

**REHABILITATION LACHINE CANAL WALLS  
REPAIR AND REPLACEMENT OF THE CROWNING WALLS AND  
SEAT REPAIRS (AREAS 13.1, 13.2, 13.3, 13.4, 13.5 AND 13.6 –  
REACH NO 4)  
Project N° CLAC-1455-04**

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**END OF SECTION**

**Partie 1      General**

**1.1            RELATED REQUIREMENTS**

- .1      All drawings issued for tender

**1.2            SUMMARY OF WORKS**

- .1      The Contractor must respect all archaeological monitoring clauses indicated in point 1.3.
- .2      Consider that an archaeologist will be present at the site.

**1.3            ARCHAEOLOGICAL CLAUSES**

- .1      Special Conditions:
  - .1      The Canadian national historic site of the LACHINE CANAL is deemed a highly-recognized heritage site by the Canadian government. Thus, all excavation work identified with the potential of containing historical remains or ruins, must be monitored by an Archaeologist appointed by Parks Canada Agency. The excavation work required for the rehabilitation of the wall is therefore subject to the following sections' specifications.
- .2      Access and Collaboration:
  - .1      The Contractor must cooperate and comply with all instructions issued by the Departmental Representative during excavation works to avoid any loss of archaeological information on the site.
  - .2      The Contractor must facilitate access to the work site and collaborate with the Archaeologist. The Archaeologist or his representative will be present on site as required, in relation to the protection and recording of the historical remains. Their role will be to guide the Contractor to avoid loss of archaeological information and to gather information on the remains.
  - .3      The Contractor must allow the team of archaeologists to conduct examinations and archaeological surveys.
- .3      Archaeological Discoveries
  - .1      The Contractor must notify the Departmental Representative and the Archaeologist (or his representative) of any archaeological discovery (remains of buildings or facilities, objects, and fragments of objects) made on the premises and wait for his written instructions before continuing work around the discovery. Relics, antiques, and other items with some interest from a historical, archaeological, or scientific perspective (remains, object, or fragment of an object) found on the site or in the areas of excavation or demolition remain the property of the Crown. The Contractor must protect and obtain instructions from the Departmental Representative in this regard.

- .4 Suspension of Work:
- .1 The Contractor must provide in his contract, at his expense, five (5) minute work suspensions per hour of excavation in all areas requiring the presence of the Archaeologist (as described in section 1.2). These work stoppages, if unused, will be accumulated and can be reused later as needed. A register of the unused time will be documented by the Departmental Representative or his representative in agreement with the Contractor and the Archaeologist.
  - .2 For work stoppages lasting more than 30 minutes, the Departmental Representative will assess the implications of the stoppage and notify the Contractor to that effect. The Contractor may be required to move the machinery to another area to allow the continuation of the archaeologists' work. If reassignment is not possible, the Contractor will be compensated from the bank of hours. In the case where the bank of hours is exhausted, the Contractor will be compensated in accordance with the agreements made during the first site meeting.
- .5 Manual Excavations for Archaeological Purposes:
- .1 Given the possibility of archaeological discoveries, the Contractor is advised that during work, manual excavations may be required in addition to any other work necessary in ensuring the protection of discoveries. The Contractor shall be compensated in accordance with the agreements made at the first site meeting.
- .6 Protection of Relics and Structures:
- .1 The Contractor must take all reasonable precautions during excavation and other works to protect the excavated remains and to allow their examination by the Archaeologists. Parks Canada Agency will not tolerate any exception in this regard. If by neglect the Contractor deteriorates any relic whatsoever, he will be held responsible and the Department will determine the implications.
  - .2 In the event where the Departmental Representative authorizes the demolition of materials on site, the Contractor must take all necessary precautions to ensure the protection of adjacent structures which are not to be demolished. The demolition of materials must be carried out gradually and in a controlled manner once the archaeological surveys have been completed. If items are damaged during construction works, the Contractor must immediately notify the Departmental Representative.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 99 – Demolition for minor works
- .2        Section 03 10 00 – Concrete Forming and Accessories
- .3        Section 03 20 00 – Concrete Reinforcing
- .4        Section 03 30 00 – Cast-in-Place Concrete
- .5        Section 03 30 03 – Concrete Repair
- .6        Section 03 37 13 – Shotcrete
- .7        Section 05 50 00 – Metal Fabrications
- .8        Section 09 97 19 – Painting Exterior Metal Surfaces
- .9        Section 31 05 16 – Aggregate Materials
- .10       Section 31 11 00 – Clearing and Grubbing
- .11       Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12       Section 31 32 19 – Geotextiles
- .13       Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14       Section 32 14 13 – Precast concrete pavers
- .15       Section 32 91 19.13 – Topsoil Placement and Grading
- .16       Section 32 92 23 – Sodding
- .17       Section 35 59 29 – Mooring Devices

**1.2                DEFINITIONS**

- .1        Navigation period: from the Friday preceding Victoria day until thanksgiving.

**1.3                WORK COVERED BY CONTRACT DOCUMENTS**

- .1        The Work covered by this contract includes the restoration of the Lachine Canal walls on the section(s) indicated in the Tender Form and on drawings.
  - .1        The restoration works can include one or more of the following activities, without limitation:
    - .1        Replacement or rehabilitation of crowning walls (Retaining wall) and seats;
    - .2        Any other repair details shown on drawings and proposed in the current contract,

- .3 Perform a detailed list of walls to be repaired or replaced. Validate precise dimensions, and profiles of walls subject to the current contract. Validate the alignment starting from the base of existing crowning wall. Perform all required survey.
  - .4 Provide detailed shop drawings, showing existing profiles of wall that must be repaired or replaced in addition to final profiles, for the Departmental Representative's approval. Submitted profiles must be consistent with existing profiles.
  - .5 Note all existing drains, pipes, scales, bollards and railings in the work zone and locate them in the shop drawings. These items must be reinstalled or conserved as existing.
  - .6 The Contractor is responsible for providing appropriate platforms and temporary supports, required to undertake work shown on the plans, specifications, and tender form. No additional fees will be allotted to the contractor if he must modify his access system during work.
  - .7 Provide and install confinement chambers to allow concrete pouring in winter conditions,
  - .8 The Contractor is responsible to provide, at his own expenses, all required shelters, and heating systems, to be able to perform work in winter conditions.
  - .9 The Departmental Representative will film certain stages of work. By bidding on this contract, the Contractor is aware of this circumstance and can in no case oppose the films being recorded during the execution of work.
  - .10 Perform landscaping work.
  - .11 A navigation corridor will have to be put in place on the encroachment line in the canal (ref plan 8#24) Contractor must install navigation buoy at the end of each work zone and an additional one in the middle. The navigation buoys must be all green on the port (left) side when moving upstream direction and red on the starboard (right) side when moving upstream direction. In addition to the navigation buoys, security buoys (yellow) must be put in place to maintain a cable up flow. Installation of buoys must be in accordance with Transport Canada regulation.
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- .2 All construction, demolition, and related temporary work, must be performed in accordance with standards, including the security code for construction S-2.1, r.6, CSA S350 and other applicable safety regulations put in place by the owner.
  - .3 The Contractor must provide all required labour, materials, and equipment to perform work shown in the drawings.
  - .4 Perform demolition work as shown on the drawings. The section shown in the drawings specify either additional demolition, removal of loose concrete or cleaning cavities.
  - .5 In zones affected by the demolition works, the contractor assumes all responsibilities in regards to the protection against dust, the danger of demolition, and others.

- .6 Provide, for verification purposes, the drawings, graphics, and details indicating the dismantling order of the work, shoring parts, and temporary work.
- .7 All temporary work drawings must be certified by a competent engineer, recognized in the province of Quebec.
- .8 Take all necessary precautions to prevent any movement or collapse of structures that must be conserved to avoid any damage. Provide and install all parts required for shoring and reinforcement. Perform all necessary remedial work as required. Put in place all necessary precautions to ensure the safety of workers throughout the work.
- .9 Anchors must be installed in accordance with the recommendation of the Departmental Representative in the presence of his authorised representative.
- .10 The Contractor must coordinate his work in accordance with the existing dimensions and profiles, and must provide profiles adapted to the existing ones for the Departmental Representative's approval. The Contractor must provide shop drawings showing final profiles and variants for comment.
- .11 Marking required for any encroachment in the canal during the navigation period.

#### **1.4 CONTRACT METHOD**

- .1 Construction work is under lump-sum contract and unit price contract, in accordance with the articles presented in the Tender Form.

#### **1.5 WORK BY OTHERS**

- .1 Not used.

#### **1.6 FUTURE WORK**

- .1 Not used.

#### **1.7 WORK SEQUENCE**

##### **.1 Deadlines**

- .1 The works under this contract including planning of banks, lands and paths used by the contractor must be completed 26 weeks after the receipt of the award letter.**
- .2 The normal water level in the Canal will be lowered between October 18<sup>th</sup>, 2017 to December 17<sup>th</sup>, 2017 inclusively. The water level in the canal will be raised after. The Contractor have this time window to complete the wall seat repair works (Type 1). *The Contractor must make sure an adequate working method and the necessary man labor to complete the work in the time window asked.***
- .3 The final demobilization must be completed ten (10) opening day after the acceptance by the owner of the declaration of substantial completion of works.**
- .4 All other activities must be completed within the 26 weeks deadline.**

## **.2 Scheduling**

### **.1 Construction Facilities**

- .1 At the kick-off meeting, the Contractor must submit the Construction Facilities Layout Plan to the Departmental Representative for approval.
  - .1 In the five (5) days following of submittal of the layout plan, the Departmental Representative shall return a reviewed copy of the plan, along with any comments to the Contractor.
  - .2 Within five (5) days following the acceptance of the Construction Facilities Layout Plan, the Contractor shall have completed the installation of the construction trailers.

### **.2 Restoration of the Lachine Canal Walls**

- .1 At the kick-off meeting, the Contractor must submit to the Departmental Representative the Work Sequence for the wall restoration with a justification for each phase of the works.
  - .1 The Work Sequence for the wall restoration shall be prepared by prioritizing certain work to allow the execution of other work, in favour of the execution time.
  - .2 In the five (5) days following the submittal of the Work Sequence for the restoration work, the Departmental Representative shall return to the Contractor, a reviewed copy of the document, along with any comments.
- .2 At the kick-off meeting, the Contractor must submit to the Departmental Representative the Construction Schedule, considering the information contained in the Work Sequence.
  - .1 Prepare the Construction Schedule in accordance with the timeframes specified in the present specifications section and in the Tender Form.
  - .2 In the five (5) days following the submittal of the Construction Schedule, the Departmental Representative shall return to the Contractor a reviewed copy of the schedule, along with any comments.
- .3 Perform all repair works in accordance with the Work Sequence and the Construction Schedule approved by the Departmental Representative.
- .4 At the kick-off meeting, submit to the Departmental Representative the Temporary Signage drawings for traffic management during the execution of the wall restoration work.
  - .1 In the five (5) days following the submittal of the Temporary Signage drawings for traffic management, the Departmental Representative shall return to the Contractor a reviewed copy of the drawings, along with any comments.
  - .2 Within five (5) days following the acceptance of Temporary Signage drawings, the Contractor shall have completed the installation of these drawings on the site.

- .5 At the kick-off meeting, submit to the Departmental Representative the shop drawings of the Temporary Access System for the execution of the wall restoration works.
  - .1 In the five (5) days following the submittal of the Temporary Access System shop drawings, the Departmental Representative shall return to the Contractor a reviewed copy of the drawings, along with any comments.
  - .2 Immediately after having received the acceptance of the Temporary Access System shop drawings, and once the temporary signage has been installed and approved by the Departmental Representative, the Contractor shall implement the Temporary Access System on the site.
- .6 In the seven (7) days following the kick-off meeting, submit to the Departmental Representative the shop drawings required for the execution of the wall restoration works.
  - .1 In the five (5) days following the submittal of the shop drawings, the Departmental Representative shall return to the Contractor a reviewed copy of the drawings, along with any comments.
  - .2 Within five (5) days following the acceptance of the shop drawings, the Contractor shall deliver the necessary materials to the site.

## 1.8 INSTRUCTIONS TO THE CONTRACTOR

- .1 By accepting this Contract, the Contractor accepts all the responsibilities normally assigned to the Prime Contractor under the workplace health and safety regulations. Before starting the works, the Contractor must perform the following activities:
  - .1 Submit to the Departmental Representative a Health and Safety Plan and a mechanical inspection certificate for each piece of machinery used on site.
  - .2 Ensure that workers on the site have received the training and information required to perform the work safely and that all required tools and protective equipment are available, in compliance with all standards, laws, and regulations.
  - .3 Comply at all times with the provisions of the occupational health and safety regulations and safety codes.
  - .4 Inform your employees of their right to refuse any work that is dangerous to their health or safety.
  - .5 Identify and barricade the work area and control access to the site.
  - .6 In the case of an unforeseen incident, take all necessary measures, including stopping work, to protect the health and safety of the workers and the public, and immediately contact the Departmental Representative.
- .2 Execute the work to provide for continuous public usage. Maintain access to the public places as long as an alternative has not been developed when the progress of the works is an impediment to the free movement of the public.



## **1.9 CONTRACTOR USE OF PREMISES**

- .1 The work area can be used continuously until substantial completion. The construction sites are restricted to the areas mentioned on the plans.
- .2 The use of the premises is restricted to the areas necessary for the execution of the work and those areas made available to the Contractor for the installation of the Construction Facilities and for the storage of the equipment and materials required for the works. The Contractor shall allow access to these areas outside the work zones to the PCA to allow:
  - .1 Maintenance of equipment;
  - .2 Partial Owner occupancy, if required;
  - .3 Work by other contractors.
- .3 Coordinate use of premises under direction of the Departmental Representative.
- .4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .5 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .6 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the Departmental Representative.
- .7 The Contractor cannot use existing structures for the execution of his work. He shall take the necessary precautions to protect existing structures and shall assume complete responsibility of any claims resulting in the damages that are attributed to him. An authorization from the Departmental Representative is necessary before any installation (fixations etc.) on an existing structure. Upon completion of the work, the existing structure must be in an equivalent or superior state than it was at the beginning of the work.
- .8 Boats and navigation within the scope of the contract shall be limited to the areas specified in the plans. If the contractor wants for the needs of the site to set up barges in the last few decades being confined to the perimeter. Sporadic transport of barges and equipment to meet Transport Canada standards. Under these conditions, it is possible to be accepted on presentation of an out-of-stock procedure.

## **1.10 OWNER OCCUPANCY**

- .1 The Owner will occupy the premises (outside the work zones) during the entire construction period for execution of normal operations.
- .2 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

## **1.11 PARTIAL OWNER OCCUPANCY**

- .1 Schedule and substantially complete designated portions of Work for Owner's occupancy prior to Substantial Performance of entire Work.

- .2 Execute Certificate of Substantial Performance for each designated portion of Work prior to Owner occupancy. The Contractor must allow access to the premises to the Owner at all times.
- .3 On occupancy, Owner will provide for occupied areas:
  - .1 Maintenance.
  - .2 Security.
- .4 Execute Partial Interim Certificate of Completion for each designated portion of Work prior to partial Owner occupancy. Following, allow access to the premises to the Owner.

**1.12 PRE-PURCHASED EQUIPMENT**

- .1 Not used.

**1.13 OWNER FURNISHED ITEMS**

- .1 Not used.

**1.14 ALTERATIONS, ADDITIONS, OR REPAIRS TO EXISTING BUILDING**

- .1 Not used.

**1.15 EXISTING SERVICES**

- .1 Submit schedule to and obtain approval from the Departmental Representative at least seven (7) days in advance for any shut-down or closure of active services or facilities including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .2 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

**1.16 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Other documents as specified.

**Part 2 Products**

**2.1 Survey marker**

- .1 Installation: Provide and install a Legal survey marker to replace the one identified on the drawings. The exact localisation of the new survey marker needs to be implemented and transmitted after installation
- .2 Payment: The probe is paid in accordance to the section 01 29 00 – Payment Procedures

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1            General**

- .1        Not used.

**Part 2            Explanation of the Bid Form prices**

**2.1                Item 1. – Government Representative Site Office, Environment, and General Items**

- .1        Item 1.1 – Construction Facilities
- .1        Payment item 1.1 of the *Schedule of Prices* is a fixed lump sum amount to compensate all necessary expenses incurred in the execution of the works as well as any other expenses not included in the other *Schedule of Prices* items, in accordance with the requirements of the specifications.
- .2        The amount includes, but is not limited to, the following:
- .1        All that is described in Section 01 52 00, *Construction Facilities*, such as:
- .1        Electricity, water, and lighting on site.
- .2        Construction site offices; Furnishings, telephone and related services (internet, pagers, fax, etc.), microwave and small refrigerator (9 cubic feet minimum), cold and hot water dispenser, including drinking water, heating and air conditioning of the site offices.
- .3        Access roads including the necessary deforestation, clearing-up, removal of scrub, vines, dead wood, trees and shrub whose trunk diameter is less than 50 mm (measured from the diameter at chest height), the removal of all brush at the junction of the crowning walls and seat, the removal of fences and vines on the edge of the crowning wall, the moving and replacing of urban furniture (tables, benches, garbage cans, etc.), sanitary facilities, site fencing, warehouse, scaffolding, site signs and maintenance, in accordance with the requirements of the specifications and drawings, and as directed by the Government Representative.
- .4        The required coordination with the City of Montreal and other stakeholders, including obtaining all necessary permits to carry out the work.
- .5        The maintenance of the worksite and of its access routes.
- .6        All that is required in the following sections and is not directly attributed or related to one of the other items of the Bid Form:
- |                     |                                |
|---------------------|--------------------------------|
| Section 01 11 00    | Summary of Work                |
| Section 01 31 19    | Project Meetings               |
| Section 01 32 16.07 | Construction Progress Schedule |
| Section 01 33 00    | Submittal Procedures           |
| Section 01 35 29.06 | Health and Safety Requirements |

- |     |  |   |
|-----|--|---|
|     | Section 01 52 00   | Construction Facilities   |
|     | Section 01 52 00   | Construction Facilities   |
|     | Section 01 56 00   | Temporary Barriers and Enclosures   |
|     | Section 01 73 00   | Execution   |
|     | Section 01 74 11   | Cleaning  |
|     | Section 01 74 21   | Construction/Demolition Waste Management and Disposal   |
|     | Section 01 77 00   | Closeout Procedures   |
|     | Section 07 78 00   | Closeout Submittals   |
| .7  | All costs associated with surveying and staking the works and all other site take-offs and measurements that are not allocated to any of the other items of the <i>Schedule of Prices</i> .  |   |
| .8  | The costs of providing a security guard or other means of supervision for the site (if required).  |   |
| .9  | Rental costs of land and/or space for the storage of materials.  |   |
| .10 | The protection of existing public utilities within the work site during construction. If the Contractor damages these installations during his work, he must replace them at his expense.  |   |
| .11 | All fees pertaining to the supply of water and electricity for the duration of the work.   |   |
| .12 | Expenses for all means taken to avoid damage to earthworks, trees, shrubs, paving, bed of the river and its banks, etc.  |   |
| .13 | The rehabilitation of the premises:  |   |
|     | .1   | All work to restore the temporary sites used (access road, storage area, etc.) to their natural state;  |
|     | .2   | All work to restore street furniture (benches, tables, garbage cans, etc.) to their original condition;   |
|     | .3   | All work to restore vegetation by grassing of sites damaged by work;  |
|     | .4   | All work permitting the repair of all other damages and damages that the Contractor caused to the site of the works, to the public or private property affected by its works. |
| .14 | The Contractor shall repair all damage caused in the performance of its work to the satisfaction of the Owners concerned and that of the Government Representative. The work site must be returned in a similar or better condition to that existing before the work begins. |   |
| .3  | A portion equal to 20 % of the total amount bid for this item will be paid with the first progress claim, provided that the work has begun.  |   |
| .4  | Other progress payments under this item will be paid to a percentage consistent with the general progress of work for each progress claim period except for the  |   |

- last payment which shall be paid to an amount up to 85% of the general progress of the work.
- .5 The last progress claim equivalent to 15% shall be paid with the payment emitted during the "*Substantial Performance of the Work*".
- .2 Item 1.2 – Environmental Protection Measures
- .1 Payment item 1.2 of *Schedule of Prices* is a fixed lump sum amount to compensate all necessary expenses incurred for measures to protect the environment in accordance with the requirements of the specifications.
- .2 The amount includes, but is not limited to, the following:
- .1 All that is described in Section 01 35 43, *Environmental Procedures* such as the preparation, presentation, and implementation of the environmental protection plan;
- .2 The preparation, presentation, and implementation of :
- .1 The emergency spill plan;
- .2 The construction facilities location plan location;
- .3 The work zone plans;
- .4 The air pollution prevention plan;
- .5 The contamination prevention plan;
- .6 The wastewater management plan;
- .7 The plan for the designation and protection of wetlands and historical, archaeological, cultural, and biological resources;
- .8 The preparation, presentation, and implementation of a plan to protect the historical and heritage character of the site.
- .3 Vegetation protection measures (trees, plants, etc.);
- .4 Temporary facilities for pollution prevention;
- .3 A portion equal to 20 % of the total amount bid for this item will be paid with the first progress claim, provided that the work has begun.
- .4 Other progress payments under this item will be paid to a percentage consistent with the general progress of work for each progress claim period.
- .3 Item 1.3 - Sediment Barrier
- .1 Payment item 1.3. of the *Schedule of Prices* is per linear meter (m. Lin.) for all costs incurred for the supply and the installation of sediment barrier in accordance with the requirements of the plans and specifications
- .2 Price includes, but is not limited to, the following:
- .1 The preparation, presentation, and correction of the Work Plan;
- .2 Mobilization of labor, tools and equipment required for the execution of the work;
- .3 Supply including geotextile, transportation, handling, warehousing and placing;

- .4 Servicing and maintenance of barriers for the duration of the work;
  - .5 Dismantling of the sediment barrier;
  - .6 Cleaning of the premises at the end of work;
  - .7 Any incidental expense.
- .4 Item 1.4 - Turbidity curtain (confinement)
- .1 Payment item 1.4 of the *Schedule of Prices* is per linear meter (m. Lin.) for all costs incurred for the supply and the installation of a turbidity curtain in accordance with the requirements of the plans and specifications
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction, of the Work Plan and shop drawings;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The supply, transportation, handling, storage, and operation;
    - .4 Maintenance and retention of the curtain for the duration of the work;
    - .5 Dismantling of the curtain;
    - .6 Cleaning of premises at the end of work;
    - .7 Any incidental expense.
- .5 Item 1.5 – Deforestation of the excavation zone
- .1 Payment items 1.5.1 to 1.5.5 – Deforestation of trees with diameters superior to 200 mm (measured from the diameter at chest height)
    - .1 Payment items 1.5.1 to 1.5.5 of the *Schedule of Prices* are priced per unit for all the costs incurred for the deforestation of trees according to their dimensions, in accordance with the requirements of the plans and specifications.
    - .2 This item applies only to trees in the excavation area or the trees identified by the ministry representative.
    - .3 The price includes, but is not limited to, the following:
      - .1 Preparation, presentation, and correction of the Work Plan;
      - .2 The mobilization of labour, tools, and equipment required to carry out the work;
      - .3 Supply, transport, handling, maintenance, and removal of access required for clearing works;
      - .4 The clearing of areas identified by the Government Representative;
      - .5 Loading, transporting and disposing of debris to a site in accordance with current policies;
      - .6 Cleaning at the end of the works;

- .7 Any incidental expenses.
- .6 Item 1.6 – Removal, Painting and Repositioning of Guardrails
- .1 Payment item 1.6 of the *Schedule of Prices* is priced per linear meter (m. Lin.) for the removal, the surface preparation, painting and repositioning of guardrails in accordance with the requirements of the plans and specifications.
  - .2 The guardrail posts have to be removed, repainted and reinstalled. The guardrail posts are made of cast iron. **Note that the existing guardrail paint contain lead.** The Contractor must adapt his price to take into account the requirement of CNESST in terms of lead exposition during stripping.
  - .3 The surface preparation and the paint stripping containing lead can't be done in the field work zone. The works must be done inside a factory.
  - .4 The guardrails must be removed et be disposed. The Contractor have to supply and install new guardrails of same diameter of the existing. The new guardrails must be galvanised and painted according to the specifications.
  - .5 The quantities on the price schedule include also the activities above for the guardrails outside of the replacement and repair areas as shown on the drawings.
  - .6 The quantities on the price schedule include also the installation of a new railing for the stairs (see drawings). The posts of the new railing are supplied by Parks Canada. The Contractor have to supply, paint and install the new guardrails and also paint, and install the posts supplied by Parks Canada.
  - .7 Price includes, but is not limited to, the following:
    - .1 The lengths and dimensions survey of the guardrails and the post localisation, the preparation, presentation, and correction of shop drawings, the paint stripping procedure containing lead, the painting procedure, samples, and technical data sheets required;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 Removal, transportation, handling, storage of guardrail;
    - .4 The supply and transportation of the new guardrails;
    - .5 The supply, handling, transport and use of materials (anchors, grout, paint, etc.);
    - .6 All costs incurred in the surface preparations;
    - .7 Painting of guardrails (posts and guardrails);
    - .8 The lead paint removal wastes disposition;
    - .9 The restoration of the guardrails, including the new anchors of the same size as the existing one;
    - .10 Leveling the guardrails, if necessary, with cementitious grout;
    - .11 In the event of damage, immediately repair the affected items and at the Contractor's expense;
    - .12 Any incidental expenses.



.7 Item 1.7 - Platforms and Access System

.1 Payment items 1.7.1 and 1.7.2 – Platforms and access system for seats and crowning walls

.1 Payment item 1.7.1 and 1.7.2 of the *Schedule of Prices* is priced per linear meter (m. Lin.) of wall intervention for the supply, installation and removal of the access platforms and system in accordance with the requirements of plans and specifications. The unit price for the platforms and access system (in linear meter) includes the equivalent of the intervention length, regardless of the number of vertical displacements required. Only the equivalent of the intervention length will be paid. If the Contractor puts two platforms at two different heights on the same repair section of 1 m, only one platform of 1 m will be paid and not 2 m.

.2 Price includes, but is not limited to, the following:

- .1 The preparation, presentation, and correction of shop drawings and design calculations;
- .2 Mobilization of labor, tools and equipment required for the execution of the work;
- .3 The supply, transport, handling, installation, maintenance and removal of platforms and access systems;
- .4 Any incidental expenses.

.3 The submitted price is paid as shown below for each item:

- .1 60% du the price after the installation of the platform with the satisfaction of the ministry representative;
- .2 40% of the price after the evacuation of all materials composing the platform, out of the work site.

**2.2 Item 2. – Replacement of the Crowning Walls**

.1 Item 2.1 – Excavations and stockpiling

.1 Payment item 2.1 of the *Schedule of Prices* is priced per cubic meter (m<sup>3</sup>) for excavated and stockpiled backfilled material. The volume shall be calculated based on a joint statement of the excavations in accordance with the requirements of the plans and specifications.

.2 Price includes, but is not limited to, the following:

- .1 Mobilization of labor, tools and equipment required for the execution of the work;
- .2 Complete removal of stumps and roots in excavation areas and the disposition;
- .3 Drying and drainage of the excavation bottom;
- .4 Excavation, loading, transport and stockpiling of the backfilled material;
- .5 Any incidental expenses.

- .2 Item 2.2 – Disposal of Contaminated Soil
  - .1 Item 2.2.1 to 2.2.4 – Range <A, A-B, B-C, C+
    - .1 Payment items 2.2.1 to 2.2.4 of the *Schedule of Prices* are priced per tonnes (t) of evacuated soil for the disposal of different types of contaminated soils range <A, A-B, B-C and C+, in accordance with the requirements of the specifications and drawings, and as directed by the Government Representative.
    - .2 The amount includes, but is not limited to, the following:
      - .1 Disposal of contaminated soil contaminated soils <A, A-B, B-C, C+, as directed by the Government Representative.
      - .2 Loading, transport off site and treatment as prescribed by Section 01 74 21 *Construction / Demolition Waste Management and Disposal* and by section 01 35 13.43, *Special project procedures for contaminated sites*;
      - .3 Stockpiling and off-site disposal
      - .4 Clean-up;
      - .5 Any incidental expenses.
  - .3 Items 2.3, –Demolition and/or removal of collapsed walls
    - .1 The line item 2.3 of the Schedule of Prices are priced per cubic meter (m<sup>3</sup>) of concrete demolished, in accordance with the requirements of the specifications and drawings, and as directed by the Government Representative.
    - .2 The amount includes, but is not limited to, the following:
      - .1 Preparation, presentation, and correction of the Work Plan regarding the demolition of the wall;
      - .2 The mobilization of labour, tools, and equipment required to carry out the work;
      - .3 All required saw cuts;
      - .4 The demolition of defective and sound concrete as directed by the Government Representative;
      - .5 Cleaning, surface preparation and disposition of debris;
      - .6 Cleaning the reinforcing steel to be retained;
      - .7 Cleaning of the concrete substrate;
      - .8 The collection and treatment of demolition materials as prescribed by Section 01 74 21 *Construction / Demolition Waste Management and Disposal*;
      - .9 Any incidental expenses.

- .4 Item 2.4 - Galvanized reinforcement
  - .1 The price to the payment item 2.4, of the *Schedule of Prices* is priced per kilogram (kg) of steel according to the quantities placed in the formwork, in accordance with the requirements of the drawings and specifications.
  - .2 This item includes also the reinforcement needed for the stairs reconstruction has shown on the drawings.
  - .3 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation and correction of the Work Plan for the Installation of Steel Bars;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The preparation, presentation, and correction, if required, of the shop drawings and the slip of the frames;
    - .4 The supply of reinforcing bars and the shaping thereof,
    - .5 Galvanization where stipulated in the plans and specifications;
    - .6 The cuts and adjustment on site;
    - .7 Installation of reinforcing steel required;
    - .8 Any incidental expenses.
  
- .5 Items 2.5 - Chemical anchorage
  - .1 Item 2.5.1 and 2.5.2 – Chemical anchorage 15M, Chemical anchorage 20M
    - .1 The price to the payment items 2.5.1 and 2.5.2 of the *Schedule of Prices* are priced per unit of chemical anchor, in accordance with the requirements of the plans and specifications.
    - .2 This item includes also the anchorage needed for the stairs reconstruction has shown on the drawings.
    - .3 Price includes, but is not limited to, the following:
      - .1 The preparation, presentation, and correction of shop drawings and anchor chemical technical sheet;
      - .2 Mobilization of labor, tools and equipment required for the execution of the work;
      - .3 Drilling and cleaning of holes for the installation of chemical anchors;
      - .4 The supply, handling, transport and installation of steel anchor rods and anchor chemicals;
      - .5 The execution of tests on control anchorages, in accordance with Section 03 30 03;
      - .6 Any incidental expenses.
    - .4 The following items are excluded from this item:
      - .1 Anchors, used to replace the formwork tie-rods, used to hold the formwork in place, and which are required for placing concrete

on existing concrete, are not covered by any item in the slip. All costs incurred by the Contractor for the construction of these works are included in the price of the formwork;

.6 Positions 2.6 – Cast-in-Place Concrete

- .1 The price in item 2.6 of the Schedule of Prices is priced per cubic meter (m<sup>3</sup>) of wall concrete, the quantities shall be calculated according to the theoretical dimensions in accordance with the requirements of the plans and specifications.
- .2 This item includes the concrete for the stairs reconstruction as shown on the drawings.
- .3 Price includes, but is not limited to, the following:
  - .1 The preparation, presentation, and correction, if required, of shop drawings, the concreting procedure, the descriptions of the mixtures and the technical data sheets required;
  - .2 Mobilization of labor, tools and equipment required for the execution of the work;
  - .3 Supply, installation and dismantling of formwork;
  - .4 Supply and installation of chamfers;
  - .5 The supply and application of mold release agent;
  - .6 Supply and installation of formwork ties;
  - .7 The supply and application of repair mortar to the location of the formwork ties;
  - .8 The anchors, used to replace the formwork tie-rods, used to hold the formwork in place and required for the placement of concrete on existing concrete.
  - .9 Supply and installation of steel wire;
  - .10 The supply, transport, handling and placing of the drain 150 mm x 150 mm;
  - .11 The supply, transport, handling and placing of the steel components incorporated in the concrete, as shown in the drawings;
  - .12 Treatment of substrate before concreting;
  - .13 Supply, installation, vibration, finishing, wet curing of concrete;
  - .14 The execution of the saw-strokes shown in the drawings;
  - .15 Cleaning of concrete surfaces adjacent to the concreting area;
  - .16 At the end of the work, off-site evacuation of the formwork materials and correction of defective repairs;
  - .17 Concrete Finishing
  - .18 Treatment of surplus materials in accordance with Section 01 74 21, *Construction / Demolition Waste Management and Disposal*;
  - .19 Any incidental expenses.

.7 Position 2.7 - Bollards

- .1 The price at item 2.7 of the Schedule of Prices is unit priced for the removal, surface preparation, painting and replacing of the bollards in accordance with the requirements of the drawings and specifications.
- .2 **Note that the existing bollard paint contain lead.** The Contractor must adapt his price to take into account the requirement of CNESST in terms of lead exposition during stripping.
- .3 The surface preparation and the paint stripping containing lead can't be done in the field work zone. The works must be done inside a factory.
- .4 Price includes, but is not limited to, the following:
  - .1 The survey of the bollard localisation, the preparation, presentation, and correction, if required, of shop drawings, the paint stripping procedure containing lead, the painting procedure, samples and technical data sheets required;
  - .2 Mobilization of labor, tools and equipment required for the execution of the work;
  - .3 Removal, transportation, handling, storage of bollards;
  - .4 The supply, handling, transport and use of materials;
  - .5 All costs incurred in the preparation of surfaces;
  - .6 The lead paint removal wastes disposition;
  - .7 Painting of the bollards
  - .8 Repositioning bollards, including new anchors of the same size as the existing one (same localisation them existing);
  - .9 In the event of damage, immediately repair the affected items and at the Contractor's expense;
  - .10 All costs related to the work in section 35 59 29 - Mooring equipment;
  - .11 Any incidental expenses.

.8 Posts 2.8 - Rungs

- .1 The price at item 2.8 of the Schedule of Prices is unit priced for the establishment of a series of steps in accordance with the requirements of the plans and specifications.
- .2 The unit rungs include steps similar to the existing conditions. The sets of steps are composed with holes for the feet and galvanized reinforced steel in front and on top of the walls as described on the plans. The price also includes the support to hold the bars.
- .3 The existing conditions is composed of four ranks on the front face and one on the top. In case of variation, the rungs will be paid proportionally.
- .4 Price includes, but is not limited to, the following:
  - .1 The preparation, presentation, and correction of shop drawings, samples, and technical data sheets;

- .2 Mobilization of labor, tools and equipment required for the execution of the work;
  - .3 The supply, transport, handling and setting of the echelons, such as the existing ones;
  - .4 Any incidental expenses.
- .9 Item 2.9- Excavation backfilling
- .1 The price at item 2.9 of the Schedule of Prices is priced per cubic meter (m<sup>3</sup>) for the materials who, according to the laboratory test results, are adequate for reuse. The volume shall be calculated based on a joint statement of the of the backfilled excavation.
  - .2 Price includes, but is not limited to, the following:
    - .1 Mobilization of labor, tools and equipment required for the execution of the work;
    - .2 The loading, the transport, the execution of the backfill;
    - .3 Compaction;
    - .4 Cleaning of premises;
    - .5 Any incidental expenses.
- .10 Item 2.10- Type 1 borrowing materials, MG-20
- .1 The price at item 2.10 of the Schedule of Prices is priced per tonne (t) for the borrowed materials in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 This item covers materials that replace materials deemed unsuitable by the Government Representative.
    - .2 Transportation of loan materials to the site.
    - .3 The supply and installation of borrowed materials in accordance with the plans, specifications, and instructions of the Government Representative.
    - .4 Compaction;
    - .5 Cleaning of premises;
    - .6 Any incidental expenses.
- .11 Item 2.11 - Concrete for support pad (Concrete 1 MPa)
- .1 The price at item 2.11 of the Schedule of Prices is priced per cubic meter (m<sup>3</sup>) for the backfill concrete in accordance with the requirements of the plans and specifications and the instructions of the Government Representative.
  - .2 The concrete of the support pad is a pumpable concrete with a minimum compression resistance of 1 MPa.
  - .3 Price includes, but is not limited to, the following:

- .1 The preparation, presentation, and correction of shop drawings, the concreting procedure, the descriptions of the mixtures and the technical data sheets required;
  - .2 Supply, installation and dismantling of formwork;
  - .3 Carrying concrete for the support pad to the site.
  - .4 Purchase and installation of support pad per plans and specifications.
  - .5 Treatment of surplus materials in accordance with Section 01 74 21, *Construction / Demolition Waste Management and Disposal*
  - .6 Cleaning of premises;
  - .7 Any incidental expenses.
- .12 Item 2.12 - Perforated drain 200 mm and geotextile, PVC (type 1) or PVC COEX (type 1) or PE (type 2), 180 kPa min.
- .1 The price at item 2.12 of the Schedule of Prices is priced per linear meter (m. Lin.) for the perforated drain in accordance with the requirements of the plans and specifications.
  - .2 The drainage system to install behind the crowning wall must have a diameter of 200mm.
  - .3 Price includes, but is not limited to, the following:
    - .1 The supply of materials, the installation of drains including the installation of the geotextile, the preparation of the foundation, the clear stone support cushion, the connection of the elements and all accessories required for the installation Such as joints between the various sections;
    - .2 The execution of the slope needed for drainage;
    - .3 Cleaning of premises;
    - .4 Any incidental expenses.
- .13 Item 2.13- Top Soil
- .1 The price at item 2.13 of the Schedule of Prices is priced per square meter (m<sup>2</sup>), based on the area covered in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 Stripping, loading, transport and storage of topsoil;
    - .2 The preparation of the ground for the placement of the topsoil;
    - .3 The supply of the material, loading, transport, spreading, leveling, stripping, removal of woody debris and waste, and any amendments necessary to make the material conform to plans and specifications;
    - .4 Loading, transport and use of topsoil;
    - .5 Any incidental expenses.

.14 Item 2.14 – Laying Sod

- .1 The price at item 2.14 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) for laying sod and shall be used to measure the maintenance of the sodded area during the guarantee period in square meters in accordance with the requirements of the plans and specifications.
- .2 Price includes, but is not limited to, the following:
  - .1 The supply, implementation of materials in accordance with the plans and directives of the Government Representative;
  - .2 Recovery of sodding of portions of covered surfaces by less than 75% shoot height 150 mm (including watering)
  - .3 Cleaning of premises;
  - .4 First lawn mowing;
  - .5 Any incidental expense
- .3 It is noted that only the area above the excavated trench is included in this payment item. Costs related to all other areas damaged by the work are considered miscellaneous and are included in the reclamation price.

.15 Posts 2.15 - Geotextile

- .1 The price at item 2.15 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) based on the actual surface area covered, without addition for overlap, for the geotextile required for the excavations, in accordance with the requirements of the plans and specifications.
- .2 Price includes, but is not limited to, the following:
  - .1 The provision of warehousing, handling, transport, laying, assembling of slicks, fixing anchorages, and the use of materials in accordance with drawings and specifications;
  - .2 Cleaning and shimming;
  - .3 Any incidental expenses.

**2.3 Item 3. - Repair of the crowning wall without overlay**

- .1 Item 3.1 - Cast -in-Place Concrete; Type XIV-R or XIV-S (self-consolidating)
  - .1 The price at item 3.1 of the Schedule of Prices is priced per cubic meter (m<sup>3</sup>) of wall concrete, the quantities are calculated according to the actual quantities put in place, in accordance with the requirements of the plans and specifications.
  - .2 The type 2A are repairs to be done continuously on all length of selected sections.
  - .3 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation and correction, if required, of the Work Plan for the demolition of the wall;



- .2 Mobilization of labor, tools and equipment required for the execution of the work;
  - .3 The demolition of defective and sound concrete, as directed by the Government Representative;
  - .4 The 300 mm excavation at the back of the wall, if applicable;
  - .5 Loading, transport and storage of excavated material;
  - .6 Loading, transport and installation of the embankment with the excavated material;
  - .7 Saw lines required;
  - .8 Cleaning of reinforcing steel to be retained;
  - .9 Cleaning and surface preparation,
  - .10 Supply, installation and dismantling of formwork;
  - .11 Supply and installation of chamfers;
  - .12 The supply and application of mold release agent;
  - .13 Supply and installation of formwork ties;
  - .14 The supply, transport, handling and placing of the steel components incorporated in the concrete, as shown in the drawings;
  - .15 Supply, installation, vibration, finishing, wet curing of concrete (including additional concrete at bollard localisation);
  - .16 The collection of demolition materials, their disposal outside the building site and their treatment in accordance with the requirements of Section 01 74 21, *Construction/Demolition Waste Management and Disposal*;
  - .17 Any incidental expenses.
- .2 Item 3.2 - Galvanized reinforcement
- .1 The price to the payment item 3.2 of the *Schedule of Prices* is priced per kilogram (kg) of steel according to the quantities placed in the formwork, in accordance with the requirements of the drawings and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation and correction of the Work Plan for the Installation of Steel Bars;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The preparation, presentation, and correction, if required, of the shop drawings and the slip of the frames;
    - .4 The supply of reinforcing bars and the shaping thereof,
    - .5 Galvanization where stipulated in the plans and specifications;
    - .6 The cuts and adjustment on site;
    - .7 Installation of reinforcing steel required;
    - .8 Any incidental expenses.

- .3 Items 3.3 - Chemical anchorage
  - .1 The price to the payment item 3.3 of the Schedule of Prices is priced per unit of chemical anchor, in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction of shop drawings and anchor chemical technical sheet;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 Drilling and cleaning of holes for the installation of chemical anchors;
    - .4 The supply, handling, transport and installation of steel anchor rods and anchor chemicals;
    - .5 The execution of tests on control anchorages, in accordance with Section 03 30 03;
    - .6 Any incidental expenses.
  - .3 This item excludes the following items:
    - .1 Anchors, used to replace formwork tie-rods, which are used to hold the formwork in place and are required for the placement of concrete on existing concrete, are not covered by any item in the slip and All costs incurred by the Contractor for the construction of these works are included in the price of the formwork;
- .4 Position 3.4 - Bollards
  - .1 The price at item 3.4 of the Schedule of Prices is unit priced for the removal, surface preparation, painting and replacing of the bollards in accordance with the requirements of the drawings and specifications.
  - .2 The contractor has to demolish deeper in the concrete at each bollard localisation to be able to remove it.
  - .3 **Note that the existing bollard paint contain lead.** The Contractor must adapt his price to take into account the requirement of CNESST in terms of lead exposition during stripping.
  - .4 The surface preparation and the paint stripping containing lead can't be done in the field work zone. The works must be done inside a factory.
  - .5 Price includes, but is not limited to, the following:
    - .1 The survey of the bollard localisation, the preparation, presentation, and correction, if required, of shop drawings, the paint stripping procedure containing lead, the painting procedure, samples and technical data sheets required;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 Removal (including local concrete demolition), transportation, handling, storage of bollards;
    - .4 The supply, handling, transport and use of materials;

- .5 All costs incurred in the preparation of surfaces;
  - .6 The lead paint removal wastes disposition;
  - .7 Painting of the bollards
  - .8 Repositioning bollards, including new anchors of the same size as the existing one (same localisation them existing);
  - .9 In the event of damage, immediately repair the affected items and at the Contractor's expense;
  - .10 All costs related to the work in section 35 59 29 - Mooring equipment;
  - .11 Any incidental expenses.
- .5 Posts 3.5 - Rungs
- .1 The price at item 3.5 of the Schedule of Prices is priced per unit for the establishment of a series of steps in accordance with the requirements of the plans and specifications.
  - .2 The unit rungs include steps similar to the existing conditions. The sets of steps are composed with whole for the feet and galvanized reinforced steel in front and on top of the walls as described on the plans. The price also includes the support to whole the bars.
  - .3 The existing conditions is composed of four ranks on the front face and one on the top. In case of variation, the rungs will be paid proportionally.
  - .4 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation and correction, if required, of shop drawings, samples and technical data sheets;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The supply, transport, handling and installation of steps including new anchorages of the same size as the existing one;
    - .4 Any incidental expenses.
- .6 Item 3.6 – Laying Sod
- .1 The price at item 3.6 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) for laying sod and shall be used to measure the maintenance of the sodded area during the guarantee period in square meters in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The supply, implementation of materials in accordance with the plans and directives of the Government Representative;
    - .2 Recovery of sodding of portions of covered surfaces by less than 75% shoot height 150 mm (including watering)
    - .3 Cleaning of premises;
    - .4 First lawn mowing;

- .5 Any incidental expense
- .3 It is noted that only the area above the excavated trench is included in this payment item. Costs related to all other areas damaged by the work are considered miscellaneous and are included in the reclamation price.

## 2.4 Item 4. – Repair of concrete seat and/or crevices

- .1 Items 4.1 – Concrete Demolition
  - .1 The price at item 4.1 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) of demolish seat concrete surface area, in accordance with the requirements of the specifications and drawings, and as directed by the Government Representative.
  - .2 The amount includes, but is not limited to, the following:
    - .1 Preparation, presentation, and correction of the Work Plan regarding the demolition of the seat surface;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 All required saw cuts;
    - .4 The demolition of defective and sound concrete as directed by the Government Representative;
    - .5 The cleaning of steel reinforcement to be conserved;
    - .6 The cleaning of concrete substrate to be conserved and disposition of debris;
    - .7 The collection and treatment of demolition materials as prescribed by Section 01 74 21 *Construction / Demolition Waste Management and Disposal*;
    - .8 Any incidental expenses.
- .2 Items 4.2 – Galvanized wire mesh 51x51 MW9,1xMW9,1
  - .1 The price at item 4.2 of the Schedule of Prices is priced per square meter of wire mesh, in accordance with the requirements of the specifications and drawings and as directed by the Government Representative.
  - .2 The amount includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction of the Work Plan for the installation of wire mesh;
    - .2 The mobilization of labour, tools, and equipment required to carry out the work;
    - .3 The supply of wire mesh flat sheets;
    - .4 Installation of required wire mesh including overlap;
    - .5 Steel wire used to connect the wire mesh sheets;
    - .6 Any incidental expenses.

- .3 Item 4.3 - Galvanized reinforcement
  - .1 The price to the payment item 4.3 of the *Schedule of Prices* is priced per kilogram (kg) of steel according to the quantities placed in the formwork, in accordance with the requirements of the drawings and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation and correction of the Work Plan for the Installation of Steel Bars;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The preparation, presentation, and correction, if required, of the shop drawings and the slip of the frames;
    - .4 The supply of reinforcing bars and the shaping thereof,
    - .5 Galvanization where stipulated in the plans and specifications;
    - .6 The cuts and adjustment on site;
    - .7 Installation of reinforcing steel required;
    - .8 Any incidental expenses.
- .4 Items 4.4 - Chemical anchorage
  - .1 The price to the payment item 4.4 of the Schedule of Prices is priced per unit of chemical anchor, in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction of shop drawings and anchor chemical technical sheet;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 Drilling and cleaning of holes for the installation of chemical anchors;
    - .4 The supply, handling, transport and installation of steel anchor rods and anchor chemicals;
    - .5 The execution of tests on control anchorages, in accordance with Section 03 30 03;
    - .6 Any incidental expenses.
- .5 Items 4.5 – Shotcrete
  - .1 The price to the payment item 4.5 of the Schedule of Prices is priced per Cubic meter (m<sup>3</sup>) of wall concrete, in accordance with the requirements of the specifications and drawings, and as directed by the Government Representative.
  - .2 For the quantity calculation, an average thickness of 300mm has been used.
  - .3 Price includes, but is not limited to, the following:
    - .1 Costs related to the cooling of concrete or other approved method of implementation of concrete in hot weather must be included in the unit price of concrete;

- .2 The preparation, presentation, and correction of shop drawings, the concreting procedure, the descriptions of the mixtures and the technical data sheets required;
- .3 The certification of the spray gun operator;
- .4 The mobilization of labour, tools, and equipment required to carry out the work;
- .5 The supply, installation, and dismantling of required formwork;
- .6 The identification, marking and adjustment of the projected slope;
- .7 Supply, installation, vibration, finishing, and wet curing of concrete;
- .8 The moulds for the manufacture of the samples;
- .9 Implementation, finishing and treatment of surfaces and cleaning surfaces abutting;
- .10 At the end of the work, repair of the defective zone;
- .11 Saw cut as shown on the drawing;
- .12 Cleaning of adjacent concrete surface;
- .13 Treatment of surplus materials in accordance with the requirements of Section 01 74 21 Construction / Demolition Waste Management and Disposal;
- .14 Any incidental expenditure.

## 2.5 Item 5. – Traffic maintenance end temporary signage

The temporary signage and the dimensions of signs on the bike path and streets have to be compliant with Annexe F – Liste des panneaux de signalisation pour les voies cyclables, with chapter 7 – Voies cyclables and with tome V – Signalisation routière – Volume 1, 2 and 3 of road works published by “Les publications du Québec”.

The signs used for this project have to be obligatory bilinguals.

- .1 Item 5.1- Traffic Maintenance and Temporary Signage
  - .1 The price at item 5.1 is a daily price for traffic and temporary signaling in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 Maintenance of traffic and temporary signaling of the cycling path as presented in the specification annexe;
    - .2 The preparation of all signaling plans The plans must be signed by an engineer member of the “ordre des ingénieurs du Québec”;
    - .3 Mobilisation maintenance and dissembling of the temporary signaling;
    - .4 Maintenance of access to properties;
    - .5 The provision of signalers as required;

- .6 The provision, mobilization, maintenance, replacement in the event of breakage or vandalism, the commissioning or disengagement, the displacement and demobilization of the temporary signaling required to carry out work on the entire site in accordance with the requirements of this document;
  - .7 Maintenance of signs and traffic lanes including inspections requested;
  - .8 Temporary signaling, tools, equipment, vehicle and manpower required for the complete execution of all works;
  - .9 Modification and rehabilitation of existing signage;
  - .10 Closing of the two pedestrian accesses by Monk boulevard as shown in the specification annexe and the required signs for the pedestrian detour;
  - .11 Closing of the bike path with signaling personnel for the implementation and dismantling of the deviation path and work areas;
  - .12 Bilingualism of the temporary signs;
  - .13 As well as other costs relating to the special requirements for traffic control;
  - .14 Any incidental expenses.
- .2 Item 5.2 – Temporary deviation of the cycling path
- .1 The price at item 5.2 of the Schedule of Prices is a lump sum for the conformity and installation of a temporary deviation of the cycling path in accordance with the requirements of the specifications.
  - .2 The Linear length of the deviation is about 230m. The contractor have to foresee the following installation steps:
    - .1 Removing of the existing laying sod under the temporary path;
    - .2 Installation of a geotextile membrane type III;
    - .3 Installation and compaction of a layer of MG-20 of thickness 150mm on all the length;
    - .4 Installation and compaction of a layer of temporary pavement ESC-10 (PG 50-28) on all the length.
  - .3 Price includes, but is not limited to, the following:
    - .1 Mobilization of labor, tools and equipment required for the execution of the work;
    - .2 Removing, transportation and disposition of the laying sod;
    - .3 Transportation and supply of all materials to the work zone (geotextile, MG-20, pavement, etc.);
    - .4 Implementation, preparation and compaction of materials;
    - .5 Temporary marking of the temporary path with a water base paint according to MTQ tome V;
    - .6 Demobilization at the end of the contract;
    - .7 Transportation and disposition of the materials;

- .8 Supply, transport and install the new laying sod layer;
- .9 Cleaning of the area;
- .10 Any incidental expenses.

.3 Item 5.3 - Special Panels

- .1 The price at item 5.3 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) for the conformity and installation of special panels and signs in accordance with the requirements of the drawings and specifications.
- .2 Price includes, but is not limited to, the following:
  - .1 The preparation, presentation and correction of shop drawings signed and sealed by a member engineer in good standing of the Ordre des ingénieurs du Québec;
  - .2 Obtaining all required certificates;
  - .3 The supply, shaping, transportation and handling of the materials required for the application of the special panels and signs;
  - .4 Mobilization of labor, tools and equipment required for the execution of the work;
  - .5 The provision of accessories required for the installation of panels and signs such as poles, braces, hardware;
  - .6 Implementation, maintenance, replacement in case of accident, breakage or vandalism of special panel;
  - .7 Demobilization of special panels and signs at the end of the work;
  - .8 Turning the traffic sign on or off, as often as required;
  - .9 Temporary signage required during operations;
  - .10 Any incidental expenses.

**2.6 Item 6 – Precast concrete pavers**

- .1 Item 6.1 – Precast concrete pavers (B4-N-43-D)
  - .1 The price at item 6.1 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) for the construction of a new precast concrete pavers in accordance with the plans and specifications.
  - .2 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction of shop drawings and technical sheets of all materials and products used;
    - .2 The supply of paving samples and all other requirements describe at specification section 32 14 13;
    - .3 Mobilization of labor, tools and equipment required for the execution of the work;
    - .4 The removing and storage of existing pavers in zone 1 as shown on the drawing 26 of 34;



- .5 The removing, transportation and disposition of the existing pavement as shown on drawing 26 of 34;
- .6 The removing, transportation and disposition of the existing sand bed and existing foundation on a thickness of 300mm in the zones 1 and 2 as shown on drawing 26 of 34;
- .7 Transportation and supply of all materials to the work zone and implementation (Geotextile, MG-20, sand bed, concrete pavers, polymeric joints, anchors, PVC borders, etc.);
- .8 Compaction of the granular foundation MG-20;
- .9 Cleaning of the surface;
- .10 Any incidental expenses.

## 2.7 **Item 7. - Provision for winter conditions - Concreting in cold weather**

- .1 Item 7.1 - Temporary Shelter for Concrete Work
  - .1 The price at item 7.1 of the Schedule of Prices is priced per linear meter (m. Lin.) to offset all costs incurred for the temporary shelter for concrete work in accordance with the requirements of the plans and specifications.
  - .2 Temporary shelter is payable only if it is required in writing by the Government Representative.
  - .3 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction of the shop drawings and the description of the shelter.
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The supply, handling and transportation of the materials required to construct the shelter;
    - .4 Installation, maintenance during construction and dismantling at the end of the temporary shelter;
    - .5 Heating the temporary shelter during the work;
    - .6 Off-site transportation of materials;
    - .7 Any incidental expenses.
  - .4 The bid price is paid as follows:
    - .1 60% of the amount after assembly of the shelter to the satisfaction of the Representative of the Ministry;
    - .2 40% of the amount after the evacuation of the materials that made up the shelter, outside the building site.

- .2 Item 7.2 - Insulation (RSI 0.40 per coat)
  - .1 The price at item 7.2 of the Schedule of Prices is priced per square meter (m<sup>2</sup>) of new uncut concrete surface covered with insulation in accordance with the requirements of the plans and specifications.
  - .2 Insulation layers shall be payable only if required in writing by the Government Representative.
  - .3 Price includes, but is not limited to, the following:
    - .1 The preparation, presentation, and correction, if required of the description of the composition of the insulating layer;
    - .2 Mobilization of labor, tools and equipment required for the execution of the work;
    - .3 The supply, handling, transportation, installation, maintenance during construction, removal, and disposal of insulation layers at the end of the work;
    - .4 The cost of insulation protection of concrete required because of the correction of defective works shall be borne by the Contractor.
    - .5 Any incidental expenses.
  - .4 The bid price is paid as follows:
    - .1 60% of the amount after installation of the insulation layers requested;
    - .2 40% of the post after the removal of the insulating materials from the building site.
- .3 Item 7.3 - Heating of Concrete Components
  - .1 The price at item 7.3 of the Schedule of Prices is priced per cubic meter (m<sup>3</sup>) of concrete or cement slurry installed, the components of which are heated in accordance with the requirements of the drawings and specifications.
  - .2 Price includes but is not limited to:
    - .1 Heating of the mixing water (between 40 ° C and 80 ° C) used for the manufacture of the concrete;
    - .2 Heat aggregates to remove frozen pieces, snow, and ice;
    - .3 The cost of heating the concrete or grout components without the need for shrinkage because of the correction of defective work shall be borne by the Contractor;
    - .4 Any incidental expenses.

## **2.8 Item 8 - Specialty Supplies**

- .1 Item 8.1 - Installation of a legal survey marker
  - .1 The price at item 8.1 of the Schedule of Prices is priced per unit in accordance with the requirements of the plans and specifications.
  - .2 Price includes, but is not limited to, the following:

- .1 The preparation, presentation, and correction, if required, of the technical specification of the marker;
- .2 Mobilization of labor, tools and equipment required for the execution of the work;
- .3 The supply manutention transport and installation of the survey marker;
- .4 Any incidental expenses.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – *Demolition for minor works*
- .2      Section 03 10 00 – *Concrete Forming and Accessories*
- .3      Section 03 20 00 – *Concrete Reinforcing*
- .4      Section 03 30 00 – *Cast-in-Place Concrete*
- .5      Section 03 30 03 – *Concrete Repair*
- .6      Section 03 37 13 – *Shotcrete*
- .7      Section 05 50 00 – *Metal Fabrications*
- .8      Section 09 97 19 – *Painting Exterior Metal Surfaces*
- .9      Section 31 05 16 – *Aggregate Materials*
- .10     Section 31 11 00 – *Clearing and Grubbing*
- .11     Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .12     Section 31 32 19 – *Geotextiles*
- .13     Section 31 04 31 – *Historic Subgrade, Shoring and Bracing*
- .14     Section 32 14 13 – *Precast concrete pavers*
- .15     Section 32 91 19.13 – *Topsoil Placement and Grading*
- .16     Section 32 92 23 – *Sodding*
- .17     Section 35 59 29 – *Mooring Devices*

**1.2                PRICES AND PAYMENT**

- .1      The costs of project meetings should be included in the bid prices for each relevant item of the *Schedule of Prices*.

**1.3                ADMINISTRATIVE**

- .1      Plan to hold project meetings every two (2) weeks throughout the duration of the work.
- .2      Government Representative prepares agenda for meetings.
- .3      Distribute a written notice of each meeting five (5) days in advance of the meeting date to the Contractor, the Parks Canada Agency (PCA) project manager, the Government Representative, and the Design Engineer (when required).
- .4      Provide physical space and plan for meetings.
- .5      Government Representative presides at meetings.
- .6      Government Representative records the meeting minutes.    Include significant proceedings and decisions. Identify actions by parties.

- .7 Reproduce and distribute copies of minutes within five (5) days after meetings and transmit to meeting participants and affected parties not in attendance.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

#### **1.4 PRECONSTRUCTION MEETING**

- .1 Within fifteen (15) days after emission of contract award letter, Government Representative organise a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.
- .2 The PCA project manager, the Government Representative, the Design Engineer, as well as the Contractor and the main Subcontractors will be in attendance.
- .3 Government Representative establishes time and location of meeting and notifies parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
  - .1 Appointment of official representative of participants in the Work.
  - .2 Schedule of Work
  - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
  - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - *Construction Facilities*.
  - .5 Delivery schedule of specified equipment, for each bridge.
  - .6 Site security in accordance with Section 01 56 00 - *Temporary Barriers and Enclosures*.
  - .7 Proposed changes, change orders, procedures, approvals required, mark-up, administrative requirements.
  - .8 Owner provided products.
  - .9 Record drawings in accordance with Section 01 33 00 - *Submittal Procedures*.
  - .10 Take-over procedures, acceptance, and warranties.
  - .11 Monthly progress claims, administrative procedures, photographs, hold backs.
  - .12 Appointment of inspection and testing agencies or firms.
  - .13 Insurances, transcript of policies.
  - .14 Shop drawings and development plan.

#### **1.5 PROGRESS MEETINGS**

- .1 The Government Representative shall establish a schedule of the progress meetings to be held every two (2) weeks during the Work, until its completion.
- .2 Contractor, major Subcontractors involved in Work, the PCA project manager, and the Government Representative are to be in attendance.
- .3 Government Representative notifies parties a minimum of five (5) days prior to meetings.

- .4 The Contractor must submit to the Government Representative a work schedule based on the real progress of the work a minimum of twenty-four (24) hours prior to the meetings. The presented schedule must compare the real progress to the original work schedule.
- .5 Government Representative records minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.
- .6 Agenda to include the following:
  - .1 Review, approval of minutes of previous meeting.
  - .2 Review of Work progress since previous meeting.
  - .3 Field observations, problems, conflicts.
  - .4 Health and safety.
  - .5 Problems which impede construction schedule.
  - .6 Review of off-site fabrication delivery schedules.
  - .7 Corrective measures and procedures to regain projected schedule.
  - .8 Revision to construction schedule.
  - .9 Progress schedule, during succeeding work period.
  - .10 Review submittal schedules: expedite as required.
  - .11 Maintenance of quality standards.
  - .12 Review proposed changes for effect on construction schedule and on completion date.
  - .13 Other business.

#### **1.6 MEETINGS PRIOR TO IMPLEMENTATION**

- .1 Must be in attendance: The Contractor including the Engineer who signed the procedure, and all principal Subcontractors participating in the work, the Laboratory Testing Representative, and the Government Representative.
- .2 The Department Representative shall advise the parties at least five (5) days prior to the meetings.
- .3 The meeting shall only take place once the procedure has been judge complete by the Government Representative. The meeting agenda shall include a review of the procedure and the contractual requirements for the work.

**END OF SECTION**

## **Part 1            General**

### **1.1                DEFINITIONS**

- .1        Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2        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, Bar Chart should be derived from commercially available computerized project management system.
- .3        Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
- .4        Construction Work Week: Monday to Friday, inclusive, will provide five (5) days work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
- .5        Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
- .6        Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7        Milestone: significant event in project, usually completion of major deliverable.
- .8        Project 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 satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9        Project Planning, Monitoring and Control System: overall system operated by the Departmental Representative to enable monitoring of project work in relation to established milestones.

### **1.2                REQUIREMENTS**

- .1        Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2        Plan to complete Work in accordance with prescribed milestones and time frame.
- .3        Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4        Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to the Government Representative within seven (7) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.
- .3 Submit Project Schedule to the Government Representative within five (5) working days of receipt of acceptance of Master Plan.

### **1.4 PROJECT MILESTONES**

- .1 Project milestones form interim targets for Project Schedule.
  - .1 Repairs of the crowning walls;
  - .2 Replacement of the crowning walls;
  - .3 Repairs of the seat;
  - .4 Any other work shown on plans, specifications, and Schedule of Prices.

### **1.5 MASTER PLAN**

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).
- .2 The Government Representative will review and return revised schedules within five (5) working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

### **1.6 PROJECT SCHEDULE**

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes, as minimum, milestone and activity types as follows:
  - .1 Award;
  - .2 Shop Drawings, Samples;
  - .3 Permits;
  - .4 Mobilization/demobilisation;
  - .5 Minimally one activity for each article in the tender form;
  - .6 Any other tasks or deliverables required.

### **1.7 PROJECT SCHEDULE REPORTING**

- .1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.



- .2 Include as part of Project Schedule, 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.

## **1.8 PROJECT MEETINGS**

- .1 Hold meetings in accordance with section 01 31 19 – Project Meetings.
- .2 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .3 Weather related delays with their remedial measures will be discussed and negotiated.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 99 – *Demolition for minor works*
- .2        Section 03 10 00 – *Concrete Forming and Accessories*
- .3        Section 03 20 00 – *Concrete Reinforcing*
- .4        Section 03 30 00 – *Cast-in-Place Concrete*
- .5        Section 03 30 03 – *Concrete Repair*
- .6        Section 03 37 13 – *Shotcrete*
- .7        Section 05 50 00 – *Metal Fabrications*
- .8        Section 09 97 19 – *Painting Exterior Metal Surfaces*
- .9        Section 31 05 16 – *Aggregate Materials*
- .10       Section 31 11 00 – *Clearing and Grubbing*
- .11       Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .12       Section 31 32 19 – *Geotextiles*
- .13       Section 31 04 31 – *Historic Subgrade, Shoring and Bracing*
- .14       Section 32 14 13 – *Precast concrete pavers*
- .15       Section 32 91 19.13 – *Topsoil Placement and Grading*
- .16       Section 32 92 23 – *Sodding*
- .17       Section 35 59 29 – *Mooring Devices*

**1.2                REFERENCES**

- .1        Not used.

**1.3                ADMINISTRATIVE**

- .1        The Contractor shall provide a list of subcontractors and proof of contract with the Contractor for a maximum of two (2) weeks following the award of the contract with Parks Canada.
- .2        Promptly and according to a predetermined sequence such that the execution of works is not delayed, submit the required documents and samples to the Government Representative for inspection. A delay in this respect is not a sufficient reason to obtain an extension to the completion schedule of the Works and therefore no such request will be accepted.
- .3        Do not undertake work for which the submittal of documents and samples are required until the inspection of all documents submitted has been completely finished.

- .4 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .5 Where items or information is not produced in SI Metric units converted values are acceptable.
- .6 Review submittals prior to submission to the Government Representative. This review represents that necessary requirements have been determined and verified, or will be, 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.
- .7 Notify the Government Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .8 Verify field measurements and affected adjacent Work are co-ordinated.
- .9 Contractor's responsibility for errors and omissions in submission is not relieved by the Government Representative's review of submittals.
- .10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Government Representative's review.
- .11 Keep one reviewed copy of each submission on site.
- .12 Perform a detailed survey of the walls sections to be repaired or replaced. Determine exact profile of existing walls and validate their real dimensions. Submit detailed shop drawings showing final and existing profiles of each type of wall.
- .13 In addition to the instruction, provide all supplementary details that apply to the work.

#### **1.4 SHOP DRAWINGS, PROCEDURE, TECHNICAL SPECIFICATION, AND PRODUCT DATA**

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 The Contractor shall present all shop drawings or technical specifications for all materials he intends on using.
- .3 The shop drawings and procedures must bear the seal and signature of a qualified and authorized engineer, member in good standing of the *Ordre des ingénieurs du Québec*.
- .4 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 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.
- .5 Submit to the Government Representative, all documents 7 days before beginning all work associates with the documents.
- .6 Adjustments made on shop drawings by the Government Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Government Representative prior to proceeding with Work.

- .7 Make changes in shop drawings as the Government Representative may require, consistent with Contract Documents. When resubmitting, notify the Government Representative in writing of revisions other than those requested.
- .8 Accompany submissions with transmittal letter, in duplicate, containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
  - .6 Refer to plans and specifications
- .9 Submissions include:
  - .1 Date and revision dates.
  - .2 Project title and number.
  - .3 Name and address of:
    - .1 Subcontractor.
    - .2 Supplier.
    - .3 Manufacturer.
  - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 Details of appropriate portions of Work as applicable:
    - .1 Fabrication.
    - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
    - .3 Setting or erection details.
    - .4 Capacities.
    - .5 Performance characteristics.
    - .6 Standards.
    - .7 Operating weight.
    - .8 Wiring diagrams.
    - .9 Single line and schematic diagrams.
    - .10 Relationship to adjacent work.
- .10 If upon review by the Government Representative, no errors or omissions are discovered or if only minor corrections are made, one (1) printed copy will 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.
- .11 The review of shop drawings by Parks Canada Agency (PCA) is for sole purpose of ascertaining conformance with general concept.

- .1 This review shall not mean that PCA approves detailed 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.
- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.
- .12 Distribute copies of the shop drawings and technical specifications once approved by the Government Representative.
- .13 Submit two (2) printed copies and one (1) electronic copy of all shop drawings prescribed in the specification sections and according to the requirements of the Government Representative.
- .14 Perform a detailed survey of the walls sections to be repaired or replaced. Determine exact profile of existing walls and validate their real dimensions. Submit detailed shop drawings showing final and existing profiles of each type of wall.
- .15 If a shop drawing is not required due to the use of a standard manufacturing product, submit two (2) printed copies and one (1) electronic copy of the technical data sheet or the manufacturer's documentation prescribed in the specification sections and as required by the Government Representative.
- .16 Submit two (2) printed copies and one (1) electronic copy of the manufacturer's instructions as prescribed in the specification sections and as required by the Government Representative.
  - .1 Documents must be pre-printed, describing the method of installation of the products, equipment, materials, and systems, including special notices and material safety data sheets indicating any impedances and hazards, as well as safety measures to be implemented.

## 1.5 SAMPLES

- .1 Carry out samples of required work in accordance with Section 01 45 00 - *Quality Control*.
- .2 Submit the three (3) product samples for examination, fifteen (15) days prior to commencement of work subject to this requirement, as prescribed in the technical sections of the specification. Label the samples indicating their origin and intended destination.
- .3 Ship samples to the business office of the Government Representative.
- .4 Notify the Government Representative in writing, when submitting product samples, of deviations from the requirements of the contract documents.
- .5 Where color, pattern or texture is prescribed, submit the entire range of samples required.
- .6 Modifications made to the samples by the Government Representative are not intended to vary the contract price. If this is the case, however, notify the Government Representative in writing prior to commencing work.

- .7 Provide samples that may be requested by the Government Representative while meeting the requirements of the contract documents.
- .8 The samples examined and approved will become the benchmark from which the quality of the materials and the quality of the finished and installed works will be assessed.

## **1.6 SAMPLE REPORTS**

- .1 Submit to the Government Representative at least two (2) weeks prior to commencement of work subject to this requirement two (2) printed copies and one (1) electronic copy of the test reports prescribed in the technical sections of the specifications and required by the Government Representative.
  - .1 The report signed by the official representative of the testing laboratory shall certify that materials, products, or systems identical to those proposed during the work have been tested in accordance with the prescribed requirements.
  - .2 Tests must have been completed within five (5) years prior to contract award date.
- .2 Submit two (2) printed copies and one (1) electronic copy of reports of on-site inspections by the manufacturer as prescribed in the technical sections of the Specifications and required by the Government Representative.
- .3 Reports of tests and checks carried out by the manufacturer's representative to confirm the conformity of the products, materials, equipment, or systems installed with the manufacturer's instructions.

## **1.7 CERTIFICATE OF COMPLIANCE**

- .1 Where a Certificate of Compliance is required on plans and specifications, the Contractor shall inspect the works and provide copies of the Certificates of Compliance to the Government Representative after the construction and inspection of the works and during construction.
- .2 The certificate of conformity must bear the seal and signature of a recognized professional engineer who is a member in good standing of the *Ordre des ingénieurs du Québec*.
- .3 Submit two (2) hard copies and one (1) electronic copy of the prescribed certificates in the technical sections of the estimate and required by the Government Representative.

## **1.8 CERTIFICATES**

- .1 Where certification is required on plans and specifications, the Contractor shall deliver the copies of the certificate to the Government Representative at least seven (7) days prior to the commencement of work subject to this requirement. The certificate must be valid for the duration of this work
- .2 Submit two (2) printed copies and one (1) electronic copy of the prescribed certificates in the technical sections of the Specifications and required by the Government Representative.
  - .1 The documents, printed on official correspondence paper of the manufacturer and signed by a representative of the manufacturer, must attest that the products,

materials, equipment, and systems provided comply with the requirements of the specifications.

- .2 Certificates must bear a date after the award of the contract and indicate the designation of the project.

### **1.9 LABOR QUALIFICATION**

- .1 Where a designation and specification is required, the Contractor shall submit a copy of the certificate to the Government Representative at least seven (7) days prior to the commencement of work subject to this requirement. The certificate must be valid for the duration of this work
- .2 Submit two (2) printed and one (1) electronic copies of prescribed labor qualification certificates in the technical sections of the Specifications and required by the Government Representative.

### **1.10 MANUFACTURING SOURCE**

- .1 Submit the name and address of the manufacturer to the Government Representative, four (4) weeks prior to deliveries and / or commencement of work subject to this requirement.

### **1.11 OPERATING RECORDS**

- .1 Submit two (2) printed copies and one (1) electronic copy of the operating and maintenance records prescribed in the technical sections of the Specifications and required by the Government Representative.

### **1.12 PHOTOGRAPHIC DOCUMENTATION**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 31 23 33.01 – *Excavating, Trenching, and Backfilling*

**1.2                REFERENCE STANDARDS**

- .1            Canadian General Standards Board (CGSB)
  - .1            CGSB 51-GP-51M-[81], Polyethylene Sheet for Use in Building Construction.
- .2            Transportation and Dangerous Goods Act (1999)
- .3            Canadian Council of Ministers of the Environment (CCME) Documentation

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Submittals: in accordance with Section 01 33 00- *Submittal Procedures*.
- .2            Submit, prior to start of work, plan detailing management of hazardous wastes. Submit written documentation of weekly hazardous waste inspections every month in accordance to Section 01 74 21 – *Construction/Demolition Waste Management and Disposal*.
- .3            Submittals for Progress Meetings: make submittals at least 24 hours prior to the meetings.
  - .1            Updated progress schedule detailing activities. Include review of progress with respect to previously established dates for starting and stopping various stages of Work, major problems and action taken, injury reports, equipment breakdown, and material removal.
  - .2            Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.
  - .3            Weekly copies of site entry and work area logbooks with information on worker and visitor access.
  - .4            Weekly logs documenting engineering controls.
  - .5            Other information required by Government Representative on work that can be included or relevant to agenda for upcoming progress meeting.
- .4            Site Layout: within seven (7) days after date of Notice to Proceed and prior to mobilization to site, submit site layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor including following:
  - .1            Equipment and personnel decontamination areas.
  - .2            Means of ingress, egress, and temporary traffic control facilities. Refer to Section 01 56 00- *Temporary Barriers and Enclosures for traffic control*.
  - .3            Equipment and material staging areas.
  - .4            Demolition debris stockpile areas and soil stockpile areas.
  - .5            Exclusion Zones, Contaminant Reduction Zones, and other zones specified in Contractor's site-specific Health and Safety Plan.
  - .6            Grading, including contours, required to construct temporary facilities.



.7 Wastewater storage tanks.

- .5 Equipment Decontamination Pad: submit equipment decontamination pad design to the Government Representative for review prior to commencing construction.
- .6 Submit documentation verifying that hazardous materials employees have been trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.14- *Health and Safety for Contaminated Sites*.

#### **1.4 REGULATORY REQUIREMENTS**

- .1 Provide erosion and sediment control in accordance with Section 01 35 43 – *Environmental Procedures*.
- .2 Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish.
- .3 Work to meet or exceed minimum requirements established by federal, provincial, and local laws and regulations which are applicable.
  - .1 Contractor: responsible for complying with amendments as they become effective.
- .4 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify the Government Representative immediately.

#### **1.5 SEQUENCING AND SCHEDULING**

- .1 Do not commence Work involving contact with potentially contaminated materials until decontamination facilities are operational and approved by the Government Representative.

#### **1.6 EQUIPMENT DECONTAMINATION FACILITY**

- .1 Prior to commencing work involving equipment contact with potentially contaminated materials, construct equipment decontamination.
- .2 Provide, operate, and maintain suitable portable, high-pressure, low-volume decontamination wash unit equipped with self-contained water storage tank and pressurizing system and capable of heating and maintaining wash waters to 80 degrees C and providing nozzle pressure of 1,035 kPa.
- .3 Provide, operate, and maintain necessary equipment, pumps, and piping required to collect and contain equipment decontamination wastewater and sediment and transfer materials to approved storage facilities.

#### **1.7 DRUM STAGING PAD**

- .1 Provide, maintain, and operate drum staging pad as required and with the approval of the Government Representative.
- .2 Cover the land with a membrane at locations to be used for disposal to prevent contact with contaminated soil. The Contractor shall have staging pads designed to cover the material deposited until the Government Representative authorizes the disposal of materials outside the site.

## **1.8 SOIL STOCKPILING FACILITIES**

- .1 Provide, maintain, and operate storage/stockpiling facilities [as required] [as indicated].
- .2 The used water includes but are is limited to, sink water, sanitation/decontamination shower water, water from dewatering operations, and water collected by the decontamination facility's equipment
- .3 Wastewater from the dewatering work and the equipment decontamination facility shall be stored in a separate tank from that used to store wastewater from the personnel sanitation/decontamination facility.
- .4 If the toilet / sanitation facility has toilets, the water from these toilets must be stored together with the water from the washbasins and showers to be eventually evacuated from the site.
- .5 Effluents: Comply with applicable limits and requirements for effluent. It is prohibited to evacuate sewage from the site, into sewer systems that do not comply with these limits or requirements, or that are in violation of these limits or requirements. Obtain approval from the Government Representative prior to disposal of sewage.
- .6 Install wastewater storage tanks at designated location as instructed by Government Representative.
- .7 Make connections for pumps, pipes, valves, various items, and networks necessary for the operation of the installations. Tanks, pumps, pipes, valves, and other items shall be protected against frost.
- .8 Do not use wastewater storage before they have been inspected and approved by the Government Representative.
- .9 Notify Government Representative at least 72 hours prior to scheduled storage of wastewater storage tank.
  - .1 It is prohibited to evacuate other liquids in a storage tank after the Government Representative has sampled it.
  - .2 The Government Representative shall determine the appropriate method of wastewater treatment based on the results of the analysis of the samples.
- .10 Wastewater shall be transported and disposed of to the off-site treatment facility as determined by the Contractor and approved by the Government Representative.
- .11 The transport and disposal of sewage to the off-site treatment facility is not covered in the Tender Form. All costs incurred by the Contractor shall be apportioned to the unit and aggregate price of the Schedule of Prices.

## **1.9 VEHICULAR ACCESS AND PARKING**

- .1 Maintenance and Use:
  - .1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined by the Government Representative; transport and place into designated area approved by the Government Representative. Clean access roads at least once per shift.
  - .2 The Government Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during,

and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to the Government Representative.

### **1.10 DUST AND PARTICULATE CONTROL**

- .1 Execute Work by methods to minimize raising dust from construction operations.
- .2 Implement and maintain dust and particulate control measures as determined necessary by the Government Representative during construction.
- .3 Provide positive means to prevent airborne dust from dispersing into atmosphere. Use potable water for water misting system for dust and particulate control.
- .4 Use chemical means for water misting system for dust and particulate control only with the Government Representative's prior written approval.
- .5 As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.
- .6 Prevent dust from spreading to adjacent property sites.
- .7 The Government Representative will stop work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at site, or when air quality monitoring indicates that release of fugitive dusts and particulates into atmosphere equals or exceeds specified levels.
- .8 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Contractor must discuss procedures that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

### **1.11 POLLUTION CONTROL**

- .1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.
- .2 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on site.
- .3 Promptly report spills and releases potentially causing damage to environment to:
  - .1 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
  - .2 Owner of pollutant, if known.
  - .3 Person having control over pollutant, if known.
  - .4 Government Representative.
- .4 Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.

- .5 Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- .6 Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

## **1.12 EQUIPMENT DECONTAMINATION**

- .1 Commence Work involving equipment contact with potentially contaminated material only after Equipment Decontamination Facility is operational.
- .2 Decontaminate equipment after working in potentially contaminated work areas and prior to subsequent work or travel on clean areas.
- .3 Perform equipment decontamination on Contractor-constructed equipment decontamination pad.
- .4 At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinse generated. Use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate and as approved by the Government Representative. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in Clean Zone before removing from site or travelling on clean areas. Perform assessment as directed by the Government Representative to determine effectiveness of decontamination.
- .5 Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.
- .6 Have on hand sufficient pumping equipment, of adequate pumping capacity and associated machinery and piping in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment. Maintain piping and connections in good condition and leak-free.

## **1.13 WATER CONTROL**

- .1 Maintain excavations free of water.
- .2 Protect site from puddling or running water. Grade site to drain.
- .3 Prevent surface water runoff from leaving work areas.
- .4 Do not discharge decontaminated water, or surface water runoff, or groundwater which may have come in contact with potentially contaminated material, off site or to municipal sewers.
- .5 Prevent precipitation from infiltrating or from directly running off stockpiled waste materials. Cover stockpiled waste materials with an impermeable liner during periods of work stoppage including at end of each working day and as directed by the Government Representative.

- .6 Direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.
- .7 Control surface drainage including ensuring that gutters are kept open, water is not directed across or over pavements or sidewalks except through approved pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.
- .8 Dispose of water in manner not injurious to public health or safety, to property, or to any part of Work completed or under construction.
- .9 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water.
- .10 Contain water from stockpiled [waste]materials. Transfer potentially contaminated surface waters to wastewater storage tanks separate from wastewater from Personnel Hygiene/Decontamination Facility.
- .11 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.
- .12 Contain and collect wastewaters and transfer such collected wastewaters to wastewater storage areas.

#### **1.14 DEWATERING**

- .1 Dewater various parts of Work including, without limitation, excavations, structures, foundations, and work areas.
- .2 Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.
- .3 Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions.
- .4 Provide sufficient and appropriate labour, plant, and equipment necessary to keep Work free of water including standby equipment necessary to ensure continuous operation of dewatering system.
- .5 Take precautions necessary to prevent uplift of structure or pipeline and to protect excavations from flooding and damage due to surface runoff.
- .6 Test and analyse water generated from dewatering activities and treat to meet required discharge or disposal criteria.

#### **1.15 EROSION AND SEDIMENT CONTROL**

- .1 Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.
- .2 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical. Strip vegetation, regrade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces,

drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as directed by the Government Representative.

- .3 Provide and maintain temporary measures which may include, silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off site or to other areas of site where damage might result, or that might otherwise be required by Laws and Regulations. Make sediment control measures available during construction. Place silt fences and/or hay or straw bales in ditches to prevent sediments from escaping from ditch terminations.
- .4 Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebars driven through bale 300 mm to 450 mm. Squeeze straw or hay in spaces between boots to prevent water from passing; boots must be driven at least 100 mm into the ground.
- .5 Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.
- .6 Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
- .7 Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.
- .8 Plan construction procedures to avoid damage to work or equipment encroachment onto water bodies or drainage ditch banks. In event of damage, promptly take action to mitigate effects. Restore affected bank or water body to existing condition.
- .9 Installation:
  - .1 Construct temporary erosion control items as indicated. Actual alignment and/or location of various items as directed by the Government Representative.
  - .2 Do not construct bale barriers and silt fence in flowing streams or in swales.
  - .3 Check erosion and sediment control measures weekly after each rainfall; during prolonged rainfall check daily.
  - .4 Bales and/or silt fence may be removed at beginning of work day, replace at end of work day.
  - .5 Whenever stripping vegetation, regrading, or other development causes sedimentation, remove it from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.
  - .6 Prior to or during construction, the Government Representative may require installation or construction of improvements to prevent or correct temporary conditions on site. Improvements may include berms, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes, guardrails, temporary roads, and other measures appropriate to specific condition. Temporary improvements must remain in place and in operation as necessary or until otherwise directed by the Government Representative.



- .7 Repair damaged bales, end runs, and undercutting beneath bales.
- .8 Unless contradictory instructions given by the Government Representative, remove temporary erosion and sediment control devices upon completion of Work. Spread accumulated uncontaminated sediments to form a suitable surface for seeding or dispose of, and shape area to permit natural drainage to satisfaction of the Government Representative. Materials once removed become property of Contractor.
- .10 Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- .11 Do not disturb existing embankments or embankment protection.
- .12 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- .13 If soil and debris from site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in the Government Representative's determination it is undesirable, remove accumulation and restore area to original condition.

#### **1.16 PROGRESS CLEANING**

- .1 Maintain cleanliness of Work and surrounding site to comply with federal, provincial, and local fire and safety laws, ordinances, codes, and regulations.
- .2 Co-ordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

#### **1.17 FINAL DECONTAMINATION**

- .1 Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to removal from site.
- .2 Perform decontamination as specified to satisfaction of the Government Representative. The Government Representative will direct Contractor to perform additional decontamination if required.

#### **1.18 REMOVAL AND DISPOSAL**

- .1 Remove surplus materials and temporary facilities from site.
- .2 Dispose of non-contaminated waste materials, litter, debris, and rubbish off site.
- .3 Do not burn or bury rubbish and waste materials on site.
- .4 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
- .5 Do not discharge wastes into streams or waterways.
- .6 Dispose of following materials at appropriate off-site facility identified by Contractor and approved by the Government Representative:
  - .1 Debris including excess construction material.
  - .2 Non-contaminated litter and rubbish.

- .3 Disposable PPE worn during final cleaning.
- .4 Wastewater removed from wastewater storage tank.
- .5 Wastewater generated from final decontamination operations including wastewater storage tank cleaning.
- .6 Lumber from decontamination pads.
- .7 Dispose of contaminated materials in accordance with the plans, specifications, and Section 01 74 21 – *Construction/Demolition Waste Management and Disposal*.
- .8 Wastewater sample and analysis: the Government Representative will perform sampling and analysis of stored wastewater for disposal purposes prior to removal from site. Results of analyses will determine appropriate methods of disposal. Upon receipt of analytical results, transfer tank contents without spills or release, as directed by the Government Representative. Following completion of tank emptying, decontaminate tank interior with steam or high-pressure water wash supplemented by detergent. Dispose of tank decontamination water with tank contents.
- .9 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .10 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
  - .1 Hazardous wastes recycled in manner constituting disposal;
  - .2 Hazardous waste burned for energy recovery;
  - .3 Lead-acid battery recycling;
  - .4 Hazardous wastes with economically recoverable precious metals.

#### **1.19 RECORD KEEPING**

- .1 Maintain adequate records to support information provided to the Government Representative regarding exception reports, annual reports, and biennial reports.
- .2 Maintain asbestos waste shipment records for minimum of three (3) years from date of shipment or longer period required by applicable law or regulation.
- .3 Maintain bills of lading for minimum of 375 days from date of shipment or longer period required by applicable law or regulation.

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

#### **Part 3 Execution**

##### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – *Demolition for minor works*
- .2      Section 03 10 00 – *Concrete Forming and Accessories*
- .3      Section 03 20 00 – *Concrete Reinforcing*
- .4      Section 03 30 00 – *Cast-in-Place Concrete*
- .5      Section 03 30 03 – *Concrete Repair*
- .6      Section 03 37 13 – *Shotcrete*
- .7      Section 05 50 00 – *Metal Fabrications*
- .8      Section 09 97 19 – *Painting Exterior Metal Surfaces*
- .9      Section 31 05 16 – *Aggregate Materials*
- .10     Section 31 11 00 – *Clearing and Grubbing*
- .11     Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .12     Section 31 32 19 – *Geotextiles*
- .13     Section 31 04 31 – *Historic Subgrade, Shoring and Bracing*
- .14     Section 32 14 13 – *Precast concrete pavers*
- .15     Section 32 91 19.13 – *Topsoil Placement and Grading*
- .16     Section 32 92 23 – *Sodding*
- .17     Section 35 59 29 – *Mooring Devices*

**1.2                REFERENCES**

- .1      Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2      Health Canada, Workplace Hazardous Materials Information System (WHMIS)
- .3      Province of Quebec
  - .1      *Loi sur la santé et la sécurité du travail, L.R.Q., c. S-2.1- 2014 update.*

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1      Results of site specific safety hazard assessment.
  - .2      Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

- .3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction, weekly, as well as to the Government Representative.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit the WHMIS material safety data sheets (MSDS).
- .7 The Government Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Government Representative within 5 days after receipt of comments from the Government Representative.
- .8 The Government Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to the Government Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

#### **1.4 FILING OF NOTICE**

- .1 The Contractor must send a written work advisory to the *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST) at least ten (10) days prior to the beginning of work.

#### **1.5 SAFETY ASSESSMENT**

- .1 Conduct an assessment of the risks and safety hazards present on the site in relation to the works to be performed.
- .2 It is the responsibility of the Contractor to conduct audits to ensure the safety of the work done near the Lachine Canal Walls. These checks are needed to avoid the risks of instability or collapse of the walls.

#### **1.6 MEETINGS**

- .1 Schedule and administer Health and Safety meetings with the Government Representative prior to commencement of Work.
- .2 Notify the Government Representative at least five (5) days before this meeting.

#### **1.7 REGULATORY REQUIREMENTS**

- .1 Perform the Works in accordance with the requirements of the authorities have jurisdiction over the City of Montreal territory.

## **1.8 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 The Government Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

## **1.9 RESPONSIBILITY**

- .1 Be responsible 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 conduct of Work may affect them.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.

## **1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with the health and safety regulations, *Loi sur la santé et la sécurité du travail, Règlement sur les établissements industriels et commerciaux, R.R.Q.*
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

## **1.11 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occurs during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province having jurisdiction and notify the Government Representative verbally and in writing.

## **1.12 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
  - .1 Possess practical construction site experience involving activities associated with concrete repair, electrical works, and paving works.
  - .2 Have working knowledge of occupational safety and health regulations.
  - .3 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.
  - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
  - .5 Be on site during execution of Work and report directly to and the Government Representative following his instructions.

**1.13 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province Territory having jurisdiction, and in consultation with the Government Representative.

**1.14 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the Government Representative.
- .2 Provide Government Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Government Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**1.15 BLASTING**

- .1 Blasting and other use of explosives are not allowed.

**1.16 POWDER ACTUATED DEVICES**

- .1 Use powder actuated devices only after receipt of written permission from the Government Representative.

**1.17 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                REFERENCES**

- .1      Definitions:
  - .1      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 humans; or degrade environment aesthetically, culturally, and/or historically.
  - .2      Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Prevention of pollution and damages to the environment covers the protection of soil, water, air, biological and cultural resources; it also includes management of visual aesthetics, noise, solid, chemical, gaseous, and liquid wastes, radiant energy, radioactive materials, and other pollutants.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

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

- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature, and data sheets that include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - *Health and Safety Requirements*.
- .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by the Government Representative. The Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 The actions included in the Environmental Protection Plan shall be presented with a level of detail that is consistent with the environmental concerns and the construction works to be performed.
- .6 Include in Environmental Protection Plan:
  - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
  - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
  - .3 Names and qualifications of persons responsible for training site personnel.
  - .4 Descriptions of environmental protection personnel training program.
  - .5 Drawings showing the location of temporary excavations or site trails landscaped with backfill, materials, construction, sanitation facilities, deposits of surplus materials or contaminated materials; drawings showing the methods to be used to control runoff and to contain materials on the site.
  - .6 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
    - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.
  - .7 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
  - .8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
  - .9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.
  - .10 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.
  - .11 Waste Water Management Plan identifying methods and procedures for management discharge of waste waters which are directly derived from

construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

- .12 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources, and wetlands.
  - .13 If required a Pesticide treatment plan approved by the APC process.
  - .14 A plan to prevent erosion and sediment transport, indicating the measures to be implemented, including the production of reports to verify compliance with federal, provincial, and municipal laws and regulations;
  - .15 A plan of the work area, showing the activities in every part of the work area and indicating areas of restricted and prohibited use; the plan must include measures for marking the limits of the useable areas and methods of protection of the elements found within the work areas that must be preserved;
- .7 Mitigation and/or compensation measures described in Appendix must be implemented to the satisfaction of the Government Representative.

#### **1.4 FIRES**

- .1 Fires and burning of rubbish on site is not permitted.

#### **1.5 SEDIMENT BARRIER**

- .1 Establish a sediment barrier for use in an aquatic environment consisting of a membrane suspended from a float and weighted at the base by chains or other weights to isolate the rest of the body of water from the part disturbed by work in progress in an effort to prevent suspended sediments from spreading over a wider area. This curtain shall comply with the requirements of the competent authorities.
- .2 There is no specific material to be used for the turbidity curtain. The curtain should be carried out on suspended sediments to go into the water. A bathymetric survey is provided to the plane and the channel current is low and wave-free.
- .3 Regularly inspect the turbidity curtain in place to ensure that there is no current movement, upkeep and maintain the curtain in good condition to be effective at all times.
- .4 Remove turbidity curtain when required.

#### **1.6 BARRIER FOR EROSION AND SEDIMENT CONTROL**

- .1 All work that consequently leaves a non-consolidated soil exposed (excavated, disturbed or remodeled soil, stored materials, etc.) must be accompanied by erosion and sediment control measures to avoid sediment in water environments. As the work is completed, all redesigned areas must be permanently stabilized. If a delay is required before permanent stabilization, temporary erosion and sediment control measures must remain in place until the supervisor authorizes their dismantling. Temporary measures must be removed at the end of the work.
- .2 Establishing a barrier for erosion and sediment control to prevent soil loss from storm water runoff or wind erosion or transport of this soil on adjacent properties and footpaths. Such means shall comply with the requirements of the competent authorities.



- .3 Any temporary piles of un-consolidated material, such as earth, located within 30 m of a water environment for a period of more than 24 hours, shall be protected by a sediment barrier to avoid the transport of sediments to the water environment.
- .4 Inspect the installation and maintenance until permanent vegetation is established, to ensure efficiency at all times.
- .5 Removal and timely remediation and stabilization of surfaces stirred during the work.

## **1.7 DRAINAGE**

- .1 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .2 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

## **1.8 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties as indicated by the Government Representative.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- .3 Restrict tree removal to areas indicated unless having received a written authorization from the Parks Canada Agency manager before beginning the work.
- .4 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid driving and uselessly unloading or storing materials over the root zone of the protected trees.
- .5 Minimize stripping of topsoil and vegetation.

## **1.9 WORK ADJACENT TO WATERWAYS**

- .1 The streams must remain free of debris, and scrap materials.
- .2 No debris or waste waters should be thrown into the Canal.
- .3 No borrowing material can be extracted from the bed of the Canal.
- .4 Accidentally introduced debris must be removed immediately.
- .5 Machinery moving or operating within 30m of a watercourse must use biodegradable hydraulic oil.
- .6 Construction equipment to be operated on land only.
- .7 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .8 Blasting is not allowed.

## **1.10 POLLUTION CONTROL**

- .1 Maintain temporary erosion and pollution control features installed under this Contract.



- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
  - .1 Provide temporary enclosures during the on-site cleaning and painting of steel surfaces.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

#### **1.11 HISTORICAL/ARCHAEOLOGICAL CONTROL**

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources, and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and the Government Representative.

#### **1.12 NOTIFICATION**

- .1 The Government Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial, or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform the Government Representative of proposed corrective action and take such action for approval by the Government Representative.
  - .1 Take action only after receipt of written approval by the Government Representative.
- .3 The Government Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

### **Part 2 Products**

#### **2.1 MATERIAL**

- .1 Keep the machinery in operation only during use, at the exception of extreme temperatures where the machines are in operation to prevent them from stopping.

**Part 3 Execution**

**3.1 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Ensure that streams and storm and public sanitary sewers remain free of waste and flushed volatile materials.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - *Cleaning*.
- .4 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **ANNEX Section 01 35 43 Environmental Procedures**

ANNEX A – Mitigation measures table

ANNEX B – Example of Environmental protection plan (EPP)

Mitigation measures table – CLAC-(1455-04)

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
1. Machinery use and movement Transportation of materials and equipment Storage of materials Construction and demobilization	Air quality and human health	•	<ul style="list-style-type: none"> <li>• Decreased ambient air quality through particulate matter (dust)</li> <li>• CO2 emissions from machinery</li> </ul>	1.1 Ensure that the exhaust and emission systems of the construction machinery / equipment are maintained in good condition. 1.2 Avoid unnecessary running of motors when vehicles are stationary. 1.3 Observe the municipal regulations in force (Regulation 90 of the Communauté métropolitaine de Montréal) with respect to dust emissions to air. 1.4 Ensure that fine materials used in construction and residues are confined during transport. 1.5 If necessary, cover the fine materials stored in a cloth, the particles of which may be blown by the wind. 1.6 Avoid handling and transport of easily erodible materials under high wind conditions or when a dust plume is visible. 1.7 Establish appropriate measures to reduce airborne dust emissions (ex drying materials, sweeping, use of tarpaulins, etc.).	Negligible and localized residual impact
	Sound Level	•	<ul style="list-style-type: none"> <li>• Increased ambient noise level</li> </ul>	1.8 Comply with municipal by-laws concerning noise and work schedules. 1.9 Whenever possible, plan noisy activities in order to minimize the impact on visitors, especially around residential areas and high traffic areas.	None once work is complete
	Water and Soil / Sediment Quality	•	<ul style="list-style-type: none"> <li>• Soil compaction and rutting in machinery mobilization and circulation areas</li> <li>• Risk of spillage of hydrocarbon or other hazardous materials in soil / sediment or water</li> <li>• Soil erosion, loss of topsoil and underground exposures</li> <li>• Modification of slopes, terrain and landscape.</li> </ul>	1.10 Maintain and maintain machinery and equipment on a regular basis for the duration of the work. Repair or leak vehicles or equipment immediately from site. 1.11 Use a biodegradable vegetable oil hydraulic system for all machinery that runs on shore, on water or on a temporary installation in the bottom of the canal. Proof of the application of this mitigation measure may be required. 1.12 The machinery shall not at any time run directly over the channel bed. 1.13 Where applicable, clean any equipment used in water before entering the aquatic environment and inspect daily to ensure that they do not leak. 1.14 The storage of petroleum products and hazardous materials, as well as the maintenance, refueling and cleaning of the machinery, must be carried out more than 30 m from the body of water on a site designed for this purpose where There is no risk of contamination of soil, groundwater and surface water. 1.15 Keep hazardous materials that are left on the site outside working hours. 1.16 Fuel refueling on an impervious fuel mat with a berm or in a containment tank. Clean up leaks and spills during refueling and properly dispose of contaminated material. Never dispose of or dispose of fuel in the environment or in water. 1.17 Clean off off-site tools and equipment. If it is necessary to do this on site, the cleaning must be done at a location at least 30 m from any body of water. 1.18 Do not leave any gasoline-powered vehicles, machinery or equipment on a jetty or within 10 m of the water body outside working hours or during extended site closures unless confined to a watertight enclosure. Where soil protection measures are not feasible, soil protection measures must be provided under equipment or machinery throughout the above-mentioned period (ex containment tank having a volume equivalent to at least 110% of the volume of the fuel tank Equipment or machinery).	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
				<p>1.19 Use retention tanks (110% capacity) or waterproof fuel mats with a berm for stationary equipment and machinery (generators, compressors, etc.) located on the shore and inspect installations during To avoid overflowing.</p> <p>1.20 At all times during the work, have sufficient oil recovery kits on site (containment pads, absorbent rollers, tight containers, etc.) and ensure that workers are trained to intervene quickly in the event of Leak or spill.</p> <p>1.21 Provide for an emergency procedure and a communication protocol in the event of an environmental incident.</p> <p>1.22 In the event of a spill, immediately report the situation to appropriate personnel and the Environment and Climate Change Canada Emergency Department (1-866-283-2323) for a land source spill. Notify the Coast Guard for any marine source spills (1-800-363-4735).</p> <p>1.23 In the event of an environmental incident, control the leak, contain spilled material to restrict its extent and prevent it from reaching sensitive areas, recover contaminated equipment and transport it to a site authorized by MDDELCC.</p> <p>1.24 Set up a turbidity curtain inside the mobilization area provided in the canal for the duration of the works, as close as possible to the walls according to the space required for the works. Before removing the curtain, wait until the suspended matter has settled to the bottom and remove the accumulated sediment.</p> <p>1.25 Implement additional sediment and erosion control measures if the soil is disturbed or exposed.</p> <p>1.26 Whenever possible, use erosion and sediment control products made from 100% biodegradable materials (ex, jute, sisal, or coconut fiber). Ensure that the support materials are also biodegradable.</p> <p>1.27 Any temporary pile-up of unconsolidated material located within 30 m of an aquatic environment and left in place for a period of more than 24 h must be protected by a sediment barrier or covered with a geotextile To avoid the transport of sediment into the water body.</p> <p>1.28 Avoid vehicle movements during periods of heavy rain where soils become saturated with water.</p> <p>1.29 Ensure that no deleterious substances are submerged or released into the aquatic environment or disposed of at a point that could contaminate the aquatic environment as required by the Fisheries Act and the Birds Convention Act, 1994 migratory.</p> <p>1.30 Stormwater in work areas shall be confined, sampled and treated, if required. Alternatively, they must be pumped to land in an area of buffer vegetation for infiltration, away from the body of water and bare soil, or in a pond to allow the settling of suspended matter.</p> <p>1.31 Obtain permission from the Parks Canada Representative prior to any environmental release of water.</p> <p>1.32 Intercept stormwater from outside the construction site and keep these waters off the site by moving them to stabilized facilities or locations.</p> <p>1.33 Canal water cannot be used to wash equipment or other site operations without prior authorization from the Parks Canada Representative.</p> <p>1.34 No used snow may be disposed of in a canal in accordance with the Historic Canals Regulations</p>	
	Flora et fauna	•	<ul style="list-style-type: none"> <li>• Damage to vegetation and grassed areas</li> <li>• Damage to the root system, branches, and tree bark due to</li> </ul>	<p>1.35 Advocate the mobilization / movement of vehicles on permanently or already disturbed surfaces (eg paved road, gravel surface, highly resilient disturbed area).</p> <p>1.36 Limit storage areas to durable or already disturbed surfaces. If this is not feasible, Parks Canada must have approved the proposed storage areas.</p> <p>1.37 Establish and delimit a protective area around trees and shrubs to be preserved (eg ribbons, barriers, etc.) so as not to damage them or affect the root system.</p>	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
			<ul style="list-style-type: none"> <li>the movement of machinery</li> <li>• Introduction or dispersal of invasive alien species</li> <li>• Disturbances and changes in wildlife movement.</li> <li>• Destruction or modification of habitat.</li> <li>• Mortality caused by project activities</li> </ul>	<p>1.38 Rehabilitate the land and vegetation damaged by the work so that the site is left as it was prior to the work.</p> <p>1.39 Rehabilitated surfaces should have a degree of compaction and aeration corresponding to the initial state (before work) to prevent the transport and circulation of soil particles.</p> <p>1.40 If necessary, the trees and shrubs to be felled will be replaced during the rehabilitation phase at the end of the work.</p> <p>1.41 Respond to any other requirements of the Government Representative and the Site Manager for vegetation management.</p> <p>1.42 Ensure machinery is clean and free from invasive species and noxious weeds when it arrives at the site and maintains it thereafter. At the end of the work, thoroughly clean the machinery that has come into contact with invasive exotic species to avoid dispersal in new areas.</p> <p>1.43 Choose erosion and sediment control products that reduce the risk of attracting or entangling wildlife and preventing the introduction of invasive alien species.</p> <p>1.44 If animals are observed in or near the site, give them the opportunity to leave the area and move away from areas of potential conflict.</p> <p>1.45 Ensure that on-site workers are made aware of species at risk and that they immediately report any incidental observations to the Government Representative.</p>	
	Aquatic resources	•	<ul style="list-style-type: none"> <li>• Disturbance / stress for various fish species</li> <li>• Introduction or dispersal of invasive exotic species</li> </ul>	<p>1.46 Encourage work to be carried out when the canal water is lowered or during the period prescribed by Fisheries and Oceans for the protection of fish (August 1 to March 31 for species other than salmonids).</p> <p>1.47 As a result of the work, clean or inspect the equipment or vessels used in the water to ensure that no invasive alien species are present (eg zebra mussels).</p>	Negligible and localized residual impact
	Navigation	•	<ul style="list-style-type: none"> <li>• Disruption of nautical activities</li> </ul>	1.48 Comply with Transport Canada requirements and recommendations if applicable.	None once work is complete
2. Concrete demolition	Air quality and human health	•	<ul style="list-style-type: none"> <li>• Decreased ambient air quality through particulate matter (dust)</li> </ul>	<p>2.1 Measures 1.3 to 1.7. Use working methods that generate the least amount of dust.</p> <p>2.3 Observe the regulations in place during demolition work.</p>	Negligible and localized residual impact
	Noise level	•	<ul style="list-style-type: none"> <li>• Increase in ambient noise level</li> </ul>	2.4 Measures 1.8 and 1.9.	None once work is complete
	Water and Soil / Sediment Quality	•	<ul style="list-style-type: none"> <li>• Increase in suspended solids and particulates in the canal</li> <li>• Debris from friable concrete that has been in contact with contaminated soil may be deposited on</li> </ul>	<p>2.5 Provide measures to contain and recover debris (ex, tarpaulin, geotextile, sediment barrier weighted or attached parallel to shore). Be sure to limit the movement of tailings in the water body when the facilities are removed.</p> <p>2.6 Clean up construction debris as and when available at the sites authorized by MDDELCC.</p> <p>2.7 Do not discharge any excavated material, scrap, or debris into the aquatic environment. Remove any debris accidentally introduced into the aquatic environment as soon as possible.</p>	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
			the soil or bed of the canal during work		
	Aquatic resources	•	<ul style="list-style-type: none"> <li>• Empiètement sur habitat du poisson</li> </ul>	2.8 No encroachment shall be made on the water body to avoid the loss of fish habitat, except in the case of an authorization from Fisheries and Oceans.	Negligible and localized residual impact
3. Surface cleaning (sand blasting and pressurized water jet)	Air quality, soil / sediment, Water quality Water resources Human health	•	<ul style="list-style-type: none"> <li>• Contribution of contaminated substances to the environment</li> <li>• Emission of airborne dust and particles containing silica</li> <li>• Poisoning in worker exposed to silica particles</li> </ul>	<p>3.1 Measure 1.3.</p> <p>3.2 Ensure that waste water and waste water generated by construction site installations and operations (ex equipment washing water, cleaning water from wall surfaces, residual concrete sawing water) are confined and recovered. Prior to release to the environment, these waters must be sampled and treated (where applicable) to meet applicable discharge standards, ie CCME Water Quality Guidelines - protection of aquatic life, quality criteria Of the surface water of MDDELCC (Protection of Aquatic Life - Acute Effect) and CMM Regulation 2008-47 for suspended solids, pH and C10-C50. It will be the contractor's responsibility to demonstrate compliance with these standards.</p> <p>3.3 Meet CCME's criterion for the protection of aquatic life, which permits a maximum increase in suspended solids of 25 mg / l (or 8 NTU) relative to the background concentration for short-term release (less than 24h).</p> <p>3.4 If a treatment system (sedimentation tank, filters, or other such facilities) is to be used, it must prevent contaminants and sediments from dripping into sewers and water bodies. Use the means necessary to define the mode of disposal of the collected sediments and the waste water.</p> <p>3.5 If the waters do not conform to the applicable standards and cannot be treated on site, they must be recovered in leak-proof containers and transported to a place authorized by the MDDELCC.</p> <p>3.6 Provide adequate containment and recovery measures to minimize contaminants in air and soil, for example:</p> <ul style="list-style-type: none"> <li>- Install a shed and a recovery tarpaulin to retain the sand blasting particles and the concrete residues generated by the cleaning operations. The shelter must be waterproof to avoid leaching in the event of rain and a ground catchment mechanism to avoid rejection in the canal.</li> </ul> <p>3.7 Treat sandblast residues as residual hazardous materials (MDR) as specified in the Hazardous Materials Regulations. Implement appropriate measures to:</p> <ul style="list-style-type: none"> <li>- Recover all blasting residues;</li> <li>- Store the residue tightly;</li> <li>- Dispose of the residues in the sites authorized by the MDDELCC.</li> </ul> <p>3.8 Observe the permissible grades specified in the applicable regulations for silica in the abrasive.</p> <p>3.9 Where possible, use an abrasive with less impact than silica.</p> <p>3.10 Use appropriate protective clothing (mask, gloves, etc.) per exposure guidelines.</p> <p>3.11 Proceed in periods when natural activity is less important (reproduction, feeding, etc.).</p>	Negligible and localized residual impact
4. Poured Concrete or Shotcrete	Water quality and soil / sediment and aquatic resources	•	<ul style="list-style-type: none"> <li>• Input of material into the environment</li> <li>• Contamination and loss of fish habitat</li> <li>• Alteration of the local natural</li> </ul>	<p>4.1 Measures 2.5 to 2.8.</p> <p>4.2 Use antilessivating concrete for work near water or water to reduce the percentage of concrete particles released into the water column.</p> <p>4.3 Prevent in-situ or projected concrete from meeting canal water for a minimum of 48 hours if the ambient temperature is above 0 ° C, 72 hours if the ambient temperature is less than 0 ° C or a period</p>	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
			<p>components of the aquatic environment due to the products used</p>	<p>of curing of the concrete sufficient for the pH to reach a neutral level (ex when the channel is returned to water).</p> <p>4.4 When concrete is poured under water:</p> <ul style="list-style-type: none"> <li>- Install a turbidity curtain during the concreting process and leave it in place until the pH is equal to or less than 9;</li> <li>- Ensure that no fish are trapped in the turbidity curtain while placing the concrete;</li> <li>- Immediately stop placing concrete in the presence of dead fish and contact the Parks Canada Representative.</li> </ul> <p>4.5 Concrete surplus from concrete pumps shall be poured into a sealed enclosed space. After curing, concrete residues must be managed with construction waste and disposed of in an approved facility.</p> <p>4.6 Washing water from cement mixers shall be collected in a sealed basin so as to avoid any discharge into the environment. The cleaning area must be located more than 30 m from the water body and must be authorized in advance by Parks Canada.</p> <p>4.7 Washing water may be taken over by the concrete supplier and taken back to the concrete plant for disposal. Otherwise, these waters must be confined, sampled and treated as indicated in measures 3.2 and 3.4.</p>	
5. Excavation et backfill	Water and soil / sediment quality human health	•	<ul style="list-style-type: none"> <li>• Migration of contaminants to soil, water and sediment</li> <li>• Soil erosion and sediment transport in the aquatic environment</li> <li>• Contamination of new embankment by adjacent soils</li> <li>• Modification of slopes, terrain and landscape relief</li> </ul>	<p>5.1 Measures 1.25 to 1.27, 1.38, 1.39, 3.2 to 3.5.</p> <p>5.2 Submit a contaminated soil management plan to Parks Canada for approval prior to excavation.</p> <p>5.3 Manage excavated soil in accordance with applicable federal, provincial and municipal laws and regulations for contaminated soil management.</p> <p>5.4 Avoid excavation during periods when the soil is saturated, where rainfall is abundant, and there is runoff, strong winds or wet snow.</p> <p>5.5 Limit the area of the reclaimed and exposed soil areas and stabilize them as soon as possible. If necessary, use ground cover, mulch, straw, sod, granular material, an erosion cover or any other device that can reduce soil erosion in the event of prolonged exposure, Intensive use.</p> <p>5.6 Limit in situ storage time for excavated materials.</p> <p>5.7 Do not store excavated contaminated materials near water. If the site does not allow on-site storage, plan the excavation taking into account the opening hours of the authorized disposal sites.</p> <p>5.8 Take the necessary precautions when temporarily storing contaminated soils to avoid contamination of underlying and adjacent soils, minimally:</p> <ul style="list-style-type: none"> <li>- Segregate the soils according to their level of contamination and according to the observed stratigraphy.</li> <li>- Store floors on an impermeable canvas and cover, or store in any other type of hermetic containment. The canvases must be fixed firmly to prevent them from being lifted by the wind.</li> <li>- At all times, ensure that soils do not migrate to other media, either by air, runoff or vehicle transit.</li> </ul> <p>5.9 Replant soil as quickly as possible, depending on the initial contamination levels and the initial stratigraphic profile.</p> <p>5.10 If necessary, carry out a characterization of the surplus excavated soils to determine the degree of contamination and adequately manage their disposition.</p> <p>5.11 Surplus excavated soils that are contaminated will be stored, transported and disposed off-site in accordance with the provisions of the MDDELCC Policy in effect.</p> <p>5.12 When disposing of off-site soils, keep any document or slip attesting to their disposition in sites authorized by the MDDELCC according to their degree of contamination.</p>	Negligible and localized residual impact



Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
				5.13 Where surface soils are to be restored, a geotextile membrane shall be installed between existing contaminated soil and new material. 5.14 When the reclaimed soil exceeds the CCME guidelines for Residential / Park and / or MDDELCC Criterion B criteria, as required by Parks Canada, a minimum of 30 cm of clean soil should be applied. 5.15 Where applicable, any soil imported on the Parks Canada property must be a crop land that complies with the latest standards of the City of Montreal and the Bureau de Normalization du Québec. 5.16 Use clean backfill material free of contaminants and undesirable species. 5.17 Machinery that has come into contact with contaminated soil should be cleaned properly before being used in other areas. 5.18 New material (eg, topsoil, controlled backfill) should be compacted to avoid sagging and minimize erosion. 5.19 Divert runoff from work areas, exposed soils and erodible slopes; Ensure that they flow slowly to the surface. 5.20 Upon completion of the project, ensure good drainage of runoff, which may include restoration or improvement of original drainage conditions.	
	Archeological Resources	•	<ul style="list-style-type: none"> <li>• Damage to archaeological remains and resources during excavations</li> </ul>	5.21 Comply with all Parks Canada specific requirements for archaeological monitoring. 5.22 In the case where archaeological surveillance is not required for the works and an archaeological vestige (vestige of construction or development, object and fragment of object) is discovered accidentally during excavations. Suspend work in the immediate area of discovery and notify the Government Representative, who will then take the necessary steps to protect and conserve the archaeological remains.	Negligible and localized residual impact
	Fauna	•	<ul style="list-style-type: none"> <li>• Introduction or dispersal of invasive exotic species</li> <li>• Damage to vegetation and grassed areas</li> <li>• Damage to the root system</li> </ul>	5.23 In areas where invasive alien species are present, excavated materials from the construction site (eg, topsoil, borrow materials, fill, gravel) will not be available for use in other areas of the Lachine Canal. Materials and plant residues must be properly placed in approved sites. 5.24 Restore disturbed sites as work progresses. Vegetated perturbed soils with native species. 5.25 Submit plant species and seed mixtures to Parks Canada for approval. The restoration elements must ensure that the environment is equivalent or improved compared to the pre-intervention situation. 5.26 If the growing season is too late, stabilize the soil to prevent erosion and wait until the following spring to restore vegetation. 5.27 Monitor disturbed and replanted parcels until the Parks Canada Representative determines that native vegetation is growing there and that the spread of invasive alien species has been avoided. 5.28 If the root system of a tree to be kept is damaged by excavation work, implement the following measures: <ul style="list-style-type: none"> <li>- Cut the roots with a concrete saw (15 cm) and carry out a gradual stripping where roots are or may be present;</li> <li>- Use a geotextile to cover exposed roots;</li> <li>- Water regularly affected trees during construction;</li> <li>- Restore crown / root balance as a function of the percentage of root system loss by performing compensatory pruning where the same percentage of branches is removed, prioritizing diseased, weak, and / or poorly placed branches;</li> <li>- At the end of the work, the level of the ground must be identical to that which was present before the work.</li> </ul>	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
	Aquatic resources	•	<ul style="list-style-type: none"> <li>• Disturbance / stress for various fish species</li> <li>• Contamination and loss of habitat (siltation and bed modification)</li> </ul>	<p>5.29 Mesures 2.7 et 2.8.</p> <p>5.30 Implement effective measures to limit sediment and debris from the site to the aquatic environment (ex, sediment barrier, berms, sediment trap, sedimentation basin, temporary slope stabilization, water diversion to Areas of vegetation). The measures must remain effective when the site is temporarily closed and during periods of flood or heavy rain. Pay attention to limiting the movement of particles in the water when removing the installations.</p> <p>5.31 Conduct regular inspection and maintenance of erosion and sediment control during construction.</p> <p>5.32 Sediment and erosion control methods must be adapted to the different situations that may be encountered or may be substituted by other methods if they are ineffective.</p> <p>5.33 Do not deposit material below the high-water mark except in the case of an authorization from Fisheries and Oceans.</p> <p>5.34 Implement mitigation measures in accordance with the requirements and recommendations of Fisheries and Oceans Canada.</p> <p>5.35 Do not take any borrowed material from the body of water.</p>	Negligible and localized residual impact
6. Tree clearing and / or vegetation cleaning	Flora and Fauna	•	<ul style="list-style-type: none"> <li>• Vegetation damage</li> <li>• Destruction or modification of wildlife habitat</li> <li>• Damage to nests and / or disturbance of breeding birds</li> <li>• Introduction or dispersal of invasive alien species</li> </ul>	<p>6.1 Measures 1.37 to 1.42, 5.24 to 5.28.</p> <p>6.2 Limit clearing/ grubbing to a minimum to preserve plant cover as much as possible.</p> <p>6.3 Clearly define the area where the vegetation will be removed and mark the trees to be retained. The plan of trees to be felled must be submitted for prior approval by Parks Canada</p> <p>6.4 Restore and re-green the site upon completion of the work. This includes restoring vegetation cover in areas previously approved by Parks Canada using native, fast-growing, low-maintenance, adaptable native species to the project area to enhance the local plant community.</p> <p>6.5 Carry out deforestation activities outside the migratory bird breeding season, which extends from early April to late August for the majority of species in southern Quebec.</p> <p>6.6 If the work is to be done during the breeding season, an inventory should be made prior to the planned activities that could affect the nests. If a nest has been found, a protection zone must be established until the chicks leaves the nest.</p> <p>6.7 Check for dens in the area before clearing vegetation and avoid disturbance to occupied dens.</p> <p>6.8 Trunks and other recovered material shall be transported to a storage site without debris and without damage to standing trees or landscape features outside the limits for clearing or storage. They must not be dragged into the watercourse.</p> <p>6.9 If vegetation is to be removed early in the season due to sensitive periods for wildlife, perform the soil drying just before construction to ensure soil stability.</p> <p>6.10 Stumps, roots, encrusted trunks and other non-earthly debris must be removed and shaken to release soil and loose rock before being transported to a designated site.</p> <p>6.11 Vegetation debris shall be removed as soon as possible from the right-of-way and transported off-site for disposal. Residues of invasive alien species must be disposed of at a landfill site that accepts them, or at an incineration site.</p> <p>6.12 Store vegetation removed in areas already subject to disturbance to minimize disturbance.</p> <p>6.13 Comply with the City of Montréal's regulations for the control of the Emerald Ash Borer. The recommended slaughter period is from 15 September to 31 December. The processing, displacement and disposal of ash wood must comply with the provisions of Regulation 15-040 in force.</p>	Negligible and localized residual impact

Components or project activities	Environmental components		Description of environmental effects	Impact mitigation measures	Importance of residual effects
				6.14 Do not use pesticides near water (within 3 m of the high-water mark). If pesticides are required elsewhere on the work site, a pesticide treatment plan must be submitted for approval by the Parks Canada process.	
	Public health	•	<ul style="list-style-type: none"> <li>Irritating effects of certain plants on workers</li> </ul>	<p>6.15 Verify the presence of irritant species (eg, wild parsnip, poison ivy, ragweed) in the work area prior to carrying out the work and identify the affected areas. Eliminate species in work areas to reduce the risk of contact.</p> <p>6.16 Ensure workers are aware of the presence of these irritant species and are able to identify them.</p> <p>6.17 If necessary, wear long clothing and gloves to remove these species. Do not burn poison ivy, as fumes are toxic.</p> <p>6.18 Revegetate rapidly revealed areas with native species to avoid the establishment of irritant species.</p>	Negligible and localized residual impact
7. Disposal of off-site waste (construction materials, hazardous materials, cleaning water, etc.)	Air quality, soil / sediment, water, aquatic resources and human health	•	<ul style="list-style-type: none"> <li>Contribution of construction debris and demolition</li> <li>Inputs of contaminants with cleaning residues</li> <li>Soil quality degradation</li> </ul>	<p>7.1 Measures 3.2, 3.4, 3.5, 3.7, 4.5 to 4.7, 5.11</p> <p>7.2 Dispose of all non-hazardous waste materials outside the site and provide sufficient containers to store household waste daily.</p> <p>7.3 Establish an adequate management program to ensure the containment and disposal of waste such as metal debris, used bituminous surfacing and concrete debris. These wastes must be as far as possible isolated at source and recycled.</p> <p>7.4 Do not store hazardous waste materials on site and dispose of them off site in accordance with applicable regulations.</p> <p>7.5 Where appropriate, regularly maintain portable sanitary facilities and dispose of waste accumulated in an appropriate disposal facility. Portable installations must have sufficient capacity and be managed in such a way as to prevent waste from being discharged into the receiving environment.</p>	Negligible and localized residual impact
8. Embankment or other temporary installation in the bed of the canal	Sediment Quality, Aquatic Resources and Human Health	•	<ul style="list-style-type: none"> <li>Input of materials into the aquatic environment</li> <li>Sediment contamination</li> <li>Modification of fish habitat (sediment compaction, bed modification)</li> <li>Contamination of contaminated sediments</li> </ul>	<p>8.1 Measure 1.12, 2.8, 5.16 and 5.33 to 5.35.</p> <p>8.2 Ensure that the channel bed is dry before installing backfill or any other type of temporary installation.</p> <p>8.3 Install a sediment separation device (eg, geotextile) to avoid contact with the fill or other temporary installation.</p> <p>8.4 Where applicable, ensure that the geotextile protrudes on each side of the granular material deposited at the bottom of the canal.</p> <p>8.5 Limit the movement of the machinery only to the backfill provided for this purpose.</p> <p>8.6 Machinery that runs on the backfill or any other type of temporary facility shall be operated with biodegradable vegetable oil.</p> <p>8.7 Remove the machinery from the bottom of the canal outside of the working hours.</p> <p>8.8 A photo report of the conditions "before" and "after" the laying of the embankment or other temporary installation shall be forwarded to Parks Canada after the work.</p> <p>8.9 Rehabilitate the site closest to the original condition, including removal of the embankment and geotextile, and dispose of it appropriately. Ensure that the backfill is not contaminated, otherwise it must be disposed of according to the MDDELCC Response Guide - Soil At the end of the work, the profile and materials forming the channel bed shall remain the same as before the work began.</p>	Negligible and localized residual impact

Company logo

**Project Name**

**Location**

**Environnemental protection plan (EPP)**

**Project #**

**Date**

**Contractor name**

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## **Document modifications follow-up**

Modification number	Date	Author(s)	Brief modification description
1.0	[yyyy-mm-dd]	[Name of author]	Document Creation.

## **EPP Objective**

An Environmental Protection Plan (EPP) is a document that describes site-specific environmental protection measures and responsibilities during the implementation of a project. An EPP is designed to ensure that the environmental mitigation commitments and measures outlined in the specifications are properly understood and implemented by the Contractor. The EPP must contain specific and direct guidelines to achieve the targeted environmental outcomes in the mitigation measures.

The "ENVIRONMENTAL PROTECTION" section of the quotation contains a non-exhaustive list of indications on the EPP. This list may include, for example, the following:

- The Contractor must submit an Environmental Protection Plan to the Government Representative for review and approval prior to the commencement of construction activities or the delivery of materials and equipment to the site;
- The plan should provide a comprehensive overview of known or potential environmental problems to be addressed during construction and of applicable safeguards to mitigate environmental impacts;
- The actions included in the environmental protection plan must be presented per a level of detail which agrees with the environmental problems and with the construction work to be carried out.

# Environmental Protection Plan (EPP)

\*Please insert a nomenclature into a subsection, ex 1.1, 1.2, 1.3, etc.

## **1. Contact Information**

*The objective of this section is to identify the persons responsible for the implementation of the EPP.*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- The names of the persons responsible for ensuring compliance with the plan;
- The names and skills of the persons responsible for the exit signs for residual hazardous materials to be evacuated from the site.

Specifically, this section should include, but is not limited to:

- The name and contact information of the Contractor's representative responsible for the implementation of the EPP;
- The names of Parks Canada staff involved in the environmental component of the project;
- The names of other project contacts with key environmental responsibilities;
- Environmental responsibility of each stakeholder;
  - o An organizational chart of the Contractor and the communication chain.

## **1. Worker awareness of EPP**

*The objective of this section is to describe the Entrepreneur's strategy to ensure that its staff is aware of the content of the EPP, is aware of the environmental issues at the site of work and is adequately trained in the implementation of the EPP.*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- The names and qualifications of the persons responsible for the training of construction site personnel;
- A description of the training program for personnel assigned to the protection of the environment.

Specifically, this section should include, but is not limited to:

- Strategy for training workers prior to work;
- The EPP communication strategy for workers, for example:
- Review of environmental issues and measures at start-up and construction meetings;
  - o Discussion of the environmental aspect in daily work planning meetings

## **2. Environmental Regulatory Framework**

*Include in this section a list of environmental notices, permits, approvals and approvals received prior to construction. A copy of these documents must be at all times at the site.*

*The main environmental restrictions and requirements outlined in these documents are to be found in this section.*

*Any other regulatory compliance measures affecting or restricting the construction project (ex critical periods for wildlife protection) should also be included in this section.*

## **3. Erosion and sedimentation control**

*The purpose of this section is to develop an erosion and sediment control plan for all periods of construction and reclamation. This plan must be adapted to the scope of the project and the associated risks. The plan must define concretely the means and techniques used to control the sediments and the location of the facilities.*

*The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:*

- *A plan for the prevention of erosion and sediment transport, indicating the measures to be implemented, including monitoring of work and reporting to verify compliance with federal laws and regulations, Provincial and municipal governments.*
- *Traffic control plans, including measures to reduce the erosion of temporary road platforms by the movement of construction vehicles, particularly in rainy weather. These plans must include measures to reduce the transport of materials on public roads by vehicles or runoff.*

Specifically, this section should include, but is not limited to:

- Identification of areas at risk (ex watercourses, wetlands, steep slopes, etc.);
- Erosion prevention procedures (ex timing of project implementation, minimization of site area to the minimum required, management of the area under construction, land cover measures);



- Sediment control measures (ex sediment barriers, filter berm, sediment traps, etc.), including the usual specifications and drawings of sediment control structures (may be included in the annex);
- Detailed work plans for aquatic structures, including site isolation and project timelines;
- Water management plans, including on-site controls, equipment, and proposed drainage areas;
- Areas where erosion and sediment control measures are applied (indicate on the plan in Appendix 1);
- Monitoring of control measures, preventive measures, and corrective measures (ex repairs);
- Removal of non-biodegradable materials when the area is stabilized.
  - o Any other requirements specified in the specification and the mitigation table for erosion and sediment control.

#### **4. Procedure for refueling and maintenance of equipment**

*The purpose of this section is to identify measures to protect the environment during maintenance and refueling of machinery and equipment. Planned supply areas should be identified on the mobilization plan in Appendix 1.*

#### **5. Wastewater, Stormwater and Pump Water Management Plan**

*The purpose of this section is to define on-site water management, including wastewater, storm water inside and outside the site, and pumping water (ex, drying a work area or keep dry excavations).*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- A run-off and leach management plan, indicating the measures that will be implemented to prevent any discharge of the water coming from the site into the surrounding aquatic environment;
- A wastewater management plan, indicating the methods and procedures to be used for the management or disposal of wastewater directly from construction activities, eg water used for concrete curing, Cleaning / discharging, grounding, disinfection, hydrostatic testing and rinsing of pipelines.

More specifically, this section should include, but is not limited to:

- Pre-discharge sites approved by Parks Canada;
- Methods of confinement and recovery of wastewater from the site (eg cleaning water from concrete surfaces, cleaning water from concrete pumps, runoff water, etc.);
- Water treatment methods, if required;
- Control of turbidity in the aquatic environment;

- Methods of verifying compliance with applicable quality criteria for water discharged into the aquatic environment;
- Any other requirements specified in the estimate and the mitigation measures table for on-site water management.

## **6. Excavated soil management plan**

*This section is complementary to section 4 on erosion and sediment control. It aims to detail temporary storage measures for excavated soil during the work, contaminated soil management methods, where appropriate, and protection of the environment during the period of soil disturbance.*

More specifically, this section should include, but is not limited to:

- Temporary storage areas (indicate in the mobilization plan in Appendix 1);
- Methods for stabilizing slopes and disturbed soils;
- Methods for managing soils during temporary storage (excavated soil to be reused and soils disposed off-site);
- The name of the center (s) to which the contaminated soil will be sent, if applicable;
- Details on the concrete implementation of the measures specified in the estimate for contaminated soil management, where applicable;
- Any other requirements specified in the specification and the mitigation table for soil and excavation management.

## **7. Vegetation protection**

*The objective of this section is to indicate the means that will be put in place to protect the vegetation on the site and outside the site near taxiways and access roads, to plan for the management of undesirable species, and specify the trees and shrubs to be felled or pruned for the purposes of the work. Any intervention on vegetation must be validated and authorized by Parks Canada.*

More specifically, this section should include, but is not limited to:

- Measures to manage irritant species and invasive alien species (ex, phragmite), including methods of cleaning machinery and means of disposing of plant residues;
- Measures to protect trees and shrubs against damage and disturbance caused by the work;
- Identification and location of trees to be felled and pruned, previously approved by Parks Canada;

- If required, a pesticide treatment plan approved by the Parks Canada process;
- Any other requirements specified in the specification and the mitigation table for vegetation management.

## **8. Residual Materials and Hazardous Materials Management Plan**

*Indicate in this section waste management measures, including hazardous and non-hazardous residual materials. This section should also include measures for the storage and handling of hazardous materials used on site.*

The "CONSTRUCTION WASTE / DEMOLITION MANAGEMENT AND DISPOSAL" section of the estimate contains a non-exhaustive list of waste management and waste reduction measures. This list may include, for example, the following:

- Before starting work, meet with the Government Representative to review the waste management objectives and waste reduction plan for the construction, renovation and demolition (CRD) waste generated by the project.
- The waste management objective is to reduce as much as possible the total flow of construction / demolition waste to landfills.
- Provide the Government Representative with documents certifying that comprehensive measures and procedures for waste management, recycling, reuse / reuse of recyclable and reusable / re-employable materials have been implemented.
- Minimize the amount of non-hazardous solid waste generated by the work; Maximize the reduction at source, reuse / reuse and recycling of solid waste produced by CRD activities.

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- A plan for the disposal of non-hazardous residual materials, hazardous or special residual materials including methods and sites for the disposal of solid waste and debris from clearing.
- A plan for the prevention of contamination indicating the potentially hazardous substances to be used on the site, measures to prevent the substances being suspended in the air or introduced into the soil, as well as the details of the measurements that will be taken to ensure that the storage and handling of these substances are in compliance with federal, provincial and municipal laws and regulations.

This section should include, but is not limited to:

- Waste management measures, including hazardous and non-hazardous waste;
- Measures for the storage and handling of hazardous materials used on site;
- Container and hazardous material shelter locations (indicate in the mobilization plan in Appendix 1);
- The procedure for the management and disposal of concrete surplus from concrete pumps;
- Any other requirements specified in the specification and the mitigation measures table for the management of residual materials and hazardous materials.

## **9. Protection of wildlife**

*Indicate in this section the requirements specified in the estimate and the table of mitigation measures to protect terrestrial, aquatic, and avian wildlife.*

## **10. Protection of aquatic environments**

*The purpose of this section is to identify the means to meet the requirements of the estimate and the mitigation table to protect aquatic environments (rivers, canals, wetlands, etc.). Among other things, indicate ways of preventing the dispersal of invasive exotic species (ex zebra mussels).*

## **11. Dust and emission control**

*Indicate in this section the requirements specified in the specification and the table of mitigation measures that aim to minimize emissions of fine particulate matter and greenhouse gases into the air.*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- A plan for the prevention of air pollution, specifying measures to retain dust, debris, materials and residual materials inside the site.

## **12. Noise control**

*Indicate in this section the requirements outlined in the quote and the table of mitigation measures to minimize noise and inconvenience to site visitors and area residents as appropriate.*

## **13. Modalities of restoration of the site at the end of the works**

*The objective of this section is to specify the planned restoration measures at the end of the work.*

## **14. Emergency Response and Environmental Prevention**

*This section should specify steps for emergency response, particularly in the case of a spill of oil or other hazardous materials.*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- A spill contingency plan that includes procedures to be followed, instructions to be followed and reports to be produced in the event of an unpredictable spill of a controlled substance.

Specifically, this section should include, but is not limited to:

- List of products and materials considered or defined as hazardous or toxic to the environment. These products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot-melt rubber membrane materials, bituminous cement, sand blasting agents, paint, solvents, and hydrocarbons;
- Equipment required on site;
- The contents and location of on-site recovery kits;
- Procedures for refueling and storing fuel;
- Spill prevention procedures (containment and storage of materials, safety, handling, use and disposal of empty containers, surplus products or waste generated by the application of these products in accordance with federal and provincial force);
- The spill response procedure (containment, cleaning, disposal of contaminated materials, etc.);
- An Incident Report Form to report spills (if included as an appendix, refer to them here);
- An up-to-date contact list for emergency response (Parks Canada, Environment Canada, Coast Guard, etc.), including information required to report spills.
- A fire emergency response plan;
- Any other requirements specified in the specification and the mitigation measures table for the management of spills and environmental emergencies.

## **Annexe 1. Mobilization plan**

*This schedule must include a plan identifying all elements that can be located in relation to environmental issues and the protection of the environment in the mobilization area and the machinery lanes.*

The "ENVIRONMENTAL PROTECTION" section of the estimate contains a non-exhaustive list of the elements to be contained in an EPP. This list may include, for example, the following:

- Drawings showing the location of temporary excavations or site paths in embankments, materials, constructions, sanitary installations, deposits of surplus materials or contaminated materials; The drawings illustrating the methods that will be used to control runoff and to confine the materials to the site.
- A plan of the work area showing the activities planned in each part of the works area and indicating the areas of restricted use as well as the prohibited areas of use. This plan shall include measures to mark the boundaries of usable areas and methods of protection of the elements within authorized work areas to be preserved.

Specifically, this section should include, but is not limited to:

- Location of trees to be felled and trees to be protected (tree felling must be approved in advance by Parks Canada);
- Excavation areas;
- Temporary lanes and access;
- The location of temporary facilities (ex, platforms, cofferdams, etc.);
- Storage areas for excavated soils and other stacked materials, where applicable;
- Storage areas for building materials and debris;
- Location of erosion prevention equipment (ex, sediment barrier);
- Location of maintenance and refueling areas for machinery;
- Location of hazardous material shelters and waste containers;
- Location of oil recovery kits;
- The location of the confined enclosure for concrete surplus, where applicable;
- Location of water treatment facilities, where applicable (settling pond, etc.);
- Identified sites for the discharge of water into the environment.
- Etc.

## **Annexe 2. Environmental surveillance plan**

*Include a periodic monitoring report that captures the main measures of each section of the EPP to systematically check on their implementation and their proper functioning.*

### **Additional Annexes**

Add annexes to include the following:

- Material Safety Data Sheets;
- Data sheets on sediment containment methods (ex sediment barrier) or other specific equipment related to the environment used on the site;
- Management of nonconformities;
- Relevant shop drawings and drawings.

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 99 – Demolition for minor works
- .2        Section 03 10 00 – Concrete Forming and Accessories
- .3        Section 03 20 00 – Concrete Reinforcing
- .4        Section 03 30 00 – Cast-in-Place Concrete
- .5        Section 03 30 03 – Concrete Repair
- .6        Section 03 37 13 – Shotcrete
- .7        Section 05 50 00 – Metal Fabrications
- .8        Section 09 97 19 – Painting Exterior Metal Surfaces
- .9        Section 31 05 16 – Aggregate Materials
- .10       Section 31 11 00 – Clearing and Grubbing
- .11       Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12       Section 31 32 19 – Geotextiles
- .13       Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14       Section 32 14 13 – Precast concrete pavers
- .15       Section 32 91 19.13 – Topsoil Placement and Grading
- .16       Section 32 92 23 – Sodding
- .17       Section 35 59 29 – Mooring Devices

**1.2                Section 32 91 19.13 – TOPSOIL PLACEMENT AND GRADING REFERENCES**

- .1        Canadian Construction Documents Committee (CCDC)
  - .1        CCDC 2-94, Stipulated Price Contract.

**1.3                INSPECTION**

- .1        Allow the Government Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2        Give timely notice requesting inspection if Work is designated for special tests, inspections, or approvals by the Government Representative instructions, or law of Place of Work.
- .3        If Contractor covers or permits to be covered Work that has been designated for special tests, inspections, or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.



- .4 The Government Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, the Government Representative shall pay cost of examination and replacement.

#### **1.4 INDEPENDENT INSPECTION AGENCIES**

- .1 The Parks Canada Agency (PCA) will be responsible for engaging the services of independent testing and inspection bodies (lab). The cost of these services will be borne by the PCA. This does not absolve the Contractor to carry out tests to meet contractual requirements.
- .2 Provide equipment required for executing inspection and testing by appointed agencies.
- .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by the Government Representative at no cost to the Government Representative. Pay costs for retesting and re-inspection.

#### **1.5 ACCESS TO WORK**

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

#### **1.6 PROCEDURES**

- .1 Notify appropriate agency and the Government Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

#### **1.7 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the Government Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of the Government Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will

deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Government Representative.

### **1.8 CERTIFICATION**

- .1 Where certification is required on plans and specifications, the Contractor shall provide a copy of the certificate to the Department prior to commencement of work subject to this requirement. The certificate must be valid for the duration of this work.

### **1.9 COMPLIANCE CERTIFICATION**

- .1 Where a certificate of compliance is required on plans and specifications, the contractor may not use any material for which such a certificate has not been transmitted.
- .2 The manufacturer of the material must sign this certificate of compliance. The certificate of compliance and the receipts for the delivery of the materials must be drawn up in such a way that they can be linked. The Contractor must return the certificate of compliance to the Government Representative within the prescribed time.
- .3 If the Contractor is unable to provide all required information to the Plans and Specifications, the Contractor shall at its own expense use a registered laboratory to provide missing information on the certificate of compliance. The attestation of compliance must then be signed by the representative of the laboratory which executed the tests.

### **1.10 QUALIFICATION**

- .1 Where a design is required, the Contractor shall provide a copy of the certificate to the Department prior to the commencement of work subject to this requirement. The certificate must remain valid for the duration of the work.

### **1.11 REPORTS**

- .1 Submit (4) copies of inspection and test reports to the Government Representative.
- .2 Provide copies to subcontractor of work being inspected or tested.

### **1.12 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the Government Representative and may be authorized as recoverable.

### **1.13 MILL TESTS**

- .1 Submit mill test certificates as required of specification Sections.

**Part 2            Products**

**2.1                NOT USED**

.1                Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Not used.

**1.2                REFERENCES**

- .1            Canadian General Standards Board (CGSB)
  - .1            CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood or equivalent approved by the Government Representative.
  - .2            CGSB 1.59, latest edition, Alkyd Exterior Gloss Enamel or equivalent approved by the Government Representative.
- .2            Canadian Standards Association (CSA International)
  - .1            CSA-A23.1/A23.2, latest edition, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2            CSA-0121, latest edition, Douglas Fir Plywood.
  - .3            CAN/CSA-S269.2, latest edition, Access Scaffolding for Construction Purposes.
  - .4            CAN/CSA-Z321, latest edition, Signs, and Symbols for the Occupational Environment.
- .3            U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1            EPA 832R, last edition, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .4            U.S. Environmental Protection Agency (EPA) / Office of Water
  - .1            EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plan and Best Management Practices.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.

**1.4                INSTALLATION AND REMOVAL**

- .1            The Parks Canada Agency has made land available to the Contractor for the installation of construction site facilities (the Contractor's site office, the Government Representative's site office, and storage areas). The mobilization zone is indicated in the annex.
- .2            Prepare a site plan showing the proposed location and dimensions of the area to be fenced and used by the Contractor, the number of required construction trailers, the access routes to the fenced area, and details of the fence installation.
- .3            Identify areas that must be covered with gravel to prevent mud accumulation.
- .4            Indicate any additional areas or staging areas.

- .5 Provide construction facilities in order to execute work expeditiously.
- .6 Remove from site all such work after use.

### **1.5 SCAFFOLDING**

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms, and temporary stairs and ensure proper maintenance throughout the duration of the Works.

### **1.6 HOISTING**

- .1 Provide, operate, and maintain hoists cranes required for moving of workers, materials, and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists cranes to be operated by qualified operator.

### **1.7 SITE STORAGE/LOADING**

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

### **1.8 CONSTRUCTION PARKING**

- .1 Parking will not be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Clean runways and taxi areas where used by Contractor's equipment.

### **1.9 SECURITY**

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

### **1.10 OFFICES**

- .1 Provide an office heated to 22 degrees C, lighted 750 lux and ventilated, of sufficient size to accommodate site meetings and furnished with a drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors shall provide their own offices as necessary. Direct location of these offices.
- .4 Site office of the Government Representative:
  - .1 Provide temporary office for the Government Representative including a parking spot.
  - .2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4-50 % opening windows and one lockable door.

- .3 Insulate building and provide heating system/cooling system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.
- .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
- .5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.
- .6 The Government Representative's site office must include a high-speed internet connection, with all connection and user fees paid for by the Contractor.
- .7 A photocopier-scanner with auto-charger in new condition, letter size (8 ½ x 11 inches), legal (8 ½ x 14 inches) and tabloid (11 x 17 inches) including stationery for the duration of contract;
- .8 A fax machine letter (8 ½ x 11 inches) and legal (8 ½ x 14 inches), in new condition including stationery for the duration of the contract;
- .9 A microwave and small refrigerator (9 cubic feet minimum).
- .10 A hot/cold water dispenser including drinking water for the duration of the contract.
- .11 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.
- .12 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
- .13 The Contractor must keep in place the Government Representative's office until the final work and quantities have been accepted by the Contractor and the Government Representative.
- .14 All supply costs, insurance (vandalism and theft), maintenance and operation of such equipment, and all long-distance charges incurred by the Government Representative or his representatives for this contract, are included in the unit price of the supervisor's office.
- .15 The contractor shall clean the facilities on a weekly basis. These facilities include the Government Representative's private washroom and office.
- .16 Maintain in clean condition.

#### **1.11 EQUIPMENT, TOOL, AND MATERIALS STORAGE**

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment, and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

#### **1.12 SANITARY FACILITIES**

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

### **1.13 CONSTRUCTION SIGNAGE**

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by the Government Representative.
- .2 Construction sign 1200 x 2400 mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.
- .3 Indicate on sign, name of Owner, Government Representative, of design style established by the Government Representative.
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Provide project identification site sign comprising foundation, framing, and one 1200 x 2400 mm signboard as detailed and as described below.
  - .1 Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.
  - .2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
  - .3 Signboard: Medium Density Overlaid Douglas Fir Plywood to CSA O121.
  - .4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.
  - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
  - .6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by the PCA project manager.
- .6 Locate project identification sign where indicated by the Government Representative and construct as follows:
  - .1 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
  - .2 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .7 Direct requests for approval to erect Government Representative/Contractor signboard to the Government Representative. For consideration general appearance of Government Representative/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .8 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .9 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by the Government Representative.

### **1.14 PROTECTION AND MAINTENANCE OF TRAFFIC**

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
- .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by the Government Representative.
- .3 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.
- .4 Protect travelling public from damage to person and property.
  - .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
  - .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
  - .7 Construct access and haul roads necessary.
  - .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
  - .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
  - .10 Dust control: adequate to ensure safe operation at all times.
  - .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by the Government Representative.
  - .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
  - .13 Provide snow removal during period of Work.
  - .14 Remove, upon completion of work, haul roads designated by the Government Representative.

**1.15 CLEAN-UP**

- .1 Execute all cleaning work in accordance to Section 01 74 11-Cleaning.
- .2 Divide the debris subject to recycling regulations, in accordance to Section 01 74 21 – Construction/Demolition, waste management and disposal.
- .3 Remove construction debris, waste materials, packaging material from work site daily.
- .4 Clean dirt or mud tracked onto paved or surfaced roadways.
- .5 Store materials resulting from demolition activities that are salvageable.
- .6 Stack stored new or salvaged material not in construction facilities.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.



**Part 3 Execution**

**3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures in the form of a geotextile, in accordance to Section 01 35 43 – *Environmental Procedures*.
- .2 Provide sediment barrier in accordance to Section 01 35 43 – *Environmental Procedures*.

**END OF SECTION**

## **Part 1      General**

### **1.1            RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

### **1.2            REFERENCES**

- .1      Canadian General Standards Board (CGSB)
  - .1      CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
  - .2      CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2      Canadian Standards Association (CSA International)
  - .1      CSA-O121-FM1978(C2003), Douglas Fir Plywood.

### **1.3            INSTALLATION AND REMOVAL**

- .1      Provide temporary controls in order to execute Work expeditiously.
- .2      Remove from site all such work after use.

### **1.4            SITE FENCING**

- .1      Apply plywood panels vertically as indicated flush and butt jointed.

- .2 Provide one lockable truck entrance gate gates and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.
- .4 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

## **1.5 GUARD RAILS AND BARRICADES**

- .1 Provide secure, rigid guard rails and barricades around deep excavations, unenclosed stairwells, and along the edge of the Canal.
- .2 Provide as required by the Government Representative as indicated.
- .3 Under no circumstances may the contractor use the existing works for his work. He shall take the necessary precautions to protect them and assumes full responsibility for any claims resulting from the damage caused to them.
- .4 Under no circumstances will it be permitted to fix guardrails to existing structures without the authorization of the Government Representative to do this, the contractor must submit the work procedure to the department's representatives and this seven (7) prior to commencing the work.

## **1.6 PLATFORMS AND ACCESS SYSTEMS**

- .1 The Contractor shall submit to the Government Representative the workshop drawings and design calculations seven (7) days prior to the execution of the work as indicated in Section 01 33 00 - *Submittal Procedures*.

## **1.7 DUST TIGHT SCREENS**

- .1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.
- .3 In the event of damage or vandalism, repair or replace the dust cover screens.

## **1.8 TEMPORARY ACCESS STRUCTURES**

- .1 Comply with laws, regulations, intergovernmental agreements or decrees from authorities which may at any time and in any way affect the work, labor, equipment, and materials.
- .2 Take responsibility and bear the costs of any claim or obligation that intend to break such laws, regulations, or decrees by the Contractor or its subcontractors or their respective employees.
- .3 Before starting work, the Contractor shall obtain, at his own expense, any licenses or permits required by the laws, decrees, or regulations.
- .4 Describe, on the drawings of the temporary structures, the proposed method used for the repair of a permanent structure.

- .5 Shop drawings, design calculations, and the Work Plan must be prepared, signed, and sealed by a professional engineer and registered member in good standing of the *Ordre des ingénieurs du Québec*. The Work Plan must include structural calculations, the assumptions used for the calculations, the sequence of assembly and disassembly of the various elements, and any other related element.

## **1.9 ACCESS TO SITE**

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

## **1.10 PUBLIC TRAFFIC FLOW**

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

## **1.11 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

## **1.12 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

## **1.13 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.14 CLEANING**

- .1 Cleaning during work: carry out cleaning work in accordance to section 01 74 11 - Cleaning.
  - .1 Keep the area clean at the end of each working day.
- .2 Final cleaning: remove surplus materials / materials, waste, tools, and equipment from site in accordance to Section 01 74 11 - Cleaning

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                REFERENCES**

- .1      If there is question as to whether products or systems are in conformance with applicable standards, the Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .2      Cost for such testing will be borne by the Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

**1.3                QUALITY**

- .1      Products, materials, equipment, and articles incorporated in Work shall be new, not damaged, or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2      Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve Contractor responsibility, but is precaution against oversight or error. The Contractor must remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with the Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

#### **1.4 AVAILABILITY**

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify the Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

#### **1.5 STORAGE, HANDLING AND PROTECTION**

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Construction timber, sheet materials, panel materials, and timber on rigid supports must be placed flat such that they do not rest directly on the ground. Provide a gentle slope to encourage the flow of condensate.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of the Departmental Representative.

- .9 Touch-up damaged factory finished surfaces to satisfaction of the Departmental Representative. Use touch-up materials to match original. Do not paint over name plates.

## **1.6 TRANSPORTATION**

- .1 Pay costs of transportation of products required in performance of Work.

## **1.7 MANUFACTURER'S INSTRUCTIONS**

- .1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify the Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that the Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

## **1.8 QUALITY OF WORK**

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify the Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. The Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with the Departmental Representative whose decision is final.

## **1.9 CO-ORDINATION**

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Contractor be responsible for coordination and placement of openings, sleeves and accessories.

## **1.10 CONCEALMENT**

- .1 Before installation inform the Departmental Representative if there is interference. Install as directed by the Departmental Representative.

## **1.11 REMEDIAL WORK**

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

**1.12 FASTENINGS**

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**1.13 FASTENINGS - EQUIPMENT**

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Bolts may not project more than one diameter beyond nuts.
- .3 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

**1.14 PROTECTION OF WORK IN PROGRESS**

- .1 Prevent overloading of parts of building. Do not cut, drill or sleeve load bearing structural member, unless specifically indicated with written approval of the Departmental Representative.

**1.15 EXISTING UTILITIES**

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.



Rehabilitation Lachine Canal Walls  
Repair and replacement of the  
crowning walls and seat repairs  
(Areas 13.1, 13.2, 13.3, 13.4, 13.5 and 13.6 – Reach No 4)

COMMON PRODUCT  
REQUIREMENTS

Section 01 61 00  
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**Part 3            Execution**

**3.1                NOT USED**

.1                Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                QUALIFICATIONS OF SURVEYOR**

- .1      Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to the Government Representative.

**1.3                SURVEY REFERENCE POINTS**

- .1      The Contractor shall make all calculations for the execution of the work and shall carry out all surveys necessary for the completion of the contract, with exception to the work carried out by the Department. To this effect, he must have a competent survey team to carry out this work.
- .2      At the start of the work, the Contractor verifies the reference points established by the Department to ensure the reliability of the surveys to be carried out during construction.
- .3      The Contractor is required to supplement the general staking with additional staking. This entails the transfer of all points necessary for construction to the field, to allow an easy and quick check.
- .4      The stakes and markers established by the Contractor shall make it possible to verify the positioning of the works by the

#### **1.4 SURVEY REQUIREMENTS**

- .1 Establish (1) permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Contractor must install the stake chain every ten (10) meters minimum, unless a curve is present in which case the Contractor must then install the stakes every five (5) meters minimum.
- .3 Establish lines and levels, locate, and lay out, by instrumentation.
- .4 Stake for grading, fill and topsoil placement and landscaping features.
- .5 Stake slopes.

#### **1.5 EXISTING SERVICES**

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify the Government Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by the Government Representative.

#### **1.6 RECORDS**

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

#### **1.7 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit all required documents in accordance with Section 01 33 00 - *Submittal Procedures*
- .2 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

#### **1.8 SUBSURFACE CONDITIONS**

- .1 Promptly notify the Government Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should the Government Representative determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
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- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                EXISTING INFORMATION AVAILABLE FOR CONSULTATION**

- .1      Parks Canada provides Contractors with the information available regarding the Canal Lachine walls.
- .2      The PCA does not guarantee the accuracy of the information contained in the available documents as described above and assumes no responsibility with respect thereto.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submittals: in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2      Submit written request in advance of cutting or alteration which affects:
  - .1      Structural integrity of elements of project.
  - .2      Integrity of weather-exposed or moisture-resistant elements.
  - .3      Efficiency, maintenance, or safety of operational elements.

- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.
- .3 Include in request:
  - .1 Identification of project.
  - .2 Location and description of affected Work.
  - .3 Statement on necessity for cutting or alteration.
  - .4 Description of proposed Work, and products to be used.
  - .5 Alternatives to cutting and patching.
  - .6 Effect on Work of Owner or separate contractor.
  - .7 Written permission of affected separate contractor.
  - .8 Date and time work will be executed.

#### **1.4 COMPETENCY OF LABOR**

- .1 The Contractor shall employ as a Project Manager, General Foreman or Foreman, competent persons with relevant experience and sufficient training to understand plans and specifications. These employees must direct the work to obtain results in accordance with the requirements of the contract. These conditions also apply to foremen of subcontractors

### **Part 2 Product**

#### **2.1 MATERIALS**

- .1 Required for original installation.
- .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - *Submittal Procedures*.

#### **2.2 STATE AND MATERIAL CAPACITY**

- .1 The contractor shall use all material appropriately, in sufficient capacity and quantity to properly execute the work in the required contractual delay. This material must be in good working condition without threat to the workers and public in accordance to current regulations. All material that release hazardous liquids for the works or environments (hydrocarbons, oils, or other hazardous products) is not authorized site entry.

### **Part 3 Execution**

#### **3.1 PREPATORY WORK**

- .1 Inspect the site to evaluate existing conditions and identify the elements susceptible to damage or displacement during cutting and patching phases.
- .2 Once elements are known, inspect them, and identify all conditions having the potential to influence the work execution.

- .3 Commencing cutting and patching work implies that the existing conditions have been accepted.
- .4 Provide and install all supports to adjacent structures to maintain structural integrity. Provide devices and consider methods to protect other structural elements from damage.
- .5 Provide a surface protection for areas exposed to elements as a result of the work; keep excavations dry.
- .6 Complete a comprehensive survey of the existing walls (dimensions and profiles), and prepare the Shop Drawings accordingly.

### **3.2 EXECUTION**

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.
- .3 Remove and replace defective and non-conforming Work.
- .4 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .5 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .6 Restore work with new products in accordance with requirements of Contract Documents.
- .7 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .8 Finish surfaces to ensure uniformity with adjacent finishes. In the case of continuous surfaces, finish up to the nearest intersection between two (2) elements; In the case of an assembly of elements, complete the entire finish.

### **3.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse/recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

### **3.4 CLEANING**

- .1 Complete the cleaning work in accordance with Section 01 74 11 – *Cleaning*

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                PROJECT CLEANLINESS**

- .1      Maintain Work in tidy condition, free from accumulation of waste products and debris.
- .2      Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .3      Provide on-site containers for collection of waste materials and debris.
- .4      Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
- .5      Dispose of waste materials and debris at designated dumping areas on Crown property, off site.
- .6      Do not burn waste materials on site
- .7      Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.

- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

### **1.3 FINAL CLEANING**

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Remove stains, spots, marks and dirt from decorative work.
- .4 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .5 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .6 Remove dirt and other disfiguration from exterior surfaces.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse/recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

### **1.5 REHABILITATION OF THE AREA**

- .1 The Contractor shall repair or rebuild fences and other necessary structures that have been demolished or damaged, and dispose of all materials in a manner that does not deface access to works and related works.
- .2 The Contractor shall repair all other damages and damage caused to the site, the public or private property, bodies of water, camp sites, storage facilities, storage or material supply sites, and the environment affected by his work.
- .3 Return pavements affected by work to the original state, prior to start of work, taking care to respect the original thickness of these elements.
- .4 Clean and rehabilitate areas affected by work as instructed by Departmental Representative

**END OF SECTION**



**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – Demolition for minor works
- .2      Section 03 10 00 – Concrete Forming and Accessories
- .3      Section 03 20 00 – Concrete Reinforcing
- .4      Section 03 30 00 – Cast-in-Place Concrete
- .5      Section 03 30 03 – Concrete Repair
- .6      Section 03 37 13 – Shotcrete
- .7      Section 05 50 00 – Metal Fabrications
- .8      Section 09 97 19 – Painting Exterior Metal Surfaces
- .9      Section 31 05 16 – Aggregate Materials
- .10     Section 31 11 00 – Clearing and Grubbing
- .11     Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12     Section 31 32 19 – Geotextiles
- .13     Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14     Section 32 14 13 – Precast concrete pavers
- .15     Section 32 91 19.13 – Topsoil Placement and Grading
- .16     Section 32 92 23 – Sodding
- .17     Section 35 59 29 – Mooring Devices

**1.2                WASTE MANAGEMENT GOALS**

- .1      Prior to start of Work, conduct meeting with the Project Manager of PCA, Government Representative to review and discuss Parks Canada Agency (PCA) waste management goals.
- .2      Parks Canada Agency (PCA) waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites.
- .3      Prior to project completion provide the Government Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials has been extensively practiced.
- .4      Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .5      Protect environment and prevent environmental pollution damage.

### 1.3 DEFINITIONS

- .1 Class III: non-hazardous waste - construction renovation and demolition waste.
- .2 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices.
- .3 Audit des déchets de démolition (ADD) : S'applique aux déchets effectivement générés par les travaux
- .4 Inert Fill: inert waste - exclusively asphalt and concrete.
- .5 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .11 Separate Condition: refers to waste sorted into individual types.
- .12 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .13 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. (Refer to Annex A of the present section)
- .14 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .15 Waste Reduction work plan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation, and reporting procedures, anticipated results, and responsibilities.

Waste Reduction Work plan (Annex B of the present section) information acquired from Waste Audit (Appendix A of the present section).

#### **1.4 DOCUMENTS**

- .1 Post and maintain in visible and accessible area at job site, one copy of following documents:
  - .1 Waste Audit
  - .2 Waste Reduction Workplan
  - .3 Waste Source Separation Program.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Prepare and submit following prior to project start-up:
  - .1 Two (2) copies of completed Waste Audit (WA, Annex A of the present section)
  - .2 Two (2) copies of completed Waste Reduction work plan (WRW, Annex B of the present section)
  - .3 Two (2) copies of the Demolition Waste Audit (DWA, Annex C of the present section)
  - .4 Two (2) copies of Cost/Revenue Analysis work plan (CRAW, Annex E of the present section)
  - .5 Two (2) copies of Waste Source Separation Program (WSSP, Annex A of the present section)
- .3 Submit prior to final payment the following, the Waste Diversion Report, indicating final quantities by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials.
  - .1 Failure to submit the required report could result in the withholding of final payment.
  - .2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.
  - .3 For each waste material generated by the project and recycled/reused, recycled, or sold, indicate the quantity in kilograms, the type, and the destination.
  - .4 Indicate the quantity in kilograms and the name and address of the dumping site for all waste materials generated by the project.

#### **1.6 WASTE AUDIT (WA)**

- .1 Perform the Waste Audit (WA) prior to project start-up.
- .2 Prepare WA (Annex A of the present section).
- .3 Indicate on the WA (Annex A of the present section) the quantities and types of waste materials that will be generated as well as their potential to be reused and/or recycled.

## **1.7 WASTE REDUCTION WORKPLAN (WRW)**

- .1 Prepare and submit WRW prior to project start-up.
- .2 WRW should include but not limited to:
  - .1 Destination of materials identified.
  - .2 Deconstruction/disassembly techniques and sequencing.
  - .3 Deconstruction/disassembly schedules.
  - .4 Location of waste bins on-site.
  - .5 Security of on-site stock piles and waste bins.
  - .6 Protection of personnel, sub-contractors.
  - .7 Clear labelling of storage areas.
  - .8 Details on materials handling and removal procedures.
  - .9 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
- .3 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .4 WRW must describe the proposed waste management methods.
- .5 Based on the information indicated in the WA, identify opportunities to Reduce, Reuse, and Recycle waste materials.
- .6 Post WRW or summary where workers at site are able to review content.
- .7 Set realistic waste reduction goals; determine existing limitations and develop strategies to eliminate them.
- .8 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project.

## **1.8 DEMOLITION WASTE AUDIT (DWA)**

- .1 Perform the Demolition Waste Audit (DWA) prior to project start-up.
- .2 Prepare DWA (Annex C of the present section).
- .3 Provide an inventory of the quantities of waste materials to be recovered for reuse, recycling, or disposal.

## **1.9 COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

- .1 Prepare CRAW (Annex D of the present section).

## **1.10 WASTE SOURCE SEPARATION PROGRAM (WSSP)**

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.

- .3 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide containers in which materials for reuse and recycling will be deposited.
- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Locate separated materials in areas which minimize material damage.
- .7 Waste materials must be collected, handled, and stored on-site and evacuated once sorted:
  - .1 Recovered waste materials must be transported to users of recycled waste materials.
- .8 Waste materials must be collected, handled, and stored on site and evacuated unsorted:
  - .1 Recovered waste materials must be shipped to a site operated under a certificate of approval.
  - .2 Waste materials must be sorted into relevant categories for reuse or recycling.

#### **1.11 STORAGE, HANDLING AND PROTECTION**

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by the Government Representative.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Separate and store materials produced during project in designated areas.
- .6 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off site processing facility for separation.
  - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

#### **1.12 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste or volatile materials into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
  - .4 Tonnage reused or recycled.
  - .5 Reused or recycled waste destination.

- .4 Remove materials on-site as Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

### **1.13 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work in accordance to Section 01 32 16.07- *Construction Progress Schedule*

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

### **3.2 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – *Cleaning*.
- .2 Upon completion of the work, remove tools and evacuate waste. Leave the site clean and in order.
- .3 The work zone must be continually cleaned.
- .4 Separate at the source all waste materials that must be reused/recycled or salvaged to specified sort areas.

### **3.3 DIVERSION OF MATERIALS**

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by the Government Representative, and consistent with applicable fire regulations.
  - .1 Mark containers or stockpile areas.
  - .2 Provide instruction on disposal practices.
- .2 On-site sale of materials is not permitted.

.3 Demolition Waste:

Type of Waste Material	Recommended Percentage	Recovery	Actual Recovery Percentage
Mechanical Materials	100		
Metal	100		
Rubble	100		
Wood (uncontaminated)	100		

.4 Construction Waste:

Type of Waste Material	Recommended Percentage	Recovery	Actual Recovery Percentage
Cardboard	100		
Plastic Packaging	100		
Rubble	100		
Steel	100		
Wood (uncontaminated)	100		
Other	100		

## ANNEX Section 01 74 21 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

ANNEX A: - WASTE AUDIT (WA)

ANNEX B: WASTE REDUCTION WORKPLAN (WRW)

ANNEX C: AUDIT DES DÉCHETS DE DÉMOLITION (ADD)

ANNEX D: DEMOLITION WASTE AUDIT (DWA)

ANNEX E: CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF  
RESPONSIBILITY FOR THE ENVIRONMENT



**ANNEX A - WASTE AUDIT (WA)**

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) Percentage (%) Recycled	(7) Percentage (%) Reused
Wood and Plastics						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						
Wood						
Metal						
Other						

**ANNEX B - WASTE REDUCTION WORKPLAN (WRW)**

(1) Material Category	(2) Person(s) Responsible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	(5) Actual Amount	(6) Recycled Amount (unit) Projected	(7) Actual Amount Recycled	(8) Material(s) Destination
Wood and Plastics							
Off-cuts							
Warped Pallet Forms							
Plastic Packaging							
Cardboard Packaging							
Other							
Wood							
Metal							
Concrete							

**ANNEX C - DEMOLITION WASTE AUDIT (DWA)**

(1) Material Description	(2) Quantity	(3) Unit	(4) Total	(5) Volume (cum)	(6) Weight (cum)	(7) Observations and Hypotheses
Wood						
Concrete						
Steel						
Other						

**ANNEX D - COST/REVENUE ANALYSIS WORKPLAN (CRAW)**

(1) Material Description	(2) Total Quantity (unit)	(3) Volume (cum)	(4) Weight (cum)	(5) Disposal Cost/Credit (+/-) \$	(6) Category Sub-total (+/-) \$	(7) Cost (-) Credit (+) \$
Wood						
Concrete						

**ANNEX E - CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

Province	Address	General Inquiries	Fax
Canada (Quebec)	Ministère de l'Environnement et de la Faune, Siège social 150, boul. René-Lévesque Est Quebec QC G1R 4Y1	418-643-3127 1-800-561-1616	418-646-5974
	Conseil de la conservation et de l'environnement 800, Place d'Youville Place, 19 <sup>e</sup> étage Quebec QC G1R 3P4	418-643-3818	
Montreal	Division du contrôle des rejets industriels, Direction de l'Environnement Service des infrastructures, transport et environnement 827, boul. Crémazie Est, bureau 202 Montreal QC H2M 2T8		
Quebec (Montreal)	5199, rue Sherbrooke Est, bureau 3860 Montreal QC H1T 3X9 Email: montreal@mddefp.gouv.qc.ca	514 873-3636	514 873-5662

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 99 – Demolition for minor works
- .2        Section 03 10 00 – Concrete Forming and Accessories
- .3        Section 03 20 00 – Concrete Reinforcing
- .4        Section 03 30 00 – Cast-in-Place Concrete
- .5        Section 03 30 03 – Concrete Repair
- .6        Section 03 37 13 – Shotcrete
- .7        Section 05 50 00 – Metal Fabrications
- .8        Section 09 97 19 – Painting Exterior Metal Surfaces
- .9        Section 31 05 16 – Aggregate Materials
- .10       Section 31 11 00 – Clearing and Grubbing
- .11       Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .12       Section 31 32 19 – Geotextiles
- .13       Section 31 04 31 – Historic Subgrade, Shoring and Bracing
- .14       Section 32 14 13 – Precast concrete pavers
- .15       Section 32 91 19.13 – Topsoil Placement and Grading
- .16       Section 32 92 23 – Sodding
- .17       Section 35 59 29 – Mooring Devices

**1.2                REFERENCES**

- .1        Canadian Construction Documents Committee (CCDC)
  - .1        CCDC 2-2008, Stipulated Price Contract.
  - .2        DOC 14-2000, Design-Build Stipulated Price Contract.
  - .3        DOC 15-2000, Design-Builder/ Government Representative Contract.
- .2        Canadian Environmental Protection Act (CEPA)
  - .1        SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

**1.3                ADMINISTRATIVE REQUIREMENTS**

- .1        Acceptance of Work Procedures:
  - .1        Contractor's Inspection:
    - .1        The Contractor shall conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

- .2 Notify the Government Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
- .2 Government Representative's Inspection:
  - .1 The Government Representative and the Contractor shall inspect Work and identify defects, deficiencies and omissions.
  - .2 If the Government Representative does not find the work acceptable, the Contractor will make the corrections requested.
- .3 Completion Tasks: submit written certificates in French that tasks have been performed as follows:
  - .1 Work: completed and inspected for compliance with Contract Documents.
  - .2 Defects: corrected and deficiencies completed.
  - .3 Work: complete and ready for final inspection.
- .4 Final Inspection:
  - .1 When completion tasks are done, request final inspection of Work by the Government Representative, and Contractor.
  - .2 When Work incomplete according to the Government Representative, complete outstanding items and request re-inspection.
- .5 Declaration of Substantial Performance:
  - .1 When the Government Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
- .6 Commencement of Lien and Warranty Periods:
  - .1 Date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.
- .7 Final Payment:
  - .1 When the Government Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
  - .2 When Work deemed incomplete by the Government Representative, complete outstanding items and request re-inspection.
- .8 Payment of Holdback:
  - .1 After issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

#### **1.4 FINAL CLEANING**

- .1 Execute final cleaning in accordance with Section 01 74 11 – *Cleaning*.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

- .2 Waste Management.
  - .1 Separate waste materials for reuse/recycling in accordance with Section 01 74 21 – *Construction/Demolition Waste Management and Disposal.*

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 01 77 00 – Closeout procedures

**1.2                REFERENCES**

- .1            Canadian Environmental Protection Act (CEPA)
  - .1            SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

**1.3                ADMINISTRATIVE REQUIREMENTS**

- .1            Pre-warranty Meeting:
  - .1            Convene meeting one (1) week prior to contract completion with Contractor's representative and the Government Representative, in accordance with Section 01 31 19 – *Project Meetings*.
  - .2            The Government Representative shall establish communication procedures for:
    - .1            Notifying construction warranty defects.
    - .2            Determine priorities for type of defects.
    - .3            Determine reasonable response time.
  - .3            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.
  - .4            Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Provide submittals in accordance with Section 01 33 00 – *Submittal Procedures*.
- .2            When requested, provide documents confirming the type, supplier, and quality of the products installed.
- .3            Provide “As built” plans indicating the intervention zones, the modifications from the “For construction” plans and the approved final profiles.

**1.5                FORMAT**

- .1            Organize data as instructional manual.
- .2            Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3            When multiple binders are used correlate data into related consistent groupings.
  - .1            Identify contents of each binder on spine.



- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems and process flow under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab.
  - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in .dwg format on CD.

## **1.6 CONTENTS - PROJECT RECORD DOCUMENTS**

- .1 Table of Contents for Each Volume: provide title of project;
  - .1 Date of submission; names.
  - .2 Addresses, and telephone numbers of Government Representative and Contractor with name of responsible parties.
  - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
  - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
  - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - *Quality Control*.

## **1.7 AS -BUILT DOCUMENTS AND SAMPLES**

- .1 Maintain, at site for Government Representative one record copy of:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Change Orders and other modifications to Contract.
  - .5 Reviewed shop drawings, product data, and samples.
  - .6 Field test records.
  - .7 Inspection certificates.
  - .8 Manufacturer's certificates.

- .2 Store record documents and samples in field office apart from documents used for construction.
  - .1 Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.
  - .1 Label each document "Project Record" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry, and legible condition.
  - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by the Government Representative.

## **1.8 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS**

- .1 Record information on set of black line opaque drawings, provided by the Government Representative.
- .2 Record information concurrently with construction progress.
  - .1 Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: mark each item to record actual construction, including:
  - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
  - .3 Field changes of dimension and detail.
  - .4 Changes made by change orders.
  - .5 Details not on original Contract Drawings.
  - .6 References to related shop drawings and modifications.
- .4 Specifications: mark each item to record actual construction, including:
  - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
  - .2 Changes made by Addenda and change orders.
- .5 Other Documents: maintain field test records, required by individual specifications sections.
- .6 Provide digital photos, if requested, for site records.

## **1.9 FINAL SURVEY**

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - *Examination and Preparation*, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

## **1.10 WARRANTIES AND BONDS**

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, (30) days before planned pre-warranty conference, for the Government Representative's approval.
- .3 Warranty management plan to include required actions and documents to assure that the Government Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to the Government Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
  - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
  - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
  - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten (10) days after completion of applicable item of work.
  - .4 Verify that documents are in proper form, contain full information, and are notarized.
  - .5 Co-execute submittals when required.
  - .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Nine (9) months after the date of Substantial Completion of the Work, perform a warranty inspection with the Government Representative.
- .9 Include information contained in warranty management plan as follows:
  - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers, or suppliers involved.
  - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
    - .1 Name of item.
    - .2 Model and serial numbers.
    - .3 Location where installed.
    - .4 Name and phone numbers of manufacturers or suppliers.
    - .5 Names, addresses and telephone numbers of sources of spare parts.
    - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

- .7 Cross-reference to warranty certificates as applicable.
- .8 Starting point and duration of warranty period.
- .9 Summary of maintenance procedures required to continue warranty in force.
- .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
- .11 Organization, names, and phone numbers of persons to call for warranty service.
- .12 Typical response time and repair time expected for various warranted equipment.
- .3 Contractor's plans for attendance at 9-month post-construction warranty inspections.
- .4 Procedure and status of tagging of equipment covered by extended warranties.
- .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
  - .1 Failure to respond will be cause for the Government Representative to proceed with action against Contractor.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 03 30 03 – Concrete Repair

**1.2                REFERENCES**

- .1            CSA International
  - .1            CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2            U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1            EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2            Submit demolition drawings:
  - .1            Submit for review and approval by the Government Representative shoring and underpinning drawings showing the proposed methods. These documents must be signed and sealed by a professional engineer licensed with the *Ordres des ingénieurs du Québec, OIQ*.
- .3            Sustainable Design Submittals:
  - .1            Submit all required technical specification documents concerning equipment the Contractor plans to use during the work and demolition to the Government Representative. Equipment is only authorized when the technical specifications conform to the requirements.
- .4            Required documents/samples concerning sustainable design.
  - .1            Management of construction waste.
    - .1            Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50 % of construction wastes were recycled or salvaged in accordance to Section 01 74 21- *Construction/Demolition waste management and disposal*

**1.4                SITE CONDITIONS**

- .1            Protection de l'environnement
  - .1            Perform works in accordance with section 01 35 43 – *Environmental Procedures*.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 For the fine demolition of seats, use a manual pneumatic hammer not exceeding 15 kg.
- .2 Demolition of concrete at the intersection point of 2 saw lines shall be carried out using a 7 kg manual pneumatic hammer.
- .3 For demolition of concrete in recessed wall sections or within 150 mm of piping:
  - .1 Type of hammer: pneumatic or manual
  - .2 Maximum weight: 7 kg
  - .3 Hammerhead: Spade
- .4 The Government Representative may, at any time, request a capacity reduction of authorized demolition equipment when he determines that the demolition work is causing damage to the reinforcement or concrete to be saved.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .2 Notify and obtain approval of utility companies before starting demolition.
- .3 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
  - .1 Immediately notify Government Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
  - .2 Immediately notify Government Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.
- .4 Execute the work in accordance to Section 01 71 00 – *Examination and preparation*.

### **3.2 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary geotextile sedimentation control measures in accordance to Section 01 35 43 – *Environmental Procedures*.

### **3.3 PROTECTION**

- .1 Do Work in accordance with Section 01 35 29.06 - *Health and Safety Requirements*, Section 01 56 00 – *Temporary barriers and enclosures* and Section 01 35 29.06 – *Health and safety requirements*.

- .2 Protection of In-Place Conditions:
  - .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
- .3 Keep noise, dust, and inconvenience to occupants to minimum.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.

### 3.4 IMPLEMENTATION

- .1 Demolish and remove items as indicated on plans or by the Government Representative.
- .2 Demolition/removal of Pavements, Curbs and Gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by the Government Representative.
  - .2 Protect adjacent joints and load transfer devices.
  - .3 Protect underlying and adjacent granular materials.
- .3 Demolition
  - .1 Take necessary precautions to avoid damage to existing parts to be retained during concrete demolition work. For this purpose, authorized pneumatic demolition equipment can be found in Part 2 of the present Section.
  - .2 Areas to be demolished shall be outlined by a saw line 20 mm deep perpendicular to the surface on all faces. The depth of the saw cut is reduced as necessary to avoid damage to the rebars. Saw lines must not cross.
  - .3 The Contractor is responsible for the quality of the saw lines throughout the work. In the event that a saw line is damaged by traffic or equipment, it must be repaired at the contractor's expense.
  - .4 The Contractor shall take the necessary precautions to avoid damage to the concrete and not bend or damage the rebar to be retained. The bars damaged by the Contractor during the work must be replaced at his own expense, taking into account a minimum overlap length of 600 mm.
  - .5 After demolition, cleaning with a pressurized water jet (pressure 15 MPa, flow rate 20 l / min, circular nozzle concentrates and nozzle-to-cement distance of 150 mm to 200 mm). Must be carried out on:
    - .1 Exposed rebar following the demolition of concrete to remove rust.
    - .2 Concrete surfaces to be retained to detach any small pieces of concrete that no longer adhere to the surface and to obtain a rough surface for better adhesion to the new concrete.
- .4 After final surface cleaning, the Government Representative will review the condition of the remaining concrete to ensure that there are no moving parts.

### 3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - *Cleaning*.
- .3 Refer to demolition drawings and specifications for items to be salvaged for reuse.
- .4 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**



## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1      Section 03 20 00 - *Concrete reinforcing*
- .2      Section 03 30 00 - *Cast-in-place concrete*
- .3      Section 03 30 03 – *Concrete repair*
- .4      Section 03 37 13 – *Shotcrete*

### **1.2                REFERENCES**

- .1      Canadian Standards Association (CSA International)
  - .1      CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2      CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
  - .3      CSA O121-M1978 (R2003), Douglas Fir Plywood.
  - .4      CSA O151-04, Canadian Softwood Plywood.
  - .5      CSA O153-M1980 (R2003), Poplar Plywood.
  - .6      CAN/CSA-O325.0-92 (R2003), Construction Sheathing.
  - .7      CSA O437 Series-93 (R2006), Standards for OSB and Waferboard.
  - .8      CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
  - .9      CAN/CSA-S269.3-M92 (R2003), Concrete Formwork, National Standard of Canada
- .2      Underwriters' Laboratories of Canada (ULC)
  - .1      CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
- .3      Ministère des Transports du Québec (MTQ)
  - .1      *Cahier des charges et devis généraux – Infrastructures routières – Construction et réparation (CCDG)*
  - .2      Ouvrages routiers, Normes, Tome VII – Matériaux, norme 3101, *Béton de masses volumiques normales*.
  - .3      Ouvrages routiers, Normes, Tome VII – Matériaux, norme 3501, *Matériaux de cure*.
  - .4      Ouvrages routiers, Normes, Tome VII – Matériaux, norme 3801, *Mortiers cimentaires en sac*.
  - .5      Ouvrages routiers, Normes, Tome VII – Matériaux, norme 3901, *Coulis cimentaires*.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Submit shop drawings for formwork and falsework.
  - .1 Submit drawings stamped and signed by professional engineer member of the *Ordre des ingénieurs du Québec*.
  - .2 Shop drawings must indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings Comply with CAN/CSA-S269.3 for formwork drawings.
  - .3 Provide shop drawings including formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
  - .4 Provide sequence of erection and removal of formwork/falsework as directed by the Departmental Representative.
- .3 After construction, inspection and prior to the concrete pour, provide the Departmental Representative an advisory stating that the formwork and falsework conform to the plans submitted. The advisory must indicate the time and date of the inspection and be signed and sealed by an engineer, member of the *Ordre des ingénieurs du Québec*.
- .4 Submit the technical specifications with regards to the formwork and falsework.
  - .1 Provide the Departmental Representative all the technical specifications as well as the manufacturers documents concerning the formwork ties, form release agents and any other products required for the work of formwork and temporary support structures or falsework. The specifications must indicate the product characteristics, performance criteria, dimensions, limits and finish.
- .5 Specify the assembly and disassembly of the formwork and falsework in accordance to the Departmental Representatives requirements.
- .6 Submit required Material Safety Data Sheets (MSDS), in accordance with the Workplace Hazardous Materials Information System (WHMIS) and according to Section 01 35 29.06 – *Health and Safety Requirements* and Section 01 35 43 – *Environmental Procedures*.

### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Divert wood materials from landfill to a recycling reuse composting facility as approved by the Departmental Representative.
- .4 Divert plastic materials from landfill to a recycling reuse composting facility as approved by the Departmental Representative.
- .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 All the crowning walls of the Lachine Canal are elements with particular architectural features.
- .2 Formwork materials:
  - .1 The formwork use must be new. The surfaces and surrounding of the wood should be smooth and unbroken
  - .2 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.
  - .3 For concrete with special architectural features, use formwork materials to CSA-A23.1/A23.2.
- .3 Form ties:
  - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
  - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
  - .3 For the special requirements of complete crowning walls replacement, formwork ties are not permitted in the concrete of the walls to retain the vertical walls of the formwork. The tie rods must be located above the formwork or on the soles and removed after installation. Reinforcement parts must be installed on the exterior of the formwork to ensure structural integrity. For repair of the crowning walls workform ties are allowed.
  - .4 Concerning wall repairs, formwork ties are permitted.
  - .5 The ties and tie-rods ends that remain in the concrete shall be galvanized.
- .4 Form stripping agent
  - .1 colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm<sup>2</sup>/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .5 Falsework materials comply to CSA-S269.1, latest version.

## **Part 3 Execution**

### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1.
- .3 Do not place shores and mud sills on frozen ground.
- .4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

- .5 Fabricate and erect 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.
- .6 Align form joints and make watertight.
  - .1 Keep form joints to minimum.
- .7 Unless otherwise specified and with approval for the Departmental Representative, use the same chamfer strips as the existing structure on the top of the crowning wall.
- .8 Visible and non-visible sharp edges shall be chamfered. Unless otherwise indicated in the specifications and drawing, the chamfer dimensions are use 15 mm x 15 mm.
- .9 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .10 Grooves, slots, openings, drip edges, re-entrants, and expansion and contraction joints must comply with specifications.
- .11 Embed anchors, sleeves, and other embedded items required for the works specified in other sections.
  - .1 Ensure that anchors and embeds do not protrude from surfaces to be coated with a finishing product, a coat of paint for example.
- .12 Coat the inside of the formwork with a commercially available form removal agent designed to prevent the adhesion of concrete.
- .13 Brush forms before their installation according to the application rate specified in the data sheet of the product to be used. The form removal agent should not come in contact with the reinforcement.
- .14 Obtain authorization by the Departmental Representative prior to pouring concrete directly in the ground or when reserving openings in the formwork that aren't indicated in the drawings.
- .15 Determine the elevation of the concrete pour by the top of formwork or by molding.
- .16 Before pouring the concrete, clean formwork in accordance with CSA standard A23.1/A23.2, latest edition.
  - .1 For cleaning formwork, use a compressed air jet, a jet of pressurized water, or a vacuum to remove any ice, snow, debris, or other foreign matter.
  - .2 The air jet must be equipped with a filter that removes oil. Demonstrate the effectiveness of the filter before use.
  - .3 Use mixing water for concrete in accordance with CSA standard A23.1/A23.2, latest edition, for cleaning formwork.

### **3.2 REMOVAL AND RESHORING**

- .1 After pouring the concrete, leave the formwork in place for at least three (3) days.
- .2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

- .3 The formwork shall be considered removed once it has been loosened and a part of it is no longer in contact with the concrete.
- .4 The requirements related to concrete cure must be applied in sequence with the formwork removal if the formwork is removed before the curing period, in accordance to Section 03 30 00 – *Cast in place concrete*.
- .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

### 3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - *Cleaning*.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1    Section 03 10 00 – *Concrete forming and accessories*
- .2    Section 03 30 00 - *Cast-in-place concrete*
- .3    Section 03 30 03 – *Concrete repair*
- .4    Section 03 37 13 – *Shotcrete*

### **1.2                REFERENCES**

- .1    American Concrete Institute (ACI)
  - .1    SP-66, ACI Detailing Manual 2004.
- .2    ASTM International
  - .1    ASTM A82/A82M, last edition, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2    ASTM A143/A143M, last edition, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .3    ASTM A185/A185M, last, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .4    ASTM A775/A775M, last edition, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .3    CSA International
  - .1    CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2    CAN/CSA-A23.3, Design of Concrete Structures, latest edition.
  - .3    CSA-G30.18, Carbon Steel Bars for Concrete Reinforcement, latest edition.
  - .4    CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, latest edition.
  - .5    CSA W186-M1990, Welding of Reinforcing Bars in Reinforced Concrete Construction, latest edition.
- .4    Reinforcing Steel Institute of Canada (RSIC)
  - .1    RSIC-2004, Reinforcing Steel Manual of Standard Practice.
- .5    Ministère des Transports du Québec (MTQ)
  - .1    *Cahier des charges et devis généraux – Infrastructures routières – Construction et réparation* (CCDG), latest edition.
  - .2    *Ouvrages routiers, Normes, Tome VII – Matériaux, norme 5101, Armatures pour les ouvrages de béton*, latest edition.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice SP-66.
- .3 Shop Drawings:
  - .1 Submit drawings signed and sealed by professional engineer, member in good standing with the *Ordre des ingénieurs du Québec* (OIQ).
  - .2 Indicate placing of reinforcement and:
    - .1 Bar bending details.
    - .2 Lists.
    - .3 Quantities of reinforcement.
    - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by the Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
    - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
  - .3 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
- .4 Submit rebar datasheets.
  - .1 Submit to the Departmental Representative, the required technical data sheets and the manufacturer's documentation for the wire mesh, galvanized touch-up, and any other necessary products. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits, and the finish.
- .5 Submit proposed supply of reinforcement materials to the Departmental Representative at least two (2) weeks before their delivery on site.
- .6 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review the Departmental Representative prior to its use.

### 1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - *Common Product Requirements* with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements
  - .1 During transport and handling, cover all galvanized components to adequately protect them.

- .2 Store materials off ground, indoors, in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .3 Replace defective or damaged materials with new.
- .4 Waste Management and Disposal
  - .1 Develop Construction Waste Management Plan related to the work of the present section and in accordance with Section 01 74 21 - *Construction/Demolition waste management and disposal*.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Steel bars
  - .1 Reinforcing steel shall be galvanized.
  - .2 Ensure that reinforcing bars are free from dirt, earth, paint, splashes of hardened concrete from previous concrete pours, oil, and free of rust sheets on their surface.
  - .3 Ensure that reinforcing bars to be used are not deformed or twisted.
  - .4 Any replacement of reinforcing steel by different sized bars must be authorized in writing by the Departmental Representative.
  - .5 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
  - .6 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .2 Steel wire:
  - .1 Cold-drawn annealed steel wire ties: to ASTM standard A82/A82M.
  - .2 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.
  - .3 Steel wire used with galvanized reinforcing bars shall be galvanized.
- .3 Steel mesh
  - .1 Mesh must be galvanized.
  - .2 Steel wire used with galvanized wire mesh must also be galvanized.
  - .3 Welded steel wire fabric comply to ASTM A185/A185M.
  - .4 Welded deformed steel wire fabric comply to ASTM A82/A82M.
  - .5 Provide in flat sheets only.
- .4 Galvanizing of non-prestressed reinforcement: minimum galvanization of 87  $\mu\text{m}$  according to CAN/CSA-G164, latest edition, *Hot Dip Galvanizing of Irregularly Shaped Articles*.
- .5 Mechanical splices: subject to approval of the Departmental Representative.



- .6 Plain round bars: to CSA-G40.20/G40.21.

## 2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and with the *Reinforcing Steel Manual of Standard Practice* by the Reinforcing Steel Institute of Canada (RSIC).
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.
- .5 Apply tolerances for length and bending of reinforcing steel as specified in Figure 6.1 of the RSIC *Reinforcing Steel Manual of Standard Practice*.
- .6 Unless otherwise indicated on the drawings and specifications, apply a minimum length of 600 mm overlap between interconnecting bars following work carried out in several distinct phases.

## 2.3 SOURCE QUALITY CONTROL

- .1 Quality control: conform to Section 01 45 00- *Quality Control*.
- .2 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum two (2) weeks prior to beginning reinforcing work.
- .3 Upon request, inform Departmental Representative of proposed source of material to be supplied.

## Part 3 Execution

### 3.1 PREPARATION

- .1 Galvanizing to include chromate treatment.
  - .1 Duration of treatment to be 1 hour per 25 mm of bar diameter.
- .2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

### 3.2 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by the Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
  - .1 Bending: cold bending by machine.

- .3 Replace bars, which develop cracks or splits.

### 3.3 PLACING REINFORCEMENT

- .1 Galvanized reinforcing bar:
  - .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
  - .2 Secure reinforcing steel using steel wire ties to prevent movement during the pouring of concrete:
    - .1 Attach firmly the reinforcing steel at intersections if these intersections are 300 mm or more away or at every two (2) intersections if distance is lesser.
    - .2 In the case of repair works, the reinforcing steel bars are fixed to the formwork ties.
    - .3 To link the reinforcing steel, use annealed steel wire with a diameter of at least 1.6 mm (16 gauge).
    - .4 Fold wires to obtain the same cover as required for reinforcement.
    - .5 Replace existing reinforcing steel whose ties have been altered during the demolition works in their original position. Attach the reinforcement to each formwork tie to meet the required concrete cover and a minimum distance of 25 mm between the reinforcing steel and the concrete to be conserved.
  - .3 Use plastic spacers spaced at a maximum distance of 1,200 mm from center to center, to maintain the reinforcing steel at the required distance from the forms, the ground, or the existing concrete:
    - .1 Use circular plastic spacers whose center is fixed to the reinforcing steel for holding in position the reinforcing steel grids comprising 15 M and 20 M bars.
    - .2 Use plastic spacers to maintain upright the reinforcing steel grids comprising bars sized 25 M or larger.
    - .3 Use continuous wedges with plastic coated wire and coated plastic tabs to keep horizontal the reinforcing steel grid which is closest to the formwork, the ground, or the existing concrete.
    - .4 Unless otherwise indicated in the drawings and specifications, use individual plastic spacers for the horizontal reinforcing steel.
  - .4 During repair work, at the request of the Departmental Representative, add reinforcement if corrosion has thinned the existing reinforcing steel bars enough to reduce the structural capacity of the structure.
    - .1 Install this additional reinforcement to obtain a minimum overlap of 600 mm.
    - .2 If required, demolish concrete to respect this requirement.

- .5 Steel mesh
- .1 The mesh shall be free of dirt, dirt, paint, rust, hardened concrete splash from previous sprayed concrete placement, oil and shall not be deformed or twisted.
  - .2 The mesh shall be securely fixed in the concrete, using mechanically anchored ties or securely attached to existing reinforcements, to avoid displacement when placing the concrete.
  - .3 Steel wire used to bond wire mesh shall be of annealed steel and shall have a diameter no less than 1.6 mm (16 gauge). The steel wire used with galvanized wire mesh must be galvanized. The steel wires shall be folded in such a way as to have the same coating as that required for the lattices they fix.
  - .4 Existing rebar whose fasteners have been altered by demolition work shall be returned to their original position and secured by steel wire tie to each grid anchor.
  - .5 The mesh shall be spaced at least 25 mm from the surface to be covered and shall have a minimum coating of 30 mm. The mesh must overlap a minimum distance of 150 mm.
  - .6 Prior to pouring concrete, obtain Departmental Representative's approval of reinforcing material and placement.
  - .7 Ensure that the integrity of the reinforcement coating is preserved during concrete pouring.

### 3.4 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

### 3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - *Cleaning*.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1      Section 03 10 00 - *Concrete Forming and Accessories*
- .2      Section 03 20 00 - *Concrete Reinforcing*
- .3      Section 03 30 03 – *Concrete Repair*
- .4      Section 03 37 13 – *Shotcrete*

### **1.2                Abbreviations and Acronyms**

- .1      Portland Cement : hydraulic cement, blended hydraulic cement (b suffix - b denotes blended) and Portland-limestone cement.
  - .1      Type GU, GUb and GUL - General use cement.
  - .2      Type MS and MSb - Moderate sulphate-resistant cement.
  - .3      Type MH, MHb and MHL - Moderate heat of hydration cement.
  - .4      Type HE, HEb and HEL - High early-strength cement.
  - .5      Type LH, LHb and LHL - Low heat of hydration cement.
  - .6      Type HS and HSb - High sulphate-resistant cement.
- .2      Fly ash:
  - .1      Type F - with CaO content less than 15 %.
  - .2      Type CI - with CaO content ranging from 15 to 20 %.
  - .3      Type CH - with CaO greater than 20 %.
- .3      GGBFS - Ground, granulated blast-furnace slag.

### **1.3                REFERENCES**

- .1      ASTM International
  - .1      ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2      ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3      ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.
  - .4      ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .5      ASTM D412-06a (2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  - .6      ASTM D624-00 (2007), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

- .7 ASTM D1751-04 (2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .8 ASTM D1752-04a (2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 CSA International
  - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.
  - .3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-installation Meetings: one week (1) prior to the concrete work, convene a meeting in accordance with Section 01 32 16.07 - *Construction Progress Schedules - Bar (GANTT) Chart* and Section 01 31 19 - *Project Meetings*.
  - .1 The Government Representative and a representative of the testing laboratory must be present.
    - .1 Verify project requirements.
    - .2 Examine concrete pouring procedure.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Testing inspection
  - .1 Provide testing inspection results reports for review by the Government Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .3 Concreting
  - .1 Provide the concrete pouring procedure to the Government Representative for approval. This procedure shall describe the proposed method of work.
- .4 Technical specifications and descriptions
  - .1 Submit the required technical and/or descriptive data sheets as well as the manufacturer's documentation of the concrete type, concrete mixing equipment and any other products or equipment required for concreting to the Government Representative. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits, and the finish.

- .5 Unsuccessful concreting registry
  - .1 Provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature, and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .6 Concreting Notice
  - .1 Submit, in writing, a concreting notice at least 24 hours prior to commencement of concreting to the Government Representative.
- .7 Concrete hauling time
  - .1 Provide for review by Government Representative DCC Representative Government Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

## **1.6 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00 - *Quality Control*.
- .2 Provide the Government Representative, minimum two (2) weeks prior to starting concrete work, with a valid and recognized certificate from the plant delivering concrete.
  - .1 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.
- .3 Minimum 2 weeks prior to starting concrete work, provide proposed quality control procedures for review by Government Representative DCC Representative Government Representative on following items:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.
- .4 Quality Control Plan: provide written report to the Government Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- .1 Deliver, store and handle all materials in accordance to Section 01 61 00 – *Common product requirements* and manufacturing instructions.
- .2 Delivery and Acceptance Requirements:

- .1 Do not modify maximum time limit without receipt of prior written agreement from the Government Representative and concrete producer as described in CSA A23.1/A23.2.
- .2 Concrete hauling time: deliver to site of Work and discharged within a maximum of 120 minutes after batching.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .3 Packaging Waste Management
  - .1 Remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## **1.8 SITE CONDITIONS**

- .1 Place concrete while complying with the temperature limits in CAN/CSA-A23.1/A23.2.
- .2 Do not place concrete:
  - .1 In the presence of rain or excessive wind or dust.
  - .2 If the conditions, in the opinion of the Government Representative, seem harmful to concrete.
- .3 Comply with cold weather requirements when the air temperature drops below 5 degrees C or is forecast to drop below 5 degrees C in the 24 hours following the concreting.
- .4 Comply with the warm weather requirements when the air temperature is above 27 degrees C or is forecast to surpass 27 degrees C during concreting.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Alternative 1 - Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

### **2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan
  - .1 Ensure concrete supplier meets performance criteria of concrete as established by the Government Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

### **2.3 MATERIALS**

- .1 Portland Cement: to CSA A3001, Type GU.
- .2 Blended hydraulic cement: Type GUb to CSA A3001.
- .3 Portland-limestone cement: Type GUL to CSA A23.1.

- .4 Supplementary cementing materials : selon la norme CAN/CSA A3001 et selon les exigences suivantes :
  - .1 Remplacement minimal de 15 % de cendres volantes selon la masse des matériaux cimentaires au total.
  - .2 Minimum de 5 % de fumées de silice.
  - .3 Remplacement maximal de 30 % selon la masse des matériaux cimentaires au total.
- .5 Water: to CSA A23.1.
- .6 Aggregates: to CSA A23.1/A23.2.
- .7 Admixtures:
  - .1 Air entraining admixture: to ASTM C260.
  - .2 Chemical admixture: to ASTM C494. Government Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .8 Shrinkage compensating grout: premixed compound consisting of metallic non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
  - .1 Compressive strength: 35 MPa at 28 days.
  - .2 Net shrinkage at 28 days: maximum 0.08 %.
- .9 Non premixed dry pack grout: composition of non metallic aggregate Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 35 MPa at 28 days.
- .10 Post-Tensioning Ducts: to CSA A23.1/A23.2.
- .11 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D1751.
- .12 Weep hole tubes: galvanized steel plastic.
- .13 Polyethylene film: 0.15 mm thickness to CAN/CGSB-51.34.
- .14 Steel reinforcement placement compliant to Section 03 20 00 – *Concrete reinforcing*.

## 2.4 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
  - .2 Provide concrete mix to meet following plastic state requirements:
    - .1 Workability: free of surface blemishes loss of mortar colour variations segregation.
  - .3 Provide concrete mix to meet following hard state requirements:
    - .1 Durability and class of exposure: C-1.
    - .2 Compressive strength at 28 age: 35 MPa minimum.



- .3 Intended application : repair work and barriers.
- .4 Aggregate size: 22 mm maximum.
- .5 Pre-Qualification: air-entraining agent, slump, and temperature results based on the previous use of the proposed mixture.
- .4 Provide quality management plan to ensure verification of concrete quality to specified performance.
- .5 Certification du fournisseur de béton : la centrale de malaxage et les matériaux doivent satisfaire aux exigences de la norme CAN/CSA A23.1.

### **Part 3 Execution**

#### **3.1 FIELD QUALITY CONTROL**

- .1 Require a delivery slip for each concrete load from the concrete supplier and submit a copy of the slip to the Government Representative after each pour. The following information should appear on the slip:
  - .1 Supplier name and address
  - .2 Truck Number
  - .3 Name of Contractor
  - .4 Designation and Location of the Project
  - .5 Concrete class
  - .6 Cumulative Quantity
  - .7 Beginning of unloading
  - .8 End of unloading
  - .9 Maximum aggregate size
  - .10 Air Required
  - .11 Types of Adjuvants Used
  - .12 Quantity and type of cement
  - .13 Water quantity.
- .2 Site tests
  - .1 Conduct tests as follows in accordance with Section 01 45 00 - *Quality Control* and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
    - .1 Concrete pours.
    - .2 Slump.
    - .3 Air content.
    - .4 Compressive strength at 7 and 28 days.
    - .5 Air and concrete temperature.
  - .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by the Government Representative for review to CSA A23.1/A23.2.

- .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and the Government Representative.
- .4 The testing laboratory will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

### **3.2 PREPARATION**

- .1 Obtain Government Representative's written approval before placing concrete.
  - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - *Concrete Reinforcing*.
- .3 During concreting operations
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete will not be permitted is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Government Representative approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Protect previous Work from staining.
- .8 Clean and remove stains prior to application for concrete finishes.
- .9 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
  - .1 Place steel dowels of deformed steel reinforcing bars and pack solidly with shrinkage compensating grout epoxy grout to anchor and hold dowels in positions as indicated.
- .11 Do not place load upon new concrete until authorized by Government Representative.
- .12 Immediately before placing concrete, properly water the substrate with clean water.

### **3.3 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Sleeves and inserts

- .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, except where indicated or approved by the Government Representative.
  - .2 Where approved by the Government Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
  - .3 Sleeves and openings greater than 100 x 100 mm not indicated must be reviewed by the Government Representative.
  - .4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from the Government Representative before placing of concrete.
  - .5 Confirm locations and sizes of sleeves and openings shown on drawings.
  - .6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
- .3 Anchor bolts
- .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
  - .2 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from the Government Representative.
    - .1 Formed holes: 100 mm minimum diameter.
    - .2 The diameter of the drilled holes after the concrete has set must comply with the manufacturer's recommendations.
  - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
  - .4 Set bolts and fill holes with shrinkage compensating grout epoxy grout.
  - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:
- .1 Form weep holes and drainage holes in accordance with Section 03 10 00 - *Concrete Forming and Accessories*. If wood forms are used, remove them after concrete has set.
  - .2 Install weep hole tubes and drains as indicated.
- .5 Finishing and curing:
- .1 Finish concrete to CSA A23.1/A23.2.
  - .2 Use procedures as reviewed by the Government Representative to remove excess bleed water. Ensure surface is not damaged.
  - .3 Finishing:
    - .1 Sidewalks : broom finish.
    - .2 Repairs to soffits, abutments, and retaining walls: rough finish.
    - .3 Approach slabs: rough finish.
    - .4 Elsewhere: smooth finish.

- .6 Joint fillers:
  - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by the Government Representative.
  - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
  - .3 Locate and form isolation construction expansion joints as indicated.
  - .4 Install joint filler.
- .7 Crack initiation
  - .1 Saw cut required by drawings shall be carried out as soon as feasible without loosening aggregates or causing spalling when the concrete has begun to harden, but before the stresses produced by shrinkage have caused irregular cracks.
  - .2 Saw cut shall be rectilinear. It shall not deviate by more than 6 mm over a length of 3 m. Immediately after sawing, the groove produced and the surface of the concrete lining must be cleaned of any sawdust or debris.

### 3.4 SURFACE TOLERANCE

- .1 S'assurer que les surfaces soient lisses, continues et uniformes.

### 3.5 CAST-IN-PLACE CONCRETE CURING

- .1 The concrete cure installed must be done so in accordance with the following requirements in addition to the curing requirements of CAN / CSA-A23.1 / A23.2.
- .2 Cure of non-enclosed concrete surfaces: Absorbent water-absorbent cloth
  - .1 Install water-saturated synthetic fiber webs on sufficiently hardened concrete surfaces to prevent surface damage and then cover with impermeable sheets to maintain moisture on the surface of the concrete.
  - .2 Overlap each sheet by a minimum of 75 mm and secure against wind movement.
  - .3 Maintain absorbent webs in place and keep them moist so that there is a thin layer of water on the surface of the concrete throughout the cure, for a period of seven (7) days thereafter concreting.
- .3 Concrete surface curing :
  - .1 No additional curing is required if the formwork is left in place for seven (7) days or more.
  - .2 If the formwork is removed within seven (7) days, wetted water-absorbent cloths or membrane curing materials shall be applied immediately to the stripped surfaces and maintained for a seven (7) day period in accordance with Section 03 10 00 - *Concrete Form and Accessories*.
- .4 During the curing period, only the areas requiring finishing treatment can be uncovered. All other surfaces shall remain covered.

### 3.6 PROTECTION

- .1 Concrete work in Annex 1 (Tome VII, Chapter 3) may be carried out in cold weather and may require shelter, heating, or thermal insulation.
- .2 The temperature of the plastic concrete at the time of installation shall comply with the requirements of Standard 3101 of the Ministère des Transports du Québec as set out in Annex 1, *Normal Density Concretes*.
- .3 Assume the heating of the shelter to comply with the requirements of this section and with the requirements of CSA Standard A23.1 / A23.2, Constituents and performance of work/test methods and standardized practices for concrete, relative to the temperatures of the materials adjacent to the repairs during the concreting, to the constituents of the concrete and to the temperature during curing.
- .4 Maintain a minimum temperature of 10 ° C on concrete surfaces for a minimum of seven (7) consecutive days following concreting.
  - .1 Extend protection period until concrete reaches 70% of required compressive strength at twenty-eight (28) days.
- .5 After the protection period, lower the concrete temperature gradually for the first twenty-four (24) hours.
  - .1 The rate of decrease in temperature shall not exceed 10 ° C / hour.
  - .2 Do not allow concrete to encounter exterior air if the temperature if the difference between the concrete and the outside air is greater than 20 ° C.
- .6 Concrete curing requirements apply regardless of the type of protection installed.
- .7 Any concrete that has frozen is not paid and is rejected. The part of the structure constructed with this concrete is deemed to be defective and must be reconstructed per the plans and specifications at the Contractor's cost.
- .8 Existing concrete, frames and formwork
  - .1 The use of sodium chloride or calcium chloride as a de-icing agent is prohibited.
  - .2 In the case of open air concreting, all surfaces (existing concrete, reinforcement, formwork, etc.) with which the plastic concrete comes into contact must be pre-heated to a minimum temperature of 5 ° C until concreting.
- .9 In the case of concreting under cover, heat and maintain the contact surfaces at a temperature between 5 ° C and 20 ° C for a period of at least 24 hours prior to concreting.
- .10 Keep shuttering in place for the entire duration of protection and maintain enclosed areas at a temperature of 5 ° C and 20 ° C for
- .11 Types of protection
  - .1 Insulation
    - .1 Use an insulating material to cover the surface of plastic concrete.
      - .1 Each layer of insulating material shall be of the waterproof cover type made from a closed cell foam plate and have an RSI thermal resistance of 0.40.

- .2 On the day before concreting, have the Government Representative approve the number of layers of insulating material to be laid.
  - .1 Depending on the temperature of the concrete during the protection period, the Government Representative may require to reduce or increase the number of layers; the removal or addition of a layer shall be completed within three (3) hours following the Government Representative's request.
  - .3 Ensure insulation is installed in such a way that it prevents exposure of concrete surfaces to outside air throughout the duration of protection.
  - .4 Seams of insulating covers shall have an overlap of at least 75 mm.
  - .5 Insulation shall be paid to the insulation item.
- .2 Temporary Shelters
  - .1 Build protective shelters to enclose structures.
  - .2 Prepare and submit the plan for the construction of the protective shelter at least two (2) weeks prior to commencing concreting under these shelters.
  - .3 Make the shelter to cover the surfaces of the work to be concreted with canvas and tarpaulins.
    - .1 These covers shall be leakproof, resistant and secured so as not to be moved during the period of protection.
  - .4 Ensure that the shelter is of sufficient height and size to allow indoor placement, concrete placement (cast or cast), concrete finish and curing.
  - .5 Shelter shall be paid to the temporary shelter item.

### 3.7 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Keep the area clean at the end of each workday.
- .2 Final cleaning: Evacuate surplus materials / materials, waste, tools, and equipment from the site in accordance to section 01 74 11 – *Cleaning*.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .1 Prepare a Waste Reduction Workplan (WRW) according to Section 01 74 21 – *Construction/Demolition Waste Management and Disposal*.
  - .2 Divert unused concrete materials from landfill to local quarry facility after receipt of written approval from the Government Representative.
  - .3 Remove bins and recycling trolleys from site and dispose of materials at appropriate facilities.
  - .4 Provide appropriate area on job site where concrete trucks and be safely washed.
  - .5 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Government Representative.

- .6 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .7 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .8 Using appropriate safety precautions, collect liquid, or solidify liquid with inert, non-combustible material and remove for disposal.
- .9 Dispose of waste in accordance with applicable local, Provincial/Territorial, and National regulations.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1      Section 02 41 99 – *Demolition for Minor Works*
- .2      Section 03 10 00 – *Concrete Forming and Accessories*
- .3      Section 03 20 00 – *Concrete Reinforcing*
- .4      Section 03 30 00 – *Cast-in-place Concrete*

### **1.2                REFERENCES**

- .1      Unless otherwise indicated, execute all concrete repair works in accordance with the requirements of the following standards:
  - .1      CSA International:
    - .1      CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
    - .2      CAN/CSA-269.1-1975 (R1998), Falsework for Construction Purposes.
    - .3      CAN/CSA-S269.3-M92 (R2013), Concrete Formwork.
    - .4      CAN/CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
    - .5      CAN/CSA G30.3-M1983 (R1998), Cold-Drawn Steel Wire for Concrete Reinforcement.
    - .6      CAN/CSA-G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.
    - .7      CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .2      American Concrete Institute:
    - .1      ACI 304.2R-96, Placing Concrete by Pumping Methods.
    - .2      ACI 546.1.R-80, Guide to Repair of Concrete Bridge Superstructures.
  - .3      ASTM International
    - .1      ASTM E488/E488M-10, Standard Test Methods for Strength of Anchors in Concrete Elements.
  - .4      Ministère des Transports du Québec :
    - .1      Liste des matériaux relatifs au béton éprouvés par le laboratoire des chaussées, 2012.
    - .2      Cahier des charges et devis généraux, Infrastructures routières, Construction et réparation, Édition 2013, Gouvernement du Québec.
    - .3      Normes Ouvrages routiers, Tome VII, Matériaux, Gouvernement du Québec.



### 1.3 DOCUMENTS/SAMPLES REQUIRED

- .1 Submit the documents and samples required under section 01 33 00, *Documents and Samples*.
- .2 Shop Drawings
  - .1 Submit to the Departmental Representative, for inspection, the required shop drawings, signed by a qualified engineer, a member of the *Ordre des ingénieurs du Québec*. The drawings shall illustrate the proposed work method.
- .3 Submit Technical and Descriptive Sheets
  - .1 Submit to the Departmental Representative the required technical and / or descriptive data sheets and the manufacturer's documentation for concrete repair work. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits, and the finish.
- .4 Submit work procedure, shop drawings, technical specifications, and other demolition documents in accordance with Section 02 41 99 - Demolition - Small Work.
- .5 Submit work procedure, shop drawings, technical specifications and any other documents relating to concrete formwork, in accordance with Section 03 10 00 - *Concrete Forms and Accessories*.
- .6 Submit work procedure, shop drawings, technical specifications and other documents relating to the work of the reinforcement laying, in accordance with Section 03 20 00 - *Concrete Reinforcing*.
- .7 Submit work procedure, shop drawings, technical specifications and any other documents relating to in-place concrete work in accordance with Section 03 30 00 – *Cast-in-place Concrete*.
- .8 Submit procedure for crack injection.
  - .1 Provide a work plan for the injection of the cracks, including a detailed description of the products and the proposed injection method. Include technical data sheets of the products and materials, the make and model number of the pressure gauge, including a certificate of calibration dated no more than 12 months prior to the date of the repair works.

### 1.4 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with section 01 45 00 – *Quality Control*.
- .2 Demolition work in accordance to Section 02 41 99 – *Demolition for minor works*.
- .3 Concrete forming work in accordance to Section 03 10 00 - *Concrete forming and accessories*.
- .4 Rebar work in accordance to Section 03 20 00 - *Concrete reinforcing*.
- .5 Concrete work in accordance to Section 03 30 00 - *Cast-in-place concrete*.
- .6 Chemical Anchors:

- .1 Before beginning the installation of chemical anchoring, install three (3) dowels for chemical anchors in areas designated by the Departmental Representative.
- .2 Perform pull tests on the dowels in accordance with ASTM E488 in the presence of the Departmental Representative.
- .3 If the pullout capacity of the dowels is less than the elastic limit shown on the plans, modify the anchoring method and redo the dowel pull tests on new dowels.
- .4 Repair all concrete surfaces damaged during the pull tests.

## **1.5 SITE CONDITIONS**

- .1 For demolition work refer to Section 02 41 99 – *Demolition for minor works*.
- .2 For formwork refer to Section 03 10 00 - *Concrete forming and accessories*.
- .3 For reinforcement bar placement refer to Section 03 20 00 - *Concrete reinforcing*.
- .4 For cast-in-place concrete refer to Section 03 30 00 - *Cast-in-place concrete*.
- .5 Crack injection should not be performed when the concrete temperature is lower than 15 °C or above 30 °C.

## **1.6 TRANSPORT, STORAGE, AND HANDLING**

- .1 For demolition work refer to Section 02 41 99 – *Demolition for minor works*.
- .2 For formwork refer to Section 03 10 00 - *Concrete forming and accessories*.
- .3 For reinforcement bar placement refer to Section 03 20 00 - *Concrete reinforcing*.
- .4 For cast-in-place concrete refer to Section 03 30 00 - *Cast-in-place concrete*.

## **Part 2 Products**

### **2.1 MATERIALS AND EQUIPMENT**

- .1 For demolition work refer to Section 02 41 99 – *Demolition for minor works*.
- .2 For formwork refer to Section 03 10 00 - *Concrete forming and accessories*.
- .3 For cast-in-place concrete refer to Section 03 30 00 - *Cast-in-place concrete*.
- .4 Grout
  - .1 Portland cement: to CAN/CSA-A3000 standard, GU type.
  - .2 Water: to CSA-A23.1.
  - .3 Aggregates: to CSA-A23.1/A23.2.
  - .4 Dry Unmixed Grout: product containing Portland cement with non-metallic aggregate and sufficient water to be able to hold its shape when made into a ball with one's hands, and able to reach a compressive strength of 35 MPa in 28 days.
- .5 Binding Agent (adhesive):
  - .1 Binding agent (adhesive) on the surface of existing concrete before pouring: slurry composed of latex, cement, and water mixed in the following proportions:

- .1 3 kg of cement, GU type
  - .2 7.5 liters of latex
  - .3 About 2.5 liters of water to obtain a creamy consistency.
- .6 Chemical Anchors:
- .1 Provide dowels in accordance to Section 03 20 00- *Concrete reinforcing*.
  - .2 Use a two-component injectable adhesive for installation of all reinforcing dowels in the existing concrete.
  - .3 Use only recommended distributors and mixing nozzles.
  - .4 Included in the “Dowel Adhesives” list of the “Designated Sources for Materials” document published by the Ministry of Transportation of Ontario and available on “The Road Authority” website.

### **Part 3 Execution**

#### **3.1 GENERALITIES**

- .1 Before commencing work, the Departmental Representative will determine and delineate, in the presence of the Contractor, the concrete to be demolished.
- .2 Provide the Departmental Representative with all necessary safety equipment to allow him/her to identify the areas to be demolished and to inspect the affected surfaces.
- .3 Remove and replace any damaged or defective concrete by concrete that meets the requirements of the plans and specifications and as directed by the Departmental Representative.
- .4 Following the removal of formwork, the Departmental Representative shall examine voids, honeycomb cracking and other defects. Submit repair procedures for voids, honeycomb cracking or other defects, if applicable, to the Departmental Representative for approval. Do not perform surface corrections until authorized by the Departmental Representative.
- .5 Carry out work in accordance with Section 01 35 43 – *Environmental procedures*.

#### **3.2 CONCRETE DEMOLITION**

- .1 Carry out work in accordance with Section 02 41 99 – *Demolition for minor works*.

#### **3.3 REBARS/DOWELS**

- .1 Carry out work in accordance with Section 03 20 00 - *Concrete reinforcing*.

#### **3.4 CHEMICAL ANCHORS**

- .1 Unless otherwise indicated in the plans and specifications, the drill hole characteristics for anchoring are as follows:
  - .1 Drill holes to depths required by the manufacturer of the chemical anchoring adhesive for the elastic limit set out plans for a concrete of 35 MPa.

- .2 Minimum depth of holes: 200 mm.
- .3 Drill holes on vertical surfaces inclined at 15 ° to the horizontal, below the orifice.
- .2 Brush holes to a clean state and blow using a compressed air jet just before the injection of the chemical anchoring adhesive. Insert the air jet hose to the bottom of the hole.
- .3 Inject the chemical anchoring adhesive in the hole. Inject an amount sufficient to completely fill the space between the dowel and the hole over the entire length of the hole.
- .4 Insert a clean dowel free of any grease into the bottom of the hole.
- .5 Prevent disturbance of the dowel during the curing period.

### **3.5 SURFACE PREPARATION**

- .1 The exposed surfaces shall be clean and free from loose and friable particles in accordance with Section 02 41 99 – *Demolition for minor works*.
- .2 The Departmental Representative shall approve the exposed surfaces before the beginning of the pouring of concrete.
- .3 Keep the surfaces wet for a period of at least 8 hours before the pouring of the concrete and remove all accumulations of water. Surfaces must be superficially dry before the pour.

### **3.6 BONDING AGENT APPLICATION**

- .1 On the areas required by the Departmental Representative, the bond between the old and new concrete must be improved by the application of the described bonding agent. If the bonding agent is dry at the moment of the pour, the surface must be cleaned again with a water jet and a new coat of bonding agent must be applied.

### **3.7 REPAIR WITHOUT OVERLAY**

- .1 Carry out demolition work in accordance with Section 02 41 99 - *Demolition for minor works*. and the following indications:
  - .1 Unless otherwise specified, concrete surfaces to be repaired with formwork without overlay shall be demolished to a minimum depth of 100 mm; All non-sound concrete located beyond this depth shall be removed. The exposed frame shall have a 25 mm clearance.
- .2 Perform shuttering and concrete work in accordance with Sections 03 10 00 - *Concrete Forms and Accessories*, 03 30 00 - *Cast-in-Place Concrete* and the following:
  - .1 Between October 15 and November 1, XIV-C type concrete shall replace Type XIV-R concrete.
- .3 Carry out reinforcement work in accordance with Section 03 20 00 - *Concrete reinforcement* and anchorage in accordance with sub section 3 of the present Section.

### 3.8 CONCRETE FABRICATION

- .1 Carry out cast-in-place concreting work in accordance with Section 03 30 00 - *Cast-in-place concrete*.
- .2 Provide V-S type concrete (35 MPa) in accordance with the plans and specifications of Standard 3101 "Normal Mass Concrete" of the Ministère des Transports du Québec
- .3 For each load of concrete, the concrete supplier must provide the Departmental Representative with a copy of the delivery slip. The following information will appear on the slip:
  - .1 Company name and address of the supplier
  - .2 Truck number
  - .3 Name of the Contractor
  - .4 Name and location of project
  - .5 Concrete class
  - .6 Cumulative quantity
  - .7 Unloading start time
  - .8 Unloading end time
  - .9 Maximum size of aggregate
  - .10 Required air content
  - .11 Types of additives used
  - .12 Amount and type of cement
  - .13 Amount of water.
- .4 Comply with indications of section 20 of CSA-A23.1-M90 standard regarding construction joints. Execute shear keys on the entire length of any construction joint. Those keys shall have a width equal to one-third of the section thickness and a depth equal to one-sixth of that thickness, to a maximum of 100 mm. Slightly bevel sides of shear keys.
- .5 Element finishing, in accordance with Section 03 30 00 - *Cast-in-place concrete*.
- .6 Element curing, in accordance with Section 03 30 00 - *Cast-in-place concrete*.

### 3.9 WINTER CONDITIONS

- .1 Carry out work in accordance with Section 03 30 00 - *Cast-in-place concrete* and/or Section 03 37 13 – *Shotcrete*.

### 3.10 CLEANING

- .1 Clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Keep the area clean at the end of each workday.
- .2 Final cleaning: Evacuate surplus materials / materials, waste, tools, and equipment from the site in accordance to section 01 74 11 – *Cleaning*.

- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .1 Prepare a Waste Reduction Workplan (WRW) according to Section 01 74 21 – *Construction/Demolition Waste Management and Disposal*.
  - .2 Divert unused concrete materials from landfill to local quarry facility after receipt of written approval from the Departmental Representative.
  - .3 Remove bins and recycling trolleys from site and dispose of materials at appropriate facilities.
  - .4 Provide appropriate area on job site where concrete trucks can be safely washed.
  - .5 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collection site as approved by the Departmental Representative.
  - .6 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
  - .7 Prevent admixtures and additive materials from entering drinking water supplies or streams.
  - .8 Using appropriate safety precautions, collect liquid, or solidify liquid with inert, non-combustible material and remove for disposal.
  - .9 Dispose of waste in accordance with applicable local, Provincial/Territorial, and National regulations.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1        Section 03 10 00 – *Concrete Forming and Accessories*
- .2        Section 03 20 00 – *Concrete reinforcing.*
- .3        Section 03 30 00 – *Cast-in-place concrete.*

### **1.2                DEFINITIONS**

- .1        Two (2) basic shotcreting processes are:
  - .1        Dry mix process where mix water is added at nozzle.
  - .2        Wet mix process where mix water is added before concrete enters delivery hose, and compressed air is added at nozzle.
- .2        Overspray: shotcrete material deposited away from intended receiving surface.
- .3        Irregularity: Positive or convex elevation from the surface with respect to a straight line between two points of contact.
- .4        Depression: Negative or concave displacement from the surface from a straight line between two points of contact.
- .5        Maximum variance under the ( $\Delta H$ ) rule: Maximum distance between the surface of the covering and the lower edge of the rule laid on the surface of the roadway.

### **1.3                REFERENCE STANDARDS**

- .1        American Concrete Institute (ACI)
  - .1        ACI 506R-[05], Guide to Shotcrete.
  - .2        ACI 506.2-[95], Specification for Shotcrete.
  - .3        ACI Certified Shotcrete Nozzleman.
- .2        ASTM International
  - .1        ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2        ASTM C42/C42M-[10], Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - .3        ASTM C618-[08a], Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
  - .4        ASTM C642-[06], Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
  - .5        ASTM C1116-[10], Standard Specification for Fibre-Reinforced Concrete.
  - .6        ASTM C1202-[10], Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-3.3-2007, Kerosene.
- .4 CSA International
  - .1 CSA A23.1/A23.2-F09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

#### **1.4 ADMINISTRATIVE PROCEDURES**

- .1 Pre-implementation meeting: one (1) week prior to beginning concreting, hold meeting in accordance with Sections 01 32 16.07 - *Construction Progress Schedule - Bar (ganttt) Chart* and 01 31 19 – *Project Meetings*.
- .2 Ensure that the Government Representative and the Test Laboratory representative are present.
  - .1 Check job requirements.
  - .2 Examine concreting procedure.

#### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Testing inspection
  - .1 Provide testing inspection results reports for review by the Government Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .3 Concreting
  - .1 Provide the concrete pouring procedure to the Government Representative for approval. This procedure shall describe the proposed method of work.
- .4 Shop drawings
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Ordres des ingénieurs du Québec (OIQ).
- .5 Technical specifications and descriptions
  - .1 Submit the required technical and/or descriptive data sheets as well as the manufacturer's documentation of the concrete type, concrete mixing equipment and any other products or equipment required for concreting to the Government Representative. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the limits, and the finish.
- .6 Documents/Samples to be submitted for sustainable design in accordance with Section 01 74 21 - *Construction / Demolition Waste Management and Disposal*.
  - .1 Construction Waste Management
    - .1 Submit waste reduction plan established for the project which shall specify the recycling and recovery requirements.
  - .2 Recycled content (recycled content)



- .1 Where applicable, provide documentation certifying the percentage of cementitious admixtures used to replace the cement in preparation for the asphalt binder.
- .7 Certification of projector operators
  - .1 Submit projector launch operator certification seven (7) days prior to beginning shotcreting.
- .8 Concreting Notice
  - .1 Submit, in writing, a concreting notice at least 24 hours prior to commencement of concreting to the Government Representative.
- .9 Concrete hauling time
  - .1 Provide for review by Government Representative DCC Representative Government Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

## 1.6 QUALIFICATIONS

- .1 Use operators of equipment for mixing and application of shotcrete experienced in process to be used.
- .2 Operators: qualified to perform work to ACI 506R.
- .3 Foremen: minimum two (2) years experience as ACI Certified Shotcrete Nozzleman.
- .4 ACI Certified Shotcrete Nozzleman: minimum six (6) months experience on similar applications.

## 1.7 QUALITY CONTROL

- .1 Quality Assurance in accordance with Section 01 45 00 - *Quality Control*.
- .2 The tests and samples performed during the work and the results obtained shall be approved in accordance with ACI 506.2 and as required by the Government Representative.
- .3 Carry out sample panels in accordance with ACI 506 and Submit samples in accordance with Section 01 33 00- *Submittal procedures*.
  - .1 Cover concrete with a sample panel for each projection angle proposed and for each concrete mix prepared for the work. Each applicator hired as part of the work must submit this series of samples.
  - .2 Provide three (3) core samples from each sample panel to the test lab designated by the Government Representative.
  - .3 Ensure curing of sample panels on site is in accordance with ACI 506.2.
- .4 Remove and replace sprayed concrete where there are depressions, segregation, honeycomb cracking, leafage, dry areas, clods, voids, pockets or sand as directed by the Government Representative.
- .5 Submit a valid and recognized certificate issued by the concrete plant to the Government Representative, at least two (2) weeks prior to commencement of concreting,

- .1 Provide test data and certification from a recognized and independent testing and inspection laboratory confirming that the materials used in the production as well as the dosage formula conform to the specifications.
- .6 Submit to the Government Representative, proposed methods for quality control of the following aspects at least two (2) weeks prior to commencing concrete work:
  - .1 Erection of temporary shoring structures.
  - .2 Hot weather concreting.
  - .3 Cold weather concreting.
  - .4 Cure.
  - .5 Finish.
  - .6 Stripping.
  - .7 Joint execution.

## **1.8 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and with Section 01 61 00- *Common Product Requirements*.
- .2 Delivery and Acceptance
  - .1 Transport time: Concrete shall be delivered to the site and discharged within 120 minutes of mixing.
    - .1 Any changes to the maximum transport time, if applicable, must be accepted in writing by the Government Representative and the concrete producer as per CAN / CSA A23.1 / A23.2.
    - .2 Variances must be submitted to the Government Representative for review.
  - .2 Concrete delivery: Ensure that the concrete plant ensures continuous delivery of concrete in accordance with CAN / CSA A23.1 / A23.2.
- .3 Management of Packaging Waste
  - .1 Recover packaging waste for reuse / reuse of pallets, crates, padding and other packaging materials in accordance with Section 01 74 21 - *Construction / Demolition Waste Management and Disposal*.

## **1.9 SITE CONDITIONS**

- .1 Place concrete in compliance with limit values in accordance with CAN / CSA-A23.1 / A23.2.
- .2 Do not install concrete:
  - .1 In case of precipitation, excess wind, or dust.
  - .2 Where conditions, as concluded by the Government Representative, appear to be detrimental to concrete.
- .3 Comply with cold weather concreting requirements when ambient temperature is below 5 ° C or where ambient temperature is likely to fall to less than 5 ° C within 24 hours of placing concrete.

- .4 Comply with hot weather concreting requirements when the ambient temperature is 27 ° C or higher or when it is likely to exceed 27 ° C during concreting.

**Part 2 Products**

**2.1 CALCULATIONS CRITERIA**

- .1 In accordance to CAN / CSA A23.1 / A23.2 and the specifications of the DOSAGE FORMS in PART 2 - PRODUCTS.

**2.2 PERFORMANCE CRITERIA**

- .1 Quality Control Plan
  - .1 Ensure that the concrete supplier can provide concrete that meets the performance criteria established by the Government Representative and provide for a material conformity check in accordance with the requirements of QUALITY CONTROL from Part 1.

**2.3 MATERIALS**

- .1 Concrete mixes and materials: in accordance with Section 03 30 00- Cast-in-Place Concrete and as specified below.
  - .1 Shotcrete aggregate gradation: to CSA A23.1/A23.2 and within limits specified.

Sieve Size	% Passing (by mass)
	Fine Aggregate 1
10 mm	100
5 mm	95-100
2.5 mm	80-100
1.25 mm	50-90
0.630 mm	25-65
0.315 mm	10-35
0.160 mm	2-10
0.080 mm	0-3

- .2 Silica fume: to be from production of silicon or ferro-silicon alloys containing at least 75 % silicon.
- .3 Fly ash: to ASTM C618.
- .4 Use of admixtures subject to approval of the Government Representative.
- .5 Do not use calcium chloride or compounds containing calcium chloride.
- .6 Water: to CSA A23.1/A23.2.
- .2 Reinforcing steel: in accordance with Section 03 20 00- Concrete Reinforcing.
- .3 Steel anchors, supports and spacers: galvanized to ASTM A123/A123M.
- .4 Kerosene: to CAN/CGSB-3.3.
- .5 Shotcrete equipment for dry mix process to ACI 506R.

- .6 Batching equipment to proportion aggregate and cement mixtures on mass basis or by integral cement bag count and sand measured on volume basis.
- .7 Use air supply system that delivers air uncontaminated by oil and capable of maintaining constant air pressure.
- .8 Provide separate air hose and blow pipe, capable of simultaneous operation with shotcreting operation, for removal of rebound and dust.
- .9 Equipment subject to approval of the Government Representative.
  - .1 Maintain equipment in proper working order.
  - .2 Provide additional test panels and test cores as required by the Government Representative to demonstrate that equipment is functioning properly during shotcreting operation, in accordance with Section 01 33 00- *Submittal Procedures*.
- .10 A rigid aluminum ruler 3 m in length shall be provided by the Contractor and made available to the Government Representative for the duration of the work. The ruler must meet the following criteria:
  - .1 Length: 3000 mm  $\pm$  3 mm;
  - .2 The section of the rule shall be rectangular:
    - .1 Width of 25 mm  $\pm$  1 mm;
    - .2 Height greater than 50 mm;
  - .3 The ruler shall be rigid so that when it's supported on its ends, its measuring face does not deviate at any point by more than  $\pm$  0.5 mm from a true plane;
  - .4 The ruler shall be rectilinear over its entire length and, with respect to a straight line, shall not have a

## 2.4 MIXES

- .1 Proportion concrete for wet process shotcrete to: CSA A23.1/A23.2, and give following properties:
  - .1 Use type GU with silica fume, Gub-SF or GUb-S/SF.
  - .2 Silica fume: content maximum 15% by mass of cement content.
  - .3 Minimum compressive strength in place as determined from cores taken from test panels to ASTM C42/C42M:
    - .1 35 MPa at 28 days.
  - .4 Minimum cement content: 410 kg / m<sup>3</sup>.
  - .5 Minimum water/cementitious materials ratio: 0.40.
  - .6 Air content in hardened concrete: 3.5 to 7%.
  - .7 Measured air content at exit of mixer truck (after addition of superplasticizer, if applicable): 10 to 15%
  - .8 Minimum fiber mass (in accordance with MTQ Standard 3301, Volume 7): 0.9 kg / m<sup>3</sup>. Minimum cement content: ratio of cement to aggregate to be 1 to [4]by mass.

### **Part 3 Execution**

#### **3.1 SOURCE QUALITY CONTROL**

- .1 Require a delivery slip for each concrete load from the concrete supplier and submit a copy of the slip to the Government Representative after each concreting. The following information should appear on the slip:
  - .1 Supplier name and address
  - .2 Truck Number
  - .3 Name of Contractor
  - .4 Designation and location of project
  - .5 Concrete class
  - .6 Cumulative Quantity
  - .7 Beginning of unloading
  - .8 End of unloading
  - .9 Maximum aggregate size
  - .10 Air Required
  - .11 Types of Adjuvants Used
  - .12 Quantity and type of cement
  - .13 Water quantity

#### **3.2 PREPARATION**

- .1 Obtain written authorization from Government Representative prior to concrete placement.
  - .1 Provide at least 24 hours notice of concreting.
- .2 Place reinforcements in accordance with Section 03 20 00 - Concrete reinforcements.
- .3 Prepare surfaces for shotcreting to ACI 506R.
- .4 Remove unsound concrete with equipment approved by the Government Representative. Remove only in areas and to depths as directed by the Government Representative.
- .5 After acceptance of surface by the Government Representative, water blast surfaces including existing reinforcing steel. Remove dirt, grease, oil, or other substances which would interfere with bond of newly placed shotcrete.
- .6 Air blast and water blast surfaces just prior to application of shotcrete.
- .7 Respect the following instructions during concrete work:
  - .1 No joints are to be made.
  - .2 Ensure that concrete is transported and handled in a manner that minimizes interference during installation and does not cause damage to existing structures or structures.
- .8 Pumping of concrete will only be permitted once the materials and dosage formulas are approved.
- .9 Ensure that rebars and embedded parts are not moved during concrete placement.

- .10 Prior to pouring concrete, obtain approval from the Government Representative for the proposed method of protecting concrete during installation and curing in bad weather.
- .11 Protect existing structures from dirt.
- .12 Clean concrete surfaces and remove stains before applying finish.
- .13 Keep a record of the concreting work, indicating precisely the date and location of each mix, concrete characteristics, ambient temperature, and samples taken.

### 3.3 APPLICATION

- .1 Projection
  - .1 Apply shotcrete to prepared surfaces to ACI 506R.
  - .2 Do not apply shotcrete to surface having running or free standing water.
  - .3 Do not apply shotcrete in high winds, when temperature is below 5 degrees C or when it is raining.
  - .4 Apply shotcrete to build concrete surface to finished lines. Acceptable minus tolerance of finished surfaces is 25 mm. Provide minimum cover of 50 mm over steel reinforcement.
  - .5 Use depth gauges in accordance with ACI 506R as guide to obtain correct thickness of shotcrete.
  - .6 Do not screed surface of shotcrete.
  - .7 Protect adjacent surfaces from shotcrete and rebound during operations and clean up material deposited.
  - .8 During application continuously remove rebound from surfaces.
  - .9 Do not reuse rebound or overspray material.
- .2 Finish
  - .1 Finish concrete surfaces in accordance with CAN / CSA A23.1 / A23.2.
  - .2 Use methods reviewed to the satisfaction of the Government Representative to remove excess bleed water. Be careful not to damage the surfaces of the concrete elements.
  - .3 Finish:
    - .1 Sidewalk: swept finish.
    - .2 Repairs to soffits, abutments and retaining walls: rough finish.
    - .3 Approach tiles: rough finish.
    - .4 Other: smooth finish.
- .3 Crack initiation
  - .1 Saw cut required on drawings shall be carried out as soon as practicable without loosening aggregates or causing spalling when the concrete has begun to harden, but before the stresses produced by shrinkage have caused irregular cracks.
  - .2 Saw line must be rectilinear. It must not deviate by more than 6 mm over a length of 3 m. Immediately after sawing, the groove produced and the surface of the concrete lining must be cleaned of any sawdust or debris.

### **3.4 APPLICATION TOLERANCE**

- .1 Measurement of Irregularities and Depressions
  - .1 Measure the maximum elevation of the profile of the projected concrete surface between two points of contact using a 3 m rule. The rule can be placed in all directions to get the maximum difference in level. Take at least two readings where the maximum elevation has been localized.
  - .2 Maximum height difference must not exceed 10 mm on 3 m.

### **3.5 SHOTCRETE CURE**

- .1 Provide curing and protection of finished surfaces in accordance with ACI 506.2.
- .2 Apply two (2) coats of protective coating containing 50% boiled linseed oil and 50% kerosene, measured in volume.
- .3 The first coat should be applied at 135 mL / m<sup>2</sup> and the second at 90 mL / m<sup>2</sup>.
- .4 Apply protective coating when surfaces are dry and clean and temperature is above 10 degrees Celsius.
  - .1 Wait for the first coat to dry completely before applying the second coat.

### **3.6 COLD WEATHER PROTECTION**

- .1 Concrete work in Annex 1 (Tome VII, Chapter 3) may be carried out in cold weather and may require shelter, heating, or thermal insulation.
- .2 The temperature of the plastic concrete at the time of installation shall comply with the requirements of Standard 3101 of the Ministère des Transports du Québec as set out in Schedule 1, *Normal Density Concretes*.
- .3 Assume the heating of the shelter to comply with the requirements of this section and the requirements of CSA Standard A23.1 / A23.2, *Constituents and Performance of Work / Test Methods and Standardized Practices for Concrete, Relative to the temperatures of the materials adjacent to the repairs during the concreting, to the constituents of the concrete and to the temperature during the curing of the concrete*.
- .4 Maintain a minimum temperature of 10 ° C on concrete surfaces for a minimum of seven (7) consecutive days following concreting.
  - .1 Extend protection period until concrete reaches 70% of required compressive strength at twenty-eight (28) days.
- .5 After the protection period, lower the concrete temperature gradually for the first twenty-four (24) hours.
  - .1 The rate of decrease in temperature should not exceed 10 ° C/hour.
  - .2 Do not allow concrete to encounter outside air if the temperature difference between the concrete and the outside air is greater than 20 ° C.
- .6 Concrete curing requirements apply regardless of the type of protection installed.
- .7 Any concrete that has frozen is not paid and is rejected. The part of the structure constructed with this concrete is deemed to be defective and must be remade per the plans and specifications at the expense of the Contractor.

- .8 Existing concrete, frames and formwork
  - .1 The use of sodium chloride or calcium chloride as a de-icing agent is prohibited.
  - .2 In the case of concreting in the open air, all surfaces (existing concrete, reinforcement, formwork, etc.) with which the plastic concrete meets must be pre-heated to a minimum temperature of 5 ° C until concreting.
- .9 In the case of concreting under cover, heat and maintain the contact surfaces at a temperature between 5 ° C and 20 ° C for a period of at least 24 hours prior to concreting.
- .10 Keep shuttering in place for the entire duration of protection and maintain enclosed areas at a temperature of 5 ° C and 20 ° C for the entire protection period.
- .11 Types of protection
  - .1 Insulation
    - .1 Use an insulating material to cover the surface of plastic concrete.
      - .1 Each layer of insulating material shall be of the waterproof cover type made from a closed cell foam plate and have an RSI thermal resistance of 0.40.
      - .2 On the day before concreting, have the Government Representative approve the number of layers of insulating material to be laid.
        - .1 Depending on the temperature of the concrete during the protection period, the Government Representative may require to reduce or increase the number of layers; The removal or addition of a layer shall be completed within three (3) hours following the request of the Government Representative.
      - .3 Ensure insulation is installed in such a way that it prevents exposure of concrete surfaces to outside air throughout the duration of protection.
      - .4 Seams of insulating covers shall overlap by at least 75 mm.
      - .5 Insulation shall be paid to the insulation item.
    - .2 Temporary Shelters
      - .1 Build protective shelters to enclose structures.
      - .2 Prepare and submit the Plan for the construction of these shelters at least two (2) weeks prior to commencing concreting under protective shelter.
      - .3 Make the shelter to cover the surfaces of the work to be concreted with canvas and tarpaulins.
        - .1 These covers shall be leakproof, resistant and secured so as not to be moved during the period of protection.
      - .4 Ensure that the shelter is of sufficient height and size to allow indoor placement, concrete placement (cast or projected), concrete finish and curing.
      - .5 Shelter shall be paid to the temporary shelter item.

### 3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- *Cleaning*.
  - .1 Leave Work area clean at end of each day.



- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- *Cleaning*.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.
  - .1 Prepare a construction waste reduction plan in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .2 After receiving written permission from the Government Representative, transport concrete and unused concrete components to a local recycling facility.
  - .3 Remove bins and recycling trolleys from site and dispose of materials at appropriate facilities.
  - .4 Provide adequate space on site for safe washing of concrete trucks.
  - .5 Transport unused admixtures (pigments, fibers) to an approved hazardous materials collection site authorized by the Government Representative.
  - .6 No unused admixture may be discharged into sewer, watercourse, lake, soil or any other place where it may be hazardous to health or the environment.
  - .7 Take necessary measures to prevent contamination of water bodies or sources of drinking water.
  - .8 Where applicable, collect this liquid waste or solidify it with non-combustible inert material, taking all appropriate safety measures.
  - .9 Dispose of and dispose of waste in accordance with provincial / territorial regulations.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 09 97 19 – Painting Exterior Metal Surfaces

**1.2 REFERENCE STANDARDS**

- .1 American Association for State Highway and Transportation Officials (AASHTO)
  - .1 AASHTO, *Standard Specifications for Highway Bridges*, last edition.
- .2 ASTM International
  - .1 ASTM A325M, last edition, *Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength*.
  - .2 ASTM A490M, last edition, *Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints*.
- .3 CSA International
  - .1 CSA G40.20/G40.21– last edition, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA G164– last edition, Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA S16 – last edition, Design of Steel Structures.
  - .4 CSA W48– last edition, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5 CSA W59– last edition, Welded Steel Construction (Metal Arc Welding).
- .4 Ministère des Transports du Québec
  - .1 *Cahier des charges et devis généraux – Infrastructures routières – Construction et réparation*
  - .2 Ouvrages routiers, Normes, Tome VII – Matériaux, norme 6101, *Acier de construction*.
  - .3 Ouvrages routiers, Normes, Tome VII – Matériaux, norme 6201, *Boulons, tiges d’ancrage, écrous et rondelles d’acier*.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- *Submittal Procedures*.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for steel and other metal products and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Material Safety Data Sheets:
  - .1 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 43- *Environmental Procedures* and 01 35 29.06- *Health and Safety Requirements*.

- .4 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Quebec, by the *Ordres des ingénieurs du Québec*.
  - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

#### 1.4 QUALITY ASSURANCE

- .1 Quality assurance: in accordance with Section 01 45 00 – *Quality Control*.
- .2 Test Reports
  - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties in accordance with Section 01 33 00- *Submittal Procedures*.
- .3 Certifications
  - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements at least two (2) weeks prior to work.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- *Common Product Requirements* and the manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.

### Part 2 Products

#### 2.1 MATERIALS

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48 Series.
- .4 High strength bolts and anchor bolts: to ASTM A325M. Bolts in accordance to ASTM A490M can be used with approval from the Government Representative.
- .5 Anchor bolts, nuts and washers: to CAN/CSA-G40.21, galvanized in 400W steel.

## **2.2 FABRICATION**

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.

## **2.3 FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m<sup>2</sup> to CAN/CSA-G164.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of the Government Representative.
  - .2 Inform the Government Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed the Government Representative

### **3.2 ERECTION**

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to the Government Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts.
- .7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
  - .1 Primer: maximum VOC limit 250 g/L to GS-11.

### **3.3 PROTECTION**

- .1 Protect installed products and components from damage during construction.

- .2 Repair damage to adjacent materials caused by metal fabrications installation. The Contractor assumes all responsibility for claims resulting from damage caused by him.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- *Cleaning*.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **Part 1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 – Metal Fabrications

### **1.2 REFERENCES**

- .1 The Master Painters Institute (MPI)
  - .1 Exterior Structural Steel and Metal Fabrications, [07].
    - .1 EXT 5.1D, Alkyd.
    - .2 EXT 5.1G, Polyurethane, Pigmented (over epoxy zinc rich primer and high build epoxy).
    - .3 EXT 5.4, Aluminum.
  - .2 Federal Standard (FS)
    - .1 FED-STD-595B-[89], Colours Used in Government Procurement.
  - .3 The Society for Protective Coatings (SSPC)
    - .1 SSPC-SP 1 - last edition, Solvent Cleaning.
    - .2 SSPC-SP 2- last edition, Hand Tool Cleaning.
    - .3 SSPC-SP 3- last edition, Power Tool Cleaning.
    - .4 SSPC-SP 6/NACE No. 3- last edition, Commercial Blast Cleaning.
    - .5 SSPC-SP 7/NACE No. 4- last edition, Brush-off Blast Cleaning.
    - .6 SSPC-SP 10/NACE No. 2- last edition, Near White Blast Cleaning.
    - .7 SSPC-PA 2- last edition, Measurement of Dry Coat Thickness with Magnetic Gauges.
    - .8 SSPC Good Painting Practices, Volume 1, 4th Edition.
    - .9 SSPC-Vis-1- last edition, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specs.).
  - .4 Ministère des Transports du Québec :
    - .1 Cahier des charges et devis généraux – *Infrastructures routières – Construction et réparation*
    - .2 Ouvrages routiers, Normes, Tome VII – Matériaux, norme 10102, *Peintures et système de peintures à base de zinc pour structures d'acier.*
    - .3 Ouvrages routiers, Normes, Tome VII – Matériaux, norme 10103, *Peintures et systèmes de peinture organiques pour structures d'acier.*
    - .4 Ouvrages routiers, Normes, Tome VII – Matériaux, norme 10104, *Systèmes de peintures pour structures d'acier.*
    - .5 Direction des structures, *Guide peinture des charpentes métalliques.*

### 1.3 ANALYSIS OF EXISTING PAINT

- .1 Analysis of existing paint show presence of lead.
- .2 Lead trace are between 1400 and 8200 mg/kg.
- .3 Solid waste generated by surface preparation for painting have to be consider as hazardous material.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - *Health and Safety Requirements* and 01 35 43 - *Environmental Procedures*.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Submit color samples for paint selection to the Departmental Representative at least fifteen (15) days prior to commencement of work. These paint samples will allow the Departmental Representative to choose the color.
  - .3 Submit color samples that resemble current color on existing surface.
  - .4 Incorporate the color of the approved sample into the color of the finish coat of the selected paint system.
  - .5 Select paint systems as described in Part 2 of this section of the specifications.
- .4 Certificates: Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .5 Test Reports:
  - .1 Submit test reports showing compliance with specified performance characteristics and physical properties and in accordance with Section 01 45 00 - *Quality Control*.
  - .2 Ensure that the test report contains the following information:
    - .1 Title and date of report.
    - .2 Non-volatile matter content (% by mass) according to ASTM D2369, Standard Test Method for Volatile Content of Coating.
    - .3 Pigment content (% by mass) according to ASTM D2371, Standard Test Method for Pigment Content of Solvent Reducible Paints.
    - .4 Density (kg / l) according to ASTM D1475, Standard Test Method for Density of Liquid Coating, Inks and Related Products.
    - .5 Consistency (Stormer) (K.U.) according to the requirements of ASTM D572, Standard Test Method for Consistency of Paints Measuring Krebs Units (KU) Viscosity Using a Stormer Type Viscometer.

- .3 Verify conformity of test results by reference to the approval values shown on the approval lists for paint systems. A tolerance is associated with each value of the approval.
- .4 As an additional verification, if required, provide the Departmental Representative with infrared spectra of the components of this paint according to the requirements of ASTM D2621, Standard Test Method for Infrared Identification of Vehicle Solids from Solvent Reducible Paints.
- .5 Submit the construction waste management plan in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## 1.5 QUALITY ASSURANCE

- .1 For each delivery of paint, the Contractor shall provide the Supervisor with a certificate of compliance containing the following information for each production lot:
  - .1 Name of paint manufacturer;
  - .2 The name of the painting;
  - .3 Production lot number.
  - .4 A production batch corresponds to a tank number. In the case of zinc powder, a production batch corresponds to a manufacturer code.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

## 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - *Common Product Requirements* and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Materials must be stored in a heated container at the temperature recommended by the supplier, but no less than 10 ° C.
- .4 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## Part 2 Products

### 2.1 MATERIALS

- .1 Surfaces that need painting must be covered by the following painting system or equivalent approved by the Departmental Representative:
  - .1 Base coat: Intershield 300
  - .2 Second coat: Intergard 377
  - .3 Finishing coat: Interthane 990HS



- .2 Consider the finish coat to be the color of the paint sample approved by the Departmental Representative.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for painting exterior metal surfaces installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of the Departmental Representative.
  - .2 Paint analysis showing presence of lead on the surfaces of the painted element have been done by a qualified laboratory.
  - .3 View current paint analysis reports.
  - .4 Take all necessary measures in accordance with Federal, Provincial, and Municipal regulations in effect on the territory of the City of Montreal for the removal, recovery of existing paint removal materials and disposal of paint waste depending on the results of the chemical analysis.
  - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

#### **3.2 PREPARATION**

- .1 Prior to repairing and/or replacing steel structure components and inspection, remove existing metallic paint, rust or corrosion particles from the steel surfaces as indicated below.
- .2 New metal surfaces:
  - .1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:
    - .1 Commercial blast cleaning: to SSPC-SP 6.
    - .2 Solvent cleaning: to SSPC-SP 1.
    - .3 Hand tool cleaning: to SSPC-SP 2.
    - .4 Power tool cleaning: to SSPC-SP 3.
    - .5 Brush-off blast cleaning: to SSPC-SP 7.
    - .6 Near White Blast Cleaning: to SSPC-SP 10/NACE No. 2.
- .3 Metal surfaces to be repainted:
  - .1 For all existing elements containing lead paint a mechanical cleaning to bare metal to SSPC-SP11 must be done.
- .4 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-Vis1.

- .1 Apply primer, paint, or pretreatment after surface has been cleaned and before deterioration of surface occurs.
- .2 Clean surfaces again if rusting occurs after completion of surface preparation.
  
- .5 Mixing paint:
  - .1 Do not dilute or thin paint for brush application.
  - .2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
  - .3 Do not mix or keep paint in suspension by means of air bubbling through paint.
  - .4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to [Departmental Representative] [DCC Representative] [Consultant].
- .6 Number of paint coats
  - .1 For painting of metallic surfaces, apply the coats in accordance to the manufacturer's recommendations for the chosen paint system.

### 3.3 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Delay for applying the first coats: Apply a first coat of paint as soon as possible after surface preparation and before surface rust occurs to any surface cleaned, but not more than eight (8) hours when a zinc or high performance paint system approved in accordance with Standard 10102 or 10104 (Tome VII) of the Ministère des Transports du Québec is used, and twenty-four (24) hours in the case of an organic paint system or maintenance approved respectively according to standard 10102 or 10104 (Tome VII) of the Ministère des Transports du Québec.
- .3 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Brush application:
  - .1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers, or sheepskins.
  - .2 Brush out runs and sags.
  - .3 Remove runs, sags and brush marks from finished work and repaint.
- .5 Spray application:
  - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.

- .3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- .4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
- .5 Brush out immediately runs and sags.
- .6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
- .7 Remove runs, sags and brush marks from finished work and repaint.
- .6 Shop painting:
  - .1 Do shop painting after fabrication and before damage to surface occurs from weather or other exposure.
  - .2 Do not paint metal surfaces which are to be embedded in concrete.
  - .3 Paint metal surfaces to be in contact with wood with either full paint coats specified or three shop coats of specified primer.
  - .4 Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of approved primer or protective coating after shop fabrication is completed.
  - .5 Remove weld spatter before painting. Remove weld slag and flux by methods as specified in paragraph 3.2.3 Metal Surfaces to be Repainted.
  - .6 Protect machine finished or similar surfaces that are not to be painted but that do require protection, with coating of rust inhibitive petroleum, molybdenum disulphide, or other coating approved by the Departmental Representative.
- .7 Handling painted metal:
  - .1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
  - .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

### **3.4 QUALITY CONTROL**

- .1 Site Tests, Inspections:
  - .1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2.
  - .2 Submit dry film results to Departmental Representative.

### **3.5 PROTECTION**

- .1 Protect painted surfaces from damage during construction.
- .2 Protection of surfaces:
  - .1 Protect surfaces not to receive paint.
  - .2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between

- applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
- .3 Protect cleaned and freshly painted surfaces from dust to approval of the Departmental Representative.
- .3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1        Section 02 41 99 – Demolition For Minor Works
- .2        Section 31 23 33.01 – Excavating, Trenching and Backfilling

### **1.2                REFERENCES**

- .1        American Society for Testing and Materials International (ASTM)
  - .1        ASTM A325M-05, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
  - .2        ASTM A490M-04a, Standard Specification for High Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints Metric.
- .2        Canadian Standards Association (CSA International)
  - .1        CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
  - .2        CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .3        CAN/CSA O86.1-01, Engineering Design in Wood.
  - .4        CSA O121-M1978 (R2003), Douglas Fir Plywood.
  - .5        CSA O122-2006, Structural Glued-Laminated Timber.
  - .6        CSA O151-04, Canadian Softwood Plywood.
  - .7        CSA O153-M1980 (R2003), Poplar Plywood.
  - .8        CAN/CSA-S16-01, Limit States Design of Steel Structures.
  - .9        CAN/CSA-S136-01, North America Specification for the Design of Cold Formed Steel Structural Members including supplement CSA-S136.1-01.
  - .10      CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .3        Forest Stewardship Council (FSC)
  - .1        FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
  - .2        FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1.
  - .3        FSC Accredited Certification Bodies.

### **1.3                DEFINITIONS**

- .1        Bracing: temporary support installed in excavation or structure to stabilize against deformations or failure.
- .2        Shoring: temporary support installed in an excavation or structure to relieve loads.

## **1.4 PERFORMANCE REQUIREMENTS**

- .1 Ensure that materials, equipment, and procedures safely supporting existing structure and construction live loads; that allow work to be accomplished and that minimize risk of damage to historic and archaeological elements.

## **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Provide shop drawings
  - .1 Submit drawings stamped and signed by professional engineer registered with the *Ordre des ingénieurs du Québec*.
  - .2 Shop drawings to indicate shop and erection details in accordance with performance requirements in 1.4.
  - .3 Submit to the Government Representative for review of shoring, bracing and temporary framing drawings signed by professional engineer registered with the *Ordre des ingénieurs du Québec*.
- .3 Technical Specifications
  - .1 Submit to the Government Representative the required technical specifications and the manufacturer's documentation for the work of this section. The specifications must indicate the characteristics of the products, the performance criteria, the dimensions, the limits and the finish.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Packing, shipping, handling and unloading:
  - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - *Common Product Requirements*.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Structural wood members:
  - .1 Forest Stewardship Council (FSC) certified.
    - .1 Lumber: FSC certified.
- .2 Structural steel members to CSA G40.21.
- .3 Steel connections: steel gusset plates angles to CSA G40.21.
- .4 Nails: to CSA B111.
- .5 Bolts: lag screws, nuts and washers to CAN/CSA O86.1.

- .6 High-tensile bolts: to ASTM A325M or ASTM A490M.
- .7 Welding materials: CSA W59.

## **2.2 SOURCE QUALITY CONTROL**

- .1 Quality control: in accordance with Section 01 45 00 – *Quality Control*.
- .2 Timber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .3 Plywood identification: by grade mark in accordance with applicable CSA standards.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Before starting work, verify existing conditions and variations from original contract documents and notify the Government Representative.

### **3.2 PREPARATION**

- .1 Before shoring bracing is begun, drain areas adjacent to foundation excavation ground to support bracing. Maintain area free of standing water dry for the duration of the contract.
- .2 Treat wood in contact with ground water in accordance with Section 06 05 73 - *Wood Treatment*.

### **3.3 INSTALLATION**

- .1 Commence work as per the Government Representative.
- .2 Obtain approval from the Government Representative, before execution, if alteration to bracing shoring system is necessary.
- .3 Support individual elements that become loose during shoring bracing installation.
- .4 Erect structural timber to CAN/CSA O86.1.
- .5 Erect structural steel work to CAN/CSA-S16 and CAN/CSA-S136.
- .6 Weld to CSA W59.
- .7 Bracing of structures:
  - .1 Install packing after review by the Government Representative behind wall pieces to compensate for unevenness of wall surfaces.
- .8 Bracing of excavations:
  - .1 Conduct work in accordance with the current legislation.
  - .2 In water-bearing ground, leave narrow gaps between poling boards to allow drainage.
- .9 Shoring of structures:
  - .1 Install packing after review by the Government Representative behind wall pieces to compensate for unevenness of wall surface.

- .2 Before final raking shores are erected, install temporary shores, consisting of an upright against wall and raker notched in, to stabilize wall.
- .3 Install boards, between needles of dead shores, to prevent core escaping.

### **3.4 ADJUSTMENT**

- .1 Monitor bracing shoring system performance and maintain its effectiveness by making adjustments, replacing or repairing damaged and weakened elements of system until final completion of project.
- .2 If adjustments exceed specified parameters, notify the Government Representative.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Clean the work area at the end of each shift.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - *Cleaning*.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

**END OF SECTION**



**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1        Section 31 23 33.01 – Excavating, Trenching and Backfilling
- .2        Section 32 14 13 – Precast concrete pavers

**1.2                REFERENCE STANDARDS**

- .1        ASTM International
  - .1        ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00- *Submittal Procedures*.
- .2        Product Data:
  - .1        Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3        Samples:
  - .1        Sampling and testing shall be carried out at the minimum rate of one (1) test per 5000 tons of granular material with a minimum of three (3) tests for each type of subgrade material.
  - .2        Allow continual sampling by the Government Representative during production.
  - .3        Provide the Government Representative with access to source and processed material for sampling.
  - .4        Install sampling facilities at discharge end of production conveyor, to allow the Government Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by the Government Representative to permit full cross section sampling.
  - .5        Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by the Government Representative.
  - .6        Supply new or clean sample bags or containers according appropriate to aggregate materials.
  - .7        Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
  - .8        Provide water, electric power and propane to the Government Representative laboratory trailer at production site.

**1.4                DELIVERY, STORAGE AND HANDLING**

- .1        Deliver, store and handle materials in accordance with Section 01 61 00- *Common Product Requirements* and with manufacturer's written instructions.

- .2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination, and degradation.
- .3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
  - .1 Greatest dimension to exceed five (5) times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
  - .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
  - .2 Reclaimed asphalt pavement.
  - .3 Reclaimed concrete material.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
  - .1 Crushed rock.
  - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
  - .3 Light weight aggregate, including slag and expanded shale.
  - .4 Reclaimed asphalt pavement.
  - .5 Reclaimed concrete material.

### **2.2 SOURCE QUALITY CONTROL**

- .1 Inform the Government Representative of proposed source of aggregates and provide access for sampling four (4) weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise the Government Representative Four (4) weeks minimum in advance of proposed change of material source.
- .4 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.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.
  - .1 Visually inspect substrate in presence of the Government Representative.
  - .2 Inform the Government Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with topsoil stripping. only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Government Representative.

**3.2 PREPARATION**

- .1 Topsoil stripping:
  - .1 In accordance to Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .2 Aggregate source preparation:
  - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by the Government Representative, in accordance to Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .3 Erosion control
  - .1 Establish sediment barriers consisting of geotextile in accordance with Section 01 35 43 - *Environmental Procedures*.
- .4 Processing:
  - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
  - .2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.
    - .1 Use methods and equipment approved in writing by the Government Representative.
- .5 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.
- .6 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.
  - .1 Use only equipment approved in writing by the Government Representative.
- .7 Stockpiling:
  - .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by the Government Representative. Do not stockpile on completed pavement surfaces.

- .2 Stockpile aggregates in sufficient quantities to meet project schedules.
- .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Government Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
  - .1 Maximum 1.5 m for coarse aggregate and base course materials.
  - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
  - .3 Maximum 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

### 3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- *Cleaning*.
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by the Government Representative.
- .5 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.
- .7 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to the Government Representative.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1            Section 31 23 33.01 – Excavating trenching and backfilling.

**1.2                DEFINITIONS**

- .1            Clearing
  - .1            Consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
  - .2            Close-cut clearing
    - .1            Consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
  - .3            Underbrush clearing
    - .1            Consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.
  - .4            Grubbing
    - .1            Consists of excavation and disposal of stumps and roots [boulders and rock fragments of specified size] to not less than specified depth below existing ground surface.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2            Site layout
  - .1            Prior to commencement of work, the Contractor shall provide the address of the site where the excavation and grubbing products will be located. This site will comply with the MDDELCC's Soil Protection and Remediation Policy.

**1.4                STORAGE AND PROTECTION**

- .1            Provide adequate protection of all trees, landscaped areas, natural elements, benchmarks, streams, tree roots to be conserved in accordance with section 01 35 43 – Environmental Protection.
  - .1            If necessary, repair damaged elements to the satisfaction of the Government Representative.
  - .2            If the trees to conserve were damaged, replace as directed by the Government Representative.

## 1.5 SCOPE OF WORK

- .1 Provide supervision of the works and provide all labour, equipment, tools, materials, transportation, and other services necessary to conduct and complete all work described and specified in this section and in the contract documents, including, but not limited to: clearing, grubbing trees of all sizes, of all tree stumps located in the work area previously approved by the Government Representative, of all shrubs and bushes, branches, etc., excavation, stripping, and storage of the vegetative cover for later reuse, backfilling with granular material consistent and compaction of the specified surfaces to prepare for the various works of the present contract, and the installation of protective stone coverings.
- .2 The Contractor must thoroughly clean the right of way of all materials resulting from the clearing and grubbing performed or resulting from work previously done. Deforestation must include the complete removal of any tree, stump, etc. The Contractor must, however, limit deforestation to include only the areas affected by the work, which must first be approved by the Government Representative. Everything must be loaded, transported, and disposed of to a site that complies with the requirements of the MDDEFP's Policy on soil protection and the rehabilitation of contaminated land ("*Politique de protection des sols et de réhabilitation des terrains contaminés*"). Unless otherwise instructed, the topsoil must be collected as a priority and put in a pile for later use during the revegetation of certain areas.
- .3 Rough clearing:
  - .1 Rough clearing work includes, but is not limited to, providing the equipment and manpower required to carry out site sealing per plan specifications including:
    - .1 Removal of brush, dead wood and trees with trunk less than 50 mm in diameter, and removal debris.
    - .2 Loading, transporting and disposing of debris to a site in accordance with the MDDELCC soil policy *Politique de protection des sols et de réhabilitation des terrains contaminés*.
- .4 Deforestation
  - .1 Deforestation includes, but is not limited to, providing the equipment and manpower required to carry out the deforestation of the site in accordance with the specifications of the plans,
    - .1 Tree felling strictly within the area of work approved by the Government Representative.
    - .2 Loading, transporting and disposing of debris to a site in accordance with the MDDELCC soil policy *Politique de protection des sols et de réhabilitation des terrains contaminés*.
- .5 Clearing and Grubbing
  - .1 Clearing and grubbing work involves, but is not limited to, providing the equipment and labor necessary to carry out, in accordance with good engineering practice, clearing and grubbing site, as much for wooded, marshy or other lands, per plan specifications including:
    - .1 Coarse clearing, clearing at ground level, swarming, grubbing.

- .2 Storage of topsoil and humus for subsequent reuse.
- .3 Drainage and drainage of excavation in accordance with Section 31 23 33.01 - *Excavation, trenching and backfilling*.
- .4 Loading, transporting and disposing of debris to a site in accordance with the MDDELCC soil policy *Politique de protection des sols et de réhabilitation des terrains contaminés*.

**Part 2 Products**

- .1 Not used.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Inspect site and verify with the Government Representative, items designated to remain. Locate and protect utility lines: preserve in operating condition active utilities traversing site.
- .2 Identify and delineate areas proposed for the storage of topsoil.

**3.2 IMPLEMENTATION**

- .1 Rough clearing
  - .1 Perform cuts at a height not exceeding 300 mm above the ground. On land to be subsequently grubbed, stumps remaining after clearing must not amount to more than 500 mm above the ground. Fell trees and cut tree branches that overhang the cleared area.
- .2 Clearing to ground level
  - .1 Perform ground level clearing to less than 100 mm above the ground.
  - .2 Perform ground level clearing work by hand, so as not to damage the muskeg.
- .3 Grubbing
  - .1 Grub designated areas down to ground level.
- .4 Stump clearing
  - .1 Pull out stumps and roots to at least 200 mm below the ground level.
  - .2 Remove visible stones and rock fragments less than 0.25 m<sup>3</sup> in volume, but whose largest dimension is greater than 300 mm.
- .5 Removal and disposal of debris
  - .1 The clearing, grubbing, and stump clearing works must include the loading, transport, and disposal of debris off-site according to the requirements of the MDDEFP's Policy on soil protection and the rehabilitation of contaminated land ("*Politique de protection des sols et de réhabilitation des terrains contaminés*").

- .6 Finished surface
  - .1 Leave ground surface in condition suitable for immediate grading operations and stripping of topsoil as approved by the Government Representative.
- .7 Removal of topsoil
  - .1 In work areas, following the clearing, grubbing, and stump clearing works, start removing topsoil and humus. Unless otherwise indicated, remove the entire depth of topsoil and humus contained within the perimeter of the work site.
  - .2 The layer of arable land, topsoil, or any other plant debris must be removed as directed by the Government Representative.
  - .3 This excavation, even if the work requires it to be done separately or by sorting of material, is part of the 2<sup>nd</sup> class excavation materials.
  - .4 Topsoil and humus to be reused in the project must be placed in a pile in the spaces provided for this purpose and protected against contamination. The height of the pile must not exceed 2 m.
  - .5 The surplus of topsoil that cannot be used for the purposes of the project must be disposed of to a site that complies with the guidelines of MDDEFP's Policy on soil protection and the rehabilitation of contaminated land ("*Politique de protection des sols et de réhabilitation des terrains contaminés*").

### 3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- *Cleaning*.
- .3 Waste Management: separate waste materials for recycling/reuse in accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.

**END OF SECTION**



## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1    Section 31 11 00 – Clearing and Grubbing
- .2    Section 31 32 19.01 - Geotextiles
- .3    Section 32 14 13 – Precast concrete pavers
- .4    Section 32 91 19.13 – Topsoil Placement and Grading
- .5    Section 32 92 23 – Sodding

### **1.2                REFERENCES**

- .1    American Society for Testing and Materials International (ASTM)
  - .1    ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2    ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3    ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils.
  - .4    ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
  - .5    ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
  - .6    ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2    CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3    Canadian Standards Association (CSA International)
  - .1    CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1    CSA-A3001-03, Cementitious Materials for Use in Concrete.
  - .2    CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4    U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1    EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

### 1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
  - .1 Rock: solid material in excess of 1.00 m<sup>3</sup> and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m<sup>3</sup> bucket. Frozen material not classified as rock.
  - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
  - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
  - .2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters 1 inch in any dimension.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
    - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
    - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - *Submittal Procedures*.

- .2 Quality Control: in accordance with Section 01 45 00 - *Quality Control*.
  - .1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article of this Section.
  - .2 Submit for review by the Departmental Representative proposed dewatering heave prevention methods as described in PART 3 of this Section.
  - .3 Submit to the Departmental Representative written notice at least seven (7) days prior to excavation work, to ensure cross sections are taken.
  - .4 Submit to the Departmental Representative written notice when bottom of excavation is reached.
  - .5 Submit to the Departmental Representative testing inspection results report as described in PART 3 of this Section.
- .3 Documents and Workshop Drawings
  - .1 Submit work shop drawings for cofferdam and excavation, trenching and backfilling work to the Departmental Representative for approval, signed by a qualified engineer, a member of the *Ordre des ingénieurs du Canada Quebec*.
  - .2 Prior to commencement of work, submit documentation with regards to the location of underground utilities.
- .4 Procedure
  - .1 Submit to the Departmental Representative, for review, the procedure for storing excavation materials to be used for the backfill.
- .5 Technical Specifications
  - .1 Before commencing the work referred to in this section, submit a list of the main equipment and materials
- .6 Samples:
  - .1 Inform the Departmental Representative at least two (2) weeks prior to beginning Work, of proposed source of fill unshrinkable fill materials and provide access for sampling.
  - .2 Ship samples prepaid to the Departmental Representative, in tightly closed containers to prevent contamination and exposure to elements.
  - .3 At least 4 weeks prior to beginning Work, inform the Departmental Representative source of fly ash and submit samples to the Departmental Representative.
    - .1 Do not change source of Fly Ash without written approval of the Departmental Representative.

## 1.5 QUALITY ASSURANCE

- .1 Quality control: in accordance with Section 01 45 00 – *Quality Control*.
- .2 Qualification Statement: submit proof of insurance coverage for professional liability prior to commencing work

- .3 Materials testing and compaction testing shall be carried out by a Laboratory designated by the Departmental Representative.
- .4 No more than one (1) week prior to the commencement of backfilling or filling provide the designated testing organization with the descriptive records and grading of the proposed fill material for the work.
- .5 Notify the Departmental Representative in writing not later than forty-eight (48) hours prior to commencing backfilling or filling with the approved materials so that the designated testing laboratory can perform the necessary compaction tests.
- .6 Submit design and supporting data at least two (2) weeks prior to beginning Work.
- .7 Design and supporting data submitted to bear stamp and signature of qualified Professional Engineer, member of the *Ordre des ingénieurs du Québec*.
- .8 Retain the services of a recognized, competent engineer, member in good standing of the *Ordre des ingénieurs du Québec* (where the work will be performed) for the design and inspection of cofferdams, shoring works, bracing works, and underpinning works used during the performance of Work.
- .9 Do not use soil material until written report of soil test results are reviewed approved by the Departmental Representative.
- .10 Health and Safety Requirements:
  - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## **1.7 EXISTING CONDITIONS**

- .1 Buried services:
  - .1 Before commencing work verify establish location of buried services on and adjacent to site.
  - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
  - .3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.
  - .4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
  - .5 Prior to beginning excavation Work, establish location and state of use of buried utilities and structures, notify the Departmental Representative, and clearly mark such locations to prevent disturbance to services during Work.
  - .6 Confirm locations of buried utilities by careful test excavations soil hydrovac methods.
  - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.

- .8 Record location of maintained, re-routed and abandoned underground lines.
- .9 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
  - .1 Conduct, with the Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
  - .2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately undertake repairs as directed by the Departmental Representative at the Contractor's expense.
  - .3 Where required for excavation, cut roots or branches as directed by the Departmental Representative.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Type 1 and Type 2 fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:
  - .1 Crushed, pit run or screened stone, gravel or sand.
  - .2 Gradations to be within limits specified when tested to ASTM C136 ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
  - .3 Table:

Sieve Designation	% Passing	
	Type 1	Type 2
75 mm	-	100
50 mm	-	-
37.5 mm	-	-
25 mm	100	-
19 mm	75-100	-
12.5 mm	-	-
9.5 mm	50-100	-
4.75 mm	30-70	22-85
2.00 mm	20-45	-
0.425 mm	10-25	5-30
0.180 mm	-	-
0.075 mm	3-8	0-10

- .2 Geotextiles: to Section 31 32 19.01 - Geotextiles.

### **Part 3 Execution**

#### **3.1 SITE PREPARATION**

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
- .3 Temporary erosion and sedimentation protection
  - .1 Establish sediment barriers consisting of geotextile in accordance with Section 01 35 43 - *Environmental Procedures*.

#### **3.2 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - *Temporary Barriers and Enclosures* and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

#### **3.3 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as indicated by the plans and specifications after area has been cleared of brush, weeds, grasses, and removed from site.
- .2 Stripping must be done in such a way as to avoid contaminating the topsoil usable for landscaping with underlying materials of different composition. Thus, the depth of clearing varies per the nature of the terrain.
  - .1 Do not mix topsoil with subsoil.
- .3 The Contractor shall, at its own expense, recover and store all the topsoil required for its work and provide the necessary space for storage
  - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 If organic soils cannot be used for landscaping, the Contractor shall dispose them.

#### **3.4 COFFERDAMS, SHORING, BRACING AND UNDERPINNING**

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and the Health and Safety Act for the Province of Quebec.
  - .1 Where conditions are unstable, the Contractor's engineer shall verify and advise methods.

- .2 During backfill operation:
  - .1 Unless otherwise indicated or directed by the Departmental Representative, remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
  - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.
- .3 Upon completion of substructure construction:
  - .1 Remove cofferdams, shoring and bracing.

### 3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for the Departmental Representative's review, approval details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
  - .1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- .4 Protect open excavations against flooding and damage due to surface run-off.
- .5 Dispose of water in accordance with Section 01 35 43 - *Environmental Procedures* collection runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
  - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

### 3.6 EXCAVATION

- .1 Advise, by writing, the Departmental Representative at least seven (7) days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the Departmental Representative.
- .4 Restrict vehicle operations directly adjacent to open trenches.
- .5 **All usable materials from second-class excavated material must be used for the construction of embankments.**
- .6 **If usable materials are lost due to the fault of the Contractor, he shall replace them at his own expense with an equivalent volume of materials conforming to the requirements of the plans and specifications.**
- .7 **If cuttings can not be used or are deemed unsuitable by the Department's laboratory, the contractor must discard them.**



- .8 Materials deemed unsuitable by the Department's laboratory will be replaced with Type 1 Mg-20 borrowing materials or backfill class B according to the representative directive.**
- .9 Do not obstruct flow of surface drainage or natural watercourses.
- .10 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .11 Notify the Departmental Representative when bottom of excavation is reached.
- .12 Obtain the Departmental Representative's approval of completed excavation.
- .13 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the Departmental Representative.
- .14 Correct unauthorized over-excavation as follows:
- .1 Fill under other areas with Type 2 fill compacted to not less than 90 % of corrected Standard Proctor maximum dry density.
  - .2 If excavated bottom materials have been stirred, compact them to a density at least equal to that of the unmovable soil.
- .15 Install geotextiles, immediately after excavation, in accordance with the Departmental Representative and Section 31 32 19.01 - *Geotextiles*.

### **3.7 STOCKPILING**

- .1 The contractor has, at its own expense, to recover and stockpile all the backfill material needed for the works and get the locations for stockpile.
- .1 Stockpile the granular material to prevent segregation.
- .2 The contractor has to take the necessary measure to make sure the compactable excavation material, stockpiled, are protected from bad weather and can be used as backfill.
- .3 The contractor have to expect a minimum of three (3) days delay before receiving the excavated soil qualification results.
- .4 Take the appropriated control measure against erosion and sedimentation, in accordance to section 01 35 43 - *Environmental\_procedures*, to prevent the migration of sediment off the work site limits et towards water streams.

### **3.8 FILL TYPES AND COMPACTION**

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D1557.
- .1 Use Type 2 as indicated on the plans, fill and compact to 90 %.
  - .2 Use recoverable material from cuttings as indicated in Plans and compact up to 90%.

### **3.9 BACKFILLING**

- .1 Do not proceed with backfilling operations until completion of following:



- .1 The Departmental Representative has inspected and approved installations.
  - .2 Inspection, testing, approval, and recording location of underground utilities.
  - .3 Removal of concrete formwork.
  - .4 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
  - .3 Do not use backfill material which is frozen or contains ice, snow or debris.
  - .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
  - .5 Backfilling around installations:
    - .1 Place bedding and surround material as specified elsewhere.
    - .2 Do not backfill around or over cast-in-place concrete within seventy-two (72) hours after placing of concrete.
    - .3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
      - .1 Permit concrete to cure for minimum fourteen (14) days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from the Departmental Representative;
      - .2 If approved by the Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative DCC Representative Departmental Representative.
  - .6 Install drainage filter system in backfill as indicated as directed by the Departmental Representative.

### **3.10 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*, trim slopes, and correct defects as directed by the Departmental Representative.
- .2 The final leveling shall cover the alterations to be made to render the profiles in accordance with the theoretical longitudinal and transverse lines and all the work required for the cleaning and restoration of the premises.
  - .1 In accordance with sections 32 91 19.13 – *Topsoil placing and grading*, 32 92 19.16 - *Hydraulic seeding* and 32 92 23 – *Sodding*.
  - .2 Return pavements affected by work to condition and level prior to start of work, taking care to respect the original thickness of these structures.
- .3 Clean and rehabilitate areas affected by work as instructed by Departmental Representative and in accordance with 01 74 11 – *Cleaning*.

**END OF SECTION**

## **Part 1            General**

### **1.1                RELATED REQUIREMENTS**

- .1        Section 31 23 33.01 – Excavating, Trenching And Backfilling
- .2        Section 32 14 13 – Precast concrete pavers

### **1.2                REFERENCES**

- .1        ASTM International
  - .1        ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2        ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
  - .3        ASTM D4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
  - .4        ASTM D4716-08, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
  - .5        ASTM D4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .2        Canadian General Standards Board (ONGB or CGSB)
  - .1        CAN/CGSB-4.2 No. 11.2-2004, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
  - .2        CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.
    - .1        No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.
    - .2        No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.
    - .3        No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
    - .4        No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
    - .5        No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.
- .3        CSA G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

### **1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1        Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2        Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Test and Evaluation Reports:
  - .1 Submit copies of mill test data and certificate at least two (2) weeks prior to start of Work.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - *Common Product Requirements* with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect geotextiles from direct sunlight and UV rays.
  - .3 Replace defective or damaged materials with new.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan Waste Reduction Work Plan in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

### **Part 2 Products**

#### **2.1 MATERIAL**

- .1 Geotextiles: fabrics of woven or nonwoven synthetic fibers, supplied in rolls. Geotextiles must be Type III per Ministry of Transport of Quebec standard 13101. Physical and hydraulic properties of the standard 13101 must be met; the standard can be found in Volume VII of road works standards.
- .2 Securing pins and washers: to CSA G40.21, Grade 300 W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to ASTM A123/A123M.
- .3 Factory seams: sewn in accordance with manufacturer's recommendations.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of the Government Representative.

- .2 Inform the Government Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Government Representative.

### **3.2 PROTECTION**

- .1 Forbid vehicular traffic directly on the geotextiles.

### **3.3 INSTALLATION**

- .1 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .3 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .4 Join successive strips of geotextile by sewing.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within four (4) hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of the Government Representative.
- .8 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **Part 1           General**

### **1.1               RELATED REQUIREMENTS**

- .1     Section 31 05 16 – *Aggregate Materials*
- .2     Section 31 23 33.01 – *Excavating, Trenching and Backfilling*
- .3     Section 31 32 19.01 – *Geotextiles*

### **1.2               REFERENCES**

- .1     ASTM International Inc.
  - .1     ASTM C136-13, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .2     ASTM C979/C979M-10, Standard Specification for Pigments for Integrally Colored Concrete.
  - .3     ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
  - .4     ASTM C127-07, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
  - .5     ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasions and Impact in the Los Angeles Machine.
  - .6     ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2     Canada Green Building Council (CaGBC)
  - .1     LEED Canada-NC, version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green building rating system + addendum 2007
  - .2     LEED Canada-CI, version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Rating system for commercial interiors
  - .3     LEED Canada 2009 for Green Building Design and Construction-2010, LEED (Leadership in Energy and Environmental Design) : Rating system for green building.
  - .4     LEED Canada-Existing Buildings: Operations & Maintenance 2009, LEED Canada 2009 (Leadership in Energy and Environmental Design) : Rating System for existing buildings: operations & maintenance.
- .3     CSA Group
  - .1     CSA A23.1-09/A23.2-09 (R2014) - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
  - .2     CAN/CSA-A179-04 (R2014) - Mortar and Grout for Unit Masonry.
  - .3     CSA A231.1/A231.2-06 (R2010), Precast Concrete Paving Slabs/Precast Concrete Pavers.
  - .4     CSA A283-06 (R2011), Qualification Code for Concrete Testing Laboratories.

### **1.3 DEFINITIONS**

- .1 Requirements concerning the execution of the precast concrete pavers laid manually or by mechanical means, and related execution methods.
- .2 The contractor should ensure, in accordance with the plans and other documents, the supply of the materials, the equipment and the manpower required for the execution of the works of:
  - .1 Precast concrete pavers areas.
- .3 Including but not limited to, the related works required by this section and included with the works specified in the bill of quantities are the following:
  - .1 The sand bed for drainage;
  - .2 The supply and installation of concrete pavers;
  - .3 The cutting work for shapes and patterns;
  - .4 The sand filling joints of polymer type;
  - .5 The patching with the adjacent areas;
  - .6 Clearing out of site all non-reusable materials.

### **1.4 MEASUREMENT AND PAYMENT**

- .1 Measure the precast concrete pavers areas in square meters, including but not limited to, the supply, installation, sand bed, sand filling joints and paver curbs.

### **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Technical specifications and descriptions
  - .1 Provide the technical specifications and/or descriptive data sheets required as well as the manufacturer documents concerning the precast concrete pavers. The technical specifications should indicate the characteristics of the products, the performance criteria, the dimensions, the limitations and the finishing.
  - .2 Provide the following technical specifications for the precast concrete pavers:
    - .1 Test results in compliance to CSA A231.2;
    - .2 The technical data and the installation instructions of the manufacturer
  - .3 Provide the technical data concerning the samples, the granulometry, the mineralogical nature, the provenance and the test results of the following materials:
    - .1 Sand bedding;
    - .2 Sand filling joints.
- .3 Shop drawings
  - .1 Submit drawings that indicates or shows the disposition, the model and the details of the joints for the fixed installations, as well as the details of the precast concrete pavers works.

- .4 Documents/Samples
  - .1 Provide a full-size sample of each type of the proposed pavers.
- .5 Testing inspection
  - .1 Certificates: provide the documents signed by the manufacturer certifying that the products, the materials and the equipment meet the requirements of the physical characteristics and the performance criteria.
  - .2 Test results: provide the testing reports certifying that the products, the materials and the equipment meet the requirements of the physical characteristics and the performance criteria.

## **1.6 QUALITY CONTROL**

- .1 Qualifications
  - .1 Fitter: specialized company or specialised person in installing precast concrete pavers, having five (5) years of experience with references support.
- .2 Testing inspections reports: provide the reports of the testing inspections certifying that the products, the materials and the equipment meet the requirements of the physical characteristics and the performance criteria.
- .3 Certificates: provide the documents signed by the manufacturer certifying that the products, the materials and the equipment meet the requirements of the physical characteristics and the performance criteria.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance: deliver the equipment and the materials to the site with their original packaging, which have the label indicating the name and address of the manufacturer.
- .3 Storage and handling
  - .1 Store the materials and the equipment in a clean, dry and well ventilated place in accordance with the manufacturer recommendations.
  - .2 Store the precast concrete pavers in a way that protects them from marks and scratches.
  - .3 Replace the damaged materials and equipment with new ones.

## **Part 2 Products**

### **2.1 CONCRETE PAVERS**

- .1 Concrete pavers: in accordance to CSA A23.1/A23.2 and the following specifications :
  - .1 Acceptable precast concrete pavers:
    - .1 Pavé Méga Paléo de Permacon or ;
    - .2 Pavé TriAppia de Bolduc ;

- .2 Dimensions:
    - .1 100 mm x 125 mm x 300 mm;
    - .2 100 mm x 125 mm x 200 mm;
  - .3 Colors: Red of Lachine Canal, the homogeneity difference with the approved arrangement being subject to acceptance with the client contract administrator.
  - .4 Finishing: (culbulté)
- .2 Ending, angular and edge standard pavers: depending on the working needs.
  - .3 Pavers fabricated in molds, provided with spacer bars, ready to be installed, and delivered to site in blocks of several plates of pavers covered with a protective packaging.
  - .4 Pigments used for the coloring of concrete pavers: in accordance to ASTM C979/C979M.

## 2.2 MATERIALS FOR THE BEDDING AND THE JOINTS

- .1 For each analysed sample, the maximum percentage of sieves and the maximum increase of the percentage of sieves should be in accordance with following table :
- .2 The bedding should be a thin layer of a not compacted sand, with an average thickness of 15 mm without exceeding 25 mm at any point.
- .3 Granulometry: in accordance to the specification given in table 4 - \* Granulometric limits of thin aggregates + the following CSA-A23.1/A23.2 and CSA A179

Sieve size	% Passing of sand for the bedding haunch	% Passing of the sand for filling joints
10 mm	[100]	
5 mm	[95 -100]	[100]
2.5 mm	[80 - 100]	[95 - 100]
1.25 mm	[50 - 90]	[60 - 100]
630 micrometers	[25 - 65]	
600 micrometers		[35 - 80]
315 micrometres	[10 - 35]	
300 micrometres		[15 - 20]
160 micrometres	[2 - 10]	
150 micrometres		[2 - 15]

- .4 Sand with polymer seal in bag:
  - .1 Mix of polymer sand Nextgel from the Techniseal company or an approved equivalent. Color adapted to the type of pavers, at the choice of the representative of the ministry.

## 2.3 CURBS AND FENCES

- .1 Industrial flexible curbs in PVC or polyethylene with an average density designed for the installation of pavers, provided with connectors and holes for nail anchors drilled during manufacture.



- .1 Fences: nail anchor in galvanised steel wires with a diameter of 9.5 mm and a length of 254 mm, installed each 300 mm of curbs and at a distance of 100 mm from each side of the joints.

## **2.4 CLEANING PRODUCTS**

- .1 Colorless organic solvent, designed and specified by the manufacturer to remove the smears from the concrete pavers.
- .2 Acid based chemical detergent, designed and specified by the manufacturer to remove the smears from the concrete pavers.

## **Part 3 Execution**

### **3.1 MANUFACTURER INSTRUCTIONS**

- .1 Compliance: comply to the requirements, the recommendations and the specifications written by the manufacturer, including all the available technical bulletins, the instructions figuring on the products catalog and the products packaging, and specifications of the technical data sheets.

### **3.2 INSPECTION**

- .1 Verification of conditions: before proceeding to the installation of precast concrete pavers, ensure that the condition of the areas/supports already implemented in other sections or contracts are acceptable and allow to achieve the work in accordance to the written instructions of the manufacturer.
  - .1 Proceed to a visual inspection of the areas/supports in the presence of the client contract administrator.
  - .2 Inform immediately the client contract administrator of any unacceptable detected condition.
  - .3 Commence the installation work only after rectifying all the unacceptable conditions and receiving a written approval from the client contract administrator.

### **3.3 BASE**

- .1 Ensure that the base is in accordance to the requirements regarding the level and the degree of compaction required to install the pavers. In case of noncompliance, inform the client contract administrator and do not start the work before receiving new instructions from the client contract administrator.
- .2 Ensure that the area of the base do not show any level difference of more or less than 10 mm compared to the specified level, measured with a levelling ruler of 3 m.
- .3 Ensure that the base is not frozen and that there is no accumulation of stagnant water when installing the pavers.

### **3.4 INSTALLATION OF CURBS AND FENCES**

- .1 Install the curbs and fences at the specified level in accordance to the specifications of the manufacturer.

### **3.5 IMPLEMENTATION OF THE BEDDING**

- .1 Ensure that the materials intended to the realization of the bedding are neither frozen nor saturated with water when implementing the bedding.
- .2 Spread and level the materials on the base in a way to obtain a layer having a thickness equaling 15 mm after compaction, once the pavers placed with vibrating plates. Do not use the sand destined to fill the joints for the bedding.
- .3 Do not displace the leveled materials. Do not use the materials of the bedding to fill in the depressions of the base.

### **3.6 INSTALLATION OF THE CONCRETE PAVERS**

- .1 Install the pavers in accordance to the specified lines and model. The pavers should be separated from each other with a spacing in accordance to the specifications of the manufacturer.
- .2 Use the appropriate ending, edge or angular pavers when required. Cut with a saw the pavers that should be installed around obstacles or at meeting points with other objects.
- .3 Use vibrating plates with low amplitude and high speed, with a compaction force of at least 22 kN to partially drive in the pavers in the sand bedding.
- .4 Inspect the installed pavers and remove the pavers that are spalled, broken or damaged in any other way.
- .5 Fill the joints with the sand filling dry joints with a broom.
- .6 Tamp the sand by tamping the pavers with the vibrating plates.
- .7 Continue the spreading of the sand filling joints and tamping the pavers with vibrating plates till the joints are fully filled. Do not use the vibrating plates within one (1) m of the unsupported edges of the pavers.
- .8 Complete the installation up to one (1) m from the edge of the areas to be floored, by filling the joints with sand, at each end of working period.
- .9 Clean with a broom having thin brushes and remove any residuals with a blower.
- .10 Proceed to the drenching by sections of 20 m<sup>2</sup> (200 pi<sup>2</sup>) at a time. Ensure that the drenching of a section is completed before switching to another section. The drenching of the whole area should be done without interruptions.
- .11 Once the drenching is completed for a section around 92 m<sup>2</sup> (1000 pi<sup>2</sup>), use a blower for quickly expel the water from the area. This will allow the removal of the remaining sand and polymer residuals.
- .12 The final level of the paved area should not present any level difference of more or less than 10 mm compared to the specified level, measured with a levelling ruler of 3 m.
- .13 The level of the pavers should exceed by 3 to 4 mm the adjacent concrete sewer outlets, curbs and floor drains.

- .14 Ensure that the final level of pavers is in accordance with the requirements.

### **3.7 SAWING OF PAVERS**

- .1 The contractor should take care of the grinding of the saw lines so that the new pavers have a similar chamfer look as the original pavers.

### **3.8 CLEANING OF THE PRECAST CONCRETE PAVERS**

- .1 The cleaning should be done within the time and conditions required by the cleaning product manufacturer and in accordance to the instructions of the client contract administrator.
- .2 Clear the paved area from any non-adherent substance or material that don't belong to it.
- .3 Apply the appropriate cleaning products to clear the pavers from any stain in accordance to the manufacturer recommendations.
- .4 The final finishing area should be exempt from any stain.

### **3.9 CLEANING**

- .1 Once the installation works are finished, clear out all the exceeding materials, the scum materials, the tools and security barriers from the site.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 32 92 23 - Sodding

**1.2                REFERENCES**

- .1            Agriculture and Agri-Food Canada
  - .1            The Canadian System of Soil Classification, Third Edition, 1998.
- .2            Canadian Council of Ministers of the Environment
  - .1            PN1340-2005, Guidelines for Compost Quality.
- .3            U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1            EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

**1.3                DEFINITIONS**

- .1            Compost:
  - .1            Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  - .2            Compost is processed organic matter containing 40 % or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
  - .3            Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth and contain no toxic or growth inhibiting contaminants.
  - .4            Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).
- .2            Fertilizer: an industry-approved, nitrogen, phosphorus, potassium, and any other micronutrient suitable for plant species or specific applications or determined on the basis of soil testing.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2            Quality control submittals:
  - .1            Soil testing
    - .1            Submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

.2 Certificates

- .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**1.5 QUALITY ASSURANCE**

- .1 Quality control: in accordance with Section 01 45 00 – *Quality Control*.
- .2 Pre-installation meetings: in accordance with Section 01 31 19 – *Project Meetings*.
- .1 Conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

**1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse /recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
- .2 Divert unused soil amendments from landfill to an official hazardous material collections site approved by the Government Representative.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

**Part 2 Products**

**2.1 TOPSOIL**

- .1 Topsoil for seeded areas planting beds: mixture of particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth.
- .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
- .1 Debris and stones over 50 mm diameter.
- .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2 % of soil volume.
- .4 Consistence: friable when moist.

**2.2 SOIL AMENDMENTS**

- .1 Fertilizer: major soil nutrients present in following amounts:
- .1 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
- .2 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
- .3 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.

- .4 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
- .5 Ph value: 6.5 to 8.0.
- .2 Peatmoss:
  - .1 Derived from partially decomposed species of Sphagnum Mosses.
  - .2 Elastic and homogeneous, brown in colour.
  - .3 Free of wood and deleterious material which could prohibit growth.
  - .4 Shredded particle minimum size: 5 mm.
- .3 Sand: washed coarse silica sand, medium to coarse textured.
- .4 Organic matter
  - .1 Compost Category A, B in accordance with CCME; PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
  - .2 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .5 Limestone:
  - .1 Ground agricultural limestone.
  - .2 Gradation requirements: percentage passing by weight, 90 % passing 1.0 mm sieve, 50 % passing 0.125 mm sieve.

### **2.3 SOURCE QUALITY CONTROL**

- .1 Advise the Government Representative of sources of topsoil manufactured topsoil to be utilized with sufficient lead time for testing at least two (2) weeks before site delivery.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Testing of topsoil will be carried out by testing laboratory designated by the Government Representative.
  - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

## **Part 3 Execution**

### **3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Provide temporary erosion and sedimentation control measures in accordance with Section 01 35 43 – *Environmental Procedures*.

### **3.2 STRIPPING OF TOPSOIL**

- .1 Begin topsoil stripping of areas as indicated as directed by the Government Representative after area has been cleared of brush weeds grasses and removed from site.

- .2 Strip topsoil to depths as indicated as directed by the Government Representative.
  - .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Stockpile in locations as indicated directed by the Government Representative.
  - .1 Stockpile height not to exceed 2 m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by the Government Representative.
- .5 Protect stockpiles from contamination and compaction.

### **3.3 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify the Government Representative and do not commence work until instructed by the Government Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
  - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  - .2 Remove debris which protrudes more than 75 mm above surface.
  - .3 Dispose of removed material off site in accordance with Section 01 74 21 – *Construction/Demolition waste management and disposal.*
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### **3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL**

- .1 Place topsoil after the Government Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil as indicated to following minimum depths after settlement.
  - .1 150 mm for seeded areas.
  - .2 135 mm for sodded areas.
  - .3 300 mm for flower beds.
  - .4 500 mm for shrub beds.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

### **3.5 SOIL AMENDMENTS**

- .1 For planting beds turf: apply and thoroughly mix soil amendments into full specified depth of topsoil top 50 mm of existing soil, in the proportions provided by the supplier and in accordance with the testing laboratory's recommendations.

### **3.6 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by the Government Representative.
  - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

### **3.7 ACCEPTANCE**

- .1 The Government Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

### **3.8 SURPLUS MATERIAL**

- .1 Dispose of materials except topsoil not required off site where directed by the Government Representative and in accordance with Section 01 74 21 – *Construction/Demolition waste management and disposal*.

### **3.9 CLEANING**

- .1 Proceed in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- *Cleaning*.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21- *Construction/Demolition Waste Management and Disposal*.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 32 91 19.13 - Topsoil Placement and Grading

**1.2 REFERENCES**

Not used.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling: in accordance with Section 01 32 16.07 – *Construction Progress Schedule*.
  - .1 Schedule sod laying to coincide with preparation of soil surface.
  - .2 Schedule sod installation when frost is not present in ground.
- .2 Pre-Installation Meetings: in accordance with Section 01 31 19 - Project Meetings.
  - .1 Conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Technical Specifications:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - *Health and Safety Requirements*.
- .3 Samples:
  - .1 Submit:
    - .1 Sod for each type specified.
      - .1 Install approved samples in one (1) square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.
      - .2 Bio-degradable geotextile fabric.
      - .3 0.5 kg container of each type of fertilizer used.
    - .2 Obtain approval of samples by the Government Representative.
- .4 Certificates
  - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

- .5 Test Reports
  - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

## **1.5 QUALITY ASSURANCE**

- .1 Quality control: in accordance with Section 01 45 00 – *Quality Control*.
- .2 Qualifications:
  - .1 Landscape Contractor: to be a Member in good standing of the *Association des paysagistes professionnels du Québec (APPQ)* or any other horticultural association approved by the Government Representative.
  - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
  - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - *Common Product Requirements* and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with supplier's recommendations.
  - .2 Replace defective or damaged materials with new.
- .4 Develop a construction waste management plan for the works covered by this section in accordance with Section 01 74 21 – *Construction/Demolition Waste Management and Disposal*.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
  - .1 Turf Grass Nursery Sod types:
    - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50 % Kentucky Bluegrass cultivars.

- .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40 % Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
- .3 Number One Named Cultivars: Nursery Sod grown from certified seed.
- .2 Turf Grass Nursery Sod quality:
  - .1 Not more than 1 broadleaf weed and up to 1 % native grasses per forty (40) square metres.
  - .2 Density of sod sufficient so that no soil is visible from height of 1,500 mm when mown to height of 50 mm.
  - .3 Mowing height limit: 35 to 65 mm.
  - .4 Soil portion of sod: 6 to 15 mm in thickness.
- .2 Commercial Grade Turf Grass Nursery:
  - .1 Mow sod at height directed by Government Representative DCC Representative Government Representative within thirty-six (36) hours prior to lifting, and remove clippings.
  - .2 Not more than five (5) broadleaf weeds and up to 20 % native grasses per forty (40) square metres.
- .3 Sod establishment support:
  - .1 Biodegradable geotextile, square mesh.
  - .2 Wooden pegs: 17 x 8 x 200 mm.
  - .3 Biodegradable starch pegs: 17 x 8 x 200 mm.
- .4 Water:
  - .1 Supplied by the Contractor.
- .5 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
  - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

## 2.2 SOURCE QUALITY CONTROL

- .1 Submit to the Government Representative, at least two (2) weeks prior to delivery, the proposed source of sod and obtain written approval. No other source shall be accepted without written approval from the Government Representative.
- .2 When proposed source of sod is approved, use no other source without written authorization from the Government Representative.

### **Part 3 Execution**

#### **3.1 INSTALLERS**

- .1 Installers must be members in good standing of the *Association des paysagistes professionnels du Québec* (APPQ) or any other horticultural association approved by the Government Representative.

#### **3.2 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for sod installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of the Government Representative.
  - .2 Inform the Government Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Government Representative.

#### **3.3 PREPARATION**

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - *Topsoil Placement and Grading*. If discrepancies occur, notify the Government Representative, and commence work when instructed by the Government Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as directed by the Government Representative in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

#### **3.4 IMPLEMENTATION**

- .1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.
- .2 Lawn sodding periods are between late thaw and June 15th (spring), and between August 15th and the beginning of the frost (fall season).
- .3 Do not perform work when conditions are unfavorable, such as when the ground is frozen or damp, or when covered with snow, ice or stagnant water.
- .4 Sod must be delivered within twenty-four (24) hours of collection. They must be laid within 48 hours of collection.
- .5 In dry weather, before laying sod sections, the Contractor must protect them to maintain their vitality by maintaining sufficient moisture to prevent the soil from becoming detached during handling.

### **3.5 SOD PLACEMENT**

- .1 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .2 Roll sod as directed by the Government Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.
- .3 Water sufficiently so that water penetrates and soaks grass sections to the ground immediately after laying sod sheets.

### **3.6 SOD PLACEMENT ON SLOPES AND PEGGING**

- .1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
- .2 Start laying sod at bottom of slopes.
- .3 Unroll sod sections perpendicular to slope, using offset joints. Tighten them one against the other to leave no voids, but do not overlap. Cut narrow or irregularly shaped sections using sharp tools.
- .4 Plant stakes in sod laid on steep slopes, whose gradient exceeds 1/3, and the on the sod placed within 1 m of manholes and less than 1 m from canals and drainage ditches. Arrange stakes as follows:
  - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
  - .2 No less than 3 pegs per square metre.
  - .3 No less than 6 pegs per square metre in drainage structures. Adjust pattern as directed by the Government Representative.
  - .4 Drive pegs vertically so that they are 20 mm above soil surface of sod sections.
- .5 Water sufficiently so that water penetrates and soaks sod sections to the ground immediately after laying sod sheets.

### **3.7 FERTILIZING PROGRAM**

- .1 Fertilize during formation and warranty periods.
- .2 Apply fertilizer uniformly, the basic formula of which meets 1-3-1 providing a minimum of 25 kg / ha of nitrogen (N), 75 kg / ha of phosphorus (P<sub>2</sub>O<sub>5</sub>) and 25 kg / Ha of potassium (K<sub>2</sub>O). The recommendations of the laboratory performing the soil analysis take precedence over the above requirements

### **3.8 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
  - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Clean and reinstate areas affected by Work.
- .3 Waste Management: separate waste materials for reuse, compost, and recycling 01 74 21 - *Construction/Demolition Waste Management and Disposal*.
  - .1 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.
  - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by the Government Representative.

### **3.9 PROTECTION BARRIERS**

- .1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by the Government Representative.
- .2 Remove protection after inspection as directed by the Government Representative.

### **3.10 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following operations from time of installation until acceptance.
  - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to a depth of 75 mm.
  - .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
  - .3 Maintain sodded areas weed free 95%.
  - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
  - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

### **3.11 ACCEPTANCE**

- .1 Turf Grass Nursery Sod areas will be accepted by the Government Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Sod is free of bare and dead spots.
  - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
  - .4 Sodded areas have been cut minimum two (2) times prior to acceptance.
- .2 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by the Government Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.

- .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
  - .4 Sodded areas have been cut minimum two (2) times prior to acceptance.
  - .5 Fertilizing in accordance with fertilizer program has been carried out at least once.
- .3 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
  - .4 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

### **3.12 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Perform following operations from time of acceptance until end of warranty period:
  - .1 Water sodded Turf Grass Nursery Sod Commercial Grade Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
  - .2 Repair and re-sod dead or bare spots to satisfaction of the Government Representative.
  - .3 Cut grass and remove clippings that will smother grass as directed by the Government Representative to height as follows:
    - .1 Turf Grass Nursery Sod:
      - .1 50 mm during normal growing conditions.
    - .2 Commercial Grade Turf Grass Nursery Sod:
      - .1 60 mm during normal growing conditions.
  - .3 Cut grass at two (2) week intervals; at intervals where approximately one third of growth is removed in single cut.
  - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
  - .5 Remove weeds by mechanical means.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 02 41 99 – Demolition For Minor Works

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - *Submittal Procedures*.
- .2 Product data
  - .1 Submit manufacturer's printed product literature, specifications, and datasheet.

**1.3 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse recycling in accordance with Section 01 74 21 - *Construction/Demolition Waste Management and Disposal*.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Bollards: in molded carbon or steel. There are existing bollards that must be dismantled and put back into position.

**Part 3 Execution**

**3.1 SETTING AND GROUTING**

- .1 Set mooring devices at locations and elevations following the surveying report.

**3.2 CLEANING**

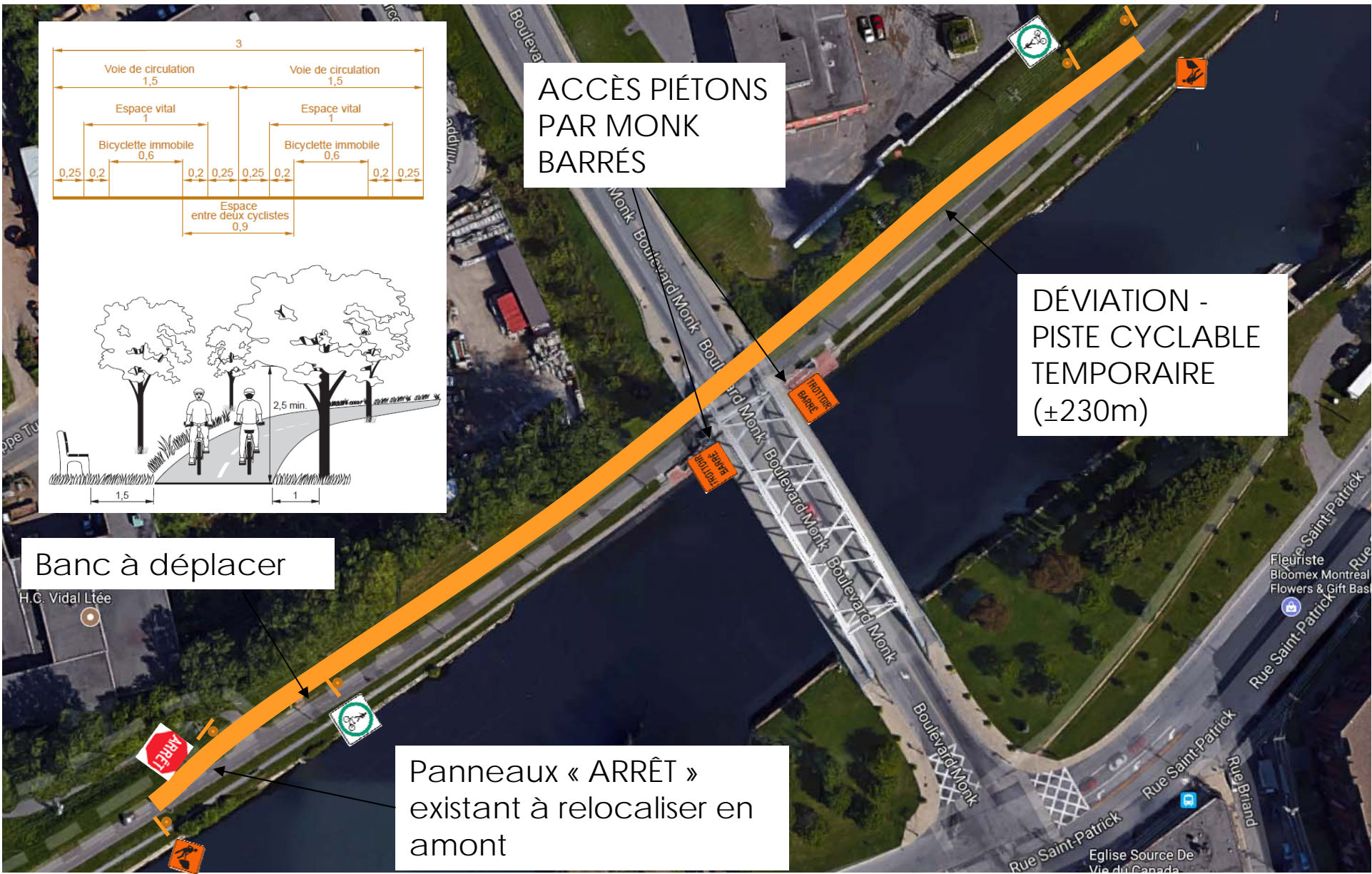
- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - *Cleaning*.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - *Cleaning*.

**END OF SECTION**



**REHABILITATION LACHINE CANAL WALLS  
REPAIR AND REPLACEMENT OF THE CROWNING  
WALLS AND SEAT REPAIRS  
(Areas 13.1, 13.2, 13.3, 13.4, 13.5 and 13.6 – Reach No 4)  
Project N° CLAC-1455-04**

**ANNEX I - Temporary deviation**

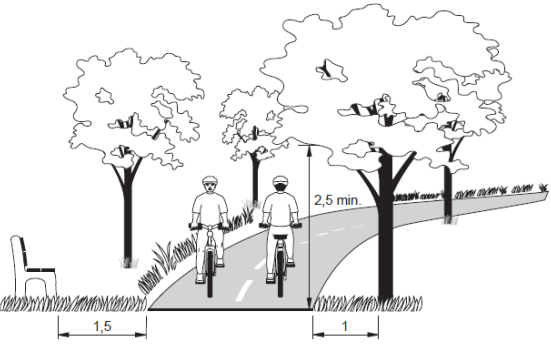
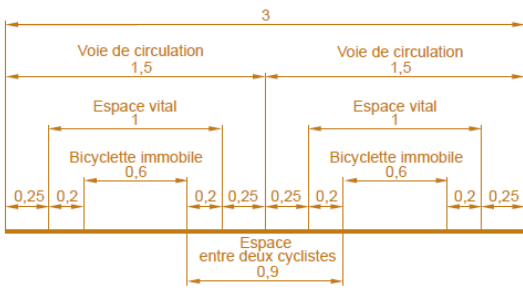


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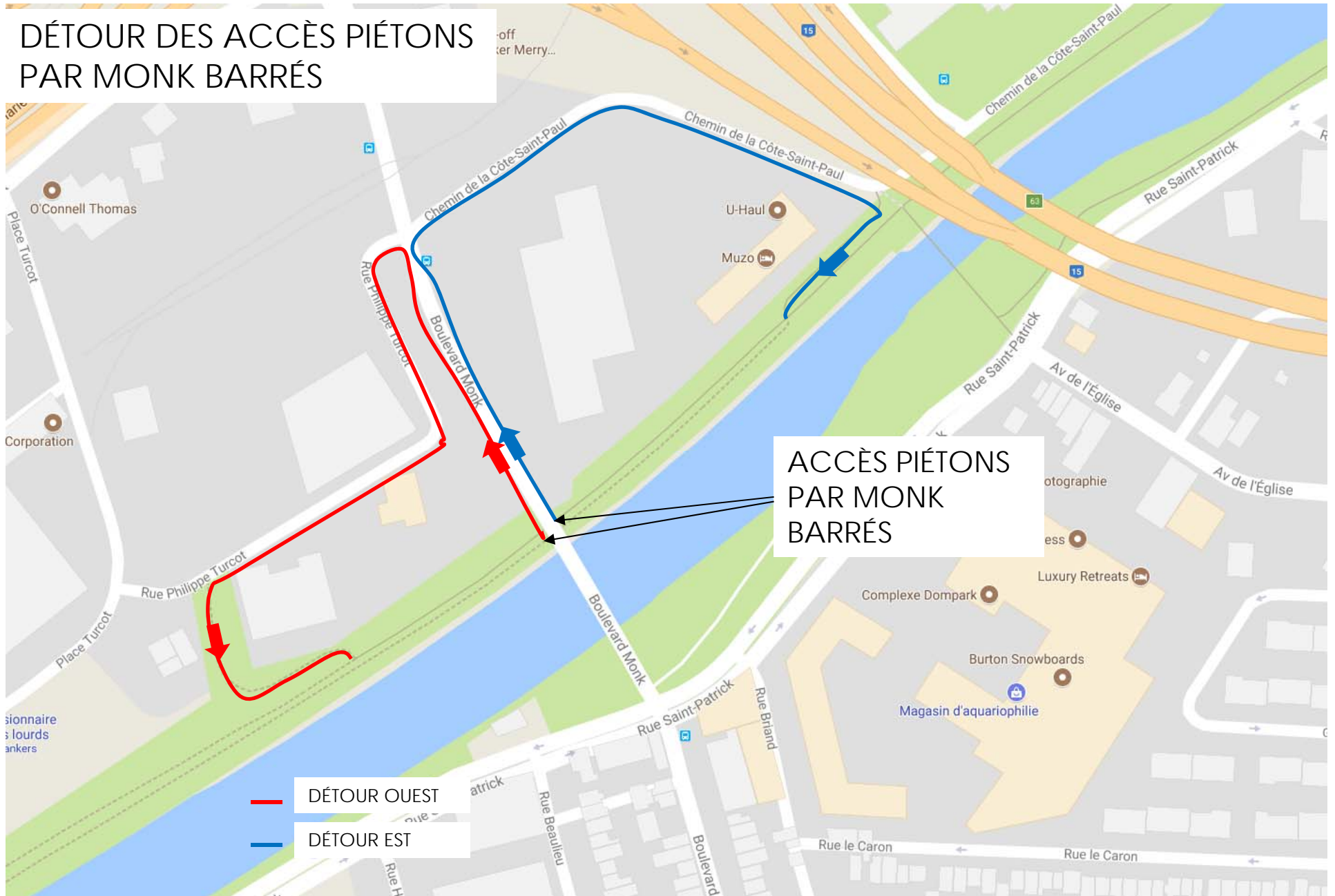
DÉVIATION -  
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Banc à déplacer

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# DÉTOUR DES ACCÈS PIÉTONS PAR MONK BARRÉS



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PAR MONK  
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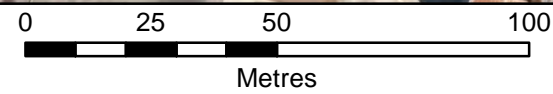
**REHABILITATION LACHINE CANAL WALLS  
REPAIR AND REPLACEMENT OF THE CROWNING  
WALLS AND SEAT REPAIRS  
(Areas 13.1, 13.2, 13.3, 13.4, 13.5 and 13.6 – Reach No 4)  
Project N° CLAC-1455-04**

**ANNEX II - PAC Property plans**

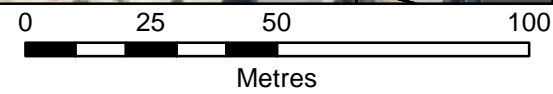




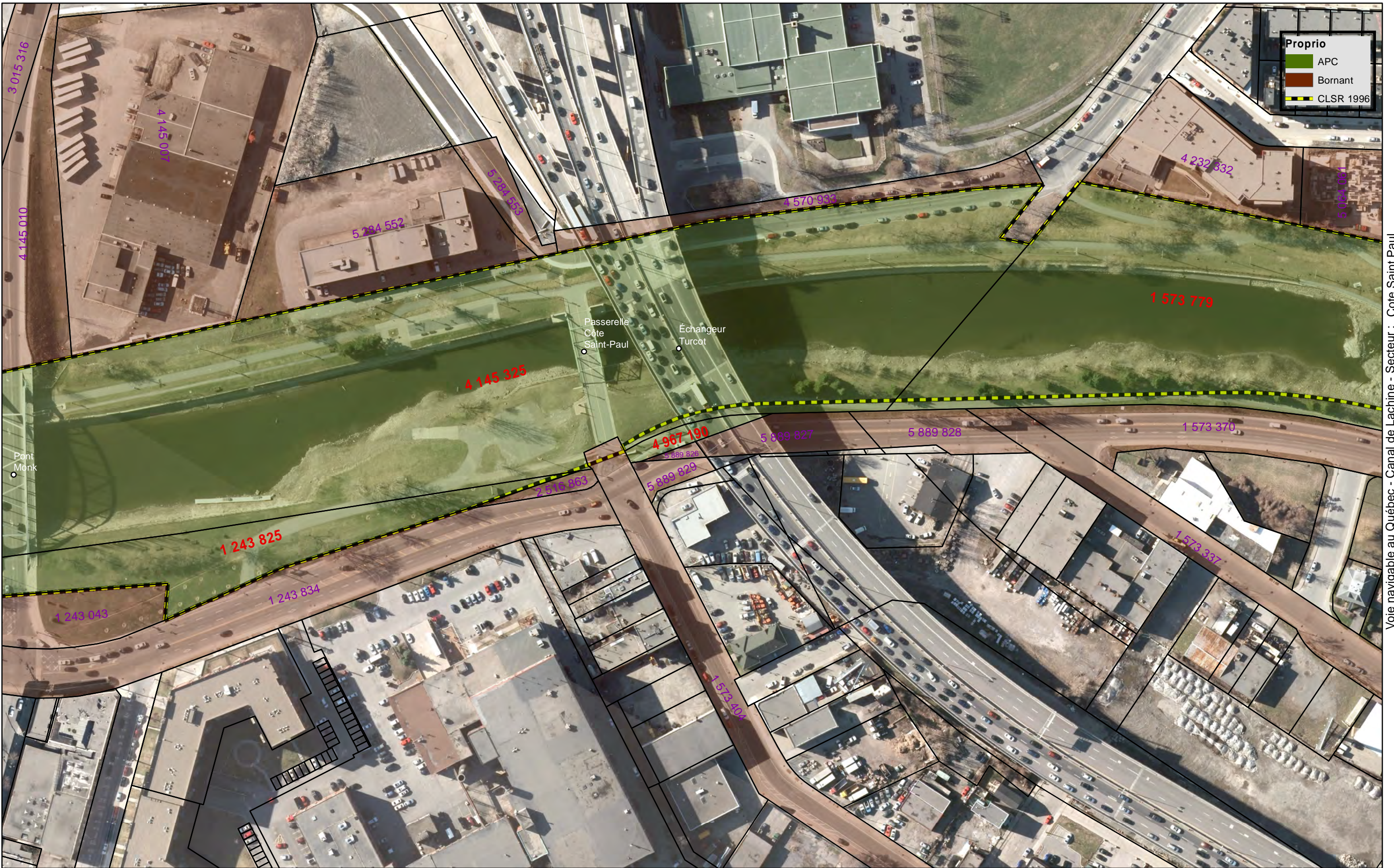




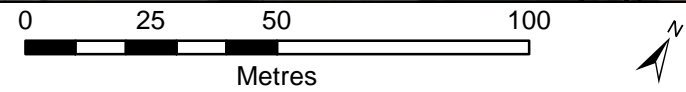








Voie navigable au Québec - Canal de Lachine - Secteur : Côte Saint Paul





**REHABILITATION LACHINE CANAL WALLS  
REPAIR AND REPLACEMENT OF THE CROWNING  
WALLS AND SEAT REPAIRS  
(Areas 13.1, 13.2, 13.3, 13.4, 13.5 and 13.6 – Reach No 4)  
Project N° CLAC-1455-04**

**ANNEX III - Photos of Crowning Wall**



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



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CLAC-PIF-894-B4N43-13



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# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N44-01



CLAC-PIF-894-B4N44-02



CLAC-PIF-894-B4N44-03



CLAC-PIF-894-B4N44-04



CLAC-PIF-894-B4N44-05



CLAC-PIF-894-B4N44-06



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N44-07



CLAC-PIF-894-B4N44-08



CLAC-PIF-894-B4N44-09



CLAC-PIF-894-B4N44-10



CLAC-PIF-894-B4N44-11



CLAC-PIF-894-B4N44-12



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N44-13



CLAC-PIF-894-B4N44-14



CLAC-PIF-894-B4N44-15



CLAC-PIF-894-B4N44-16



CLAC-PIF-894-B4N44-17



CLAC-PIF-894-B4N44-18



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N45-01



CLAC-PIF-894-B4N45-02



CLAC-PIF-894-B4N45-03



CLAC-PIF-894-B4N45-04



CLAC-PIF-894-B4N45-05



CLAC-PIF-894-B4N45-06



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N45-07



CLAC-PIF-894-B4N45-08



CLAC-PIF-894-B4N45-09



CLAC-PIF-894-B4N45-10



CLAC-PIF-894-B4N45-11



CLAC-PIF-894-B4N45-12



# MURS DU CANAL-DE-LACHINE CLAC-1455-04-RMUR



CLAC-PIF-894-B4N45-13



CLAC-PIF-894-B4N45-14



CLAC-PIF-894-B4N45-15



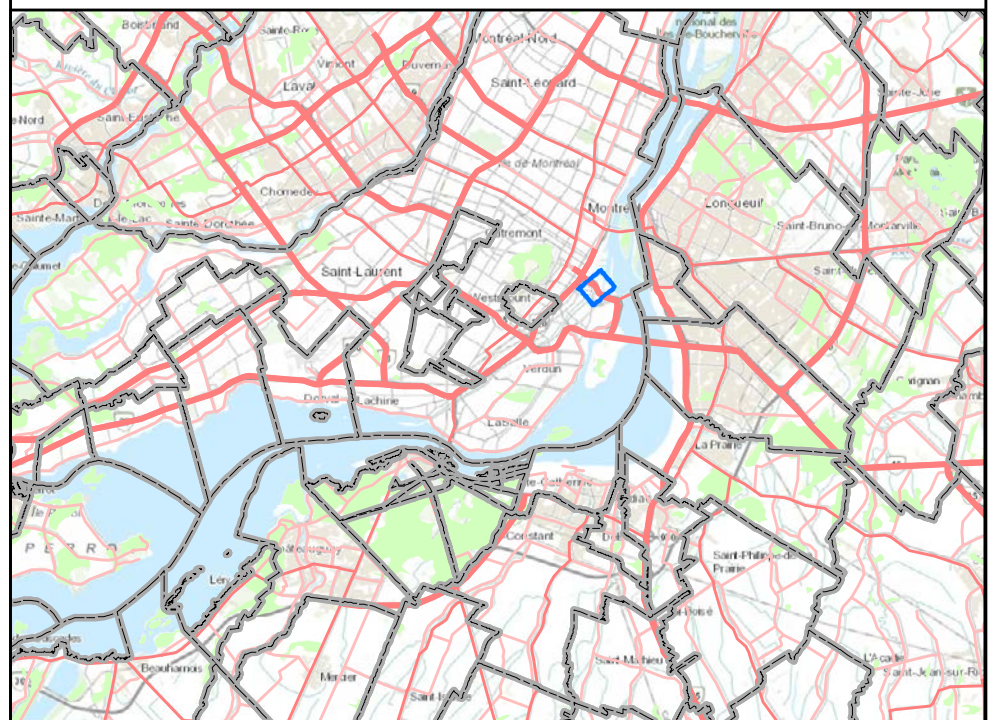
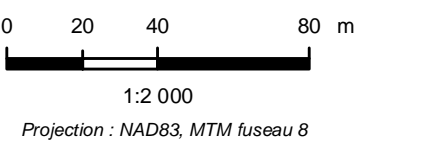
**REHABILITATION LACHINE CANAL WALLS  
REPAIR AND REPLACEMENT OF THE CROWNING  
WALLS AND SEAT REPAIRS  
(Areas 13.1, 13.2, 13.3, 13.4, 13.5 and 13.6 – Reach No 4))  
Project N° CLAC-1455-044**

**ANNEX IV - Plans of valued environmental  
components**





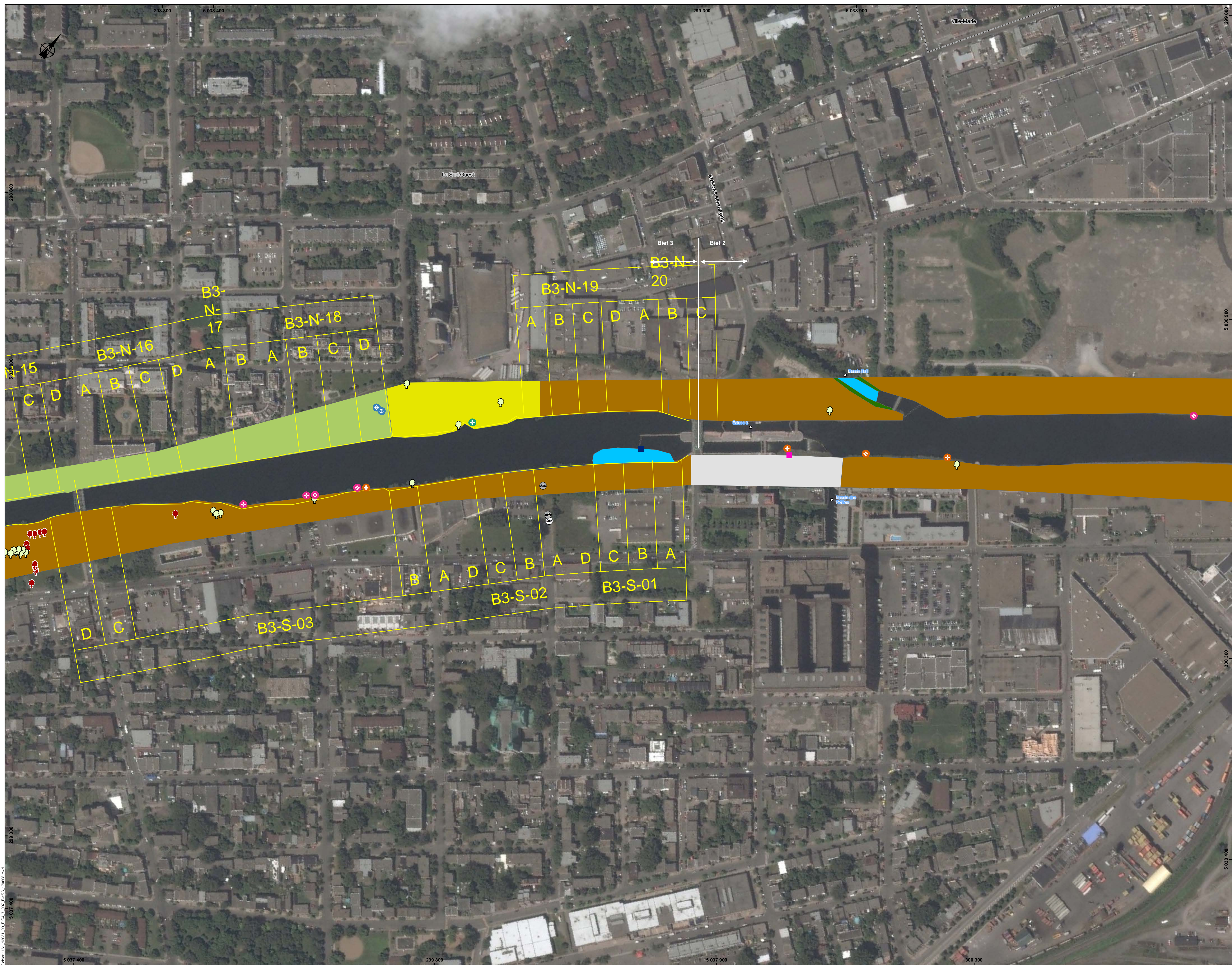
- Limite municipale
- Limite d'arrondissement
- Section du canal
- Espèce envahissantes (APC, 2016)**
  - Nerprun cathartique
  - Alpiste roseau
  - Butome à ombelle
  - Phragmite commun
- Plantes irritantes (APC, 2016)**
  - Herbe à puce
  - Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - Frêne
  - Micocoulier
- Occurrences Fauniques GENIVAR (2008-2009)**
  - Ouaouaron
  - Grande chauve-souris brune
  - Chauve-souris cendrée
  - Couleuvre brune
- WSP (2016)**
  - Colonie d'hirondelles
  - Couple de Crécerelle d'Amérique
  - Couple de faucon pèlerin
  - Martinet ramoneur en vol
  - Tortue géographique et tortues
  - Martinets ramoneur en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - Eaux calmes et végétation
  - Herbier aquatique
  - Milieu arboré
  - Milieu ouvert et orée des bois
  - Rive rocheuse
  - Troncs et roches émergents
  - Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - Herbier aquatique
  - Lisière boisée
  - Milieu anthropique
  - Zone mixte (anthropique, pelouse et arbres)
  - Parc aménagé
  - Zone gazonnée et arbres



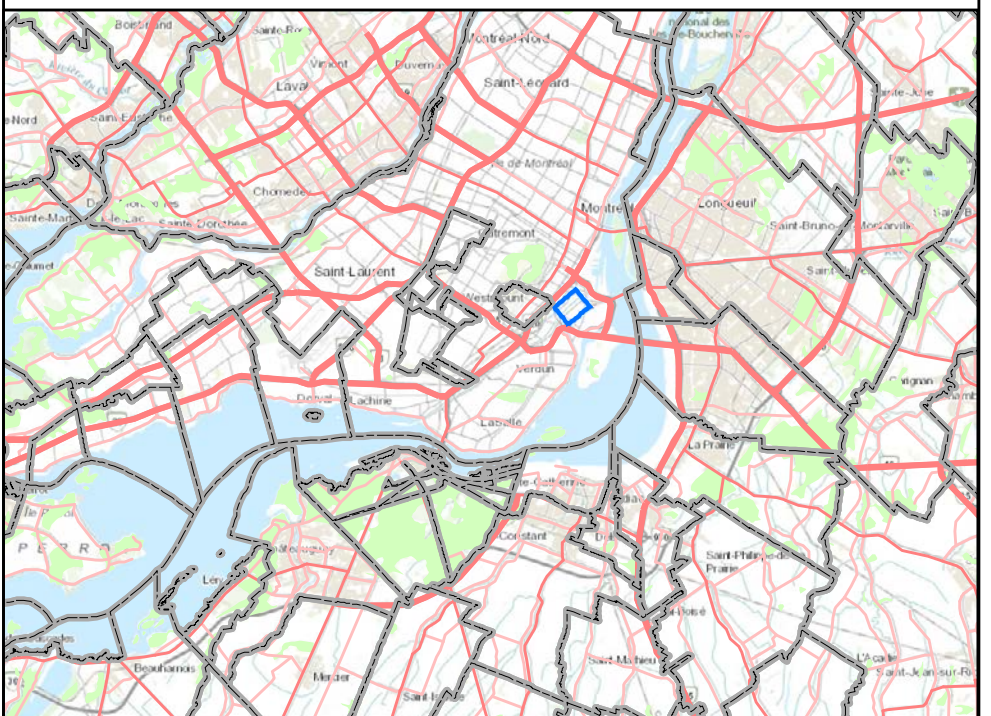
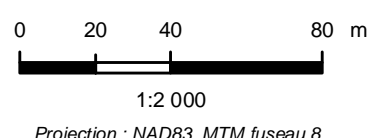
**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
Canal Lachine, Montréal, Qc.

**Carte 4-6**  
**Composantes valorisées - Biefs 1 et 2.**





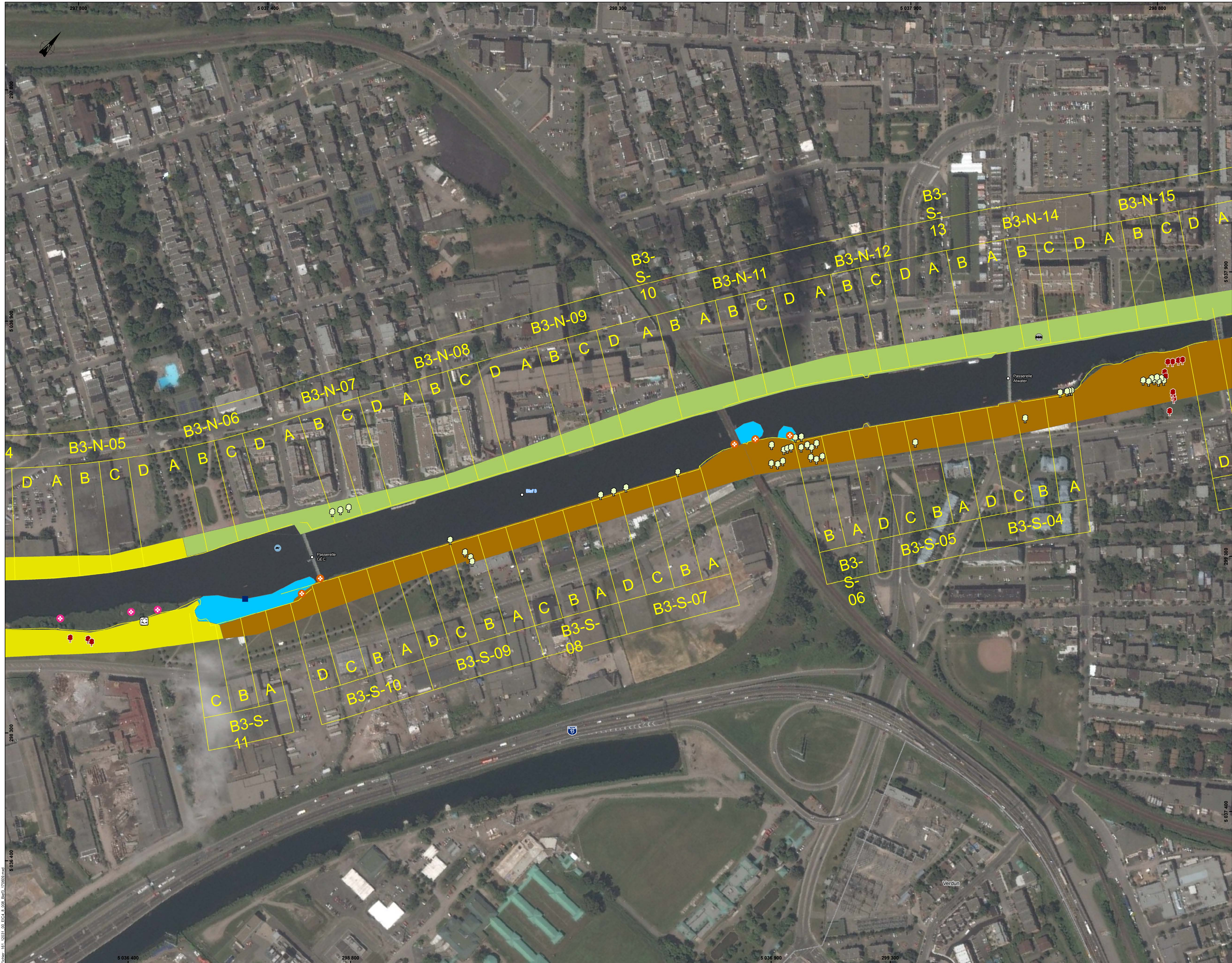
- Limite municipale
- Limite d'arrondissement
- Section du canal
- Espèce envahissantes (APC, 2016)**
  - Nerprun cathartique
  - Alpiste roseau
  - Butome à ombelle
  - Phragmite commun
- Plantes irritantes (APC, 2016)**
  - Herbe à puce
  - Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - Frêne
  - Micocoulier
- Occurrences Fauniques GENIVAR (2008-2009)**
  - Ouaouaron
  - Grande chauve-souris brune
  - Chauve-souris cendrée
  - Couleuvre brune
- WSP (2016)**
  - Colonie d'hirondelles
  - Couple de Crécerelle d'Amérique
  - Couple de faucon pèlerin
  - Martinet ramoneurs en vol
  - Tortue géographique et tortues
  - Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - Eaux calmes et végétation
  - Herbier aquatique
  - Milieu arboré
  - Milieu ouvert et orée des bois
  - Rive rocheuse
  - Troncs et roches émergents
  - Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - Herbier aquatique
  - Lisière boisée
  - Milieu anthropique
  - Zone mixte (anthropique, pelouse et arbres)
  - Parc aménagé
  - Zone gazonnée et arbres



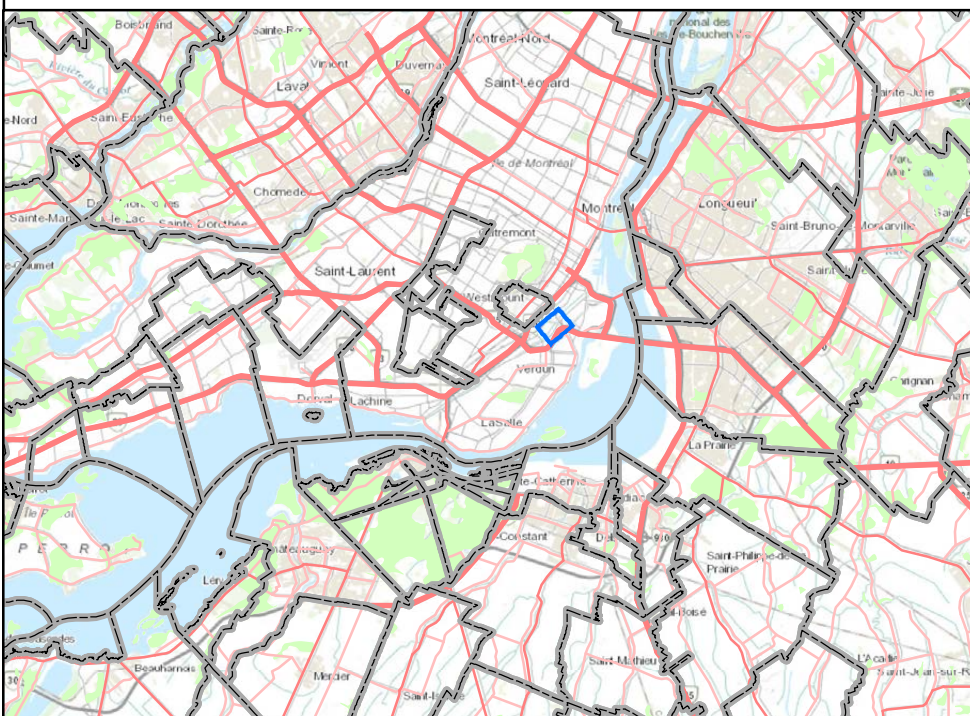
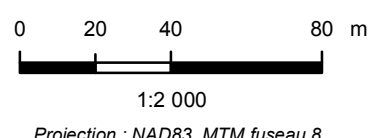
ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR  
Canal Lachine, Montréal, Qc.

**Carte 4-7**  
**Composantes valorisées - Biefs 2 et 3.**





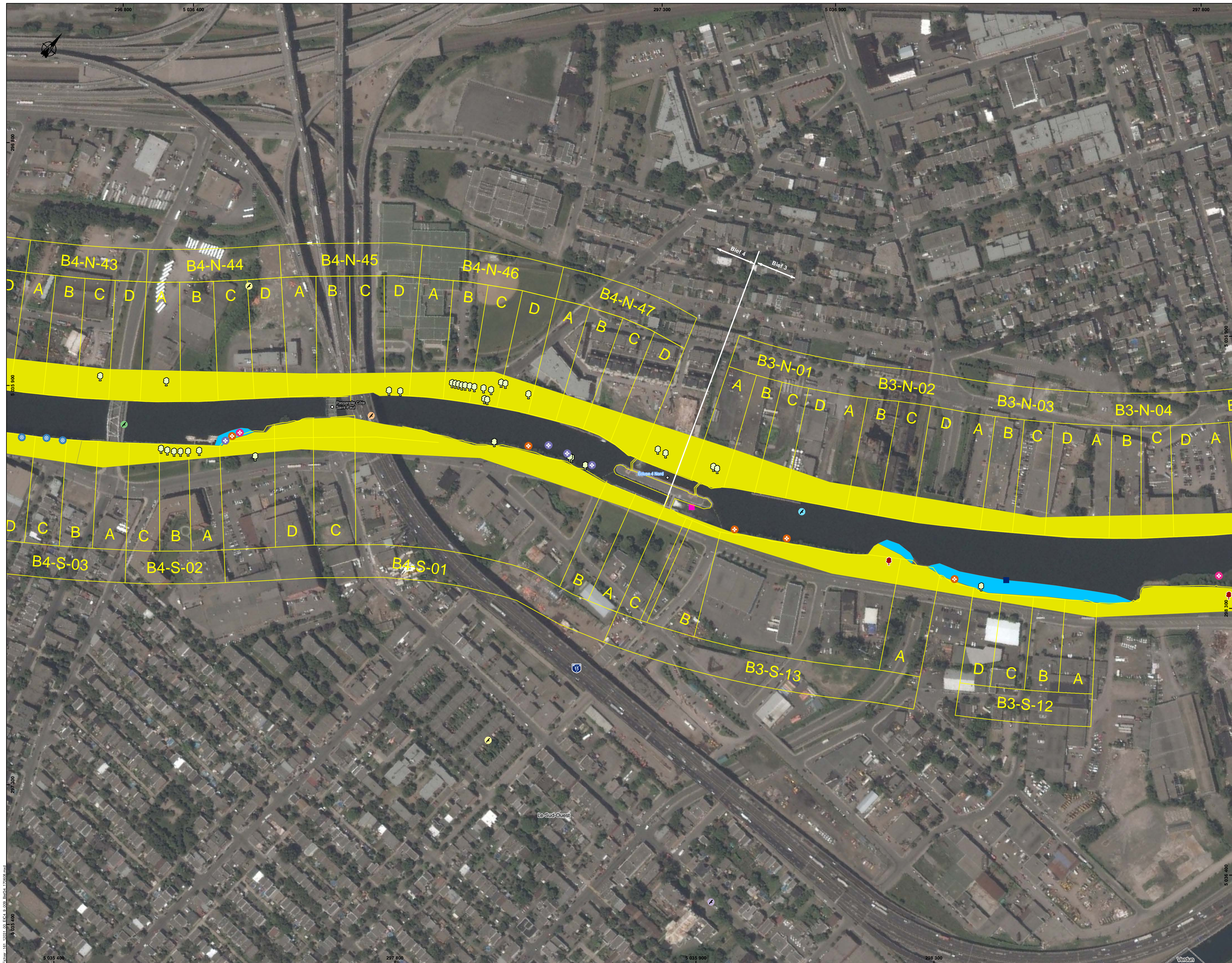
- ▭ Limite municipale
- ▭ Limite d'arrondissement
- ▭ Section du canal
- Espèce envahissantes (APC, 2016)**
  - ⊕ Nerprun cathartique
  - ⊕ Alpiniste roseau
  - ⊕ Butome à ombelle
  - ⊕ Phragmite commun
- Plantes irritantes (APC, 2016)**
  - ⊕ Herbe à puce
  - ⊕ Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - ⊕ Frêne
  - ⊕ Micocoulier
- Occurrences Fauniques**  
GENIVAR (2009-2009)
  - ⊕ Ououaron
  - ⊕ Grande chauve-souris brune
  - ⊕ Chauve-souris cendrée
  - ⊕ Couleuvre brune
- WSP (2016)**
  - ⊕ Colonie d'hirondelles
  - ⊕ Couple de Crécerelle d'Amérique
  - ⊕ Couple de faucon pèlerin
  - ⊕ Martinet ramoneurs en vol
  - ⊕ Tortue géographique et tortues
  - ⊕ Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - ▭ Eaux calmes et végétation
  - ▭ Herbier aquatique
  - ▭ Milieu arboré
  - ▭ Milieu ouvert et orée des bois
  - ▭ Rive rocheuse
  - ▭ Troncs et roches émergents
  - ▭ Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - ▭ Herbier aquatique
  - ▭ Lisière boisée
  - ▭ Milieu anthropique
  - ▭ Zone mixte (anthropique, pelouse et arbres)
  - ▭ Parc aménagé
  - ▭ Zone gazonnée et arbres



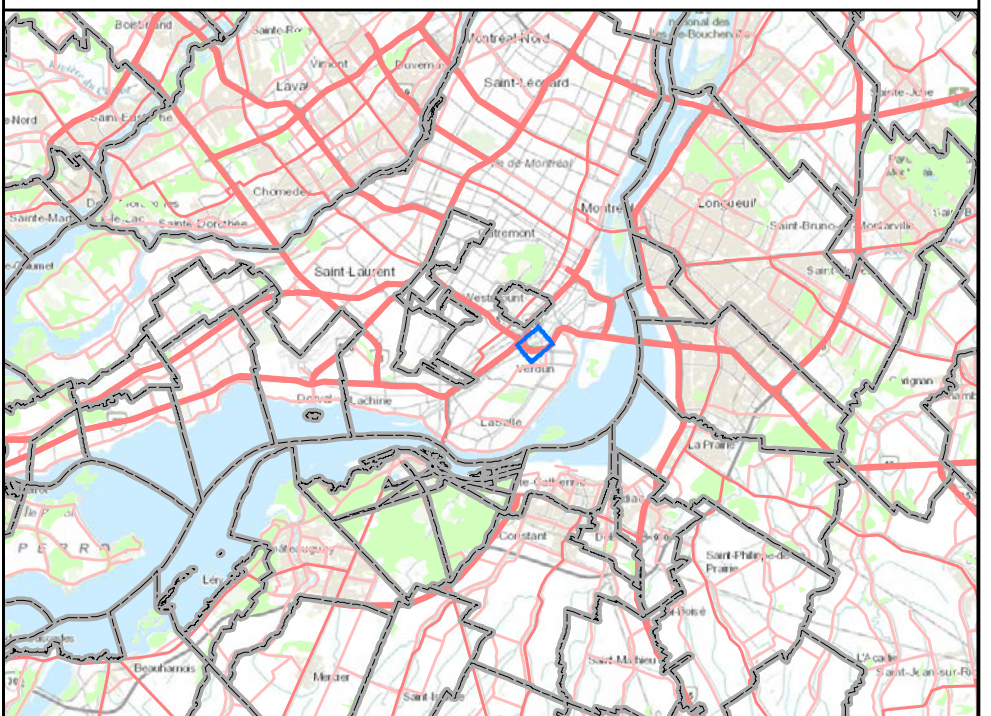
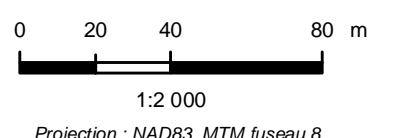
**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
Canal Lachine, Montréal, Qc.

**Carte 4-8**  
**Composantes valorisées - Bief 3.**





- ▭ Limite municipale
- ▭ Limite d'arrondissement
- ▭ Section du canal
- Espèce envahissantes (APC, 2016)**
- ⊕ Nerprun cathartique
- ⊕ Alpiniste roseau
- ⊕ Butome à ombelle
- ⊕ Phragmite commun
- Plantes irritantes (APC, 2016)**
- ⊕ Herbe à puce
- ⊕ Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
- ⊕ Frêne
- ⊕ Micocoulier
- Occurrences Fauniques**
- GENIVAR (2008-2009)
- ⊕ Ouaouaron
- ⊕ Grande chauve-souris brune
- ⊕ Chauve-souris cendrée
- ⊕ Couleuvre brune
- WSP (2016)
- ⊕ Colombie d'hirondelles
- ⊕ Couple de Crécerelle d'Amérique
- ⊕ Couple de faucon pèlerin
- ⊕ Martinet ramoneurs en vol
- ⊕ Tortue géographique et tortues
- ⊕ Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
- ▭ Eaux calmes et végétation
- ▭ Herbier aquatique
- ▭ Milieu arboré
- ▭ Milieu ouvert et orée des bois
- ▭ Rive rocheuse
- ▭ Troncs et roches émergents
- ▭ Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
- ▭ Herbier aquatique
- ▭ Lisière boisée
- ▭ Milieu anthropique
- ▭ Zone mixte (anthropique, pelouse et arbres)
- ▭ Parc aménagé
- ▭ Zone gazonnée et arbres



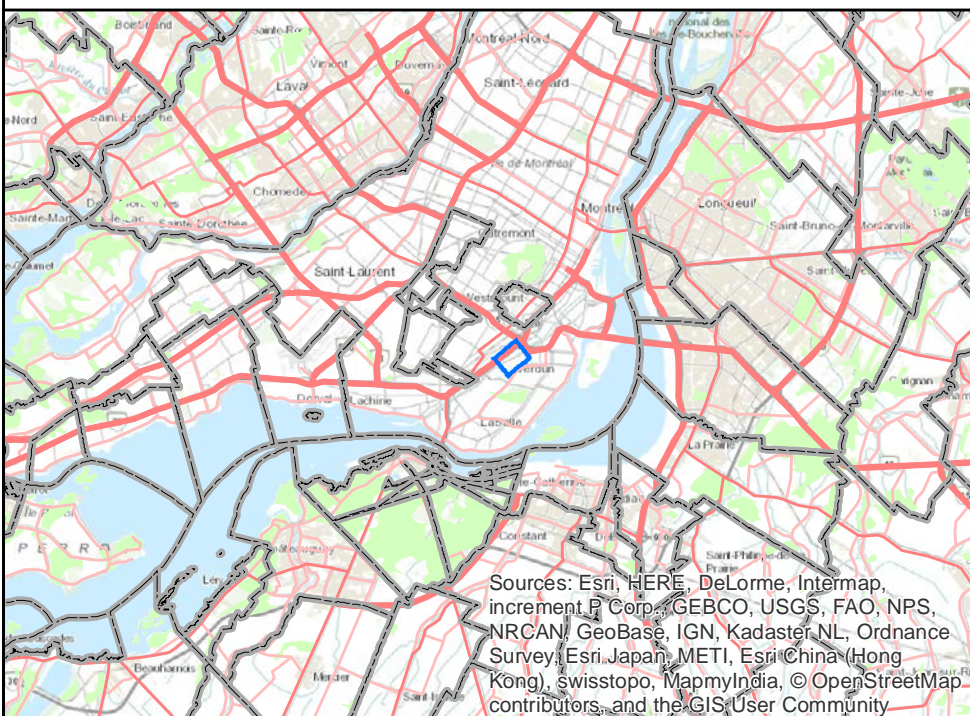
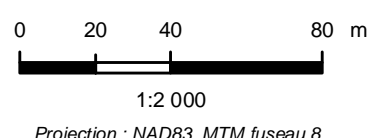
**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
Canal Lachine, Montréal, Qc.

**Carte 4-9**  
**Composantes valorisées - Biefs 3 et 4.**





- ▭ Limite municipale
- ▭ Limite d'arrondissement
- ▭ Section du canal
- Espèce envahissantes (APC, 2016)**
  - ⊕ Nerprun cathartique
  - ⊕ Alpiniste roseau
  - ⊕ Butome à ombelle
  - ⊕ Phragmite commun
- Plantes irritantes (APC, 2016)**
  - ⊕ Herbe à puce
  - ⊕ Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - ⊕ Frêne
  - ⊕ Micocoulier
- Occurrences Fauniques**  
GENIVAR (2008-2009)
  - ⊕ Ouaouaron
  - ⊕ Grande chauve-souris brune
  - ⊕ Chauve-souris cendrée
  - ⊕ Couleuvre brune
- WSP (2016)**
  - ⊕ Colonie d'hirondelles
  - ⊕ Couple de Crécerelle d'Amérique
  - ⊕ Couple de faucon pèlerin
  - ⊕ Martinet ramoneurs en vol
  - ⊕ Tortue géographique et tortues
  - ⊕ Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - ▭ Eaux calmes et végétation
  - ▭ Herbière aquatique
  - ▭ Milieu arboré
  - ▭ Milieu ouvert et orée des bois
  - ▭ Rive rocheuse
  - ▭ Troncs et roches émergents
  - ▭ Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - ▭ Herbière aquatique
  - ▭ Lisière boisée
  - ▭ Milieu anthropique
  - ▭ Zone mixte (anthropique, pelouse et arbres)
  - ▭ Parc aménagé
  - ▭ Zone gazonnée et arbres



Canada

**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**

Canal Lachine, Montréal, Qc.

**Carte 4-10**

**Composantes valorisées - Bief 4.**

Sources : - MRNF, 31 H4-200-101  
- ESR World topographic map

Préparée par : J. Carreau  
Designée par : P. Cordeau  
Vérifiée par : J.-P. Rioux

08 juin 2017 161-12031-00

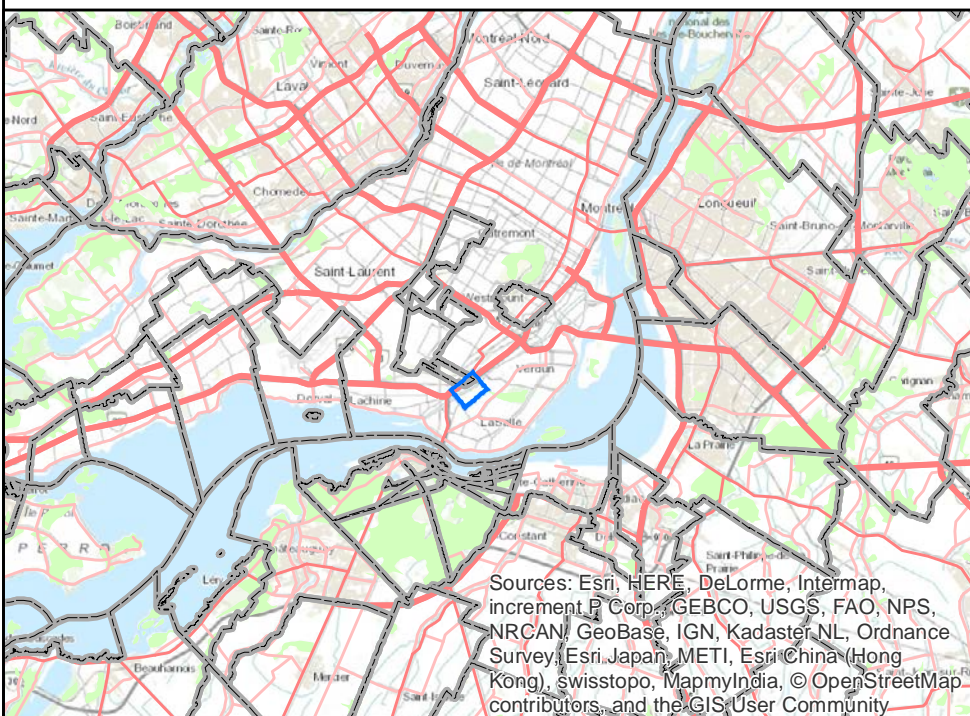
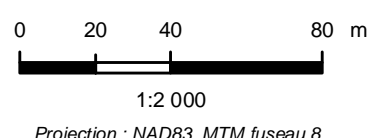








- ▭ Limite municipale
- ▭ Limite d'arrondissement
- ▭ Section du canal
- Espèce envahissantes (APC, 2016)**
  - ⊕ Nerprun cathartique
  - ⊕ Alpiste roseau
  - ⊕ Butome à ombelle
  - ⊕ Phragmite commun
- Plantes irritantes (APC, 2016)**
  - ⊕ Herbe à puce
  - ⊕ Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - ⊕ Frêne
  - ⊕ Micocoulier
- Occurrences Fauniques**  
GENIVAR (2008-2009)
  - ⊕ Ouaouaron
  - ⊕ Grande chauve-souris brune
  - ⊕ Chauve-souris cendrée
  - ⊕ Couleuvre brune
- WSP (2016)
  - ⊕ Colonie d'hirondelles
  - ⊕ Couple de Crécerelle d'Amérique
  - ⊕ Couple de faucon pèlerin
  - ⊕ Martinet ramoneurs en vol
  - ⊕ Tortue géographique et tortues
  - ⊕ Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - ▭ Eaux calmes et végétation
  - ▭ Herbier aquatique
  - ▭ Milieu arboré
  - ▭ Milieu ouvert et orée des bois
  - ▭ Rive rocheuse
  - ▭ Troncs et roches émergents
  - ▭ Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - ▭ Herbier aquatique
  - ▭ Lisière boisée
  - ▭ Milieu anthropique
  - ▭ Zone mixte (anthropique, pelouse et arbres)
  - ▭ Parc aménagé
  - ▭ Zone gazonnée et arbres



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox, © OpenStreetMap contributors, and the GIS User Community

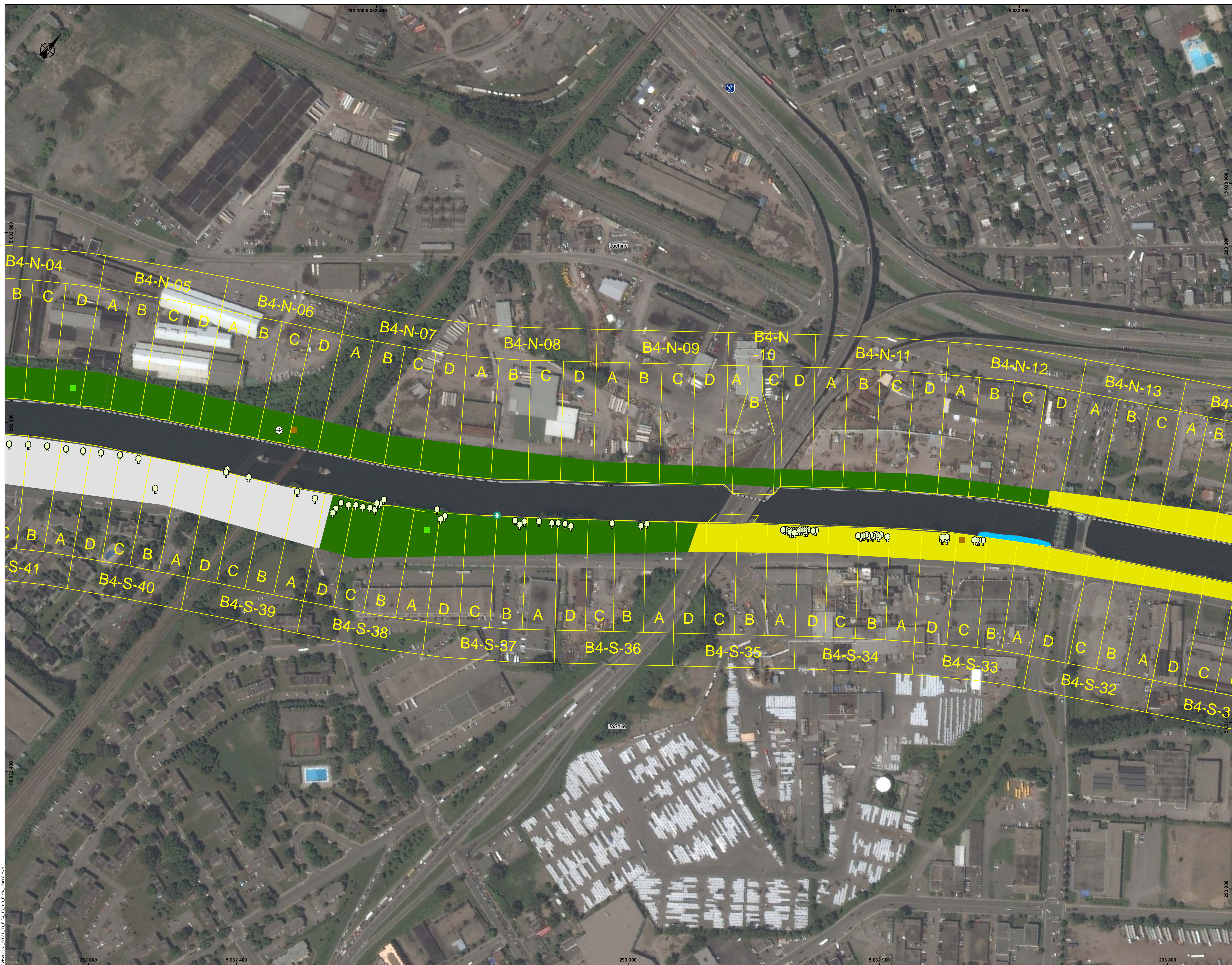
**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
 Canal Lachine, Montréal, Qc.

**Carte 4-12**  
**Composantes valorisées - Bief 4.**

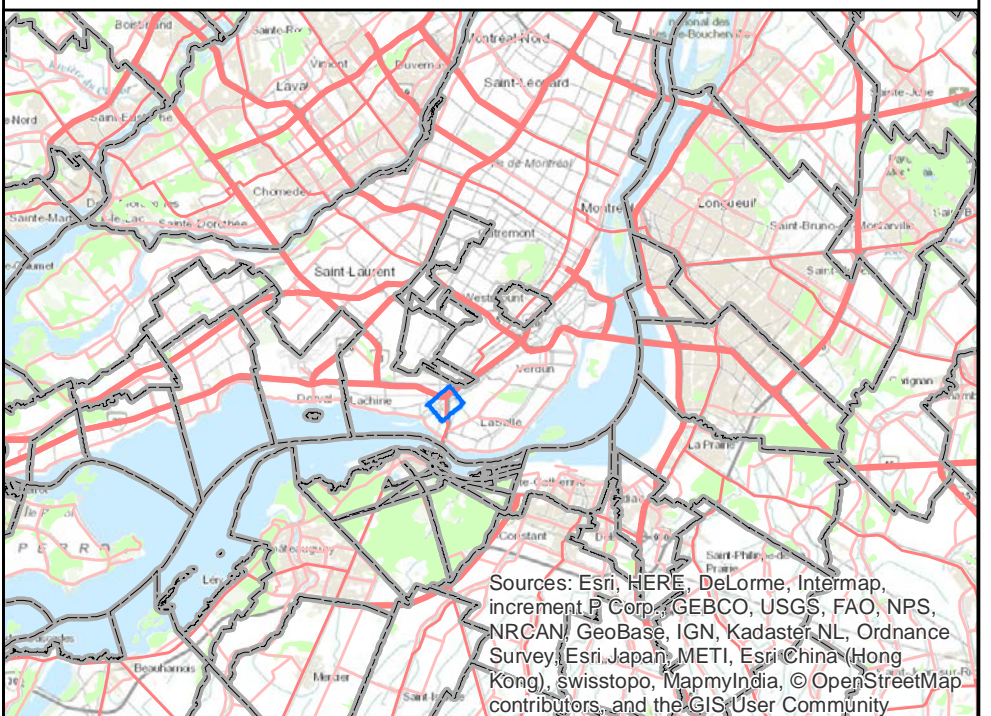
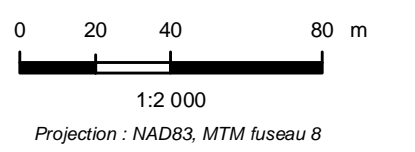
Sources : MRNF, 31 H14-200-101 - ESRI World Topographic Map  
 Préparée par : J. Carreau  
 Destinée par : P. Corbeil  
 Vérifiée par : J.-P. Rivest

08 juin 2017 161-12031-00





- ▭ Limite municipale
- ▭ Limite d'arrondissement
- ▭ Section du canal
- Espèce envahissantes (APC, 2016)**
  - ⊕ Nerprun cathartique
  - ⊕ Alpiste roseau
  - ⊕ Butome à ombelle
  - ⊕ Phragmite commun
- Plantes irritantes (APC, 2016)**
  - ⊕ Herbe à puce
  - ⊕ Petite herbe à puce
- Arbres d'intérêt (APC, 2016)**
  - ⊕ Frêne
  - ⊕ Micocoulier
- Occurrences Fauniques**  
GENIVAR (2008-2009)
  - ⊕ Ouaoaron
  - ⊕ Grande chauve-souris brune
  - ⊕ Chauve-souris cendrée
  - ⊕ Couleuvre brune
- WSP (2016)**
  - ⊕ Colonie d'hirondelles
  - ⊕ Couple de Crécerelle d'Amérique
  - ⊕ Couple de faucon pèlerin
  - ⊕ Martinet ramoneurs en vol
  - ⊕ Tortue géographique et tortues
  - ⊕ Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - ▭ Eaux calmes et végétation
  - ▭ Herbière aquatique
  - ▭ Milieu arboré
  - ▭ Milieu ouvert et orée des bois
  - ▭ Rive rocheuse
  - ▭ Troncs et roches émergents
  - ▭ Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - ▭ Herbière aquatique
  - ▭ Lisière boisée
  - ▭ Milieu anthropique
  - ▭ Zone mixte (anthropique, pelouse et arbres)
  - ▭ Parc aménagé
  - ▭ Zone gazonnée et arbres



**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
 Canal Lachine, Montréal, Qc.

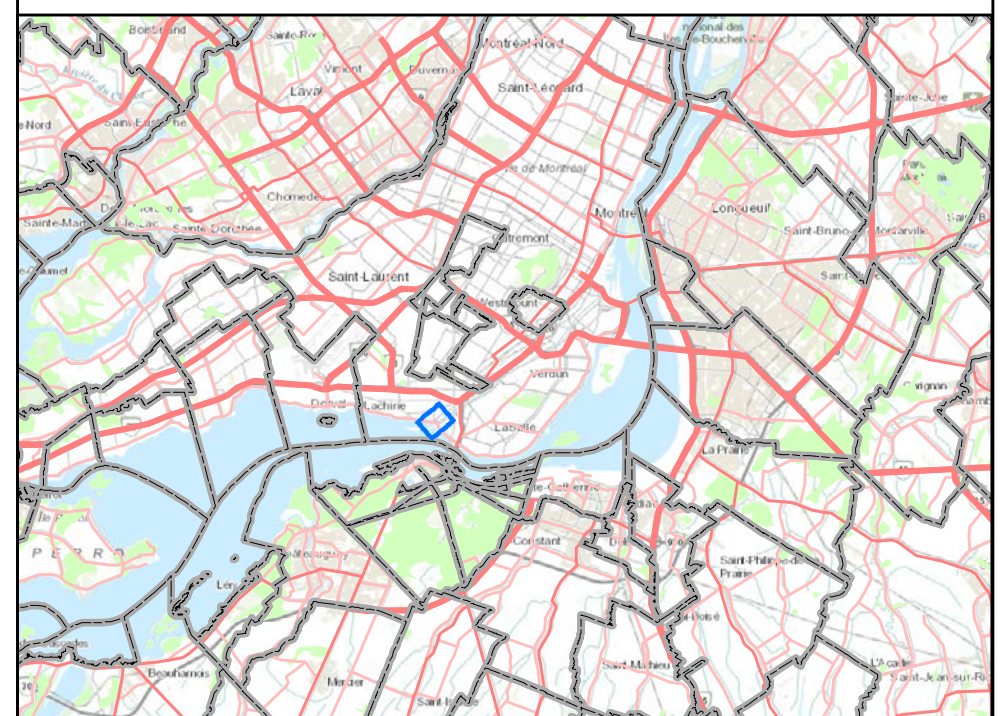
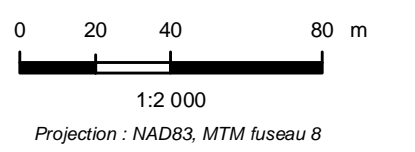
**Carte 4-13**  
**Composantes valorisées - Bief 4.**

Sources : - MRNF, 31 H14-200-101  
 - ESRI World Topographic Map  
 Préparée par : J. Carreau  
 Dessinée par : P. Corbeil  
 Vérifiée par : J.-P. Rivest  
 08 juin 2017 161-12031-00





- Limite municipale
- Limite d'arrondissement
- Section du canal
- Espèce envahissantes (APC, 2016)**
  - Nerprun cathartique
  - Alpiste roseau
  - Butome à ombelle
  - Phragmite commun
- Plantes irritantes (APC, 2016)**
  - Herbe à puce
  - Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - Frêne
  - Micocoulier
- Occurrences Fauniques GENIVAR (2008-2009)**
  - Ouaouaron
  - Grande chauve-souris brune
  - Chauve-souris cendrée
  - Couleuvre brune
- WSP (2016)**
  - Colonie d'hirondelles
  - Couple de Crécerelle d'Amérique
  - Couple de faucon pèlerin
  - Martinet ramoneurs en vol
  - Tortue géographique et tortues
  - Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - Eaux calmes et végétation
  - Herbier aquatique
  - Milieu arboré
  - Milieu ouvert et orée des bois
  - Rive rocheuse
  - Troncs et roches émergents
  - Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - Herbier aquatique
  - Lisière boisée
  - Milieu anthropique
  - Zone mixte (anthropique, pelouse et arbres)
  - Parc aménagé
  - Zone gazonnée et arbres



**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
Canal Lachine, Montréal, Qc.

**Carte 4-14**  
**Composantes valorisées - Bief 4 et Vieux Canal.**

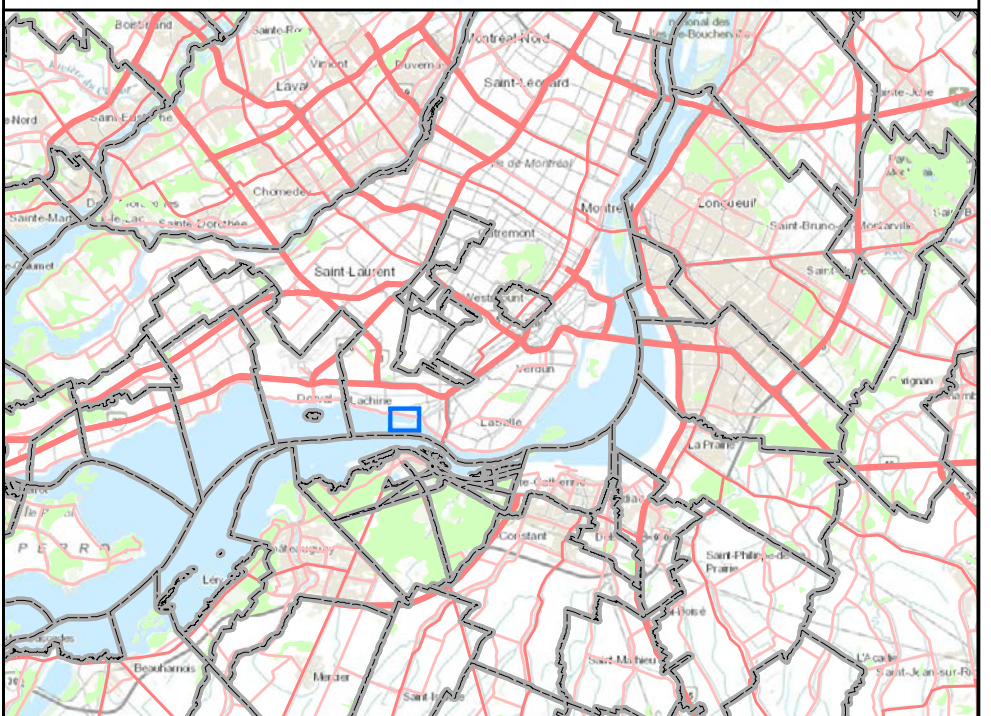
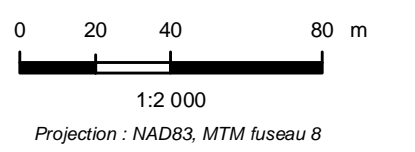
**Sources :**  
Cartes : - MRNF, 31 H14-200-101  
- ESRI World Topographic Map

**Préparée par :** J. Carreau  
**Destinée par :** P. Corbeil  
**Vérifiée par :** J.-P. Rivest





- Limite municipale
- Limite d'arrondissement
- Section du canal
- Espèce envahissantes (APC, 2016)**
  - Nerprun cathartique
  - Alpiste roseau
  - Butome à ombelle
  - Phragmite commun
- Plantes irritantes (APC, 2016)**
  - Herbe à puce
  - Petite herbe à poux
- Arbres d'intérêt (APC, 2016)**
  - Frêne
  - Micocoulier
- Occurrences Fauniques**  
GENIVAR (2008-2009)
  - Ouaouaron
  - Grande chauve-souris brune
  - Chauve-souris cendrée
  - Couleuvre brune
- WSP (2016)**
  - Colonie d'hirondelles
  - Couple de Crécerelle d'Amérique
  - Couple de faucon pèlerin
  - Martinet ramoneurs en vol
  - Tortue géographique et tortues
  - Martinets ramoneurs en vol
- Habitat des espèces en péril, potentiel et confirmé**
  - Eaux calmes et végétation
  - Herbier aquatique
  - Milieu arboré
  - Milieu ouvert et orbe des bois
  - Rive rocheuse
  - Troncs et roches émergents
  - Zone de courant (écluses)
- Végétation (GENIVAR, 2009)**
  - Herbier aquatique
  - Lisière boisée
  - Milieu anthropique
  - Zone mixte (anthropique, pelouse et arbres)
  - Parc aménagé
  - Zone gazonnée et arbres



**ANALYSE D'IMPACT ENVIRONNEMENTAL - DESCRIPTION DU MILIEU RÉCEPTEUR**  
Canal Lachine, Montréal, Qc.

**Carte 4-15**  
**Composantes valorisées - Vieux-Canal.**