb-F/SF and GUb-S/SF type cements must contain at least 5% silica fumes and at least 15% fly ash or slag. Total mass of supplementary cementing materials (fly ash, silica fumes and slag) shall not exceed 30% of the total cement mass.
HEb-N type cement must contain at least 12% metakaolin.
- (2) Air content to specifications stipulated in the table, regardless of whether or not superplasticizer has been added.
- (3) After addition of superplasticizer, slump to be 120 ± 30 mm.
- (4) HE type cement is only authorized when outdoor temperature is less than 15 °C.
- (5) Minimum compressive strength at 48 hours to be 10 MPa.
- (6) At pump outlet, spacing factor to be less than 260µm.
- (7) Sand / (cement+water+air) volume ratio to be between 0.6 and 0.8.
- (8) Maximum volume of coarse aggregate to be 330 litres of the total mix volume.

2.2 Mix Designs (Cont.)

Concrete designations refer to:

- V-S: Type V, with superplasticizer
- XIV-C: Self-placing concrete for construction
- XIV-R: Self-placing concrete for repairs

Bagged self-placing concrete is prohibited unless otherwise indicated on the drawings.

With ternary cements, it may be necessary to add a superplasticizer at the plant.

Different types of concrete to be used as follows:

- TYPE V CONCRETE is required for: approach span.
- TYPE V-S CONCRETE is required for: backwall, pier and abutment repairs, and concrete pilings.
- TYPE VI or VII CONCRETE is required for: sidewalks, curbs, and drainage pipes.
- TYPE XIV-C CONCRETE is required for: fill for inserting culvert
- TYPE XIV-R CONCRETE is required for: deck concrete repair (repairs without excessive thickness)
- FILL CONCRETE (lean concrete) is required for: backfilling behind abutment backwalls.

3.0 EXECUTION**3.1 Preparation**

Place reinforcements and anchors in accordance with Section 03 20 00 - Concrete Reinforcing.

Obtain Parks Canada Representative's written approval before placing concrete. Provide twenty-four (24) hour minimum notice prior to beginning concrete work.

Prior to placing concrete, obtain Parks Canada Representative's approval of proposed method for protection of concrete during placement and curing in adverse weather.

During concreting operations:

- Development of cold joints not allowed.
- Ensure concrete delivery and handling facilitates placement with minimum amount of re-handling, and without damage to existing structure or Work.

Protect existing Work from staining.

Pumping of concrete is permitted only after approval of equipment and mix.

Ensure reinforcement and inserts are not disturbed during concrete placement.

Clean and remove stains prior to applying concrete finishes.

Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with chemical resin or non-shrink grout to anchor and hold dowels in positions as indicated.

Do not place load upon new concrete until authorized by Parks Canada Representative.

Preparation of Surfaces to Preserve

Once concrete has been demolished, clean the following with high pressure water jet or wet abrasive blasting:

- Reinforcing bars visible after concrete demolition, to remove any rust
- Surfaces of concrete to preserve, to remove any loose particles

Equipment used for wet abrasive blasting shall be equipped with a filter that traps oil; filter efficiency shall be demonstrated prior to using the equipment.

Surfaces in contact with new concrete shall be cleaned to remove all debris using high-pressure water jet (pressure: 15 MPa, flow rate 20 L/min, with a round pinpoint nozzle, and a nozzle-to-concrete-surface distance of 150 to 200 mm).

Keep concrete surfaces wet to point of saturation, however surfaces must be completely dry when new concrete is placed.

3.2 Placement

Perform cast-in-place concrete work to CSA A23.1/A23.2.

Unless otherwise indicated on drawings and specifications, minimum thickness of coating on reinforcement materials and other metal parts to comply with requirements for reinforcement materials set out in the Ministère des Transport du Québec's Tome III – Ouvrages d'art (Civil Engineering Structures).

Concrete for slabs, sidewalks or bicycle path may not be placed when it is raining. If rain starts during concrete work, Contractor shall stop work immediately, make a construction joint according to the Parks Canada Representative's instructions, and effectively protect concrete already placed from the effects of rain until it is sufficiently hardened.

The different types of concrete shall be placed in horizontal layers no more than 500 mm thick, and no less than 1.5 m from their position. Concreting height shall not exceed 1.5 m.

Self-Placing Concrete

Pumped concrete to be placed in accordance with requirements set out in ACI 304.2R.

Place self-placing concrete continuously, without stopping, in order to preserve thixotropic properties and prevent concrete from setting up too quickly.

Install vent pipes in formwork as needed. Openings created in pipes for placement of concrete may serve as vents.

To prevent concrete segregation, pumping line must remain full throughout pumping operation; install a 75 mm diameter reducer at the end of the line. Pump output pressure shall be sufficient to fill the upper portion of the pipes.

Fill Concrete

Concrete shall not be poured during heavy rain or if there is any standing water in the areas to be filled.

Concrete shall be mixed just prior to unloading, and poured at high speed to minimize segregation and obtain maximum uniformity and compactness. Use of pumps and buckets is prohibited.

Concrete should not be reworked after initial set.

Level surface while still saturated with water.

Cold Weather Concrete

Temperature of plastic concrete at time of placement shall comply with concrete manufacturing requirements set forth in the Ministère des Transport du Québec's standard 3101.

All surfaces with which fresh concrete comes into contact shall be re-heated beforehand to a minimum temperature of 10 °C and kept at this temperature for a minimum period of twelve (12) consecutive hours before concrete placement.

Concrete shall be kept at a minimum temperature of 10 °C during curing period.

Contractor shall ensure concrete is appropriately protected throughout placement and curing. Protect using heated shelters, enclosures, insulation or by a combination of any of these measures.

Enclose work in a shelter. Construct shelter so that surfaces to be concreted are enclosed with fabric or tarpaulins. Covers to be waterproof, resistant and affixed so they remain in place entire time protection is required.

The day before concrete work is to take place, Contractor shall obtain Parks Canada Representative's approval of the number of layers of insulation to be installed. Depending on concrete temperature fluctuations during the protection period, Parks Canada Representative may require the number of layers to be increased or decreased; such requirements shall be fulfilled within three (3) hours of the Parks Canada Representative's request.

Concrete protection period shall be extended until the concrete has reached 70% of specified compressive strength at twenty-eight (28) days.

When protection period ends, gradually lower concrete temperature over the first twenty-four (24) hours. Decrease rate shall not exceed 10 °C/hr. Do not allow concrete to be exposed to outdoor air if the difference between the concrete temperature and outdoor temperature is more than 20 °C. All requirements pertaining to concrete curing apply, regardless of the type of protection implemented.

Any concrete that has frozen shall be rejected and not compensated. Any portion of the work constructed using this concrete shall be considered defective and must be re-constructed at the Contractor's expense, in accordance with the drawings and specifications.

Hot Weather Concrete

Temperature of plastic concrete at time of placement shall comply with concrete manufacturing requirements set forth in the Ministère des Transport du Québec's standard 3101.

Contractor shall replace a portion of the mixing water with ice or cool one of the concrete ingredients in order to control the concrete temperature during hot weather conditions.

Anchors and Dowels

Use of a diamond drill is prohibited unless Parks Canada Representative's prior authorization was given.

Diameter of drilled holes to meet recommendation of anchor manufacturer.

Brush sides of holes and then clean with compressed air, inserting nozzle inside hole. Equipment used for compressed air shall be equipped with a filter that traps oil; filter efficiency shall be demonstrated prior to using the equipment.

Quantity of cement grout or chemical anchor product applied in holes shall be sufficient to completely fill space between metal rod and concrete, to the point that it overflows when metal rod is inserted.

Inserts

Where approved by Parks Canada Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.

Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Parks Canada Representative before placing concrete.

Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

Finishing and Curing

Finish concrete surfaces to CSA A23.1/A23.2. Water or any other product to facilitate concrete finishing is prohibited.

Use procedures as reviewed by Parks Canada Representative to remove excess bleed water. Ensure concrete surface is not damaged.

Formed concrete surfaces, form ties and other metal parts must be removed or cut back to less than 40 mm from concrete surface.

Holes left by ties as well as indentations and cavities must be deep enough and have edges to hold patching mortar.

Saturate indentations and cavities with water and repair by brushing patch area with a pure cement paste and fill with mortar composed of the same sand and cement as that used in the concrete.

Keep surfaces wet for a period of three (3) consecutive hours before filling with concrete or mortar.

Firmly press or compact mortar into cavity to completely fill; finish to same texture as adjacent surface.

Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.

Top surface of bearing seat blocks to be perfectly flat and horizontal.

3.3 Placement Tolerances

Concrete surface finishing tolerance to CSA A23.1, Straightedge Method.

3.4 Field Quality Control

The Contractor must conduct the quality control tests on the concrete and submit report as described in section 01 33 00 – Submittal Procedures, regarding the following elements:

- Concrete batches;
- Spread;
- Air content;
- Compressive strength at seven (7) and twenty-eight (28) days;
- Air and concrete temperature;

Non-destructive methods for testing concrete: to CSA-A23.1/A23.2.

3.5 *Crack Repair*

Perform crack repair according to methods indicated in Appendix 1 to this document.

3.6 *Waterproof Coating*

Perform waterproof coating work according to methods indicated in Appendix 2 to this document.

3.7 *Clean Up*

Clean in accordance with Section 01 74 11 - Cleaning.

Waste Management

Separate waste materials for reuse and recycling in accordance with Section 01 74 11 – Cleaning.

Divert admixtures and additive materials from landfill to local recycling facility after receipt of written approval from Parks Canada Representative.

Provide appropriate area on job site where concrete trucks can be safely washed, in accordance with environmental protection requirements.

Divert unused admixtures (pigments, fibres) from landfill to official hazardous material collections site as approved by Parks Canada Representative.

Do not dispose of unused admixtures and additive materials into sewer systems, lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

Take all measures necessary to prevent admixtures from entering drinking water supplies or streams.

Using appropriate safety precautions, collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.

Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

**CAST-IN-PLACE CONCRETE
CRACK INJECTIONS**

Realization of plans and specifications for the
rehabilitation of three (3) bridges and for the
reconstruction of one (1) culvert
La Mauricie National Park
Project. : 45353174

**APPENDIX 1
CRACK INJECTIONS**

**CAST-IN-PLACE CONCRETE
CRACK INJECTIONS**

Realization of plans and specifications for the rehabilitation of three (3) bridges and for the reconstruction of one (1) culvert
La Mauricie National Park
Project. : 45353174

CRACK INJECTIONS

The work aims to seal cracks on the sides of the Arched Bridge at km 3.8 - Parkway by pressurized injection with an injection product based on epoxy. Each crack to be injected has, at any point along its length, an aperture of at least 0.8 mm. Cracks have a variable length and may be exposed or on both opposite sides of an element (crack passing through the element), or on one face of the element. The cracks to be injected are identified on the premises by the Site Canada Parks' Representative.

The Contractor must provide to the Canada Parks' Representative, at least fourteen (14) days before the beginning of work, a work plan describing in detail the products, equipment and injection method proposed as well as the name of the manager of this work on the site. The data sheets of the products and equipment, the model and serial number of the pressure gauge of 300 psi along with its calibration certificate not older than twelve (12) months, and the list of five (5) similar projects that the manager has supervised the work for, should also be included in the work plan. The latter must be signed by an engineer, member of the Ordre des ingénieurs du Québec (OIQ); This engineer, who must not have an employment relationship with a Contractor who carries out injection works, must have at least five (5) years' experience in the field of epoxy injection of structural works. The work plan should include a complete description of five (5) similar projects carried out by the engineer over the past five years.

Cracks should be injected in accordance with the work plan presented to the Canada Parks' Representative with the details of the present specifications.

The injectors must be of the "surface" type. The sealant must be a modified epoxy mortar; it must have sufficient strength to withstand the pressure generated during the injection. The viscosity of the injection product, after the addition of the hardener, should be less than 250 cps at about 22°C. The date of manufacture of the injection product must be indicated on the containers and must not be prior to March 1st, 2015. The addition of a solvent, thinner or other injection material product is prohibited. All products are to be delivered to the site in their original, sealed containers.

The following injections products are approved by Parks Canada :

- Sikadur 52, available at Sika Canada inc.
- Epoxy-Scel-80, available at Specmont inc.
- M68, available at Mulco.

The Contractor remains responsible for the choice of the injection product to use and its performance once implemented.

**CAST-IN-PLACE CONCRETE
CRACK INJECTIONS**

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The equipment used for the injection procedure must be in good condition and consist of piston pumps, electrical or pneumatic and have a maximum pressure of 200 psi. In following the path of the epoxy in the injection line, a calibrated pressure gauge is to be installed, followed by the mixing chamber to be immediately followed by the injection nozzle. The equipment dimensions must be such as to be located on the scaffolding and the close proximity of the cracks to be injected.

The Contractor must provide written notice of at least twenty-four (24) hours to the Canada Parks' Representative to specify the date and time of the beginning of the crack injection work. A similar written notice must also be given for any suspension of work of more than twenty-four (24) hours.

The crack injection work may only be made when the concrete temperature measured in the shade exceeds 15°C without however exceeding 30°C. The crack injection work is suspended between October 1st and April 30th. The temperature of the injection components must be between 20°C and 30°C during the injection work. Crack injection work, on parts exposed to the elements or spray from the circulation, can be done as long as the injection equipment and products are not exposed themselves.

The adjacent surfaces to the cracks must be cleaned with a steel brush so they are free of dirt, oil, efflorescence and other foreign materials. Cleaning inside the cracks with water or any other product is not necessary. The injectors are then attached to the concrete, at the cracks, on the vertical faces opposite of the element and this, without any drilling of the concrete. The injectors are spaced apart by a distance corresponding to approximately the thickness of the item to be injected and are installed in places where the crack is clean and has the highest possible aperture, even if this requires that the spacing between two injectors varies a little. The first and the last injectors are positioned at a distance from the end of the crack that corresponds to half of the usual spacing. A minimum of two injectors must be used for each vertical face of an element. The sealant must be placed around the injector, on the adjacent surfaces of the cracks and, when required, on the other faces of the element; the product is placed on a uniform width of at least 50 mm and up to and beyond the visible boundaries of the cracks.

Just before the injection of each crack and after the obturation of all the injectors, the Contractor must perform a leak test of the injectors and the sealant using a compressed air jet of 75 psi. Any leakage of air will require to the replacement of the defective materials and a new leak test. Leak testing is also used to determine whether the crack passes through the element from one face to the other. The material used for the air jet must be provided with an oil capturing filter; its effectiveness must be demonstrated before its usage.

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The Contractor must demonstrate that he masters the injection procedure by injecting a first crack; the Canada Parks' Representative authorizes the Contractor to continue with the other cracks if the first crack is injected to its satisfaction. During the injection of this crack, an adequate quantity of the injection product components is taken at random before the mixing chamber, is poured into graduated containers, in order to verify the proportion of each component. The maximum permitted deviation from the specifications of the manufacturer's data sheet is $\pm 5\%$.

The engineer who signed the work plan must be on site during the injection of the first crack of the first structure; he must remain on site as long as the Canada Parks' Representative or the Contractor deems necessary.

The injection cannot begin until the color of the injection product is uniform.

The injection procedure cannot begin until the color of the injection product is uniform. For a vertical or inclined crack, injection must start from the lowest point of the crack; for a horizontal crack, the injection must start at either end of the crack. The Contractor must inject a single crack at a time and from one side of the element if it has been established that the crack runs through the element; in the latter case, the injectors of the opposite face serve as vents. The injection pressure measured at the nozzle outlet must be less than 50 psi. The injection procedure must be performed continuously, the next injector must be closed when the injection product is flowing through and so on with the other injectors until refusal; maintain refusal pressure (50 psi) in the first injector for at least ten (10) minutes. The injector is then closed and the injection must continue to the last injector where there has been a flow, up until the complete filling of the crack. In the case of a crack going through the element, if there is still no flow at an injector located on the opposite side to the one used for the injection after maintaining the pressure at refusal for at least ten (10) minutes, the Contractor shall continue the same injection procedure on the opposite side.

Any stop time of the injection procedure exceeding 75% of the pot life of the injection product used causes the cessation of work and cleaning of all equipment and accessories. If microcracks form close to the current crack injection location, the injection procedure must be stopped immediately.

If there is leakage of the injection product caused by a clogged or closed injector, the injection procedure must be stopped immediately; the injection procedure can continue after the leak is stopped. For cracks that are not yet injected, the leak test is performed with an air pressure of 125 psi.

The sealant, injectors and any leaks, leaking or injection product splatters must be removed down to the level of the original concrete once the injection product has hardened sufficiently, but not before a period of at least twenty-four (24) hours following the end of the injection procedure.

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CRACK INJECTIONS**

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Mode de paiement

The mobilization/demobilization of equipment is paid by the unit at one mobilization/demobilization unit by structure; the price covers all the operations necessary to carry the equipment required by the work to the site and in working condition, the labor, and includes any incidental expenses.

The injection procedure is paid per linear meter of injected crack, and this, for each of the opposite vertical faces of an element. The crack length is measured from the first to the last injector nozzle; additional length corresponding to the average spacing between two injectors is added for payment. The price covers the work plan provided, the injection products and equipment, the access to the cracks during the injection procedure, the installation and removal of the sealant on the sides of an element where injectors are not installed, the cleaning of all surfaces, the implementation, and it also includes any incidental expenses.

**CAST IN PLACE CONCRETE
WATERPROOFING AND SURFACE COATING**

Realization of plans and specifications for the
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**CAST IN PLACE CONCRETE
WATERPROOFING AND SURFACE COATING**

Realization of plans and specifications for the
rehabilitation of three (3) bridges and for the
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SURFACE COATING

The work consists in the application of a waterproofing layer and a type 1 surface coating (standard) on the concrete surfaces on the sides of the Arched Bridge at km 3.8 - Parkway.

The following protective coatings are accepted by Parks Canada :

- CHEMORCLAD 9600, available at Tri-Tex Co inc.
- CORR-BOND, available at Adjuvants Euclid Canada inc.
- EMACO P24, available at BASF Building System inc.
- PLANIBOND 3C, available at Mapei inc.
- SIKATOP ARMATEC 110 EpoCem, available at Sika Canada inc.
- DuralPrep A.C., available at Adjuvants Euclid Canada inc.

Concrete waterproofing

The waterproofing of the concrete must be done by applying a silane-type silicone polymer having solids content greater than or equal to 40% by mass.

Concrete surfaces must be clean and dry prior to the application of waterproofing layer.

Between seven (7) days and twenty-four (24) hours before the application of waterproofing layer, surfaces to be waterproofed must be previously treated with a wet abrasive blast or high pressure water jet to obtain a surface free of any coating, curing material, laitance, oil, paint, rust or other dirt. Within the same period, the treated surfaces should then be cleaned using a pressurized water jet (15 MPa pressure, flow rate 20 l / min, a concentrated circular jet nozzle and a nozzle-surface distance to the concrete surface between 150 mm to 200 mm) so as to obtain a surface free of any debris.

The material used for wet abrasive blast must be equipped with a filter that removes oil; filter efficiency must be demonstrated before using the equipment.

The apparent or newly apparent reinforcement following the cleaning work must be covered with a protective coating after cleaning the surfaces prior to the application of waterproofing solution. The reinforcement protective coating can be applied only if the ambient temperature and that of the surfaces to be coated are above 7°C or higher. The protective coating must be applied only on exposed surfaces of the reinforcements without overflowing onto the surrounding concrete. Allow a minimum period of four (4) hours between the application of the protective coating on the reinforcement and the waterproofing solution.

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The waterproofing solution can be applied only if the ambient temperature and that of the surfaces to be waterproofed are above 5°C and if there is no risk of freezing during the twelve (12) hours after application.

Protective measures must be taken to prevent the waterproofing solution to come into contact with asphalt or other materials that constitute the surfaces adjacent to those to be treated.

The waterproofing solution is to be applied using a low pressure hand sprayer at a rate of 0.33 l / m². Depending on the porosity of the concrete surfaces, the waterproofing solution may need to be applied in several layers.

The treated surfaces should be protected from rain and splashing for a period of six (6) hours following the application of waterproofing solution.

Surface coating

Surfaces must be clean and dry prior to the application of the protective coating.

In the case of surfaces previously coated with a waterproofing solution, the surface coating must be applied after a period of at least twenty-four (24) hours but no more than seventy-two (72) hours following the waterproofing solution application.

The products used for surface sealing and for the surface coating must be compatible with each other.

The apparent reinforcement or reinforcement that became apparent following the cleaning work must be covered with a protective coating after the cleaning of the surfaces and prior to the application of the waterproofing solution, if any, or the surface coating. The protective coating can be applied only if the ambient temperature and that of the surfaces to be coated are above 7°C and higher. The protective coating should be applied only on exposed surfaces of the reinforcements without overflowing onto the surrounding concrete. A minimum period of four (4) hours must be respected between the placement of the protective coating on the reinforcement and the application of the waterproofing or surface coating.

The surface coating must be delivered to the site in sealed containers at the manufacturer's factory and stored at a minimum temperature of 5°C. The surface coating must be conditioned to a minimum temperature of 15°C at the time of the application.

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The application of the surface coating can be made only when:

- the temperature of the outside air and that of the surface to be coated is above 5°C and going up;
- the temperature of the outside air is not likely to fall below 0°C in the twelve (12) hours following the end of the application of the surface coating (according to the forecasts from the Meteorological Office in the region);
- the surfaces to be coated are not exposed to rain or runoffs from rain, at the time of application and for a period of twelve (12) hours following the end of the application of the coating.

The finish of the surface layer must be a sanded type. The color of the surface coating should conform to that of standard No. 36357 of the US FED-STD 595B "Colors used in Government Procurement" standards.

The color difference should not exceed the following values:

- L^* : 10,0 à + 2,0 units CIELAB;
- a^* : ± 1,0 unit CIELAB;
- b^* : ± 2,5 units CIELAB;
- ΔE : 10,0 units CIELAB.

The measure symbols L^* , a^* , b^* and ΔE are those used in the CIELAB system (ASTM D2244 Standard « Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates »).

Coverage with the surface coating must be performed according to the following two steps :

- The application of a first layer, at the application rate recommended by the manufacturer's data sheet, with a minimum of 0.5 ℓ / m^2 ;
- The application of a second layer, within twenty-four (24) to seventy-two (72) hours of the first layer, at the rate of application recommended by the manufacturer's data sheet, with a minimum of 0.5 ℓ / m^2 .

The surface coating must be applied with a paint gun at a uniform thickness and without drips, so as to cover the depressions, holes and other irregularities in the concrete surface. The application of the surface coating must allow to completely hide the concrete surface to be coated and minor defects that might exist.

Surfaces that should not be covered with the surface coating should be protected against splashes and other damages that may occur during the application. The surfaces to be coated must be clearly defined so as to have straight transitions to surrounding areas. The surfaces other than concrete surfaces, such as pipes, steel elements of the security railings or fixtures, which are located on the surfaces to be coated should not be covered with the surface coating and must be protected against splashing.

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Method of payment

Waterproofing of surfaces is paid per square meter of coated surface. The price includes the access to surfaces to be treated, the provision of materials, surface cleaning, the application of the protective coating on the apparent reinforcement, implementation, and includes any incidental expense.

The covering with surface coating is paid per square meter. The price includes the access to surfaces to be treated, the supply of materials, surface cleaning (if not already paid in another section of the list), and includes any incidental expenses.

STRUCTURAL STEEL FOR BRIDGES

Section 05 12 33

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1.0 GENERAL**1.1 *Related Requirements***

This section addresses work that may be performed in conjunction with the following sections:

Section 03 10 00	Concrete Formwork
Section 03 20 00	Concrete Reinforcing
Section 33 00 00	Cast-in-Place Concrete

1.2 *Measurement for Payment*

Fabrication, supply and installation of steelwork and steel restrainers shall be paid as a lump sum price for the « Structural Steel for Bridges », « Deck Joints » and « Bearing Device » packages, depending on the nature of work. The price shall include materials and work required under this section for each structure, which is primarily the following:

- Radiographic examination of optional shop-welded joints and additional field-welded joints;
- Production of shop drawings and structural steel erection drawings, as well as all other required documents;
- Supply, fabrication, transportation and installation of all steel components, bridge bearing, deck joints and interface drains;
- Supply, fabrication, transportation and installation of chemical or mechanical anchors;
- All incidental expenses.

Replacement of bearing devices shall be included in overall price. The price shall also include, most particularly, costs associated with temporary support and, if required, jacking the bridge, removing existing bearing devices and plates where applicable, supplying and installing new bearing plates, drilling holes in the concrete, supplying and installing anchor rods, supplying and installing new devices and anchor rods including field welding and inspection, lowering the bridge onto its new bearings, and all incidental expenses.

Replacement of deck joints shall be included in overall price. This price shall include costs related to saw cuts, excavating and backfilling, concrete demolition, removal of existing joints, work to strip surfaces adjacent to the joints, supply and placement of concrete and reinforcement materials, as well as implementation of new deck joints, including field welding and inspection, shop drawings and all incidental expenses.

1.3 Description

Primary work covered by this section is as follows:

- Fabrication and erection of steelwork for the steel-wooden bridge at km 3.4 – Rivière-à-la-Pêche
- Replacement of bearing devices, expansion joints and steel restrainers on curved bridge at km 58.3 – Route Promenade (including work to temporarily support / jack existing bridge), as well as the addition of new steel restrainers.

1.4 References

Ministère des Transports du Québec

- MTQ – Cahier des charges et devis généraux (CCDG) (Book of General Specifications)

American Association for State Highway and Transportation Officials (AASHTO)

- AASHTO Standard Specifications for Highway Bridges-17th Edition 2002

ASTM International

- ASTM A108-07 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A325M-14, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric)
- ASTM A490M rev A -14, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric)

CSA International

- CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel
- CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles
- CAN/CSA-S6-06, Canadian Highway Bridge Design Code
- CSA S16-09, Design of Steel Structures
- CSA S269.1-1975 (R2003), Falsework for Construction Purposes
- CAN/CSA W47.1-03 Certification of Companies for Fusion Welding of Steel Structures
- CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding
- CSA W59-13, Welded Steel Construction (Metal Arc Welding)

- CAN/CSA W178.2-08 Certification of Welding Inspectors
- CAN3 Z299.3-F85 (C2006) Quality Assurance Program - Category 3

(SSPC) The Society for Protective Coatings:

- SSPC-SP 11, Power Tool Cleaning to Bare Metal

1.5 Administrative Terms and Conditions

Pre-Installation Meetings:

- Convene pre-installation meeting with Parks Canada Representative one week before beginning work to install bearing devices, expansion joints and steelwork, in accordance with Section 01 31 19 - Project Meetings, to:
 - Verify Work requirements.
 - Review installation and substrate conditions.
 - Co-ordinate work with other subtrades.
 - Determine necessary access and temporary support / jacking equipment.
 - Review manufacturer's written installation instructions and warranty requirements.

Arrange for site visit with Parks Canada Representative to examine existing site conditions adjacent to work, prior to start of work.

Hold project meetings every week.

Ensure key personnel attend the said meetings.

Parks Canada Representative shall provide written notification 24 hours prior to scheduled meeting to all those involved regarding any change to the meeting schedule established upon contract award.

Site meetings: As part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits to review work.

Deck Joints

Submit to Parks Canada Representative, at least fourteen (14) days prior to ordering any materials or fabricating any components, all shop drawings, data sheets and samples of materials to be used within the context of work in this Contract pertaining to the steel joint components.

The Contractor may not make any modifications to the materials or construction details set forth in the shop drawings examined by the Parks Canada Representative without prior written authorization from the latter.

Before preparing the shop drawings, Contractor shall perform a complete and detailed field survey of all existing components to determine their precise dimensions and validate the position values of assembly holes indicated on the drawings. Contractor shall survey every location where the same detail is applicable.

If, following the detailed survey of components, dimensions obtained are significantly different than those indicated on the drawings, or if actual conditions do not allow work to be performed as set forth in the drawings and specifications, Contractor shall notify and follow the directives of the Parks Canada Representative.

The fact that the documents or components mentioned above are examined by the Parks Canada Representative does not relieve the Contractor from its liability pursuant to this Contract, including, but not limited to its liability with regards to supply of appropriate equipment and material, adopting appropriate construction methods, assurance of good quality workmanship, and application of adequate safety measures.

Bearing Devices

The Contractor is responsible for selecting the manufacturer of products used, as well as the performance of these products once installed.

The Parks Canada Representative may refuse any material that has not met technical requirements in similar prior projects.

Design, fabrication and installation of bearing devices shall comply with standard CAN/CSA S6-06, with the following clarifications:

- Elastomeric parts of the bearing devices shall be made of natural virgin polyisoprene or virgin polychloroprene. 50 ± 5 Shore A durometer hardness for confined elastomeric devices.
- The polytetrafluoroethylene (PTFE) selvage edges on the lateral guides of the PTFE sheet shall be embedded and bonded, and compliant with ASTM D4894 Standard Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials.
- In the case of confined elastomeric devices, the PTFE sheet, with the exception of the PTFE selvage edges on the lateral guides, shall be honeycomb-type, lubricated and non-reinforced.

Bearing devices shall be designed and sized to meet the load, movement and space requirements as indicated on the drawings.

Design notes and shop drawings to be stamped and signed by a professional engineer who is a member of the Ordre des Ingénieurs du Québec, and has a minimum of five (5) years of relevant experience.

Bearing device design shall comply with standard CAN/CSA S6-06 Canadian Highway Bridge Design Code, with the following clarifications:

- Laminated elastomeric bridge bearings shall have a minimum rotation capacity at serviceability limit states of 0.015 radians. The average compressive strain for each layer of elastomer shall be less than 7% of their respective thicknesses.
- Confined elastomer bridge bearings shall have a minimum rotation capacity at serviceability limit states of 0.02 radians.
- Average pressure applied to the confined elastomeric disc shall not exceed 30 MPa at serviceability limit states, and 45 MPa at ultimate limit states.

In the case of confined elastomer bridge bearings, the location of the base plate must allow a horizontal displacement in all directions from the centres indicated on the drawings for each bearing device and according to indications shown on the plans.

1.6 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical Data Sheets

Submit the required manufacturer material safety data sheets, instructions and documentation for the structural steel, and include product characteristics, performance criteria, physical size, finish and limitations.

Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

Shop Drawings

Submit drawings stamped and signed by a professional engineer registered or licensed in province of Quebec, Canada.

Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets and welds. Indicate welds using symbols defined in the CSA W59 standard.

Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.

Work Method

Submit description of work methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel, as well as the bridge jacking procedure for replacing bearing devices.

Work methods shall be stamped and signed by a professional engineer who is a member of the Ordre des Ingénieurs du Québec; engineer who signed these documents shall be present during works. At each step that is completed, the aforementioned engineer shall submit certification confirming stability of temporary structures, stipulating, as necessary, any corrective measures or directives to implement to ensure structure stability.

1.7 Delivery, Storage, and Handling

Ensure components are delivered, stored and handled properly.

Provide protective blocking for lifting, transporting and storing components.

- Exercise care during fabrication, transportation and erection of girders and beams.
- Do not notch edges of members.
- Do not cause excessive stress.

Mark mass on members weighing more than 3 tonnes.

Protect unpainted weathering steel before erection with waterproof covering.

Ensure that no portion of steel comes into contact with ground.

Provide Parks Canada Representative with delivery schedules a minimum of seven (7) days prior to shipping.

Bearing Devices

Bearing devices shall be clearly identified by the manufacturer. Contractor shall submit delivery slips to the Parks Canada Representative upon request.

Protect bearing devices from impact and contamination throughout handling, storage and installation.

Damaged bearing devices or those deemed as such by the Parks Canada Representative shall be rejected and replaced at Contractor's expense.

1.8 Quality Assurance

Whenever steel, bolts, screws, washers or anchor rods are delivered, Contractor shall submit to the Parks Canada Representative, at least fourteen (14) days prior to its use, a certificate of compliance.

Compliance certification for the steel shall contain the following information for each production lot:

- Name of the steel mill
- Fabrication date and location
- Nominal dimensions
- Grade
- Category
- Heat batch number
- Analysis and testing results as well as quality control measures
- Production lot number

Compliance certification for bolts, nuts, washers and anchor rods shall contain the following information for each production lot:

- Manufacturer's name
- Manufacturing date
- Identifying marks
- Nominal dimensions
- Steel grade
- Category
- Heat batch number
- Analysis and test results
- Information about coating
- Production lot number

A production lot is composed of structural steel parts of the same type, grade, category and dimensions, produced from the same cast.

Samples used in physical testing must be available from the steel mill for inspection by the Parks Canada Representative.

Preconstruction Testing

- Provide suitable facilities and co-operate with Parks Canada Representative in carrying out inspection and tests required.

2.0 PRODUCTS**2.1 Materials**

Structural steel shall be sourced from a Canadian or American steel mill that holds a registration certificate in accordance with ISO 9001, "Quality Management Systems". Contractor shall provide the Parks Canada Representative with the name of the steel mill at least two (2) weeks before delivery of any structural steel to the work site or fabrication facility.

Steel components shall be new and free of any deformation, rust or flaws such as cracks, nicks or sharp edges.

Fabrication and welding shall be performed by firms certified by the Canadian Welding Bureau, in accordance with CSA W47.1, division 1.

Structural steel: to CSA G40.20/G40.21, 300W and 350W grade and type standard.

All steel components shall be hot-dip galvanized.

Hot-dip galvanized, high tensile strength nuts, bolts and washers: to ASTM A325M. Bolts that comply with ASTM A490M may be used as approved by Parks Canada Representative.

Hot-dip galvanized anchor nuts, bolts, and washers: to CSA G40.20/G40.21, grade 300W galvanized steel.

Bearing devices: pads to CAN/CSA S6 made of Teflon and stainless steel.

Welding electrodes: to CSA W48.

Shear connectors: to CSA W59, Clause 5.5.6.

Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 600 g/m².

Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents.

304-type stainless steel for bearing plates.

Laminated Elastomeric Bridge Bearings

Laminated bridge bearings shall be die-cast and heated in smooth finish die blocks.

Laminated bridge bearings shall be natural rubber / steel, laminated bridge bearings with a hardness of 55 ± 5.

Elastomeric material shall be a natural rubber-based compound adapted to the climate conditions prevalent in the location where bridge work is taking place.

The steel plates shall meet the following requirements:

- The elastomeric layers and steel plates shall be uniform in thickness
- Interior steel plates shall be free of sharp edges
- Steel plates shall be completely bonded to the elastomer on all surfaces during moulding.
- Elastomer covering on lateral surfaces shall be at least 5 mm thick. Outer, bottom and top layer thickness shall not exceed 70% of a single inner layer of elastomer.
- Steel plates shall be made from mild laminated steel sheets with a minimum yield strength of 230 MPa, in accordance with CAN/CSA S6-06.

Replaceable Confined Elastomer Bridge Bearings

Elastomeric material shall be a natural rubber-based compound adapted to the climate conditions prevalent in the location where work is taking place.

Steel to comply with CSA-G40.20/G40.21, grade 300W or 350W.

Exposed steel galvanized to ASTM A123/A123M.

2.2 Source Quality Control

Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.

Provide suitable facilities and co-operate with Parks Canada Representative in carrying out inspection and tests required.

Unless otherwise indicated on the drawings, all welds shall be fully inspected visually in accordance with CSA W59, before, during and after welding. Moreover, on main beams and diaphragms, the following tests shall be performed:

- Corner welds, between web or base plate and stiffeners, shall be fully inspected by magnetic particle inspection.
- Corner welds, between bridge bearing and base plate, shall be fully inspected by magnetic particle inspection.
- Corner welds, between pier components, shall be fully inspected by magnetic particle inspection.
- Where applicable, all full penetration welds shall be fully inspected by ultrasound and magnetic particle inspection.

3.0 EXECUTION**3.1 Examination**

Verification of conditions: Prior to installing structural steel components, verify that condition of substrates previously installed under other sections or contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.

- Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
- Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Parks Canada Representative.

3.2 Preparation

Clean steel surfaces as directed by Parks Canada Representative when staining or defacing occurs.

Verify location of substructure units, elevations of bearing seats and location of anchor bolts before erection of structural steel; report discrepancies to Parks Canada Representative.

Work near river banks or embankments in accordance with written instructions from Parks Canada Representative.

Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.

- Enlarge holes if necessary by reaming only after receipt of written approval from Parks Canada Representative.
- Ensure reamed holes are 2 mm maximum larger than bolt size used.

Fabricate and install bearings as indicated.

Drill and place anchor bolts at elevations and locations indicated.

- Protect holes against entry of water and foreign material.
- Provide heating and protection as directed by Parks Canada Representative and completely fill space around anchor bolts with grout.

3.3 Installation

Construct falsework in accordance with CSA S269.1.

Fabricate and erect structural steel in accordance with CAN/CSA S6, Canadian Highway Bridge Design Code.

Welding: In accordance with CSA W59, except where specified otherwise.

- Weld in shop unless otherwise permitted by Parks Canada Representative in writing.
- Weld only at locations indicated.

High strength bolts: Install high strength bolts to CAN/CSA S6. Use “turn-of-nut” tightening method. Tighten in presence of Parks Canada Representative.

Finish: Members true to line, free from twists, bends, open joints, sharp corners and sharp edges.

Allowable tolerance for bolt holes:

- Holes drilled in different parts to be assembled shall line up so that bolts 2 mm smaller in diameter than hole passes freely through assembled members at right angles to such members.
- Diameter of finished holes shall not be more than 2 mm larger than diameter of bolt unless otherwise specified by Parks Canada Representative.
- Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
- Centre-to-centre distance between any two groups of holes shall meet the following requirements:
- Correct mispunched or misdrilled members only as directed by Parks Canada Representative.

Span length tolerances:

- Girders and beams: plus or minus 6 mm.
- Centre-to-centre of bearing stiffeners and bearing plates: plus or minus 3 mm.

Girder support requirements:

- Support top and bottom flanges of ends of girders and intermediate bearing locations of continuous girders parallel to each other at 90 degrees to girder web.
- Install flat and smooth except as otherwise indicated.
- Install bearing stiffeners after girder support requirements have been met.

- Correct girder flange irregularities as instructed by Parks Canada Representative.

Shop erection:

- Support each girder on its bearing points; then measure and record deflection at same points indicated for measurement of camber.
- Measure deflections in plane of girder web.
- Submit diagram to Parks Canada Representative showing deflection measurements for each girder before delivery.

Field splices: to approval of Parks Canada Representative.

Mark members in accordance with CSA G40.20/G40.21.

- Do not use die stamping.

Match marking: shop mark bearing assemblies and splices.

Protect exposed concrete surfaces of substructures from staining due to weathering of unpainted steel as follows:

- Use galvanized anchors for anchorage to concrete.

Deck Joints

Install deck joint in accordance with CAN/CSA S6-06 and drawing requirements, with the following clarifications:

- Longitudinal and transverse slopes of concrete shoulders to correspond with planned pavement profiles on both sides of the joint.
- Adjust joint opening as stipulated on drawings, according to ambient air temperature measured under the bridge at joint location when fastened.
- Place joint in formwork and firmly fasten with tack welds to slab reinforcement and backwall or with fastener rods.
- Remove steel angles or temporary assembly plates after joint is fastened.

Do not place load upon new concrete components until strength has reached 25 MPa.

The establishment of the joint seal is to be completed in a single phase. The Contractor must provide temporary measures required to cover and protect the joint according to the work phases.

Bearing Devices

Install bearing devices in accordance with these drawings and specifications, as well as the manufacturer's recommendations.

During installation, bearing surfaces and bearing devices themselves shall be clean and free of any non-adhering materials and lubricants.

Align bearing devices such that the bearing axis is perfectly parallel to direction of movement.

Position bearing pad such that both bearing axes are ± 3 mm from their precise theoretical positions under the structural components to support.

Contractor shall establish schedule to ensure that installation takes place when ambient temperature forecasted by Environment Canada is between $+20$ °C and -10 °C.

Seat elevations are provided according to the bearing device thickness indicated in the drawings and specifications. If the device thickness differs, Contractor shall correct the seat block elevations accordingly.

Contractor shall install steel beams after the concrete in the seat blocks has reached a compressive strength of at least 20 MPa. In the case where bearing devices are being replaced, compressive strength of concrete in seat blocks shall be at least 30 MPa prior to the charging of the bridge bearings.

Steel top plate on the bearing device in contact with the beam shall be grade 350A when the plate is field welded.

Contractor shall ensure that the type of electrode used to weld top plates on beam bearing devices is compatible with the steel used for plates and beams.

When field welding is complete, welds and surrounding steel surfaces that will not be covered shall be protected by application of two layers of zinc-rich coating.

After tightening, threaded end of anchor rods shall extend from nut at least 3 mm.

Confined Elastomer Bridge Bearings

Contractor shall use a temporary steel jig to place anchor rods, seat plate and each bearing device; jig shall remain in place until the foundation unit concrete has hardened.

Once the seat block concrete has hardened, Contractor shall ensure that the distance between the specified level of the bottom of the seat plate on each bearing device and the top of the seat block concrete is between 10 and 15 mm. Contractor shall then install the bearing device seat plate ensuring it is level, and finally fasten using anchor rods.

Bearing device anchor rod nuts shall be securely tightened using a spud wrench approximately 400 mm in length. After tightening, threaded end of anchor rods shall extend from nut at least 3 mm.

Contractor shall place a form around the seat plate and bearing device, with an injection port and vent on opposite sides of the device. Then, Contractor shall inject cementitious grout, under constant pressure, under the seat plate. Surfaces that enter into contact with the grout shall have a minimum temperature of 10 °C at the time of grouting. When the grout seeps out the vent continuously for five (5) seconds, close off the vent while maintaining injection pressure. After an additional five (5) second delay, injection port shall also be closed and injection pressure released. Grout temperature shall be kept above 10 °C for twenty-four (24) hours following application. Injection port and vent shall be cut-off at a right angle of the bearing device seat plate, once the form is removed. Form shall be removed at least twenty-four (24) hours after grouting.

3.4 Support/Jacking the Deck

The deck on the curved bridge at km 58.3 – Route Promenade must be supported and jacked, as needed, prior to replacing the existing bearing devices. It shall not be jacked more than 5 mm above its final level, unless otherwise indicated by the Parks Canada Representative.

Design

Contractor shall submit the detailed bridge jacking methods to the Parks Canada Representative for examination and comments at least fourteen (14) days prior to the date when bridge support/jacking is scheduled to begin.

Contractor's engineer/designer who designs the support/jacking system shall be a member of the OIQ with more than ten (10) years of experience in structural and other related projects. Contractor shall replace any engineer/designer who, in the opinion of the Parks Canada Representative, does not meet the aforementioned requirements.

Contractor shall be responsible for jacking method design, including verification of existing structural component capacity, if existing structure will be used to transmit loads or if it will be displaced by the jacking system or temporary supports.

Contractor shall take into account the following non-exhaustive list of considerations: dead load, overload provisions for traffic, wind, dynamic effects, expansion and all other loads indicated on the drawings, existing component dimensions and conditions, as well as the span slopes at support/jacking points.

In the design, contractor shall also consider that the surface on which the support/jacking system will rest may not be completely horizontal.

Contractor shall produce a detailed drawing of the span support/jacking method, including dimensioning and design calculations for the following:

- Support/jacking system
- Jacking equipment for the spans, including pumps and jacks
- Load distribution plates
- Any other required elements (shims, grout, mortar) for jacking the bridge
- Method for securing temporary supports

Temporary Supports

Deck jacking and support shall be designed so as not to damage the deck joint or any other bridge element, and so that the bridge is raised uniformly across the entire width of the deck. Support shall be designed without the use of jacks and include transverse blocking of the deck.

Shims, cribs or saddles of which the temporary supports are composed shall be made of steel. Shims may be different specific thicknesses or tapered, according to the Contractor's jacking method and the condition of the underlying and adjacent surfaces.

Once the jacking system and support systems are in place and the engineer who is a member of the Ordre des ingénieurs du Québec has inspected everything, Contractor shall submit, to the Parks Canada Representative, a written notice signed by the said engineer certifying that the systems installed comply with the plan submitted. This notice shall also specify the date and time of the inspection.

Equipment and Tools

The equipment and tools used (such as hydraulic pumps, jacks and valves) shall be of sufficient capacity to ensure that no more than 75% of their rated capacity will be used.

The hydraulic system shall be equipped with check valves to ensure uniform and constant pressure on each jack used in the jacking operation.

Work Planning

Before jacking the deck, the Contractor shall reach an agreement with the Parks Canada Representative regarding the manner to reference the elevation of the top of each bearing device being replaced, to ensure tops of new bearing devices are properly positioned.

Span jacking shall be performed under the responsibility and authority of the Contractor's engineer/designer who shall:

- Ensure jacking system and all components used in jacking operation were fabricated and installed in compliance with the drawings and method proposed to and examined by the Parks Canada Representative.
- For each structural element to jack, establish a method to control changes in level between the top of the seat and bearing point of the structural member being jacked.
- The period during which the span is supported by temporary supports shall be as short as possible.

Contractor's engineer/designer shall perform a mandatory jacking system inspection in the presence of the Parks Canada Representative, and submit a written certificate of compliance for installation of the jacking system and components required for jacking the spans.

Work related to replacing the bearing devices must be completed prior to placement of any concrete to replace, modify or eliminate a deck joint.

Prior to any span jacking or lowering operation, Contractor shall hold a coordination meeting with the Parks Canada Representative and Contractor's engineer/designer, in order to ensure all employees and contributors participating in the operation understand the jacking method.

Throughout the jacking operations, the Contractor's engineer/designer shall ensure that the jacking operation is performed safely and that no improvisation takes place on the work site that could compromise the integrity of the bridge.

Jacking Operation

Jacking shall be performed uniformly, in increments of no more than 1.5 mm; jacking height shall be verified before proceeding with the next step.

To provide temporary support and in the event that a jack would break, temporary steel supports capable of supporting the loads shall be installed in appropriate locations. They shall be positioned so as not to interfere with the planned position of the bearing devices or new parts to be installed, or hinder any work to be carried out during the period between when the spans are jacked and when they are lowered back into place.

Throughout the jacking operation, all jacks shall be connected to the hydraulic system in order to maintain the exact same amount of pressure on each one.

Hydraulic pressure shall be continuously monitored in order to prevent pressure from exceeding what was established by the Contractor's engineer/designer for the jacking operation.

During the jacking operation, Contractor shall ensure that none of the members involved in the jacking system crack or become deformed. When necessary, stop work immediately. Contractor shall notify the Parks Canada Representative immediately and any members affected shall be repaired and reinforced as instructed by the Contractor's engineer/designer, subject to authorization from the Parks Canada Representative.

During the jacking operation, Contractor shall ensure that none of the structural members involved crack or become deformed. When necessary, stop work immediately. Contractor shall notify the Parks Canada Representative immediately and any members affected shall be repaired as directed by the Parks Canada Representative.

Height of the temporary support shall be adjusted by adding shims as each element is jacked up. Shim thickness shall be such that the height between the top of the temporary support and the bottom of the element being jacked is never greater than 1.5 mm.

Components that have been jacked up may not be lowered until the Contractor's engineer/designer has received written authorization from the Parks Canada Representative.

Before lowering the deck onto the new bearing devices, the Contractor shall verify the elevation of the bearing devices in the presence of the Parks Canada Representative; any anomalies observed shall be remedied.

3.5 *Field Quality Control*

Manufacturer's Field Services

- Schedule site visits at the following stages:
 - After delivery and storage of products, and when preparatory work, or other work, on which the work of this section depends, is complete but before installation begins.
 - Once during progress of work, at 60% completion.
 - Upon completion of the work, after cleaning is carried out.

3.6 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 - Cleaning. Leave work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

FRAMEWORK

Section 06 10 00

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1.0 GENERAL

1.1 *Related Requirements*

This section addresses work that may be performed in conjunction with the following sections:

Section 03 10 00	Concrete Formwork
Section 03 20 00	Concrete Reinforcing
Section 33 00 00	Cast-in-Place Concrete
Section 05 12 23	Structural Steel for Bridges

1.2 *Measurement for Payment*

Include materials and work required under this section in lump sum amount bid for the « Framework » and « Wood Foundation » packages, depending on the nature of work. This lump sum amount for each structure shall also include the following:

- Supply of anchors, hardware, geotextile and aggregates for the filling of the caisson;
- Supply, fabrication, transportation and implementation of wooden components for bridge deck and safety (guardrails and curbs);
- Preservative treatment of wood, when required;
- Supply, fabrication, transportation and installation of chemical or mechanical anchors associated with Framework;
- Drawings and surveys;
- Fabrication, installation and loading of the wood foundation caissons;
- All incidental expenses.

1.3 *References*

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG).
- Cahiers des Normes – Ouvrages routiers, Tome VII « Matériaux » Chapitre 11 – Bois (Book of Standards – Road Structures, Tome VII, “Materials”, Chapter 11 – Wood).

ASTM International:

- ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood

CSA International:

- CSA B111-1974 R1998, Wire Nails, Spikes and Staples
- CSA O112.9-10 R2014, Evaluation of Adhesives for Structural Wood Products (Exterior Exposure)
- CSA O141-05 (C2009), Softwood Lumber
- CAN/CSA-O325-07, Construction Sheathing
- CAN3-080, Wood Preservation
- Standard Grading Rules for Canadian Lumber, 2008

1.4 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical data sheets:

- Submit the required manufacturer material safety data sheets, instructions and documentation for the wood and accessories, and include product characteristics, performance criteria, physical size, finish and limitations.

Whenever wood is delivered, Contractor shall submit to the Parks Canada Representative, at least seven (7) days prior to its use, a certificate of compliance containing the following information for each production lot:

- Species of treated wood and density (kg/m^3)
- The distinctive stamps used to differentiate between first and second grade lumber
- The proportion of sides made of heart and sapwood
- Name and member number of the recognized grading agency.
- Nominal dimensions in mm and quantity of pieces in the production batch
- Storage or shipment location

Assembly plan:

In the case of a caisson, Contractor shall submit to the Supervisor, at least seven (7) days prior to start of work, an assembly plan indicating the length and location of the pieces of wood composing the caisson.

1.5 Quality Assurance

Lumber identification: grade stamp from an agency certified by Canadian Lumber Standards Accreditation Board.

When a Contractor sources from a distributor who does not have an ISO 9001: 2008, "Quality Management Systems" registration certification, Contractor shall submit the manufacturer's certification to Parks Canada Representative. Moreover, Contractor shall demonstrate that the distributor has not transformed the product in any way, such that the certificate of compliance remains valid as it was when the product was manufactured.

1.6 Delivery, Storage, and Handling

Deliver, store and handle materials in accordance with manufacturer's written instructions.

Delivery and acceptance requirements: Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

Storage and handling:

- Store materials off the ground in clean, dry, well-ventilated area, and in accordance with the manufacturer's recommendations.
- Store and protect wood from nicks, scratches, and blemishes.
- Replace defective or damaged materials with new.

2.0 PRODUCTS

2.1 *Wood Framing and Structural Components*

Lumber:

- Softwood, S4S (surfaced on 4 sides), moisture content 19% (S-dry) or less in accordance with following standards:
- CSA O141 and standard 11101 of the Ministère des Transports du Québec
- NLGA Standard Grading Rules for the Canadian Lumber.

Framing wood:

- Decking cross beams: Grade 1 or better, hemlock only.
- Square posts and timbers for caisson: Grade 1 or better, hemlock only.
- Other pieces of wood: Grade 1 and less than 35% grade 2 or better, hemlock only.

No wane (lack of wood) is permitted on upper corners of planks that form the traveling surface.

2.2 *Accessories*

Hardware for Wood:

Bolts and threaded rods used to assemble pieces of wood compliant with the Ministère des Transports du Québec's Standard 6201.

Bolts shall be grade A and compliant with ASTM A307, "Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength"; threaded rods shall be grade 36 and compliant with ASTM F1554, "Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength".

Steel pins shall comply with the Ministère des Transport du Québec's standard 6101; steel grade shall be 260 W. The leading end of the pins shall be beveled, tapered or hemispherical.

Unless otherwise indicated in the drawings and specifications, minimum outer diameter of washers or minimum side dimensions of the plates shall be equal to four (4) times the diameter of bolt used. Minimum thickness of washers and square plates shall be 4 mm.

All hardware used to assemble pieces of wood (bolts, threaded rods, pins and lag bolts) shall be galvanized.

Nails: to CSA B111.

Bolts: complete with nuts and washers, diameter indicated on the drawing.

Fastener Finishes:

Galvanized metal: to ASTM A123/A123M, for exterior wood structures.

Wood Preservatives:

No wood preservatives permitted. All wooden elements shall be made of hemlock wood unless otherwise indicated.

Geotextile for Wood Caissons:

Geotextiles shall be type V and comply with standard 13101 of the Ministère des Transports du Québec. It shall be non-woven needle-punched and have a puncture resistance greater than 2930 N. Tensile strength shall not be less than 1050 N.

Caisson Fill Materials:

Granular material shall be 100-200 caliber and comply with BNQ 2560-114, "Travaux de génie civil – Granulats", "Partie II: Fondation, sous-fondation, couche de roulement et accotement", (Civil Engineering Work - Aggregates, Part II - Materials for Granular Base, Subgrade, Surface Course and Shoulder), once materials have been put in place.

Surface course above caissons shall be MG-20 type with minimum thickness of 400 mm.

3.0 EXECUTION

3.1 Examination

Verification of conditions: Verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.

- Visually inspect substrate in presence of Parks Canada Representative.
- Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
- Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Parks Canada Representative.

3.2 Installation

Install members true to line, levels and elevations, square and plumb.

Construct continuous members from pieces of longest practical length.

Select exposed framing for appearance. Install lumber materials so that grade marks and other defacing marks are concealed.

Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

Countersink bolts where necessary to provide clearance for other work.

Bolts, lag bolts and threaded rods shall include steel washers or plates on each end in contact with assembled pieces of wood.

Pieces of wood assembled with bolts and threaded rods shall be pre-drilled; hole diameter shall be 2 mm larger than the hardware diameter.

When assembling with lag bolts, pins or nails that have a diameter of greater than 6 mm, pieces of wood to assemble shall be pre-drilled; diameter of pilot hole shall be 2 mm smaller than the hardware diameter.

Bolts and lag bolts shall be tightened to ensure proper contact between all pieces assembled.

Wood Caissons:

The inside of an abutment or wall caisson shall be filled with 100-200 size stones. Place stone carefully so as not to damage the wooden caisson pieces and to minimize voids between stones.

Geotextile on rear caisson surface shall be installed loosely to fit contour of wood pieces that compose the surface to be covered. Undertake whatever measures necessary to prevent geotextile from tearing. In the case where geotextile is not continuous, overlap joints by a minimum of 500 mm. Construct the base of the caisson at an elevation such that the top of the bridge deck coincides with the finished level of the road, or with the elevation set by the Parks Canada Representative.

Fill bottom portion of abutment caissons with 100-200 size stones with D50 equal to 150 mm over a thickness of 300 mm; then cover these stones with geotextile. Fill last 400 millimetres with MG 20 type granular material in layers no more than 200 mm thick. Each layer to be compacted to 98% maximum dry density determined in accordance with CAN/BNQ 2501-255, "Soils - Determination of the Water-Density Relation - Modified Effort Compaction Test (2700 kN.m/m³)".

3.3 Stairway and Platform

Contractor shall perform a survey in conjunction with the Parks Canada Representative prior to starting stairway and platform demolition works on the curved bridge structure at km 58.3 – Route Promenade.

Contractor shall provide a drawing of the existing stairway and platform.

Contractor shall also provide the shop drawings to reconstruct as the existing.

3.4 Protection

Protect installed products and components from damage during construction.

Repair damage to adjacent materials caused by rough carpentry installation.

3.5 Clean Up

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

Leave Work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

**MODIFIED BITUMINOUS
SHEET WATERPROOFING**

Section 07 13 52

**MODIFIED BITUMINOUS
SHEET WATERPROOFING**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
Mauricie National Park
V/REF.: 45353174

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**MODIFIED BITUMINOUS
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1.0 GENERAL

1.1 *Related Requirements*

Section 02 41 13.14 Asphalt Pavement Removal

Section 02 41 16 Structure Demolition

1.2 *Measurement for Payment*

The manufacturing, supply and installation of the waterproofing elements with modified bitumen membrane are paid by the lot of waterproofing membrane. The price must include all materials and work prescribed in this section, for each structure, and in particular cover the following:

- The correction of existing surface is required;
- The cleaning of the surface;
- The provision, manufacture, transport and implementation of all waterproofing membrane elements and flashing without addition to overlapping and flashings;
- Any incidental expense.

1.3 *Description*

Primary work covered by this section is as follows:

- Correction of concrete slab surfaces with cement mortar
- Cleaning of concrete surfaces prior to application of the waterproofing membrane and self-adhesive joint membrane
- Application of tack coat on surfaces to be waterproofed
- Application of waterproofing membrane on concrete bridge slab surfaces (including flashing installation)
- Application of a self-adhesive joint membrane to re-seal between the backwall and approach span
- Application of a self-adhesive joint membrane to re-seal along backwall demolition line.

**MODIFIED BITUMINOUS
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1.4 References

Ministère des Transports du Québec:

- MTQ – Cahier des charges et devis généraux (CCDG) (Book of General Specifications)
- MTQ – Normes – Ouvrages routiers – Tome VII Matériaux, Chapitre 3. Bétons de ciment et produits connexes, Norme 3701 « Membranes d'étanchéité » et Norme 3801 « Mortiers cimentaires en sac ». (Standards – Road Structures – Tome VII Materials, Chapter 3. Cementitious Concrete and Related Products, Standard 3701, “Waterproofing Membranes” and Standard 3801, “Bagged Cement Mortars”.

(ASTM) ASTM International:

- ASTM E965 – Standard Test Method for Measuring Pavement Macrot texture Depth Using a Volumetric Technique
- ASTM D6506-01 Standard Specification for Asphalt Based Protection for Below-Grade Waterproofing

1.5 Action and Informational Submittals

Submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical Data Sheets

- Submit two (2) copies of most recent technical data sheets at least seven (7) days in advance. These data sheets must describe the materials' physical properties, and contain explanations about membrane application specifying: application method, restrictions, limitations and other manufacturer recommendations.
- Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets.
- Manufacturer's installation instructions: Indicate special precautions required for seaming the membrane.

**MODIFIED BITUMINOUS
SHEET WATERPROOFING**

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1.6 Delivery, Storage, and Handling

Provide and maintain dry, off-ground weatherproof storage.

Store membrane in upright position with selvage edge up.

Store waterproofing materials in accordance with manufacturer's written instructions, to prevent damage or loss of performance.

Once waterproofing membrane application is complete, no vehicle traffic is permitted on membrane except for those used to lay the asphalt pavement.

Place plywood runways over completed Work to enable movement of material and other traffic.

2.0 PRODUCTS

Cement Mortar

Cement mortar conforms to the Ministère des Transports du Québec's Standard 3801, "Mortiers cimentaires en sac" (Bagged Cement Mortar).

Tack Coat

Tack coat shall be composed of an asphalt-based coating modified by an SBS (Styrene Butadiene Styrene) polymer, with a minimum content of 8% of the volume.

Waterproofing Membrane

Membrane composed of non-woven polyester reinforcement and SBS modified bitumen. Top layer covered with granules and underside covered by a thermofusible plastic film.

SBS (Styrene Butadiene Styrene) elastomer asphalt coating on each side of the synthetic reinforcement.

Top protective layer composed of grey mineral chips applied at a maximum rate of 1.2 kg/m², embedded in the asphalt.

Minimum thickness of pre-fabricated sheet shall be 4.5 mm when measured as a full sheet.

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Flashing

Flashing composed of plastic cement with an SBS polymer asphalt base.

Joint Membrane

Self-adhesive membrane shall have a nominal thickness of 3 mm. The following self-adhesive membranes are the only ones accepted by Parks Canada for this application:

- Sopralene Flam Stick and Colphene HR, available from Soprema Inc. Tel.: 1 (800) 567-1492
- Armourbond 180 available from IKO Ltd. Tel.: (450) 699-6960
- Bakor Modified Plus NP 180 Tack Sheet available from Henry Canada Inc. Tel.: (514) 364-5224

3.0 EXECUTION

3.1 *Planning*

Submit to Parks Canada Representative, at least fourteen (14) days prior to ordering any materials or installing any components, all shop drawings, data sheets and samples of materials to be used within the context of the waterproofing membrane application work in this Contract.

The contractor may not make any modifications to the materials or construction details set forth in the technical data sheets and shop drawings examined by the Parks Canada Representative without prior written authorization.

Contractor shall provide written notice to the Parks Canada Representative at least twenty-four (24) hours in advance, specifying the date and time of installation. Contractor shall schedule work to be performed during a period of time when no rain is forecast, for the entire duration of the work.

Contractor shall plan work so as to ensure there will be no traffic on the waterproofing membrane.

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3.2 Preparation & Cleaning of Concrete Surfaces

When there are existing slab surfaces the Contractor shall clean all concrete slab surfaces, the first 65 millimetres at the bottom of the curb and/or sidewalks, as well as the vertical sides on the ends of the deck using a two (2) step process that includes first an initial cleaning and then a supplemental cleaning step. The initial cleaning shall be performed immediately after the existing pavement and waterproofing membrane are removed. Supplemental cleaning shall be performed no more than 48 hours before application of the waterproofing membrane tack coat, after the concrete used to repair the slab and the mortar applied to correct the slab surfaces have cured.

Initial cleaning shall be performed by wet blasting or high-pressure water jet, removing any laitance, traces of rust on metal portions of the curb and/or sidewalks, embedded debris, curing materials, asphalt residue, etc. Any debris remaining on surfaces cleaned in this manner shall be removed by high-pressure water jet (pressure: 15 MPa, flow rate 20 L/min, with a round pinpoint nozzle, and a nozzle-to-concrete-surface distance of 150 to 200 mm).

Additional deep cleaning of all concrete surfaces shall be performed using steel shotblasting equipment on wheels. Equipment shall be calibrated for maximum blasting intensity. Concrete surfaces shall be dry prior to cleaning. Clean surfaces ensuring they remain smooth and level. Surfaces located along the sidewalks and curbs, over the first 65 millimetres at the bottom of the curbs as well as the vertical sides on the ends of the deck shall be cleaned by dry blasting; water or wet blasting is prohibited. Quality of this cleaning shall be at least equivalent to that obtained by steel shotblasting.

Remove dust and debris with a jet of compressed air immediately prior to applying the tack coat and waterproofing membrane on existing slab and new backwall surfaces. Equipment used for compressed air shall be equipped with a filter that traps oil; filter efficiency shall be demonstrated prior to using the equipment.

Concrete surfaces soiled by oily matter shall be cleaned or repaired.

Traffic on the slab is prohibited from the time the supplemental cleaning work begins, except for vehicles required for membrane application.

3.3 Correction of Slab Surfaces

At the Parks Canada Representative's request, existing slab surfaces shall be corrected by filling voids using a bagged cement mortar or by grinding down rough spots. Slab shall be inspected jointly by the Parks Canada Representative and the Contractor. Curing shall be carried out using a curing material that forms a translucent membrane with a water-based fugitive dye. After curing, and in the Contractor's presence, Parks Canada Representative shall use a hammer to check all surfaces covered with cement mortar. Surfaces that produce a hollow sound, a sign of improper adherence, shall be demolished and re-constructed at the Contractor's expense.

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Bagged cement mortar used to correct surfaces shall have a compressive strength of at least 20 MPa after 24 hours. Before applying the mortar, Contractor shall first outline the surfaces to be treated with a saw cut 10 mm in depth, perpendicular to the concrete surface. Depth of saw cut shall be decreased as needed to prevent damaging reinforcement. Contractor shall then demolish surfaces to a minimum depth of 15 mm using a hand-held pneumatic hammer weighing no more than 7 kg.

Minimum temperature of concrete surfaces to correct shall be 5 °C prior to applying mortar.

Existing slab surfaces to correct shall first be cleaned by wet blasting or high-pressure water jet to remove all laitance, embedded debris, curing materials, asphalt residue or any other materials likely to hinder proper adherence of mortar or asphalt. This cleaning may be omitted if the initial cleaning was performed less than forty-eight (48) before surface correction. Equipment used for wet blasting shall be equipped with a filter that traps oil. Filter efficiency shall be demonstrated prior to using the equipment.

3.4 Surface Examination

A membrane supplier representative shall inspect the surface of the slab and confirm in writing that it meets manufacturer requirements before the Contractor begins the tack coat binder application. Inspection shall be performed in the presence of the Parks Canada Representative and the Contractor.

3.5 Time Frame, Authorized Period, and Weather Conditions

In the case of existing slab surface corrections, tack coat shall be applied forty-eight (48) hours after the mortar has been applied, i.e. after the twenty-four (24) hour mortar-curing period, followed by twenty-four (24) hours without precipitation.

In the case of sidewalk and curb construction or repairs, tack coat shall be applied after a period of twenty-four (24) hours without precipitation, following the end of curing.

In the case of concreting of the new backwalls, tack coat shall be applied after a seven (7) day curing period, plus twenty-four (24) hours without precipitation.

In every case, the period without precipitation begins after curing materials and any stagnant water on the slab are removed.

Waterproofing membrane shall be installed between May 15 and October 15.

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Tack coat or waterproofing membrane application shall only take place when the ambient temperature and concrete temperature, measured in the shade, are higher than 5 °C and rising. Tack coat or waterproofing membrane application shall not start when there is precipitation; if precipitation begins during the application, Contractor shall cease work.

3.6 *Method of Installation*

Install waterproofing membranes on appropriately-primed surfaces.

Waterproofing work shall be completed continuously, as surfaces are readied and weather conditions permit.

Protect adjacent surfaces from damage due to application work. Soiled surfaces shall be cleaned by the Contractor, to the Parks Canada Representative's satisfaction.

Ensure adhesive tape bearing product identification is removed from the membrane rolls.

3.7 *Equipment*

Keep equipment and tools designed for performing waterproofing work in good working order.

Only use types of torches and rollers recommended by the manufacturer.

Use automated membrane installation equipment such as a Mini-Macaden (or equivalent approved by the Parks Canada Representative) that meets the following conditions:

- Installs 1 m x 8 m rolls.
- Features hot air nozzles to weld the membrane.
- Rubber roll that adheres the membrane to the substrate.

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3.8 Tack Coat

Impregnate surface to receive torch-applied membranes with a tack coat designed for heat-welded membranes at a rate of 0.15 to 0.20 litre/m². This rate is calculated before solvent or water evaporation. Tack coat shall be as specified by the waterproofing membrane manufacturer; in the case of existing slab surfaces or new slab surfaces that were temporarily covered, tack coat shall be water-based. Contractor shall protect sidewalks, curbs, handrails, guardrails, deck joints, etc. from splashing using tarps or any other appropriate material; tack coat shall be applied with a roller along these components over a minimum width of 600 mm. Contractor shall clean surfaces that have been soiled during the work. Tack coat shall be applied by roller, brush or sprayer.

Primer shall be dry prior to applying the membrane.

3.9 Waterproofing Membrane Application

Unroll membrane parallel to longitudinal axis of the structure. Unroll strips in direction of traffic.

Torch weld membrane to concrete substrate that was prepared beforehand with a tack coat.

Torch welding parameters shall be adapted to suit relief of surfaces to cover as well as weather conditions (wind speed, temperature, etc.), so as to obtain, throughout entire application process, a bead of melted bitumen a minimum of 20 mm wide in front of the membrane roll, and an overlap of bitumen along the joints.

Install waterproofing membrane on clean and dry surfaces, a minimum of twelve (12) hours but no more than twenty-four (24) hours after application of the tack coat.

Waterproofing membrane shall be installed beginning at the lowest points and moving toward the highest point of the cross-section. Transverse joints shall be offset so as to ensure no more than three (3) membrane thicknesses are overlapped at any point. Overlap longitudinal joints by 75 mm and transverse joints by 150 mm. Membrane shall be installed as close as possible and no more than 15 mm from curbs, sidewalks, guardrails, drains and deck joints.

Once membrane application is complete, flashing composed of plastic cement with an SBS (Styrene Butadiene Styrene) polymer modified asphalt base shall be installed along curbs and sidewalks.

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After each membrane strip is installed, improperly-welded overlapping joints shall be re-welded. Once installation is complete, membrane shall be carefully inspected; air pockets and wrinkles shall be lanced and covered with a piece of membrane extended at least 100 mm around the membrane repair area.

3.10 Self-Adhesive Joint Membrane

A tack coat shall be applied at a rate of 0.15 L/m² on surfaces to be covered with the self-adhesive membrane. Tack coat shall be as specified by the membrane manufacturer. Apply membrane to clean and dry surfaces, a minimum of twelve (12) hours but no more than twenty-four (24) hours after application of the tack coat.

Self-adhesive joint membrane shall be applied, following concreting of concrete surfaces to be covered with the membrane, following a minimum period of fourteen (14) days, i.e. seven (7) days of concrete curing, followed by six (6) days after all curing materials have been removed, and a twenty-four (24) hour period without precipitation.

The twenty-four (24) hour period begins after all stagnant water has been removed from the surfaces. This fourteen (14) day period may be reduced if the tack coat is applied after a period of three (3) consecutive days without precipitation after all curing materials have been removed, as well as any stagnant water following precipitation. This period of time, however, may not be less than ten (10) days following concreting.

Contractor shall heat surfaces to be covered using a propane torch immediately prior to membrane application.

3.11 Minimum Requirements for Surface Course

Surface course of asphalt concrete shall be laid within a maximum of seventy-two (72) hours after installation of the waterproofing membrane.

Pavement temperature at time of application shall be a minimum of 140 °C at point of contact with the membrane.

Any cracks that appear after the roller has made its initial pass indicates that bubbles have formed between the surface and the membranes. When this occurs, Contractor shall immediately cut into bubble with a sharp tool at a 45 ° angle to ensure that when the roller makes its next pass, the air caught in the bubble shall be released and the heat from the pavement will help to adhere the membrane to the surface.

Minimum thickness of asphalt pavement after compaction: 75 mm.

END OF SECTION

ROUGH GRADING

Section 31 22 13

ROUGH GRADING

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1.0 GENERAL

1.1 *Related Requirements*

Section 31 24 13 Roadway Embankments

1.2 *Measurement for Payment*

The following rough grading work shall be included in a lump sum payment as set forth in Section 31 24 13 – Roadway Embankments:

- Reshaping of existing granular roadbed
- New granular material for base course
- Water used for compacting
- Supply and application of water for dust control
- Supply and application of calcium chloride for dust control
- Compacting of materials
- Repair of soft areas
- Preparation of sub-grade for placing of topsoil.
- Stripping of topsoil
- Stockpiling of topsoil

1.3 *References*

Ministère des Transports du Québec:

- Cahier des charges et devis généraux issued by the Ministère des Transport du Québec, most recent edition
- Cahiers des normes, ouvrages routier, Tome II “Construction Routière”, dernière édition. (Book of Standards – Road Structures, Tome II, “Road Construction”, most recent edition)

1.4 *Action and Informational Submittals*

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.5 *Existing Conditions*

Refer to paragraph about dewatering in Section 31 23 33.01 - Excavating, Trenching and Backfilling.

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2.0 PRODUCTS**2.1 Grading Materials**

Fill material: Type B in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

Excavated or graded material existing on site may be suitable to use as fill for grading work if approved by Parks Canada Representative.

2.2 Materials

Granular base course material: to Section 31 05 16 - Aggregate Materials and following requirements:

- Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material and other deleterious materials.
- Gradation: within limits specified hereafter, when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.
- Gradation requirements

Sieve Designation	% Passing
100 mm	-
75 mm	-
50 mm	-
38.1 mm	-
25 mm	-
19 mm	100
12.5 mm	70-100
9.5 mm	-
4.75 mm	40-70
2.00 mm	23-50
0.425 mm	7-25
0.180 mm	-
0.075 mm	3-8

- Los Angeles Degradation: to ASTM C131, maximum % loss by weight: 45.
- Crushed particles: at least 50% of particles by mass within 19.0 mm to 4.75 mm sieve designation range to have at least 1 freshly fractured face. Material divided into ranges using methods set forth in ASTM C136.

3.0 EXECUTION

3.1 Examination

Verification of conditions: Prior to beginning rough grading work, verify that condition of substrates previously installed under other sections or contracts are acceptable for performing work in accordance with manufacturer's written instructions.

- Visually inspect substrate in presence of Parks Canada Representative.
- Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
- Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Parks Canada Representative.

3.2 Stripping of Topsoil

Do not handle topsoil while in wet or frozen condition or in any manner which, in the opinion of the Parks Canada Representative, could alter soil structure.

Commence topsoil stripping of areas as directed by Parks Canada Representative after brush has been cleared and removed from site.

Strip topsoil to depths as indicated by Parks Canada Representative. Avoid mixing topsoil with subsoil.

Stockpile in locations as directed by Parks Canada Representative. Stockpile height not to exceed 2.5 m.

3.3 Temporary Erosion and Sedimentation Control

Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. These measures shall comply with requirements of local authorities having jurisdiction.

Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.4 Grading

Rough grade to levels, profiles, and contours allowing for surface treatment as indicated. Grade ditches to depth required for maximum run-off as directed.

Prior to placing fill over existing ground, scarify surface to depth of 150 mm. Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

Compact filled and disturbed areas to corrected maximum dry density determined in accordance with ASTM D698, i.e.:

- 95% under paved and sidewalk areas.

Do not disturb soil within branch spread of trees or shrubs to remain.

Verify that grades are correct.

- If discrepancies occur, notify Parks Canada Representative and do not commence work until instructed by Parks Canada Representative.

Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

Remove debris, roots, branches, stones in excess of 50 mm in diameter and other deleterious materials.

- Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
- Remove debris that protrudes more than 75 mm above surface.
- Dispose of removed material off-site.

Cultivate entire area to receive topsoil to minimum depth of 100 mm.

- Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.5 Reshaping Work

Scarifying and Reshaping

- Scarify roadbed to width as indicated unless otherwise directed by Parks Canada Representative and to minimum depth of 100 mm.
- Where deficiency of material exists, add and blend in new granular base material as directed by Parks Canada Representative. Do not place frozen material.

Compaction Equipment

- Compaction equipment shall be capable of obtaining required material densities.
- Provide Parks Canada Representative with proof of equipment efficiency for unspecified equipment.
 - Efficiency of proposed equipment equal to specified equipment.
 - Obtain approval from Parks Canada Representative before using proposed equipment.

Compaction

- Compact to density of not less than 95% corrected maximum dry density, in accordance with ASTM D698.
- Shape and roll alternately to obtain smooth, even and uniformly-compacted base.
- Apply water as necessary during compaction to obtain specified density.

Repair of Soft Areas

- Correct soft areas by removing defective material to depth and extent directed by Parks Canada Representative. Replace with material acceptable to Parks Canada Representative and compact to specified density.
- Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until acceptance by Parks Canada Representative.

3.6 *Placing Topsoil*

Place topsoil only after Parks Canada Representative has accepted bedding.
Spread topsoil during dry conditions by backhoe in uniform layers not exceeding 250 mm, over unfrozen bedding free of standing water.
Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.
Cultivate soil following spreading procedures.

3.7 *Tolerances*

Reshaped compacted surface within plus or minus 10 mm of elevation as indicated.

3.8 *Testing*

Inspection and testing of soil compaction shall be carried out by testing laboratory designated by ULC. Costs of tests shall be paid by Owner.
Submit testing procedure, frequency of tests, and testing laboratory as designated by ULC or certified testing personnel to Parks Canada Representative for review.

3.9 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

- Leave Work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Clean Up.

3.10 *Protection*

Protect and/or transplant existing fencing, trees, natural features, bench marks and pavement that are to remain, as directed by Parks Canada Representative. If damaged, restore to original or better condition unless directed otherwise.

Maintain access roads to prevent accumulation of construction-related debris on roads.

END OF SECTION

ROADWAY EMBANKMENTS

Section 31 24 13

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1.0 GENERAL**1.1 Section Content**

Works consist in excavating the soil around the existing abutments in accordance with the phases and limits indicated on the drawings, and in backfilling the excavations upon completion of the works on these same foundation units. Works shall be performed in accordance with article 15.2 of the CCDG.

1.2 Related Requirements

Section 01 35 43	Environmental Procedures.
Section 02 41 13.14	Removal of Asphalt Pavement

1.3 Measurement for Payment

Payment for items set forth in this section will be part of a lump sum for the various items listed on the pay items table for each structure. Lump sum prices shall include the following items, depending on the nature of work:

- Saw cuts to outline the work areas and phases
- Excavation and backfilling with MG 20b, MG-20 and MG-112 granular materials, as indicated on the drawings
- Transition layout
- Stockpiling of materials for future use
- Hauling materials
- Roadway fill for road banks (MG-20b)
- Finishing ;
- All incidental expenses.

1.4 References

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG)
- Cahier des Normes, Ouvrages routiers, Tome II « Construction routière » et Tome VII « Matériaux », chapitre 2 - Granulats (Book of Standards – Road Structures, Tome II, “Road Construction”, most recent edition and Tome VII, “Materials”, chapter 2, Aggregate Materials)

Bureau de normalisation du Québec (BNQ) (Most recent edition)

- NQ 2501-255: Sols - Détermination de la relation teneur en eau-masse volumique - Essai avec énergie de compactage modifiée (2 700 kN.m/m³)

(Soils - Determining the Water Content / Density Ratio - Testing with Modified Compaction Energy (2700 kN.m/m³))

- Standard NQ 2560-114 "Travaux de génie civil – Granulats", "Partie II : Fondation, sous-fondation, couche de roulement et accotement" (Civil Engineering Works – Aggregates", "Part II: Base, Subbase, Surface Course and Road Bank")

1.5 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical Data Sheets

- Submit the required manufacturer material safety data sheets, instructions and documentation for aggregates, include product characteristics, performance criteria, and dimensions.

Samples

- Provide Parks Canada Representative with access to source and processed material for sampling.
- Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

Prior to start of excavation works, Contractor shall submit the detailed drying and temporary support methods (according to phases) to Parks Canada Representative for verification and approval.

1.6 Delivery, Storage, and Handling

Deliver, store and handle materials in accordance with manufacturer's written instructions.

Delivery and handling: Deliver and handle aggregates to avoid segregation, contamination and degradation.

Storage: Store washed materials or materials excavated from water for at least 24 hours to allow enough time for the free water to drain out and equalize water content.

1.7 Quality Assurance

Regulatory Requirements

- Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.

2.0 PRODUCTS

2.1 Granular Materials

Granular material shall be composed of natural, non-plastic soils such as sand or crushed stone of graduated size, as stipulated in the specifications. This materials shall comply with the Ministère des Transport du Québec’s standards 2101 and 2102, regarding aggregate grade size as well as physical and mechanical properties. Materials shall be pre-approved by the Laboratory and Parks Canada Representative.

Stone diameter not to exceed one-third of the thickness of the base layer or 112 mm.

- Granular material used shall meet requirements set forth in MTQ 2102:
- MG-112 class granular material or sand may also be used in embankment and in backfilling excavations.
- Granular material grading ranges shall meet the requirements set out in Table 1 - “Granular material grading range”, and the granular material’s physical properties shall meet the requirements set out in Table 2 - “Physical properties of aggregate materials for the roadway infrastructure and base”.
- Compliance: Any granular material that does not meet the aforementioned requirements shall be refused and replaced with materials that meet these requirements.

Table 1 - Granular material grading range

Granular Materials	Sieve (mm)									Sieve (µm)			
	112	80	56	31.5	20	14	10	5	1.25	630	315	160	80
(% passing)													
MG-20	-	-	-	100	90-100	69-93	-	35-60	19-38	-	9-17	-	2-7*
MG-20b	-	-	-	100	90-100	69-93	-	35-60	19-38	-	9-17	-	5-11
MG-112	100	-	-	-	-	-	-	12-100	-	-	-	-	0-10

* To follow before and after compaction

Table 2 - Physical properties of aggregate materials for the roadway infrastructure and base

Designation	Physical Properties					
	Max. Organic Matter (%)	Micro-Deval (MD) (%)	Min. Fragmentation	Los Angeles (LA) (%)	Max. (%)	Blue Value
	Standard					
	LC 31-228	NQ 2560-070	LC 21-100	BNQ 2560-400	MD + LA	BNQ 2560-255
MG-20	0.8	35	50	50	80	0.2
MG-20b	0.8	35	50	50	85	0.2
MG-56	0.8	35	50	50	80	0.2
MG-112	0.8	40	-	50	85	0.2

2.2 Embankment Materials

- Embankment materials require Parks Canada Representative’s approval. Derived from excavated materials and used under the roadway infrastructure line.
- All materials that are compactible and to MTQ 1101 standard may be used if they meet the requirements set forth in MTQ’s CCDG article 11.6.1, except for organic soil, contaminated soil and frozen soil.
- Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.

2.3 Source Quality Control

Inform Parks Canada Representative of proposed source of aggregates and provide access for sampling at least four (4) weeks prior to commencing production.

If materials from proposed source do not meet, or cannot reasonably be processed to meet specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

Notify Parks Canada Representative at least four (4) weeks in advance of proposed change of material source.

Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

3.0 EXECUTION

3.1 *Excavation*

General

- Notify Parks Canada Representative when any type of waste materials are encountered and remove to depth and extent directed.
- Remove reworked materials at bottom of excavations and keep excavation areas dry for the duration of the work.
- Replace excavated materials with approved embankment materials and compact to required embankment density.

3.2 *Examination*

Verification of conditions: Ensure condition of substrate is suitable for roadway embankment work. Before placing the granular base layer, verify conditions of substrates previously installed under other sections or contracts are acceptable for performing work in accordance with manufacturer's written instructions:

- Visually inspect substrate in presence of Parks Canada Representative.
- Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
- Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Parks Canada Representative.

3.3 *Placement of Subbase Course*

Place subbase layer materials after bottom of excavation has been inspected and approved in writing by Parks Canada Representative.

Subbase materials are defined and placed in accordance with article 12.2 of the CCDG. Contractor shall supply certificate of compliance for materials, in accordance with article 12.2.2.1 of the CCDG.

Placement

- Construct granular subbase layer to depth and grade in areas indicated.
- Ensure no frozen material is placed.
- Place material only on clean unfrozen surface, free from snow or ice.
- Begin spreading subbase material on crown line or high side of one-way slope.
- Place material using methods which do not lead to segregation or degradation of aggregate.
- For spreading and shaping material, use spreader boxes with adjustable templates or screeds that will place material in uniform layers of required thickness.
- Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - Parks Canada Representative may authorize thicker lifts if specified compaction can be achieved.
- Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- Remove and replace portion of layer in which material has become segregated during spreading.

Compaction

- Compact to density of not less than 95% corrected maximum dry density, in accordance with ASTM D698 and ASTM D1557.
- Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- Apply water as necessary during compaction to obtain specified density.
- Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

Finished subbase surface to be within 10 mm above or below established grade and cross section but not uniformly high or low.

3.4 Placement of Granular Base Course

Place granular base course after subbase course has been inspected and approved by Parks Canada Representative.

Base course materials are defined and in accordance with article 12.3 of the CCDG. Contractor shall supply certificate of compliance for materials, in accordance with article 12.3.2.2 of the CCDG.

Construct granular sub-base to depth and grade in areas indicated.

Ensure no frozen material is placed.

Place material only on clean unfrozen surface, free from snow or ice.

Begin spreading granular base material on crown line or high side of one-way slope.

Place granular base materials using methods which do not lead to segregation or degradation.

Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

- Parks Canada Representative may authorize thicker lifts if specified compaction can be achieved.

Shape each layer to smooth contour and compact to specified density before pavement course is placed.

Remove and replace portion of layer in which material has become segregated during spreading.

Compaction

- Compaction equipment to be capable of obtaining required material densities.
- Compact to density of not less than 98% corrected maximum dry density, in accordance with ASTM D698 and ASTM D1557.
- Shape and roll alternately to obtain smooth, even and uniformly compacted granular base.
- Apply water as necessary during compaction to obtain specified density.
- Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

Maintain finished granular base in condition conforming to this section until succeeding layer is constructed, or until acceptance of work by Parks Canada Representative.

3.5 Placement of Granular Topping on Road Banks

Place MG-20b type granular topping to minimum thickness indicated.

Place material in uniform layers not to exceed 50 mm compacted thickness.

- Compact layer to 100% Standard Density in accordance with ASTM D698.

3.6 Compaction Equipment

Compaction equipment: vibrating roller compactors or vibrating plate compactors capable of compacting materials to required density.

- Demonstrate effectiveness of compaction equipment on prescribed materials and thickness of lifts by documenting performance on a test area prior to starting work.
- Replace equipment or use additional equipment if that which is used does not compact to required density.

Operate compacting equipment continuously over each embankment course constructed.

3.7 Water Applicators

Apply water with equipment capable of uniform distribution.

3.8 Compaction

Place, spread and level embankment materials in layers no more than 300 mm thick before compaction.

- Compact each embankment layer until compaction equipment has completely stabilized the materials.

- Compact each layer before placing succeeding layer.

Use specialised compaction equipment, as well as alignment, transport and levelling equipment for each embankment layer.

Obtain written authorization from the Parks Canada Representative before using special compaction equipment such as tamping rollers, vibrating roller compactors or other compaction equipment that provides necessary results.

- Use tamping rollers with tamping foot that provides at least 1000 kPa pressure on the surface to be tamped, in transverse rows.

Compact each layer to minimum 95% maximum dry density, ASTM D698 (AASHTO T99), except top 150 mm of subgrade.

- Compact top 150 mm to 100% maximum dry density.

Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.9 Finishing

Shape entire roadbed to within 50 mm of design elevations.

3.10 Clean Up

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

END OF SECTION

ASPHALT PAVEMENT

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ASPHALT PAVEMENT

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
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1.0 GENERAL

1.1 *Section Content*

Work consists in recovering the bridge and approach slabs with hot-mix pavement. Pavement thickness is indicated on the drawings.

1.2 *Related Requirements*

Section 07 13 52	Modified Bituminous Sheet Waterproofing
Section 31 24 13	Roadway Embankments
Section 31 22 13	Rough Grading

1.3 *Measurement for Payment*

The manufacturing, supply and installation tar pavement elements are paid in lump sum amount, as indicated in the paid items table « Bituminous Pavements. » The price must include all materials and work prescribed in this section, for each structure, and in particular cover the following:

- The provision and implementation of bituminous pavement including the attachment binder;
- Any incidental expense.

1.4 *References*

Ministère des Transports du Québec (MTQ)

- Cahier des charges et devis généraux (CCDG).
- Cahier des Normes, Ouvrages routiers, Tome II « Construction routière » et Tome VII « Matériaux », chapitre 4, Liants et Enrobés Bitumineux (Book of Standards – Road Structures, Tome II, “Road Construction”, most recent edition and Tome VII, “Materials”, chapter 4, Bituminous Binders and Pavement)

BNQ Standards, series 2560 regarding aggregates

Canadian General Standards Board (CGSB)

- CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series
- CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric
- CAN/CGSB-16.3, Asphalt Cements for Road Purposes

1.5 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical Data Sheets

- Submit the required manufacturer material safety data sheets, instructions and documentation for asphalt mixtures and aggregates, and include product characteristics, performance criteria, physical size, finish and limitations.
- Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C four (4) weeks prior to beginning Work.

1.6 Quality Assurance

Upon request by Parks Canada Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this section.

1.7 Delivery, Storage, and Handling

Deliver, store and handle materials in accordance with manufacturer's written instructions.

Deliver, store and handle materials in accordance with ASTM D140.

2.0 PRODUCTS

2.1 Asphalt Pavement Materials

Performance graded asphalt cement: to AASHTO M320, grade PG-58-34 when tested to AASHTO R29.

Hot-mix asphalt shall comply with requirements set forth in article 13.3, "Enrobé préparé et posé à chaud" (Hot Mix Asphalt Pavement) of the CCDG. Pavement shall also comply with requirements set forth in article 15.11 "Revêtement en enrobé" (Asphalt Pavement) of the CCDG for the types of mix to use.

Aggregate materials and bitumen to be used in the pavement mix design for bridge approaches are as follows:

- Coarse aggregate with intrinsic category 3 characteristics and category c manufacturing characteristics
- Fine aggregate with intrinsic category 2 characteristics
- PG 58-34 performance class bitumen, ESG-14 type

Aggregate materials and bitumen to be used in the pavement mix design for the bridge are as follows:

- Coarse aggregate with intrinsic category 3 characteristics and category c manufacturing characteristics
- Fine aggregate with intrinsic category 2 characteristics
- PG 58-34 performance class bitumen, ESG-10 type

Bitumen to be used in the pavement mix design shall comply with the Ministère des Transport du Québec's standard 4101.

Bitumen used shall be produced by a manufacturer that has a registration certificate proving its quality system meets ISO 9001: 2000 standard requirements.

2.2 Asphalt Tack Coat Materials

The asphalt emulsion shall be type cationic CRS-1h only, in accordance with standard 4105 found in the MTQ's tome VII. Residual asphalt rate indicated in article 13.2.4 of the CCDG is a minimum.

Asphalt binder applied to the slab shall comply with requirements set forth in article 13.2, "Liant d'imprégnation ou d'accrochage" (Asphalt Binder or Tack Coat) of the CCDG. Binder to use shall be an asphalt emulsion, i.e. water-based. Do not use a cutback asphalt-based binder that could damage the waterproofing membrane, reduce "membrane-pavement" bond or result in bleeding.

2.3 Asphalt Pavement Equipment

Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.

Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

Vibrating roller compactors (for roadway only):

- Cylinder diameter: 1200 mm.

Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

- Boxes with tight metal bottoms.
- Covers of sufficient size and weight to completely cover and protect asphalt mix when truck is fully loaded.
- In cool weather or for long hauls, insulate entire contact area of each truck box.
- Use only trucks which can be weighed in single operation on scales supplied.

Hand tools:

- Lutes or rakes with covered teeth for spreading and finishing operations.
- Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Parks Canada Representative, may be used instead of tamping irons.
- Straight edges, 4.5 m in length, to test finished surface.

2.4 Asphalt Tack Coat Equipment

Equipment required to perform work set forth in this section shall be in good working order and properly maintained throughout the duration of the work.

Pressure Distributor

- Designed, equipped, maintained and operated so that asphalt material can be:
 - Maintained at even temperature.
 - Applied uniformly on variable widths of surface up to 3 m.
 - Applied at pre-determined and controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and with a tolerance not exceeding 0.1 L/m².
 - Distributed in uniform spray without atomization at temperature required.
- Equipped with meter that registers metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application of asphalt tack coat at specified rate.
- Equipped with pump with a graduated flow meter in units of 5 L or less of asphalt tack coat material passing through nozzles per minute, and readily visible to operator. Pump power unit to be independent of truck power unit.
- Equipped with an easily read, accurate and sensitive device that registers temperature of liquid in reservoir.
 - Measure temperature to nearest whole degree.
- Equipped with accurate volume-measuring device or calibrated tank.

- Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- Equipped with nozzle spray bar, with operational height adjustment at increments of 0.6 m up or down.
- Cleaned if previously used with incompatible asphalt material.

3.0 EXECUTION

3.1 *Examination*

Verification of conditions: Prior to installing asphalt pavement, verify that condition of substrates previously installed under other sections or contracts are acceptable for asphalt pavement in accordance with manufacturer's written instructions.

- Visually inspect substrate in presence of Parks Canada Representative.
- Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.
- Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Parks Canada Representative.

3.2 *Preparation*

Reshape granular roadbed in accordance with Section 31 24 13 - Roadway Embankments.

Before applying pavement, apply tack coat.

Prior to laying mix, clean surfaces of loose and foreign material.

3.3 *Asphalt Tack Coat Application*

Apply asphalt tack coat only on clean and dry surface.

Dilute asphalt emulsion with water at 1:1 ratio for application.

- Mix thoroughly by pumping or other method approved by Parks Canada Representative.

Apply asphalt tack coat evenly to pavement surface at rate between 0.2 L and 0.3 L/m², but not exceeding 0.5 L/m².

Paint contact surfaces of sidewalks, curbs, manholes and like structures with thin, uniform coat of asphalt tack coat material.

Apply asphalt tack coat when air temperature is above 10 degrees Celsius or when rain is not forecast within two (2) hours following application.

Apply asphalt tack coat only on unfrozen surface.

Evenly distribute localized excessive deposits of tack coat by sweeping as directed by Parks Canada Representative.

Where traffic is to be maintained, treat no more than one half of width of surface with asphalt tack coat in one application.

- Regulate traffic in accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

Keep traffic off tacked areas until asphalt tack coat has set.

Re-tack contaminated or disturbed areas as directed by Parks Canada Representative.

Permit asphalt tack coat to set before placing asphalt pavement.

Inspect asphalt tack coat applied to ensure evenness.

- Using a sprayer, spread tack coat bitumen wherever layer is too thin or uneven, as directed by Parks Canada Representative.

Ensure tack coat spread using hand tools has the same appearance as adjacent areas where it was applied by machine.

3.4 Hauling Mix

Transport mix to job site in vehicles cleaned of foreign material.

Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required.

- Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

Schedule delivery of material for placing in daylight, unless Parks Canada Representative approves artificial light for placing at night.

Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.

- Do not dribble mix into trucks.

Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

Deliver loads continuously in covered vehicles and immediately spread and compact.

- Deliver and place mixes at temperature within range as directed by Parks Canada Representative, but never less than 135 degrees C.

3.5 *Placing Asphalt Concrete*

Existing surface to be approved by Departmental Representative prior to placing asphalt concrete.

Place asphalt concrete to thicknesses, grades and lines as indicated on drawings.

Placement Conditions:

- Place asphalt mixtures only when air temperature is at least 5 degrees Celsius.
- When temperature of surface on which material is to be placed falls below 10 degrees Celsius, provide extra rollers as necessary to obtain required compaction before cooling.
- Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

Place asphalt concrete in accordance with the provisions set out in section 13 of the Cahier des charges et devis généraux (CCDG).

3.6 *Compaction*

General:

- Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
- Roll pavement in accordance with the provisions set out in section 13 of the CCDG.

3.7 *Joints*

General:

- Remove surplus material from surface of previously laid strip.
 - Do not deposit on surface of freshly laid strip.
- Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
- Paint contact surfaces of existing structures such as sidewalks and curbs with bituminous coating prior to placing adjacent pavement.

Transverse joints:

- Offset transverse joint in succeeding lifts by at least 600 mm.
- Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
- Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

Longitudinal joints:

- Offset transverse joint in succeeding lifts by at least 150 mm.
- Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
- If cold joint cannot be avoided, cut back by saw cutting previously laid lane by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt on adjacent lane.
- Overlap previously laid strip with spreader by 25 to 50 mm.
- Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
- Roll longitudinal joints directly behind paving operation.
- When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

3.8 Finish Tolerances

Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.

Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

3.9 Defective Work

Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.

- If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.

Repair areas showing checking, rippling, or segregation.

Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.10 Clean Up

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

- Leave work area clean at end of each day.

Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Clean Up.

END OF SECTION

**CRUSHED STONE SURFACING -
RIP-RAP**

Section 32 15 40

**CRUSHED STONE SURFACING -
RIP-RAP**

Preparation of Drawings and Specifications for
Work to Repair Three (3) Bridges
and Rehabilitate One (1) Culvert in the
Mauricie National Park
V/REF.: 45353174

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**CRUSHED STONE SURFACING -
RIP-RAP**

Preparation of Drawings and Specifications for
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1.0 GENERAL**1.1 Section Content**

The works consist in constructing the embankment and drainage pipe protection and placing protective rip-rap in the waterway bed using round river rock and 100-200 mm, 200-300 mm and 300-500 mm stone with geotextile or geomembrane, according to the details indicated on the drawings.

Rip-rap placed in front of, and on the edges of, abutments beneath the high water line must be levelled with the waterway bed in order to prevent encroaching on the waterways. Rip-rapping activities that take place in the waterway shall be performed within a turbidity curtain and in accordance with the required protective measures set forth in the CCDG as well as the environmental protection provisions in these specifications.

1.2 Related Requirements

Section 01 35 43 Environmental Procedures

Section 33 42 13 Pipes for Culverts

1.3 Measurement for Payment

Crushed stone ground covering shall be paid per square metre of surface covered. The price shall include, most specifically, excavation, preparation of surface to cover, supply of materials (i.e., stone, geotextile and geomembrane), as well as installation and all incidental expenses.

1.4 References

Ministère des Transports du Québec:

- Cahier des charges et devis généraux (CCDG).
- Cahier des Normes, Ouvrages routiers, Tome II « Construction routière » et Tome IV « Matériaux » (Book of Standards – Road Work, Tome II, “Road Construction”, and Tome IV, “Materials”)

1.5 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Certificate of Compliance

- Contractor shall provide Parks Canada Representative, for each source of rip-rap material and prior to first delivery, a certificate of compliance containing the complete results of the qualitative stone analysis when it is required by standard 14501, as well as the control tests for the characteristics indicated in the MTQ's standard 14501.

Geotextile Data Sheets

- Submit the required manufacturer material safety data sheets, instructions and documentation for geotextiles and geomembranes, and include product characteristics, performance criteria, physical size, finish and limitations.

1.6 Delivery, Storage, and Handling of Geotextile

Deliver, store and handle materials and equipment in accordance with manufacturer's written instructions.

Store and protect geotextile and geomembranes from direct sunlight and UV rays.

Replace defective or damaged materials and equipment with new, at no extra cost.

2.0 PRODUCTS

Geomembranes to MTQ standard 13201.

Geotextiles (type V) to MTQ standard 13101.

Geotextiles (type V) shall have the following physical and mechanical characteristics:

- Minimum tensile strength (N): 1000 N
- Minimum elongation (%): 15%
- Maximum filtration opening size "FOS" (μm): 150 μm
- Minimum mass per unit area (g/m^2): 250 g/m^2

**CRUSHED STONE SURFACING -
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3.0 EXECUTION

The surface to cover with geotextile and/or geomembrane shall be clean, free of any organic or foreign materials and smoothed to required profiles; any bumps or depressions greater than 100 mm/m² shall be eliminated.

The geotextile and/or geomembrane shall be loosely stretched over the surface to cover such that it fits smoothly over the landform without folding over itself. On rip-rap embankments, it shall extend a minimum of 1.5 metres over the top and bottom of the slope. Overlap between two adjacent layers shall be at least 300 mm and shall meet the following criteria:

- Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- Place geotextile material on sloping surfaces in one continuous length from toe of slope to planned upper limit.
- Use hooks to secure geotextiles.

Protect installed geotextiles and/or geomembrane from damage or deterioration before, during and after placement of material layers.

Place rip-rap materials beginning at the bottom of the slope to protect. Stone shall then be placed so that the resulting surface is regular, without bumps that exceed the average size of the stone and parallel to the theoretical plane of the surface being covered. Place largest stones at the bottom of the slope.

3.1 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

END OF SECTION

PAVEMENT MARKING

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1.0 GENERAL

1.1 *Section Content*

This sub-section stipulates the requirements pertaining to pre-marking and permanent marking with medium- and long-performance paint on asphalt roadway provided for in this Contract.

1.2 *Measurement for Payment*

The pavement marking will be measured lump sum price including the supply of materials and installation of continuous or dashed lines including painting. The price must also include the price for the supply of materials, manufacturing, transportation and the implementation of permanent traffic signs and includes any incidental expenses.

1.3 *References*

Ministère des Transports du Québec:

- Cahier des charges et devis généraux (CCDG).
- Cahiers des normes, ouvrages routiers, Tome VII Matériaux, Chapitre 10 Peinture et produits de marquage (Book of Standards, Road Structures, Tome VII, Materials, Chapter 10 Paint and Products for Marking):
 - Norme 10201 Peinture alkyde pour le marquage des routes (Standard 10201 Alkyd Traffic Paint)
 - Norme 10202 Produits de marquage de moyenne durée (Standard 10202 Medium-Performance Marking Products)
 - Norme 10203 Produits de marquage de longue durée (Standard 10203 Long-Performance Marking Products)
- MTQ – Normes – Ouvrages routiers - Tome VII Matériaux, Chapitre 14 Matériaux divers, Norme 14601 Microbilles de verre pour peinture servant au marquage des routes (MTQ – Standards – Road Structures - Tome VII Materials, Chapter 14 Miscellaneous Materials, Standard 14601 Glass Microbeads for Traffic Paint)

1.4 Action and Informational Submittals

Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

Technical Data Sheets

- Submit manufacturer's printed product literature and data sheets regarding roadway marking, and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 Closeout Submittals

Submit in accordance with Section 01 78 00 - Closeout Submittals.

1.6 Delivery, Storage, and Handling

Deliver, store and handle materials and equipment in accordance with manufacturer's written instructions.

Delivery and acceptance: deliver materials and equipment to site in original factory packaging, labelled with manufacturer's name and address.

Storage and Handling

- Store materials and equipment in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- Replace defective or damaged materials and equipment with new.

1.7 Field Conditions

- Coatings used for traffic marking between May 1st and October 15th shall be subject to seasonal restrictions and shall not have a VOC concentration of more than 150 g/L.

2.0 PRODUCTS

2.1 Materials

Only marking products that comply with MTQ 10202 and found on the Ministère des Transport du Québec's certification list at time of call for tenders may be used to perform medium performance work.

Medium-performance marking products shall meet the performance criteria set forth in the table below:

Time of Verification	Durability	Retro-reflectivity (mcd. m ⁻² .lx ⁻¹)	
		Yellow	White
At application	100%	120 ≤	150 ≤
After 1 year	85%	80 ≤	100 ≤
After 2 years	75%	50 ≤	60 ≤

2.2 Signage

Road signage must be manufactured in aluminum extruded or sheets.

The retroreflective sheeting for covering aluminum extruded or sheets must be Type IV for lateral signage and type XI for the overhead signage and in accordance with the 14101 standard MTQ.

The fasteners that hold the panels in place must be made of aluminum or stainless steel.

3.0 EXECUTION

Contractor shall perform pre-marking and medium performance road markings as well as any measurements necessary for applying markings.

3.1 Examination

Verification of Conditions: Prior to applying pavement markings, verify that conditions of substrates and surfaces previously implemented under other Sections or Contracts, and which are to receive pavement markings, are acceptable for product application in accordance with MPI instructions.

- Visually inspect substrates and surfaces in presence of Parks Canada Representative.
- Pavement surface: Dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- Proceed with marking Work only after unacceptable conditions have been rectified.

3.2 Equipment

Paint applicator: Approved pressure-type, mobile, with positive shut-off distributor capable of applying paint in single, double and dashed lines. Capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

3.3 Application

Pavement marking

Pavement marking layout is indicated on the drawings.

Unless otherwise approved by Parks Canada Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within four (4) hours of application.

Apply paint evenly at rate of 3 m²/L.

Do not thin paint unless approved by Parks Canada Representative.

Symbols and letters to dimensions indicated.

Paint lines: of uniform colour and density with sharp edges.

Thoroughly clean distributor tank before refilling with paint of different colour.

Road Signage

The installation of road signage should be performed according to the requirements of Volume V - Traffic MTQ.

The Contractor shall make arrangements for transportation, handling, storage and installation of signs to avoid altering the film and any other component of the panels.

3.4 Tolerances

Paint markings: Within plus or minus 12 mm of dimensions indicated.

3.5 Protection

Protect pavement markings until dry.

Repair damage to adjacent materials caused by pavement marking application.

3.6 *Clean Up*

Progress cleaning: Clean in accordance with Section 01 74 11 - Clean Up.

- Leave work area clean at end of each day.
- Final cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Clean Up.

END OF SECTION

PIPE CULVERTS

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PIPE CULVERTS

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1.0 GENERAL

1.1 Section contents

This section specifies the requirements for the rehabilitation of 18.44 km culvert on Route Promenade in the Mauricie National Park by inserting a Multi-Plate type steel pipe (by Armtec or approved equivalent) and the filling the voids with self-compacting concrete and / or cementitious grout.

1.2 Related requirements

Section 01 35 43	Environmental protection
Section 03 10 00	Concrete forming and accessories
Section 03 20 00	Concrete reinforcing
Section 03 30 00	Cast-in-place concrete

1.3 Measurement for payment

The steel pipe insertion works are payable on the basis of a lump sum. The costs for the provision and installation of the steel corrugated pipe sections are included in the price of the item entitled "New pipes" of the Pay Item Table. The price covers the design of the required work, the supply of materials, the excavation/backfill and the cleaning of the existing culvert, the installation and connection elements, the adjustment shims and slide rails, the concrete self-placing filling concrete, the temporary shoring, if required, and includes any incidental expenses.

Concrete other than the filling concrete is payable under the terms in Section 03 30 00 - Cast-in-Place Concrete in the present specifications.

The riprap is payable per square meter of surface as indicated in in Section 32 15 40 – Crushed Stone Surfacing.

Temporary measures are payable as indicated in Sections 02 41 16 – Structure Demolition and 01 35 43 Environmental Protection.

1.4 References

Ministère des Transports du Québec

- Cahier des charges et devis généraux (CCDG).
- MTQ – Normes – Ouvrages routiers – Tome VII Matériaux, Chapitre 7 Tuyaux et accessoires.

CSA International

- CSA A3000-08, Cementitious Materials Compendium.
- CAN/CSA G401-07, Corrugated Steel Pipe Products.

1.5 Action and informational submittals

Data sheets

Submit all necessary data sheets as well as the manufacturer's instructions and documentations for the pipes.

Test and evaluation reports

At least fourteen (14) days prior to the start of pipe works, submit the results of the tests conducted by the manufacturer and a certificate of compliance certifying that the pipes meet all the requirements.

The certificate of compliance shall specify all the following details :

- Name of manufacturer.
- Date and place of fabrication.
- Category, shape and nominal dimensions including plate thickness.
- Limitations.
- Name of the provider of the plate.
- Number of the pouring.
- Number of the coil.
- Chemical properties of the plate.
- Type of coating and its basis weight.
- Tensile strength of the seal.
- Number of production lot.

Certification: to be marked on pipe.

1.6 *Delivery, storage and handling*

Deliver, store and handle materials in accordance with the manufacturer's written instructions.

Delivery and acceptance requirements

Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

Storage and handling requirements

Store materials in accordance with manufacturer's recommendations.

Store and protect pipes from damage.

Replace defective or damaged materials with new.

2.0 PRODUCTS

2.1 *Corrugated steel pipe*

Corrugated steel pipe: according to CAN/CSA-G401.

Water-tight cut-off collars: as indicated.

3.0 EXECUTION

3.1 *Examination*

Verifications of conditions

Prior to the insertion of the pipes, verify that conditions of substrate previously installed under other sections or contracts are acceptable for pipe culvert installation in accordance with manufacturer's written instructions.

Handle corrugated pipes carefully to protect coating.

Take all necessary measures to prevent deformation.

Visually inspect substrate in presence of Parks Canada Representative.

Inform Parks Canada Representative of unacceptable conditions immediately upon discovery.

Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Parks Canada Representative.

Twisted or deformed pipes must be replaced by the Contractor at his expense.

3.2 Implementation

Execute a complete cleaning of existing pipe to remove any dirt and debris that may interfere with concreting in accordance with the section "00 33 000 Cast-in-place concrete.

Within forty-eight (48) hours following the cleaning of the existing pipe, conduct a survey of the existing pipe to target sagged zones. The survey shall provide the geometry of the existing pipe and allow to verify the level of implementation of the new pipe. The survey shall be executed every six (6) meters on the circumference of the pipe : 2h, 4h, 6h, 8h, 10h et 12h.

At least forty-eight (48) hours prior to the insertion of the new pipe, provide 2D and 3D survey (AutoCad format) of the existing pipe to the Parks Canada Representative.

If required, repair damaged areas of existing pipe to ensure an adequate seal for the placement of concrete. The damaged zones shall be approved by the Parks Canada Representative.

At least forty-eight (48) hours prior to repair works, provide repair method to the Parks Canada Representative. The repair works shall begin only after the written authorization of the Parks Canada Representative.

At least seven (7) days prior to insertion works, provide shop drawings showing the rail system and the method of insertion of the new pipe and concreting to the Parks Canada Representative.

Upon approval of the Parks Canada Representative, the rails shall be left in place if they do not interfere with the placing of concrete.

Take all necessary measures to prevent deformation of the pipe during the insertion works.

If required, install temporary shoring in the new corrugated steel pipe for the concreting works.

Take all necessary precautions to prevent permanent deformation during concreting works.

3.3 Joints for corrugated steel culverts

Match corrugations or indentations of coupler with pipe sections before tightening.

Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.

Insert and tighten bolts.

Repair spots where damage has occurred. Touch up coating by applying two coats of zinc rich paint according to CAN/CGSB 1.181. Damaged surfaces shall first be cleaned according to the requirements of SSPC-SP 11. The minimal total dry film thickness of coating shall 130 µm.

If the surfaces are damaged on more than 5 mm width or on more than 100 mm in length, only repair by metallization.

3.4 Injection

The injection work involves bridging the gap between the old and the new structure using self-compacting concrete. The injection work should be carried dry.

The injection equipment can be set up using a horizontal pumping downstream to upstream or by gravity using vertical chimneys (the establishment then starts at the bottom point).

The contractor must ensure that the injected concrete fills the entire space between the two pipes and no air gap is formed in this space. He must proceed so that it is possible for Parks Canada representative to verify the achievement of this goal by practicing in several places, openings that will allow both the discharge of air and observation of the introduction of concrete. The work must be performed in compliance with all manufacturer recommendations.

The contractor must take particular care that the injection pressure of the concrete/cement material does not exceed the capacity of the new pipe or deforms more than 5% of its original shape. More than one injection and / or shoring of the new pipe must be provided as necessary to prevent deformation or displacement under water pressure.

The Contractor must take the necessary precautions to keep the vertical and horizontal alignment of the new pipe during injection. A sufficient number of shims or other connector are to be used to limit the localized deformations.

The grout used must comply with the 3901 standard of the Ministry of Transport of Quebec.

3.5 *Cleaning*

Progress cleaning

Clean in accordance with Section "01 74 11 – Cleaning".

Leave work area clean at end of each day.

Final cleaning

Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section "01 74 11 – Cleaning".

Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

VEHICULE « W-BEAM » GUIDE RAIL

Section 34 71 13.25

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1.0 GENERALS

1.1 *Related requirements*

Section 02 41 13 Selective site demolition

1.2 *Measurement and payment*

Removal and disposal of existing flexible railings are paid as a lump sum price, in accordance with section 02 41 16 « Demolition ».

Payment of the elements that are part of this section is by structure and includes the following items according to different structures:

- Semi-rigid barriers with double ripple on wooden posts;
- Wooden rails on wooden posts;
- TL -2 rigidity transition between a semi-rigid barrier with double wave steel rail and a bridge safety barrier in accordance to standerized drawing DN-VIII-3-GSR 010B of the MTQ's cahier des normes, Tome VIII.
- Concrete border is illustrated in the plans and in standard drawing DN-VIII-3-GSR018 of Tome VIII.
- Connecting device of a semi-rigid barrier with double wave steel rail to a bridge safety barrier as indicated in the plans.
- Type 1 semi-rigid barrier end devices.
- Type 2 semi-rigid barrier end devices.
- Treatment of the origin of the semi-rigid barrier with double wave steel rail for a speed of 50 km/h or less, including anchors.
- And any incidental expenses.

Payment is per linear meter of safety barrier installed.

1.3 *References*

Quebec Ministry of Transportation (MTQ) :

- Cahier des charges et devis généraux (CCDG).
- Cahiers des normes, ouvrages routiers, Tome VIII « Dispositifs de retenue ».

1.4 Action and informational submittals

Submit documents and samples required in accordance with section 01 33 00 - Documents / Submittal Procedures.

Technical data sheets

- Submit the required technical data sheets as well as the instructions and the manufacturer's documentation for the barriers, the wood and coating layers. The technical data sheets should indicate the product characteristics, performance criteria, physical size, finish and limitations.

Shop Drawings

- The submitted shop drawings of the end devices for barriers must be stamped and signed by a professional engineer registered or licensed in Canada, in the province of Quebec.

1.5 Delivery, storage and handling

Deliver, store and handle materials and equipment in accordance with the manufacturer's written instructions.

Delivery and acceptance requirements: deliver materials and equipment to the site in their original factory packaging, labeled with the name and address of the manufacturer.

Storage and handling

- Store materials and equipment so they do not rest on the floor, in a clean, dry, well-ventilated area, according to the manufacturer's recommendations.
- Replace the damaged or faulty materials and equipment with new materials and equipment.

2.0 PRODUCTS

2.1 Material/Equipment

Semi-rigid barriers with double wave steel rail on wooden posts

- Where indicated in the plans, the Contractor must supply and install semi-rigid barriers with double wave steel rail on wooden posts to 1.9 m c/c, in accordance with the requirements of Section 18.5.1.2 the CCDG and standardized drawing DN-VIII-3-GSR 001 of Volume VIII of the MTQ standards.

TL-2 rigidity transition between a semi rigid barrier with double wave steel rail and a bridge barrier

- In locations indicated in the plans, the Contractor must install a TL-2 rigidity transition between a semi-rigid barrier with double wave steel rail and a bridge barrier in accordance with section 18.5.1.3 of the CCDG and according to standardized drawing DN-VIII GSR-010B-3 of Volume VIII of the MTQ standards. The geometry of the border section is illustrated standardized drawing DN-VIII-3-GSR018 of Volume VIII.

Connection of a semi-rigid barrier with double wave steel rail to a bridge barrier

- In locations indicated in the plans, the Contractor must install a connection between a semi-rigid barrier with double wave steel rail and a bridge barrier.

Barrier end device with Type 1 lateral deviation

- Where indicated in the plans, the Contractor shall provide and install end devices for semi-rigid barriers of an MTQ approved Type 1 model (device having a lateral deviation 1 200 mm) for posted speed limits above 50 km/h. The Contractor is required to use a single model throughout the project. These devices must be supplied and installed according to the manufacturer's recommendations. Type 1 end devices must comply with section 18.7 of CCDG.

Barrier end device with Type 2 lateral deviation

- Where indicated in the plans, the Contractor shall provide and install end devices for semi-rigid barriers of an MTQ approved Type 2 model for posted speed limits above 50 km/h. The Contractor is required to use a single model throughout the project. These devices must be supplied and installed according to the manufacturer's recommendations. Type 1 end devices must comply with section 18.7 of CCDG.

3.0 EXECUTION

3.1 *Examination*

Verification of Conditions: Before the barrier installation, ensure that the condition of the surfaces/supports previously implemented under other sections or contracts is acceptable and can perform the work in accordance with the manufacturer written instructions.

- Make a visual inspection of surfaces/supports in the presence of the Parks Canada Representative.
- Immediately inform the Parks Canada Representative of unacceptable conditions detected.
- Begin with installation only after correcting the unacceptable conditions and obtaining the written approval of the Parks Canada Representative.

3.2 Installation

Install the posts where determined and indicated in the plans and proceed by aligning using survey instruments.

Install semi-rigid barriers as indicated in the detail drawings. Overlap joints in the direction of traffic.

- Tighten the nuts to a torque of 100 Nm;
 - The bolts must not protrude more than 12 mm compared to the nut.

3.3 Protection

Protect equipment and components installed against damage during construction.

Repair damage to adjacent materials and equipment throughout the barrier installation.

3.4 Cleaning

Cleaning during the course of the work: clean in accordance with the section 01 74 11 - Cleaning.

- Keep area clean at the end of each working day.

Final Cleaning: upon completion remove materials/surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

