

# REHABILITATION OF TUNNEL'S DRAINAGE SYSTEMS OF LACHINE CANAL: CHARLEVOIX AND DES SEIGNEURS

**Parks Canada**

**Technical specifications – Issue for tender  
Y/Ref : CLAC-DRAINS-TUNNELS**

Project no: 131-21559-05  
Date: September 23, 2015

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**TECHNICAL SPECIFICATIONS  
(Issue for tender)**

**OUR FILE : 131-21559-05**

**DATE : September 23<sup>th</sup>, 2015**



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- 1.1 WORK COVERED BY CONTRACT DOCUMENTS
- .1 Work of this Contract comprises renovation of the drainage systems at the level of the bike path.
- .1 Charlevoix Tunnel :
- .1 Maintain cyclist and pedestrian traffic
- .2 The establishment detours paths;
- .3 Rehabilitation of drainage;
- .4 Landscaping of the site;
- .5 Installing heating cables;
- .6 Electrical connection;
- .7 Upgrading signalization.
- .2 Des Seigneurs Tunnel :
- .1 Maintain cyclist and pedestrian traffic
- .2 The establishment detours paths;
- .3 Site preparation and demolition
- .4 Rehabilitation of drainage;
- .5 Installing heating cables;
- .6 Electrical connection;
- .7 Road reconstruction;
- .8 Upgrading signalization.
- 1.2 CONTRACT METHOD
- .1 Construct Work under single, stipulated price for each of two (2) sites mentioned at the item 1.1.1
- 1.3 WORK BY OTHERS
- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Parks Canada Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Parks Canada Representative, in writing, any defects which may interfere with proper execution of Work.
- 1.4 WORK SEQUENCE
- .1 Construct Work in stages to accommodate Owner's continued use of premises during construction.
- .2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.
- .3 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.
- 1.5 CONTRACTOR USE OF PREMISES
- .1 Limit use of premises for Work and for access, to allow:
- .1 Owner occupancy.
- .2 Public usage.
- .2 Co-ordinate use of premises under direction of Parks Canada Representative.

- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .4 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .5 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Parks Canada Representative.
- .6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

#### 1.6 OWNER OCCUPANCY

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

#### 1.7 EXISTING SERVICES

- .1 Notify Parks Canada Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Parks Canada Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to cyclists, pedestrian and vehicular traffic.
- .3 Provide alternative routes for cyclists, pedestrian and vehicular traffic.
- .4 Establish location and extent of service lines in area of work before starting Work. Notify Parks Canada Representative of findings.
- .5 Submit schedule to and obtain approval from Parks Canada Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .6 Provide adequate bridging over trenches which cross sidewalks or roads to permit pedestrian and cyclists.
- .7 Where unknown services are encountered, immediately advise [Consultant] and confirm findings in writing.
- .8 Protect, relocate or maintain existing active services. When

inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

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

1.8 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

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**



PART 1 - GENERAL1.1 ACCESS AND  
EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND  
FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Parks Canada Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING  
SERVICES

- .1 Notify Parks Canada Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Parks Canada Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum.
- .3 Provide for pedestrian, cyclists and vehicular traffic.

1.4 SPECIAL  
REQUIREMENTS

- .1 Carry out noise generating Work Monday to Friday from 8:00 to 17:00 hours.
- .2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .3 Keep within limits of work and avenues of ingress and egress.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**

PART 1 - GENERAL

- 1.1 ADMINISTRATIVE
- .1 Submit to Parks Canada Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
  - .2 Do not proceed with Work affected by submittal until review is complete.
  - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
  - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
  - .5 Review submittals prior to submission to Parks Canada Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated 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.
  - .6 Notify Parks Canada Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
  - .7 Verify if field measurements and affected adjacent Work are coordinated.
  - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Parks Canada Representative review of submittals.
  - .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Parks Canada Representative review.
  - .10 Keep one reviewed copy of each submission on site.
- 1.2 SHOP DRAWINGS 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 Submit drawings stamped and signed by professional engineer registered or licensed in Quebec.

- .3 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 7 days for Parks Canada Representative review of each submission.
- .5 Adjustments made on shop drawings by Parks Canada Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Parks Canada Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Parks Canada Representative may require, consistent with Contract Documents. When resubmitting, notify Parks Canada Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, 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.
- .8 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.

- .9 After Parks Canada Representative review, distribute copies.
- .10 Submit an electronic copy of shop drawings for each requirement requested in specification Sections and as Parks Canada Representative may reasonably request.
- .11 Submit an electronic copy of test reports for requirements requested in specification Sections and as requested by Parks Canada Representative.
  - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
  - .2 Testing must have been within 3 years of date of contract award for project.
- .12 Submit an electronic copie of certificates for requirements requested in specification Sections and as requested by Parks Canada Representative.
  - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
  - .2 Certificates must be dated after award of project contract complete with project name.
- .13 Submit an electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Parks Canada Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 Submit an electronic copie of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Parks Canada Representative.
- .15 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Submit an electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Parks Canada Representative.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.

- .19 If upon review by Parks Canada Representative, no errors or omissions are discovered or if only minor corrections are made, copies 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.
- .20 The review of shop drawings by Parks Canada Representative is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
  - .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.

1.3 CERTIFICATES  
AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit the documents required by the Health and Safety at Work Commission for relevant works..
- .2 Submit transcription of insurance immediately after award of Contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**



PART 1 - GENERAL1.1 REFERENCES

- .1 "Ministère des Transports du Québec (MTQ) Signalisation routière, Tome V".

1.2 PROTECTION OF PUBLIC TRAFFIC

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 When working on travelled way:
  - .1 Place equipment in position to minimize interference and hazard to travelling public.
  - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
  - .3 Do not leave equipment on travelled way overnight.
- .3 Close lanes of road only after receipt of written approval from Parks Canada Representative.
  - .1 Before re-routing traffic erect suitable signs and devices to "Tome V du Ministère des Transports du Québec".
- .4 Keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic.
  - .1 Temporary lane for cyclists should be at least 2 m wide when circulating in the work area and deviations in both ways.
- .5 Provide gravelled detours or temporary roads as indicated by Parks Canada Representative, to facilitate passage of traffic around restricted construction area:
  - .1 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, except where other means of road access exist that meet approval of Parks Canada Representative.

1.3 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 Supply and erect signs, delineators, barricades and miscellaneous warning devices to Guide to the signaling of road works and in the positions shown in Appendix 1.
- .3 Place signs and other devices in locations recommended in "Guide de signalisation des travaux routiers".

- .4 Meet with Parks Canada Representative prior to commencement of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Parks Canada Representative.
- .5 Continually maintain traffic control devices in use:
  - .1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
  - .2 Remove or cover signs which do not apply to conditions existing from day to day.

#### 1.4 CONTROL OF PUBLIC TRAFFIC

- .1 Provide competent flag personnel, trained in accordance with, and properly equipped to "Guide de signalisation des travaux routiers" for situations as follows:
  - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
  - .2 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
  - .3 Where temporary protection is required while other traffic control devices are being erected or taken down.
  - .4 For emergency protection when other traffic control devices are not readily available.
  - .5 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
  - .6 Delays to public traffic due to contractor's operators: 15 minutes maximum.

#### 1.5 OPERATIONAL REQUIREMENTS

- .1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Parks Canada Representative to protect and control public traffic, existing conditions for traffic to be restricted for a short time (less than 4 hours) in off-peak hours.

#### PART 2 - PRODUCTS

NOT USED

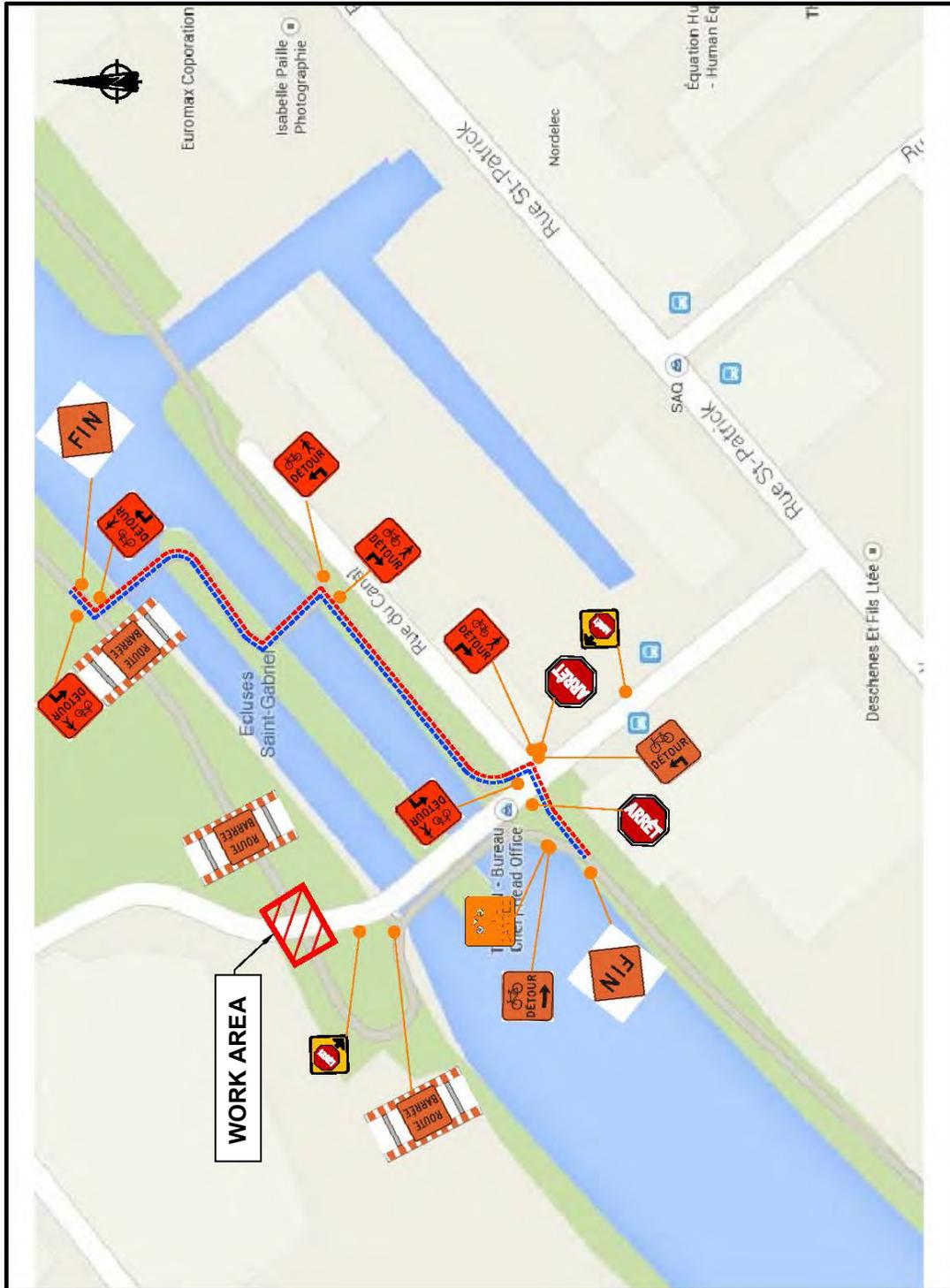
#### PART 3 - EXECUTION

NOT USED

## Appendix 1



Des Seigneurs area detour road



END OF SECTION



PART 1 - GENERAL1.1 REFERENCES

- .1 "Ministère des Transports du Québec - Ouvrages routiers Code de la sécurité routière du Québec Tome V - Signalisation routière".
- .2 "Code de la sécurité routière du Québec"
- .3 "Les règlements et les ordonnances des municipalités"

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.

1.4 SAFETY ASSESSMENT

- .1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

- .1 Schedule and administer Health and Safety meeting with Parks Canada Representative prior to commencement of Work.

1.6 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 they may be affected by conduct of Work.
- .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 Must provide notice of start of construction with the CSST.

1.7 COMPLIANCE REQUIREMENTS

**SPEC NOTE:** Use the following paragraph for projects in Province of Alberta.

- .1 Comply with Health and Safety Codes at work.
- .2 Comply with the Regulations on Health and Safety at work under the Canada Labour Code.

1.8 UNFORSEEN  
HAZARDS

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

1.9 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 having jurisdiction, and in consultation with Parks Canada Representative.

1.10 CORRECTION OF  
NON-COMPLIANCE

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

1.11 POWDER  
ACTUATED DEVICES

- .1 Use powder actuated devices only after receipt of written permission from Parks Canada Representative.

1.12 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.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**

PART 1 - GENERAL1.1 ACTION AND  
INFORMATIONAL  
SUBMITTALS

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

1.2 FIRES

- .1 Fires and burning of rubbish on site are prohibited.

1.3 DRAINAGE

- .1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.4 WORK ADJACENT  
TO WATERWAYS

- .1 Construction equipment to be operated on land only.
- .2 Do not use waterway beds for borrow material without Parks Canada Representative approval.
- .3 Waterways to be free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.
- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.

1.5 POLLUTION  
CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
  - .1 Provide temporary enclosures where directed by Parks Canada Representative.
  - .2 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.6 NOTIFICATION

- .1 Parks Canada 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 Parks Canada Representative of proposed corrective action and take such action for approval by him.
  - .1 Do not take action until after receipt of written approval by Parks Canada Representative.
- .3 Parks Canada 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

NOT USED

PART 3 - EXECUTION3.1 CLEANING

- .1 Clean in accordance with Section [01 74 11 - Cleaning].
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

**END OF SECTION**

PART 1 - GENERAL1.1 INSTALLATION  
AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.2 HOISTING

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

1.3 CONSTRUCTION  
PARKING

- .1 Parking will be permitted on site [provided it does not disrupt performance of Work].
- .2 Provide and maintain adequate access to project site.

1.4 SECURITY

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

1.5 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.

1.6 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.

1.7 CONSTRUCTION  
SIGNAGE

- .1 Fasteners: hot-dip galvanized steel nails and carriage bolts.
- .2 Vinyl sign face: printed project identification, self-adhesive, vinyl film overlay, supplied by Parks Canada Representative.
  - .1 Locate project identification sign where indicated by Parks Canada Representative and construct as follows:
  - .2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
  - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .3 Direct requests for approval to erect Consultant/Contractor signboard to Parks Canada Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.
- .4 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.
- .5 Maintain approved signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Parks Canada Representative.

1.8 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 Parks Canada 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 Parks Canada 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 Parks Canada Representative.

### 1.9 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

### PART 2 - PRODUCTS

NOT USED

### PART 3 - EXECUTION

#### 3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

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

**END OF SECTION**

PART 1 - GENERAL1.1 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Parks Canada Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Parks Canada Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 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 responsibility, but is precaution against oversight or error. 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 Parks Canada 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.

1.3 AVAILABILITY

- .1 In event of failure to notify Parks Canada Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Parks Canada Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 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 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Remove and replace damaged products at own expense and to satisfaction of Parks Canada Representative.
- .8 Touch-up damaged factory finished surfaces to Parks Canada Representative satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Parks Canada Representative. Unload, handle and store such products.

1.6 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 Parks Canada Representative in writing, of conflicts between specifications and manufacturer's instructions, so that he will establish course of action.

- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Parks Canada Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

### 1.7 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 Parks Canada 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. Parks Canada 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 Parks Canada Representative, whose decision is final.

### 1.8 CO-ORDINATION

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

### 1.9 CONCEALMENT

- .1 Before installation inform Parks Canada Representative if there is interference. Install as directed by Parks Canada Representative Parks Canada Representative.

### 1.10 REMEDIAL WORK

- .1 Refer to [Section 01 73 00 - Execution Requirements].
- .2 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.
- .3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

### 1.11 LOCATION OF FIXTURES

- .1 Inform Parks Canada Representative of conflicting installation. Install as directed.

### 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 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 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 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 cyclists, pedestrians 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

NOT USED

### PART 3 - EXECUTION

NOT USED

**END OF SECTION**



PART 1 - GENERAL

- 1.1 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.
  - .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 Written permission of affected separate contractor.
    - .7 Date and time work will be executed.
- 1.2 MATERIALS
- .1 Required for original installation.
  - .2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.
- 1.3 PREPARATION
- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
  - .2 After uncovering, inspect conditions affecting performance of Work.
  - .3 Beginning of cutting or patching means acceptance of existing conditions.
  - .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
  - .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 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 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- .8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .9 Restore work with new products in accordance with requirements of Contract Documents.
- .10 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**

PART 1 - GENERAL1.1 PROJECT  
CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Parks Canada Representative. Do not burn waste materials on site, unless approved by Parks Canada Representative.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .5 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 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 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris including that caused by Owner or other Contractors.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Parks Canada Representative. Do not burn waste materials on site, unless approved by Parks Canada Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

1.3 WASTE  
MANAGEMENT AND  
DISPOSAL

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

PART 2 - PRODUCTS            NOT USED

PART 3 - EXECUTION        NOT USED

END OF SECTION

PART 1 - GENERAL1.1 ADMINISTRATIVE  
REQUIREMENTS

- .1 Pre-warranty Meeting:
  - .1 Convene meeting one week prior to contract completion with contractor's representative and Parks Canada Representative, in accordance with [Section 01 31 19 - Project Meetings] to:
    - .1 Verify Project requirements.
    - .2 Review manufacturer's installation instructions and warranty requirements.
  - .2 Parks Canada Representative to 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.

1.2 ACTION AND  
INFORMATIONAL  
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Two weeks prior to Substantial Performance of the Work, submit to the Parks Canada Representative, four final copies of operating and maintenance manuals in French and optionally in English .
- .3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 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 Consultant 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.

#### 1.4 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, ,at site for Parks Canada Representative, [Owner]] 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 Parks Canada Representative.

#### 1.5 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
  - .1 Give function, normal operation characteristics and limiting conditions.
  - .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
  - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
  - .2 Include summer, winter, and any special operating instructions.

- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

1.6 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Parks Canada Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
  - .1 Type of product/material.
  - .2 Model number.
  - .3 Serial number.
  - .4 Contract number.
  - .5 Warranty period.
  - .6 Inspector's signature.
  - .7 Construction Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**



PART 1 - GENERAL

- 1.1 SUMMARY .1 Commissioning forms to be completed for equipment, system and integrated system.
- 1.2 INSTALLATION/ ,  
START-UP CHECK  
LISTS
- .1 Include the following data:  
.1 Product manufacturer's installation instructions and recommended checks.  
.2 Special procedures as specified in relevant technical sections.  
.3 Items considered good installation and engineering industry practices deemed appropriate for proper and efficient operation.
- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Parks Canada Representative supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Installer to sign check lists upon completion, certifying stated checks and inspections have been performed. Return completed check lists to Parks Canada Representative. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.
- 1.3 PRODUCT INFORMATION (PI)  
REPORT FORMS .1 Product Information (PI) forms compile gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Parks Canada Representative approval.

1.4 SAMPLES OF  
COMMISSIONING FORMS

- .1 Parks Canada Representative will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Revise items on Commissioning forms to suit project requirements.

1.5 CHANGES AND  
DEVELOPMENT OF NEW  
REPORT FORMS

- .1 When additional forms are required, but are not available from [DCC Representative], develop appropriate verification forms and submit to Parks Canada Representative for approval prior to use.
  - .1 Additional commissioning forms to be in same format as provided by Parks Canada Representative.

1.6 COMMISSIONING  
FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
  - .1 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
  - .2 Confirm operation as per design criteria and intent.
  - .3 Identify variances between design and operation and reasons for variances.
  - .4 Record analytical and substantiating data.
  - .5 Verify reported results.
  - .6 Form to bear signatures of recording technician and reviewed and signed off by Parks Canada Representative.
  - .7 Submit immediately after tests are performed.
  - .8 Reported results in true measured SI unit values.
  - .9 Provide [Departmental Representative] [DCC Representative] [Consultant] with originals of completed forms.
  - .10 Maintain copy on site during start-up, testing and commissioning period.

1.7 LANGUAGE

- .1 To suit the language profile of the awarded contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

**END OF SECTION**

PART 1 - GENERAL1.1 SUMMARY

- .1 This section sets out the requirements pertaining to all demolitions or the removal of components requested to perform the work in this contract.
- .2 The demolition work includes but is not limited to the following:
  - .1 Aggregate foundations to be disposed of offsite.
  - .2 Asphalt pavement to be disposed of off site.
  - .3 Concrete basins cast on site to be disposed of offsite.
  - .4 Storm water discharge drain to be disposed of offsite.
  - .5 Reinforced concrete sidewalk to be disposed of off site.
  - .6 Gutters including concrete bases and reinforcing rods to be disposed of offsite.
  - .7 Removal and storage of granite pavers.
  - .8 Removal and storage of steel handrails.
  - .9 Related demolition work indicated in the plans.

1.2 MEASUREMENT PROCEDURES

- .1 Items in "Asphalt pavement to be disposed of offsite" shall be measured and paid in square metres based on the amount indicated on the bid information sheet.
- .2 Items in "Reinforced concrete sidewalk to be disposed of offsite" shall be measured and paid in square metres based on the amount indicated on the bid information sheet.
- .3 Items in "Road structure to be disposed of offsite" shall be measured and paid in square metres based on the thickness and amounts indicated on the bid information sheet.
- .4 Items in the "150mm HDPE drain to be disposed of offsite" shall be measured and paid in linear metres based on the amount indicated on the bid information sheet. The measurements shall be taken from the centres of the man holes or catch basins or from an open extremity of one of the other pipes, as required.
- .5 Items in "Gutters to be disposed of offsite..." shall be measured and paid in full based on the amount indicated on the bid information sheet.
- .6 Items in "Catch basin and 100 mm PVC drain to be disposed of offsite", including the grate, concrete bases..." shall be measured and paid in full based on the amount indicated on the bid information sheet.
- .7 Items in "Non-return valve to be disposed of offsite" shall be measured and paid per unit based on the amount indicated on the bid information sheet.
- .8 Items in "Handrails to be removed and stored on site" shall

be measured and paid in full based on the amount indicated on the bid information sheet.

- .9 Items in "Granite pavers to be removed and stored on site" shall be measured and paid in full based on the amount indicated on the bid information sheet.
- .10 Items in "200 mm hole to be drilled into the existing concrete wall" shall be measured and paid in full based on the amount indicated on the bid information sheet.
- .11 Items in "Existing gutter grates to be disposed of offsite" shall be measured and paid in full based on the amount indicated on the bid information sheet.

### 1.3 RELATED REQUIREMENTS

- .1 Section - Excavation, Trenching and Backfilling - 31.23.33.01.
- .2 Latest edition of the Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook) of the Quebec Department of Transport.
- .3 Standardized technical specifications BNQ 1809-300/2004 (R2007) Construction work - General Technical Clauses - Drinking water and sewer pipe.

### 1.4 REFERENCES

- .1 Canadian Council of Ministers of the Environment (CCME).
- .2 Department of Justice Canada (Jus).
  - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
  - .2 Canadian Environmental Protection Act, 1999 (CEPA), c. 33.
- .3 Government of Quebec
  - .1 Environment Quality Act

### 1.5 DEFINITIONS

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.
- .3 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

### 1.6 QUALITY

- .1 Regulatory Requirements: ensure Work is performed in

ASSURANCE

compliance with applicable Provincial regulations.

1.7 PROTECTION OF THE ENVIRONMENT

- .1 Ensure that the demolition work does not have any deleterious effect on the fauna, the underground groundwater and adjacent waterways and that it does not generate excessive levels of atmospheric or acoustic pollution.
- .2 Burning waste and materials on site is prohibited.
- .3 No refuse or waste materials are to be burned on site.
- .4 Do not spill any waste or volatile materials, e.g., white spirits, oils, oil-based lubricants or toxic cleaning solutions in waterways or storm or sanitary sewers.
  - .1 Please ensure compliance with the appropriate methods of eliminating these types of waste for the entire duration of the work.
- .5 Do not spill any water containing suspended matter in waterways, storm or sanitary sewers or on adjacent land, either by pumping or any other method.
- .6 Discharge water and confine runoff containing suspended matter or other harmful substances, in accordance with the requirements of the proper authorities.
- .7 Protect the vegetation (trees, plants, bushes and their foliage) on the land and on adjacent properties, as per the instructions.
- .8 Cover dry materials and waste; and hose them down to keep dust and debris down.
- .9 Perform Work in accordance with Section 01 35 43 - Environmental Procedures.
- .10 Storage and Protection.
  - .1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
  - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to be approved by the Parks Canada Representative at no cost.
  - .3 Remove and store materials to be salvaged in manner to prevent damage.
  - .4 Store and protect in accordance with requirements for maximum preservation of material.
  - .5 Handle salvaged materials as new materials.

1.8 SITE CONDITIONS

- .1 Existing Conditions.
  - .1 Remove contaminated or hazardous materials as defined

by authorities having jurisdiction from site, in safe manner in accordance with current MDDELCC regulations.

- .2 Prior review
  - .1 Prior to the start of demolition work, proceed with the inspection of the condition of the site, the items to be kept on site and components to be dismantled and to be disposed of offsite and to be thrown away.

## PART 2 - PRODUCTS

NOT USED

## PART 3 - EXECUTION

### 3.1 PREPARATION

- .1 Inspect site with Parks Canada Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities and pipelines. Preserve active utilities and pipelines traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

### 3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

### 3.3 REMOVAL OPERATIONS

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.
- .3 Removal and disposal of Pavements, sidewalks and Gutters:
  - .1 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Parks Canada Representative.
  - .2 Protect adjacent joints and load transfer devices.
  - .3 Protect underlying and adjacent granular materials.
- .4 Excavate to the depth indicated in the drawings below pipe invert, when removing pipes under existing or future pavement area.
- .5 When removing and disposing of aggregate materials of roadway structures, dig to the depth indicated on the

drawings.

- .6 Stockpile topsoil for final grading and landscaping if reusable.
  - .1 Provide erosion control and seeding if not immediately used.
- .7 Remove and store the lengths of handrail sections that conflict with the work to be done.
  - .1 Coordinate the removal of padlocks on the existing handrails with the Parks Canada representative.
  - .2 Store handrails to protect them from marks and scratches.
- .8 Remove and store existing granite paver areas that conflict with the work to be done.
  - .1 Store the granite pavers to protect them from being broken.
- .9 At the end of each work day, ensure that no structures can sink or collapse. Close parts that will not be demolished to protect the interior from inclement weather at all times.
- .10 Demolish in a way that keeps dust down as much as possible and dampen the materials as instructed by the owner's representative.
- .11 Elimination
  - .1 Dispose of materials not selected for recycling or reuse on the site and send them to facilities authorized and approved by the MDDELCC.
- .12 Backfill.
  - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

### 3.4 STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

### 3.5 REMOVAL FROM SITE

- .1 Remove stockpiled material as directed by Parks Canada Representative, when it interferes with operations of project.

- .2 Dispose of and transport materials to waste sites recognized and approved by the MDDELCC.

### 3.6 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work and in accordance with instructions on the plans.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

### 3.7 DAMAGE REPAIR

- .1 Pay for repairs or replacements or make such repairs or replacements resulting from excessive demolition and improper handling of materials to be reinstalled. Repair the damage caused to existing buildings and facilities to be retained.
- .2 The repairs must comply in every way with the existing structures, materials and finishes; and with all other existing and similar structures, materials and finishes.

### 3.8 CLEANING

- .1 Remove debris, trim surfaces and leave work site clean, upon completion of Work.
- .2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

END OF SECTION

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 03 20 00 Concrete Reinforcing
  - .2 Section 03 30 00 Cast-in-place Concrete.
  - .3 Section 32 16 15 Concrete Walks, Curbs and Gutters
  - .4 Section 33 41 00 Storm Utility Drainage Piping
- 1.2 PRICE AND PAYMENT PROCEDURES
- .1 Unless otherwise indicated, the formwork is measured for payment by square metre of surface coming in contact with the concrete to be poured. The price covers, in particular, the supply of formwork, formwork fasteners and formwork lining, the installation and removal of formwork; and includes all incidental expenses.
- 1.3 REFERENCES
- .1 Canadian Standards Association (CSA)/CSA International
    - .1 CAN/CSA-A23.1/A23.2-F04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete
    - .2 CAN/CSA-O86S1-F05 supplement number 1 to CAN/CSA-O86-01, Engineering Design in Wood.
    - .3 CSA O121-FM1978 (C2003), Douglas Fir Plywood.
    - .4 CSA O151-F04, Canadian Softwood Plywood
    - .5 CSA O153-FM1980 (C2003), Poplar Plywood
    - .6 CAN/CSA-O325.0-F92 (C2003), Construction Sheathing
    - .7 CSA O437 Series-F93 (C2006), Standards for OSB and Waferboard
    - .8 CSA S269.1-1975 (R2003), Falsework for Construction Purposes.
    - .9 CAN/CSA-S269.3-FM92 (C2003), Concrete formwork, standards of Canada.
  - .2 Quebec Department of Transport (MTQ) - Cahier des charges et devis g n raux (CCDG).
  - .3 Underwriters Laboratories of Canada (ULC)
    - .1 CAN/ULC-S701-05 Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .4 Bureau de normalisation du Qu bec (BNQ)
    - .1 Standardized technical specifications BNQ 1809-500/2006 Construction work, Concrete Sidewalks and Curbs.

- 1.4  
DOCUMENTS/  
SAMPLES TO SUBMIT  
SUBMIT FOR APPROVAL/  
INFORMATION
- .1 Submit the required documents and samples as per section 01 33 00 - Submittal Procedures.
  - .2 Submit the shop drawings of the formwork and falswork at least seven (7) days before starting the work as per "Section 01 33 00 - Submittal Procedures".
  - .3 The shop drawings must indicate, show or include the method and schedule, shoring, stripping and re-shoring procedure, materials, arrangement of joints, ties, liners and location of temporary embedded parts comply with CSA S269.1 for formwork drawings.
  - .4 The shop drawings must indicate, show or include the design data of the form work such as the permissible rate of concrete placements, and concrete temperature in forms.
  - .5 Specify the sequence of erection and removal of formwork/falsework, as per the instructions of the Parks Canada representative.

## PART 2 - PRODUCTS

- 2.1  
MATERIALS/EQUIPMENT
- .1 Formwork materials
    - .1 The construction lumber and plywood must be compliant with CAN/CSA A23.1.
    - .2 For features concrete with no specific architectural features, use formwork made of wood and wood derivatives in compliance with CSA 0121, CAN/CSA-086, CSA 0437 Series and CSA 0153.
  - .2 Form release agent: non-toxic, biodegradable.
  - .3 Form stripping agent : Colourless mineral oil that is non-toxic, biodegradable, free of kerosene, with Saybolt Universal viscosity expressed in seconds at least 70 and not more than 110 at a temperature of 40°C and with flash point minimum 150°, open cup.

## PART 3 - EXECUTION

- 3.1 FABRICATION AND  
ERECTION
- .1 Before starting to build the formwork, check the lines, levels and centre distances; and ensure that the dimensions match those appearing on the drawings.
  - .2 Obtain the authorization from the Parks Canada representative before pouring concrete directly into the ground or to add openings in formwork that are not indicated on the drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth before.

.4 Fabricate and erect formwork in compliance 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.

.5 Align form joints and ensure they are watertight.

.1 Keep the number of joints to a minimum.

.6 Unless otherwise indicated, use 25 mm chamfer strips on external angles and/or 25 mm fillets at interior corners joints.

.7 Incorporate the anchors, sleeves and other embedded pieces required for specified structures in other sections.

.8 Before pouring the concrete, clean the formwork as per CSA-A23.1/A23.2.

### 3.2 REMOVAL AND RESHORING

.1 After pouring the concrete, leave the formwork in place for at least 24 hours or until the concrete achieves compression resistance of 10 MPa.

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

**END OF SECTION**



PART 1 - GENERAL1.1 RELATED  
REQUIREMENTS

- .1 Section 03 10 00 Concrete Framing and Accessories.
- .2 Section 03 30 00 Cast-in-place Concrete.
- .3 Section 32 16 15 Concrete Walks, Curbs and Gutters
- .4 Section 33 41 00 Storm Utility Drainage Piping

1.2 PRICE AND PAYMENT  
PROCEDURES

- .1 Measurement for payment purposes
  - .1 The galvanized reinforcing steel is measured for payment in kilograms of reinforcements installed, in accordance with the drawings and specifications and the instructions from the Parks Canada representative. The prices submitted for this item must include but not be limited to the preparation and issuance of lists of material (bar lists showing the total mass of the lot in kg), the supply of materials (including galvanized reinforcing steel, metal rods serving as anchors, connecting wires, shims and support bars), equipment, the installation of reinforcing steel and the attachment of reinforcing steel.
  - .2 Anchors:
    - .1 Anchors are measured for payment as per the number of units installed, in accordance with the drawings and specifications and the instructions from the Parks Canada representative.
    - .2 The price submitted for this item must include but not be limited to equipments, the supply of chemical anchor product, the drilling of holes and implementation.
  - .3 Unless otherwise indicated, include the costs of reinforcements steel and anchors in the lots of concrete work requiring the use of these components.

1.3 REFERENCES

- .1 Quebec Department of Transport (MTQ), Cahier des charges et devis généraux (CCDG) ("Matériaux - Ouvrages routiers") and Tome VII.
- .2 American Concrete Institute (ACI)
  - .1 SP-66-04, ACI Detailing Manual 2004.
- .3 ASTM International
  - .1 ASTM A 82/A 82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - .2 ASTM A 143/A 143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

- .3 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - .4 ASTM A 123/A 123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .5 ASTM A 497/A 497M, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
  - .4 CSA International
    - .1 CSA-A23.1-F09/A23.2-F09, Concrete Materials and Methods of Concrete Construction/ Test Methods and Standard Practices for Concrete
    - .2 CAN/CSA-A23.3-F04(R2010), Design of Concrete Structures.
    - .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
    - .4 CSA-G40.20/G40.21-F04(C2009), General requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
    - .5 CAN/CSA-G164-FM92(C2003), Hot Dip Galvanizing of Irregularly Shaped Articles
    - .6 CSA W186-FM1990(C2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
  - .5 Reinforcing Steel Institute of Canada (RSIC/IAAC)
    - .1 RSIC-2004, Reinforcing Steel, Manual of Standards Practiceé
- 1.4  
DOCUMENTS/  
SAMPLES TO SUBMIT FOR  
APPROVAL/  
INFORMATION
- .1 Submit the documents and samples required in accordance with section 01 33 00 – Submittal Procedures.
  - .2 The reinforcement drawings must be executed in compliance with the RSIC Manual of standard Practice SP-66.
  - .3 Shop drawings:
    - .1 The drawings must bear the seal and signature of a recognized competent engineer or one holding a licence allowing him to perform in Canada in the Province of Quebec.
    - .2 The drawings must indicate the details of the installation of the reinforcements along with the following:
      - .1 Bar bending details;
      - .2 List of reinforcements
      - .3 Quantities of reinforcements.
    - .3 Dimensions, spacing and location of reinforcements. The reinforcements shown must be marked with an identification code to permit correct placement without any need to refer to the structural drawings.
    - .4 The drawings must also indicate the dimensions, spacing and location of the chairs, spacers and supports.
  - .4 The lap lengths and bar development lengths must be compliant with CAN/CSA-A23.3.

- 
- 1.5 QUALITY ASSURANCE
- .1 Quality assurance: as per the SOURCE QUALITY CONTROL of PART 2.
  - .2 Mill Test Report: at least one (1) week before the reinforcements are installed, give the Parks Canada representative, if requested, a certified copy of mill test report of reinforcing steel.
  - .3 If requested, submit in writing to the Parks Canada representative the proposed source of reinforcement materials to be supplied.
  - .4 The contractor must provide a compliance certificate for the reinforcing steel.
- 1.6 TRANSPORTATION,  
STORAGE AND HANDLING
- .1 Transport, store and handle materials and equipment in accordance with the manufacturer's written instructions.
  - .2 Delivery and acceptance: deliver the materials and equipment to site in original factory packaging, labelled which the manufacturer's name and address have been indicated.
  - .3 Storage and handling
    - .1 Store the materials and equipment in a clean location that is dry and well ventilated in accordance with the manufacturer's recommendations.
    - .2 Replace damaged reinforcements with new ones.
    - .3 The contractor must ensure that the reinforcement steel is stored to prevent rust, damage to the covering and deformation of the steel.
    - .4 When the reinforcements are delivered to the site, the contractor must verify the storage conditions, validate the steel mill markings vs. the compliance certificate, check to ensure the steel is weldable(W type), check the diameters of the bars, the yield strength for regular steel, check the dimensions of the hangers and, if necessary, the curvature and bending radii.
    - .5 The contractor must ensure that galvanization has been performed where it was required on the information sheets, the quality of the galvanization and the general condition of the reinforcements; and report the non-compliance to Parks Canada Representative.
-

PART 2 – PRODUCTS

- 2.1  
MATERIALS/EQUIPMENT
- .1 Substitute of different size bar must be authorize in writing by The Parks Canada representative.
  - .2 All new reinforcing steel must be deformed bars and have high adherence as per CAN/CSA G30.18, 400 W grade, unless otherwise indicated on the drawings.
  - .3 The reinforcing steel bars must be bent after galvanization and before their installation in the exact shape as indicated in the drawings. The contractor must ensure that the folding measurements have been carefully checked and that the clearances with respect to the formwork have been verified.
  - .4 Wire Tie : cold-drawn annealed steel wire ties as per ASTM A 82/A 82M.
  - .5 Reinforcing wire: high-adherence steel wire as per ASTM A 82/A 82M.
  - .6 High-adherence reinforcing wire mesh compliant with ASTM A 82/A 82M.
  - .7 Steel wire used with galvanized reinforcing wire must be galvanized.
  - .8 Galvanization protection for non-prestressed reinforcements: minimum zinc coating of at least 610 g/m<sup>2</sup> as per CAN/CSA-G164.
    - .1 Chromate the galvanized steel reinforcements to prevent reactions with Portland cement paste.
    - .2 If the reinforcements are chromated immediately following galvanization, the reinforcements must be immersed in an aqueous solution containing at least a mass of 0.2% of sodium dichromate or 0.2% chromic acid.
      - .1 The reinforcements must be immersed for at least 20 seconds in a solution maintained at a temperature equal to or greater than 32 degrees.
    - .3 If the galvanized reinforcements steel are kept at ambient temperature, add sulfuric acid that will serve as a binder. The sulfuric acid concentration must be between 0.5 and 0.1 %.
      - .1 In that case, the temperature restrictions regarding the solution do not apply.
    - .4 The chromate solutions offered commercially for this purpose can be used in place of the aforementioned solution, provided that they are comparably effective.
      - .1 Provide the description of the product under consideration as per DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL/INFORMATION in PART 1.

- .9 Chairs, spacers, bar supports and support shims as per CSA-A23.1/A23.2.
- .10 Factory-cut straight galvanized reinforcing bars may be delivered to the site, provided a zinc-rich coating no less than 130 µm thick has been brushed on the cut ends at the factory.

## 2.2 FABRICATION

- .1 Steel reinforcements must be fabricated as per CSA-A23.1/A23.2 SP-66 and Reinforcing Steel Manual of Standard Practice by the Reinforcement Steel Institute of Canada (RSIC)
  - .1 Guide SP-66, unless otherwise indicated.
- .2 The Parks Canada representative must approve the location of the splices other than those indicated in the installation drawings.
- .3 The lots of reinforcement bars shipped must be clearly marked with an identification code as per the list of reinforcement bars required and their bending details.

## 2.3 QUALITY CONTROL AT THE SOURCE

- .1 At least two (2) weeks before the installations of the reinforcements begin, give the Parks Canada representative a certified copy of the report on the testing done at the plant, which contains the findings of the physical and chemical analyses of the reinforcing steel.
- .2 Inform the Parks Canada representative of proposed source of materials to be supplied.

## PARTIE 3 – EXECUTION

### 3.1 PREPARATION

- .1 The galvanization of the reinforcing bars must include a chromate treatment.
  - .1 The duration of the treatment is determined by the diameter of the bars, i.e., one (1) hour for every 25 mm. of diameter.
- .2 Perform bending tests to verify galvanized bar fragility as per ASTM A 143/A 143M.

### 3.2 FIELD BENDING

- .1 Unless the Parks Canada representative indicates otherwise or provides his authorization, reinforcing bars must not be bent or welded at the site.
- .2 When on-site bending is authorized, bend the bars by applying slow and steady pressure. Do not heat them.
- .3 Replace bars which develop cracks or splits.

### 3.3 PLACING REINFORCEMENT

- .1 Install reinforcing steel as per the instructions in the installation drawings and CSA-A23.1/A23.2.
- .2 Ask the Parks Canada representative to accept the reinforcements and their installation prior to pouring the concrete.
- .3 Make sure to maintain the integrity cover of the reinforcements while the concrete is being poured.
- .4 The reinforcing steel must be free of mud, coating oil or any other substance likely to reduce the adherence of the concrete.
- .5 All of the connecting wires used to bind the reinforcing bars to one another must be bent inward so as not to reduce the cover of concrete.
- .6 Anchor installation
  - .1 Anchors can be installed with epoxy resins as per the manufacturer's instructions. Anchor bars, drilled holes and resin cartridges must have diameters compatible with one another.
  - .2 The resin mixture must fill the anchor holes completely. The necessary precautions must be taken for overhanging anchors to prevent gravity-induced loss of material.
  - .3 The MSDS of the resins and the installation method, including the equipment used, must be submitted to Parks Canada Representative for review and comment at least fourteen (14) days before the anchor installation work begins.
  - .4 When the ambient temperature drop below 5°C or happens to be at the minimum specified by the manufacturer, the epoxy resin cartridges must be stored in a heated area so that they can be used at a temperature between 10°C and 25°C; and the reinforcing bars must be preheated immediately before they are installed.
  - .5 Holes can be drilled with percussion or rotating drills, and their diameter must match the dimensions specified by the anchor manufacturer. The holes must be cleaned with a compressed air spray to remove debris produced by the drilling.
  - .6 No stress must be put on the anchors for twenty-four (24) hours following installation and they must not be touched or moved during the initial hardening of the resin or grout.

3.4 FIELD TOUCH-UP

.1 Touch up damaged or cut ends of the galvanized reinforcements or epoxy coatings with a compatible finishing product to obtain a continuous coating.

3.5 CLEANING

.1 Cleaning while work is in progress: Clean up as per section 01 74 11 - Cleaning.

.1 Leave work area clean at the end of each work day.

.2 Final cleaning: once the work has been completed, remove from the worksite all surplus materials, waste, tools and equipment as per section 01 74 11 - Cleaning.

**END OF SECTION**



PART 1 - GENERAL

- 1.1 RELATED REQUIREMENTS
- .1 Section 03 10 00 Concrete framing and accessories.
  - .2 Section 03 20 00 Concrete reinforcing.
  - .3 Section 32 16 15 Concrete walks, curbs and gutters.
- 1.2 PRICE AND PAYMENT PROCEDURES
- .1 Measurement and Payment:
    - .1 Unless otherwise specified, the concrete is measured for payment in cubic meter of concrete placement, in accordance to drawings and specifications and as directed by Parks Canada Representative.
    - .2 The price tendered for this section must include, but must not be limited to, providing technical data sheets of the concrete mixture as well as the supply, installation, finishing and curing of concrete. The price tendered must also include the costs relating to the use of a concrete pump truck, if required, for the implementation of concrete in pipes as well as any other equipment required.
- 1.3 REFERENCES
- .1 Abbreviations and Acronyms:
    - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
    - .2 Type GU, GUb and GUL - General use cement.
    - .3 Type MS and MSb - Moderate sulphate-resistant cement.
    - .4 Type MH, MHb and MHL - Moderate heat of hydration 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%.
    - .4 GGBFS - Ground, granulated blast-furnace slag.
  - .3 Quebec Ministry of Transportation (MTQ) : Cahier des charges et devis généraux (CCDG) and Normes - Ouvrages routiers - Tome VII Matériaux, Chapitre 3 Béton de ciment et produits connexes.
    - .1 ASTM International
      - .1 ASTM C 260/C 260M-[10a], Standard Specification for Air-Entraining Admixtures for Concrete.
      - .2 ASTM C 309-[07], Standard Specification for

Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C 494/C 494M-[10a], Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C 1017/C 1017M-[07], Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.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, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

#### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit test results and reports to Parks Canada Representative for review, and in the event of any discrepancy or any divergence in regards to the dosage formula or parameters prescribed for the concrete mix, do not continue work without first obtaining a written authorization.

.3 Parks Canada Representative may request the contractor to submit samples of the admixtures he intends to use.

.4 Manufacturer's certificate must accompany all admixture samples, ensuring that they are of the same composition as those that will be provided to be implemented.

.5 Concrete hauling time: provide for review by Parks Canada representative, deviations exceeding maximum allowable time of 120 minutes for concrete delivered on site and discharged after batching.

.6 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

#### 1.5 QUALITY ASSURANCE

.1 Provide Parks Canada representative, minimum 2 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixes will meet specified requirements.

.2 Minimum 2 weeks prior to starting concrete work, provide

proposed quality control procedures for review by Parks Canada representative on following items:

- .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.
- .3 Quality Control Plan: provide written report to Parks Canada representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
  - .4 Provide the technical data sheet for curing materials to Parks Canada Representative.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- .1 Delivery and Acceptance Requirements:
- .2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
  - .1 Do not modify maximum time limit without receipt of prior written agreement from Parks Canada representative and concrete producer as described in CSA A23.1/A23.2.
  - .2 Deviations to be submitted for review by Parks Canada representative.

### PART 2 - PRODUCTS

#### 2.1 DESIGN CRITERIA

- .1 In compliance with standard CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

#### 2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Parks Canada representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

#### 2.3 MATERIALS

- .1 Hydraulic cement: as per CAN/CSA A23.1 and CAN/CSA A3000
- .2 Cement : hydraulic cement of type GUb-SF, GUb-S/SF or GUb-F/SF
- .3 Total mass of supplementary cementing materials (fly ash, GGBFS - Ground, granulated blast-furnace slag, type F) should not be more than 30% of total cementitious material.
- .4 Silica fumes: as per CAN/CSA A3000 type U
- .5 Fly ash : as required, must comply to requirements to type F of CAN/CSA A3000 and section A3001- cement used in concrete.

- .6 Water: to CSA A23.1.
- .7 Aggregates: to CSA A23.1/A23.2.
- .8 Admixtures:
  - .1 Air entraining admixture: to ASTM C 260.
  - .2 Chemical admixture: to ASTM C 494 ASTM C 1017. Laboratory to approve accelerating or set retarding admixtures during cold and hot weather placing.
- .9 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
  - .1 Compressive strength: 35 MPa at 28 days for sidewalks, walls and new gutters.
  - .2 Provide technical data sheet of cement grout to Parks Canada Representative at least fourteen (14) days before its implementation.
- .10 Curing compound: to CSA A23.1/A23.2 white and ASTM C 309,.
- .11 Premoulded joint fillers:
  - .1 Bituminous impregnated fiber board: to ASTM D 1751.
- .12 Chemical resin for anchors of type HIT-HY-200 by Hilti or equivalent approved by Parks Canada Representative.

## 2.4 MIXES

- .1 The characteristics and the concrete mix to be used in this project are defined in the table below.

Type	28 days strength (MPa)	Min. weight binder (kg/m <sup>3</sup> )	Type of binder <sup>(1)</sup>	Ratio of water/cement max. or in the range	Settlement (mm) ± 30 <sup>(2)</sup>	Large aggregates (mm)	Air content (%) <sup>(3)</sup>	Permeability to chloride ions max. (Coulombs)
V-5	35 <sup>(4)</sup>	340 365	GUb-SF GUb-F/SF, GUb-S/SF	0,45	80	5-20	5-8	1000

- .1 GUb SF-type binder must contain at least 8% of silica fumes. GUb-F/SF and GUb-S/SF type binders must contain at least 5% of silica fumes and at least 15% of fly ash or slag. The total mass of supplementary cementing materials (SCM) (fly ash, silica fumes, slag) must not be greater than 30% of the total weight of the binder.
- .2 After the addition of the superplasticizer, the sag must be  $120 \pm 30$  mm.
- .3 Air content must conform to the specifications listed in the table, whether or not a superplasticizer is added.
- .4 Minimum compressive strength at 48 hours must be 10 MPa.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- .1 Obtain Parks Canada 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 Concrete pumping will only be allowed once the materials and mix formula is approved.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Parks Canada representative's approval of proposed method for protection of concrete during placing and curing.
- .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 and pack solidly with epoxy mortar as indicated on the plans to anchor and hold dowels in positions.
- .11 Do not place load upon new concrete until authorized by Parks Canada representative.

- 3.2  
INSTALLATION/  
APPLICATION
- .1 Execute cast-in-place concrete work as CSA A23.1/A23.2.
  - .2 Pumping of concrete must be execute in compliance with requirements of ACI 304.2R.
  - .3 Sleeves and inserts:
    - .1 Where approved by Parks Canada representative set sleeves, ties, pipe hangers and other inserts and openings as indicated on drawings or specified elsewhere.
    - .2 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Parks Canada Representative.
    - .3 Confirm locations and sizes of sleeves and openings shown on drawings.
    - .4 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.
  - .4 Finishing and curing:
    - .1 Finish concrete to CSA A23.1/A23.2.
    - .2 Use procedures as reviewed by Parks Canada representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
    - .3 Do not use water or other products to facilitate concrete finishing.
    - .4 The surfaces must be kept moist for a period of three (3) consecutive hours preceding the filling operation with concrete.
    - .5 Use curing compounds compatible with the finishing product applied to concrete surfaces. Attach a written declaration that the various products used are compatible.
- 3.3 SURFACE  
TOLERANCE
- .1 Concrete tolerance to CSA A23.1 Straightedge Method
- 3.4 FIELD QUALITY  
CONTROL
- .1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Parks Canada representative for review to CSA A23.1/A23.2.
    - .1 Ensure testing laboratory is certified to CSA A283.
  - .2 Ensure test results are distributed for discussion at pre-pouring concrete meeting between Parks Canada representative and Consultant.
  - .3 Parks Canada representative will pay for costs of tests.
  - .4 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.

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Divert unused concrete materials from landfill to local recycling facility after receipt of written approval from Parks Canada representative.
  - .2 Provide appropriate area on job site where concrete trucks and be safely washed.
  - .3 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

**END OF SECTION**



PART 1 - GENERAL1.1 SUMMARY

- .1 This section specifies the requirements to perform the removal of existing handrails and the installation of guardrails retrieved from the Lachine Canal workshops, as part of this contract.
- .2 The work of this section include, without limitation, the following:
  - .1 Removal of existing cast iron handrails and fences at the locations shown on the plans. Upon removal of the guardrail, existing anchors must be cut flush with the concrete and the remaining part will be covered with a zinc coating.
  - .2 Reinstallation of removed handrails and installation of fences at the locations where they have been previously removed from.
  - .3 Installation of handrail and fence sections at the locations indicated in the plans.

1.2 RELATED REQUIREMENTS

- .1 Section - Selective Site Demolition - 02 41 13
- .2 Handrail sections to be installed (posts and cross beams) will be retrieved at the Lachine Canal workshops at the following address:

1156, rue Mill, Montréal (Québec) H3K 2B3

1.3 REFERENCES

- .1 CSA International
- .2 CSA W59-[03(R2008)], Welded Steel Construction, (Metal Arc Welding).

1.4 PRICE AND PAYMENT PROCEDURES

- .1 The section « Removal and Disposal of existing handrail » will be measured and paid on a global basis in accordance with the amount indicated on the Pay Items Table.
- .2 The section « Installation of handrails with fences, including the chemical anchors, will be measured and paid on a global basis in accordance with the amount indicated on the Pay Items Table. This section includes material recovery at the Lachine Canal workshops and the supply of bushings, end pieces, screws and bolts (hardware), paint, fence, drilling of holes for the new anchors, the epoxidic adhesive, threaded rods, anchors, railing and fences sections installation and any incidental expenses.

PART 2 - PRODUCTS NOT USEDPART 3 - EXECUTION3.1 INSTALLATION

- .1 Reinstall cast iron handrails and fences in accordance with.
- .2 Install components plumb and level.
- .3 Elements must be installed so that their joints are perfectly adjusted and that they are assembled securely.
- .4 Unless otherwise stated, screws or countersunk bolts appropriate for the component model and placed in areas where they will not harm should be used as apparent mechanical fasteners.
- .5 Perform a diamond drilling for each anchor. Clean the hole properly. The Contractor must take every precaution to avoid bursting the existing concrete during drilling operations. If applicable, the contractor must follow the instructions of the Parks Canada Representative to carry on with the work.
- .6 Use 5/8 " (16 mm) threaded rods with a penetration of 200 mm and an epoxy resin type HIT-HY200 (or approved equivalent) to anchor the handrails to the existing concrete walls. The grade of the steel of the anchors must be ASTM A193-B7 or an equivalent approved by the Parks Canada Representative.
- .7 If required, weld steel pipes according to the following requirements.
  - .1 Smooth welds with a grinder.
  - .2 Touch-up weld areas with a primary coating and a topcoat of the same color than the one on the existing elements.
- .8 Install the Omega type fence (or equivalent) with U-steel fasteners bolted through the cross beams of the handrails. The color of the fence and its attachments must be black.

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.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by hand rail installation.

**END OF SECTION**

**PART 1 GENERAL****1.1 PRICE AND PAYMENT PROCEDURES****.1 Measurement and Payment:**

- .1 Measurement for supply, installation, painting of signboards, sign supports will be based on each complete sign installation. This price must include the manufacturing specifications for any non-standard signboards.
- .2 Measurement for removal of signboards, sign supports will be based on each complete sign removal, including the transport to return the sign to the location specified by the Parks Canada Representative.

**1.2 REFERENCES**

- .1 MTQ - Normes - Ouvrages routiers - Tome I to Tome VIII by the Ministry of Transportation, latest edition. American Association of State Highway and Transportation Officials (AASHTO)
  - .1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).
- .3 ASTM International
  - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM A276-10, Standard Specification for Stainless Steel Bars and Shapes.
  - .3 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].
  - .4 ASTM B210M-05, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes [Metric].
  - .5 ASTM B211M-03, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire [Metric].
- .4 Canadian General Standards Board (CGSB)
  - .1 CGSB 62-GP-9M-80, Prefabricated Markings, Positionable, Exterior, for Aircraft Ground Equipment and Facilities.
  - .2 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.
- .5 CSA International
  - .1 CSA G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA O80 Series-08, Wood Preservation.
  - .3 CSA O121-08, Douglas Fir Plywood.

- .4 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
- .5 CAN/CSA-Z809-08, Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
  - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

### 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 traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Quebec, Canada.
  - .2 Indicate items as follows:
    - .1 Dimensions (height, width, depth)
    - .2 Reflective film
    - .3 Materials
    - .4 Manufacturing specifications for non-standard signboards

### 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: 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.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- .1 Sign supports:
  - .1 Steel posts: to CSA G40.21, 4 m long, flanged "U" shaped in cross section, measuring 65 mm wide x 30mm deep. Metal thickness: 4.5 mm. Hot dipped galvanized: to ASTM A123/A123M.
  - .2 Standard tubular supports for small signs: to ASTM B210M.

- .3 Vertical tubular supports and connecting diagonal members: to ASTM B210M.
- .4 Truss members: to ASTM B210M.
- .5 Aluminum tubular members: belt ground satin finish.
- .6 Base plates for ground mounted signs: to ASTM B209M. Base plates for overhead supports: to ASTM B209M.
- .7 Tubular support caps for ground mounted signs: to ASTM B210M or fabricated from aluminum plate as specified in ASTM B209M. Castings for overhead signs: to ASTM B211M.
- .8 Aluminum flanges: to ASTM B211M.
- .9 Anchor and connecting bolts, 'U' clamps and miscellaneous hardware for overhead sign installations: fabricate from 304 stainless steel as specified in ASTM A276.
- .10 Fasteners: bolts, nuts, washers and other hardware for roadside signs to be cast aluminum alloy, or galvanized steel.
- .2 Signboards:
  - .1 Prior to fabricating the signboards, the contractor must validate that the height of the structures is minimum 600 mm. If the structures' height be smaller than 600 mm, the contractor needs to inform the Parks Canada Representative.
  - .2 Plywood: to CSA O121, 19mm thick. Overlaid Douglas Fir, Medium Density CAN/CSA-Z809 or FSC or SFI certified, overlaid one side only with fibre or plastic sheet surfacing material.
  - .3 Aluminum sheet: to ASTM B209M, precut to required dimensions.
    - .1 Thickness for signboards up to 750 mm wide: 1.6 mm minimum.
    - .2 Thickness for signboards 750-1200 mm wide: 2.1 mm minimum.
    - .3 Thickness for refurbishing existing sign panels: 1.0 mm minimum.
  - .4 Silk screen ink:
    - .1 Transparent or opaque colours as indicated.
  - .5 Reflective sheeting and tape: to CGSB 62-GP-11M. Adhesive, class of reflectivity and colour as indicated.
  - .6 Transparent tape: flexible, smooth-surfaced, moisture resistant tape with pressure sensitive adhesive.
  - .7 Clear varnish protective coat: MPI-EXT 6.4H VOC limit of 350 g/L.

## 2.2 FABRICATION

- .1 Supports:
  - .1 Connect aluminum support members by welding in accordance with CSA W47.2. Work to be performed by Canadian Welding Bureau qualified members only. Flame cutting of members not permitted.
  - .2 Welds must be of the same strength as adjacent member or casting.
  - .3 Reinforce in area of electrical hand holes to equal strength of full section member.

- .4 Remove sharp edges and burrs.
- .2 Signboards:
  - .1 Aluminum blanks:
    - .1 Degrease, etch and bonderize with chemical conversion coating.
    - .2 Clean surfaces with xylene thinner. Dry.
    - .3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
    - .4 For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with MPI-EXT 5.4A.
  - .2 Reflective background sheeting and lettering:
    - .1 Cut and apply in accordance with manufacturer's instructions.
    - .2 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
    - .3 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.
    - .4 Reflective signboard faces may be prepared using silk screen transparent ink.
  - .3 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB 62-GP-9M, or paint using required colour of finish paint maximum VOC of 250 g/L or silk screen transparent ink.
  - .4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.
  - .5 Protect finished signboard faces with one coat of clear varnish with maximum VOC limit of 350 g/L.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Sign support:
  - .1 The contractor must provide the fasteners to install certain signboards directly on the structures.
  - .2 Erect supports as indicated. Permissible tolerance: 50 mm maximum departure from vertical for direct buried supports. Where separate concrete footings have been placed, erect posts with base plates resting on levelling nuts and restrained with nuts and washers. Permissible tolerance: 12 mm maximum departure from vertical.
  - .3 Single channel steel posts:
    - .1 Drive to required depth without damage to posts.

- .2 If rock or concrete is encountered, drill hole to required depth and set post in sand.
  - .3 In finished concrete surfaces, backfill with concrete or grout. Protect from adverse conditions until cured.
- .2 Signboard:
- .1 Fasten signboards to supporting posts and brackets as indicated.
  - .2 Fasten lane markers to signboard.

### 3.2 CORRECTING DEFECTS

- .1 Correct defects, identified by Parks Canada Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Parks Canada Representative.

### 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 reuse or recycling
  - .1 Carefully dismantle and salvage wood, aluminum and steel materials for reuse or recycling.
  - .2 Dismantle electrical equipment. Terminate power feed as indicated. Salvage luminaires and pack in weatherproof containers with glassware adequately protected. Salvage brackets, hardware and accessories.

### 3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION



**PART 1 GENERAL****1.1 SUMMARY**

- .1 Contents of this section
  - .1 Radiant heating cables for snow melting, accessories, thermostats, sensors and installation methods

**1.2 REFERENCES**

- .1 CSA Group
  - .1 CAN/CSA-C22.2 No.130-03(R2013), Requirements for Electrical Resistance Heating Cables and Heating Device Sets.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material safety data sheet.

**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 radiant heating electrical cables and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Submit a specific installation drawing per site supplied by the manufacturer. The drawings shall indicate the lengths of the hot and cold sections, the attachment procedure, the location of the thermostat and the temperature probe.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for radiant heating electrical cables for incorporation into manual.
- .3 Record on drawings, layout of snow melting cables in poured concrete, hot mastic asphalt or free air. Indicate depth of cable where applicable.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

**1.6 WARRANTY**

- .1 For the radiant heating cables for snow melting of the present Section 23 83 13.01 Radiant Heating electric cables - snow melting, the 12 month warranty from article GC 32.1 from General conditions "C" is prolonged to 24 months.
- .2 The contractor guarantees that the radiant heating cables are without defects according to article CG 24 from the General conditions, but for a period of 24 months.

## **PART 2 Products**

### **2.1 GENERAL**

- .1 Heating cables: to CAN/CSA-C22.2 No.130.

### **2.2 SNOW MELTING CABLES**

- .1 Mineral insulated copper conductor with copper sheath and HDPE jacket factory spliced and sealed, cold leads, and as indicated. As the cables from the Mi heating cable series by Pyrotanax Pentair or approved equivalent.

### **2.3 ACCESSORIES**

- .1 Stainless steel prepunched strapping to hold cables in place when embedded in concrete or asphalt.
- .2 Stainless steel two-hole strappings installed at every 300 mm to attach the cables in place when install in free air in the bottom of the gutters.

### **2.4 CONTROLS**

- .1 Thermostat: type electronic, line voltage rating as indicated.

### **2.5 SNOW SENSING CONTROLS**

- .1 Snow sensing controls consisting of control unit and sensor module.
- .2 System features as follows:
  - .1 Lowering of outside air temperature to selected dial setting to close contacts of variable thermal control in control unit and activate solid state module.
  - .2 Control unit complete with manual off-auto control switch, pilot light, and manual temperature setting switching device.

### **2.6 365-DAY ASTRONOMICAL TIMER**

- .1 365-day astronomical timer as indicatd in the drawings. The contractor shall program the timer in order to energize the heating cable circuit exclusively during the snow melting period.

## **PART 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Conform to requirements, recommendations and to written specifications by the manufacturer, including all available technical bulletin, to the instructions pertaining to transport, handling, storing, installation of products and to technical specifications.

### **3.2 INSTALLATION**

- .1 Install cables in accordance with manufacturer's instructions.
- .2 Install cable straps fastened to concrete with 25 mm nails when 2 pour method used. Locate at 0.9 m intervals.
- .3 Secure cable to anchoring devices and confine cable within 150 mm minimum from edge of slab.
- .4 Protect heating cables with 13 mm plywood sheets and remove progressively when concrete topping is poured.
- .5 Do not cross expansion joints with cable. Where structural design changes location of expansion joints, affecting snow melting cables, report to Parks Canada's Representative.
- .6 Do not alter heating cable length.
- .7 Ensure cables do not bunch or cross.
- .8 Do not energize cable for 28 days after concrete pour.
- .9 Make power and control connections.

### **3.3 FIELD QUALITY CONTROL**

- .1 Tests:
  - .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
  - .2 Use 500 V Megger to test cables for continuity and insulation value and record readings as follows:
    - .1 On cable reel.
    - .2 After installation.
    - .3 Before concrete pouring.
    - .4 During concrete pouring.
    - .5 24 hours after pouring.
  - .3 Where resistance of 50 megohms or less is measured, stop work and advise Parks Canada's Representative.

### **3.4 CLEANING**

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

- .1 Definitions:
  - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
- .2 Reference Standards:
  - .1 CSA Group
    - .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
    - .2 CSA C22.2 No. 130-F03.
  - .2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
    - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Product Data:
    - .1 Submit manufacturer's instructions, printed product literature and data sheets for the supplied materials and equipment and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit for review single line electrical diagrams in a pocket and locate inside the cabinets' door.
  - .3 Certificates:
    - .1 Provide CSA certified material.
    - .2 Where CSA certified material is not available, submit such material to authority having jurisdiction for approval before delivery to site.
    - .3 Submit test results of installed electrical systems and instrumentation.
    - .4 Permits and fees: in accordance with General Conditions of contract.
  - .4 Manufacturer's Field Reports: submit to Parks Canada's Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

**1.3 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

- .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
  - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  - .3 Safety precautions.
  - .4 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

#### 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect the materials from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## PART 2 PRODUCTS

### 2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
  - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification labels for control items in English and in French.
- .4 Use one label for both languages.

**2.2 MATERIALS AND EQUIPMENT**

- .1 Provide material in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material to be CSA certified. Where CSA certified material is not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .1 Factory assemble control panels and component assemblies.

**2.3 WIRING TERMINATIONS**

- .1 The material shall conform to the requirements of Section 01 61 00 - Common products requirements
- .2 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

**2.4 EQUIPMENT IDENTIFICATION**

- .1 Identify electrical equipment with labels as follows:
  - .1 Sizes as follows:

<b>NAMEPLATE SIZES</b>			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates labels to be approved by Parks Canada's Representative prior to manufacture.
- .4 Allow for minimum of twenty-five (25) letters per label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Terminal cabinets and pull boxes: indicate system and voltage.

**2.5 WIRING IDENTIFICATION**

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

**PART 3 EXECUTION****3.1 SITE VISIT**

- .1 The contractor shall visit the site of each tunnel in order to measure the dimensions and confirm the quantities of the works to do before placing the orders for the materials to install.

**3.2 EXAMINATION**

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

**3.3 INSTALLATION**

- .1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.
- .2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

**3.4 NAMEPLATES AND LABELS**

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

**3.5 CO-ORDINATION OF PROTECTIVE DEVICES**

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

**3.6 FIELD QUALITY CONTROL**

- .1 Load Balance:
  - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Conduct following tests in accordance with :
  - .1 Circuits originating from branch distribution panels.
  - .2 Insulation resistance testing:
    - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

- .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
- .3 Check resistance to ground before energizing.
- .3 Carry out tests in presence of Parks Canada's Representative.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 Manufacturer's Field Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
  - .2 Provide heating cables manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

### 3.7 SYSTEM STARTUP

- .1 Instruct Parks Canada's Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

### 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 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 REFERENCES**

- .1 CSA International
  - .1 CAN/CSA-C22.2 No.18-[98(R2003)], Outlet Boxes, Conduit Boxes and Fittings.
  - .2 CAN/CSA-C22.2 No.65-[03(R2008)], Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).
- .2 National Electrical Manufacturers Association (NEMA)

**1.2 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 wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

**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: 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 manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Clamps or connectors for TECK cable, mineral insulated cable as required to: CAN/CSA-C22.2 No.18.

**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 wire and box connectors installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada's Representative.
  - .2 Inform Parks Canada's Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

**3.2 INSTALLATION**

- .1 Remove insulation carefully from ends of conductors cables and:
  - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
  - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

**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 PRODUCT DATA**

- .1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

**PART 2 PRODUCTS****2.1 TECK 90 CABLE**

- .1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.
  - .1 Grounding conductor: copper.
  - .2 Circuit conductors: copper, size as indicated.
- .2 Insulation:
  - .1 Cross-linked polyethylene XLPE.
  - .2 Rating: 600 V.
- .3 Inner jacket: polyvinyl chloride material.
- .4 Armour: flat aluminum.
- .5 Overall covering: thermoplastic polyvinyl chloride.
- .6 Fastenings:
  - .1 One hole malleable iron straps to secure surface cables 50 mm and smaller.  
Two hole steel straps for cables larger than 50 mm.
- .7 Connectors:
  - .1 Watertight, approved for TECK cable.

**2.2 NON-METALLIC SHEATHED CABLE**

- .1 Non-metallic sheathed copper cable type: RWU90, size as indicated.

**PART 3 Execution****3.1 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform the electrical tests using method appropriate to site conditions and to approval of Parks Canada's Representative and local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.

**3.2 GENERAL CABLE INSTALLATION**

- .1 Install cable in conduits in accordance with Section 33 65 76 Direct buried underground ducts.
- .2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

- .3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

### 3.3 INSTALLATION OF TECK90 CABLE (0 -1000 V)

- .1 Install cable, securely supported by staples.

### 3.4 INSTALLATION OF NON-METALLIC SHEATHED CABLE

- .1 Install cables.
- .2 Install straps and box connectors to cables as required.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 CSA Group
  - .1 CSA C22.2 No. 62-93.
  - .2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

### **1.3 WASTE MANAGEMENT**

- .1 Sort and recycle waste according to Section 01 74 11 - Cleaning
- .2 Evacuate all packaging materials from the site toward the appropriate recycling facilities.

## **PART 2 PRODUCTS**

### **2.1 CONNECTORS AND TERMINATIONS**

- .1 Copper compression connectors to CSA C22.2 No.62-93 as required sized for conductors.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Bond and ground as required to CSA C22.2No.41.

**END OF SECTION**



**PART 1 GENERAL****1.1 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 raceway and boxes and include product characteristics, performance criteria, physical size, finish and limitations.

**1.2 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for raceway and boxes for incorporation into manual.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .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 manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**PART 2 PRODUCTS****2.1 SPLICE BOXES**

- .1 As indicated in the drawings.

**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 raceway and boxes installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada's Representative.
  - .2 Inform Parks Canada's Representative of unacceptable conditions immediately upon discovery.

- .3 Proceed with installation only after unacceptable conditions have been remedied.

### 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.
- .3 Waste Management: separate waste materials for 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 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 cables and include product characteristics, performance criteria, physical size, finish and limitations.

**1.2 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: 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 manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect cables from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**PART 2 Execution****2.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for cable installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada's Representative.
  - .2 Inform Parks Canada's 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 Parks Canada's Representative.

**2.2 DIRECT BURIAL OF CABLES**

- .1 After sand bed in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, lay cables maintaining 75 mm clearance from each side of trench to nearest cable.
  - .1 Do not pull cable into trench.
- .2 Include offsets for thermal action and minor earth movements.
  - .1 Offset cables 150 mm minimum for each 60 m run, maintaining minimum cable separation and bending radius requirements.
- .3 Make termination and splice only as indicated leaving 0.6 m minimum of surplus cable in each direction.
  - .1 Make splices and terminations in accordance with manufacturer's written recommendations using approved splicing kits.

- .4 Cable separation:
  - .1 Maintain 75 mm minimum separation between cables of different circuits.
  - .2 At crossover, maintain 75 mm minimum vertical separation between low voltage cables and 150 mm between high voltage cables.
  - .3 Install treated planks on lower cables 0.6 m minimum in each direction at crossings.
- .5 After sand protective cover specified in Section 31 23 33.01 - Excavating, Trenching and Backfilling, is in place, install continuous row of overlapping 38 x 140 pressure treated planks as indicated to cover length of run.

### 2.3 CABLE INSTALLATION IN DUCTS

- .1 Install cables as indicated in ducts.
- .2 Do not pull spliced cables inside ducts.
- .3 Install multiple cables in duct simultaneously.
- .4 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .5 To facilitate matching of colour coded multiconductor control cables reel off in same direction during installation.
- .6 Before pulling cable into ducts and until cables are properly terminated, seal ends of lead covered cables with wiping solder; seal ends of non-leaded cables with moisture seal tape.
- .7 After installation of cables, seal duct ends with duct sealing compound.

### 2.4 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using qualified personnel.
  - .1 Include necessary instruments and equipment.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Check each feeder for continuity, short circuits and grounds.
  - .1 Ensure resistance to ground of circuits is not less than 50 megohms.
- .5 Pre-acceptance tests:
  - .1 After installing cable but before splicing and terminating, perform insulation resistance test with 1000 V megger on each phase conductor.
  - .2 Check insulation resistance after each splice and/or termination to ensure that cable system is ready for acceptance testing.
- .6 Acceptance Tests:
  - .1 Ensure that terminations and accessory equipment are disconnected.
  - .2 Ground shields, ground wires, metallic armour and conductors not under test.
- .7 Provide Parks Canada's Representative with list of test results showing location at which each test was made, circuit tested and result of each test.
- .8 Remove and replace entire length of cable if cable fails to meet any of test criteria.

**2.5 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.

**2.6 PROTECTION**

- .1 Repair damage to adjacent materials caused by cables installation.

**END OF SECTION**



**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 28 20 Ground fault interrupters - class "A"

**1.2 REFERENCES**

- .1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)
  - .1 ANSI/IEEE C37.13-2008, Low Voltage AC Power Circuit Breakers Used in Enclosures.
  - .2 CSA International
    - .1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

**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 air circuit breakers and include product characteristics, performance criteria, physical size, finish and limitations.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

**1.5 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: 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 manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect air circuit breakers from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **PART 2 PRODUCTS**

### **2.1 AIR CIRCUIT BREAKER**

- .1 Air circuit breaker: to ANSI/IEEE C37.13 and CSA C22.2 No.5.
- .2 600 V class breakers, with characteristics as the existing and from the same manufacturer as the existing.
- .3 Solid-state tripping system consisting of 1 current sensor per pole, 1 solid-state trip unit and self-powered trip actuator. Equipped with short ground fault function.
- .4 Breakers with on-off indicator and spring charged/discharged indicator.
- .5 Interlocks to prevent circuit breaker drawout when in closed position and to prevent closing unless fully engaged or in test position.

## **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 air circuit breakers installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada's Representative.
  - .2 Inform Parks Canada's 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 Parks Canada's Representative.

### **3.2 INSTALLATION**

- .1 Install air circuit breakers as indicated.

### **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 REFERENCES**

- .1 CSA International
  - .1 CSA C22.2 No. 5-[09], Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Packaging Waste Management: remove for reuse as specified in Construction Waste Management.

**PART 2 PRODUCTS****2.1 BREAKERS GENERAL**

- .1 Moulded-case circuit breakers with ground-fault circuit-interrupters: to CSA C22.2 No.5.
- .2 Bolt-on moulded case circuit breaker: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
- .3 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
- .4 Common-trip breakers: with single handle for multi-pole applications.
- .5 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
  - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
- .6 Circuit breakers with interchangeable trips as indicated.
- .7 Circuit breakers to have minimum 14 kA symmetrical rms interrupting capacity rating.

**2.2 THERMAL MAGNETIC BREAKERS [DESIGN A]**

- .1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

**PART 3 EXECUTION****3.1 INSTALLATION**

- .1 Install circuit breakers as indicated.

**END OF SECTION**



**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 26 28 16.01 Air circuit breakers.

**1.2 REFERENCES**

- .1 CSA International
  - .1 CAN/CSA C22.2 No.144-M91(R2006), Ground Fault Circuit Interrupters.
- .2 National Electrical Manufacturers Association (NEMA)
  - .1 NEMA PG 2.2-1999(R2009), Application Guide for Ground Fault Protection Devices for Equipment.

**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 ground fault circuit interrupters and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Test and Evaluation Reports: submit test report for field testing of ground fault equipment to Parks Canada's Representative and certificate that system as installed meets criteria specified.

**1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for ground fault circuit interrupters for incorporation into manual.

**1.5 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: 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 manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect ground fault circuit interrupters from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

**PART 2 Products****2.1 MATERIALS**

- .1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA C22.2 No.144.
- .2 Components comprising ground fault protective system to be of same manufacturer.

**2.2 BREAKER TYPE GROUND FAULT INTERRUPTER**

- .1 Ground fault circuit interrupter, 1 phase circuit c/w test and reset facilities.

**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 ground fault circuit interrupters installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada's Representative.
  - .2 Inform Parks Canada's Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

**3.2 INSTALLATION**

- .1 Do not ground neutral on load side of ground fault relay.
- .2 Pass phase conductors including neutral through zero sequence transformers.
- .3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

**3.3 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Arrange for field testing of ground fault equipment by Contractor before commissioning service.
- .3 Demonstrate simulated ground fault tests.

**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.

**END OF SECTION**

PART 1 - GENERAL1.1 REFERENCES

- .1 Construction work - General technical clauses - Aggregates NQ1809-114.
- .2 BNQ standards, series 2560 on aggregates.
- .3 Latest edition of the Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook) of the Quebec Department of Transport.
- .4 Standardized technical specifications BNQ 1809-300/2004 (R2007) Construction work - General Technical Clauses - Drinking water and sewer pipe.

1.2 DEFINITIONS

- .1 Excavation classes: (2) 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. 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 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 D 4318, and gradation within limits specified when tested to ASTM D 422 and ASTM C 136: Sieve sizes to BNQ 1530-060 standards.

.2 Table:

Sieve Designation	% Passing
5.00 mm	100
1.25 mm	45 - 100
315 µm	10 - 80
80 µm	0 - 45

.3 Coarse grained soils containing more than 20% by mass passing 0.075 mm sieve.

### 1.3 EXISTING CONDITIONS

- .1 Buried services:
- .1 Before commencing work 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, notify applicable Parks Canada representative establishes location and states of use of buried utilities and structures. Parks Canada representative to clearly mark such locations to prevent disturbance during Work.
  - .6 Confirm locations of buried utilities by careful test excavations.
  - .7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.
  - .8 Where utility lines or structures exist in area of excavation, obtain direction of Parks Canada representative before removing. Costs for such Work to be paid by Parks Canada representative.
  - .9 Record location of maintained, re-routed and abandoned underground lines.
  - .10 Confirm locations of recent excavations adjacent to area of excavation.
- .2 Existing buildings and surface features:
- .1 Conduct, with Parks Canada 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 make repair as directed by Parks Canada representative.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Prior to use, have the owner's representative approve all of the fill materials.
- .2 Provide a certificate stating that the fill materials are pyrite- and shale-free (DB certified materials)
- .3 Materials
- .1 Materials considered as fill in the various structures are defined hereunder:
- .2 Crushed aggregate, calibre 20 - 0 mm : materials with the following physical and mechanical properties.

**Physical and mechanical properties of crushed aggregate, calibre 20 - 0 mm**

Test	BNQ standard	Selection criteria
Petrographic number	2560 - 900	200 max.
Durability (MgSO <sub>4</sub> )	2560 - 450	20 % max.
Los Angeles (LA)	2560 - 400	50 % max.
Micro-Deval (MD)	2560 - 070	35 % max.
Micro-Deval and Los Angeles (MD et LA)		80 % max.
Fragmentation (% of fragmented particles)		50 % min.
Organic matter content		0.8 % max.

Granulometry must comply with the following limits after installation :

Screen	% passing through
31.5 mm	100
20 mm	90 - 100
14 mm	68 - 93
5 mm	35 - 60
1.25 mm	19 - 38
315 µm	9 - 17
80 µm	2 - 7

PART 3 - EXECUTION3.1 TEMPORARY  
EROSION AND  
SEDIMENTATION  
CONTROL

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

3.2 SITE  
PREPARATION

- .1 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3  
PREPARATION/  
PROTECTION

- .1 Keep excavations clean, free of standing water, and loose soil.
- .2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Parks Canada representative approval.
- .3 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.
- .4 Protect buried services that are required to remain undisturbed.

3.4 STRIPPING OF  
TOPSOIL

- .1 Begin topsoil stripping of areas as directed by Parks Canada representative after area has been cleared of weeds and grasses and removed from site.
- .2 Strip topsoil to depths as directed by Parks Canada representative.
  - .1 Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Parks Canada representative.
  - .1 Stockpile height not to exceed 2 m and should be protected from erosion.
- .4 Dispose of unused topsoil to location as directed by Parks Canada representative.

### 3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Parks Canada representative 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 to approved 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 Parks Canada representative at least (7) days in advance of excavation operations for initial cross sections to be taken.
- .2 Perform the excavation work based on the dimensions, layouts, hills and levels indicated.
- .3 Remove concrete, paving, walks, demolished foundations and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.
- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 Do not disturb soil within branch spread of trees or shrubs that are to remain.
  - .1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .6 For trench excavation, unless otherwise authorized by Parks Canada representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Parks Canada representative.
- .8 Restrict vehicle operations directly adjacent to open trenches.
- .9 Dispose of surplus and unsuitable excavated material in approved location on site.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

- .12 Notify Parks Canada representative when bottom of excavation is reached.
- .13 Obtain Parks Canada representative approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Parks Canada representative.

### 3.7 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Parks Canada representative has inspected and approved installations.
  - .2 Parks Canada representative has inspected and approved of construction below finish grade.
  - .3 Inspection, testing, approval, and recording location of underground utilities.
  - .4 Removal of concrete formwork.
  - .5 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 24 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 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Parks Canada representative.
    - .2 If approved by Parks Canada representative erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Parks Canada representative.

3.8 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris. Trim slopes, and correct defects as directed by Parks Canada representative.
- .2 Replace topsoil as indicated or as directed by Parks Canada representative.
- .3 Reinstate lawns to elevation which existed before excavation.
- .4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
- .5 Clean and reinstate areas affected by Work as directed by Parks Canada representative.
- .6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION



PART 1 - GENERAL1.1 SUMMARY

- .1 This section sets out the requirements pertaining to the installation of geotextiles and reinforcement geocomposite.
- .2 The work in this section includes but is not limited to the:
  - .1 Supply and installation of geotextile to make the drainage trench in the Charlevoix sector.

1.2 RELATED REQUIREMENTS

- .1 Section - Storm Utility Drainage Piping - 33 41 00.
- .2 Latest edition of the Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook) of the Quebec Department of Transport.
- .3 Standardized technical specifications BNQ 1809-300/2004 (R2007) Construction work - General Technical Clauses - Drinking water and sewer pipe.

1.3 MEASUREMENT AND PAYMENT

- .1 The articles in "GÉO-9 Georoute type needle-punched reinforcement geocomposite..." will be measured in square metres of covered surface and paid based on the amount on the bid information sheet
- .2 See the section entitled Storm Utility Drainage Piping- Section 33 41 00 - to measure the geotextile to make the drainage trench.

1.4 REFERENCES

- .1 The geocomposite for the infrastructure reinforcement must comply with type II geotextile requirements of MTQ standard 13101
- .2 All separation geotextile must be compliant with type III membrane requirements of MTQ standard 13101.
- .3 The separation geotextile for the drainage ditch must be compliant with the requirements of BNQ standard NGCTTG 3001.

1.5 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.

PART 2 - PRODUCTS

- 2.1 MATERIAL
- .1 "Géoroute Géo-9-type" needle-punched reinforcement geocomposite by Texel or an approved equivalent.
    - .1 Tensile load of at least 11 kN/m, according to CGSB standard 148.1 No.7.3.
    - .2 Permeability at least  $3.1 \times 10^{-1}$  cm/sec, according to CGSB standard 148.1 No.4.
    - .3 Bursting strength at least 2600 KPa, according to CGSB standard 4.2 No.11.1.
  - .2 Texel-type separation geotextile no. 7609 or an approved equivalent.
    - .1 Tensile load of at least 825 N, according to CGSB standard 148.1 No.7.3.
    - .2 Permeability at least  $0,4 \times 10^{-1}$  cm/sec, according to CGSB standard 148.1 No.4.
    - .3 Bursting strength at least 2400 KPa, according to CGSB standard 4.2 No.11.1.
  - .3 F-200 type geotextile from Texel or an approved equivalent.
    - .1 Tensile load of at least 400 N, according to CGSB standard 148.1 No.7.3.
    - .2 Permeability at least  $0,4 \times 10^{-1}$  cm/sec, according to CGSB standard 148.1 No.4.
    - .3 Bursting strength at least 2400 KPa, according to CGSB standard 4.2 No.11.1.
  - .4 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to ASTM A 123/A 123M.
  - .5 Factory seams: sewn in accordance with manufacturer's recommendations.
  - .6 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 Parks Canada representative.
    - .2 Inform Parks Canada 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 Parks Canada representative.

3.2 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600 mm over previously laid strip.
- .5 Overlap each successive strip of geotextile for the drainage drench on the previously laid strip based on the width indicated on the drawings.
- .6 Pin successive strips of geotextile with securing pins at recommended interval as indicated.
- .7 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .8 Replace damaged or deteriorated geotextile to approval of Parks Canada representative.

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.

3.4 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION



PART 1 - GENERAL

- 1.1 MEASUREMENT AND PAYMENT .1 Measure removal of pavement markings by lump sum per site.
- 1.2 REFERENCES .1 Canada Green Building Council (CaGBC)  
.1 LEED Canada-NC Version 1.0-[2004], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum [2007]).
- 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 each type of abrasives and solvent used on project.
- 1.4 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Abrasives and solvents used for removal of paint, oil, grease, rubber deposits: proprietary products specially designed for pavement cleaning, subject to approval by Parks Canada representative.

PART 3 - EXECUTION

- 3.1 REMOVING PAVEMENT MARKINGS .1 Remove rubber tire deposits and paint markings, in areas as directed by Parks Canada representative by water blasting, or other method approved in writing by Parks Canada representative.  
.2 Exercise care to avoid dislodging of coarse aggregate particles, excessive removal of fines, damage to bituminous.  
.3 Do not heat pavement surfaces above 120 degrees C, when using heater planning equipment.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .2 Leave Work area clean at end of each day.
- .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 in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .5 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

PART 1 - GENERAL1.1 SUMMARY

- .1 This section sets out the requirements pertaining to the spreading of aggregate materials for sub-foundations, foundations and road profile correction.

1.2 RELATED REQUIREMENTS

- .1 Section - Excavating, Trenching and Backfilling- 31 23 33.01.
- .2 BNQ series 2560 standards concerning aggregates.
- .3 Latest edition of the "Cahier des charges et devis généraux (CCDG)" (General Drawings and Specifications Workbook).

1.3 MEASUREMENT AND PAYMENT

- .1 Items in "Preparation and layout of the infrastructure" will be measured and paid in square metres based on the amount indicated in the bid information sheet.
- .2 Items in "Road sub-foundation, MG-112 sand, 450 mm to 700 mm thick" will be measured and paid in square metres based on the amount indicated in the bid information sheet.
- .3 Items in "Road foundation, MG-20 crushed stone 300 mm thick" will be measured and paid in square metres based on the amount indicated in the bid information sheet.
- .4 Items in "Road foundation, MG-20 crushed stone ± 250 mm thick" will be measured and paid in metric tonnes based on the amount indicated in the bid information sheet.
- .5 Items in "MG-20 crushed stone to correct the road profile" will be measured and paid in metric tonnes based on the amount indicated in the bid information sheet

1.4 REFERENCES

- .1 BNQ series 2560 standards on aggregates.
- .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 Latest edition of the "Cahier des charges et devis généraux (CCDG)" (General Drawings and Specifications Workbook).

1.5 ACTION AND  
INFORMATIONAL  
SUBMITTALS

- .1 Submit the suppliers' MSDS with the description and characteristics of aggregates to the laboratory and to the Parks Canada representative.

PART 2 - PRODUCTS2.1 MATERIALS

- .1 Aggregate characteristics: good quality, hard, resistant, free of flat particles, needles, soft or laminate particles, organic materials, clumps of clay, minerals or other substances that could interfere with the intended use.
- .2 The fine aggregates that meet the relevant requirements of the sections must consist of one or a mixture of the following:
  - .1 MG-112 sand;
  - .2 Natural sand;
  - .3 Artificial sand;
  - .4 Screenings from the crushing of quarry blocks, boulders, gravel or slag.
- .3 The coarse aggregates that meet the relevant requirements of the sections must consist of one or a mixture of the following:
  - .1 MG-20 crushed stone;
  - .2 Crushed rock;
  - .3 Gravel and crushed gravel consisting of natural stone particles;
  - .4 Lightweight granulate, including slag and expanded shale.

2.2 QUALITY CONTROL AT  
THE SOURCE

- .1 Inform the Parks Canada representative of the proposed source of supply of the aggregates and allow him/her access to collect samples at least 2 weeks prior to the start of production.
- .2 If the Parks Canada representative believes that the proposed supply source does not meet the prescribed standards or cannot reasonably be prepared to meet them, find another supply source or demonstrate that the materials in question can be prepared to meet the prescribed requirements.
- .3 Advise the Parks Canada representative two weeks before any change in the aggregate supply source.
- .4 Material accepted at its supply source can nonetheless be rejected subsequently if it does not meet the specified requirements, if the quality or properties of the delivered materials are not uniform or if the material does not perform satisfactorily on site.

PART 3 - EXECUTION3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular sub-base installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada representative.
  - .2 Inform Parks Canada 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 Parks Canada representative.

3.2 PREPARATION

- .1 Stockpiling
  - .1 Aggregates must be stockpiled on level and well-drained ground with load-bearing capability and stability sufficient to support the stockpiled materials and the handling equipment.
  - .2 Unless the materials are stockpiled on an acceptable stabilized surface, the base of the stockpile must consist of compacted sand at least 300 mm thick to prevent contamination of the aggregates. Stockpile the aggregates on the ground but do not incorporate into the work the layer of materials 300 mm thick at the base of the stockpile.
  - .3 To avoid mixing the aggregates, allow sufficient space between different stockpiles of aggregates or separate them using sturdy, full-height partitions.
  - .4 Mixed or contaminated materials must not be used. Remove and eliminate rejected materials within 48 hours of refusal, according to the directives from the Parks Canada representative.
  - .5 Stockpile the materials in uniform layers of no more than 1.5 m high.
  - .6 Unload aggregates brought to the piles by truck into uniform piles and shape the piles in accordance with instructions.
  - .7 Do not make cone-shaped piles or have materials tumble down each side of the piles.
  - .8 Do not use stockpiling conveyors.
  - .9 For work in the winter time, prevent ice and snow from becoming mixed in with or taken out of the stockpiles.

3.3 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Parks Canada representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
  - .1 Parks Canada representative may authorize thicker lifts if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.4 COMPACTION

- .1 Perform the compaction pursuant to the latest edition of the Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook).

3.5 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.

3.6 SITE TOLERANCES

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.7 PROTECTION

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Parks Canada representative.

END OF SECTION

PART 1 - GENERAL

- 1.1 SUMMARY .1 This section sets out the requirements pertaining to the installation of asphalt pavement including an asphalt binder.
- 1.2 RELATED REQUIREMENTS .1 Section - Excavating, Trenching and Backfilling - 31 23 33.01.
- .2 Section - Granular Sub-base - 32 11 16.01
- .3 Latest edition of the "Cahier des charges et devis généraux (CCDG)" (General Drawings and Specifications Workbook).
- .4 BNQ series 2560 standards on aggregates.
- 1.3 MEASUREMENT AND PAYMENT .1 Items in "EB-10S asphalt pavement" will be measured and paid for in square metres according to the amount indicated on the bid information sheet.
- 1.4 REFERENCES .1 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 CAN/CGSB-16.3, Liants bitumineux pour les routes.
- .2 Latest edition of the "Cahier des charges et devis généraux (CCDG)" (General Drawings and Specifications Workbook).
- 1.5 ACTION AND INFORMATIONAL SUBMITTALS .1 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C prior to beginning Work.

PART 2 - PRODUCTS2.1 MATERIALS

- .1 Performance graded asphalt cement: to AASHTO M320, grade PG 58-28 when tested to AASHTO R29.
- .2 Aggregates: in accordance with BNQ series 2560 on aggregates.
- .3 Mix of EB-10S-type asphalt paving.
- .4 Asphalt binder compliant with MTQ standard 4104.

2.2 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
  - .1 Drum diameter: 1200 mm minimum.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
  - .1 Boxes with tight metal bottoms.
  - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
  - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
  - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
  - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
  - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Parks Canada representative may be used instead of tamping irons.
  - .3 Straight edges, 4.5 m in length, to test finished surface.

PART 3 - EXECUTION3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada representative.
  - .2 Inform Parks Canada 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 Parks Canada representative.

3.2 PREPARATION

- .1 Reshape granular roadbed in accordance with Section - Granular Sub-base - 32 11 16.01
  - .1 When levelling course is not required, patch and correct depressions and other irregularities to approval of Parks Canada representative before beginning paving operations.
- .2 Apply tack coat prior to paving.
- .3 Prior to laying mix, clean surfaces of loose and foreign material.
- .4 As the case may be, apply a layer of asphalt binder when the asphalt paving is applied directly to an existing concrete slab.

3.3 TRANSPORTATION  
OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required.
  - .1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless Parks Canada representative approves artificial light for night placing.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
  - .1 Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

- .6 Deliver loads continuously in covered vehicles and immediately spread and compact.
  - .1 Deliver and place mixes at temperature within range as directed by Parks Canada representative but not less than 135 degrees C.

### 3.4 PLACING

- .1 Obtain Parks Canada representative's approval of existing surface prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated on plans.
- .3 Placing conditions:
  - .1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.
  - .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
  - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Apply the asphalt pavement in accordance with the instructions in section 13 of Latest edition of the MTQ "Cahier des charges et devis généraux (CCDG)" (General Drawings and Specifications Workbook).

### 3.5 COMPACTING

- .1 General:
  - .1 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
- .2 Perform the rolling in accordance with Latest edition of the MTQ Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook).

### 3.6 JOINTS

- .1 General:
  - .1 Remove surplus material from surface of previously laid strip.
    - .1 Do not deposit on surface of freshly laid strip.
  - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
  - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

- .2 Transverse joints:
  - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
  - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
  - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
  
- .3 Longitudinal joints:
  - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
  - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
  - .3 If cold joint cannot be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
  - .4 Overlap previously laid strip with spreader by 25 to 50 mm.
  - .5 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
  - .6 Roll longitudinal joints directly behind paving operation.
  - .7 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

### 3.7 FINISH TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.

### 3.8 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
  - .1 If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.9 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 SOMMAIRE .1 This section sets out the requirements concerning the installation of granite pavers in this contract.
- .2 Pavement work consisting of prefab granite pavers include but are not limited to the following:
- .1 The reinstallation of granite pavers in the locations they were previously taken from in order to perform some of the work.
- .2 The supply and laying of a granitic sand base 25 mm thick.
- .3 The supply and installation of plastic edge restraints.
- 1.2 RELATED REQUIREMENTS .1 Section - Selective site demolition - 02 41 13.
- .2 Section - Granular sub-base - 32 11 16.01.
- 1.3 MEASUREMENT PROCEDURES .1 Items in "Granite pavers to reinstall..." shall be measured and paid for in full according to the amount indicated in the bid information sheet.

PART 2 - PRODUCTS

- 2.1 CONCRETE PAVERS .1 Use the existing granite pavers.
- 2.2 BEDDING AND JOINT MATERIAL .1 Bedding and joint sand: clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from crushed rock or gravel. Do not use limestone screenings or stone dust.
- .2 Gradation: to CSA-A23.1, Table 4 - Grading Limits for Fine Aggregate, and CSA A179 as follows:

Sieve Designation	% Passing for Joint Sand Bedding Sand	
10 mm	[100]	
5 mm	[95-100]	[100]
2.5 mm	[80-100]	[95-100]
1.25 mm	[50-90]	[60-100]
630 microns	[25-65]	
600 microns		[35-80]
315 microns	[10-35]	
300 microns		[15-20]
160 microns	[2-10]	
150 microns		[2-15]

2.3 EDGE RESTRAINTS

- .1 Edge restraints shall be plastic.

2.4 CLEANING  
COMPOUND

- .1 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.
- .2 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

PART 3 - EXECUTION3.1 STRUCTURAL  
SURFACE

- .1 Verify that structural surfaces conform to levels and compaction required for installation of unit pavers. If discrepancies occur, notify Parks Canada representative and do not commence work until instructed by Parks Canada representative.
- .2 Verify that top of structural surface (top of base) does not exceed plus or minus 10 mm of grade over 3 m straightedge.
- .3 Ensure that structural surface is not frozen or standing water is present during installation.

3.2 STRUCTURAL  
CURBS

- .1 Verify that structural curbs conform to elevations and alignments required.

3.3 PLACING OF  
BEDDING MATERIAL

- .1 Ensure bedding material is not saturated or frozen at all times until installation is complete.
- .2 Spread and screed material on structural surface to achieve 25 mm compacted thickness after vibrating pavers in place. Do not use joint sand for bedding sand.
- .3 Do not disturb screeded material. Do not use bedding material to fill depressions in structural surface.

3.4 INSTALLATION OF  
CONCRETE PAVERS

- .1 Lay pavers to pattern indicated. Joints between pavers: 2 to 5 mm wide or as they currently exist.
- .2 Installation by mechanical equipment:
  - .1 Place paver pallets and other materials without exceeding load bearing capacity, or otherwise detrimentally affecting installations.
  - .2 Run equipment approved for installation only on paving surfaces vibrated in place.

- .3 Use a low amplitude, high frequency plate compactor capable of at least 22 kN centrifugal compaction force to vibrate pavers into bedding sand.
- .4 Inspect, remove, and replace chipped, broken and damaged pavers.
- .5 Sweep dry joint sand material into joints.
- .6 Settle sand by vibrating pavers with plate compactor.
- .7 Continue application of joint material and vibrating of pavers until joints are full. Do not vibrate within 1 m of unrestrained edges of pavers.
- .8 Complete installation to within 1 m of laying face, with sand-filled joints, at completion of each work day.
- .9 Sweep off excess joint material when installation is complete.
- .10 Final surface elevations not to exceed plus or minus 10 mm under 3 m long straightedge.
- .11 Surface elevation of pavers: 3 to 4 mm above adjacent drainage inlets, concrete collars or channels.
- .12 Ensure conformance of final elevations.

### 3.5 CLEANING

- .1 Carry out cleaning at times and conditions recommended by manufacturer of cleaning compound, immediately prior to sealing and as directed by Parks Canada representative.
- .2 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.
- .3 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.
- .4 Final surface to be free of contamination.

### 3.6 FIELD QUALITY CONTROL

- .1 If some granite pavers are damaged, replace them with equivalent material to the satisfaction of the Parks Canada representative at no charge to the latter.

### 3.7 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION



PART 1 - GENERAL

- 1.1 SUMMARY .1 This section sets out the requirements pertaining to the construction of sidewalks and the coating of prefab gutters.
- 1.2 MEASURING PROCEDURES .1 Items in the "35 MPa Reinforced Concrete Sidewalk" shall be measured and paid in square metres based on the amount indicated in the bid information sheet.
- 1.3 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.
- 1.4 REFERENCES .1 Bureau de normalisation du Québec (BNQ).  
.1 Standardized technical specifications BNQ 1809-500/2006 Construction work - Sidewalks and concrete curbs.
- 1.5 ACTION AND INFORMATIONAL SUBMITTALS .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.  
.2 Inform Parks Canada representative of proposed source of materials and provide access for sampling at least 2 weeks prior to commencing work.  
.3 If materials have been tested by testing laboratory approved by Parks Canada representative within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.  
.2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.  
.3 Joint filler and Curing Compound: in accordance with Section 03 30 00 - Cast-in-Place Concrete.  
.4 Granular base: material to Section 31 23 33 01 - Excavating, Trenching and Backfilling.

PART 3 - EXECUTION3.1 GRADE  
PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 GRANULAR BASE

- .1 Obtain Parks Canada representative approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated.
- .3 Compact granular base in maximum 150 mm layers to at least 95% of maximum density to ASTM D 698.

3.3 CONCRETE

- .1 Obtain Parks Canada representative's approval of granular base and reinforcing steel prior to placing concrete.
- .2 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 10 mm radius edging tool.

3.4 TOLERANCES

- .1 Finish surfaces to within 6 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND  
CONTRACTION JOINTS

- .1 After towelling and while the concrete is firm but still pliable, fill the lateral contraction joints at 4.5 m intervals and based on the recommendations of BNQ 1809-500/2006.
- .2 Provide expansion joints according to the recommendations of BNQ 1809-500/2006.
- .3 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.6 ISOLATION  
JOINTS

- .1 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 Install joint filler in isolation joints as indicated.
- .3 Seal isolation joints with sealant approved by Parks Canada representative.

3.7 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1/A23.2 to exposed finished surfaces for at least 7 day after placing, or sealing moisture in by curing compound as directed by Parks Canada representative.
- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film, in accordance with manufacturer's requirements.
- .4 Curing must begin immediately after finishing work.

3.8 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling.
- .2 Backfill to designated elevations with material as directed by Parks Canada representative.
  - .1 Compact and shape to required contours as directed by Parks Canada representative.

3.9 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION



**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

**1.2 MEASUREMENT FOR PAYMENT**

- .1 Pavement marking measured by metres of painted length including supply of materials and execution.

**1.3 REFERENCES**

- .1 MTQ- Normes - Ouvrages Routiers - Tome I to Tome VIII of the Ministry of Transportation, latest edition.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature and data sheets for pavement markings and include product characteristics, performance criteria, physical size, finish and limitations.

**1.5 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operations and Maintenance Data: submit information on materials relative to work of this Section for inclusion in operations and maintenance manual.

**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 manufacturer's recommendations in a clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**1.7 SITE CONDITIONS**

- .1 Traffic marking coating application between May 1st and October 15th is subject to seasonal use restriction and must not have a VOC concentration in excess of 150 g/L.

**PART 2 PRODUCTS****2.1 MATERIALS**

- .1 Only products that meet the requirements of the MTQ norme 10202 and are permitted as per the latest version of the MTQ approved list (medium term) may be used for the paintings and markings works.

**PART 3 EXECUTION****3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.
  - .1 Visually inspect substrate in presence of Parks Canada Representative.
- .2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.
- .3 Proceed with Work only after unacceptable conditions have been rectified.

**3.2 EQUIPMENT REQUIREMENTS**

- .1 Paint applicator: approved pressure type with positive shut-off distributor capable of applying paint in single, double and dashed lines and capable of applying marking components uniformly, at rates specified, and to dimensions as indicated.

**3.3 APPLICATION**

- .1 Pavement markings: laid out as per the pavement marking and signalisation plans.
- .2 Unless otherwise approved by the Parks Canada Representative, apply paint only when air temperature is above 10 degrees C, wind speed is less than 60 km/h and no rain is forecast within next 4 hours.
- .3 Apply traffic paint evenly at rate of 3 m<sup>2</sup>/L.
- .4 Do not thin paint unless approved by Parks Canada Representative.
- .5 Symbols and letters to dimensions indicated.
- .6 Paint lines of uniform colour and density with sharp edges.
- .7 Thoroughly clean distributor tank before refilling with paint of different colour.

**3.4 TOLERANCE**

- .1 Paint markings: within plus or minus 12 mm of dimensions indicated.
- .2 Remove incorrect markings in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

**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.
  - .1 Remove insulation material spilled during installation and leave work area ready for application of wall board.

**3.6 PROTECTION**

- .1 Protect pavement markings until dry.
- .2 Repair damage to adjacent materials caused by pavement marking application.

**END OF SECTION**

PART 1 - GENERAL1.1 RELATED  
REQUIREMENTS

- .1 Excavating, Trenching and Backfilling Section 31 23 33.01.
- .2 Latest edition of the Cahier des charges et devis généraux (CCDG) (General Drawings and Specifications Workbook).
- .3 Standardized technical specifications NQ 0605-100/2001 Aménagement paysagé à l'aide de végétaux (plant landscaping method).

1.2 MEASUREMENT AND  
PAYMENT

- .1 Payment for sodding will be made at unit price bid of actual area surface measurements taken and computed by Parks Canada representative for:
  - .1 Items in "Sod, including top soil 150 mm thick" shall be measured and paid in square metres based on the amount on the bid information sheet.

1.3 ADMINISTRATIVE  
REQUIREMENTS

- .1 Scheduling:
  - .1 Schedule sod laying to coincide with preparation of soil surface.
  - .2 Schedule sod installation when frost is not present in ground.

1.4 QUALITY  
ASSURANCE

- .1 Testing reports: submit the testing reports certifying that the products, materials and equipment meet the requirements with respect to their physical characteristics and performance criteria.
- .2 Certificates: submit documents signed by the manufacturer certifying that the products, materials and equipment meet the requirements with respect to their physical characteristics and performance criteria.

PART 2 - PRODUCTS2.1 MATERIALS

- .1 Commercial Grade Turf Grass Nursery:
  - .1 Mow sod at height directed by Parks Canada representative within 36 hours prior to lifting, and remove clippings.
  - .2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.
- .2 Water:
  - .1 Water used to water the grass shall be taken from the Lachine Canal with a pump provided by the contactor.

- .3 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
  - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.
- .4 Top soil for sodding: mixture of particles, microorganisms and organic matter that provide an environment conducive to the growth of the desired plants.
  - .1 Texture based on the Canadian Soil Classification System: soil made up of 20 to 70% sand, at least 7% clay and 2 to 10% of organic matter in weight.
  - .2 Must not contain any toxic elements or growth inhibitors.
  - .3 The finished surface provided must be free of debris and stones more than 50 mm in diameter.
  - .4 Coarse plant matter 10 cm in diameter and 100 mm in length and accounting for 2% of the soil volume.
  - .5 Consistency: friable soil when damp.

## 2.2 SOURCE QUALITY CONTROL

- .1 Obtain written approval from Parks Canada representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from Parks Canada representative.

## 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 sod installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Parks Canada representative.
  - .2 Inform Parks Canada 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 Parks Canada representative.

### 3.2 PREPARATION

- .1 Verify that grades are correct. If discrepancies occur, notify Parks Canada representative and commence work when instructed by Parks Canada representative.
- .2 Level the soil to eliminate unevenness and bumps and provide a slope that allows for proper runoff.
- .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.

### 3.3 LAYING AND SPREADING OF TOPSOIL AND HUMUS

- .1 Once the Parks Canada representative has accepted the capping layer, spread the topsoil.
- .2 Spread the topsoil in uniform layers not to exceed 150 mm thick.
- .3 In areas to be sodded, increase the layer of topsoil to 15 mm of the final soil level.
- .4 Spread the topsoil according to instructions in layers of minimum thickness after settlement:
  - .1 150 mm for areas to be sodded.
- .5 Spread topsoil and humus by hand around trees, bushes and obstacles.

### 3.4 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.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### 3.5 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 depth of 75 to 100 mm.
  - .2 Maintain sodded areas weed free 95%.

### 3.6 ACCEPTANCE

- .1 Turf Grass Nursery Sod areas will be accepted by Parks Canada representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Sod is free of bare and dead spots.
  - .3 Earth visibility following mowing to a height of 60 mm is acceptable.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.
- .4 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION

PART 1 - GENERAL1.1 SUMMARY

- .1 This section sets out the requirements pertaining to the installation of drains and gutters; and to the cleaning of existing pipes.
- .2 The work in this section includes but is not limited to the:
  - .1 Supply and installation of prefab gutters.
  - .2 Supply and installation of storm water discharge drains.
  - .3 Cleaning of existing storm sewer pipes.
  - .4 Connection of the proposed drain to the existing one.
  - .5 Construction of a drainage trench.
  - .6 Cleaning of drains, gutters and small catch basins installed.
  - .7 Supply of additional grate sections.

1.2 RELATED REQUIREMENTS

- .1 Section - Excavating, trenching and backfilling - 31 23 33.01.
- .2 Section - Concrete forming and accessories - 03 10 00.
- .3 Section - Concrete reinforcing - 03 20 00.
- .4 Section - Cast-in-place concrete - 03 30 00.
- .5 Section - Concrete walks, curbs and gutters- 32 16 15.
- .6 Standardized technical specifications BNQ 1809-300/2004 (R2007) Construction work - General technical clauses - Drinking water and sewer pipe

1.3 PRICE AND PAYMENT PROCEDURES

- .1 Items in "PDX-5 Gutter..." or "Neutral-slope Polydrain gutter" shall be measured and paid in linear metres based on the amount indicated in the bid information sheet.
- .2 Items in "Anti-Vermin Grate" shall be measured and paid per unit based on the amount indicated in the bid information sheet.
- .3 Items in "Supply of Additional Grate Sections" shall be measured and paid per unit based on the amount indicated in the bid information sheet.
- .4 Items in "150 mm Ø HDPE R320 non-perforated drain..." or "150 mm Ø CPV DR-28 drain" shall be measured and paid in full based on the material, diameter and the amount indicated in the bid information sheet.

- .5 Items in "Drainage trench..." shall be measured and paid in linear metres based on the amount indicated in the bid information sheet. Measurements shall be taken from the centres of the maintenance holes or the catch basins or from an open extremity to the other of the pipes, as required.
- .6 Items in the "375mm Ø HDPE Small Catch Basin" shall be measured and paid per unit based on the amount indicated in the bid information sheet.
- .7 Items in the "Connection to the Existing Drain..." shall be measured and paid per unit based on the material, diameter and the amount indicated in the bid information sheet.
- .8 Items in the "Existing Drain to be Cleaned" and "Storm Sewer to be Cleaned" shall be measured and paid in linear metres or in full based on the material, diameter and the amount indicated in the bid information sheet. Measurements shall be taken from the centres of the maintenance holes or the catch basins or from an open extremity to the other of the pipes, as required.
- .9 Items in "Cleaning of drains and gutters when the work has been completed" or the "Cleaning of drains, gutters and small catch basins when the work has been completed" or the "Cleaning of gutters when the work has been completed" shall be measured and paid in linear metres or in full based on the material, diameter and the amount indicated in the bid information sheet. Measurements shall be taken from the centres of the maintenance holes or the catch basins or from an open extremity to the other of the pipes, as required.

#### 1.4 REFERENCES

- .1 Bureau de normalisation du Québec (BNQ)
  - .1 Standardized technical specifications BNQ 1809-300/2004 (R2007) Construction work - General technical clauses - Drinking water and sewer pipe

#### 1.5 SCHEDULING

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.
- .2 Submit schedule of expected interruptions for approval and adhere to approved schedule.
- .3 Coordinate the creation of holes of various structures such as gutters, small catch basins, etc. to pass and install electric heating cables.

#### 1.6 ACTION AND INFORMATIONAL

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

SUBMITTALS

- .2 Product Data to submit 2 weeks prior to Work:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for drains, gutters, frames and grates of the gutters, small catch basins in PEHD, connecting parts and all related components and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings to submit 2 weeks prior to Work:
  - .1 Shop drawings to indicate proposed method for installing gutters, drains and small catch basins.
- .4 Independent report to be submitted two (2) weeks before the work starts.
  - .1 Submit an independent report showing that the gutter grates are compliant.
  - .2 Submit an independent report showing the mechanical characteristics of the polymer concrete.
  - .3 Submit an independent report for the "N" roughness coefficient.
- .5 Manufacturer's instructions: submit to the Parks Canada representative one (1) copy of the installation instructions prepared by the manufacturer for all of the gutters to be installed.

1.7 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance 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 manufacturer's recommendations.
  - .2 Store and protect [pipes] from [damage].
  - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS2.1 PREFAB GUTTERS

- .1 PolyDrain-type prefab polymer concrete gutters from ABT Inc. or an approved equivalent, certification CAN/ULC-102.2, class A required:
  - .1 Nil slope.
  - .2 Longitudinally slotted ductile iron grates, model 2504, from ABT Inc. or the approved equivalent with maximum openings of 12 mm, compliant with ASSHTO-M306-10.
  - .3 Tight joints.
  - .4 Roughness coefficient n=0,010.
  - .5 The gutter must be shaped to include an anchor key for the concrete envelope surrounding the gutter.

.6 See the manufacturer's instructions when connecting the outlet drains as shown in the drawings to include all of the parts needed to complete the proposed work.

.2 PDX-5-type prefab polymer concrete gutters from ABT Inc. or an approved equivalent, certification CAN/ULC-102.2, class A required:

.1 Slope indicated in the drawings.

.2 Longitudinally slotted ductile iron grates, model 2504, from ABT Inc. or the approved equivalent with maximum openings of 12 mm, compliant with ASSHTO-M306-10, including a frame, model 2514AF.

.3 Tight joints.

.4 Roughness coefficient  $n=0,010$ .

.5 The gutter must be shaped to include an anchor key for the concrete envelope surrounding the gutter.

.6 See the manufacturer's instructions when connecting the outlet drains as shown in the drawings to include all of the parts needed to complete the proposed work.

## 2.2 ADDITIONAL GUTTER GRATES

.1 The contractor shall provide 500 mm long sections of additional grates, including transportation to the storage area designated by Parks Canada. The additional grates shall comply with the following requirements:

.1 Longitudinally slotted ductile iron grates, model 2504, from ABT Inc. or the approved equivalent with maximum openings of 12 mm, compliant with ASSHTO-M306-10.

## 2.3 PLASTIC PIPE

.1 Polyvinyl chloride (CPV) pipes compliant with BNQ 1809-300/2004 (R2007) with tight joints.

.2 High-density polyethylene (HDPE) pipes compliant with BNQ 1809-300/2004 (R2007) with tight joints.

## 2.4 SMALL CATCH BASINS

.1 Small catch basin made of high-density polyethylene (HDPE) pipes compliant with BNQ 1809-300/2004 (R2007)

.1 Smooth interior wall and corrugated exterior wall for off-roadway applications

.2 Interior diameter of 375 mm.

.3 Non-adjustable iron frame and grate.

## 2.5 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material in accordance with Section 31 23 33.01 - Excavating, trenching and backfilling.

.2 Concrete mixes and materials for bedding, cradles, encasement, supports: in accordance with Section 03 30 00 - Cast-in-Place Concrete and Section 32 16 15 - Concrete walks, curbs and gutters.

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- 2.6 BACKFILL MATERIAL
- .1 As indicated on plans.
  - .2 In accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- 2.7 JOINT MORTAR
- .1 Portland cement: to CAN/CSA-A3000, normal type 10.
  - .2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.
- PART 3 - EXECUTION
- 3.1 PREPARATION
- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Parks Canada representative.
- 3.2 TRENCHING
- .1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
  - .2 Protect trench from contents of sewer.
  - .3 Trench alignment and depth to approval of Parks Canada representative prior to placing bedding material and pipe.
- 3.3 CONCRETE BEDDING AND ENCASEMENT
- .1 Do concrete Work in accordance with Section 03 30 00 - Cast-in-Place Concrete.
  - .2 Backfill over concrete after 24 hours from placing.
- 3.4 GRANULAR BEDDING
- .1 Place bedding in unfrozen condition.
  - .2 Place granular bedding material in uniform layer[s] not exceeding 150 mm compacted thickness depth as indicated on plans.
  - .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipes and gutters.
    - .1 Do not use blocks when bedding pipes.
  - .4 Shape transverse depressions as required to suit joints.
  - .5 Compact each layer full width of bed as indicated on plans.

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- 3.5 INSTALLATION .1 Drain installation must comply with BNQ 1809-300/2004 (R2007).
- .2 Gutter installation must comply with BNQ 1809-300/2004 (R2007) and the manufacturer's instructions.
- .3 Connections of new drains to existing ones must comply with BNQ 1809-300/2004 (R2007).
- 3.6 PIPE SURROUND .1 Place aggregate surround materials as per BNQ 1809-300/2004 (R2007).
- 3.7 BACKFILL .1 Place backfill material in unfrozen condition.
- .2 Place unshrinkable backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Install backfill as per BNQ 1809-300/2004 (R2007).
- 3.8 CLEANING OF EXISTING PIPES .1 Clean the existing pipes and drains appearing in the drawings.
- .1 Remove all debris, rocks, stones and all other deposits in the drains and pipes.
- .2 Dispose of debris at facilities authorized and approved by MDDELCC.
- 3.9 FIELD TESTS AND INSPECTIONS .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 Clean the drains, gutters and small catch basins installed.
- .1 Remove all debris, rocks, stones and all other deposits in the drains and pipes by injecting water or by using some other method accepted by the Parks Canada representative.
- 3.10 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 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 and include product characteristics, performance criteria, physical size, finish and limitations.

**1.2 QUALITY ASSURANCE**

- .1 Quality assurance submittals: submit following :
  - .1 Certificates: signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

**1.3 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, address.
- .3 Packaging Waste Management: remove for reuse of packaging materials in accordance with Section 01 74 11 Cleaning.

**PART 2 PRODUCTS****2.1 PVC DUCTS AND FITTINGS**

- .1 Rigid PVC duct: Type DB2/ES2, with fabricated fittings, for direct burial , Trade size as indicated.
  - .1 Nominal length: 6 or 3 m plus or minus 12 mm.
  - .2 Rigid PVC split ducts.
- .2 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct, to make a complete installation.
- .3 Rigid PVC 90 degrees, 45 degrees bends and 5 degrees angle couplings as required.

**2.2 SOLVENT WELD COMPOUND**

- .1 Solvent cement for PVC duct joints.

**2.3 CABLE PULLING EQUIPMENT**

- .1 6 mm stranded nylon pull rope tensile strength 5 kN.

**2.4 WARNING TAPE**

- .1 Standard 4-mil polyethylene 76 mm wide tape, yellow with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW ".

**PART 3 EXECUTION****3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

**3.2 INSTALLATION**

- .1 Install duct in accordance with manufacturer's instructions and at elevations as indicated.
- .2 Clean inside of ducts before laying.
- .3 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.
- .4 Pull through each duct steel mandrel not less than 300 mm long and of diameter 6 mm less than internal diameter of duct, followed by stiff bristle brush to remove sand, earth and other foreign material.
  - .1 Pull stiff bristle brush through each duct immediately before pulling-in cables.
- .5 Install a pull rope continuous throughout each duct run with [3] m spare rope at each end.
- .6 Place continuous strip of warning tape 300 mm above duct before backfilling trenches.
- .7 Notify the Parks Canada's Representative for field review upon completion of direct buried ducts and obtain acceptance prior to backfill.

**3.3 CLEANING**

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**DESCRIPTION OF ITEMS ON THE BID INFORMATION SHEET**  
**CIVIL ENGINEERING WORK**

- 1) The quantities indicated beside the various items on the bid information sheet are for information purposes only. The contractor must calculate and validate the quantities that the work involves by referring to the drawings and specifications. The contractor's lump sum amount must include all items indicated in the drawings, even though they may not appear on the bid information sheet. The lump sum amount must include all related work not explicitly indicated on the drawings and specifications, which are required to perform all of the work.

The contractor shall use machinery adapted to the worksites and to the constraints associated with confined spaces.

- 2) The descriptions of the items on the bid information sheet supersede or complete those indicated in standard NQ 1809-300/2004 (R 2007), BNQ 1809-500/2006 and in the latest edition of the Cahier des charges et devis généraux (General Plans and Specifications) of the MTQ (Quebec Department of Transport).

**1. SITE PREPARATION AND DEMOLITION**

**1.1 Asphalt pavement to be disposed of off site**

Includes but is not limited to the:

- a) Pavement saw cuts on the boundaries of the work, the buildings and adjacent structures, including the gutters and concrete catch basins beneath the paving to be located, the concrete bases, and so on;
- b) Removal, loading, transportation and disposal off site;
- c) Location and protection of all infrastructures and the existing utilities;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

**1.2 Reinforced concrete sidewalk to be disposed of off site**

Includes but is not limited to the:

- a) Saw cuts on the boundaries of the existing sidewalks to be removed;
- b) Excavation, removal, loading, transportation and disposal off site of sidewalks, including reinforcing rods, mesh and granular foundation of the sidewalks;
- c) Protection of adjacent structures such as the roadway structure, geotextile, deeper aggregate foundations, etc.;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

**1.3 Road structure to be disposed of off site**

Includes but is not limited to the:

- a) Excavation, loading, transportation off site and disposal of infrastructure materials based on the depths required to build the proposed roadway structures in the various work zones;
- b) Location, protection and support of existing infrastructures and all existing utilities located near the work zone;
- c) All incidental expenses.

All as indicated in the drawings and specifications.

**1.4 150mm HDPE drain to be disposed of off site**

Includes but is not limited to the:

- a) Excavation, loading, transportation and disposal of excavation excess materials;
- b) Loading, transportation and disposal off site of the drain to be removed;
- c) Protection of the existing road structure to be maintained;
- d) Fill;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

**1.5 Gutters to be disposed of offsite, including concrete bases and reinforcement rods**

Includes but is not limited to the:

- a) Excavation, loading, transportation and disposal of excavation surpluses;
- b) Loading, transportation and disposal off site of the gutters indicated on the drawings which are to be removed, including the concrete bases, reinforcing rods, framework and grates, etc.;
- c) Protection of the existing road structure to be maintained;
- d) Fill, if required;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

**1.6 Catch basins and 100 mm CPV drain to be disposed of offsite, including the grates, concrete bases and reinforcing rods**

Includes but is not limited to the:

- a) Saw cuts at the boundaries of the existing catch basins to be removed, including the saw cut of the existing concrete slab;
- b) Demolition of the existing concrete slab up to the elevations indicated on the drawings, including the removal of the reinforcing rods;
- c) Demolition of the drain between both catch basins;
- d) Loading, transportation and disposal off site of the catch basins to be removed, including the concrete, reinforcing rods, frames and grates, the drain between both catch basins, etc.
- e) Excavation, loading, transportation and disposal of surplus excavation;
- f) Protection of the existing concrete slab;
- g) All incidental expenses.

All as indicated in the drawings and specifications.

**1.7 Existing gutter grates to be disposed of off site**

Includes but is not limited to the:

- a) Parts, equipment and labour required to remove the existing grates;
- b) Protection of the existing gutter;
- c) Protection of the existing concrete slab;
- d) Loading, transportation and off-site disposal of the grates;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

**1.8 Non-return valve to be disposed of off site**

Includes but is not limited to the:

- a) Parts, equipment and labour required to remove the existing valve;
- b) Loading, transportation and off-site disposal of the valve to be removed;
- c) Protection of the 150 mm PVC drain;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

**1.9 Handrail to be removed and stored on site**

Includes but is not limited to the:

- a) Parts, equipment and labour required to remove the sections of handrails indicated in the drawings;
- b) Sawing of steel pipes (if required);
- c) Coordination with Parks Canada to remove the existing padlocks on the bottom of the handrails;
- d) Removal and storage of handrails in a location the contractor has designated for this purpose on the site;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

**1.10 Granite pavers to be removed and stored on site**

Includes but is not limited to the:

- a) Parts, equipment and labour required to remove the sections of the granite pavers;
- b) Removal and storage of granite pavers in a location the contractor has designated for this purpose on the site;
- c) All incidental expenses.

All as indicated in the drawings and specifications.

**1.11 200 mm hole to be drilled into the existing concrete wall**

Includes but is not limited to the:

- a) Parts, equipment and labour required to drill into the wall;
- b) Drilling into the existing concrete wall based on the diameter indicated and the required slope to install the proposed drain;
- c) Support and protection of the surrounding structures;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

## **2. DRAINAGE**

### **2.1 Drainage trench, including a 150 mm Ø HDPE R180 perforated drain, geotextile and clean stone**

Includes but is not limited to the:

- a) Excavation of the trenches;
- b) Transportation and disposal of excavation surpluses and/or garbage to an authorized site;
- c) Water control and pumping;
- d) Support for the surrounding structures, if required;
- e) Supply and installation of perforated drains based on the diameter and type indicated, including all of the required parts and accessories;
- f) Creation of the drainage trench, including the geotextile and clean stone;
- g) Supply and installation of clean stone for the fill above the drainage trench;
- h) Fill and compaction of surrounding structures;
- i) All incidental expenses.

All as indicated in the drawings and specifications.

### **2.2 375 mm Ø HDPE small catch basin**

Includes but is not limited to the:

- a) Excavation;
- b) Transportation and disposal of excavation surplus and/or garbage in an authorized site;
- c) Propping, retention of the trench, water control and pumping;
- d) Support for surrounding structures, if required;
- e) Preparation and installation of the seat;
- f) Supply and installation of the complete prefab small catch basin;
- g) Fill around the small catch basin with excavation materials or Class B borrow material;
- h) Compaction;
- i) Connections to drains;
- j) All incidental expenses.

All as indicated in the drawings and specifications.

### 2.3 150 mm Ø HDPE R320 non-perforated drain

Includes but is not limited to the:

- a) Excavation of trenches;
- b) Transportation and disposal of excavation surplus and/or garbage in an authorized site;
- c) Water control and pumping;
- d) Support for surrounding structures, if required;
- e) Supply and installation of the drain based on the diameter and type indicated, including all parts;
- f) Seat and cover of the MG-20 crushed stone, fill and compaction;
- g) Installation of the drain in the hole in the small concrete wall for this purpose;
- h) Supply and application of non-shrink mortar;
- i) All incidental expenses.

All as indicated in the drawings and specifications.

### 2.4 150 mm Ø CPV DR-28 drain

Includes but is not limited to the:

- a) Trench excavation;
- b) Transportation and disposal of excavation surpluses and/or garbage in an authorized site;
- c) Water control and pumping;
- d) Support of surrounding structures (geotextile, aggregate foundations, etc.);
- e) Supply and installation of the drain based on the diameter and type indicated, including all of the parts needed for connection to the proposed gutter;
- f) Connection of the drain to the proposed gutter;
- g) Seat and cover of the MG-20 crushed stone, fill and compaction;
- h) Supply and installation of borrow material, when required;
- i) Supply and installation of non-shrink mortar in the areas indicated;
- j) All incidental expenses.

All as indicated in the drawings and specifications.

### **2.5 Connection to the existing 150 mm Ø CPV drain**

Includes but is not limited to the:

- a) Clearance of the existing drain and its preparation to receive the connection;
- b) Removal of the plug, if necessary;
- c) Connection of the new drain or the new gutter to the existing drain;
- d) Water control and pumping;
- e) Support for surrounding structures, if required;
- f) All incidental expenses.

All as indicated in the drawings and specifications.

### **2.6 Existing drain to be cleaned / Existing storm sewer to be cleaned**

Includes but is not limited to the:

- a) Cleaning of existing drains and sewers according to the diameter and material indicated;
- b) The removal of all debris, rocks, stones or other deposits in the drains and pipes;
- c) Disposal of debris in facilities authorized and approved by MDDELCC;
- d) Water control and pumping, if required;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

### **2.7 Cleaning of drains, gutters and small catch basin when the work has been completed / Cleaning of gutters when the work has been completed / Cleaning of drains and gutters when the work has been completed**

Includes but is not limited to the:

- a) Cleaning of drains, gutters and small catch basins when the work has been completed;
- b) Cleaning of frames and grates of the structures;
- c) The removal of all debris, rocks, stones or other deposits in the drains and pipes;
- d) Disposal of debris in facilities authorized and approved by MDDELCC;
- e) Water control and pumping, if required;
- f) All incidental expenses.

All as indicated in the drawings and specifications

### **2.8 Anti-vermin grate**

Includes but is not limited to the:

- a) All parts, equipment and labour required for the installation of the anti-vermin grate;
- b) Supply of the anti-vermin grate;
- c) All incidental expenses.

All as indicated in the drawings and specifications

### **2.9 PDX-5 gutter from ABT Inc. or an approved equivalent to be installed in the existing gutter**

Includes but is not limited to the:

- a) Supply and installation of the gutter;
- b) Supply and installation of the gutter grates, including the frame;
- c) Supply and installation of the concrete, if required;
- d) Cribs for the installation of the concrete, if required;
- e) Supply and application of the adhesive for the concrete;
- f) Protection and safeguarding of the concrete;
- g) Supply and installation of the gutter anchors;
- h) Supply and application of a concrete curing agent;
- i) Water control and pumping, if required;
- j) All incidental expenses.

All as indicated in the drawings and specifications.

### **2.10 PDX-5 gutter from ABT Inc. or the approved equivalent to be installed in the middle of the tunnel**

Includes but is not limited to the:

- a) Supply and installation of the gutter;
- b) Supply and installation of the gutter grates, including the frame;
- c) Supply and installation of the concrete around the gutter, including the protective material for the curing of the concrete;
- d) Cribs for the installation of the concrete, if required;
- e) Supply and application of the adhesive for the concrete;
- f) Protection and guarding of the concrete;
- g) Supply and installation of the gutter anchors;
- h) Supply and application of a concrete curing agent;

- i) Supply and installation of the reinforcing rods and pins;
- j) Monitoring of the water and pumping, if required;
- k) All incidental expenses.

All as indicated in the drawings and specifications

**2.11 Neutral-slope Polydrain gutter from ABT Inc. or an approved equivalent**

Includes but is not limited to the:

- a) Supply and installation of the gutter;
- b) The MG-20 crushed stone seat, compaction and fill;
- c) Supply and installation of the gutter grates;
- d) Supply and installation of the concrete around the gutter;
- e) Cribs for the installation of the concrete;
- f) Protection and guarding of the concrete;
- g) Supply and application of a concrete curing agent;
- h) Supply and installation of the reinforcing rods;
- i) Water control and pumping, if required;
- j) All incidental expenses.

All as indicated in the drawings and specifications

**2.12 Supply of additional grate sections**

Includes but is not limited to the:

- a) Purchase and supply of sections of additional grates and transportation to the location designated by Parks Canada;
- b) All incidental expenses.

All as indicated in the drawings and specifications.

### **3. ROADWAY**

#### **3.1 GÉO-9 georoute type needle-punched geocomposite from TEXEL or an approved equivalent**

Includes but is not limited to the:

- a) Supply and installation of geotextile;
- b) Overlapping of geotextile in the required locations;
- c) All incidental expenses.

All as indicated in the drawings and specifications.

#### **3.2 Preparation and layout of the infrastructure**

Includes but is not limited to the:

- a) Layout, leveling and compaction of the infrastructure;
- b) Loading, transportation and off-site disposal of surplus infrastructure materials;
- c) All incidental expenses.

All as indicated in the drawings and specifications.

#### **3.3 Road sub-foundation, MG-112 sand**

Includes but is not limited to the:

- a) Supply, transportation, unloading, installation, compaction and levelling of MG-112-type sand for the sub-foundation according to the thicknesses indicated;
- b) Loading, transport and off-site disposal of surplus dry materials;
- c) Levelling of surfaces based on the levels indicated on the plans;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

#### **3.4 Road foundation, MG-20 crushed stone**

Includes but is not limited to the:

- a) Supply, transportation, unloading, installation, compaction and levelling of MG-20-type sand for the upper foundation according to the thicknesses indicated;
- b) Loading, transport and off-site disposal of surplus dry materials;
- c) Levelling of surfaces based on the levels indicated on the plans;
- d) Location, protection and retention of existing infrastructures and utilities;
- e) All incidental expenses.

All as indicated in the drawings and specifications.

### **3.5 MG-20 crushed stone to correct the road profile**

Includes but is not limited to the:

- a) Supply, transportation, unloading, installation, compaction and levelling of MG-20-type sand to correct the profile according to the thicknesses indicated;
- b) Loading, transport and off-site disposal of surplus dry materials;
- c) Levelling of surfaces based on the levels indicated on the plans;
- d) All incidental expenses.

All as indicated in the drawings and specifications.

### **3.6 EB-10S asphalt pavement**

Includes but is not limited to the:

- a) Cleaning, preparation and final layout before application;
- b) Application of asphalt binder on the surfaces indicated in the drawings and specifications;
- c) Supply, transportation, spreading and compacting of asphalt concrete with the required slopes for drainage;
- d) Connections to existing structures;
- e) Sawing of pavement, when required;
- f) All incidental expenses.

All as indicated in the drawings and specifications.

## **4. SITE LAYOUT**

### **4.1 35 MPa Reinforced concrete sidewalk**

Includes but is not limited to the:

- a) Excavation, loading, transport and disposal of excavation surplus;
- b) Supply and installation of the MG-20 crushed stone seat;
- c) Fill with MG-20 crushed stone behind the sidewalks;
- d) Compaction;
- e) Supply, application and layout of the concrete;
- f) Connection of proposed sidewalks to the existing sidewalks, including the expansion joints;
- g) Protection and safeguarding of concrete;
- h) Supply and application of a concrete curing agent;
- i) All incidental expenses.

All as indicated in the drawings and specifications.

#### **4.2 Handrails to reinstall, including chemical anchors and threaded rods**

Includes but is not limited to the:

- a) All parts, equipment and labour required to proceed with the reinstallation of handrails;
- b) Chemical anchors and threaded rods;
- c) Welds to connect the steel pipes, if required;
- d) Coordination with Parks Canada to reinstall padlocks at the bottom of the handrails;
- e) All incidental expenses;

All as indicated in the drawings and specifications.

#### **4.3 Sod, including top soil 150 mm thick**

Includes but is not limited to the:

- a) Sod, protection and maintenance;
- b) Supply and application of 150 mm of top soil;
- c) Application of fertilizers and removal of waste and stones with a diameter of 50 mm and over;
- d) Watering and cutting;
- e) Supply of a pump to extract water from the Lachine Canal for watering;
- f) All incidental expenses.

All as indicated in the drawings and specifications.

#### **4.4 Granite pavers to reinstall, including a 25 mm thick granitic sand foundation**

Includes but is not limited to the:

- a) Excavation and preparation of the granitic sand bed face;
- b) Supply, application and compaction of the granitic sand bed face;
- c) Reinstallation of granite pavers according to the existing pattern;
- d) Plastic retention borders;
- e) The replacement of prefab granite pavers damaged or broken with an equivalent model, if required;
- f) All incidental expenses.

All as indicated in the drawings and specifications.

END OF SECTION

**DESCRIPTION OF ITEMS ON THE BID INFORMATION SHEET**  
**ELECTRIC ENGINEERING WORK**

- 1) The quantities indicated beside the various items on the bid information sheet are for information purposes only. The contractor must calculate and validate the quantities that the work involves by referring to the drawings and specifications. The contractor's lump sum amount must include all items indicated in the drawings, even though they may not appear on the bid information sheet. The lump sum amount must include all related work not explicitly indicated on the drawings and specifications, which are required to perform all of the work.

The contractor shall use machinery adapted to the worksites and to the constraints associated with confined spaces.

- 2) The descriptions of the items on the bid information sheet supersede or complete those indicated in standard NQ 1809-300/2004 (R 2007), BNQ 1809-500/2006 and in the latest edition of the Cahier des charges et devis g n raux (General Plans and Specifications) of the MTQ (Quebec Department of Transport).

**1. Installation of a heating cable system**

**1.1 Excavating and backfilling of trenches, warning tape, compaction, excluding final restoration**

Includes but is not limited to the:

- a) asphalt saw cut, excavation, trench dewatering, disposal of excavation surplus and/or scrap material;
- b) supply and installation of bottom layer and sand layer;
- c) backfilling and compaction;
- d) levelling, final adjustment and cleaning of terrain;
- e) all incidental expenses.

The final restoration of the trenches is treated in a separate article in the bid sheet and is excluded from the current article.

All as indicated in the drawings and specifications.

**1.2 Rigid PVC conduit 53 mm  , CSA C22.2 #211.2 buried in a sand bed**

Includes but is not limited to the:

- a) supply and installation of the rigid PVC conduit and the connection at both ends;
- b) supply and installation of the yellow warning tape;
- c) cleaning of the conduit, the passage of a mandrel and brush and the installation of a 6 mm nylon cable for cable pulling;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

### 1.3 Polymer concrete buried pull box

Includes but is not limited to the:

- a) excavation;
- b) trench underpinning, water control and support of environning structures;
- c) supply and installation of the pull box;
- d) backfilling and compaction;
- e) disposal of excavation surplus and/or scrap materials;
- f) final levelling and final adjustments;
- g) all incidental expenses.

All as indicated in the drawings and specifications.

### 1.4 Connection to existing conduit

Includes but is not limited to the:

- a) excavation and backfilling;
- b) interception of the conduit;
- c) supply and installation of the couplings;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

### 1.5 Monoconductor cables #6 RWU 90 X-LINK (-40  C)

Includes but is not limited to the:

- a) supply and installation of the monoconductor cable RWU-90, -40, X-LINK;
- b) an extra length of 3 m per rise in a pole;
- c) electrical tests;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

### 1.6 Watertight splices

Includes but is not limited to the:

- a) supply and installation of the splices following the manufacturer's recommendations;
- b) the compression connectors and all other necessary accessories;
- c) all incidental expenses.

All as indicated in the drawings and specifications.

**1.7 Supply of heating cable system complete with related equipment and breaker**

Includes but is not limited to the:

- a) supply of heating cable, thermostat, 365-day astronomical timer and the breaker;
- b) supply of the clips for the heating cable;
- c) supply of the aluminum control cabinet, conductors, terminal blocks, etc;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

**1.8 Installation of the heating cable system, including commissioning by the supplier**

Includes but is not limited to the:

- a) installation of heating cable, thermostat, 365-day astronomical timer and the breaker;
- b) installation of the clips for the heating cable;
- c) cable pulling in existing pipes, including all necessary specialized equipment, when applicable;
- d) piercing works of the gutters, manholes, walls or any other work;
- e) installation of the aluminum control cabinet, as indicated;
- f) commissioning by the supplier and the electrical tests;
- g) all incidental expenses.

All as indicated in the drawings and specifications.

**1.9 TECK cable 2#6**

Includes but is not limited to the:

- a) supply and installation of the teck cable RWU-90, -40, X-LINK;
- b) watertight connectors;
- c) electrical tests;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

**1.10 Modifications to the existing lighting control panel**

Includes but is not limited to the:

- a) all necessary modification to the existing lighting control panel to allow for the installation of a circuit for the heating cable;
- b) the conduits and elbows required for the connection of the new control cabinet for the heating cables;
- c) new wiring in the panel;
- d) all incidental expenses.

All as indicated in the drawings and specifications.

### 1.11 Modifications to the existing cabinet

Includes but is not limited to the:

- a) all necessary modification to the existing cabinet to allow for the installation of a circuit for the heating cable;
- b) new wiring in the panel;
- c) all incidental expenses.

All as indicated in the drawings and specifications.

END OF SECTION

**DESCRIPTION OF ITEMS ON THE BID INFORMATION SHEET**  
**CIVIL ENGINEERING WORK**

- 1) The quantities indicated beside the various items on the bid information sheet are for information purposes only. The contractor must calculate and validate the quantities that the work involves by referring to the drawings and specifications. The contractor's lump sum amount must include all items indicated in the drawings, even though they may not appear on the bid information sheet. The lump sum amount must include all related work not explicitly indicated on the drawings and specifications, which are required to perform all of the work.

The contractor shall use machinery adapted to the worksites and to the constraints associated with confined spaces.

- 2) The descriptions of the items on the bid information sheet supersede or complete those indicated in standard NQ 1809-300/2004 (R 2007), BNQ 1809-500/2006 and in the latest edition of the Cahier des charges et devis généraux (General Plans and Specifications) of the MTQ (Quebec Department of Transport).

**1. DEMOLITION**

**1.1 Slab demolition (including excavations)**

Includes but is not limited to the:

- a) the saw cuts and circular drilling of concrete to the limits of work (slab and concrete wall);
- b) the demolition of the slab and part of the wall as indicated on the drawings, excavation, removal, loading, transport and off-site disposal of demolition materials, excavated soil and any other debris;
- c) control and water pumping, if required;
- d) the location, protection of adjacent structures and all the existing infrastructure and utilities;
- e) any incidental expenses.

All as indicated in the drawings and specifications.

### 2.1 Reconstruction of the slab and the wall (including backfill)

Includes but is not limited to:

- a) the foundation of crushed stone MG-20, including the supply of materials and equipments, transportation and placement, compaction;
- b) rigid insulation, including the supply of materials and equipment, transport and set up;
- c) the backfill concrete and concrete type VS, including the supply of materials and equipments, transport and set up (including the curing and finishing of concrete) and the provision of all required documents to the specifications;
- d) forms for the establishment of concrete, including the supply of materials and equipments, transport and installation and removal at the end of the work;
- e) the protection of the concrete;
- f) the provision and installation of reinforcement and anchors at the locations shown on the drawings; including the supply of materials and equipment, transport and the establishment and provision of all required documents to the specifications;
- g) the supply and installation of the drain sleeve of the sleeve for heating wire and anti-vermin grid and the connection to the existing drain as indicated on the drawings and specifications, including all required parts, accessories and implementation;
- h) any incidental expenses.

All as indicated in the drawings and specifications.

### 2.2 Steel for gutter - supply and installation (including perforated plates, angles, studs, plates, screws, etc.)

- a) the supply and installation of steel gutter, including the supply of materials and equipment, manufacturing, transportation and implementation;
- b) the supply and installation of channel gratings including the frame, the perforated plates, studs and fasteners (welds, countersunk screws, bolts);
- c) The galvanization of all steel elements;
- d) the purchase and supply of sections of additional perforated plates and transportation to the location designated by Parks Canada Representative;
- e) any incidental expenses.

All as indicated in the drawings and specifications.

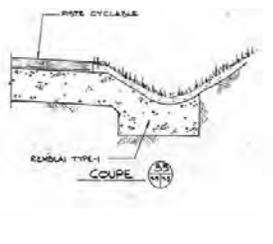
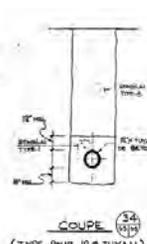
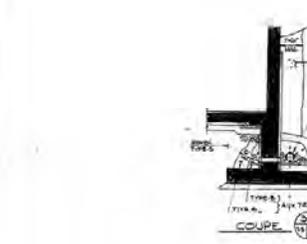
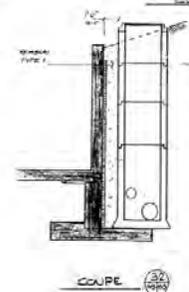
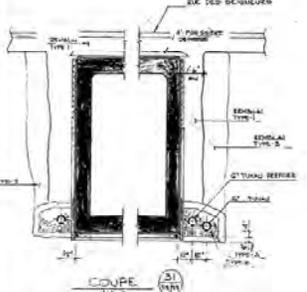
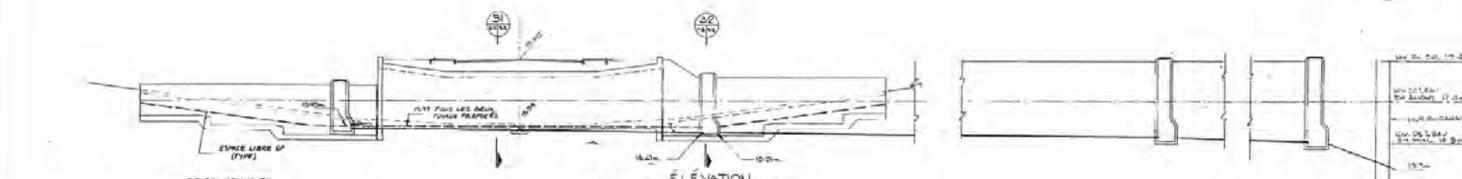
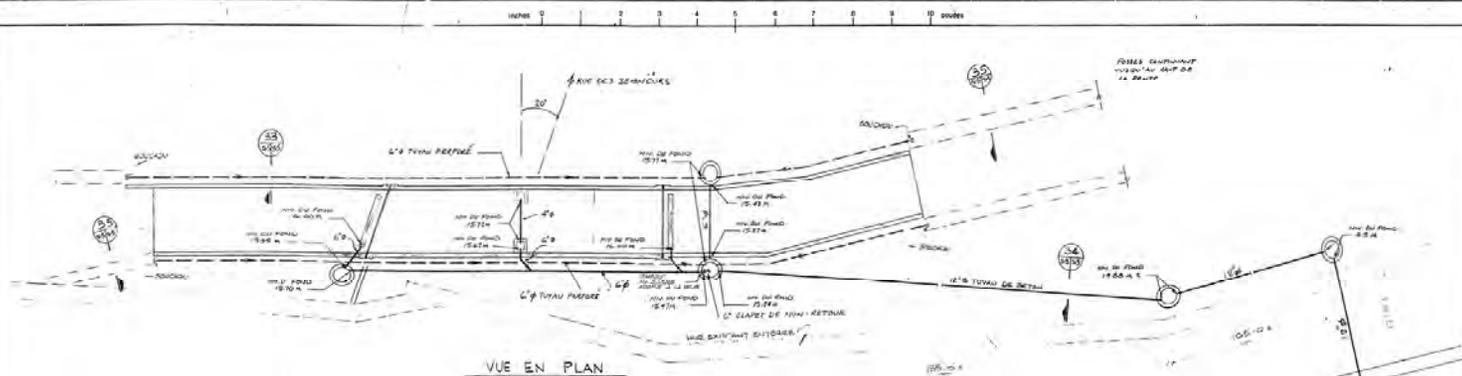
END OF SECTION

**APPENDIX D**

**DRAWINGS OF THE ACTUEL**

**TUNNEL DES SEIGNEURS**

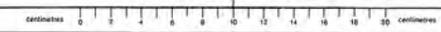




**NOTES:**

- 1- ACCÈS D'AMORÇAGE + BALLE DE BOU TOUS LES 200 M.
- 2- SEMBLAUX TYPE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- 3- LES DIMENSIONS SONT EN MILLIMÈTRES SAUF INDICATION CONTRAIRE.
- 4- TOUTES LES ASSÈRES DEVIENT ÊTRE EN ALUMINIUM ANODISÉ.
- 5- TOUTES LES ASSÈRES DEVIENT ÊTRE EN ALUMINIUM ANODISÉ.
- 6- TOUTES LES ASSÈRES DEVIENT ÊTRE EN ALUMINIUM ANODISÉ.
- 7- ISOLATION: TYPE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- 8- TUYAU DE BÉTON: TYPE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- 9- TUYAU PERFORÉ: TYPE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- 10- TUYAU PERFORÉ: TYPE 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

COPIE DEMI-GRANDEUR  
VOIR ÉCHÈLES GRAPHIQUES



**PROJET 77**  
**PROJET SPECIAL**  
**DU CANAL DE LACHINE**

**TUNNEL - RUE DES SEKNEURS**  
**PLAN DE DRAINAGE**

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PROJET SPECIAL  
 DU CANAL DE LACHINE  
 ZONE - 5  
 TUNNEL-RUE DES SEIGEURS  
 PLANS DE STRUCTURE

COUPE DEMI-GRANDIEUR  
 VOIR ECHELLES GRAPHIQUES

VOIR NOTES  
 SUR LE DESS  
 # D - 5

ACTION 77  
 PROJET SPECIAL  
 DU CANAL DE LACHINE

ZONE - 5  
 TUNNEL-RUE DES SEIGEURS  
 PLANS DE STRUCTURE

030186 DB 005  
 5-4 de 32

