Rehabilitation of the sewers, the watermain and the parking lot of the workshop and rehabilitation of the 15,5 site of the Lachine Canal

Technical Specifications

Project Number: CLAC-1803

Prepared for:
Parks Canada Agency

Prepared by:
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Sign-off Sheet

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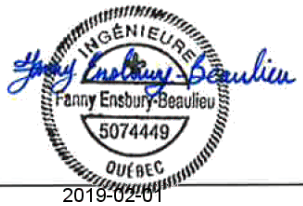

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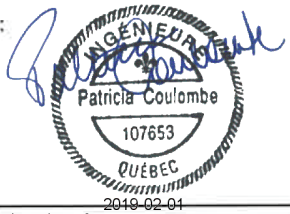

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LIST OF SECTIONS

TECHNICAL SPECIFICATIONS

APPENDIXS:

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 14 00 – Work Restrictions

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Civil works covered by this contract consist of the rehabilitation of sanitary and storm sewers, watermain and workshop parking lot and include, but are not limited to, the following activities:

- .1 Demolition work, off-site transportation and disposal of various materials to an authorized disposal facility;
- .2 Completion of exploratory pits and location of buried services prior to excavation work;
- .3 Installation of underground infrastructure;
- .4 Backfill excavations, first with excavated soil that is deemed "clean" and has permissible geotechnical properties, then with imported soil to the infrastructure level, using materials that meet the specifications in this document.
- .5 Leveling, foundation laying of granular materials and bituminous paving and laying of curbs, as shown on plans;
- .6 Grassing works
- .7 Complete cleaning within the boundaries of the work and disposal of waste materials outside the property of Canada Parks.
- .8 Protection and prevention measures to prevent any damage to existing buildings, structures and developments on the site;
- .9 All other related work for a complete and functional work and all ancillary work which, although are not specified in this specification, is customary and necessary for the completion of the work required to complete it for the use to which they are intended.

.2 The environmental works covered by this contract consist of the environmental rehabilitation of Lachine Canal site 15.5 and include, but are not limited to, the following activities

- .1 Excavate contaminated soil exceeding industrial criteria in the zones identified in Figure 2 of Appendix A.

.2 Excavate, transport and dispose of non-hazardous residual materials encountered during excavation operations;

.3 Excavations to bottom level of projected excavations

.4 Transportation and elimination of excavated soil exceeding applicable criteria or below applicable criteria but not suitable for reuse on-site as backfill to a disposal site authorized by the Quebec's ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC);

.5 Complete cleaning within the boundaries of the work and disposal of waste materials outside the property of Canada Parks.

.6 Protection and prevention measures to prevent any damage to existing buildings, structures and developments on the site;

.7 All other related work for a complete and functional work and all ancillary work which, although are not specified in this specification, is customary and necessary for the completion of the work required to complete it for the use to which they are intended.

.8 For further details concerning the work, refer to Appendix A of the call for tenders. The 2016 characterization report is presented in Appendix B.

.3 The electrical work covered by this contract consists of the supply and installation of materials including labor, equipment and machinery, and includes, but is not limited to, the following activities:

.1 Concrete duct systems including ducts, concrete, supports, shapes, shoring, hardware and accessories;

.2 Underground ductwork;

.3 Draw wells, frames and buffers;

.4 Excavation and backfilling of trenches;

.5 Drilling of building foundations;

.6 Shaft chucking of ducts and ductwork;

.7 Incidental expenses required to complete the work.

1.3 WORK SEQUENCE

.1 Construct Work in stages to accommodate Canada Parks's continued use of building #1 and continued access to buildings #2, #3 and #4 during construction.

.2 Coordinate Progress Schedule and coordinate occupancy with Canada Parks Representative during construction.

.3 Maintain fire access/control.

.4 The Contractor is responsible for obtaining all necessary permits for the realization of the work from the authorities concerned.

.5 Field work shall not exceed 12 weeks.

1.4 OWNER OCCUPANCY

.1 Parks Canada Agency (PCA) can occupy the buildings during the entire construction period. However, parking will not be occupied by PCA for this period.

.2 Cooperate with PCA in scheduling operations to minimize conflict and to facilitate PCA usage.

.3 To maintain site access for PCA employees, an opening could be made in the fence south of building #2 prior to the commencement of works. This opening must be equipped with a hinged door and a locking system.

.4 A pedestrian access must always be maintained to building #1, at least two doors must always be accessible. The Contractor can not restrict access to PCA. However, PCA employees must comply with the Contractor's health and safety criteria when accessing the site.

1.5 EXISTING SERVICES

.1 The Contractor shall establish the location of all public and private underground utilities prior to the commencement of works by calling on specialized firms (Info-excavation and/or other private companies). If deemed necessary, hydrovac shall be used to visually confirm the position of underground utilities prior to digging.

.2 When necessary, the Contractor shall relocate any existing equipment (underground or otherwise) that could affect the safe execution of the works. The Contractor shall replace, at its own expense, any equipment (underground or otherwise) that was not intended to be dismantled and that was damaged during the execution of works. Upon completion of works, the Contractor shall ensure that all equipment is functional.

.3 Any works related to disconnecting/reconnecting, securing or temporarily re-routing public utilities (overhead or underground) shall be executed in accordance with applicable codes, standards and regulations, and shall

be coordinated with the companies or the municipality that owns such service lines, and all requirements that they issue to this effect must be complied with in full.

.4 Any works related to disconnecting/reconnecting, securing or temporarily re-routing private service lines (overhead or underground) shall be executed in accordance with applicable codes, standards and regulations, and shall be coordinated with PCA management via Stantec Consulting Inc.

.5 During works specified in points 3 and 4, the Contractor shall maintain safe distances from electrical equipment as specified by the CNESST or other relevant regulatory bodies.

.6 If it is not possible to maintain safe distances from electrical equipment as specified by the CNESST, or if overhead power lines pass over areas to be excavated or near them and could be affected by the works, such equipment must be secured or temporarily re-routed, ensuring minimal service interruptions for connected customers. Once rehabilitation works have been completed, re-routed equipment must be returned to their original location, ensuring minimal service interruptions.

.7 The Contractor is fully responsible for the safety and stability of overhead and/or underground utilities for the full duration of the works and must select appropriate protective measures in accordance with type and sequence of planned work.

.8 Notify PCA and utility companies of intended interruption of services and obtain required permission. The Contractor shall inform, in writing, the PCA representative of selected protective measures 72 hours prior to the execution of these works.

.9 An unused sewage line may be updated during the excavation works. If this is the case, this line shall be permanently blocked off.

.10 Provide temporary services to maintain critical building and occupant systems.

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

.12 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.6 DOCUMENTS REQUIRED

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

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders.
.5 Other Modifications to Contract.
.6 Field Test Reports.
.7 Copy of Approved Work Schedule.
.8 Health and Safety Plan and Other Safety Related Documents.
.9 Other documents as specified.

1.7 CONTRACT DOCUMENTS

.1 All work mentioned in the tender documents (plans, specifications, price schedule, addenda, etc.) are integral parts of the contract. All portions and sections of the contract are complementary to one another. The General Contractor and specialized contractors shall take into account all the requirements of each of the sections of these specifications and tender documents when carrying out works.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 56 00 – Temporary Barriers and Enclosures.

1.2 ACCESS AND EGRESS

.1 The Contractor shall visit the site at least five (5) business days prior to the commencement of works to mark the ground to indicate work areas so that these can be kept free of vehicles, materials or other. Parks Canada Agency shall be responsible for ensuring that vehicles are moved out of the area marked by the Contractor.

.2 The Contractor shall provide locks for access points and ensure they are of the same series used by Parks Canada to facilitate access control.

.3 Access to the Rogers Tower must be maintained at all times for Rogers employees. The Contractor must coordinate the work according to this requirement. Rogers employees must still comply with the Contractor's health and safety criteria. The Contractor will have to prepare a subordination agreement to allow Rogers employees access to its site so that the Contractor remains the Project Manager for the duration of the Contract.

1.3 USE OF SITE AND FACILITIES

.1 Maintain existing services to building and provide for personnel and vehicle access.

.2 Where security is reduced by work provide temporary means to maintain security.

.3 The Contractor shall supply and maintain adequate sanitary facilities for its staff. Use of PCA sanitary facilities is prohibited.

1.4 EXISTING SERVICES

.1 The Contractor shall locate all public and private underground utilities prior to the commencement of works by calling on specialized firms (Info-excavation and/or other private companies). If deemed necessary, hydrovac shall be used to visually confirm the position of underground utilities prior to digging.

.2 Notify the Canada Parks Representative and utility companies of intended interruption of services and obtain required permission. The Contractor shall inform, in writing, the Canada Parks Representative e of selected protective measures 72 hours prior to the execution of these works.

.3 Provide for personnel and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 – Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule of works to the Canada Parks Representative at least seven (7) days before start of work.

.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.

1.6 EXCLUSION ZONE

.1 Provide trunk protection around the eastern cottonwood tree at the south-east corner of building # 2. The recommended method is stipulated in the BNQ standard, landscaping with plants. In addition, a geotextile membrane with granular material over it must be installed in the area of 3 meters around the trunk to avoid damaging the root system of the tree. These two safeguards will need to be removed with caution following the work to restore the site to its original state.

.2 Ensure an excavation exclusion zone around the telecommunications tower being built in the northeast corner of the site near building #4 to prevent damage to this structure. Maintain 300 mm between the edge of the fence and the excavation wall.

1.7 EXCAVATION ALONG THE FOUNDATIONS OF HISTORIC BUILDINGS

.1 Since the foundations of historic buildings are fragile, no more than three (3) linear metres of foundation should be uncovered at a time during excavation works.

1.8 VIBRATION CONTROL

.1 Control vibrations when using a soil compaction vibrator, percussion equipment and rock-removal equipment, and when performing

excavation work near buildings. When this type of equipment is used or this type of work is carried out within 30 metres of existing structures that must be preserved, the particle velocity in the soil located in immediate proximity to the structure must be kept within the following ranges on any of the three wave components (vertically, horizontally or diagonally):

.1 Frequency ≤ 10 Hz: 3 mm/sec

.2 10 Hz < frequencies ≤ 30 Hz: 10 mm/sec

.3 Frequencies > 30 Hz: 12 mm/sec

.2 The Contractor must enlist the services of a vibration control firm to ensure that proper measures are taken to protect structures at the site. For works near buildings and over City of Montreal sewer collection pipes, the firm must measure vibratory waves using a sufficient number of seismographs (minimum of four) on the structures requiring protection that are nearest to the equipment or work (e.g., building foundations, manholes, snow chute, etc.). If seismographs cannot be installed in existing manholes, the Contractor shall install a concrete block in the ground at approximately two (2) feet deep. The seismograph must be installed on this concrete block to monitor vibrations. The firm specializing in vibratory wave control must determine the type of concrete and the maximum size of the block, or determine an equivalent method. The concrete block must be removed upon completion of works.

.3 During work execution, waves must be continuously recorded.

.4 The Contractor shall prepare and submit to the Canada Parks Representative a detailed weekly report covering the recording of the vibrations caused by the equipment or works carried out near structures requiring protection. The report must include the following:

.1 Seismograph location, distance between seismographs, location of works, and the shortest distance between structures requiring protection and the location of works;

.2 A copy of each recording and the recordings for peak vector sum in mm/s, particles and frequencies;

.3 A summary of damage caused (with support photos), if any;

.4 The signature of the person in charge.

.5 The report must be accompanied by the recording film with an indication of the nature, direction and size of each of the components contributing to the peak vector sum.

.6 A copy of this report must be immediately submitted to the Canada Parks Representative.

1.9 SMOKE-FREE ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

END OF SECTION

DESCRIPTION OF ITEMS IN UNIT PRICE TABLE

1 Civil engineering

1.1 Preparation, securing of premises and general fixed expenses

1.1.1 Item 1.1.1: General expenses, mobilization, demobilization, traffic management and signage

1.1.1.1 This item includes mobilization and demobilization of personnel and equipment to and from the site, implementation of all health/safety requirements, application for permits, payment of permit fees, arrangements and coordination with the City of Montreal for work in the municipal right-of-way, all board, lodging and subsistence expenses, installation and maintenance of site trailer, chemical toilets, fences, supply and installation of new chain link fence or opening in the existing fence for temporary site access (if required), including concrete, posts, bars, fasteners and grating. This item also includes installation and maintenance of temporary signage in accordance with MTMDET standards, including temporary signage, coordination with authorities, surveying and staking out of structures, and survey expenses not included in other items of the Bid Form, site security services (if necessary), protection of existing public utilities in the work zones and all other items required in the Bid Documents.

1.1.1.2 The lump-sum bid price for the work under this item is payable on the following terms:

1.1.1.2.1 An initial payment of 30% of the lump-sum bid price for this item is payable once general mobilization is complete;

1.1.1.2.2 A second payment of 50% of the lump-sum bid price for this item is payable on a prorated basis according to the work estimate;

1.1.1.2.3 The balance of the lump-sum bid price for this item is payable once general demobilization is complete.

1.1.2 Item 1.1.2: Environmental procedures

1.1.2.1 The price in payment item 1.1.2 of the Bid Form is a lump-sum amount for all expenses incurred by the Contractor for environmental protection, in accordance with the instructions in this contract.

1.1.2.2 The price includes but is not limited to the following:

1.1.2.2.1 Everything described in Section 01 35 43, Environmental Procedures, including preparation, presentation and implementation of the environmental protection plan; preparation, presentation and implementation of the spill control plan; preparation, presentation and implementation of the location plan for the various site facilities; preparation, presentation and implementation of the work zone plans; preparation, presentation and implementation of the air pollution control plan; preparation, presentation and implementation of the contamination prevention plan; preparation, presentation and implementation of the wastewater management plan; preparation, presentation and implementation of the wetlands and historical, archeological, cultural and biological resources identification and protection plan; measures to protect the existing tree and plants; temporary facilities to prevent pollution; preparation, presentation and implementation of a site historical and heritage value protection plan.

1.1.2.3 The lump-sum bid price for this payment item is payable on the following terms:

1.1.2.3.1 An initial payment of 20% of the lump-sum bid price for this item is payable once implementation of the protection plans is complete;

1.1.2.3.2 The other progress payments under this item will be charged on each invoice at a percentage in line with the general progress of work on that invoice.

1.1.3 Item 1.1.3: Winter conditions

1.1.3.1 The price for payment item 1.3 in the Bid Form is a global lump-sum amount for all expenses incurred in installing the necessary facilities for performance of the work in cold weather, as well as costs not included in other payment items in the Bid Form, in accordance with the specifications.

1.1.3.2 The price includes but is not limited to the following:

1.1.3.2.1 Preparation, presentation and correction, if required, of the description of facilities. Snow removal.

1.1.3.2.2 Mobilization of labour, tools and equipment required for performance of the work;

1.1.3.2.3 Supply, handling and transportation of materials required to build the facilities;

1.1.3.2.4 Installation, maintenance during the work and dismantling of temporary facilities upon work completion;

1.1.3.2.5 Heating of temporary facilities during the work;

1.1.3.2.6 Transportation of materials off-site;

1.1.3.2.7 Any incidental expenses.

1.1.3.2.8 Winter conditions are payable only if required, in writing, by the Departmental Representative.

1.1.3.2.9 The bid price shall be paid as follows:

1.1.3.2.10 60 % of the amount after assembly of facilities to the Departmental Representative's satisfaction;

1.1.3.2.11 40 % of the amount after removal from the site of materials used in building the facilities.

1.1.4 Item 1.1.4: Support for excavation walls

1.1.4.1 This item includes support for the excavation walls, as well as all special measures to ensure integrity of the soil, as well as the structures and infrastructure of neighbouring properties and buildings on the property.

1.1.5 Item 1.1.5: Relocation and reinstallation of two (2) steel containers in the work zone

1.1.5.1 This item includes temporary relocation off site of two 12.2 m (40') long steel containers and reinstallation of the containers on the proposed concrete slab.

1.1.6 Item 1.1.6: Demolition of concrete slabs in the bulk storage area

1.1.6.1 This item includes demolition of the concrete slab located in front of Building #4 measuring approximately 1.3 m wide by 16 m long and 250 mm thick, as well as the slab for the bulk storage, saw cutting, excavation, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.1.7 Item 1.1.7: Mill Street: Demolition of concrete sidewalk (coordination with City of Montreal)

1.1.7.1 This item includes coordination with the City of Montreal, saw cutting, excavation, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.1.8 Item 1.1.8: Mill Street: Street saw cutting for connection of utilities – Demolition of pavement (coordination with City of Montreal)

1.1.8.1 This item includes coordination with the City of Montreal, saw cutting, excavation, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.1.9 Item 1.1.9: Demolition of existing curbs

1.1.9.1 This item includes saw cutting, excavation, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.1.10 Item 1.1.10: Removal of concrete blocks and maintenance and reinstallation of Jersey barriers upon work completion

1.1.10.1 This item includes loading, transportation and temporary storage of Jersey barriers at 50 Notre-Dame Street West, Lachine (Parks Canada Agency address), as well as loading, transportation and disposal of concrete blocks at a facility that meets MDDELCC requirements, and any other items required in the Bid Documents.

1.1.11 Item 1.1.11: Removal of sanitary and storm sewer pipes of varying diameters and other materials

1.1.11.1 This item includes removal and disposal of sewer pipes, excavation and backfilling to the subgrade line, as well as any other items required in the Bid Documents.

1.1.12 Item 1.1.12: Abandonment of sanitary and storm sewer pipes of varying diameters and other materials (Mill Street)

1.1.12.1 This item includes abandonment of the existing pipe by injecting it with lean concrete, plugging it at both ends with plugs made of the same materials as the pipe being abandoned, excavation and backfilling, surface repairs, as well as any other items required in the Bid Documents.

1.1.13 Item 1.1.13: Removal of manholes and/or catch basins

1.1.13.1 This item includes excavation, removal, transportation and disposal of manholes and/or catch basins at a facility that meets MDDELCC requirements, drawdown of water from the trenches and diversion of water to pipes, delivery of recoverable materials to a site designated by the Parks Canada Representative, sealing of the pipe ends, as required, as well as any other items required in the Bid Documents.

1.1.14 Item 1.1.14: Removal of water supply pipe

1.1.14.1 This item includes removal and disposal of the water supply pipe, excavation, sorting of materials, removal, loading, transportation and disposal of existing valves, key-operated valve boxes and accessories at a facility that meets MDDELCC requirements and backfilling to the subgrade line, as well as any other items required in the Bid Documents.

1.1.15 Item 1.1.15: Abandonment of water supply pipe (Mill Street)

1.1.15.1 This item includes abandonment of the existing water supply pipe by injecting it with lean concrete, plugging the ends of the existing pipe with plugs made of the same materials as the pipe being abandoned, excavation and backfilling, surface repairs and any other items required in the Bid Documents.

1.1.16 Item 1.1.16: Vibration control

1.1.16.1 This item includes all costs associated with controlling vibrations as described in section 01 14 00 of the specifications. Such costs include but are not limited to excavation, temporary support, cut and fill to install and recover seismographs, concrete masses, detailed reports and copies of recording film.

1.1.17 Item 1.1.17: Loading, placement and compaction of excavated soil piled temporarily on site and deemed to be reusable.

1.1.17.1 This item includes handling, transportation, placement in the excavation and compaction in accordance with the instructions found in the Bid Documents.

1.1.17.2 Where applicable, the quantity of soil excavated and stored in piles on-site for reuse as backfill will be assessed for volume either by measurement or by survey using a method selected jointly by the Parks Canada Representative and the Contractor.

1.1.18 Item 1.1.18: Supply, transportation, placement and compaction of clean material from off-site to the subgrade limit in accordance with specifications.

1.1.18.1 This item includes supply, handling, transportation, placement in the excavation and compaction in accordance with the instructions in the Bid Documents.

1.1.18.2 All imported soil that will be used to complete the backfilling of the excavation will be billed at the unit price provided under item 1.18 of the Bid Form. The weight tickets issued on supply of the imported soil must clearly indicate the tonnage for each truckload and be submitted to the Parks Canada Representative at the end of each day.

1.2 Road work

Parking lot

1.2.1 Item 1.2.1: Subgrade preparation

1.2.1.1 This item includes protection of manholes, key-operated valve boxes and catch basins, cut and fill, loading, transportation and disposal of surplus materials at a facility that meets MDDELCC requirements, preparation of the subgrade, grading, compaction of the subgrade, and any other items required in the Bid Documents.

1.2.2 Item 1.2.2: Supply and placement of geotextile

1.2.2.1 This item includes supply and placement of geotextile as shown on the plans and in accordance with the supplier's recommendations, including cutting and sewing, overlapping, extra width of 0.5 metre for each side of the pavement, as well as any other items required in the Bid Documents.

1.2.3 Item 1.2.3: Supply and placement of MG-56 subbase, 400 mm thick

1.2.3.1 This item includes supply and placement of granular material, spreading, grading and compacting of the granular material, adjustment of structures, as well as any other items required in the Bid Documents.

1.2.4 Item 1.2.4: Supply and placement of MG-20 base, 200 mm thick

1.2.4.1 This item includes supply and placement of granular material, spreading, grading and compacting of the granular material, adjustment of structures, as well as any other items required in the Bid Documents.

1.2.5 Item 1.2.5: Supply and placement of ESG-10 asphalt overlay, single course (PG 58-28), 60 mm thick

1.2.5.1 This item includes supply and placement of the asphalt overlay, spreading, grading and compacting, adhesive for asphalt joints, as required, chamfer strips, adjustment of frames and covers, cleaning, and any other items required in the Bid Documents.

1.2.6 Item 1.2.6: Marking and signage

1.2.6.1 This item includes cleaning of surfaces to be marked, supply and coating of paint on the pavement and micro-beads, including supply of templates, temporary signage, supply and installation of signboards in the proposed locations, supply and installation of posts, as required, as well as any other items required in the Bid Documents.

1.2.7 Item 1.2.7: Supply and installation of rigid insulation in the area of the universal access

1.2.7.1 This item includes supply and installation of rigid insulation, as well as any other items required in the Bid Documents.

<u>Concrete slab</u>

1.2.8 Item 1.2.8: Supply and installation of reinforced concrete slab, 300 mm thick, for the containers

1.2.8.1 This item includes supply and placement of concrete, reinforcing steel, including excavation, granular material base, forms, supports, accessories, joints and

materials necessary to protect and cure the concrete, grading, and any other items required in the Bid Documents.

1.2.9 Item 1.2.9: Supply and placement of MG-20 granular base beneath the slab, 300 mm thick

1.2.9.1 This item includes supply and placement of granular material, spreading, grading and compacting of the granular material, and any other items required in the Bid Documents.

1.2.10 Item 1.2.10: Supply and installation of rigid insulation beneath the concrete slab

1.2.10.1 This item includes supply and installation of rigid insulation, as well as any other items required in the Bid Documents.

Mill Street

1.2.11 Item 1.2.11: Mill Street: Street saw cutting for connection of utilities – Pavement repairs (coordination with City of Montreal)

1.2.11.1 This item includes supply and placement of geotextile in accordance with the supplier's recommendations, including cutting and sewing, overlapping, extra width of 0.5 metre for each side of the pavement, supply and placement of granular material, spreading, grading and compacting of the granular material, adjustment of structures, supply and placement of concrete, forms, supports, accessories, joints and materials necessary to protect and cure the concrete, supply and placement of the asphalt overlay, spreading, grading and compacting, adhesive for asphalt joints, as required, supply and installation of binder, chamfer strips, adjustment of frames and covers, cleaning, coordination with City of Montreal, and any other items required in the Bid Documents.

1.3 Concrete sidewalks and curbs

1.3.1 Item 1.3.1: Construction of concrete curbs

1.3.1.1 This item includes supply and installation of materials to build the concrete curbs, including bedding, reinforcing steel, saw cutting, excavation, granular base, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, forms, supports, accessories, joints, activities and materials necessary to protect and cure the concrete in accordance with the weather conditions (frost protection), grading at curb height, as well as any other items required in the Bid Documents.

1.3.2 Item 1.3.2: Mill Street: Construction of monolithic sidewalk (coordination with City of Montreal)

1.3.2.1 This item includes supply and installation of materials to build the concrete sidewalks, including bedding, reinforcing steel, disabled access ramps, access lanes, saw cutting, excavation, granular base, loading, transportation and disposal of excavated materials at a facility that meets MDDELCC requirements, forms, wire mesh, supports, accessories, joints, activities and materials necessary to protect and cure the concrete in accordance with the weather conditions (frost protection), coordination with City of Montreal, and as any other items required in the Bid Documents.

1.4 Sodding

1.4.1 Item 1.4.1: Sodding with turf, including 150 mm of topsoil

1.4.1.1 This item includes supply and placement of topsoil, turf slabs, including watering, stakes and accessories, initial maintenance work, and any other items required in the Bid Documents.

1.5 Water supply pipes

1.5.1 Item 1.5.1: Supply and placement of soft copper, type K, water supply pipe, 38 mm diameter

1.5.1.1 This item includes supply and placement of pipes, including excavation, dewatering of trenches, connections and accessories, sleeves, plugs, valves, restraints and cathodic protection, concrete counterforts, diversions shown on the plans as well as thermal insulation, as required. This item also includes bedding, pipe wrapping and backfilling to the subgrade line, as well as any other items required in the Bid Documents.

1.5.2 Item 1.5.2: Supply and installation of key-operated valve box

1.5.2.1 This item includes supply and installation of the valve, complete adjustable key-operated valve box with joints and accessories, restraints and cathodic protection, as well as any other items required in the Bid Documents.

1.5.3 Item 1.5.3: Mill Street: Connection to existing water main (coordination with City of Montreal)

1.5.3.1 This item includes location and uncovering of the existing pipe, cutting and cleaning of the pipe, connection to the existing water main, including a sleeve or reduced coupling, as necessary, disinfection of the connecting parts, manufacture of watertight seal for connection, supply and installation of all

other materials necessary for completion of the structure, coordination with City of Montreal, as well as any other items required in the Bid Documents.

1.6 Sanitary sewer

1.6.1 Item 1.6.1: Supply and installation of PVC DR-28 sanitary sewer branch connection, 100 mm diameter

1.6.1.1 This item includes supply and installation of sanitary sewer pipe, including accessories, plugs, various connection parts, monolithic tees, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.6.2 Item 1.6.2: Mill Street: Connection to existing combined sewer (coordination with City of Montreal)

1.6.2.1 This item includes location and uncovering of the existing pipe, cutting, cleaning, connection of pipe to existing sewer, including a sleeve or reduced coupling, as necessary, manufacture of watertight seal for connection, supply and installation of all other materials necessary for completion of the structure, coordination with City of Montreal, as well as any other items required in the Bid Documents.

1.7 Storm sewer

1.7.1 Item 1.7.1: Supply and installation of PVC DR-28 storm sewer branch connection, 150 mm diameter

1.7.1.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.2 Item 1.7.2: Supply and installation of PVC DR-35 storm sewer pipe, 200 mm diameter

1.7.2.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.3 Item 1.7.3: Supply and installation of TBA Class IV storm sewer pipe, 300 mm diameter

1.7.3.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.4 Item 1.7.4: Supply and installation of TBA Class IV storm sewer pipe, 375 mm diameter

1.7.4.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.5 Item 1.7.5: Supply and installation of TBA Class IV storm sewer pipe, 525 mm diameter

1.7.5.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.6 Item 1.7.6: Supply and installation of TBA Class IV storm sewer pipe, 600 mm diameter

1.7.6.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.7 Item 1.7.7: Supply and installation of TBA Class IV storm sewer pipe, 1200 mm diameter

1.7.7.1 This item includes supply and installation of storm sewer pipe, including accessories, plugs, excavation and dewatering of trenches, bedding, pipe wrapping, backfilling to the subgrade line, transportation and disposal of excavated material at a facility that meets MDDELCC requirements, as well as any other items required in the Bid Documents.

1.7.8 Item 1.7.8: Supply and installation of a retention basin, using pipes 1200 mm in diameter – Option 1: TBA Class IV pipes or Option 2: HDPE pipes

1.7.8.1 The bidder shall enter a price for the supply and installation of a retention basin using 1200 mm diameter pipes of the material of its choice, either Option 1 (TBA Class IV pipes) or Option 2 (HDPE pipes). The bidder shall also indicate which option it has selected in the Bid Form.

1.7.8.2 This item includes supply and installation of pipes to form the underground retention basin, the access shafts and their assembly, connecting parts, bedding and pipe wrapping, calculation of hydrostatic forces. The basin and its access shafts must support the passage of trucks, excavation and backfilling, as well as any other items required in the Bid Documents.

1.7.9 Item 1.7.9: Supply and installation of circular manhole-catch basin, 1200 mm diameter

1.7.9.1 This item includes supply and installation of reinforced concrete manhole-catch basins, with rubber gaskets, channel, access shaft, frame, guide and adjustable cover, grade rings, rungs, protective grates, deflectors, as required, connections to the proposed pipes, backfill around the manhole, geotextile membrane, leak testing, search for and repair of sources of infiltration, as applicable, as well as any other items required in the Bid Documents.

1.7.10 Item 1.7.10: Supply and installation of rectangular storm sewer manhole, 1750 mm X 1550 mm

1.7.10.1 This item includes supply and installation of reinforced concrete manholes, with rubber gaskets, channel, access shaft, frame, guide and adjustable cover, grade rings, rungs, protective grates, deflectors, as required, connections to the proposed pipes, backfill around the manhole, geotextile membrane, leak testing, search for and repair of sources of infiltration, as applicable, as well as any other items required in the Bid Documents.

1.7.11 Item 1.7.11: Supply and installation of a rectangular storm sewer manhole, 2150 mm X 1750 mm

1.7.11.1 This item includes supply and installation of reinforced concrete manholes, with rubber gaskets, channel, access shaft, frame, guide and adjustable cover, grade rings, rungs, protective grates, deflectors, as required, connections to the proposed pipes, backfill around the manhole, geotextile membrane, leak testing, search for and repair of sources of infiltration, as applicable, as well as any other items required in the Bid Documents.

1.7.12 Item 1.7.12: Supply and installation of a regulation chamber, 2435 mm X 2135 mm, including flow regulator and check valve

1.7.12.1 This item includes supply and installation of reinforced concrete manholes, with rubber gaskets, channel, access shafts, frame, guide and adjustable cover, grade rings, rungs, protective grates, deflectors, as required, connections to the proposed pipes, backfill around the manhole, geotextile membrane, leak testing, search for and repair of sources of infiltration, as applicable, supply and installation of a vortex flow regulator, including anchor plate, vent, supply and installation of a check valve and accessories, as well as any other items required in the Bid Documents.

1.7.13 Item 1.7.13: Supply and installation of catch basins, 610 mm diameter, including perforated drains, 150 mm diameter

1.7.13.1 This item includes supply and installation of a precast, reinforced concrete catch basin, including watertight seals, butyl cords, frame, guide and anti-cycle grate, cast iron traps, grade rings, opening with grate, concrete slab, supply and complete installation of connecting pipe, watertight connection of pipe to the catch basin, cleaning, encasement around the catch basin using crushed rock, supply and installation of perforated drains and accessories, wrapping of drains and backfilling of trenches with clean stone to the planned subgrade elevation, supply and installation of a geotextile membrane around the clean stone, as well as any other items required in the Bid Documents.

1.7.14 Item 1.7.14: Mill Street: Connection to existing combined sewer (coordination with City of Montreal)

1.7.14.1 This item includes digging of hole, excavation and backfilling, removal of plug, if necessary, cutting and cleaning the existing pipe, connection of the proposed manhole to the existing pipe, including manufacture of watertight seal for connection, supply and installation of all other materials required for completion of the structure, coordination with City of Montreal, as well as any other items required in the Bid Documents.

2 Environmental work

2.1 Excavation and management of soil and excavated materials

.1 The bidder shall indicate the unit prices for the various steps involved in excavation, temporary storage in piles, transportation and disposal of the various categories of soil and materials indicated.

.2 For the purposes of the cost estimate, the bidder may consider the affected soil that must be disposed of at authorized facilities to contain one or more of the following substances: C10-C50 petroleum hydrocarbons, BTEX compounds (benzene and xylene), metals and/or polycyclic aromatic hydrocarbons (PAH).

.3 The soil and residual materials removed from the site shall be weighed directly at the authorized disposal facility. Weight tickets issued must clearly indicate the net weight of each truckload of soil or residual materials and must be provided at the end of each day to the Parks Canada Representative on site. The total tonnage indicated on each weight ticket for each category of soil or material taken to the authorized facilities will be used by the Contractor for billing for each category for which a price per tonne is provided in the Bid Form.

.4 The quantity of excavated soil piled on site for reuse as backfill will be assessed for volume, either by measurement or by surveying, using the method chosen jointly by the Parks Canada Representative and the Contractor. This volume with be used for billing in section 1.1 of the Bid Form.

.5 Similarly, the quantity of excavated soil piled on site that must be analyzed before disposal will be assessed for volume, either by measurement or by surveying, using the method chosen jointly by the Parks Canada Representative and the Contractor. This volume with be used for billing in section 1.2 of the Bid Form.

.6 The final dimensions of the excavation will be surveyed if the Parks Canada Representative and the Contractor deem it necessary.

2.1.1 Item 2.1.1: Excavation, loading, transportation and temporary storage of soil that may be reused for backfilling the excavation

2.1.1.1 This item includes excavation, loading, transportation and temporary storage in piles, on the site of the work, of the soil that may be reused for backfilling the excavation.

2.1.2 Item 2.1.2: Excavation, loading, transportation and disposal of soil <B that cannot be reused

2.1.2.1 This item includes excavation, loading, transportation and disposal of excavated soil with concentrations below criteria B of the Intervention Guide but which cannot be reused.

2.1.3 Item 2.1.3: Excavation, loading, transportation and disposal of soil B-C

2.1.3.1 This item includes excavation, loading, transportation and disposal of excavated soil with concentrations in the B-C criteria range of the Intervention Guide.

2.1.4 Item 2.1.4: Excavation, loading, transportation and disposal of soil ≥ C (but ≤ RESC)

2.1.4.1 This item includes excavation, loading, transportation and disposal of excavated soil with concentrations greater than criteria C of the Intervention Guide, but below the limits set out in Schedule I of the RESC (*Regulation respecting the burial of contaminated soils* – c. Q-2, r.6.01).

2.1.5 Item 2.1.5: Excavation, loading, transportation and disposal of soil ≥ RESC

2.1.5.1 This item includes excavation, loading, transportation and disposal of excavated soil with concentrations greater than the limits set out in Schedule I of the RESC (*Regulation respecting the burial of contaminated soils* – c. Q-2, r.6.01).

2.1.6 Item 2.1.6: Excavation, transportation and removal of asphalt and concrete

2.1.6.1 This item includes removal, loading, transportation and disposal of asphalt and asphalt concrete excavated throughout the site at an authorized facility.

2.1.7 Item 2.1.7: Handling, transportation and disposal of non-hazardous residual materials

2.1.7.1 This item includes handling, transportation and disposal of residual materials classified as non-hazardous but which cannot be reused.

2.1.7.2 Handling includes, excavation, temporary storage of soil on site and supply, installation, cleaning and removal of waterproof membranes.

2.2 Dewatering of excavations, where applicable

2.2.1 Item 2.2.1: Pumping of water using a vacuum truck

2.2.1.1 This item includes all equipment required to pump water using a vacuum truck, as well as any other items required in the Bid Documents.

2.2.2 Item 2.2.2: Supply of tanker truck

2.2.2.1 Indicate capacity of proposed truck, in litres.

2.2.2.2 This item includes supply of a tanker truck, as well as any other items required in the Bid Documents.

2.2.3 Item 2.2.3: Supply of labour and submersible pump and related equipment

2.2.3.1 This item includes all required equipment, as well as any other items required in the Bid Documents.

2.3 Filling of minor vertical cracks in the foundations, where applicable

2.3.1 Item 3.1: Filling of minor vertical cracks

2.3.1.1 This item includes filling of minor cracks by injecting a sealant compatible with the foundation materials and installation conditions (including temperature).

2.3.1.2 This item includes filling materials as well as equipment and labour required to inject the sealant.

2.3.1.3 The unit prices apply if minor cracks are discovered during the work on the building foundations.

2.3.1.4 The proposed costs shall include all costs related to raw materials as well as labour and equipment required to carry out the work.

3 Electrical work

3.1 Electrical/telecomm entry to Building #1 and spillway / Building #1 to Building #2 / Building #1 to Building #3 / Building #1 to Building #4

3.1.1 Items 3.1.1, 3.2.1, 3.3.1 and 3.4.1: Trenching, including excavation and backfilling

3.1.1.1 This item includes excavation, loading, transportation, disposal of excavated materials at a facility that meets MDDELCC requirements, supply and installation of fill material, backfilling, and any other items required in the Bid Documents.

3.1.2 Item 3.1.2: two conduits concrete duct, 104 mm

3.1.2.1 The two conduits concrete duct is paid by the linear metre. The price includes supply and installation of concrete, type 2 PVC conduit, supports, fasteners, materials, labour and machinery, excavation and backfilling, rack, including rings, accessories and 90° long radius elbow and fill material. The price also includes transportation of unused excavation material off site, shaft chucking, connection to the existing conduit and manholes, adaptors, marking tape, temporary repairs of all excavated surfaces and any incidental expense incurred in completion of the work.

3.1.2.2 The Contractor shall install marking tape above the conduits midway between the top of the conduit and the finished elevation. The tape should be IDENTOLINE by BRADY be marked " BURIED ELECTRICAL LINE BELOW."

3.1.2.3 The conduits used must comply with the requirements set out in the plans.

3.1.2.4 If the trenches dug in the pavement and sidewalks cannot be completely backfilled the same day and/or before the road opens to traffic, the Contractor shall install and properly secure steel plates, which must be inspected and approved by the Parks Canada Representative.

3.1.2.5 Unless otherwise indicated on the plans, all underground conduits shall be concreted and installed in accordance with CSEM and Hydro-Québec standards.

3.1.3 Item 3.1.3: single conduit concrete duct, 104 mm

3.1.3.1 The single conduit concrete duct a is paid by the linear metre. The price includes supply and installation of concrete, type 2 PVC conduit, supports, fasteners, materials, labour and machinery, excavation and backfilling, rack, including rings, accessories and 90° long radius elbow and fill material. The price shall also include transportation of unused excavation material off site, shaft chucking, connection to the existing conduits and manholes, adaptors, marking tape, temporary repairs of all excavated surfaces and any incidental expense incurred in completion of the work.

3.1.3.2 The Contractor shall install marking tape above the conduits midway between the top of the conduit and the finished elevation. The tape should be IDENTOLINE by BRADY be marked "BURIED ELECTRICAL LINE BELOW."

3.1.3.3 The conduits used must comply with the requirements set out in the plans.

3.1.3.4 If the trenches dug in the pavement and sidewalks cannot be completely backfilled the same day and/or before the road opens to traffic, the Contractor shall install and properly secure steel plates, which must be inspected and approved by the Parks Canada Representative.

3.1.3.5 Unless otherwise indicated on the plans, all underground conduits shall be concreted and installed in accordance with CSEM and Hydro-Québec standards.

3.1.4 Item 3.1.4, 3.2.2, 3.3.3 and 3.4.2: Rigid PVC conduit, 104 mm

3.1.4.1 Electrical conduit is paid by the linear metre according to the type of conduit supplied and installed.

3.1.4.2 The price per linear metre includes materials, labour, equipment and machinery required to supply, install and connect the rigid conduit of the indicated diameter, on or below grade, including rings, attachment accessories, 90° long radius elbows, connection boxes, pull boxes and junction boxes, drilling, bases, anchors and any other incidental expense.

3.1.5 Item 3.1.5, 3.2.4, 3.3.5 and 3.4.4: Drilling

3.1.5.1 The drilling is paid at the unit price. The price shall include supply and installation of all material, labour, equipment, excavation, backfilling, shoring, hardware and accessories, as well as any other expenses inherent in the functional completion of the work.

3.1.5.2 The price also includes sealing of the opening after installation of the conduit.

3.2 Building #1 to Building #2 / Building #1 to Building #3 / Building #1 to Building #4

3.2.1 Item 3.2.3, 3.3.4 and 3.4.3: Rigid PVC conduit, 53 mm

3.2.1.1 Electrical conduit is paid by the linear metre according to the type of conduit supplied and installed.

3.2.1.2 The price per linear metre includes materials, labour, equipment and machinery required to supply, install and connect the rigid conduit of the indicated diameter, on or below grade, including rings, attachment accessories, 90° long radius elbows, connection boxes, pull boxes and junction boxes, drilling, bases, anchors and any other incidental expense.

3.3 Building #1 to Building #3

3.3.2 Item 3.3.2: Pull pit

3.3.2.1 The pull pit is paid by the unit price. The price shall include supply and installation of the pit, frame (ductile iron), cover (ductile iron), as well as excavation, backfilling, shoring, protection of excavations, backfilling, disposal of excavated materials, labour, equipment and all expenses inherent in complete and functional installation.

3.3.2.2 The price also includes connection of the system of conduits and concrete ducts to the pit.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work.

1.2 ADMINISTRATIVE

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

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

.9 Keep one reviewed copy of each submission on site.

1.3 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status. The Contractor must provide the end-of-project manual.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 11 00 – Summary of Work

.2 Section 01 14 00 – Work Restrictions

.3 Section 01 33 00 – Submittal Procedures

.4 Section 01 35 43b – Archeology

.5 Section 01 74 11 – Cleaning

.6 Section 01 74 19 – Waste Management and Disposal

1.2 REFERENCE STANDARDS

.1 Ensure environmental protection in accordance with these specifications and the following standards:

.1 Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés (MDDELCC, 2016);

.2 Ministère du Développement durable, de l'Environnement et des Parcs du Québec : Guide d'échantillonnage à des fins d'analyses environnementales : Cahier 5 – Échantillonnage des sols, 2010 ;

.3 Ministère du Développement durable, de l'Environnement, de la Faune et des Parcs du Québec, Modes de conservation pour l'échantillonnage des sols, 2013;

.4 Quebec laws and regulations:

.1 Canadian law on the environmental protectection (1999) (L.C. 1999, ch. 33)

.2 Law on the species at risk (L.C. 2002, ch. 29).

.3 Law of 1994 on the Convention on Migratory Birds (L.C. 1994, ch. 22)

.4 Historic Canal Regulations (SOR / 93-220)

.5 Canadian Environmental Quality Guidelines (CCME 1999)

.6 Environment Quality Act (CQLR, c Q-2), 2018;

.7 Regulation respecting solid waste (CQLR, c Q-2, r 13), 2013;

.8 Regulation respecting the burial of contaminated soils (CQLR, c Q-2, r 18), 2018;

.9 Regulation respecting the landfilling and incineration of residual materials (CQLR, c Q-2, r 19), 2018;

.10 Regulation respecting hazardous materials (CQLR, c Q-2, r 32), 2018;

.11 Land Protection and Rehabilitation Regulation (CQLR, c Q-2, r 37), 2018;

.12 Regulation respecting contaminated soil storage and contaminated soil transfer stations (CQLR, c Q-2, r 46), 2018;

.2 The standards and general documents cited above are complementary, regardless of the nature of work to be done. In the event of a discrepancy between the documents and these specifications, the specifications have priority.

1.3 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Before the work

.1 Health and safety plan

.2 Schedule of work

.2 During the work

.1 Weight tickets

.2 Five (5) days before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Canada Parks Representative.

.3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.5 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan must include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.7 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management of discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water,

disinfection water, hydrostatic test water, and water used in flushing of lines.

.12 A plan for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.13 Pesticide treatment plan to be included and updated, as required.

1.5 MITIGATION MEASURES

.1 The mitigation measures described in Appendix D of this specification must be implemented to the satisfaction of the Canada Parks Representative.

1.6 FIRES

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

1.7 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.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.

1.8 PLANT PROTECTION

.1 Where required for excavation, cut roots as directed:

.1 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to a minimum height of 2 m.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

1.9 POLLUTION CONTROL

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

.2 Install geotextile over the fences around the site to prevent wind erosion. Keep the geotextile in good condition throughout the work.

.3 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.10 HISTORICAL/ARCHAEOLOGICAL CONTROL

.1 Preserve the archeological nature of the site in accordance with Section 01 35 43b – Archeology.

.2 An archeologist under Parks Canada Agency responsibility will be present on site. Contractor must interrupt work for about 30 minutes per 4 hours of work to allow the archeologist to inspect the excavation.

.3 If an archeological resource is discovered, the Parks Canada archeologist will work with the Contractor to take steps to protect the resource.

1.11 NOTIFICATION

.1 The Canada Parks Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform the Canada Parks Representative of proposed corrective action and take such action for approval by the Canada Parks Representative.

.1 Take action only after receipt of written approval by the Canada Parks Representative.

.3 The Canada Parks 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 EXECUTION

2.1 CLEANING

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

.1 Leave Work area clean at end of each day.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.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 recycling and reuse.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

1.1 RELATED REQUIREMENTS

1. Section 01 11 00 – Summary of Work
2. Section 01 14 00 – Work Restrictions
3. Section 01 35 43 – Environmental Procedures

1.2 SPECIFIC CONDITIONS

1. The site of the rehabilitation works has been recognized by the Canadian Government as an area with archaeological potential. Therefore, any excavation of soil that may contain archeological remains must be supervised by an archeologist appointed by the Canadian government.
2. Due to the high probability of finding archeological remains during the planned excavations, these works are subject to the terms set out in this section.

1.3 ACCESS AND COOPERATION

1. The Contractor shall cooperate and comply with all directives issued by the Canada Parks Representative during excavation works to prevent the loss of archeological information at the site.
2. The Contractor shall facilitate access to works and cooperate with the archeologist. The archeologist or his representative shall work at the site as needed to protect and record any remains. Their role will be to guide the Contractor to avoid any loss of archeological information and to collect information about any remains found.
3. If necessary, the Contractor shall allow the archeological team to conduct tests and take archeological samples.

1.4 ARCHEOLOGICAL FINDINGS

1. The Contractor shall inform the Parks Canada representative, or in his absence the archeologist or his representative, of any archeological findings (construction or housing remains, objects or pieces of objects)

from the site and wait for directives prior to continuing work where the item was found.

2. Remains, antiquities and other objects of historical, archeological or scientific interest (remains, object or fragment of object) found on the work site, excavation zone or demolition zone shall remain Crown property. The Contractor shall protect any such findings and obtain instructions from the Canada Parks Representative.

1.5 WORK STOPPAGE

1. In its contract, the Contractor shall include, at its expense, excavation stoppages of approximately 30 minutes per half-day in areas where an archeologist is required to be present. If unused, these stoppages shall be accumulated and may be used at a later date, as needed. A record of unused time shall be kept by the Canada Parks Representative in accordance with the Contractor and the archeologist.

2. In the event of a work stoppage exceeding 30 minutes, the Canada Parks Representative shall assess the implications of the stoppage and shall inform the Contractor. The Contractor may have to use its machinery in another area to allow the archeologists to continue their work. If it is not possible to use the machinery in another area, the Contractor shall be compensated in the bank of hours or, if it is empty, in accordance with agreements established at the start-up meeting.

3. In the event that cultural resources are discovered when an archeologist is not present, the Project Manager/Project Owner shall imperatively suspend work in the immediate area of the discovery and inform the Parks Canada Agency Project Lead.

1.6 MANUAL EXCAVATIONS FOR ARCHEOLOGICAL PURPOSES

1. Given the possibility of making archeological discoveries, the Contractor is advised that, during the works, manual excavation may be required along with any other types of work to protect possible discoveries. The Contractor shall be compensated in accordance with predetermined agreements.

1.7 PROTECTION OF REMAINS AND STRUCTURES

1. The Contractor shall take all reasonable precautions during excavations and other works to protect any uncovered remains and to allow their examination by archeologists. Parks Canada will not tolerate any deviation in this regard. If the Contractor's negligence results in damage to remains, the Contractor shall be held responsible and the Canada Parks shall determine the impact.

2. In the event that the Canada Parks Representative authorizes the demolition of archeological elements at the site, the Contractor shall take the necessary precautions to protect any adjacent archeological structures that are not slated for demolition. Elements shall be demolished progressively and in a controlled manner after all archeological surveys are complete. If structures are damaged during the works, immediately inform the Parks Canada Representative.

END OF SECTION

1.1 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation. Provide this plan five (5) business days before start of work.

.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.

.6 The contractor will have free access to the main entrance of the site via Mill Street (Access # 1) and for the entrance to the snow depot (Access # 2). It will be possible for the Contractor to construct an entrance south of Building # 2 through Mill Street. As for the entrance behind building # 1 (Access # 3), it can be used as a transit zone, provided that the free passage to the operations of the surrounding land is allowed. Accesses are shown on Drawings.

1.2 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.3 CONSTRUCTION PARKING

.1 Parking is permitted on the site, as long as it does not hinder the execution of works or reduce/encroach on the two (2) spaces needed for the Parks Canada Agency vehicle traffic and parking. A parking space for the site supervisor must also be provided.

.2 Provide and maintain adequate access to project site.

1.4 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.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Protect travelling public from damage to person and property.

.2 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.3 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.4 Dust control: adequate to ensure safe operation at all times.

.5 Provide snow removal during period of Work.

1.6 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.

.5 Clean the snow chute area if it is used.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Section 01 74 21 — Construction/Demolition Waste Management and Disposal.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations.

.2 Install geotextile over the fences around the site to prevent wind erosion. Keep the geotextile in good condition throughout the work.

1.4 FIRE ROUTES

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

1.5 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

END OF SECTION

PARTIE 1 GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit to the Canada Parks Representative copies of the following documents, including published updates:

- .1 Prior to commencing work on the site submit the Health and Safety Program as indicated in this section of the specifications;
- .2 Site opening notice;
- .3 Immediately upon receipt, reports and instructions provided by the appropriate authorities;
- .4 Reports of accidents or incidents, within 24 hours of their occurrence.

.2 Submit other data, information and documents upon request of the Parks Canada Representative, as stipulated elsewhere in this section.

1.2 COMPLIANCE REQUIREMENTS

.1 Comply with the latest version of the loi sur la santé et la sécurité au travail du Québec as well as the resulting regulations.

.2 Observe and apply construction safety measures required by:

- .1 Ministère des Transports – Normes ouvrages routiers - Volume V – Traffic Control Devices.
- .2 Code de la sécurité routière du Québec.
- .3 La Commission de la santé et de la sécurité au travail du Québec.
- .4 Canada Occupational Safety and Health Regulations
- .5 Standards of the Canadian Fire Marshal (CI), CI 301 - Construction Work and CI 302 - Welding and Cutting.
- .6 Regulations and ordinances of the municipalities
- .7 Regulations and ordinances of Canada Parks.

.3 In case of conflict between the provisions emanating from the aforementioned authorities, the most stringent provisions shall apply.

.4 Provide and maintain Worker's Compensation coverage for all employees throughout the duration of the contract. Prior to commencement of work, at the time of provisional execution and before the final payment, provide the Canada Parks Representative with a letter (certificate) from the Workplace Health and Safety Commission (or equivalent organization) certifying that the Contractor's account is in good standing.

.1 If the Contractor is a sole proprietor, provide the Canada Parks Representative with documented evidence, in a form acceptable to the Canada Parks Representative, of another personal insurance coverage that meets the above requirements for coverage workers' insurance compensation or exceeds them.

1.3 RESPONSABILITY

.1 Be responsible for safety of persons and property on site and for protection of persons off 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, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan. When the Contractor believes that the contract contains stipulations or instructions inconsistent with these laws, regulations or decrees, he must promptly notify the Canada Parks Representative in writing.

.3 If an unexpected or special hazard or hazard occurs during the performance of the Work, immediate action shall be taken to correct the situation and to prevent any damage or injury. Inform the Canada Parks Representative verbally and in writing of the danger or situation.

1.4 SITE CONTROL AND ACCESS

.1 Control the access points to the sites and the activities that take place there. Delimit the site and isolate it from adjacent areas by using appropriate ways to maintain control of all access points on the site.

.2 Take measures to allow access to the site to all persons who need access. Access authorization procedures must comply with Quebec's Occupational

Health and Safety Act, the regulations made under it and the Contractor's Health and Safety Program.

.3 Ensure that persons authorized to access the site possess and wear the minimum personal protective equipment (PPE) specified in the Contractor's Health and Safety Program. Ensure that persons authorized to access the site have received the appropriate PPE, which has more stringent characteristics than the minimum equipment indicated above and designed specifically for the activities of a site in which they participate, they have been trained to use these PPEs and wear them. Ensure the effectiveness of the supplied PPE whose characteristics are more stringent than those of the prescribed minimum equipment.

.4 Set up signaling at access points and other strategic locations around the site, clearly indicating that the site area(s) is(are) "prohibited" to non-authorized persons. Traffic signs must be prepared according to good engineering judgement, bear well-understood graphic symbols and be bilingual (French and English). The signs are not to be used for advertising purposes, but for the specific purpose of providing information on site safety and main contacts.

.1 Information to be affixed to traffic signs:

.1 Name and description of the project

.2 Name of the Contractor

.3 Name and phone number of the project superintendent

.5 Ensure construction site safety at all times to prevent unauthorized access.

1.5 FILING OF NOTICE

.1 If required, prior to commencement of work, file the Notice of Project and any other notice with the authorities and provide the Canada Parks Representative with a copy of the notices filed.

1.6 PERMITS

.1 Obtain permits, licenses and certificates of compliance at frequencies and times prescribed by the competent authorities.

.2 Display all permits, licenses and certificates of conformity on site and provide copies to the Canada Parks Representative.

1.7 PROJECT/SITE STATE AND CONDITIONS

.1 The following known hazardous substances and conditions on the site must be considered as health and environmental hazards and should be managed appropriately if presented as part of the work:

.1 Contractors must consider known hazardous substances and conditions and must include in their price proposal all work that must be performed in or near the danger zone and in the presence of hazardous substances.

.2 The list of this specification shall not be construed as a complete list of all health and safety hazards present and arising from the Contractor's activities as part of the Work. Include the above items in the hazard assessment program specified in this specification.

1.8 MEETING

.1 Prior to commencement of work, attend a pre-work meeting led by the Canada Parks Representative. Ensure at least the presence of the project manager of the Contractor. The Canada Parks Representative must specify the time, date and location of the meeting and take care of the drafting and distribution of the minutes.

.2 Hold site-specific health and safety meetings as required by the Quebec Occupational Health and Safety Act and Regulations.

.3 Write and prominently post the minutes of all meetings on site. Ensure that the Parks Representative can obtain copies upon request.

1.9 HEALTH AND SAFETY PROGRAM

.1 Under the Quebec Occupational Health and Safety Act and Regulations, Contractors must have a health and safety program. Compliance requirements for program content, details and implementation are under provincial or territorial jurisdiction. For the purpose of this contract, the health and safety program must include a site-specific health and safety plan, which recognizes, assesses and addresses the known hazardous substances

and conditions identified in this specification, as well as assessments ongoing hazards during the course of the work and documenting new or potential, unknown and previously unidentified health and safety hazards.

.2 Prior to commencement of work on the site, provide the Canada Parks Representative with a copy of the health and safety program. The copy given to the Canada Parks Representative must be used to review the program according to the requirements of the contract for known hazardous substances and conditions. The review should not be interpreted to suggest that the Canada Parks Representative approves the program as being complete, accurate, and legally compliant with the Quebec Occupational Health and Safety Act and the resulting regulations and shall not release the Contractor from its legal obligations under such a law.

1.10 DECLARATION OF ACCIDENTS

.1 Investigate and report accidents and incidents as required by Quebec's Occupational Health and Safety Act and Regulations.

.2 For the purpose of this contract, immediately investigate accidents or incidents involving the following situations and report to the Canada Parks Representative:

- .1 An injury that may or may not require medical assistance, but that results in lost working time for the injured person(s).
- .2 Exposure to toxic chemicals or substances.
- .3 Property damage.
- .4 Interruption of activities within or adjacent to the infrastructure that may result in losses.

.3 During Incident and Accident Investigation and Reporting, Contractor is required to respond promptly to correct actions deemed to be the cause of accident or incident and provide written notice of the measures taken to prevent the incident or accident from recurring

1.11 PROJECT RECORDS

.1 Maintain on site a copy of the safety documents prescribed in this section, as well as any other safety report and document obtained from the appropriate authorities.

.2 Ensure that the Canada Parks Representative can obtain copies upon request.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Section 01 74 19 – Waste Management and Disposal.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Canada Parks or other Contractors.

.2 Remove waste materials from site. Do not burn waste materials on site.

.3 Clear snow and ice from access to building. Bank/pile snow in designated areas only or remove from site.

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

.5 Provide and use marked separate bins for recycling.

.6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

1.3 FINAL CLEANING

.1 At the completion of work, remove surplus materials, tools, and construction equipment and materials that are no longer required to perform the remaining work.

.2 Remove debris and waste materials, except those generated by other contractors, and leave areas clean and ready to occupy.

.3 Prior to final inspection, remove surplus materials, tools, equipment and construction materials.

.4 Make the necessary arrangements and obtain permits from authorities having jurisdiction to dispose of debris and waste materials.

.5 Sweep and clean sidewalks, steps and other exterior surfaces; sweep or rake the rest of the site.

.6 Remove dirt and other debris from exterior surfaces.

.7 Clean and sweep roofs and gutters.

.8 Sweep and clean hard surfaces.

.9 Clean roofs, downspouts, drains and outlets.

.10 Remove snow and ice from access roads to the building.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

.1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill.

1.2 RELATED REQUIREMENTS

.1 Section 01 52 00 – Construction Facilities

.2 Section 01 74 11 – Cleaning

1.3 DEFINITIONS

.1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.

.2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction.

.3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.

.4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.

.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.13 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.14 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.15 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

.2 Wood preservatives; strippers and household cleaners;

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.16 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

.2 Preconstruction Meeting: Arrange a pre-construction meeting before starting any Work of the Contract attended by the Contractor, affected Subcontractors and the Canada Parks Representative to discuss the Construction Waste Management Plan and to develop mutual

understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials.

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

PART 2 EXECUTION

2.1 CWM PLAN IMPLEMENTATION

.1 Manager: The Contractor is responsible for designating an onsite party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Canada Parks Representative, Stantec Consulting Ltd. and other site personnel as required to maintain CWM Plan.

.3 Instruction: Provide on site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractors at appropriate stages of the project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

.1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.

.2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

.1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Canada Parks Representative, the Contractor and Stantec Consulting Ltd.

.2 Monthly waste summary shall contain the following information:

.1 The amount in tonnes or m^3 and location of material landfilled;

.2 The amount in tonnes or m^3 and location of materials diverted from landfill;

.3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

2.2 SUBCONTRACTORS' RESPONSIBILITY

.1 The Subcontractors shall cooperate fully with the Contractor to implement the CWM Plan.

.2 Failure to cooperate may result in the Canada Parks Representative not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Section 01 74 11 – Cleaning

.2 Section 01 74 19 – Waste Management and Disposal

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

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

.1 Notify the Canada Parks Representative in writing of satisfactory completion of the Contractor's inspection.

.2 Request the Canada Parks Representative's inspection.

.2 Canada Parks Representative's Inspection:

.1 The Canada Parks Representative and the Contractor shall inspect Work and identify defects and deficiencies.

.2 The Contractor shall correct Work as directed.

.3 Completion Tasks: submit written certificates in French that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by the Canada Parks Representative and the Contractor.

.2 When Work is incomplete according to the Canada Parks Representative, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 – Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for recycling and reuse in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

CIVIL

Part 1 GENERAL

1.1 NOTICE TO CONTRACTOR

.1 The general conditions of the contract apply to this section. The Contractor must take note of it and fulfill the obligations arising from it.

.2 The Contractor must be aware of all plans and specifications.

.3 If all or part of the work described below and the drawings is done by one or more specialized contractors, the Contractor remains responsible for the quality and extent of this work.

1.2 DESCRIPTION

.1 Work covered by this section includes the provision of all materials, equipment supplies and services, labour and transportation to fully carry out the following:

.1 Design, construct, provide, assemble, dismantle and maintain all formwork, scaffolding and falsework required for the construction of all structures specified or shown on the drawings.

.2 Install sleeves, anchor bolts, anchoring components, anchor plates, embedded components, grooves, sockets, angle irons, accessory parts, drains and all parts embedded in concrete shown on the plans of all disciplines or described in the invitation to tender document.

1.3 RELATED REQUIREMENTS

.1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specification sections.

.2 The Contractor is responsible for providing its specialized contractors with a copy of all sections of this specification.

1.4 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA)

.1 CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.

.2 CAN / CSA-O86-011- (CAN / CSA-08651-05 Supplement), Limit States Design Rules for Wood Frames.

.3 CSA O121-M1978, Douglas Fir Plywood.

.4 CSA O151-04, Canadian Softwood Plywood.

.5 CSA O153-M1980, Poplar Plywood.

.6 CAN/CSA 437.0-93, Standards on OSB and Waferboard.

.7 CSA S269.1-1975, Falsework for Construction Purposes.

.8 CAN/CSA-S269.3-M92, Concrete Formwork.

.9 CAN/CSA-S269.2-M87, Access Scaffolding for Construction Purposes.

.2 Council of Forest Industries of British Columbia (COFI)

.1 COFI, Exterior Plywood for Concrete Formwork.

.3 Publications du Québec:

.1 S-2.1, r.4; Safety Code for the construction work of the Ministère du travail du Québec, as well as the standards of the Commission de la Santé et de la Sécurité du Travail du Québec (C.S.S.T).

1.5 CONTRACTOR'S RESPONSIBILITIES

.1 Assume responsibility of concrete formwork and falsework. The Canada Parks Representative's review of the formwork and falsework shall not release the specialized Contractor from his responsibility regarding the provision of structures that fully comply with the drawings and specifications.

.2 The Contractor shall be aware of all laws and regulations that apply to the design and construction of formwork and falsework and shall comply with these requirements. Comply with regulations including the Quebec Safety Code, S-2.1, r.4, regarding shoring of concrete formwork.

1.6 SHOP DRAWINGS

.1 Produce shop drawings of formwork and falsework, which describe all the necessary components required to perform the work in compliance with the drawings and specifications.

.2 Before performing concrete formwork or falsework, submit these drawings to the Canada Parks Representative for review and comments. All drawings will be in the form of one (1) electronic copy and one (1) electronic copy of the commented shop drawings will be returned to the Contractor.

.3 The shop drawings shall indicate, show or include the construction method and work schedule, procedures relating to shoring, the removal of forms, and the reinstallation of supports, the materials, the specific architectural characteristics of visible surface finishes, the location of joints, fasteners, ties and interior coatings, and the location of embedded falsework components. Comply with CSA S269.1 falsework drawing requirements. Comply with CAN/CSA-S269.3 formwork drawing requirements.

.4 Shop drawings shall indicate, show or include formwork data such as the allowable speed and temperature at which concrete may be placed into the forms.

.5 In addition to the details requested in 1.6.4., indicate on the shop drawings, at each location where the falsework is connected or leaning on an existing structure or a structure under construction, or already completed, the intensity and direction of maximum loads exerted on the load-bearing structure, taking into account construction site loads.

.6 Specify the order in which the concrete formwork and falsework are to be assembled and dismantled, according to the Canada Parks Representative's directives.

1.7 PROCEDURE FOR APPROVAL OF WORKSHOP DRAWINGS

.1 The Contractor must consider that only one (1) presentation of shop drawings, calculations or any other required document will be approved.

.2 The Parks Canada Representative is the sole judge of the documents submitted for approval.

1.8 FORMWORK AND FALSEWORK DESIGN

.1 Design the falsework according to trade practices making sure not to exert abnormal stress on the structure under construction.

.2 Take construction sequences into account when designing the falsework. Describe on the shop drawings or in an explanatory note how and in what order to use the formworks, the position of specified construction joints and the falsework and formwork reuse principle. Submit the explanatory note and the relevant shop drawings to the Canada Parks Representative for review.

.3 Calculation, layout and construction of formwork are the sole responsibility of the Contractor.

.4 The formworks are engineered to sustain the loads and lateral pressures described in Section 102 of the American publication "Recommended Practice for Concrete Formwork" (ACI 347).

.5 Engineering considerations and the allowable loads shall comply with Section 103 of the above mentionned U.S. publication.

.6 Every aspect of construction shall at all times comply with various government standards (municipal, provincial and federal standards) that govern the specialized Contractor's duties regarding worker safety on construction worksites.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Submit all formwork material in direct contact with fresh concrete to the Canada Parks Representative for review.

.2 Construction Lumber: plywood and wood formwork materials in accordance with CAN / CSA-23

.1 in contact with concrete: form plywood.

.2 other: structural timber not warped and sawed straight.

.3 Formwork Materials

.1 To pour concrete with no particular architectural characteristics, use forms made of wood and wood products that comply with the CSA O121, CAN/CSA-O86.1, CSA 0437.0, and CSA O153 standards.

.2 Composites of wood and cement.

.3 Rigid insulating boards

.4 For exposed form surfaces, use new formwork materials. The formwork must be 1200 x 2400 x 20 thick plywood, sandblasted and coated with a layer of high quality formwork oil.

.5 Interior formwork liners

.1 Plywood: Douglas fir in compliance with the CSA O121, Canadian softwood complies with CSA O151.

.2 Waferboard: that complies with the CSA O437.0 standard.

.6 Form release agent: non-toxic.

.7 Form release oil: Colourless, non-toxic, biodegradable, low VOC content, colorless mineral oil.

.8 Falsework Materials: in compliance with the CSA S269-1-1975, Table 1 standard. Identify the materials using a quality index or provide certificates, trial data or other attestations of compliance.

.9 Form release oil with chemical properties, containing compounds that react with free slaked lime in concrete to form soaps that are insoluble in water and prevent concrete from adhering to the formwork.

.10 Form ties can be:

.1 metal ties embedded in concrete, designed to be broken at least 25 mm under the surface of the hardened concrete after the forms have been removed;

.2 fixed or variable length metal ties whose ends are moveable bolts. The part of the tie embedded in the concrete is embedded at least 25 mm under the surface of the hardened concrete;

.3 Spacety and Acrow-Richmond brand ties equipped with moulded water barriers at each end, for all the work. Both ends of these formwork ties shall be equipped with plastic cones at least 25 mm in diameter, which provide a minimum 25 mm of coverage on the broken end of the tie embedded in the concrete.

.11 Sleeves, fasteners, anchors and other parts embedded in concrete meet the requirements of the drawings and specifications and comply with Sections 6.2 and 6.7 of the CAN/CSA-A23.1/A23.2 standard. Sleeves embedded in concrete shall be equipped with a steel water barrier able to withstand a minimum of 60 kPa of hydrostatic pressure or the pressure in the line if it is greater.

Part 3 PERFORMANCE

3.1 CONSTRUCTION AND ASSEMBLY

.1 Unless otherwise specified, build and use the formwork in compliance with the CAN/CSA-A23.1/A23.2 standard.

.2 Before using the forms, clean and treat the form surfaces with form release oil in compliance with Section 6.5.3.3 of the CAN/CSA-A23.1/A23.2 standard.

.3 Before starting formwork and falsework construction, check the alignments, levels and centrelines, and make sure the dimensions match those indicated on the drawings.

.4 Build and assemble the formwork in compliance with the CAN/CSA-S269.3-M92 standard to obtain finished concrete structures whose shape, dimensions and levels comply with the indications and are situated in the locations indicated on the drawings and specifications. Properly truss the forms and join them so as to keep the desired position and shape while the concrete is being poured and keep them trussed until the concrete has set.

.5 Location tolerances and tolerances regarding the geometric configuration of components embedded in concrete after removal of the forms according to indications in the drawings shall comply with Section 6.4 of the CAN/CSA-A23.1-04/A23.2-04 standard.

.6 Manufacture and build the falsework and assemble it in compliance with the CSA S269.1-1975 standard and the COFI "Exterior Plywood for Concrete Formwork" guide.

.7 Obtain the Canada Parks Representative's written approval before pouring concrete directly on the ground or making openings in a form component, which are not indicated on the drawings, but which may be required for construction purposes.

.8 Align the formwork joints and seal them to prevent any loss of cement. The formwork shall contain as few joints as possible. Adequate reinforcements shall be installed behind the joints between the plywood panels to ensure that the plywood panels form a smooth, continuous surface capable of withstanding all phases of the pour without losing their shape or shifting.

.9 Before pouring concrete directly on the ground, level the walls and the bottom of the excavated area, then remove the loose soil.

.10 The footings and supports installed on the ground shall not be assembled on a frozen surface.

.11 Design lot drainage to prevent the ground from being washed away from under the footings and the supports installed at ground level.

.12 Build the grooves, dovetail joints, mouldings, mortises and tenons, openings, drips, recesses, expansion and construction joints according to the indications of the drawings and specifications.

.13 Place the formwork, trusses and supports so workers are able to remove them without causing any shocks or damage to the concrete.

.14 Forms may be reused except in the case of exposed formed surfaces. They may be reused after sufficient cleaning, providing their surfaces are not cracked or rough; cracked or rough forms must be trimmed and patched to the Canada Parks Representative's satisfaction.

.15 Install openings in the forms or other devices to enable workers to inspect and clean the forms, and to enable concrete placement and consolidation.

.16 Unless otherwise indicated, provide and install in the forms the sleeves, fasteners, anchors and other embedded components required in the drawings and/or specifications of all disciplines, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard. Immediately before pouring the concrete, use surveyor's equipment to check the dimensions required in the drawings and specifications and make sure that these parts meet specified tolerances.

.17 Before closing the forms, notify the Canada Parks Representative beforehand to allow him to perform the required inspections. The pouring of the concrete into the forms shall not take place before the Canada Parks Representative's written authorization has been received.

.18 Use 25 mm bevelled moulding for exterior corners and/or 25 mm corner guards for the inside corners of walls, unless otherwise indicated.

.19 If slip forms and flying forms are used, submit details concerning the equipment and procedures for the Canada Parks Representative approval.

3.2 ANCHORS, SLEEVES AND EMBEDDED PARTS

.1 Provide and install in the forms, the sleeves, fasteners, anchor plates and other embedded components required in the drawings and/or specifications, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard. The work shall comply with Section 03 25 00.

.2 Provide and install in the forms, the anchor bolts for fasteners and machinery as shown and detailed in the drawings, in compliance with Section 6.7 of the CAN/CSA-A23.1/A23.2 standard.

.3 In all cases, comply with the installation tolerances specified in Article 6.7.3 of the CAN/CSA A23.1/A23.2 standard.

.4 If the requirements of Article 3.2.6 cannot be met, notify the Canada Parks Representative and await his instructions on how to proceed.

.5 Coordinate with subcontractors responsible for their supply the delivery (to the construction site) and the installation in the formwork of accessory parts.

.6 It is forbidden to place in the formwork any accessory parts which are not indicated in the drawings or required in the specifications or the drawings referred to in Sub-article .2 above, unless the Canada Parks Representative so authorizes.

3.3 REMOVAL OF THE FORMS AND REINSTALLATION OF THE SUPPORTS

.1 Remove the formwork and dismantle the falsework in compliance with Article 6.5.3.5 of the CAN/CSA-A23.1/A23.2 standard, unless otherwise indicated.

.2 Do not disturb or remove the formwork or falsework as long as the concrete has not become strong enough to support its own weight and the load it supports.

.3 Have the Canada Parks Representative authorize the removal of the formwork and falsework.

.4 Leave the formwork in place after the concrete has been poured for the following lengths of time:

.1 Walls and beam sides: 3 days.

.2 The periods of time specified above represent a cumulative number of hours, days or fractions of days, not necessarily consecutive, during which the ambient temperature is maintained above 10°C.

.5 Reinstall all the supports required when frame components might be subject to additional loads during construction of the structure.

.6 Notwithstanding the provisions of Sub-article .4 above, do not remove the forms unless the Canada Parks Representative authorizes their removal because he is satisfied with the measures taken to ensure the concrete

cures properly and the concrete is protected against cold or heat and the weather.

.7 However, the Canada Parks Representative may cancel the provisions of Sub-article .4 above if the non-destructive trials on the concrete placed in beam and slab forms indicate that the concrete has achieved 80% of the compression strength specified in Section 03 30 00 of these specifications. The non-destructive trials mentioned above shall have a recognized value and be approved by the Canada Parks Representative; he will determine beforehand the locations where they are to be performed. The costs of all these trials shall be borne by the specialized Contractor.

.8 Even when the Canada Parks Representative has authorized him to remove the forms, the specialized Contractor remains solely responsible for all damage caused to concrete components if action is taken prematurely.

.9 Depending on weather conditions, the placement of the concrete and curing conditions, the Canada Parks Representative may specify a minimum period of time that must elapse before the forms are removed from the various pours.

.10 Reuse the formwork and falsework, notwithstanding the requirements of the CAN/CSA-A23.1/A23.2 standard.

3.4 FILLING OF FORM TIE HOLES

.1 Fill all cone-shaped cavities left with a two-component, quick-setting, cement-based, polymer-modified repair mortar containing a corrosion-inhibiting migratory agent after removal of the plastic cones at the ends of the form ties. Moisten beforehand as required by the manufacturer. Carefully smooth the surface after applying the mortar so that it blends in with the adjacent concrete surfaces. Allow to cure.

END OF SECTION

PART 1 GENERAL

1.1 NOTICE TO CONTRACTOR

.1 The general conditions of the contract apply to this section. The Contractor must take note of it and fulfill the obligations arising from it.

.2 The Contractor must be aware of all plans and specifications.

.3 If all or part of the work described below and the drawings is done by one or more specialized contractors, the Contractor remains responsible for the quality and extent of this work.

1.2 DESCRIPTION

.1 Provide all the expertise, labour, materials, products, equipment and services needed to supply, detail, manufacture and install all the reinforcement steel shear heads, dowels, metallic wires that must be incorporated in the concrete components indicated in the structural drawings.

1.3 RELATED REQUIREMENTS

.1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specification sections.

1.4 REFERENCE STANDARDS

.1 The following standards and publications are mentioned in this section of the specification; they are included and their requirements apply, but not in a manner limiting to the other requirements of this specification.

.2 American Concrete Institute (ACI)

.1 ACI 315-99, Manual of Engineering and Placing Drawings for Reinforced Concrete Structure.

.3 American National Standards Institute/American Concrete Institute (ANSI/ACI)

.1 ANSI/ACI 315-99, Details and Detailing of Concrete Reinforcement.

.4 American National Standards Institute/American Concrete Institute (ANSI/ACI)

.1 ASTM A 775/A 775M-97c2, Specification for Epoxy-Coated Reinforcing Steel Bars.

.5 Canadian Standards Association (CSA)

.1 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction / Methods for Test and Standard Practices for Concrete.

.2 CSA-A23.3-04, Design of Concrete Structures for Buildings.

.3 CSA G30.3-M1983 (R1998), Cold-Drawn Steel Wire for Concrete Reinforcement.

.4 CSA G30.5-M1983 (R1998), Welded Steel Wire Fabric for Concrete Reinforcement.

.5 CSA G30.14-M1983 (R1998), Deformed Steel Wire for Concrete Reinforcement.

.6 CSA G30.15-M1983 (R1998), Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

.7 CAN/CSA-G30.18-M92 (R1998), Billet-Steel Bars for Concrete Reinforcement.

.8 CAN/CSA-G40.21-98, Structural Quality Steels.

.9 CAN/CSA-G164-M92 (R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.10 CSA W186-M1990 (R1998), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.6 Institut d'acier d'armature du Québec

.1 Manuel des normes recommandées, most recent edition.

.7 Quebec Construction Code - Chapter I, Building and National Building Code of Canada (amended).

1.5 SAMPLING, TRIALS AND INSPECTION

.1 Provide the Canada Parks Representative with free access to the plant and the construction site at all times to enable him to verify, examine and supervise the quality of materials and their manufacture, and if required, take samples for testing, trial and analytical purposes.

.2 Pouring of the concrete is not authorized before the Canada Parks Representative has inspected and approved the reinforcement in place.

.3 At his request, send the Canada Parks Representative one (1) copy of the certificates issued by the steel mill attesting to the chemical composition and physical properties of the steel used to manufacture the reinforcement.

.4 Upon request, inform the Canada Parks Representative regarding the proposed source of supply for the materials to be provided.

1.6 SHOP DRAWINGS

.1 Submit for review and comments by the Canada Parks Representative, all shop drawings for all steel reinforcement for the work in compliance with the following requirements.

.2 The format of the reinforcement drawings shall be the same as that of the drawings upon which they are based. The full project title and the name of the Canada Parks Representative, Professionals and the specialized Contractors shall appear on each drawing.

.3 Submitted drawings will be in the form of one (1) electronic copy of each reinforcement drawing. One (1) copy of each order slip will accompany

the drawings. One (1) electronic copy of the commented shop drawings will be returned to the Contractor.

.4 The reinforcement drawing shall clearly indicate:

.1 The number, nominal diameter, length, position, spacing and bending details of each type of bar shown on the drawings.

.2 The bar-supports, separators, additional bars and other accessories required to support and fasten the reinforcements while the concrete is being poured.

.5 When not specified in the plans:

.1 Reinforcement overlap and sealing lengths shall comply with the requirements of Articles 7 and 12 of the CAN/CSA-A23.3 standard. Unless otherwise indicated on the drawings, all overlaps shall be Class B (1.3 Lc), in compliance with Table 17b: pre-stressed overlapping requirements for upper reinforcement in the Reinforcing Steel Institute of Canada's manual of standard practice.

.2 Overall dimensions of hangers, ties and coils shall comply with the minimum concrete cover thicknesses stipulated in Article 6.6.2 of the CSA-CSA A23.1/A23.2 standard.

.6 Unless otherwise indicated in the drawings, the hooks required at the end of certain bars, including hangers, ties and spirals are all "standard hooks", which shall comply with the description provided in Articles 6.6.2, 6.6.3 et 6.6.4 of the CSA A23.1/A23.2 standard.

.7 The reinforcement shall be marked so that it is quick and easy to find on the purchase orders.

.8 The Contractor shall provide shop drawings so the Canada Parks Representative has at least ten (10) working days to examine and comment on the shop drawings, which are submitted at each phase of the concrete work.

.9 The reviewed shop drawings, which may or may not be annotated by the Canada Parks Representative, shall be returned to the specialized Contractor, who shall revise these drawings and resubmit them to the Canada Parks Representative for review and comment, if required.

However, if the Canada Parks Representative finds that too many revisions are required, he shall return the drawings without annotating them.

.10 In addition, if the drawings need to be submitted more than twice, the Canada Parks Representative shall withhold funds from the specialized Contractor to pay for the cost of the Canada Parks Representative's additional reviews.

.11 The specialized Contractor is solely responsible for the accuracy of his drawings; he cannot claim any supplement for delays caused by the discovery, on site, of errors or omissions on his own drawings, even if they have been reviewed by the Canada Parks Representative.

.12 Unless otherwise indicated, use steel reinforcement details that comply with the most recent edition of the "Manuel des normes recommandées" published by the Institut d'acier d'armature du Québec.

.13 Wait for final approval of the shop drawings before cutting and bending the rebar.

.14 Submit the steel schedules that match the various shop drawings at the same time as the shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS

Description	Standards
▪ High adherence billet-steel reinforcement bars, regular category (R).	CAN/CSA G30.18-M92 Grade 400
▪ Tie wire, annealed cold-drawn steel wire	CSA G30.3-M1983 (R1998)
▪ Welded steel wire fabric provided in flat sheets only	CSA G30.5-M1983 (R1998)
▪ High adherence welded steel wire fabric in flat sheets only	CSA G30.15-M1983 (R1998)

Description	Standards
▪ Chairs, bar chairs, bar supports, spacers (rustproof)	CSA A23.1-00
▪ Metal coupling	Reinforcement steel, "recommended standards manual" subject to the Canada Parks Representative's approval

2.2 SUBSTITUTES

.1 Obtain the Canada Parks Representative's written approval to substitute specified bars with bars of different dimensions, and to change spacing, overlapping or bending specified on the drawings.

2.3 FORMING

.1 Form the bars at the factory, in compliance with requirements of the CAN/CSA-A23.1/A23.2 standard.

.2 The acceptable tolerances for the cutting of reinforcement bars are as follows:

.1 No. 10 and 15 bars:

- Length less than 4.0 metres: ±12 mm;
- Length greater than or equal to 4.0 metres: ±25 mm.

.2 Bars No. 20 to 35 inclusively: ±25 mm.

.3 The acceptable tolerances for the forming of bent reinforcement bars are as follows:

.1 Bars No. 10 to 35 inclusively:

- Overall length: ±25 mm;
- Overall height: ±12 mm;
- Hook diameter: ±12 mm.

.2 Hangers and ties:

- Overall height and width: ±12 mm.

.4 Unless otherwise indicated, forming tolerances are those indicated in Chapter 6 of the "Manuel des normes recommandées" published by the Institut d'acier d'armature du Québec. Bars that do not comply with these tolerances shall be rejected.

2.4 IDENTIFICATION

.1 Clearly identify bar and wire fabric lots to conform to the shop drawings and steel schedules before shipping them to the construction site.

.2 Use factory-labelled reinforcement bars. The label identifies the size, quality and manufacturer of the bar. All unlabelled bars shall be rejected.

2.5 GALVANIZATION

.1 If required, hot-dip galvanizing reinforcing steel identified in the drawings by applying a minimum of 610 g / m² in accordance with CAN / CSA-G164-M92 (R). 2003).

PART 3 PERFORMANCE

3.1 ON-SITE BENDING

.1 Unless otherwise expressly indicated or authorized by the Canada Parks Representative, do not bend steel reinforcement bars on the construction site.

.2 It is forbidden to bend rebar partially embedded in hardened concrete on site unless the Canada Parks Representative has authorized this procedure.

3.2 MANUFACTURE OF REINFORCEMENT

.1 The manufacture of the reinforcement shall not start until the Canada Parks Representative has reviewed the drawings of this reinforcement.

.2 Cut and bend the bar in strict compliance with the details shown on the drawings and in accordance with the requirements of the CAN/CSA-A23.1/A23.2 standard.

.3 No substitution of the bars shown on the reinforcement drawing shall be allowed without the Canada Parks Representative's authorization.

.4 Take every precaution to avoid deforming or dirtying the reinforcement during transportation, handling and storage.

3.3 REINFORCEMENT INSTALLATION

.1 Assemble and install the rebar with care and tie them with black annealed drawn steel wire. Use a pattern and number of supports that comply with Section 6.6.7 of the CAN/CSA-A23.1/A23.2 standard.

.2 Install the rebar and keep them in place during the pouring of the concrete in compliance with the tolerances stipulated in Section 6.6.8 of the CAN/CSA-A23.1/A23.2 standard.

.3 Unless otherwise indicated on the drawings or in Section 3.6 of these specifications, the minimum concrete cover thickness around reinforcement bars is that stipulated for each of the various structural components in Article 6.6.6 of the CAN/CSA A23.1/A23.2 standard.

.4 If required, before placing the rebar in the formwork, remove all excess rust, scale, mud, oil and any other dirt likely to reduce the concrete's adherence.

.5 Use an adequate number of support bars of the height and rigidity required to ensure all concrete coverage of the rebar complies with the thicknesses stipulated on the drawings and in the standards.

.6 Have the Canada Parks Representative approve the rebar and its installation, before pouring the concrete. The Canada Parks Representative shall have 48 hours to approve the steel reinforcement before the concrete is poured.

3.4 OVERLAPS

.1 Overlap the reinforcement as indicated on the drawings and typical details.

.2 Overlapping lengths and extension lengths of bars beyond critical points shall comply with the CSA-A23.3-94 standard. Unless otherwise indicated on the drawings, all overlaps shall be Class B (1.3 Lc), in compliance with

Table 17b: tension overlapping requirements for upper reinforcement in the Reinforcing Steel Institute of Canada's manual of standard practice.

.3 Obtain the Main Contractor's approval for the locations of reinforcement overlaps other than those shown on the drawings.

.4 Overlap at least 10% of the surface of the wire fabric sheets, but never less than one mesh width.

3.5 WELDING

.1 Do not weld steel rebar unless authorized in writing by the Canada Parks Representative.

.2 Where permitted by the Canada Parks Representative, perform the rebar welding work in compliance with Section 6.6.10. of the CAN/CSA-A23.1/A23.2 standard and the requirements of the CSA W186 standard. When welding is performed, the use of category W weldable bars is mandatory.

.3 All welding work shall be assigned to a company accredited by the Canadian Welding Bureau and shall be performed in compliance with the requirements of the most recent version of the CSA W186 standard. Prior to starting any welding work, submit to the Canada Parks Representative for verification, all details regarding the welds to be performed. In this case, the steel reinforcement to be welded shall comply with the requirements of the most recent version of the CSA G30.16 standard. Pre-heat all steel reinforcement as required by these standards.

3.6 REINFORCEMENT COVERAGE

.1 Unless otherwise indicated on the drawings, the reinforcement bars shall be installed at the following specific distances from the surface of the concrete:

	Coverage
A) Concrete poured directly on the ground	75 mm

	Coverage
B) Concrete not exposed to the weather a) Slabs (other): - top steel rebar - bottom steel rebar b) Ties	 25 mm 25 mm 30 mm
C) Concrete exposed to chlorine (exposure classes C-1, C-XL, C-3 and C-4) For slabs and outside bases	The reinforcement coverage shall not be less that any of the following values; - 60 mm - twice the nominal diameter of the reinforcement - twice the maximum nominal diameter of aggregatease

.2 For conditions A-B of the preceding table, the ratio between coverage and the maximum size of the aggregate as well as the ratio between the coverage and the nominal diameter of the bars shall be at least 1.5 for concrete exposed to the ground and weather, and 1.0 for concrete not exposed to the ground and weather.

3.7 STORAGE AND DELIVERY

.1 Deliver the reinforcement and wire fabric to the construction site in clearly identified lots.

.2 Handle the reinforcement and wire fabric with care to avoid deforming them.

.3 As soon as they are delivered on site, properly stack the steel reinforcement and wire fabric on wood skids to protect them against rust and keep them off the ground.

.4 Cover all stored steel with a woven tarp to protect it from the weather.

.5 During transportation and handling, use a covering to protect the parts of the bars coated with epoxy and paint.

3.8 CLEANING

.1 In order for the pouring of the concrete to take place, the condition of the reinforcement bars shall comply with Section 6.1.5 of the CAN/CSA A23.1/A23.2 standard.

.2 If required, clean the reinforcement immediately before the concrete is poured.

3.9 REINFORCEMENT DOWELLING

.1 The installation of reinforcement dowels in concrete that has already been poured shall be performed using a epoxy-based system.

.2 The sealing length of the dowels is that indicated in the sealing lengths table provided on the drawings.

.3 Certain types of dowels shall have conical threads designed to work with anchors equipped with conical threads.

END OF SECTION

PART 1 GENERAL

1.1 NOTICE TO CONTRACTOR

.1 The general conditions of the contract apply to this section. The Contractor must take note of it and fulfill the obligations arising from it.

.2 The Contractor must be aware of all plans and specifications.

.3 If all or part of the work described below and the drawings is done by one or more specialized contractors, the Contractor remains responsible for the quality and extent of this work.

1.2 DESCRIPTION

.1 This section specifies the requirements regarding the providing, placement, finishing, protection and curing of the cast-in-place concrete.

1.3 RELATED REQUIREMENTS

.1 The specialized Contractor is responsible for obtaining a copy of all the sections of these specifications even if they do not appear to pertain to his speciality. If he does not, it shall be understood that he agrees to the clauses and requirements of all sections in these specifications. The specialized Contractor must consult the table of contents of these specifications to have knowledge of the complete list of the specification sections.

1.4 REFERENCE STANDARDS

.1 The following standards and publications are mentioned in this section of the specifications. They form an integral part of the specifications and their provisions apply, but are not limited by the other provisions of this section.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.

.2 CGSB 81-GP-1M-77, Flooring, Conductive and Spark Resistant.

.3 Canadian Standards Association (CSA)

.1 CAN/SA-A3000-03, Cementitious Materials Compendium:

.1 A3001-03 - Cemetitious Materials for use in Concrete

.2 A3004-03 - Test Methods and Standard Practices for Cementitious Materials

.3 A3005-03 - Test Equipment and Materials for Cementitious Materials for use in Concrete and Masonry

.2 CSA-A5/A8/A362-98, Portland Cement, Masonry Cement, Mixed Hydraulic Cement.

.3 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction / Methods of Test and Standard Practices for Concrete.

.4 CSA-A23.3-04, Design of Concrete Structures.

.5 CSA-A23.5-98, Supplementary Cementing Materials.

.4 National Research Council Canada (NRC) and Régie du bâtiment du Québec:

.1 Code de construction du Québec, Chapitre I – Bâtiment, and National Building Code – Canada 2015 (modified) as well as the User Guide – NBC 2015 : Comments on calculation of structures (Part 4 of division B).

1.5 SAMPLES

.1 At least four (4) weeks before beginning the work, advise the Canada Parks Representative regarding the proposed source of supply for the aggregates, and allow him to access the source for sampling purposes.

1.6 CERTIFICATES

.1 At least two (2) weeks prior to starting concrete work, provide the Canada Parks Representative with copies of the manufacturer's trial

reports, as well as a certificate issued by a qualified independent testing and inspection laboratory attesting that the materials listed hereinafter will comply with the specified requirements.

.1 Portland Cement

.2 Blended Hydraulic Cement

.3 Supplementary Cementing Materials

.4 Grout

.5 Admixtures

.6 Aggregates

.7 Water

.8 Waterstops

.9 Waterstop Joints

.10 Joint Filler

.2 Provide the mix formulas for approval by the Canada Parks Representative and a certificate attesting that the selected mix will produce concrete of the required quality, strength and performance, and that it complies with the requirements of the CSA-A23.1-04/A23.2-04 standard.

.3 Provide a certificate attesting that the batching plant, equipment and materials that will be used to produce the concrete comply with the requirements of the CSA-A23.1-04/A23.2-04 standard.

.4 The Canada Parks Representative's acceptance of the cement mix or mixes shall in no way release the specialized Contractor from his responsibility to provide concrete whose properties, in both its elastic and hardened states, meet the requirements of these specifications.

.5 All documents will be submitted in one (1) electronic copy. One (1) annotated electronic copy will be returned to the Contractor.

1.7 QUALITY ASSURANCE

.1 At least two (2) weeks prior to starting concrete work, submit proposed quality control methods for approval by the Canada Parks Representative, regarding the following items:

.1 Hot weather concreting

.2 Cold weather concreting

.3 Curing

.4 Finishes

.5 Joints

PART 2 PRODUCTS

2.1 MATERIALS

.1 Cement: Type GU and/or GUB-SF Portland cement that complies with the CSA-A23.5—03 or CSA/A5/A8/A362-03 standards. Use a single recognized brand of cement, by type of concrete for the entire contract.

.2 Fine aggregate: of normal density, complying with Article 4.2.3 of the CSA-A23.1-04/A23.2-04 standard. The aggregate may be natural sand or manufactured sand containing at least 20% natural sand.

.3 Coarse aggregate: of normal density, complying with the article 4.2.3 of the CSA-A23.1-04/A23.2-04 standard. The particles shall be clean, durable and free from dust and harmful materials. The maximum aggregate size shall be 20 mm, unless otherwise indicated.

.1 Subject to the Canada Parks Representative's approval, a 14 mm maximum aggregate size may be used in certain areas where concrete flow is restricted. Coarse aggregates must be of normal density. The quantity of flat and elongated particles shall be in accordance with Table 12 of CSA-A23.1/A23.2 standard.

.4 Mixing water: complies with the article 4.2.2 of the CSA-A23.1-04/A23.2-04 standard.

.5 Air-entraining admixture: complies with the ASTM C260 standard.

.6 Chemical and pozzolanic mineral admixtures: comply respectively with the requirements of the ASTM C494 and ASTM C1017 standards. The use of calcium chloride or admixtures that contain calcium chloride is not allowed. The Canada Parks Representative must approve accelerators or retarders during hot and cold weather concrete work.

.7 Non-shrink mortar for concrete repairs: pre-mixed Portland cement-based product containing a non-metal aggregate and a plasticizer, capable of achieving at least 35 MPa of compression strength at seven (7) days.

.8 Superplasticizer: complies with requirements of the ASTM C494 standard.

.9 Supplementary Cementing Materials: comply with the CSA-A23.5-98 standard.

.10 Cementitious hydraulic slag: complies with the CAN/CSA-A362-98 standard.

.11 Set retarders: comply with the ASTM C494 water-based, low VOC content, solvent-free standard. The set retarder film shall never be exposed to humidity.

2.2 MIX DESIGN

.1 Assume responsibility for the mix of each type of concrete required, while taking into account the requirements described in Section 2.1 of these specifications and the following criteria in compliance with possibility No. 1 presented in Table 5 of the CSA-A23.1-04/A23.2-04 standard (article 4.1.2).

.1 Concrete types

a) Concrete for sidewalks, curbs, slabs and exterior bases, parking slabs and fences

- minimum tested compression strength at 28 days: 35 Mpa
- cement type : GU
- exposure category (Table No. 1, CSA-A23.1/A23.2): C-1

- maximum nominal size of coarse aggregate: 20 mm
- air content: 5 to 8%
- maximum mass ratio water / cement: 0,40
- Desired field sagging : 80 mm (± 30 mm)
- Chemical admixtures: comply with the ASTM C494/C494M-04 standard.
- normal density concrete

d) Obtain the Canada Parks Representative's approval for all admixtures used in concrete mixes (superplasticizers and required air-entrainers or other admixtures needed for any specific purpose, designated by the specialized Contractor). The use of calcium chloride is prohibited.

.2 Provide a sample of the admixture(s) used, at the Canada Parks Representative's request.

.3 Follow the manufacturer's instructions when using admixtures.

.4 The specialized Contractor is responsible for ensuring the admixtures are compatible with one another and with the materials included in the mix.

.5 Enter the type and quantity of the admixture(s) used on the concrete shipping slip.

.6 The use of an admixture shall never reduce the soundness of the concrete or its ability to withstand freezing and thawing.

2.3 CONCRETE CONTROL

.1 Concrete quality control performed in compliance with the CSA-A23.1/A23.2 standard by a laboratory designated by the Canada Parks Representative.

.2 Submit to the laboratory for approval, proposed formulas for batching the mixes for each class of concrete; specify the type and brand of all admixtures used.

.3 Provide the laboratory with samples of the fine and coarse aggregates that will be incorporated into the concrete blends and identify the quarry they come from.

.4 Unless otherwise directed in writing by the Canada Parks Representative, also provide the laboratory with a document signed by a recognized petrographer certifying that none of the harmful alkali-aggregate and cement-aggregate reactions described in Appendix B of the CSA-A23.1/A23.2 standard are likely to occur in the concrete after it has been poured.

.5 Notify the laboratory at least 24 hours before each concrete pour, whatever the volume involved.

.6 Cooperate with sampling and facilitate testing. Provide free access to the structures. Provide the required concrete at no cost. If applicable, protect and provide a storage area for the samples taken.

.7 The concrete's compression strength shall be checked during construction by taking 3 core samples per 75 m^3 poured or at least 3 core samples per pour. The Canada Parks Representative may ask the laboratory to produce a fourth core sample and let it cure on the construction site as a control sample. A sample shall be crushed on the 7^{th} day; the two other samples shall be crushed on the 28^{th} day.

.8 The cylinders shall be numbered consecutively, and the laboratory report shall indicate the exact location of the concrete they represent in the framework, as well as the number of the truck that delivered the concrete.

.9 The laboratory shall measure the concrete slump and air content every time it samples the concrete for strength tests and as often as necessary depending on the type of structure to be built.

.10 Provide a sheltered location on site where the concrete core samples can be stored at an ambient temperature ranging from a minimum of 10°C to a maximum of 25°C before they are shipped to the trial laboratory.

.11 If the core sample test results do not comply with Article 4.4.6.7 of the CSA A23.1/A23.2 standard, the Canada Parks Representative may require that Section 4.4.6.8 of the standard be applied.

.12 The specialized Contractor is solely responsible for the all concrete work required to complete the structures as indicated on the drawings or stipulated in the Specifications. All work that does not meet the requirements of the Specifications, for any reason whatsoever (quality of materials, batching, placement, strength, impermeability, etc.), shall be modified in compliance with the Canada Parks Representative's requirements, or it shall be completely demolished and rebuilt in compliance with the provisions of the Specifications and drawings, at the specialized Contractor's expense.

PART 3 PERFORMANCE

3.1 PREPARATION

.1 Ensure that the forms are erected and that they are clean and free of ice, snow and water, and that form reinforcement and hardware are installed in compliance with the requirements of the specification.

.2 Before starting the work, obtain the Canada Parks Representative's approval of the concrete placement methods, which shall comply with Section 7.2 of the CAN/CSA-A23.1/A23.2 standard.

.3 Obtain the Canada Parks Representative's written authorization before performing the concrete work and notify him 24 hours before beginning the work.

.4 Concrete pumping will only be permitted once the material and mix are approved.

.5 When concrete is pumped, concrete formulas must be adjusted accordingly. The concrete must maintain its characteristics until the exit of the pump's pipe.

.6 Before performing the concrete work, obtain the Canada Parks Representative's written authorization regarding the proposed method for protecting the concrete during the pour and the subsequent cure.

.7 Ensure that the reinforcement and embedded components are not moved while the concrete is being poured.

.8 No concrete shall be poured without the Canada Parks Representative's written authorization.

.9 Authorization to pour concrete shall only be provided once the Canada Parks Representative has completed his own inspection of the formwork and determined that the requirements of Article 3.1 appear to have been met.

.10 Keep a concrete placement log, which indicates the date and location of each placement, the concrete's characteristics, the truck numbers, the ambient temperature, samples taken and other relevant information.

.11 Immediately before placing the concrete, carefully clean and remove all waste and debris of any kind from the space the concrete will occupy.

.12 In areas where new concrete is bonded to an existing structure, drill holes in the existing concrete and install steel dowels made of high adherence steel rebar in it and thoroughly embed the dowels with non-shrink epoxy grout to anchor and maintain them in the positions indicated.

.13 No load shall be exerted on the new concrete components until the Canada Parks Representative has provided the required authorization.

3.2 MANUFACTURE AND DELIVERY OF THE CONCRETE

.1 Provide ready-to-use concrete manufactured in a concrete plant, transported and discharged at the site in compliance with Section 5.2 of the CAN/CSA-A23.1/A23.2 standard, or provide concrete manufactured on site, in compliance with all the requirements of that same section. If the second alternative is chosen, submit the entire procedure to the Canada Parks Representative for approval.

.2 The manufacturer of the ready-to-use concrete is solely responsible for batching the concrete, and he shall personally, at his expense, take all necessary measures to ensure the quality and uniformity of his product.

.3 Require that the concrete supplier provide a delivery slip for each load of concrete and provide the Canada Parks Representative with a copy of these slips. The slips shall contain the following information: name and address of the supplier's company, truck number, specialized Contractor's name, project name and location, class of concrete, cumulative quantity, start of discharge, end of discharge, maximum size of

aggregate, slump and air-entrainment required, types of admixtures used, quantity and type of cement and quantity of water.

.4 The addition of water to the mix after the initial batching shall only be carried out in strict adherence with Article 5.2.4.3.2 of the CAN/CSA-A23.1/A23.2 standard, but the maximum quantity used shall be 6 l/m^3. Submit all anticipated additions to the Canada Parks Representative for approval and control. Indicate on the delivery slip the quantity of all water added at discharge.

.5 Plan the manufacture of the concrete and schedule the deliveries to the site so that each pour can be performed without any interruptions. Each batch of concrete shall be completely discharged into the forms within two (2) hours of beginning of batching.

.6 Never remix concrete or mortar that has started to set.

.7 The temperature of the concrete at discharge shall be within the range presented in Table 14 of the CAN/CSA-A23.1-04/A23.2-04 standard and shall be controlled according to Article 5.2.4.4 of the same standard. Use all protective measures required for this purpose.

.8 No aluminum component shall be used to batch, transport or place the concrete.

3.3 IMPLEMENTATION

.1 Place the concrete in compliance with the requirements of the CAN/CSA-A23.1-04/A23.2-04 standard.

.2 Carry out the consolidation of the concrete using models and sizes of mechanical vibrators approved by the Canada Parks Representative.

.3 Select an appropriate type and number of vibrators and use them in accordance with Section 7.2.5 of the CAN/CSA-A23.1/A23.2 standard.

.4 Bind the fresh concrete with rock or hardened concrete in accordance with Section 7.2.2 of the CSA-A23.1/A23.2 standard.

.5 Saturate hardened concrete surfaces with water immediately before pouring concrete on these surfaces.

.6 Lay the concrete without interruption or in layers thick enough that each new layer will bind with the underlying layers before they have hardened enough to form cold joints.

.7 If difficulties arise during pouring, change the concrete formula following the laboratory's directives and use the admixture(s) prescribed by the laboratory, and assume all expenses for this procedure.

.8 Adding a superplasticizer to the concrete before it has been poured into the forms is mandatory when pouring walls (including retaining walls) and columns.

3.4 CONCRETE CURING

.1 The concrete shall be cured according to the requirements of section 7.4 of the CSA-A23.1/A23.2 standard. Walls and slabs 500 mm thick or thicker are considered mass concrete.

.2 The use of curing compounds is prohibited.

.3 The concrete of slabs shall be cured using a using a cover kept moist at all times,

.4 Slabs and other unformed surfaces shall be kept moist for a period of at least 7 days.

.5 Walls, beams, columns and other formed surfaces shall undergo the following 7-day curing schedule:

.1 forms left in place with moist curing on the top of the elements: 3 days;

.2 moist curing after removal of the forms: 4 days.

.6 When the outside temperature exceeds 20°C for mass concrete or otherwise 27°C, keep the forms moist before pouring the concrete and throughout the entire time they remain in place.

.7 In cold weather, water curing ends 12 hours before the end of protection.

.8 Throughout the entire cure, the concrete shall never be under any load and shall be adequately protected against violent shocks, excessive vibration, weather and other disturbances.

.9 The provision, installation and maintenance of all falsework and devices required for the curing and protection of the concrete in hot or cold weather, as well powering the equipment, are part of the contract work, for which all costs are to be assumed.

3.5 CONCRETE PROTECTION

.1 In hot weather, the concrete shall be protected according to Article 7.4.2.4 of the CSA-A23.1/A23.2 standard.

.2 Concrete components containing silica fume shall be protected from drying according to Article 7.4.2.2 of the CSA-A23.1/A23.2 standard.

.3 Other concrete components shall be protected from dryout based on Appendix D of the CSA-A23.1/A23.2 standard.

.4 In cold weather, the concrete shall be protected according to Article 7.4.2.5 of the CSA-A23.1/A23.2 standard.

.5 Methods for protecting concrete in cold weather are detailed in the « Cahier des charges et devis généraux », 2003 edition, chapter 15.4.3.13. The payment methods described in this chapter of the CCDG do not apply to this contract.

3.6 FINISHING OF FORMED SURFACES

.1 Clean and finish the formed surfaces in compliance with Section 7.7.3 of the CSA-A23.1/A23.2 standard. Visible surfaces in completed buildings require smooth formed surfaces in accordance with Article 7.7.3.6 of the CSA-A23.1/A23.2 standard. All other surfaces require a rough formed surface in accordance with Article 7.7.3.5 of the CSA A23.1/A23.2 standard.

.2 Fill the holes left by the form ties in compliance with Section 03 10 00 of these specifications.

3.7 CONCRETE REPARATION

.1 Remove and replace all damaged or defective concrete with concrete that meets the specifications and requirements of the drawings.

.2 After the forms have been removed, the Canada Parks Representative shall examine all voids, honeycombs and other defects. If applicable, submit the methods for repairing the voids, honeycombs and other defects to the Canada Parks Representative for approval. Do not repair any of the surfaces before having received the Canada Parks Representative's authorization.

.3 Wherever possible, repair formed surfaces as soon as possible after the forms have been removed.

.4 Cover the concrete surfaces with a cement-latex slurry or an epoxy-based glue before performing concrete or mortar repairs.

.5 The product used shall comply with Section 2.1.7 of this section.

3.8 CUTS, DRILL HOLES AND CUT-OUTS IN HARDENED CONCRETE

.1 Components that have already been poured shall never be cut, drilled or cut-out for any reason whatsoever, unless the Canada Parks Representative has authorized these procedures.

.2 Any cut, drill hole or cut-out in hardened concrete authorized by the Canada Parks Representative shall be performed at the specific location, using the exact dimensions he has approved. Use rotary tools that prevent the concrete from shattering.

3.9 TOLERANCES

.1 If the tolerances specified in Article 6.4 of the CSA-A23.1/A23.2 standard have not been met during the construction of any component of a structure shown on the drawings, the Canada Parks Representative may require that this component be demolished and rebuilt according to the tolerances of said article, at no additional expense to the Canada Parks Representative.

3.10 CONSTRUCTION JOINTS

.1 Follow the indications of Section 7.3 of the CSA-A23.1/A23.2 standard for construction joints.

.2 The Canada Parks Representative shall approve the location of the construction joints that demarcate each concrete pour. If the Canada Parks Representative deems it appropriate, he may require that these joints be brought closer together or relocated.

.3 None of the construction joints already indicated on the drawings shall be moved or eliminated without prior authorization from the Canada Parks Representative.

.4 Immediately before resuming pouring against a construction joint or above it, clean and score the surface of the hardened concrete to eliminate all loose fragments and any trace of bleeding, moisten the surface and allow to dry to obtain saturated, dry surface conditions.

.5 Allow a section to cure for a minimum of 7 days before pouring a new section next to it.

3.11 WATERSTOPS

.1 Where indicated on the drawings, install waterstops to provide continuous watertightness. Do not bend or puncture the waterstops in order to avoid hindering their performance. Do not move the reinforcement when installing waterstops. Splice waterstops on site using equipment that complies with the manufacturer's requirements. Firmly secure the waterstops before the concrete is poured.

3.12 WATER STOPS FOR COLD JOINTS

.1 Where indicated on the drawings, install weather-stripping and waterstops for cold joints to provide continuous watertightness. Strictly follow manufacturer recommendations regarding the installation, handling and materials required for each type to be used. Submit for the Canada Parks Representative's approval the installation method for each type used, in keeping with the manufacturer's recommendations.

3.13 ON-SITE QUALITY CONTROL

.1 A testing laboratory designated by the Canada Parks Representative shall inspect and test the concrete and its constituents in accordance with the CSA-A23.1/A23.2 standard.

.2 Canada Parks shall assume all costs for the trials.

.3 The Laboratory shall take additional core samples during cold weather concrete work. These core samples shall be cured on site, under the same conditions as the concrete pours they represent.

.4 Non-destructive concrete trials shall be performed according to the methods described in the CSA-A23.1/A23.2 standard.

.5 The inspection and trials performed by the Laboratory shall not replace or finalize the quality control performed by the Contractor, nor shall they release the Contractor from his contractual obligations in this respect.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11 – Civil - Excavation and Backfilling - Underground Services

1.2 SCOPE OF WORK

.1 Ensure the supervision of work and supply all manpower, equipment, tools, materials, transportation and other services required to carry out and complete the work described and specified in this section and contract documents, including but not limited to : site preparation, excavation, backfilling with appropriate granular material, and compacting of surfaces as specified for the preparation of various infrastructures for pavement, concrete curbs, grassing, etc.

1.3 REGULATIONS

.1 Provide shoring and bracing of excavations, protect slopes and embankments, and carry out all work in compliance with the strictest prevailing provincial and municipal regulations.

1.4 TESTS AND INSPECTIONS

.1 Tests on materials and backfill compaction measurements shall be carried out by a Laboratory designated by the Canada Parks Representative.

.2 No later than one week before the filling or backfilling, provide the designated Laboratory with a 25 kg sample of the fill material proposed for the execution of the work.

.3 Do not start filling or backfilling work until the Canada Parks Representative has approved the material proposed for the execution of the work.

.4 No later than 48 hours before the start of filling or backfilling work using approved materials, notify the Canada Parks Representative of the upcoming execution of this work, so that the designated organization can carry out compaction tests.

1.5 UNDERGROUND UTILITY NETWORKS

.1 Before starting the work, determine the location of all underground utility lines located on or near the worksite.

.2 If need be, arrange with the proper authorities to move underground utility lines that interfere with the execution of the work, and assume the cost of this move.

1.6 PROTECTION

.1 Protect excavations against frost.

.2 Keep excavations clean, free of stagnant water and loose materials.

.3 When the soil's volume can vary significantly due to fluctuations in moisture content, cover and protect it to the satisfaction of the Canada Parks Representative.

.4 Protect elements, both natural and man-made, that must remain intact. Unless otherwise indicated or unless they are located in the work zone, protect trees from damage.

.5 Protect all utility lines that must remain in place.

1.7 SITE PREPARATION

.1 Site preparation work consists in, but is not limited to, supplying the materials and manpower required to carry out excavation work, according to good engineering practices, up to the infrastructure line of the various surface restorations, including :

.1 Saw cuts, pavement removal, and demolition of the concrete,

.2 The loading, transportation and disposal of excavation surplus to a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.3 This work shall be carried out in compliance with the requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

1.8 EARTHWORK AND LEVELING

.1 Earthwork and levelling consist in, but are not limited to, supplying the materials and manpower required to carry out, according to good engineering practices, earthwork and levelling of the site in compliance with the plans' specifications, including:

.1 The loading, transportation and disposal of excavation surplus to a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.2 The supply and placement of backfill materials approved by the Canada Parks Representative.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIAL

.1 Backfill materials must be approved by the Canada Parks Representative prior to their use and must comply with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

2.2 SOURCE OF MATERIALS

.1 The Contractor must provide the address of the supplier of the backfill materials.

PART 3 - EXECUTION

3.1 EXCAVATION

.1 For slabs and other paved surfaces, dig to the level of the infrastructure. Remove topsoil, organic materials, debris and other loose or harmful materials encountered at this level.

3.2 BACKFILLING

.1 Carry out backfilling work in compliance with the strictest specifications in Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services and the following specifications:

.1 Each layer of backfill shall be compacted separately to the required density. Materials must be poured onto the backfill platform and pushed forward by bulldozers. It is forbidden to unload transportation vehicles along an embankment and to allow materials to roll down a slope,

.2 All embankment materials must be deposited and spread over the full width required by the embankment's theoretical slope, in even layers with a maximum 300 mm thickness after compaction. The diameter of the gravel shall not exceed 2/3 of the thickness of the layer, except in the case of the final 300 mm layer beneath the infrastructure line, where the stone's size must be less than 100 mm,

3.3 LEVELING WORK

.1 Carry out levelling work ensuring that water does not run towards the buildings, walls and paved surfaces, but that it is directed towards catch basins and other evacuation structures approved by the Canada Parks Representative. Level the ground, giving it a progressive slope between various points indicated on the drawings.

.2 Except where otherwise indicated, the ratio of embankment slopes shall not be less than 1 V : 3 H.

3.4 FILL OR SURPLUS MATERIALS

.1 Supply all fill materials other than approved and reusable surplus excavation material required for the execution of backfilling and levelling work, taking into account admissible tolerances, plus or minus, for general earthwork.

.2 Earthwork and levelling work include the loading, transportation and disposal of surplus materials off-site to a location complying with the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy, and are carried out at the Contractor's expense.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 14 11 – Civil - Earthwork and Levelling

.2 Section 32 11 00 – Civil - Roadworks

.3 Section 33 11 16 – Civil - Watermain and Fire Protection

.4 Section 33 31 00 – Civil - Sanitary and Storm Sewers

1.2 SCOPE OF WORK

.1 Ensure the supervision of work and supply all manpower, equipment, tools, materials, transportation and other services needed to carry out and complete all work described and specified in this section and contract documents including, but not limited to: excavation, stabilization, backfilling using approved granular materials and the compaction of excavations for the installation of waterworks and sewer systems, manholes, catch basins, valves, fire hydrants and service connections, etc.

.2 The excavation and backfilling work described in this section refers to the excavation and backfilling of the trench for underground utilities as well as for large-scale excavation and backfilling work.

.3 Excavations and backfilling include all necessary work to bring the infrastructure to the longitudinal and transverse profiles indicated on drawings or required by the Canada Parks Representative.

.4 According to the nature of removed materials, the excavation is of 1st or 2nd class.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (BNQ):

.1 NQ 2501-255 : Soil - Determining the moisture-unit weight ratio - Test with modified compaction energy (2 700 kN.m/m^3).

.2 Ministère des Transports du Québec:

.1 Cahier des charges et devis généraux du Québec - Infrastructures routières, Construction et réparation (latest edition) (Statement of Work and General Specifications – Road infrastructures, Construction and Repairs).

.2 Cahiers des Normes, Ouvrages Routiers, Tome VII "Matériaux" (Standards, Roadwork, Vol. VII "Materials", latest edition.

.1 2101 Standard - Aggregates

.2 2560-114 Standard – Civil engineering work

.1 Part II: Granular materials for the base, sub-base, paved surface and shoulder.

.2 Part III: Granular materials for the cushion, surround, anti-contamination layer and filter layer.

1.4 DEFINITIONS

.1 Additional excavation: any excavation work requested in writing by the Canada Parks Representative in addition to that called for in the specifications.

.2 Backfill materials: material placed over the surround or protective layer up to the level of the infrastructure, the definitive ground level or the natural soil.

.3 Backfilling: operation, which consists in filling the trench and/or excavation using bedding, surround or fill material.

.4 Bedding material: bed for the pipe's installation.

.5 Surround: material between the top of the bed and the underside of the fill.

.6 Off-site borrow material: material from a source outside the worksite, which is required to fill excavations, build embankments, or other work.

.7 Reusable excavation material: material identified by the Canada Parks Representative as suitable for specific fill applications. This material can be obtained from any excavation on the worksite.

.8 Classes of excavated material: two classes of excavated material are recognized, i.e., rock excavation (1st class excavation) and common excavation (2nd class excavation).

.9 1st class excavation: excavation of dynamized rock and concrete or heavily cemented masonry requiring the use of explosives, as well as pebbles with a size equal to or greater than 0.8 m³.

.10 2nd class excavation: excavation of material of whatever nature other than that covered by the definition of excavation 1st class, including dense till, compact clay, frozen materials and partly cemented materials, which can be ripped and excavated using heavy equipment. Stripping is considered to be 2nd class excavation.

.11 Stripping: removal of organic material initially covering the ground, including land clearing materials.

.12 Topsoil: any material likely to favor the growth of vegetation and capable of being used as complementary soil for landscaping or seeding. Furthermore, if it is present on the site, this material must be excavated where specified on the work site. Finally, this material is unsuitable for use as fill.

.13 Digging of trenches: 1st or 2nd class excavation required for the construction of a trench for laying pipes and their accessories.

.14 Unshrinkable fill: controlled density mix consisting of cement and aggregates.

.15 Waste material: excavation materials unsuitable for reuse (trees, shrubs, bushes, branches, brush, stumps, dead wood and other vegetation waste and materials containing demolition debris) or surplus materials, which cannot be reused.

1.5 ELEMENTS TO BE SUBMITTED

.1 Prior to the start of excavation work, the Contractor shall submit to the Canada Parks Representative, for verification and approval details of dewatering and heave protection methods as required before undertaking the work.

.2 At least two (2) weeks prior to the start of the work, notify the Canada Parks Representative of the proposed suppliers of aggregates and fill materials and allow access for sampling purposes.

.3 Submit granulometric analyses as well as the physical and mechanical properties of the granular materials, which the Contractor plans to use. These tests shall be carried out by a recognized laboratory approved by the Canada Parks Representative.

.4 Submit to a testing laboratory, for analysis, 25 kg samples of each type of backfill material prescribed as well as samples of the types of excavated materials for granulometric analysis and Proctor test. In the case of large gravel or pieces of stone,

submit 70 kg samples. No backfilling is to be carried out prior to the approval of materials by the laboratory.

.5 Furthermore, at the request of the Canada Parks Representative, tests may be conducted on materials required on site, to ensure they are consistent with samples submitted to the laboratory.

.6 Any non-compliant material shall be replaced by materials approved by the Canada Parks Representative and the work shall be redone at the Contractor's expense.

.7 Provide the Canada Parks Representative with a laboratory analysis confirming that the aggregates to be used as fill do not contain pyrite.

1.6 PROTECTION OF EXISTING UNDERGROUND UTILITIES

.1 Existing underground utilities and structures.

.1 Before undertaking any excavation work, the Contractor has both the responsibility and the obligation to contact Info-Excavation (1-800-663-9228) in order for the companies concerned to identify the location of underground utilities and services present on the worksite.

.2 Information relating to public utilities is based on available documents. It is provided to the Contractor for guidance purposes only and should not be considered to be complete or accurate.

.3 Should private or public structures or utilities be found, whether or not they appear on the plans or are indicated on the contract property, crossing or close to projected excavation work, above or below ground, it is the Contractor's responsibility to obtain from the owners of these services and/or public utility organizations and companies all required information on the existence, nature, location, size, depth, etc. of these utilities or services.

.4 The Contractor must, himself, and at his expense, conclude agreements with the companies concerned with regards to the procedure and program of the work to be carried out. He must transmit this program to the Canada Parks Representative at least forty-eight (48) hours before work is to start near the structures that must be protected.

.5 The Contractor must take all measures required to protect these structures against breakage and frost and/or provide the support needed to prevent collapse throughout the execution of the work which, even once it has been completed, must in no way affect the stability, quality and safety of existing structures. The Contractor alone is responsible for any and all damages incurred

as a result of his work. All work to protect and support existing utilities or structures, including digging, is at the Contractor's expense.

.6 Digging must be carried out to determine the exact location, depth, and dimensions of the underground services encountered, whether or not they appear on the plans. Excavation in the ground, whether frozen or not, is done by hand on each side of the existing underground services, over a distance of 1,5 m (5.0 ft.) and below, to the underside of the services involved. No additional remuneration will be granted for this work. The use of explosives is prohibited in this instance.

.7 Obtain appropriate directives from the Canada Parks Representative before moving or removing the utilities or structures identified in the excavation zone.

.8 Note the location of the underground utilities retained, moved or abandoned.

.9 In addition, the Contractor must provide in its original state, the land on which he has done work, and this, on the entire width of the right-of-way of the property of the company concerned.

.2 Buildings and elements present on the site.

.1 In the presence of the Canada Parks Representative, confirm the condition of buildings, trees and other vegetation, lawns, fencing, service poles, cables, pavement, benchmarks and boundaries that could be affected by the work.

.2 While work is being carried out, buildings, trees and other elements present on the site must be protected. In the event of damage, the elements affected must be immediately restored to the satisfaction of the Canada Parks Representative.

1.7 CONDITION OF THE WORKSITE

.1 Take into account the location of existing buildings and underground pipes, whether or not they appear on the plans.

.2 Take into account any special conditions existing on the site.

.3 Take into account the level of the groundwater table and its impact on excavation conditions.

.4 In the event that contaminated materials are detected during construction, these excavated materials must be managed in compliance with prevailing environmental

and municipal regulations. Moreover, excavated materials containing demolition debris must be managed as "dry materials".

.5 The Contractor must coordinate his work with that of all other contractors, companies or public utility firms carrying out work of any nature whatsoever during the time when work covered by this contract is in progress.

1.8 SHORING AND BRACING OF EXCAVATIONS AND STRUCTURES

.1 Shore and brace excavations to avoid slides, in compliance with construction safety codes, local regulations as well as the recommendations of the geotechnical study.

.2 During excavation work, the Contractor must build the embankment(s) required and/or supply and install all steel sheeting, temporary support walls, cofferdams, bracing or other support required to successfully carrying out excavation work. The Contractor is fully responsible for the above-mentioned items.

.3 All excavations in the vicinity of existing structures must be limited, and adequate shoring and bracing of existing excavations and exposed structures must be provided.

.4 The Contractor is solely responsible for the choice of excavation methods used.

.5 The Contractor is fully responsible for any damage to buildings, existing installations and services or any bodily injury resulting from the absence or precariousness of the temporary structures and/or improper leveling of the embankment.

.6 The Contractor must provide a plan of these structures signed and sealed by an engineer who is a member of the Ordre des ingénieurs du Québec (OIQ - Quebec Order of Engineers).

1.9 PROTECTIVE MEASURES

.1 Protect the bottom of excavations against any softening and should this occur, remove the softened soil and replace it with compacted MG-20b type granular materials.

.2 Protect the bottom of excavations against frost.

.3 Excavation and backfilling work must be carried out in compliance with the construction safety code and recommendations of the geotechnical study.

.4 Ensure the protection of vertical benchmarks, layout benchmarks, survey markers and geodesic monuments.

.5 Never stockpile excavated material where it could interfere with the work, drainage or the stability of excavation slopes.

.6 The Contractor is, at all times, responsible for protecting stockpiled materials, which he will store on the site or other location reserved for this purpose, In the case of debris and excavation surplus, he must determine their granulometric qualities and other physical characteristics, to determine whether they can be reused as priority fill materials. In the event of inadequate protection, the loading, transportation and disposal of this material at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy will be at the Contractor's expense.

.7 At all times, the Contractor is required to take the necessary measures to keep dust generated by his work to a minimum.

.8 At the end of each work day, all excavations must be secured to the satisfaction of the Canada Parks Representative.

1.10 INSPECTION AND TESTS

.1 The analysis and testing of materials and compaction are carried out by a specialized testing laboratory designated by the Canada Parks Representative.

.2 The Canada Parks Representative assumes the cost of the inspection and laboratory analyses. If, because of non-compliance, these tests must be repeated, costs shall then be assumed by the Contractor.

.3 Granulometric analysis: fill materials are analyzed to determine their suitability for the projected use and their compliance with specifications.

.4 Density analysis: tests are conducted on compacted materials in compliance with the NQ 2501-255 standard : Soil - Determining the moisture-unit weight ratio - Test with modified compaction energy.

.5 Compaction tests:

.1 The Canada Parks Representative reserves the right to have compaction tests carried out to determine if the required compactness has been achieved. The Contractor must collaborate on the execution of these tests and can base no claim on work stoppage or other loss of time resulting from the execution of these tests.

.6 Testing frequency is defined by the Canada Parks Representative

.7 This same laboratory must provide the Canada Parks Representative with progressive reports confirming that the required tests have been conducted as required by the plans and specifications. Moreover, the laboratory must provide the Canada Parks Representative with a final report confirming that all fill complies with the plans and specifications, and no concrete or pavement can be placed until this report has been provided.

.8 Should the Contractor use a fill material other than the one sampled, all fill materials will have to be removed and replaced at his expense.

1.11 DENSITY OF COMPACTED MATERIAL

.1 When compacted, fill material must have moisture content as close to the optimum determined by the laboratory using the maximum dry density test in keeping with the NQ 2501-255 standard. Sprinkle water on overly dry soil, taking care to avoid saturation.

.2 The density of the compacted material is expressed as a percentage of the Modified Proctor maximum dry density.

1.12 GROUNDWATER TABLE

.1 Limit the depth of the excavation to avoid problems relating to the stability of the bottom.

.2 The Contractor is entirely responsible for the excavation measures required and adequate pumping to reduce the level of the groundwater table where required, as well as the control of the groundwater table while work is in progress, and all other additional work required by conditions encountered along the way.

.3 All costs related to measures covered by the previous article must be included in the bid and no request for additional funds or schedule delay will be considered, should the Contractor have failed to take these into account.

1.13 CONCEALED ELEMENTS

.1 The Contractor formally agrees to conceal no element such as pipes or other, without first obtaining backfilling authorization from the Canada Parks Representative.

1.14 2ND CLASS EXCAVATION

.1 Work involving 2nd class excavation consists in, but is not limited to: supplying the materials and manpower required to carry out 2nd class excavation work in keeping with good engineering practices, including:

.1 The loading, transportation and disposal of excavation surplus at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.2 The location of manholes, valve chambers, valve boxes, catch basins and any other public utility or service,

.3 The protection of existing structures,

.4 The dewatering of excavations,

.5 The compaction of fill, the shaping and compacting of the infrastructure.

1.15 BORROW MATERIALS

.1 Work relating to borrow materials consists in, but is not limited to supplying the materials and manpower required to carry out the supply and application of borrow materials, according to good engineering practices, including:

.1 The dewatering of excavations,

.2 The supply, placement and compaction of borrow materials,

.3 The shaping and compacting of the infrastructure.

1.16 EXTRA CRUSHED STONE FOR BEDDING

.1 Work relating to extra crushed stone for bedding consists in, but is not limited to supplying the materials and manpower required to carry out the supply and application of extra crushed stone for bedding, according to good engineering practices, including:

.1 The dewatering of excavations,

.2 The supply, placement and compaction of the extra crushed stone for bedding,

.3 The loading, transportation and disposal of excavation surplus at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

1.17 CLASS A GRANULAR MATERIALS

.1 Work relating to Class A granular materials consists in, but is not limited to supplying the materials and manpower required to carry out the supply and application of Class A granular materials, according to good engineering practices, including:

.1 The dewatering of excavations,

.2 The supply, placement and compaction of Class A granular materials replacing excavated materials.

1.18 LOCATION OF EXISTING SERVICES

.1 Work relating to the location of existing services consists in, but is not limited to, supplying the materials and manpower required to locate existing services, according to good engineering practices, including:

.1 The dewatering of excavations,

.2 The supply, placement and compaction of Class A granular materials replacing excavated materials,

.3 The loading, transportation and disposal of excavation surplus at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The compaction of fill, the shaping and compacting of the infrastructure,

.5 Repairs to existing pavement, curbs and sidewalks,

.6 The protection and repair of public utilities and services.

PART 2 - PRODUCTS

2.1 BEDDING AND SURROUND MATERIALS FOR PIPES AND UNDERGROUND STRUCTURES

.1 The bedding and surround of underground structures or the anticontamination layer are produced using MG-20b calibre granular materials complying with the Quebec Department of Transport's 2101 and 2103 standards shown in the tables appearing in the "Granular Materials" article, and whose petrographic number is 300 max. with $MgSO_4$ (NQ2560-450) durability of 35 % max.

.2 When two successive layers of materials are not enough to meet the granular requirements for an anticontamination layer, a geotextile must be used to separate the two layers.

2.2 RECYCLED MATERIALS

.1 The recycled materials must meet the standard « Granulats - Matériaux recyclés fabriqués à partir de résidus de béton, d'enrobés bitumineux et de briques - Classification et caractéristiques » NQ 2560-600. The information concerning the use of recycled materials is given in different appendices of this standard according to classification and characteristics of these materials.

.2 The use of recycled materials is governed by all the other technical requirements appearing within the present estimate as for compactness, thickness of layers, etc.

2.3 GRANULAR MATERIALS

.1 As granular materials, use only natural non-plastic soil such as sand or graded crushed stone as stipulated in the specifications. These materials must comply with the Quebec Department of Transport's 2101 and 2102 standards relating to the granulometry and physical and mechanical properties of the aggregates. Materials must first be approved by the laboratory and the Canada Parks Representative.

.2 The diameter of the crushed stone must not exceed one third of the thickness of the base layer or larger than 112 mm.

.3 The granular materials must satisfy the requirements of standard MTQ 2102:

.4 Class MG-112 granular materials or sand can also be used as excavation fill and backfill.

.5 The grading envelopes of granular materials must meet the requirements of the following "Grading Envelope of Granular Materials" table while the physical and mechanical properties of the granular materials must meet the requirements of the following "Physical Properties of Aggregates for the Roadway Infrastructure and Base Course" table:

Grading Envelope of Granular Materials

Granular materials	Sieve (mm)									Sieve (µm)			
	112	80	56	31,5	20	14	10	5	1,25	630	315	160	80
	(% passing)												
MG-20	-	-	-	100	90-100	68-93	-	35-60	19-38	-	9-17	-	2-7
MG-20b	-	-	-	100	90-100	68-93	-	35-60	19-38	-	9-17	-	5-11
MG-56	-	100	82-100	55-85	-	-	-	25-50	11-30	-	4-18	-	2-7
MG-112	100	-	-	-	-	-	-	12-100	-	-	-	-	0-10
MG-112 modified	100	-	-	-	-	-	-	20-75	-	-	-	-	0-10
Installation bed	-	-	-	-	-	-	100	95-100	50-85	25-60	10-30	-	0-10
Stabilized sand	-	-	-	-	-	-	100	95-100	50-90	25-65	10-35	4-25	-

** To be respected before and after compaction.*

Physical Properties of Aggregates for the Infrastructure and Base Course

Designations	Physical properties					
	Organic Matter max. (%)	Micro-Deval (MD) (%)	Fragmentation min.	Los Angeles (LA) (%)	MAX. (%)	Blue Value
	Standards					
	LC 31-228	NQ 2560-070	LC 21-100	BNQ 2560-400	MD + LA	BNQ 2560-255
MG-20	0,8	35	50	50	80	0,20
MG-20b	0,8	35	50	50	85	0,20
MG-56	0,8	35	50	50	80	0,20
MG-112	0,8	40	-	50	85	0,20

Conformity: All granular materials not respecting the requirements enumerated previously are refused and must be replaced by materials in conformity with the following requirements.

2.4 BACKFILL MATERIALS

.1 Backfill materials must be approved by the Canada Parks Representative prior to their use. They are from site or borrow excavations (Class B) for use beneath the roadway infrastructure line.

.2 All compactable materials can be used, except for organic soil. Soil components must be mineral in nature. The use of these materials depends on their condition, the height of the embankments to be built and weather conditions. If required by the plans and

specifications, the condition of the materials must be improved using an appropriate treatment.

.3 Materials must be free of foreign bodies such as brick fragments, roots, trees, lawn, ash, fly ash, frozen soil, snow, ice, etc.

.4 Backfilling of excavations over the pipe surround and beneath the level of the infrastructure must use excavation surplus deemed acceptable by the Canada Parks Representative or granular borrow materials free of organic matter, with a maximum size of 150 mm (6 in.) on its largest face, placed and compacted in successive layers no thicker than 300 mm (12 in.) to a minimum of 90 % of Modified Proctor density to 150 mm beneath the infrastructure line. The last 150 mm will be compacted to 95 % of Modified Proctor.

2.5 "CLASS A" GRANULAR MATERIALS

.1 "Class A" granular materials are natural non-plastic soil such as sand, gravel or stone. The diameter of the stones must not exceed one third of the thickness of the fill layers or 112 mm at their largest.

.2 These materials are frost-proof and can be used for sub-bases, submerged backfill, and the backfilling of excavations.

.3 "Class A" granular materials must have the following granulometry as well as meet the following physical and mechanical requirements:

Grading Envelope of "Class A" Granular Materials

Granular materials	Sieve (mm)									Sieve(µm)			
	112	80	56	31,5	20	14	10	5	1,25	630	315	160	80
	(% passant)												
Gravel and sand (MG-112)	100	-	-	-	-	-	-	12	-	-	-	-	0-10
Stone dust, manufactured sand	-	-	-	-	-	-	100	75-100	-	-	-	4-25	0-10

.4 The Canada Parks Representative can accept a percentage of 0-15 passing through a sieve with openings of 80 µm if the material is located beneath the frost line.

Physical Properties of Aggregates for "Class A" Granular Materials

Physical Property						
Organic matter max. (%)	Micro-Deval (MD) (%)	MgSO4 Durability (%)	Fragmentation min	Los Angeles (LA) (%)	MAX. (%)	Blue Value
Standards						
LC 31-228	NQ 2560-070	BNQ 2560-450	LC 21-100	BNQ 2560-400	MD + LA	BNQ 2560-255
0,8	40	35	-	50	85	≤0.2

2.6 LEAN CONCRETE

.1 Generalities

.1 The lean concrete must be provided by a dosage plant certified by the Association Béton-Québec (Quebec Concrete Association) in keeping with the NQ 2621-900 standard. The hardened material must allow for easy excavation at all times.

.2 Materials

.1 The Portland cement must comply with the requirements of the CSA CAN3-A5 type 10 or 30 ACNOR.

.2 Fine and coarse aggregates must meet the requirements of CSA standard CAN3-A23.1-M ACNOR. The granulometry must comply with Table 1 of this same standard.

.3 Batch water must meet the requirements of the CAN3-A23.1-M standard.

.4 Air-entraining admixtures must comply with the requirements of the CAN3-A266.1-M standards.

.5 The lean concrete must contain a maximum of 25 kg/m³ of Type 10 Portland cement. In winter, Type 30 Portland cement can be used.

.3 Characteristics

.1 The slump of lean concrete must be between 150 mm and 200 mm.

.2 When air entrainment is required, the total content in measured air must be between 4 % and 6 %, in compliance with the CAN3-A23.2 standard.

.3 The maximum compressive strength measured in compliance with the CAN3-A23.2 9C standard is in the order of 0,5 MPa to 0,6 MPa, and can be excavated using a power shovel.

.4 Placement

.1 In areas where the work crosses public utilities or services, the unshrinkable fill can be used by the Contractor to replace other backfill materials. The unshrinkable fill can be used as a bed and/or surround for an underground pipe or element.

.2 The use of the unshrinkable fill must comply with the following requirements:

.1 High-speed blending of the mix prior to placement, to avoid segregation.

.2 Unloading at maximum speed, in keeping with site conditions.

.3 Backfilling of excavation from the low point to the high point.

.4 The use of a flexible dispensing tube is prohibited.

.5 At all times, avoid moving the fill once the initial consolidation phase has been completed, i.e. after 15 to 20 minutes.

.6 Can be excavated using a backhoe (density equivalent to compacted soil).

.3 No roadway foundation and/or structure are to be installed over unshrinkable fill until 6 hours after the latter has been placed.

.4 Any unshrinkable fill affected by frost, before and/or following its placement, must be removed and replaced.

PART 3 - EXECUTION

3.1 SITE PREPARATION

.1 Within set limits, remove obstacles, ice and snow from the surface of the excavation zone.

.2 Before undertaking excavation work, carefully cut pavement, sidewalks and curbs along limits of the proposed excavation, allowing the surface to break off cleanly and evenly. Materials removed must be disposed of off-site, in keeping with the article "Disposal of waste materials" in this section.

.3 Roads and access ramps must be built on the worksite, as needed, and maintained by the Contractor throughout the duration of excavation work.

3.2 EXCAVATION EQUIPMENT

.1 Excavation equipment must be suited to the projected work and sized to carry it out effectively.

3.3 THEORETICAL EXCAVATION AND FILL LINES

.1 A theoretical typical section of a trench excavation shall comply with both BNQ and CSST standards.

.1 Pipe (domestic sewer, storm sewer, waterworks and fire protection).

.1 For sewer and waterworks, the width of the floor of the trench shall be equal to the outer diameter of a pipe plus 600 mm, and shall, in no case, be smaller than 900 mm.

.2 The theoretical walls of the excavation shall have slopes of the following ratios:

- in the ground: according to the CSST.
- in rock: 1 H : 10 V or according to the CSST, whichever is the most restrictive.

.3 Regardless of the type of soil, the depth of the trench shall be determined by the depth of the top of the pipe plus the latter's outer diameter, plus the thickness of the bed.

.2 Underground structures (fire hydrants, valves, manholes, etc.)

.1 Dimensions of the excavation floor for the installation of underground structures shall be equal to the outer dimensions of said structures plus 600 mm (24 in.) along the entire outer perimeter of the element.

.2 The theoretical slopes of the excavation shall be the same as for a pipe.

.3 The height of the excavation shall be determined by the depth of the accessory to be installed, to which is added the thickness of the bed, as shown on the plans.

.2 It is understood that the Contractor shall, at all times, comply with the "Code de sécurité pour les travaux de construction" (Safety Code for Construction Work) in effect in the province of Québec.

3.4 TRENCH MAXIMUM WIDTH

.1 For the sewers piping, the selected and specified class of pipes depends partly on the trench width at the top of the pipe.

.2 The trenches maximum widths tolerated at the top of the sewer pipe are the following:

Pipe diameter (mm)	Allowed maximum width of excavation at the top of the pipe (m)
455 and less	1,20
535	1,35
510	1,50
685	1,65
760	1,80
915	1,95
1065	2,25
1220	2,55
1370	2,90
1525	3,20
1675	3,50
1830	3,80
1980	4,10
2135	4,40
2285	4,70
2440	5,00
2745	5,30
3050	5,60
3060	5,90

.3 The Contractor must have underpinning in conformity with the requirements of the CSST regarding the excavation widths.

3.5 2ND CLASS EXCAVATION

.1 2nd class excavation includes all excavations, which are described as 1st class excavation in the preceding article.

.2 Advise the Canada Parks Representative at least one week prior to the start of excavation work and, in his presence, note the land's natural profile where required.

.3 Dig trenches along the theoretical lines, cross-sections, layouts, levels and dimensions indicated.

.4 Completely excavate all topsoil and organic matter. This material cannot be used as fill and must be removed from the worksite. However, if the material complies with the requirements of the section on Sodding, it could be reused as topsoil where the restoration of the ground's surface calls for this type of material.

.5 Construction debris such as bricks, wood, old pavement, sidewalks, curbs, approach or median noses, riprap, stone walls, fences, etc., may be encountered during excavation. These materials must be managed as "dry materials". Refer to this section's article on "Disposal of waste materials".

.6 Build temporary structures at the required location, depth and height.

.7 Dig trenches needed for laying underground pipes. Flatten and shape the bottom of the trenches and eliminate any irregularities, clumps or ruts.

.8 Smooth the bottoms of the trench depending on the type of bed stipulated and firm it up by tamping down or other means, which the Canada Parks Representative deems satisfactory to ensure a foundation capable of supporting a pipe in position.

.9 For the installation of different underground elements, ensure a minimum of 600 mm (24 in.) between the surfaces of the structures and the walls of the excavation.

.10 The bottom of the excavations must be level, consist of dry, undisturbed soil, and free or organic or loose matter. Reworked soil must be removed by hand.

.11 Fill unneeded excavations at no additional cost, as follows: The excavation shall be filled using excavation materials deemed to be reusable, free of stones measuring more than 150 mm (6 in.) in diameter, frozen material or organic matter. Voids will be filled using a finer material. The Contractor shall compact materials to 90 % of the Modified Proctor in successive layers with a maximum thickness of 200 mm (8 in.), until the level required to restore and/or shape the infrastructure of existing or projected elements. If excavation surplus is deemed to be non-reusable, the Contractor shall use borrow materials approved by the Canada Parks Representative. Compacted fill shall be installed along the entire width of the excavation.

.12 Once the excavations have been completed, ask the Canada Parks Representative to inspect their depth and dimensions. No filling can be carried out without the authorization of the Canada Parks Representative.

.13 Take all precautions needed to prevent damage to existing services.

.14 If excavation and backfilling work is to be carried out in winter, the bottom of excavations must be protected against frost.

3.6 TRENCH OPENING LIMITS

.1 Unless written authorization has been obtained from the Canada Parks Representative, do not dig more than 10 m. (30 ft.) linear of trench. At the end of the workday, no trench must remain open.

3.7 PIPES INSTALLED IN JOINT TRENCH

.1 When several pipes are installed in the same trench, the Contractor makes sure that each pipe rests on a solid base. If, for any reason, it becomes impossible to make a shoulder within the original soil, the Contractor must compact the soil under the pipe in order to obtain the same density as the natural bordering soil, to avoid any possible depression, or backfill with humidified, classified and compacted crushed stone with a density at least equal or higher than 90 % of Modified Proctor.

3.8 TRENCH SHORING

.1 If, due to instability of the excavated walls, it becomes necessary to use excavation box, the sheeting steel piles or wood underpinning, to support the trench walls and to avoid damage or accidents, the Contractor must carry out this work without additional compensation. If the Canada Parks Representative judges it necessary, for the protection of the existing works or to prevent neighbouring landslip, he can require that wood underpinning is left in the trench. The sheeting steel piles must always be removed.

.2 At any time, the Contractor is the only person in charge of the support of the trench walls and it must be in conformity to the requirements of the Ministère du Travail related to excavation work and contained in the publication entitled: "Security standards on the Building sites of Construction" or any other more recent publication of this Ministry relative to this work.

3.9 EXCAVATION CLOSE TO EXISTING WALLS

.1 When excavation is close to existing walls, for the sewer pipes, the Contractor maintain the excavation to the minimum in order not to destabilize the foundation of these walls.

As soon as the sewer pipe is installed, the Contractor must backfill and compact the granular material.

.2 Any damage caused to the walls will have to be repaired to the expenses of the Contractor.

.3 The Contractor must respect the requirements of the vibration wave control section.

3.10 DEWATERING OF EXCAVATIONS

.1 The Contractor must plan for all pumping work required keeping excavations dry. A pumping system must be installed when required and its capacity must be sufficient to drain surface water or water from infiltrations or leaks from the sewer pipes, water mains or other artificial elements. Precautions must be taken when the soil is silty or sandy, to avoid taking in fine particles. If need be, the Contractor must dig channels away from the foundations to carry water towards the manholes or ditches, so as to properly drain the soil prior to backfilling. To this end, the Contractor must refer to the geotechnical study. The water must be channelled far from the foundations to a location where it cannot be harmful.

.2 Submit, to the Canada Parks Representative, for verification, details of dewatering and heave protection methods, such as the installation of dikes, well points and sheet-pile cut-offs.

.3 Before the start of pumping work, the Contractor must confirm the condition and capacity of ditches and storm or combined sewers into which the water is pumped. He is responsible for flooding and all property damage caused by the pumping of this water. The clean-up of accumulations of soil or other debris resulting from the pumping into existing pipes shall be at the Contractor's expense.

.4 Install and operate the dewatering system so as to avoid lowering the level of the groundwater table outside the excavation to a point that could damage or threaten adjacent structures, underground installations, sidewalks, pavement and other elements or property.

.5 The Contractor shall, at his expense, put up, install and operate all equipment needed to keep excavations dry during construction.

.6 In the event of an emergency (including breakdowns) an adequate pumping system in good working order must be available at all times. Moreover, workers capable of operating this system must also be available at all times.

.7 If there is a risk of soil liquefaction or heaving, avoid excavating beneath the groundwater table. To avoid pipeline upheaval or excavation bottom heave, lower the level of the groundwater table or use other appropriate means.

.8 Protect open-cut excavations against flooding and other damages, which could result from runoff.

.9 All surface or groundwater, whether they are from natural sources, precipitation, melting snow, ice, infiltration, leaks or outflow from sewer pipes or other artificial element, must be drained, at the Contractor's expense. The Contractor is entirely responsible for water control, which must comply with prevailing municipal and provincial environmental regulations.

.10 The Contractor cannot, at any time, discharge pumped water into existing domestic sewers, nor use the pumps of pumping stations, existing or under construction, to eliminate surface water or water infiltrations in excavations.

.11 If the Contractor uses domestic sewers under construction for disposing of infiltration water, these domestic sewers cannot be connected to the existing network until work has been completed and the Contractor is not to make the connection until the Canada Parks Representative has inspected and approved these new pipes.

3.11 PREPARATION OF THE EXCAVATION FLOOR

.1 Any excavation in the ground, within 150 mm of the finished level is removed manually or mechanically, taking great care to avoid disturbing the natural bottom, unless the Canada Parks Representative has directed otherwise. When excavating in clay, the teeth of the excavation bucket shall be continuous, with no space in between.

.2 Laying pipes on the bottom of a muddy or flooded trench is prohibited. The Contractor must dewater and prepare the trench, ensuring that it is firm and solid before installing the pipe bed. If needed, the Canada Parks Representative can require that the infrastructure be compacted anew before laying the bed for the pipes. In cold weather, the bottom of the trench must also be protected against frost.

3.12 UNSTABLE SUB-BASE

.1 Every time materials constituting the floor of an excavation, which has been brought to the level indicated on the drawings or the Canada Parks Representative, are found to be too soft or, for whatever other reason, inadequate for supporting a pipe or other element to be built, the Contractor must excavate to a greater depth and build a special base, as required by the Canada Parks Representative.

.2 Various additional works required for stabilizing the pipe bed are as follows (at the Canada Parks Representative's choice):

.1 Geogrid.

.2 Additional excavation, transportation and leveling.

.3 Reinforced geotextile.

.4 Lean concrete.

.5 Concrete and steel reinforcements in place.

.6 Wood in place.

.7 Crushed stone, crushed gravel, sand, etc.

.3 If the Canada Parks Representative considers that the condition of the soil, which is soft or unsuitable for whatever reason, is due to unavoidable conditions, special base work can then be carried out by the Contractor, as instructed by the Canada Parks Representative. The Contractor will be paid for said work according to contract terms.

.4 In the event that the Canada Parks Representative considers that the condition of materials, which are soft or unsuitable for whatever reason, results from the Contractor's failure to adequately protect, handle and drain the worksite, or other negligence on the part of the Contractor, the latter shall, at his expense, excavate to the additional depth required of him, and fill the excavation in a satisfactory manner to the required level, even if unshrinkable fill or crushed stone is to be used, or if on the orders of the Canada Parks Representative, other means are to be used to properly support the structure.

3.13 BEDDING AND SURROUND OF PIPES AND UNDERGROUND STRUCTURES

.1 Generalities

.1 Work involving the supply and installation of the bedding and surround for pipes and other underground structures includes the loading, transportation and disposal of resulting excavation surplus at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

.2 Pipes of reinforced concrete, concrete with steel cylinder, and ductile iron

.1 The bedding shall be produced using MG-20b-type crushed stone compacted to 90 % of Modified Proctor and shall have a minimum thickness of 150 mm (6 in.) or as follows:

PIPE DIAMETER	THICKNESS OF THE BED
150 to 600 mm	150 mm
675 to 1 200 mm	225 mm
1 350 to 1 650 mm	300 mm
1 800 mm and over	375 mm

.2 The central part of the cushion is non-densified over a width of De/3 and a thickness of 100 mm.

.3 The trench is filled to half the diameter of the pipe using MG-20b crushed stone in successive layers of 150 mm maximum, mechanically compacted to a density equal to or superior to 90 % of that obtained by the Modified Proctor test over the entire width of the trench.

.4 If the interior diameter of the pipe is 600 mm or less, the use of fill consisting of MG-20b crushed stone will be extended up to 300 mm over the pipe and shall be carried out in layers of no more than 200 mm (8 in.) before compacting with excavation materials or borrow materials free of organic matter, no more than 100 mm (4 in.) in diameter compacted to 90 % of Modified Proctor for trenches located beneath an existing or projected roadway, and non-compacted for trenches located away from a road surface.

.5 If the interior diameter of the pipe is 675 mm or more and that it is not on an existing street, the excavation will be filled to 600 mm over the pipe using fine materials taken on site or borrow materials free of hard elements of more than 75 mm in size, placed with care. These hard elements must not exceed fifty percent (50 %) of the volume of fill materials in this part. All is then compacted to a density at least equal to that of the neighbouring non-reworked soil.

.6 Backfill all around the pipe or structure to cancel out any heaving of the ground.

.7 The only densifying equipment permitted are rammers, plate vibrators and vibrating drum rollers whose total applied pressure does not exceed 50 kN on the first meter over the pipe.

.8 In the case where the use of clear stone is authorized to control incoming water, the clear stone must be confined to a geotextile placed on the bottom of the trench, with edges folded over the clear stone.

.9 In the case where a concrete bed is required, the Contractor shall compact the infrastructure, with or without stone to restore its original density. Armouring, if required, is installed. The pipe is attached to pieces of wood, which will then be cast in concrete in keeping with the theoretical section shown on the plans. The

filling, as previously described is only carried out once the concrete has reached a minimum strength of 15 MPa.

.10 The backfilling of the trench from half-diameter to 300 mm (12 in.) over the pipe must be carried out in layers of no more than 200 mm (8 in.) prior to compacting with excavation materials or borrow materials free of organic matter, with a maximum size of 100 mm (4 in.) in diameter, compacted to 90 % of Modified Proctor for trenches located within existing or projected roads, and non compacted trenches located away from a roadway.

.3 Pipe of polyvinyl chloride (PVC), high-density polyethylene (HDPE), corrugated aluminized steel, corrugated aluminum , and ribbed aluminized steel

.1 The bed shall be produced using MG-20b-type crushed stone with a minimum thickness of 150 mm (6 in.) (trench in granular material) or 200 mm (8 in.) (trench in rock) compacted to a density equal to or higher than 90 % of that obtained with the Modified Proctor test.

.2 The trench shall be filled in layers of 150 mm to a height of 0.5 De then in layers of 200 mm (8 in.) to a height of 300 mm (12 in.) over the pipe, using MG-20b crushed stone compacted to 90 % of the density obtained with the Modified Proctor test.

.3 Fill shall be installed simultaneously on each side of the pipe or structure to cancel out pressure exercised by the ground.

.4 Filling of the trench from mid-diameter to 300 mm (12 in.) over the pipe shall be done in layers of no more than 200 mm (8 in.) prior to compacting using MG-20b crushed stone compacted to 90 % of Modified Proctor along the entire width of the trench.

.5 When the height of the fill over the pipe exceeds 2 m, the 300 mm thick zone immediately over the pipe is non-densified.

.6 The only densifying equipment permitted are rammers, plate vibrators and vibrating drum rollers whose total applied pressure does not exceed 50 kN on the first metre over the pipe.

.7 If not on an existing street, from the top of the surround stone to 900 mm over the pipe, fine materials taken on site or borrow materials free of hard elements of more than 75 mm in size shall be placed with care. These hard elements must not exceed fifty percent (50 %) of the volume of fill materials in this part. All is then compacted to a density at least equal to that of the neighbouring non-reworked soil.

.8 In the case where the use of clear stone is authorized to control incoming water, the clear stone must be confined to a geotextile placed on the bottom of the trench, with edges folded over the clear stone.

.4 Underground structure

.1 For an underground structure, the bedding shall also be of MG-20b crushed stone compacted to 90 % of Modified Proctor and shall have a minimum thickness of 300 mm (12 in.).

.2 The surround of an underground structure shall use MG-20b type crushed stone over a width of 600 mm (24 in.), placed in successive layers compacted for a maximum thickness of 300 mm (12 in.) to 90 % of Modified Proctor to obtain a minimum fill of 150 mm (6 in.) over the roof slab or to the level of the infrastructure.

.5 Catch basin

.1 Bedding for street catch basins shall consist of either:

.1 A stable sub-base or a cushion of the same size consisting of a 150 mm thickness of MG-20b crushed.

.6 Service accesses

.1 Service accesses are always covered with MG-20b crushed stone compacted to 90 % of Modified Proctor density to a height of 300 mm over the pipes.

.7 Geotextile

.1 Where required by the Canada Parks Representative, before installing the bedding stone for sanitary, storm or waterworks pipes, the Contractor shall place, on the bottom of the trench, a geotextile whose width is equal to that of the trench.

.2 Unless otherwise indicated on the plans or in the call for tenders documents, these standards must be met at all times.

3.14 MAINTENANCE OF THE FILL SURFACE

.1 The Contractor is required to keep the fill surface of trenches in good condition until the work has been accepted. Moreover, he is responsible, at all times, for accidents and damage caused to individuals, public or private property as well as vehicles. He is required to correct any sagging that might develop in the pavement and carry out all

other work needed for the structure to be put into service or which might be required by the Canada Parks Representative.

.2 In an emergency, or if the Contractor has failed to carry out repairs deemed necessary and requested via a 48 hour written notice from the Canada Parks Representative, the latter can have said work carried out by a third party, at the Contractor's expense.

3.15 LEVELS AND ALIGNMENTS

.1 The Contractor must use a laser in every pipe, except small-diameter water mains, and ensure the ventilation required to counter radius bend.

.2 The Contractor shall coordinate his work to allow the Canada Parks Representative to carry out his verifications.

3.16 TOLERANCES FOR PIPES, MANHOLES AND CATCH BASIN LEVELS

.1 The Canada Parks Representative checks installed pipes, based on the following tolerances

	Tolerances	
	Vertical (mm)	Horizontal (mm)
Sewers, manholes	25	100
Catch basin	25	100
Watermain	25	25

.2 When the level variations exceed limits indicated, the Contractor must immediately remove the watermain or sewer section wrongly installed, check the preceding sections and to remove it if needed; until he finds a section acceptable, posed within the allowed limits.

3.17 BACKFILLING OF PIPES AND EXCAVATIONS

.1 Do not start backfilling until the Canada Parks Representative and the laboratory have inspected the premises and given their authorization, and until backfill materials have been accepted by the laboratory and the Canada Parks Representative.

.2 Before proceeding with the backfilling of excavations, the Contractor must remove all supports from excavation walls or existing structures, as well as forms, debris, waste, etc.

.3 In the case of shored excavations, remove coverings as backfilling work progresses. Do not remove shoring until backfill has reached its height. Backfill shall be placed and compacted to fill all voids left by the withdrawal of the coverings.

.4 All surfaces to be filled must be free of debris, snow, ice, water or frozen soil.

.5 Backfill shall consist of materials from debris, excavations, discharge ditches or borrow sources and placed beneath the infrastructure line according to the plans and specifications, as well as longitudinal and cross-sectional profiles, which are part of the contract, whether or not they have been modified by the Canada Parks Representative during the course of the work, in compliance with the requirements of the contract documents.

.6 Materials used must comply with the requirements of the "Fill Materials" article for the proposed use.

.7 Fill shall be installed simultaneously on each side of the pipe or structure to cancel out pressure exercised by the ground.

.8 Filling up off-road excavations must be done in the following manner:

.1 For the first meter over the pipe or other structure, the use of compacting equipment exerting more than 50 000 N of pressure is prohibited. Compacting equipment can be plate vibrators or trench rollers.

.2 The filling of the excavation shall use excavation surplus deemed to be reusable and free of stones measuring more than 150 mm (6 in.) in diameter, frozen material or organic matter. Voids must be filled using a finer material. The Contractor shall compact materials to 90 % of Modified Proctor, to obtain a density equal to that of the neighbouring non-reworked soil, in successive layers with a maximum thickness of 300 mm (12 in.), to the level required to restore and/or build the infrastructure of existing and/or projected elements. In the event that materials are deemed to be non-reusable, the Contractor shall use borrow materials accepted by the Canada Parks Representative. The fill shall be compacted along the entire width of the excavation.

.3 The fill of the 1,0 m layer over the surround stipulated for polyvinyl chloride (PVC) pipes must be free of any material of more than 100 mm (4 in.) and of an angular nature.

.4 The 150 mm (6 in.) surround layer beneath the infrastructure line shall be compacted to 95 % of Modified Proctor. The Contractor shall not spread the next layer without first obtaining the required compactness.

.5 The excavation material shall be handled so as to protect, aerate and dry it, making it suitable for filling the trench. All measures required to avoid the contamination of the excavated material and preserve its integrity for backfilling the trench shall be at the Contractor's expense.

.6 The density is verified on site by a laboratory retained by the Canada Parks Representative. The Contractor must plan for sufficient work stoppage time to allow the laboratory to conduct density tests, whether on the pipe bedding, fill or bases.

.9 Filling the excavation beneath an existing roadway must be carried out in the following manner:

.1 For the first meter over the pipe or other structure, the use of compacting equipment exerting more than 50 000 N of pressure is prohibited. Compacting equipment can be plate vibrators or trench rollers.

.2 Barring specific directives in the contract, the filling of trenches in an existing base before the start of the work must be carried out using Class A granular material compacted to a density equal to or higher than 90 % M.P., in successive layers with a maximum thickness of 300 mm (12 in.), to the level required to restore and/or construct the infrastructure of existing and/or projected elements. If the materials are deemed to be non-reusable, the Contractor shall use borrow materials accepted by the Canada Parks Representative. Compacted fill shall be installed along the entire width of the excavation.

.3 The 150 mm (6 in.) surround layer beneath the infrastructure line shall be compacted to 95 % of Modified Proctor. The Contractor shall not spread the next layer without first obtaining the required compactness.

.4 For excavations located in paved zones to be preserved, the excavation and backfilling Contractor shall maintain a 45° transition zone on the sides of the trenches for any thickness of pavement infrastructure.

.5 New foundations and pavement must be redone in keeping with the specifications in the call for tender's documents.

.6 The Contractor must comply with the following requirements concerning trench backfilling:

.1 The backfilling is carried out by layers of 600 mm thickness maximum;

.2 The density obtained is checked on site by a Laboratory retained and paid by the Owner. Required density:

.1 Class "A" granular material: 90 % modified Proctor.

.2 Granular foundation and subbase: 95 % modified Proctor.

.3 The Contractor ensures sufficient time off to allow the Laboratory to carry out the density tests that either on bedding, subbases or foundations.

.4 The cost of this work as well as excavated material transport and laying out are included in the tender.

.10 All usable 2nd Class excavation materials belong to the Canada Parks Representative and must be used where indicated by the Canada Parks Representative for the construction of embankments, shoulders, and special backfilling for sodding work along the roadway, etc.

.11 If the Contractor is responsible for the loss of reusable materials, he shall be required to replace said materials, at his expense, with an equivalent volume of material acceptable to the Canada Parks Representative.

.12 The Contractor shall also store excavated materials, which cannot be used immediately but will be used at a later time.

.13 In the case of excavated materials that must be set aside for later use, the cost of the double handling shall be included in the bid.

.14 If excavated materials cannot be used, the Contractor shall dispose of them in compliance with the requirements of the article “Disposal of Excavation Surplus”.

.15 Prior to the construction of embankments, it is necessary to take into account the removal of topsoil. Furthermore, dips and voids, whether natural or resulting from the removal of obstacles, must be filled to the level of neighbouring ground, using materials of the same nature. The surface of the soil in place must be free of snow, ice and mud.

.16 When excavated materials and excavations shown on the plans and profiles do not provide enough adequate material for the construction of embankments called for by the contract, materials from borrow pits beyond the road’s right-of-way shall be used.

3.18 COMPACTION

.1 Generalities

.1 The compaction of materials seeks to increase their load-bearing capacity and prevent future settlement. Compacting operations shall be carried out at an ambient temperature above 0 °C in the case of cohesive soil, and it must be

above - 6 °C in the case of granular soil, with the latter compacted before materials have reached a temperature below 0 °C.

.2 If the required compaction density is not achieved, the Contractor shall remove the excavation fill and restart compaction work using heavier equipment or increasing the number of passes. Repeat until the required compaction density has been reached.

.2 Compaction equipment

.1 Compaction equipment must make it possible to achieve the stipulated material densities. Replace or reinforce equipment if such is not the case.

.2 All types of standard compaction equipment, in good working order, can be used to densify various soils as stipulated. It may be necessary to add mechanical rammers, scarifiers, harrows, rotary mixers, sprinklers, etc. depending on the work to be carried out.

.3 The Contractor must provide the Canada Parks Representative with the characteristics of the compaction equipment he plans to use.

.4 However, the Canada Parks Representative reserves the right to refuse any compaction equipment that is inadequate or unsuited to local conditions, the nature of the soil and materials used.

.3 Compaction control

.1 Compaction control is ensured by the laboratory retained by the Canada Parks Representative. The Contractor must notify the Canada Parks Representative twenty-four (24) hours in advance to have the required tests carried out.

.4 Compaction levels

.1 This article deals with the level of compaction required for the natural soil and embankments. Embankments must be erected in successive layers, compacted separately and evenly.

.1 Compaction of the natural soil:

.1 The bottom cut and natural soil stripped of topsoil must be densified to a depth of 150 mm, to 90 % of Modified Proctor maximum dry density. If the bottom cut or the natural soil coincides with the infrastructure line, the first 150 mm beneath the infrastructure line must be densified to 95 % of Modified Proctor.

.2 Compaction of soil fills:

.1 Fill materials are densified to 90 % of Modified Proctor maximum dry density, except for the last 150 mm beneath the infrastructure line, which are densified to 95 % of Modified Proctor.

.3 Compaction of stone fills:

.1 Each layer beneath the infrastructure line must be compacted using four passes of a crawler tractor weighing a minimum of 30 tons. Over the top 300 mm layer, two additional passes using a vibratory roller with a minimum static weight of 5 tons and a centrifugal force of more than 10 tons are required. In the case of friable or foliated rock, each layer must be compacted in keeping with the compaction requirement of the last 300 mm layer.

.2 The fill must have a minimum density of 90 % of Modified Proctor maximum dry density, except for the last 150 mm below the infrastructure line, which shall be densified to 95 %.

.5 Optimal water content

.1 Add or dewater as needed to maintain the materials' required water content and thus achieve the stipulated compaction.

.2 The Contractor must strive to obtain, on the worksite, a water content allowing him to achieve the required density.

.3 The Contractor shall supply the equipment needed to accelerate the drying of overly moist soil or moisten overly dry soil.

.4 If the soil is too moist to allow even compaction to the required density, the Canada Parks Representative may require that the soil be mixed with dry soil or dried by aeration or scarification.

.5 If, on the other hand, the water content is inadequate, the Canada Parks Representative can require watering to obtain a suitable content. The equipment required for this work is a 4 500 litre mobile tank fitted with a pressure or gravity release mechanism. The operator must be able to adjust the water distribution rate to ensure even distribution throughout the layer to be densified prior to compacting. If the surface is smooth, the Contractor shall use a scarifier or harrow to favor water penetration.

.6 Density loss and reworking of the soil

.1 In the event that, before the end of the contract, the natural soil or a layer of materials already compacted according to specifications, should lose density due to the movement of equipment, poor weather, freeze-thaw cycle or any other reason, the Contractor shall be required to re-compact the soil to the required density, at his expense.

.7 New targeted density

.1 When the compaction level does not meet criteria for acceptance and the Canada Parks Representative is certain that this is not due to inappropriate operations by the Contractor or to his equipment, the Contractor can request that a new targeted density be established based on field tests:

.1 Establish a single field test on a uniform layer covering a surface area established on the worksite by the Canada Parks Representative. The water content of materials tested must be close to the optimal water content (as measured using the NQ 2501-255 test method).

.2 Following the placement of the materials, run the compaction equipment over the full test surface six times. Determine densities and water content at three randomly selected sites. Calculate the dry density of each of the sites and use the average as the initial density value.

.3 Run the compaction equipment over the entire field test area two more times. Determine the densities and water content at three other randomly selected sites. Calculate a new average dry density.

.4 If the new average dry density does not exceed the initial value by more than 1 %, the compaction field test shall then considered to be satisfactory and complete. If the new average dry density exceeds the initial value by more than 1 %, additional runs of compaction equipment over the field test area will be conducted, in keeping with the above-mentioned procedure, until acceptance criteria have been met.

.5 Once compaction field tests have been completed, determine the densities and water contents at seven other randomly selected sites, then calculate the dry density at each of these sites. Calculate the average field test density based on the average of these seven values and the three final values determined by the field tests.

.6 The average dry density of the field tests becomes the new targeted density.

.7 The targeted density established based on field tests should be representative of the remainder of the layer, provided that the source

and type of materials as well as the compaction equipment remain the same.

3.19 DISPOSAL OF WASTE MATERIALS

.1 Generalities

.1 The Contractor shall load, transport and dispose of all waste material off-site, at the location, which he shall select and which is suited to the disposal of said waste, in compliance with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

.2 Loading, transportation and disposal of waste are at the Contractor's expense.

.3 Refer to environmental specifications for excavation and disposal of contaminated materials.

.2 Dry materials

.1 All materials from 2nd class excavation such as crushed or shredded residue, which are non-fermentable and contain no hazardous waste such as scrap wood, rubble, waste plaster, and concrete, masonry and paving refuse, shall be transported and disposed of at a dry materials dump authorized by Quebec's Ministère de l'Environnement. The Contractor must provide the Canada Parks Representative with proof that the selected dumpsite meets the requirements of this article as well as receipts issued by the dumpsite upon reception of the material. The cost of sorting, handling and disposing of these materials shall be assume/ by the Contractor.

.2 Materials from the deforestation and clearing of the zone affected by the work (such as trees, shrubs, bushes, branches, brush, stumps, dead wood, and other vegetation waste and materials containing demolition debris) or from the demolition of existing pavement, curbs, and sidewalks or existing underground installations, shall be disposed of at a site authorized for dry materials. The cost of sorting, handling and disposing of these materials shall be assumed by the Contractor.

.3 Unusable materials

.1 All materials from 2nd class excavation and deemed unusable by the Canada Parks Representative, such as putrid matter, topsoil, loam, etc., shall be transported to a suitable location chosen by the Contractor and approved by the Canada Parks Representative. Rotting materials from debris will also be

loaded into closed truck boxes. The cost of sorting, handling and disposing of these materials shall be assumed by the Contractor.

.2 If deemed necessary by the Canada Parks Representative, the Contractor shall, for filling trenches, replace unusable materials with acceptable materials.

3.20 DISPOSAL OF EXCAVATION SURPLUS

.1 Excavation surplus refused by the Canada Parks Representative for the project's backfilling purposes must be disposed at a site selected by the Contractor and approved by the Canada Parks Representative.

.2 All work covered by the preceding provisions shall be carried out in compliance with the directives and/or regulations of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy, which, in the event of contradiction, take priority over the preceding requirements.

.3 All sites for the storage and disposal of debris (excavation surplus excluding any refuse) considered within the framework of this contract must first be approved by the Canada Parks Representative no later than the first worksite meeting. None of these materials can be disposed of until this approval has been obtained.

.4 All excavation surplus and 1st and 2nd class debris not required by the Canada Parks Representative become the property of the Contractor.

3.21 ACCESS ROADS

.1 Put in and maintain suitable roads providing access to the worksite.

.2 Maintain and clean public roadways used by the Contractor's vehicles. Comply with all prevailing municipal regulations on this subject. Repair any damage arising from the use of said roadways.

.3 The Contractor shall restore land used as an access road to its original condition.

3.22 RESTORATION WORK

.1 Once work on the project has been completed, remove surplus materials and debris, trim slopes and correct defects identified by the Canada Parks Representative.

.2 Clean and restore areas damaged by the work, as directed by the Canada Parks Representative.

.3 Unless otherwise indicated, the ratio of embankment slopes will not be less than 1 V : 3 H.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11 – Civil - Excavation and Backfilling - Underground Services

.2 Section 33 11 16 – Civil - Waterworks System and Fire Protection

.3 Section 33 31 00 – Civil - Sanitary and Storm Sewers

1.2 EXTENT OF WORK

.1 Supervise work and provide all labour, equipment, tools, materials, transportation and other services required to execute and complete all work described and specified in the present section and in the contract documents, including but not limited to: providing, laying and compacting aggregates necessary for the construction of one or more aggregate base courses and the supply and laying of one or more layers of asphalt concrete mixed in a central plant and laid over an aggregate surface, in all cases in compliance with the lines, thicknesses, levels and profiles indicated on the contract drawings or as specified by the Canada Parks Representative.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (B.N.Q. – Quebec standards office) (latest edition).

.1 NQ 2501-255 : Sols - Détermination de la relation teneur en eau-masse volumique - Essai avec énergie de compactage modifiée (2 700 kN.m/m^3). [Soils – Determination of wet density – test with modified compacting energy]

.2 Ministère des Transports du Québec (Quebec transportation department, hereafter MTQ) (latest edition)

.1 Cahier des charges et devis généraux du Ministère des Transports du Québec, latest edition. [General specifications]

.1 Section 13 - Revêtement de chaussée en enrobé. [Pavement with asphalt mixes]

.2 Cahiers des Normes, Ouvrages Routiers, vol. I "Conception routière", most recent edition. [Road construction standards – design]

.3 Cahiers des Normes, Ouvrages Routiers, vol. VII "Matériaux", most recent edition. [Road construction standards – materials]

.1 Standard 2101 - Granulats. [Aggregates]

.2 Standard 2102 - Matériaux granulaires pour fondation, sous-fondation, couche de roulement granulaire et accotement. [Aggregates for base course, subbase, aggregate surface course and shoulder]

.3 Standard 4101 - Bitumes. [Asphalts]

.4 Standard 4105 - Émulsions de bitume. [Bituminous emulsions]

.5 Standard 4201 - Enrobés à chaud formulés selon le principe de la méthode Marshall. [Hot mix asphalts mixed using Marshall method principles]

.6 Standard 10201 - Peinture alkyde pour le marquage des routes. [Alkyd paint for road markings]

.7 Standard 13101 - Géotextiles. [Geotextiles]

.8 Standard 14601 - Microbilles de verre pour peinture servant au marquage des routes. [Glass micro-beads for road-marking paint]

1.4 WORK PERFORMED BY OTHER COMPANIES OR CONTRACTORS

.1 Where applicable, the Contractor must coordinate its work with that of any other Contractor, company or public utility that needs to perform work of any nature whatsoever, before or during the period of work covered by the present contract.

1.5 INSPECTION AND TESTING

.1 Analyses and tests of materials and compacting work are to be done by a testing Laboratory designated by the Canada Parks Representative.

.2 The Canada Parks Agency shall pay said Laboratory's inspection and testing fees. If any tests must be repeated due to the discovery of non-conformities, the tests must be repeated at the Contractor's expense.

.3 Granulometric analysis: fill materials are tested to determine if they are suitable for their intended use and compliant with specifications.

.4 Wet density analysis: tests are performed on the compacted material in accordance with standard NQ 2501-255 Sols - Détermination de la relation teneur en eau-masse volumique - Essai avec énergie de compactage modifiée (2 700 kN.m/m^3). [Soils – Determination of wet density – test with modified compacting energy]

.5 Compaction tests.

.1 The Canada Parks Representative reserves the right to have compaction tests performed in order to verify that specified compactness has been reached. The Contractor shall assist in the performance of such tests and may not claim compensation for work stoppages or other losses of time resulting from performance of such tests.

.6 The frequency of tests is defined by the Canada Parks Representative.

.7 The same Laboratory shall provide the Canada Parks Representative with progressive reports confirming that it has performed all tests ordered and that the test results are consistent with the plans and specifications. In addition, the Laboratory must provide the Canada Parks Representative with a final report confirming that all fill material is consistent with the plans and specifications and that no laying of concrete or pavement was authorized before delivery of the report.

.8 If the Contractor uses a fill material other than that sampled for testing, all fill material must be removed and replaced at the Contractor's expense.

1.6 LABORATORY

.1 At the Canada Parks Representative's request, a Laboratory will be present on-site to perform qualitative tests on materials and to monitor their placing.

.2 In situ density tests and other qualitative tests

.1 In the case of in situ density tests and other qualitative tests performed to verify the compaction of the infrastructure or of aggregate fills, the cost of the first test performed for acceptance of a layer of material in a given zone shall be covered by the Canada Parks Representative.

.2 However, if the results of such tests show the work not to be compliant with the standards listed in the specification, the Contractor must complete the repairs or take other necessary actions. Further in situ density tests shall then be at the Contractor's expense.

1.7 DOCUMENTS TO BE SUBMITTED

.1 Asphalt must meet the specifications of MTQ standard 4101. Asphalt shall be sampled at the production facility before work commences.

.2 Submit test results and the certificate issued by the manufacturer attesting that the bituminous binder to be used meets the requirements of the present section.

.3 Submit to the Canada Parks Representative for approval the proportioning formula for the asphalt concrete mix together with test results for the mix, at least two (2) weeks before the beginning of work.

1.8 DELIVERY TICKETS

.1 Each load delivered to the site shall be accompanied by a delivery ticket in duplicate. The Canada Parks Representative's must sign one copy as a receipt for the Contractor and keep the other copy.

1.9 PAVED ROAD

.1 Work involving paved roads involves, without being limited to, providing the materials and labour required to complete, in a manner consistent with industry standards, the construction of a road, including:

.1 Excavation to the subgrade line,

.2 The loading, transportation and disposal of excavation waste in a site compliant with the stipulations of the Soil protection and rehabilitation of contaminated sites of the MELCC policy,

.3 Supply and placing of fill material approved by the Canada Parks Representative,

.4 Supply and installation of geotextile membrane,

.5 Supply and laying of subbase and base course as specified in the plans and specifications,

.6 Adjustment and levelling of framework and covers of valve boxes and cleaning of said structures,

.7 Supply and laying of layers of asphalt coating, base and surface courses, as specified in the plans and specifications,

.8 Supply and application of the tack coat.

1.10 ROAD MARKINGS

.1 Road-marking work involves, without being limited to, providing the materials and labour required to complete, in a manner consistent with industry standards, marking of the road as specified in the plans and specifications, including:

.1 Supply and application of paint and reflective glass micro beads in compliance with the marking plans, and all related work including cleaning of surfaces prior to marking, if necessary.

1.11 GEOTEXTILES

.1 Geotextile work comprises the supply of all materials, labour and equipment required for the installation of geotextile membranes, and also includes any loss of material for overlapping during installation of the membrane; in other words, the Contractor is paid by the theoretical square metre of surface to be covered by the geotextile membrane.

PART 2 - PRODUCTS

2.1 GOTEXTILE MEMBRANE

.1 Geotextile membranes installed in the infrastructure must be Type III and meet the requirements of MTQ standard 13101.

2.2 AGGREGATES FOR SUBBASE AND BASE COURSE

.1 Aggregates used for the subbase and base course must meet the requirements of MTQ standards 2101 and 2102 and those of Section 31 23 11 - Civil – Excavation and Backfilling - Underground Services.

2.3 ASPHALT MIXES – HOT PREPARATION AND LAYING

.1 Definitions

.1 Asphalt mixes: An asphalt mix prepared and laid hot is a combination of new aggregates and bitumen, mixed hot in a mixing plant and designed to be laid while hot.

.2 Internal quality control: Quality control done by the Contractor responsible for supplying asphalt mixes.

.3 External quality control: Quality control done by an organization independent of the Contractor and paid by the Canada Parks Agency.

.4 Internal control tracking: Tracking of the Contractor's internal control results by the external control process.

.5 Process audits: Within a specific project, documented audit of the asphalt mix production process and of the implementation of quality management activities described in the Contractor's quality manual and in the quality plan and the control and testing plan.

.6 ISO 9002: Standard that defines minimum requirements for a quality system.

.7 Reclaimed asphalt pavement: Asphalt that has been reclaimed either by milling or by in situ pulverization.

.2 Reference standards

.1 Hot mix asphalts must be compliant with the requirements indicated in the plans and specifications and with applicable standards from the MTQ's standard for road construction and maintenance (vol. VII - Matériaux des normes de constructions et d'entretien routiers). The applicable edition is the most recent as of the signing of the contract documents. The standards are:

.1 Standard 2101: Granulats [Aggregates]

.2 Standard 4101: Bitume [Asphalts]

.3 Standard 4201: Enrobés à chaud formulés selon le principe de la méthode Marshall [Hot mix asphalts formulated using the Marshall method]

.4 Standard 4202: Enrobés à chaud formulés selon la méthode de formulation du Laboratoire de chaussées [Hot mix asphalts formulated using the Laboratoire des chaussées (Quebec pavement laboratory) method]

2.4 CONSTITUENTS OF ASPHALT MIXES

.1 Asphalt

.1 Specifications

.1 The required characteristics and evaluation criteria for asphalts are found in MTQ standard 4101.

.2 The performance class of asphalts is defined by the expression PG H L, i.e.:

.1 PG: Performance Grade;

.2 H: temperature (in °C) above which the asphalt is likely to experience irreversible deformations;

.3 L: temperature (in °C) below which the asphalt is likely to crack due to thermal contraction.

.3 The performance class to be used is indicated in the specification. Class PG 58-28 is generally used for pavement designed for local traffic with no bus traffic when specified; in other cases class PG 64-34 is used for the surface course when specified.

.2 Quality assurance

.1 All asphalt used for producing asphalt mixes must be produced by a Producer holding an ISO 9002 compliant quality certification (Quality system - model for quality assurance in production, installation and servicing).

.2 For each delivery of asphalt, the asphalt-mix Producer must obtain a certification of compliance from the asphalt Producer containing the following information:

.1 General information:

.1 Identification of the Producer and place of production;

.2 Performance class of the asphalt;

.3 The lot number;

.4 Production date.

.2 Characterization tests:

.1 Date of asphalt characterization;

.2 All tests in table 4101-1 of standard 4101.

.3 Control tests:

.1 Date of test;

.2 DSR (AASHTO TP 5) tests on the source asphalt:

.1 The high characterization temperature (Te)

.3 BBR (AASHTO TP 1) tests on the source asphalt:

.1 Stiffness value - So;

.2 Slope value mo.

.4 Recommendations – service temperatures

.1 Minimum and maximum storage temperatures;

.2 Minimum and maximum mixing temperatures (1);

(1) A range of 14 °C is allowed for mixing. The interval is determined by applying a tolerance of ± 7 °C to the optimal mixing temperature corresponding to a viscosity of 0.17 Pa-s. This temperature is determined using the MTQ's LC 25-007 testing method. In the event that this calculation yields a maximum mixing temperature above 170 °C, the maximum mixing temperature is set at 170 °C and the minimum at 156 °C.

.2 Aggregates

.1 Aggregates used for preparation of asphalt mixes must be compliant with the requirements of MTQ standard 2101.

.2 For asphalt mixes formulated according to the Marshall method, aggregates must additionally meet the requirements of MTQ standard 4201. However, the polishing-by-projection coefficient requirement (LC-21-102) does not apply.

.3 For asphalt mixes developed using the Laboratoire des chaussées method, aggregates must additionally meet the requirements of MTQ standard 4202.

.4 Intrinsic and manufacturing characteristics are indicated in the contract documents. If omitted from these documents, the following characteristics apply:

TABLE - AGGREGATES

TYPE OF PAVEMENT	AGGREGATE SIZE	INTRINSIC CHARACTERISTICS CATÉGORY	MANUFACTURING CHARACTERISTICS CATEGORY
Local traffic, no buses	Coarse	2	A
	Fine	2	
All others	Coarse	2	A
	Fine	1	100 % fractured

.5 Unless otherwise specified in the contract documents, fine aggregates must consist of manufactured sand or a combination of natural and manufactured sand, and coarse aggregates must be crushed quarried rock.

.3 Hot mix asphalt

.1 Hot mix asphalts must be produced in compliance with MTQ standards 4201 and 4202. The asphalt mixes must be produced by a firm operating a mixing plant registered by a registrar accredited by the Standards Council of Canada or a recognized certifying body attesting that the Producer has a quality system compliant with ISO 9002 "Quality system - model for quality assurance in production, installation and servicing."

.2 Reclaimed asphalt concrete, coarse and fine aggregates containing scoria and/or blast furnace residues must not be used in any asphalt mix.

.4 Resistance to rutting

.1 Requirements for rutting resistance of asphalt mixes as presented in tables 4201-1 and 4202-1 of MTQ standards 4201 and 4202 apply when the asphalt used is performance grade PG 64-34.

.5 Presentation of formulas

.1 The theoretical formula for the hot mix asphalt must be signed and dated by the Producer's quality control manager and supplied at least one week before delivery. One theoretical formula per type of asphalt mix must be produced for each type of binder or each change in aggregate supply. The characteristics given in the formula must be representative of the hot mix asphalt to be placed and compliant with the requirements of the applicable standard, specifically MTQ 4201 for hot mix asphalts formulated using the Marshall method and MTQ 4202 for hot mix asphalts formulated using the MTQ Laboratoire des chaussées method. The percentage of air voids in the mix to be produced from a formula must be 3 to 4 %.

.2 Each year, when starting up production, the Producer must perform an in-process evaluation of the formula as presented. The evaluation of the asphalt mix formula is made from the results of tests done by the Producer on five samples drawn from a representative production run. Two reference samples must be taken at the time of in-process testing, and the Producer must advise the Canada Parks Representative of the date and place of the sampling, to which the Canada Parks Representative may send a representative. The list of tests required for evaluation of the formula is presented in Appendix 1.

.3 If results of the reference test are compliant with the requirements of the present specification, the final formula is accepted as submitted or with minor modifications.

.1 Lots

.1 Rulings as to compliance or non-compliance shall apply to the lot as a whole.

.2 Work is subdivided into lots of 1 000 tonnes. Work involving total quantities smaller than a lot shall be considered to constitute one lot.

.3 For work involving more than one lot, the quantity in tonnes exceeding a lot or a round number of lots, is considered to constitute a lot if equal to or greater than 100 tonnes. Otherwise, it is considered to be part of the final complete lot.

.4 A lot means the production of a single type of mix in the same plant, for a specific project involving the Canada Parks Representative and under the same contract.

.5 Sampling of the asphalt mix must be done on the jobsite or in the plant by the Laboratory using a random numbers table and at the frequency of one sample per 200 tonnes of asphalt mix. Sampling is to be done according to the LC 26-005 testing method and compliance testing is to be done at the Producer's expense. The sample is divided into two portions. One portion is used for internal control tests, while the other is set aside for external control tests. In case of quantities inferior to 600 tonnes of mix, a minimum of 3 samples is collected.

.6 The name of the quality representative and that of the sampling supervisor must be submitted to the Canada Parks Representative for approval before the start of work. For each day of production, test results by sample and the external control

samples must be submitted to the Laboratory engaged by the Canada Parks Representative not later than two business days after the placement of the asphalt mix. For a lot, the report must be submitted to the laboratory not more than 1 week after completion of production of the lot. The required tests are listed in Appendix 1.

.6 Compliance

.1 Main characteristics

.1 In addition to meeting the requirements of the present specification, a lot is considered compliant following external control testing if, for the main characteristics, the deviation between the average results obtained for samples taken from the lot and the formula is within acceptable deviations (Et) indicated in the following table:

TABLE – MAIN CHARACTERISTICS

ACCEPTABLE AND CRITICAL DEVIATIONS FROM THE FORMULA					
Main characteristic	Et for N = 1	Et for N = 2	Et for N = 3	Et for N = 4	Et for N = 5
% passing through the 80 µm screen - All mixes	1,7	1,2	1,0	0,9	0,8
Granulometric total - EB-20, EB-14, ESG-14 - EB-10S, EB-10C, ESG-10, EG-10	 40 30	 30 22	 24 18	 21 16	 19 14
Bitumen content - All mixes	0,45	0,38	0,31	0,27	0,24
Compactness - EB-20 - EB-14, ESG-14, EB-10S, EB-10C, ESG-10, EG-10	4,0 4,0	1,6 1,6	1,2 1,4	1,1 1,3	0,8 1,0

** N = Number of samples*

Note 1 *For compactness, acceptable and critical deviations are applied to the minimum requirement of 92 %.*

Note 2 *Acceptable and critical deviations apply to the mean value for the lot as compared to the formula.*

Note 3 *The values of the deviations indicated are expressed as percentages.*

.2 Percentage air void

.1 A lot will be considered compliant if the percentage of air voids as established by standard LC 26-320 deviates less than 1,5 % from the final asphalt mix formula.

.3 Correction factor

.1 No correction factor will be applied. If a batch does not respect the tolerable variations, it will be rejected. The Contractor will have to remove, to his own expenses, all the bituminous mix constituting this batch if this one is already set up and to carry out again paving work in order to respect the allowed variations.

.4 Other characteristics

.1 Hot mix asphalt formulated using the MTQ Laboratory method

.1 For hot mix asphalt formulated using the Laboratory method (MTQ standard 4202) to be compliant, it must also meet the following criteria:

.1 In results of analysis for the first screen, in which retained material is permitted, the percentage of material passing through the screen must not be under the minimum requirement indicated in table 4202-1 of MTQ standard 4202 by more than 3 %, and the requirement of 100 % of material passing through the next largest screen must be met as stipulated in the same table;

.2 The percentage of "Marshall" voids exceeding 1,0 % or deviating more than 1,5 % from the average % of "Marshall" voids obtained during the in-process analysis of the theoretical formulas and the establishment of final formulas must be targeted or met;

or

The percentage of voids indicated in table 4202-1 of MTQ standard 4202 for each number of gyrations in a gyratory shear compactor is targeted or met.

In the event that one of these criteria is not met, each sample that failed to meet one or more criteria is to be analyzed separately for compliance with the requirements of table 4201-1 of MTQ standard 4201 in order to identify the source of bias, and the Canada Parks Representative reserves the right to reject the work and have the work re-done by the Contractor.

All asphalt mixes that do not meet the requirements stated in the plans and specifications shall be deemed defective.

.7 Types of asphalt mixes

.1 All asphalt mixes must resist rutting. Rutting resistance tests must be performed in compliance with MTQ standard 4201, in particular table 4201-1.

.2 The Contractor must supply a data sheet showing that the asphalt mixes are resistant to rutting.

.8 Acceptance inspection of pavement compactness and thickness

.1 This section does not apply to asphalt mixes used for patching or for correction before laying of the surface course.

.1 Verification of compactness using radiation-type densimeter

.1 The Canada Parks Representative verifies the compactness of asphalt pavement using a radiation-type densimeter.

.2 Calibration of densimeter

.1 For each mixing plant, the densimeter to be used is calibrated using the procedure defined in standard ASTM D 2950, "Standard test method for density or bituminous concrete in place by nuclear methods" or by comparison of densimeter results and core sample densities, done at least once per year per type of asphalt mix using an average of at least six core samples in order to correct the density reading obtained with the device.

2.5 TACK COAT

.1 The tack coat is a fast-curing RS-1 type bituminous emulsion. The tack coat must meet the requirements of MTQ standard 4105. Supply of the tack coat must meet the requirements of the MTQ's general specifications (CCDG).

2.6 PROPORTIONING FORMULA

.1 The proportioning formula shall be supplied by the Contractor and approved by the Canada Parks Representative.

.2 The proportioning formula must be developed by a testing Laboratory approved by the Canada Parks Representative.

.3 The formula cannot be modified without the approval of the Canada Parks Representative. If the source of material changes, a new proportioning formula must be approved by the Canada Parks Representative.

2.7 LIQUID DUST-CONTROL AGENT

.1 When vehicles must drive on an aggregate surface and weather conditions cause excessive dust to be raised, hindering traffic and harming the environment, the Canada Parks Representative may request that the surface be treated with a liquid dust-control agent consisting of a calcium chloride ($CaCl_2$) solution.

.2 The agent is to be applied to a levelled, prepared surface.

.3 The calcium chloride solution, which must be 35 % by weight, is applied under pressure in one or two applications at the rate of 1,0 L/m^2 unless otherwise indicated.

.4 The aqueous calcium chloride solution must meet the requirements of standard NQ 2410-001 "Solution aqueuse de sels inorganiques utilisée comme abat-poussière" [Aqueous solution of inorganic salts used as dust-control agents].

.5 The Contractor shall ensure that the specified application rate is respected. No application is to be made during rain or on an excessively damp surface.

.6 If necessary, the Canada Parks Representative may verify the compliance of the product. Sampling of the material on site is done from the spreader tank according to standard ASTM-D260, and analysis of the aqueous solution is done using the Solvay 832-A method or by densimetry. The samples are used for determining the quality and concentration of $CaCl_2$ in the solution. Solutions must be applied using a spreader with spray bar fitted with accessories appropriate to the work such as a tachometer, pump, pressure gauge and spray bar with jets and sprinklers.

.7 Application of liquid calcium chloride includes purchase, transportation, application and all other incidental expenses.

2.8 ROAD MARKINGS

.1 Quality of paint

.1 The paint used for painting markings must meet the requirements of MTQ standard 10201 "Peinture alkyde pour le marquage des routes" [Alkyd paint for road markings] from the general standards (CCGD), most recent edition. The only products that will be considered are those previously approved via the most recent MTQ central laboratory call for tenders.

.2 Data sheet

.1 At the first site meeting, the Contractor must provide the Canada Parks Representative's with the paint manufacturer's data sheets, certifying compliance of the product. The data sheet must include full identification of the product, including:

.1 Manufacturer's name and address;

.2 Name of the product;

.3 Product code;

.4 The reference to MTQ standard 10201;

.5 Manufacture date;

.6 The colour and its code;

.7 The product's physical and chemical characteristics;

.8 Storage conditions;

.9 Instructions for pavement preparation;

.10 Methods and conditions of application specified by the manufacturer.

.3 Paint manufacture date

.1 All paint used for road markings must be from a batch produced not more than three (3) months before the date of application.

.4 Safety sheet

.1 Barrels must be labelled in compliance with standards for the identification of hazardous materials.

.5 Materials

.1 The Contractor must have at its disposal the required and appropriate materials for painting each type of line. The Canada Parks Representative reserves the right to verify equipment, tools, materials, or employees scheduled to do the work at any time before or after acceptance of the agreement and to reject any inadequate or non-compliant device and/or any vehicle in poor condition.

.2 Spray guns must have a minimum pressure of 550 kPa.

.6 Micro beads for painting

.1 Micro beads must meet the following standards: BNQ 3820-200 and BNQ 3702-600 "Microbilles de verre pour peinture servant au marquage des routes" and MTQ 14601, "Microbilles de verre pour peinture servant au marquage des routes" [Glass micro beads for road markings].

.2 Micro beads are to be used for centre lines, stop lines, crosswalks and arrows. The rate of application of glass beads shall be 0,6 to 0,7 kg/L of paint. Application of micro beads must be done mechanically and on the entire painted surface.

.7 Application of paint

.1 The Contractor shall apply the paint using a spray gun at the rate of 0,56 mm thick ± 0,04 mm (wet film) and apply the glass micro beads on wet paint at the rate of 0,6 to 0,7 kg/L of paint. The method of micro bead application must be approved by the supervisor.

.2 Following application, fresh paint shall be protected by markers or cones for a minimum of one hour.

.3 The product must not be applied on longitudinal seams in the pavement or on crack sealant.

.4 The product must not be applied over existing marking materials.

.5 Measurement of wet film thickness of the paint for purposes of acceptance is done by the Laboratory engaged by the Canada Parks Representative in compliance with standard NQ 3700-927 (Appendix A).

.8 Colour

.1 The colour to be used for each element is indicated on the plans. All omissions or deviations must be brought to the attention of the Canada Parks Representative as soon as possible.

.9 Quality of medium duration product

.1 Paint used for medium term markings must comply with MTQ standard 10202 "Peinture alkyde pour le marquage des routes" [Alkyd paint for road markings], most recent edition. The product must be resistant to damage from contact with sodium chloride or other chemical agents used for de-icing the road and to contact with oils in paving products and motor oil.

.2 The product must be applied in its liquid state using a modified paint gun allowing the application of the product in a single coat 120 mm wide and 0,64 mm thick.

.3 In order to ensure retro-reflective performance, reflective glass micro beads shall be sprinkled on the paint immediately after application.

.4 Drying time must not exceed 60 minutes, after which time traffic must be allowed back on the road.

PART 3 - EXECUTION

3.1 GENERAL

.1 The construction of bases and pavement shall be done after spring thaw, once the site is completely free of snow-melt runoff water. The preparation and laying of asphalt mixes must be done in favourable weather and at an ambient temperature suitable for producing a smooth surface meeting the requirements of the present specification. It is not permitted to operate when moisture in aggregates affects the temperature of the mix or the pace of operations, or when the base is soaked or covered with puddles or mud. The temperature of the surface to be paved must be at least 5 °C with an upward trend. When the surface temperature drops below 7 °C, no surface course may be laid without the Canada Parks Representative's written permission. At all times, the mix must be compacted until it reaches the specified density. No surface mix is to be laid after October 15 without the Canada Parks Representative's permission.

.2 At all times, the Contractor must take the necessary steps to reduce to a minimum dust emissions caused by the work.

.3 The asphalt mix is composed of coarse and fine aggregates or fine aggregates alone, evenly coated with asphalt binder in a mixing plant and at a temperature favourable for mixing and laying.

3.2 ALIGNMENTS AND LEVELS

.1 All work must be done in conformity with the alignments and levels indicated in the plans and details.

.2 Except as otherwise indicated on the plans, final resurfacing elevations must be the same as the elevations for connection to existing pavement.

.3 If obstructions or other circumstances not foreseen on the plans disrupt the work to the point that changes are required, the Canada Parks Representative may require that work be modified or moved.

3.3 PAVEMENT REPAIR

.1 When existing pavement is excavated, the Contractor fills the upper portion of excavations and repairs the joint with existing asphalt mix in the following manner:

.1 Make a saw cut and excavate, lay the conduit and asphalt;

.2 Fill with class "A" aggregate, compacted to 90 % of the modified Proctor value, in layers no thicker than 600 mm, to one (1) metre below the level of the surface course. From that level to the underside of the pavement, required compactness for crushed stone shall be 95 % (modified Proctor); the final layer of fill using MG-20b under the infrastructure line shall be compacted to 95 % of the modified Proctor value to a thickness of 150 mm.

.3 Make a new saw cut in the pavement, 1 metre (min.) from each side of the original saw cut, and excavate at 45° to one (1) metre below pavement level;

.4 Fill with stone for the base according to specifications in a thin layer of 150 mm to the underside of the pavement and compact to a minimum of 95 % of the modified Proctor value;

.5 Coat the sides of the pavement with a tack coat before paving.

.2 Original markings must be repainted, included in the cost of paving. After repairing the cut, seams are hot milled using the thermal regeneration method in order to melt the seams.

3.4 REPAIR OF SURFACE TO BE PAVED

.1 On an aggregate base

.1 When the scarification and removal of part of the base course are necessary due to contamination of same owing to a delay, outside the Contractor's responsibility, between constructions of the base and covering with asphalt concrete, the Contractor shall advise the Canada Parks Representative before undertaking such operations.

.2 After authorization by the Canada Parks Representative, the Contractor shall proceed to the cleaning, scarification and removal of a portion of the base course, and spread additional crushed rock in order to correct the profile of the base course.

.3 The surface to be covered must have a slope and direction consistent with the plans, longitudinal profiles and cross sections as included in the contract, must not deviate by more than 5 mm from the theoretical profile. It must be dry, compacted as per requirements and free of foreign or loose materials.

.4 All manholes, valve rooms, valve boxes, and similar infrastructure are adjusted and levelled to 10 mm below the final level of the surface course, while catch basins are installed 25 mm lower than the final surface course level. The cost of such work is included in surface preparation work.

.2 On an asphalt concrete surface

.1 When the base course of asphalt concrete is rough or irregular, a correction layer must be laid, using a leveller or mechanical spreader and compacted before the laying of subsequent courses.

.2 Before laying the new layer, the Contractor must spread an asphalt primer.

.3 Depressions and irregularities are corrected locally and defective materials, ridges and surplus material accumulated in cracks, seams or elsewhere are to be removed.

.4 All public utilities are to be adjusted to 10 mm below the final surface level, or 25 mm in the case of catch basins.

.3 Contact surface

.1 The Contractor must apply a tack coat to every paved surface to be covered, in between each layer of hot mix asphalt, on all vertical contact surfaces and on curbs, sidewalks, gutters or other structures.

.2 All seams between old and new pavement must be cleaned and filled with a bituminous binder compliant with MTQ standard 4105. The approved binder must be spread in accordance with the requirements of the article titled "Tack Coat."

3.5 SUBGRADE PREPARATION

.1 This section covers the work to be done to ensure that the subgrade has the shape indicated by the longitudinal sections and cross-sections before proceeding with construction of the pavement structure.

.2 The Contractor must excavate and remove existing bases and pavement, sidewalks and curbs on the construction site. All materials must be disposed of off-site, as described in Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.3 The loading, transportation and disposal of excavation waste from subgrade preparation in a site compliant with the Soil protection and rehabilitation of contaminated sites policy (MELCC) shall be done at the Contractor's expense.

.4 Preparation of the roadbed where foundations for the various outdoor facilities will be built must be done in compliance with the relevant requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services and in accordance with the recommendations of the geotechnical study.

.5 Subgrade preparation includes grading work necessary for creating a roadbed on which will be built the foundations of road infrastructure, consistent with the profile indicated on the plans and details. The roadbed must be profiled in a manner that permits drainage of foundations to intakes. The subgrade must be smooth and free of ruts and depressions. The layer of topsoil in the traffic lane right-of-way must be excavated.

.6 The surface to be prepared must be perfectly drained beforehand and for the duration of preparation work. If there are small inequalities, deviating less than 50 mm from the required profile, it is sufficient to level the entire surface with a grader, then to compact the surface with the appropriate tools. If the surface is rough or uneven, the Contractor must first scarify it to the level of the bottom of the depressions and recommence compacting operations.

.7 If it is impossible to obtain an even, stable surface due to the presence in the subgrade of materials in poor condition, these materials must by dried by harrowing or excavated.

.8 Any borrow required for filling such excavations must be of a quality acceptable to the Canada Parks Representative.

.9 Before laying subbase or base course materials, the evenness of the surface is to be verified by the Canada Parks Representative. Work to install the subbase or base course may not begin before the Canada Parks Representative has accepted the subgrade.

.10 Next, compact the natural soil over a thickness of at least 300 mm, such that the compactness of subgrade soil is everywhere at least 95 % of its maximum dry density as determined via the modified Proctor test.

.11 All subgrade surfaces that are not accessible to heavy compacting machinery shall also be perfectly compacted, using appropriate small machinery or a vibrating plate.

.12 Any soft or unstable points must be excavated and filled with more stable material with similar grain size distribution to surrounding materials.

.13 At locations where the ground profile must be raised to the level of the planned subgrade, the Contractor must plan for raising with modified MG-112, in layers 300 mm thick and compacted to 95 % of maximum density as determined by the modified Proctor test.

.14 After compacting and profiling the roadbed, the Contractor must, as soon as possible, begin construction of the subbase so that the subgrade is not excessively exposed to the elements and altered as a consequence.

3.6 SUBBASE

.1 Generalities

.1 The subgrade surface must be prepared in accordance with the requirements of the articles titled "Compacting of materials" and "Subgrade preparation." The thickness of the sub foundation is determined by the tender documents. Aggregates are spread in layers of uniform thickness not to exceed 300 mm. The spreading method used must prevent all segregation of aggregates.

.2 Compacting is then done using the method described under "Compacting of materials." The required degree of compactness is 95 % of maximum dry density as determined by the modified Proctor test.

.3 Before laying the subbase, the sub foundation surface must be free or ruts or other depressions and must not deviate by more than 10 mm from the levels and longitudinal and cross sections shown on the plans.

.2 Construction method

.1 Subbases are then constructed in successive layers. Specified aggregates are spread across the entire width of the subgrade or sub foundation at a uniform thickness, without segregation, in compliance with the cross section of the planned pavement. The surface is then levelled and, if necessary, moistened or dried in order to obtain the desired compactness.

.2 Each layer must be compacted separately in compliance with the requirements of the section on "Compacting of materials." The required degree of compactness is 95 % of maximum dry density as determined by the modified Proctor test. Areas that are difficult to access must be compacted manually using appropriate tampers, special compactors or vibrating plates.

.3 The Contractor shall also include the costs of the following procedure: laying of the subbase and base course, adjustment above public utilities to 100 mm ± 25 mm below the level of the surface course, including the supply of adjustment rings and cleaning of manholes, valve chambers and catch basins (even if said structures were dirty at the start of work).

.3 Shaping

.1 Final shaping of the street must follow a slope and alignment compliant with the plans.

.4 Unstable or contaminated areas

.1 If weak points slump under the compactor or subgrade soil or mud mix with the subbase, such unstable or contaminated materials must be removed and those portions of the subbase shall be rebuilt after strengthening of the subgrade.

.5 Subbase cleaning

.1 If paving is done long after the subbase is constructed, the subbase is to be decontaminated. Such work includes the removal and transportation of materials deemed by the Canada Parks Representative to be contaminated, and the shaping and compaction of the subbase.

.6 Placing

.1 Place geotextile membranes after the subgrade has been inspected and approved by the Canada Parks Representative.

.2 Place subbase materials after the subgrade has been inspected and approved by the Canada Parks Representative.

.3 Acceptance of material and density tests are described in Section 31 23 11 - Civil - Excavation and filling - Underground Services.

.4 At the joint between new and existing pavement structures, a transition must be made in the various foundation layers with a slope having a ratio of 1 V : 1 H.

3.7 PAVING

.1 General

.1 Materials (finishers, compactors, etc.) and the use of asphalt mixes must be compliant with the requirements (technical only) described in section 13 - Revêtement de chaussée en enrobé [asphalt road paving] of the MTQ's general specifications (latest edition).

.2 The payment terms described in section 13 - Revêtement de chaussée en enrobé of the MTQ's general specifications (latest edition) do not apply to this project.

.2 Transportation of mix

.1 The mix must be transported to the site in sealed (boxed) vehicles. All loads must be delivered early enough to allow for spreading and rolling in daylight. It is never permitted to overheat a mix to counteract cooling caused by travel time, no matter how long the trip.

.3 Adjustment of structures

.1 All access shafts for underground structures in paved areas must be adjusted to the final level of the pavement. Access shafts on grass shall be adjusted to grass level.

.2 Catch-basin heads and catch-basin manholes must be adjusted to 6 mm (¼ in) below the final level of the paving.

.3 For all of the above adjustment work, the Contractor must supply and install all levelling rings, extensions or other accessories required for completing the work to industry standards and to the Canada Parks Representative's satisfaction.

.4 Asphalt covering

.1 Each course of asphalt mix must have a uniform texture, free of segregation or bleeding, be regular and compliant with the profiles specified on the contract drawings. Cross sections and longitudinal sections of the paved surface must

allow for water runoff to catch basins, with no accumulations of standing water. After the final compacting of each course, the Canada Parks Representative will verify the alignment and slope. The profile of each course must not deviate by more than 6 mm (¼ in) per 3 m (10 ft) from the profile specified on the contract drawings. The thickness of each course must not deviate by more than 6 mm (¼ in) from the specified thickness.

.2 Run-off slopes on hard surfaces must not have a grade less than 1%, unless otherwise indicated.

.5 Tack coats

.1 The Contractor must apply a tack coat to surfaces to be paved, in the form of an RS-1 type emulsion in compliance with the MTQ's general specifications (most recent edition). On horizontal surfaces, the tack coat is applied uniformly using a spray bar under pressure.

.1 At the residual rate of 0,5 L/m^2 for binders on aggregate surfaces (when required);

.2 At the residual rate of 0,25 L/m^2 for the tack coat on a paved, planed or newly paved surface.

.2 Likewise, the Contractor must brush with the same binder contact surfaces between concrete curbs and sidewalks, catch basins, manholes, valve boxes, access and/or utility shafts, etc.

.3 The Contractor shall take all necessary precautions to ensure that a tack coat does not spill onto already paved adjacent surfaces or surfaces that are not going to be covered with asphalt.

.4 While the binder is curing, vehicle traffic must be detoured or controlled.

.5 If is forbidden to apply binders during rain or on wet or frozen surfaces or when, unless recommended by the manufacturer, the ambient air temperature is below 10 °C.

.6 A surface to which a tack coat has been applied must be covered with the new asphalt course the same day if the road is open to traffic overnight.

.7 All transverse joints and longitudinal seams must be brushed with an even coat of binder at the rate of 0,4 L/m^2.

.8 Cutback is not to be used for tack coats.

.6 Application of asphalt mix

.1 Mechanical

.1 Comply with the technical requirements of section 13 - Revêtement de chaussée en enrobé of the MTQ's general specifications (most recent edition).

.2 When mixing and aeration of the asphalt mix are complete, use the paving machine to spread the mix to the desired elevations.

.3 All surface, base and subbase courses are to be spread mechanically using a self-propelled paving machine driven by a competent operator. Adjustments to the subgrader, tampers, distributor screws, etc. are to be verified regularly to ensure that the mix has a uniform texture devoid of tearing, deformations or grooves. The operating mode (stop time, speed, etc.) of a paving machine must be such as to allow the laying of a course with the correct density and other characteristics. All asphalt mixes whose composition or temperature is non compliant must be rejected.

.2 Joints and seams

.1 Longitudinal seams must be parallel to the alignment lines. The paving machine must travel on a line parallel to the centre of the road. When two paving machines are working in echelon, the first follows the line and the second follows the edge of the strip of asphalt laid by the first. In order to achieve a hot, easily compacted seam, the two pavers are to drive as close to one another as possible and in no case separated by more than 75 m. When a single paving machine is used, the mix is laid in alternation on either side of the road in strips not exceeding 200 m in length in warm weather and 50 m in cold weather. The Canada Parks Representative may make an exception to this rule and indicate a more suitable sequence considering the thickness of the mix, the temperature and the hourly production of the central plant. Whenever possible, the laying of asphalt at the end of the day is to be organized so as to avoid leaving any longitudinal seams to be completed the next day. Joints between new and old pavement and between pavements laid on consecutive days are to be made with care in order to produce a perfectly continuous connection. In order to obtain well-made transverse joints, the edge of the previously laid course must be cut to the full depth, brushed with an even coat of emulsion and heated so as to make a heat seal.

.3 Irregularities

.1 Immediately after laying a course and before rolling, the surface is verified and any irregularities remedied. Accumulations of materials due to the grader are removed with a shovel or hoe. Scalloping or other depressions are filled with hot mix and levelled. It is strictly forbidden in such cases to throw the mix in a manner that causes it to fan out.

.4 Manual spreading

.1 In locations that the paving machine cannot reach, hot mix is spread manually. This must be done carefully. The mix is applied evenly and spread in a loose layer of uniform density using rakes or hoes, taking care to avoid segregation. Before rolling, take care to check the surface with a rule and remedy any irregularities. Areas surrounding structures and covers and hard-to-access locations must be compacted with a hot iron.

.5 Cleaning of manual tools

.1 When manual tools are cleaned by flame, take care not to heat them to temperatures hot enough to burn the mix. When manual tools are cleaned with oil, the oil container is to be placed in a location where it cannot contaminate the mix.

.7 Compacting

.1 Generalities

.1 The instructions in the following articles are applicable to all pavement courses.

.2 Rolling must begin as soon as the mix is strong enough to support the roller without significant deformation.

.3 For initial rolling, use multiple-tire rollers. Rolling is completed with a steel roller that must produce a smooth, even surface compliant with the elevations indicated on the plans.

.2 Number of rollers

.1 The minimum number of rollers is two (2). However, the actual required number is that which makes it possible to create an asphalt coating whose surface course and density meet specifications.

.2 Rolling must be completed before sunset. An exception may be made to this rule if the Canada Parks Representative deems that satisfactory precautions are being taken.

.3 Rolling sequence

.1 The rolling sequence must be such that the asphalt coating has a surface course and compactness that meet specifications and that transverse joints and longitudinal seams are completely waterproof and are practically identical to the rest of the surface.

.4 Temperature control

.1 Storage temperature and central plant mixing temperature of the asphalt must be less than or equal to the maximum temperatures indicated on the asphalt's certificate of compliance.

.2 The decline in temperature of an asphalt mix between mixing and laying on the site must not exceed 15 °C.

.3 All mixes that fail to meet these requirements shall be rejected.

.4 Traffic must not be allowed to use freshly laid asphalt until the temperature of the surface has cooled to less than 50 °C.

.5 Checking compactness

.1 Rolling is to continue until the mix reaches the required density.

.2 The Contractor is free to check the compactness of each layer using the method of its choice. Compactness must be between 92 % and 98 % of that indicated by standard LC 26-320.

.3 All layers of asphalt must be compacted to at least 92 % of the maximum density indicated by standard LC 26-320.

.8 Quality and evenness of asphalt

.1 The surface of each layer (surface course, binder, base) must have a uniform texture, free of segregation, and be regular and compliant with prescribed alignments and slopes.

.2 After final rolling of each course, the Canada Parks Representative verifies alignments and slopes. The profile of each course must not deviate from the prescribed profile by more than 6 mm. All irregularities or depressions greater than 5 mm per 3 m on surface courses or 6 mm per 3 m on other courses must be corrected.

.3 Verification of irregularities is done using a 3 m straight edge fitted with a level, which the Contractor must have at its disposal on the site at all times.

.4 Any defective section must be replaced or remedied to the Canada Parks Representative's satisfaction before the Canada Parks Representative will allow another course to be laid or accept the completed work. The mix used for correcting depressions must be such that the nominal diameter of the largest particle is smaller than the mean depth of the depression.

.9 Lot

.1 For purposes of compactness control and work acceptance or rejection, and for the application of correction factors to unit prices submitted, lots are subdivided into lots of 1,000 tonnes each on the same basis as the physical characteristics of mixes.

.10 Determination of compactness

.1 The compactness percentage is determined by the gross density of the mix (specific gravity measured by radiation-type densimeter divided by the specific gravity of water at 25 °C, i.e. 997,044 kg/m^3) divided by the maximum average density on that day as measured during receiving inspection of the asphalt mix, multiplied by 100.

.11 Acceptance of a lot

.1 A lot is accepted when the average of compactness results is within the limits accepted.

.2 If the average compactness value does not meet requirements, the Canada Parks Representative shall advise the Contractor in writing, indicating that a reevaluation of compactness by collecting specimens via core sampling shall be done as described in the following section.

.12 Reevaluation of compactness by testing of core samples

.1 The Canada Parks Representative sets a date for the reevaluation of compactness using one (1) core sample for every 200 tonnes of asphalt mixes laid. The sampling points are to be determined randomly. Samples must be collected within 20 days following sending of notice to the Contractor.

.2 The compactness percentage of the pavement is the ratio of the gross density of the core sample drawn from the road to the maximum average density measured on the day as measured during the receiving inspection, multiplied by 100.

.3 Tests for gross density of the samples are to be done in the laboratory mandated by the Canada Parks Representative using MTQ testing method LC 26-040.

.4 The Contractor may assign an observer during sample collection and testing; any remarks on a procedure deemed faulty must be signed immediately, and any divergences must be brought to the Canada Parks Representative's attention.

.5 If the average of the compactness measurements of the core samples does not fall within the boundaries indicated on Table 1 (article 5.19.05.01), the correction factor given in article 5.19.05.03 shall apply.

.6 The costs of such reevaluation shall be borne by the Canada Parks Agency.

.13 Cleaning of manholes, valve chambers, catch basins, sidewalks and curbs

.1 Immediately after laying a course of asphalt mix, the Contractor must clean manholes, catch basins and valve chambers of all debris that accumulated during the work or that was present at the beginning of the work. Covers must be cleaned and sidewalks must be free of all asphalt primer stains.

3.8 DAMAGE TO EXISTING PAVEMENT

.1 When working on existing pavement, the Contractor shall saw, using an appropriate tool, each side of the area to be excavated along straight lines with a minimum length of 6 m and use a loader with tires to avoid damaging pavement that is to be kept; use of a tracked loader on existing pavement is prohibited at all times. If the Contractor neglects to meet this requirement, the Canada Parks Representative may require the Contractor to repair the pavement over the entire width of the street, at the Contractor's expense. The Contractor shall also take all necessary precautions to protect existing curbs and sidewalks, and is responsible for all damage to existing infrastructure and must make all repairs deemed necessary, at its own expense.

.2 The Contractor is to fill the upper portion of excavated areas and repair joints with existing pavement in the following manner:

.1 Make a saw cut, excavate, lay the conduit and its casing;

.2 Fill with class "A" aggregate, compacted to 90 % of the modified Proctor value, in layers not to exceed 600 mm, to one (1) metre below pavement level. From this level to a level just below pavement level, the required compactness for crushed stone shall be 95 % (modified Proctor); the final layer of fill under the infrastructure line, in MG-20b material, shall be compacted to 95 % (modified Proctor) over a thickness of 150 mm;

.3 Make a new saw cut in the pavement, at 1 m (min.) from each side of the original saw cut and excavate at 45° to one (1) metre under pavement level;

.4 Fill with stone for the foundation according to specifications, in a thin layer of 150 mm to the underside of the pavement and compact to a minimum of 95 % of the modified Proctor value;

.5 Apply a tack coat to the sides of the pavement before paving;

.3 Original markings must be repainted and included in the paving work. After repairing the cut, seams are hot milled using the thermal regeneration method in order to melt the seams.

3.9 CONTROL

.1 Notify the Canada Parks Representative and the Laboratory at least 24 hours before laying any asphalt mix.

.2 While asphalt mix is being laid, a representative of the Laboratory must collect samples and be present for the work. Tests must be done by the Laboratory designated by the Canada Parks Representative. The cost of these tests and supervision shall be borne by the Canada Parks Agency.

.3 Every layer of asphalt mix must be compacted to 92 % of the maximum density as specified in standard LC 26-320.

.4 All asphalt mixes must be resistant to rutting. Rutting resistance tests must be performed in compliance with MTQ standard 4201, in particular table 4201-1.

.5 The Contractor must supply a data sheet demonstrating that asphalt mixes are resistant to rutting.

3.10 WASTE MATERIAL

.1 Waste material shall be disposed of in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.11 SAMPLING SEQUENCE FOR ASPHALT MIXES

.1 Generalities

.1 Tests required for each analysis type are presented in tables below:

.2 Production-reference

.1 For the asphalt mixes in Tableau 4201-1, a type C analysis is required on each of five production reference samples. Type E analysis must also be performed on one of the five samples.

.2 For the asphalt mixes in Tableau 4202-1, a type B analysis is required for each of the five production reference samples. Type E and type D analysis must also be performed on one of the five samples.

.3 In production

.1 For each lot, the following analyses are required:

TABLE - TYPES OF ANALYSIS REQUIRED FOR EACH SAMPLE

	REFERENCE STANDARD	
NUMBER OF LOT SAMPLE	**4201**	**4202**
1	B	B + D
3	B	B
All other samples	A	A

TABLE – LIST OF TESTS REQUIRED FOR EACH ANALYSIS TYPE

		ANALYSIS TYPE				
DESCRIPTION	**STANDARD**	A	B	C	D	E
Granulometric analysis	LC 26-360	x	x	x		
Determination of filler mass in excavated material	LC 26-110	x	x	x		
Determination of bitumen content	LC 26-100	x	x	x		
Determination of maximum density	LC 26-045	x	x	x		
Determination of percentage of air voids and compactness in compacted hot mix asphalts	LC 26-320		x	x		
"Marshall" method for determining sample resistance to deformation				x		
Determination of compactability of hot mix asphalts using gyratory shear press	LC 26-003				x	
Water content	LC 26-001					x
Resistance to rutting (Note 1)						x

Note 1: The rutting test is required when the asphalt used is performance class PG 64-34; for other performance classes the test is required when stipulated in the contract documents.

3.12 ROAD MARKINGS

.1 General

.1 The location of the work is indicated on the plans provided with the proposal. The Contractor shall perform the marking work in compliance with the standardized plans and following the details shown on the Canada Parks Representative's sample plates and those appearing on the proposal plans or in accordance with the Canada Parks Representative's instructions.

.2 Pavement markings have the following colour and width:

.1 Lines marking parking spaces : 125 mm (5 in), White

.3 Marking of parking spaces for handicapped persons must comply with the standards of MTQ volumes I and IV.

.4 All materials such as paint, thinner, micro beads and other equipment, tools and labour for performing the work are supplied and paid by the Contractor.

.2 Conditions for applying paint

.1 One of the quality criteria for ensuring high-performance markings is the controlled application of paint:

.1 Paint must be applied on clean, dry surfaces.

.2 Places susceptible to accumulations of foreign matter such as rocks, soil, oil, etc. must be completely cleaned before painting. Mechanical street sweepers are recommended for this work.

.3 To achieve uniform, satisfactory results, the speed of the painting truck must not exceed 20 km/h.

.2 Paint must not be applied to the pavement in the following conditions:

.1 Wet pavement.

.2 There is a risk of the paint being exposed to rain before a reasonable drying time has elapsed.

.3 The air temperature is below 16 °C (60 °F) or above 32 °C (90 °F).

.4 Relative humidity is above 85 %.

.5 The pavement is covered with soil, debris or other dirt that can impede painting.

.3 The Contractor is not to use any thinner to accelerate drying or for any other reason.

.3 Application of markings in parking lots

.1 Premarking must be done with white and yellow depending on line position, and must be masked as well as possible by the final painting.

.2 Only centre lines and pedestrian and school crosswalk lines not at intersections are painted yellow unless otherwise indicated in the marking plans.

.3 The proportioning characteristics of the paint and micro beads are the following:

.1 Rate of application for unbroken line: 75 L/km (27.5 gal (UK)/mi),

.2 Thickness of line: 0,60 mm (0.024 in) (fresh paint), tolerance 10 %,

.3 Kilograms of micro beads per litre of paint: 0,60 kg/L (6 lb/gal (UK)) minimum, tolerance 10 %,

.4 Concerning the application of micro beads, it is imperative that they be applied uniformly over the entire marked surface in order to provide maximum effectiveness.

.4 Cones must not be removed before the paint is dry. The Contractor must install the cones no more than 15 m (50 ft) apart. The cones must be 450 mm (18 in) high and class II as described in the BNQ traffic cones standard ("Cônes de signalisation"), NQ 1941-501.

.5 The Contractor is responsible for removing by abrasion any paint spread by vehicles contacting the paint before drying, spilled by accident on the pavement or used for applying markings due to Contractor error.

.6 Corrections must be made by abrasion assisted by specialized material, and not through the use of neutralizing paint, and there must be no visible paint marks after removal work.

.7 All errors on the part of the Contractor must be rectified within seventy-two (72) hours or less.

.8 Where indicated on the plans, the Contractor must remove existing painted markings. To do this, the Contractor must remove the markings using specialized machinery and not through the use of neutralizing paint.

3.13 MARKING SUPERVISION

.1 Quality control

.1 At least twice per day, the Contractor must test the thickness of the wet paint film and measure the width of markings. Thickness measurement shall be done with an interchemical thickness gage before the application of glass micro beads.

.2 The Contractor must test the thickness of the paint film and the width of the lines. Thickness is measured using an interchemical thickness gage.

.3 A copy of the thickness tests must be submitted to the Canada Parks Representative, who may perform certain tests including a thickness test without prior notice to the Contractor and with the Contractor's cooperation.

.4 All non-compliant work shall be re-done at the Contractor's expense.

.5 The disposal of waste material will be done in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.2 Laboratory tests

.1 Samples may be collected by the Laboratory in order to check the compliance of materials used. If a sample tests non-compliant, all of the remaining product shall be replaced and the Contractor shall reimburse the Canada Parks Agency for all testing and control costs.

.2 Sampling of the product is done by the Laboratory during execution of the work. The Contractor shall cooperate with Laboratory personnel in facilitating sampling of the product.

.3 If the paint is found to be non-compliant, the Canada Parks Representative may call a halt to the work. The Contractor shall then be required to prove the compliance of the product it wishes to use before being authorized to continue the work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11 – Civil - Excavation and Backfilling - Underground Services

.2 Section 32 11 00 – Civil - Roadworks

.3 Section 33 31 00 – Civil - Sanitary and Storm Sewers

1.2 SCOPE OF WORK

.1 Ensure the supervision of the work and provide all manpower, equipment, tools, materials, products, transportation and other services required to carry out the work described and specified in this section and Contract documents, including but not limited to: the construction of cement concrete sidewalks and curbs, including excavation and the preparation of the infrastructure, the supply and installation of granular materials, in keeping with the alignments, levels, dimensions and typical sections stipulated in the Contract drawings or the Canada Parks Representative's instructions.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (BNQ - Quebec Standards Bureau) latest edition:

.1 NQ 1809-500: Travaux de construction - Trottoirs et bordures en béton.

.2 NQ 2501-255: Soil - Determining the water/density ratio - Modified compaction energy tests (2 700 kN.m/m^3).

.3 NQ 2560-114 : Travaux de génie civil - Granulats : Partie I à Partie VI.

.4 NQ 2621-900: Concrete of normal density and components.

.5 NQ 2629-520: Concrete sidewalks and curbs produced on site.

.2 Canadian Standards Association (CSA) latest edition:

.1 CAN/CSA 23.1/A23.2-0: Materials and Methods of Concrete Construction/Methods of Test for Concrete

.2 CAN/CSA 30.18-M92 (c2002) : Billet-steel bars for concrete reinforcement metals.

.3 CSA 40.21-04 : Structural Quality Steel.

.3 Ministère des Transports du Québec (MTQ - Quebec Department of Transport):

.1 Cahier des charges et devis généraux du Québec - Infrastructures routières, Construction et réparation (Project and General Book of Specifications - Road infrastructures - construction and repairs) (latest edition).

.2 Cahiers des Normes, Ouvrages Routiers, Tome VII « Matériaux » (Standards, Roadworks) latest edition.

.1 Standard 2102 - Granular materials for foundations, sub-bases, granular road surfaces and shoulders.

.2 Standard 3101 - Cement concrete of normal density.

.3 Standard 5101 - Reinforcement bars for concrete works.

1.4 ELEMENTS TO BE SUBMITTED

.1 Submit to the Canada Parks Representative, for approval, the proportioning formula for the concrete mix as well as results relating to this mix at least two (2) weeks prior to the start of the work.

.2 Submit to the Canada Parks Representative, for approval, the source of the granular materials for foundations and stone pathways.

1.5 WORK BY OTHER COMPANIES OR CONTRACTORS

.1 If need be, the Contractor shall be required to coordinate his work with that of the Municipality or any other contractor, company, or public utility, which may need to carry out work of any nature whatsoever, before or during the execution of work covered by this contract.

1.6 CONCRETE MONOLITHIC SIDEWALK AND CURB

.1 Work relating to monolithic sidewalks, slab sidewalks and curbs consists in, but is not limited to the supply of the materials and manpower required to carry out, according to good engineering practices, the construction of the concrete sidewalk, slab and curb, including:

.1 Excavation to the infrastructure line as well as the loading, transportation and disposal of excavation surplus to a site complying with the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.2 Supply and placement of granular sub-bases,

.3 Supply and placement of formwork,

.4 Supply and placement of concrete for the sidewalks and curbs,

.5 Supply and placement of reinforcement bars and wire mesh,

.6 Production of joints as stipulated in the plans and specifications, concrete finishing, curing and protection of the concrete, stripping of the formwork,

.7 Supply and placement of load-bearing fill,

.8 Patching of adjacent surfaces and repairs to damaged sub-bases and pavement.

PART 2 - PRODUCTS

2.1 CONCRETE

.1 The concrete mix for the sidewalks shall be of type IV as defined by the Quebec Department of Transport's Standard 3101 and must have the following characteristics:

.1 Maximum water/bond ratio: 0,45,

.2 Minimal compressive strength at 28 days: 35 MPa,

.3 Nominal diameter of the coarse aggregate: 20 mm,

.4 Air content: from 5 % to 8 %,

.5 Slump:

.1 80 mm ± 30 mm for a fixed formwork

.2 30 mm ± 20 mm for a sliding formwork.

.2 The concrete produced shall have a scaling rate under 0.5 kg/m2, evaluated as per the scaling test described in the NQ 2621-900/2002 standard.

.3 For all other concrete characteristics and classes of concrete, the Contractor shall refer to Table 3101-1 of the MTQ's 3101 standard.

.4 The concrete must be manufactured in a batching plant certified according to NQ 2621-900, according to the protocol of certification NQ 2621-905/96.

.5 Tests carried out on the job site shall comply with ACNOR standards.

.6 All CSA standard, including A23.1 and A23.2 dealing with concrete, the composition and placement of concrete, formwork, reinforcement bars, on-site tests as well as the rejection or acceptance of pours, shall be considered an integral part of this section. The Contractor is required to know these standards and comply with them when carrying out all concreting work.

2.2 GRANULAR MATERIALS FOR THE SUB-BASE

.1 Granular materials for the sub-base of sidewalks and curbs shall be 20 mm or MG-20 type crushed stone complying with the MTQ's 2102 standard.

2.3 GRANULAR MATERIALS FOR THE CONCRETE

.1 The cement, sand or fine aggregate as well as the coarse aggregate used in the production of concrete shall comply with the CSA-A23.1 standard or its most recent revision. No light aggregate shall be tolerated in the concrete.

2.4 CEMENT

.1 Generalities

.1 GU- type Portland cement

.1 Portland cement shall comply with the requirements of the CAN/CSA-A5 or ASTM (type I) standards and the type of cement used shall be based on applications defined in Table 3101-1 of the MTQ's 3101 standard.

.2 Blended hydraulic cement

.1 Type 10 E-SF blended cement shall comply with the CAN/CSA-A362 standard and its use must be based on applications defined in Table 3101-1 of the MTQ's 3101 standard.

.3 Quick-setting cement

.1 Quick-setting cement shall comply with CSA A5 or ASTM (type III) standards.

.2 Concrete sand (fine aggregate)

.1 Fine aggregate shall have the intrinsic characteristics in conformity with Category 3 and shall comply with part IV of the MTQ's 3101 standard.

.3 Crushed stone

.1 Coarse aggregate shall have the intrinsic characteristics in conformity with Category 3 and fabrication characteristics in conformity with Category C of part IV of the MTQ's 3101 standard.

.4 Alkali-aggregate reactivity

.1 Aggregates used in concrete for a structure exposed to frequent wetting, humid air or the application of de-icing salts or other alkaline solutions shall not present excessive reaction to alkali in the mix.

.2 Tests to assess the potential reactivity of an aggregate shall be conducted in compliance with the MTQ 3101 standard.

.3 The maximum swelling value shall be those shown in Table B2 of the CSA A23.1 standard for concrete prism expansion tests (ref.: C.C.D.G.).

.4 Results of an aggregate evaluation obtained from the concrete prism expansion tests can be validated or invalidated by an inspection of concrete structures built from the same aggregates as those used in the laboratory tests.

.5 Aggregates revealing alkali-carbonate reactivity must not be used in the concrete.

2.5 WATER

.1 Water used in concrete mixes shall be clean, potable, free of harmful substances (soil, acid, vegetable and organic matter) and comply with the MTQ 31010 standard. Salt water must never be used.

2.6 ADMIXTURES

.1 Air-entraining agent

.1 Air-entraining agents shall comply with the MTQ 3101 standard. The air-entraining agent shall be used in a solution. The solution shall be shaken to preserve its homogeneity.

.2 Setting accelerators or retardants and water reducers

.1 Setting accelerators or retardants and water reducers shall comply with the MTQ 3101 standard. All admixtures shall be used in solution form. The solution shall be shaken to preserve its homogeneity.

.2 The use of chlorides in any concrete containing reinforcing steel is prohibited.

.3 Cementitious admixtures

.1 The use of U-type cementitious admixtures (silica fume) shall comply with the MTQ 3101 standard.

.4 Superplasticizers

.1 Superplasticizers shall comply with CAN3.A266.6M "Superplasticizing Admixtures for Concrete" and CAN3.A266.5M "Guidelines for the Use of Superplasticizing Admixtures in Concrete".

2.7 ASPHALT BINDER

.1 Asphalt binder must be in conformity with ASTM D 1751.

2.8 CONCRETE CURING MATERIALS

.1 Concrete curing materials shall comply with the requirements of the MTQ 3101 standard “Curing Materials”.

2.9 FORMWORK

.1 All formwork shall be produced from sound materials complying with CSA requirements.

2.10 REINFORCEMENTS FOR CONCRETE

.1 The reinforcements used in the concrete shall comply with the most recent editions of the Quebec Construction Code as well as the Manuel des normes recommandées de l’Institut d’acier d’armature du Québec (Handbook of standards recommended by the Quebec Steel Reinforcement Institute).

.2 Unless otherwise specified, reinforcing work to be carried out shall comply with the CSA-A23.1-M00 standard and, if required, reinforcement bars shall be welded in compliance with the W186-M1990 standard.

.3 Wire mesh shall comply with CAN/CSA G30.18-M.

.4 When required, the wire mesh will be of type 152 X 152 MW 18.7 X MW 18.7, of a diameter of 4,88 mm and nuance 400W respecting standard ASTM A 185 or ASTM A 497/A 497M.

.5 The pins will be round and smooth, of a diameter of 10 mm, nuance 300W and a 1 000 mm length in conformity with standard CSA-G40.21.

2.11 CEMENT MORTAR

.1 Batches of cement mortar shall be mixed as needed and their consistency shall allow easy placement without tending to flow.

.2 The cement mortar is designated as follows:

.1 1 into 1: one part of Type 10 or 30 Portland cement and one part masonry sand

.2 1 into 2: one part of Type 10 or 30 Portland cement and two parts of masonry sand.

.3 Masonry sand shall comply with the CSA A82-56 or ASTM standard.

.4 An unshrinkable mortar pre-mixed with shrinkage compensating concrete is also accepted.

2.12 CONCRETE QUALITY CONTROL

.1 Generalities

.1 The Laboratory retained by the Canada Parks Representative shall verify mix formulas, the technical sheets of the concrete's components and technical sheets of curing products. It shall also conduct tests on the concrete both on the work site and in the laboratory.

.2 Certificate of compliance

.1 For each of the mixes used within the framework of this contract, the Contractor shall provide the Laboratory with a certificate of compliance attesting that the materials used in the product's formula meet the requirements of these specifications.

.2 This certificate of compliance shall be signed by the concrete supplier's representative in charge of quality control and shall be presented at least three (3) days before the mix is supplied. This certificate must contain all information required for compliance with the MTQ's 3101 standard.

.1 The density of the fresh concrete, at the specified air content and slump, in kg/m^3 of mix.

.2 The cement's mass, in kg/m^3 of mix.

.3 The water's mass, in kg/m^3 of mix.

.4 The mass of fine and coarse aggregates, in kg/m^3 of mix (saturated surface dry).

.5 The water/cement ratio, considering that the aggregates are saturated surface dry.

.6 The mix's compressive strength and slump.

.7 A report from a recognized Laboratory establishing the mix's characteristics with regards to the network of entrained air voids, i.e. the air content and surface volume (MTQ 3101 standard). The cement concrete shall have an air void spacing lower than or equal to 230 microns on average and no results shall be above 260 microns. Measurement shall be determined as per ASTM C457 "Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete".

.8 The type of cement, its source and the name of the cement plant.

.9 The characteristics of the fine and coarse aggregates, as stipulated in the MTQ 3101 standard, as well as their source.

.10 The granulometry, dry tampered mass, gross relative density (saturated surface dry), and the percentage of absorption of fine and coarse aggregates, as well as the fineness modulus and the colorimetric index of the fine aggregates

.11 The types of admixtures, the names of the products, their manufacturer, quantities used and projected effects.

.12 A report from a recognized Laboratory or organization establishing potential alkali-aggregate reactivity according to the CSA A23.2-14A

standard as well as scaling resistance according to scaling tests described in the NQ 2621-900 standard.

.13 Concrete production equipment.

.3 Results of tests relating to the air-void spacing and alkali-aggregate reactivity (MTQ 3101 standard) are valid for a period of three calendar years, providing a certificate is issued annually by a geologist attesting that the petrography of the aggregates is the same as that revealed by swelling tests on concrete prisms. The results of tests for other characteristics are valid for a period of one year.

.3 Quality control of delivered concrete

.1 All tests on the concrete shall be carried out in compliance with the MTQ 3101 standard.

.2 The Laboratory lifts samples of the concrete for standard compressive strength tests at a rate of 3 cylinders for each 75 m^3 of concrete placed, for each class of concrete specified. A minimum of three cylinders are lifted for each concreting day.

.3 For standard compressive strength tests, cylinders of 100 x 200 mm shall be used. The result of the standard test, for approval of the concrete, as obtained from the 100 x 200 mm cylinders, corresponds to the average strength of 2 cylinders at 28 days. A third cylinder is subjected to the compressive strength test at 7 days.

.4 For concrete used in sidewalks and curbs or other concrete subjected to frequent freeze-thaw cycles in the presence of humidity or de-icing salts, the fresh concrete shall be tested for air content every time a batch of concrete is delivered to the site.

.4 In-situ compressive strength tests

.1 The in-situ compressive strength of concrete shall be determined in compliance with the requirements of the CAN/CSA-A23.1 standard.

.2 Tests shall be conducted with a LOKTEST unit using 25 mm-diameter anchors poured into the concrete, 25 mm below the surface. When the anchors cannot be poured into the structure, they shall be poured in 200 mm square moulds at the centre of each of the faces. These moulds shall then be kept on the job site, under the same curing conditions as the structure they represent.

.3 A compressive strength test corresponds to average results obtained from tests conducted on 8 anchors. The holding power is converted into compressive strength using a correlation curve established by the Laboratory.

.4 When compressive strength testing of the concrete is required using concrete core testing, the compressive strength of the concrete represented by the core tests is considered acceptable is the average of each series of three cores taken from the structure in question is equal to or higher than 100 % of the specified strength and if no core has a compressive strength of less than 85 % of the specified strength.

PART 3 - EXECUTION

3.1 GENERALITIES

.1 The Contractor shall carry out the construction of sidewalks and curbs as per the Contract documents' plans and details.

.2 All work shall be carried out in compliance with the alignments and levels indicated in the plans and details.

.3 Should obstructions or other fortuitous occurrence not projected in the plans interfere with the work to the point where changes are required, the Canada Parks Representative can require that work be modified or displaced as needed.

3.2 PREPARATION OF THE INFRASTRUCTURE

.1 Generalities

.1 Preparation work on the infrastructure shall be carried out in compliance with the requirements of Section 32 11 00 - Civil - Roadworks and Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.2 When carrying out filling work, it shall be necessary to plan for additional widths exceeding the limits of the concrete structures by at least 500 mm (20 in.), should they be required.

.3 The bottom of the excavation shall be carefully compacted and profiled in keeping with the stipulated levels.

.4 All unclean material shall be removed from the infrastructure to a depth established by the Canada Parks Representative, then backfilled using suitable fill materials, as defined in Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.5 The allowable difference in the infrastructure's finished surfaces is 15 mm ($^5/_8$ in.) measured at any point on a 3 m (10 ft.) ruler.

.2 Standards

.1 Work on the construction of curbs, sidewalks and other structures, shall be carried out in compliance with the CSA A23.1 standard. Concrete used shall be proportioned in keeping with requirements relating to Class C-2.

.2 The concrete shall have a scaling rate of less than 0,5 kg/m^2, evaluated in keeping with the scaling test described in the NQ 2621-900 standard.

.3 For sidewalks and curbs, no repairs shall be accepted. When their surface is damaged or pop-outs are noted over more than 1 % of the surface, the works involved shall be demolished and rebuilt.

.3 Earthwork

.1 Earthwork undertaken for the construction of sidewalks and curbs, such as excavation and backfilling, borrow, placement and compacting of materials, are all governed by Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.2 Where backfilling is required for the installation of a sidewalk and/or curb, said backfilling shall leave a 600 mm shoulder on each side of the street. This backfilling shall be sloped towards the street to produce a 2,0 % slope. The top part of the backfilling shall be at the same height of the top of the sidewalk or curb.

.4 Bed surface

.1 The Contractor shall prepare the surface of the bed in compliance with plans and profiles and compact the infrastructure mechanically to the equivalent of 95 % of M.P.

.2 The surface of the bed shall be even, free of depressions. This surface shall be properly cleaned and free of all vegetation, leaving an even, dry surface.

.3 At curb cut and ramps for the disabled, the surface of the bed beneath the sidewalk or curb shall be lowered to obtain a stone and cement concrete sub-base of even thickness at these locations.

.5 Stability of the bed

.1 The Contractor shall be entirely responsible for the stability of the bed. He shall take every precaution required, when preparing the bed of the sidewalk and curb, to ensure that these structures are permanently supported.

.6 Height of curb cuts and gutters

.1 Gutters are 150 mm in height measured between the final pavement level and the top of the edge of the sidewalk or curb.

.2 Curb cuts are 40 mm in height, measured between the final pavement level and the top of the edge of the sidewalk or curb.

.3 The tolerance with regards to the height of gutters and curb cuts is ± 7 mm. The tolerance for longitudinal alignments is ± 10 mm.

3.3 GRANULAR SUB-BASE

.1 Before spreading the granular material for the sub-base, it is necessary to have the infrastructure approved by the Canada Parks Representative.

.2 Spread the sub-base's granular materials in compliance with the alignments, widths and depths indicated.

.3 When the bed beneath the curbs and sidewalks has been completed, the Contractor shall place a sub-base with a minimum thickness of 150 mm (6 in.) of 20 mm or MG-20 type crushed stone compacted to 95 % of the Modified Proctor index (unless otherwise stipulated on the contract drawings).

.4 The Contractor shall run the vibrating plate over the clean stone and the stone shall be watered before the concrete is poured.

.5 The surface of the stone sub-base shall be 150 mm lower than the final surface of the monolithic sidewalk behind it or 400 mm lower than the final surface of the face of the monolithic sidewalk, all as shown on the details.

.6 The finished granular surface shall be less than 12 mm (½ in.) off from the profile and 10 mm (⅜ in.) from the cross-section as measured using a 3 m (10 ft.) ruler.

3.4 FORMWORK

.1 Before putting up the forms, the Contractor shall bring the granular sub-base to the required levels, alignments and degree of compaction.

.2 Formwork shall be in contact with the granular sub-base.

.3 Formwork shall remain in place for at least 24 hours after placement of the concrete during warm weather and at least 48 hours during cold weather, or as instructed by the

Canada Parks Representative. After this time, the forms shall be stripped with care, to avoid damaging the concrete.

.4 Forms, wood or steel shall be kept in place in compliance with the required alignments and levels.

.5 The formwork shall be properly supported to keep it from moving.

.6 Forms shall be produced from surfaced lumber, rigid plywood or steel of equal rigidity and an approved model. In curved parts, formwork may be thinner, allowing it to be arced. Following their placement, forms shall be cleaned and oiled.

.7 Forms shall be clean and well oiled before being put into place. They shall follow the profile and alignment of the existing gutters and be corrected if a depression of 6 mm or more is noted. There shall be a sufficient number of rests and supports strong enough to secure the forms vertically and horizontally and allow them to withstand the pressure of the concrete without warping. The type of support shall keep the form from sinking during the pour. In the event that forms should be displaced during the placement of the concrete, the Contractor shall stop the concrete pour until the forms have been properly repositioned and better secured.

.8 The inner wall of the forms shall be coated with mineral oil or other recognized substance prior to the placement of the reinforcement bars. The Contractor cannot coat the forms in oil after the reinforcement bars have been put into place. The Canada Parks Representative shall require the removal and cleaning of all steel with an oil coating.

.9 Immediately prior to pouring the concrete, the forms shall be meticulously inspected to ensure that the levels, alignment and sturdiness have been respected. Any adjustments or repairs required shall be completed before the concrete is poured.

.10 When required, the wire mesh shall be of type 102x102 MW25,8/MW25,8 for the sidewalks and 152x152 MW18,7/MW18,7 for the slabs of the building. It shall be installed in the top third of the slab's thickness.

.11 The Contractor shall respect all of the structure's dimensions and may not, at any time, use the walls of the trench as forms, whether it is for the bottom of a sewer manhole or any other construction.

.12 A key shall be built at each joint. A water shut-off valve shall be installed at each joint. The surface of the joint shall be cleaned of any debris or foreign matter. In winter, the joints shall be preheated as required for the concrete pour.

.13 At no time shall forms be stripped without the expressed authorization of the Canada Parks Representative. Said authorization in no way releases the Contractor from responsibility.

3.5 STEEL REINFORCEMENTS

.1 In the event that steel reinforcements are required by the Canada Parks Representative, the steel shall comply with the "Reinforcements for Concrete" article. These reinforcement bars shall be located as per the boards or as required by the Canada Parks Representative. Remuneration shall be by the unit for the supply and installation of steel reinforcements measuring 6 m by 10 mm.

.2 They shall be cold formed using suitable equipment and as indicated on the plans and the Canada Parks Representative's instructions.

.3 Heating the bars to fold or straighten them is not allowed, nor is welding the steel bars.

.4 All reinforcement bars shall be placed with precision and firmly secured to ensure that they remain in the position shown on the plan before, during and after the placement of the concrete.

.5 Reinforcement bar protection is:

.1 On the base slab: 75 mm from the faces.

.2 From walls and arches: 40 mm from the faces.

.6 The Contractor shall place the steel reinforcements, upon delivery to the work site, on pieces of wood high enough and positioned to keep the steel from touching the ground. He shall also protect them against excessive oxidation. The Canada Parks Representative may require that the Contractor sandblast the steel, at the latter's expense, if the cleanliness of the steel does not comply with CSA standards.

3.6 CONCRETING

.1 Advise at least 24 hours in advance before concreting and obtain the Canada Parks Representative's approval of granular sub-bases, forms and reinforcement bars once the stone sub-base has been completed and the forms installed. Also obtain the Canada Parks Representative's approval of the proposed method for protecting the concrete during the concreting and subsequent curing.

.2 Pour, consolidate and finish the concrete so as to ensure a uniform consistency.

.3 The concrete used shall be a mix of Portland cement, coarse and fine aggregates, and water, and shall have the characteristics required in part 2 "Products".

.4 The thickness of the concrete shall comply with the attached typical boards for the sidewalk and curb.

.5 The fresh concrete shall be placed on a stone sub-base as close as possible to its definitive position. It shall be well tamped, especially close to the formwork and joints, in order to eliminate voids. Once work has been completed, any holes or defects noted on the face of the sidewalks or curbs shall be properly corrected by the Contractor. Finishing shall then be done using a patter.

.6 The concrete's placement rate shall not exceed the acceptable speed of execution for the different placement and finishing operations.

.7 When the placement of the concrete is interrupted for more than 45 minutes, a transverse expansion joint shall be put in before continuing with the pour.

.8 Gutters (height of the sidewalk or curb in relation to the pavement) shall have a constant height of 150 mm (6 in.) unless otherwise indicated.

.9 Connections to an existing curb or sidewalk shall be carried out with an expansion joint.

.10 If, during the course of the work, the air temperature should drop to below 5 °C, water and aggregates shall be heated and the required precautions shall be taken by the Contractor to protect the concrete against frost until it has attained a compressive strength of at least 7 MPa.

.11 The fresh concrete is placed approximately 10 mm higher than the final surface of the sidewalk and/or curb in order to allow good levelling.

.12 No concrete shall be deposited on a frozen foundation.

3.7 SLIPFORMED CURBS

.1 Generalities

.1 Curbs produced by a slipforming machine shall be placed, shaped and compacted to the stipulated alignment and level using an approved slipforming machine.

.2 Slipforms shall have the dimensions, sizes, shape and strength needed to produce the type of curb required.

.3 The concrete shall have the required consistency to maintain the curb's shape without support.

.4 The concrete shall be poured at a uniform rate.

.5 The machine shall be operated so as to produce a well-compacted curb with no depressions. Said curbs shall require no finish expect for a light brushing with a broom dipped in water. Finishing using a brush and grout is prohibited.

.6 The machine's slipforms shall be vertically adjustable as it advances, allowing it to vary, as needed, the height of the curb in keeping with its proposed height.

.7 The curb slipforming machine shall be automatically controlled by a sensor and preinstalled self-guiding cord, to respect the alignment, profile, and transverse slope.

.8 The concrete shall be consolidated using internal vibrators.

.2 Self-guiding cord

.1 The installation of the self-guiding cord shall be carried out according to the following criteria:

.1 Support guide at 6 m c/c maximum in the right sections.

.2 Support guide at 1 m c/c maximum in curved sections.

.3 Cord tension sufficient to eliminate any deflection.

.4 Alignment and elevation tolerances shall be the same as for sidewalks poured in fixed forms.

.3 Joints

.1 Shrinkage joints shall be produced in the same way as for sidewalks and curbs poured in fixed forms. In addition to the aforementioned, shrinkage joints shall be extended into the vertical part of the sidewalk or curb with a marking tool every 6 m on either side of curb cuts.

.2 Expansion joints shall be built as follows:

.1 A saw cut of 40 mm in depth by 3 mm wide shall be produced in the concrete from 12 to 24 hours after the sidewalk or curb has been poured. The saw cut shall be straight, of even width and free of spalling. These joints shall be required in the same places as for sidewalks and curbs poured in fixed forms.

.2 The joints are cleaned.

.3 A line of ethafoam shall be inserted into the saw cut at 6 mm below the surface of the concrete.

.4 A grey sealant complying with the standard CGSB-19-GP-16 M "Sealing Compound, One Component, Polyurethane Base".

.5 The sealant shall, at no time, exceed the surface of the concrete.

3.8 CONCRETE FINISHING

.1 The placement and finishing of all sidewalks and curbs shall be carried out in a manner deemed acceptable by the Canada Parks Representative. Tools used shall also be approved by the Canada Parks Representative.

.2 After the pour, the surface of the concrete shall be evened out or planed to the correct level using a levelling lath resting on the forms, followed by planing with an aluminum or magnesium towel to eliminate high and low points, taking care not to draw too much laitance to the surface.

.3 Joints shall be produced as described in the article dealing with joints.

.4 Before the concrete's initial setting, the concrete's finishing shall be repeated a second time using the trowel, to ensure that the surface is free of irregularities, depressions or other flaws. The surface shall then be finished using a broom unless otherwise indicated by the Canada Parks Representative.

.5 After these last operations, the joints of slabs and edges shall be rounded using an appropriate tool with a radius of 5 mm.

.6 The finishing of the surface shall be carried out while it is sufficiently malleable to yield the desired levels and textures.

.7 The application of water, cement or a combination of the two on the concrete's surface shall not be allowed for the finishing.

.8 Localized flaws shall be repaired using concrete.

.9 The presence of footsteps or other marks in the finished sidewalk shall require a saw cut, the removal and replacement of the section.

3.9 EXPANSION JOINTS

.1 Expansion joints shall be produced across the sidewalks and curbs at maximum intervals of 9,0 m (30 ft.), as well as at the start and end of curb cuts and where the works stop. Where the width of the sidewalk varies abruptly, an expansion joint shall be produced.

.2 The Contractor shall install expansion joints at all critical points such as facing a pole, manhole, fire hydrant, or on either side of curb cut.

.3 Joints shall be perpendicular to the axes of the sidewalks or curbs and shall extend over the entire thickness and width of the concrete. A fillet radius of 6 mm (¼ in.) shall be produced on joint lips. When the concrete installation work is interrupted for more than an hour, the Contractor shall produce an expansion joint.

.4 For sidewalks and curbs, each of these joints shall include a prefabricated strip measuring 12,5 mm (⅝ in.) thick and consisting of compressible materials such as reed or other fibre of suitable cellular structure, evenly soaked in an asphalt binder or pentachlorophenol, lending strong cohesiveness to the whole, in compliance with the ASTM D1751 standard.

.5 These joints shall have the same form as the concrete structure, minus 5 mm on each visible face.

.6 For sidewalks, each joint shall be crossed by smooth 10 mm (⅜ in.) diameter bars measuring 1,0 m (40 in.) in length. These bars shall be placed in the sidewalk at half the concrete's thickness, perpendicular to the joint. On one side of the joint, half the length of each bar shall be embedded in the concrete while on the other side, the other half shall be kept from adhering to the concrete by a fibrous capsule coated in white grease to allow for expansion.

.7 Finally, the compressible material shall be cut out to adopt the form of the groove and the joint 's water tightness shall be ensured by a sealant complying with the requirements of the ASTM D3405 standard.

.8 For curbs, each joint shall be crossed by two (2) smooth 10 mm (⅜ in) diameter bars measuring 1,0 m (40 in.) in length. These bars shall be placed in the curb, perpendicular to the joint. On one side of the joint, half the length of each bar shall be embedded in the concrete while on the other side, the other half shall be kept from adhering to the concrete by a fibrous capsule coated in white grease to allow for expansion.

.9 Work shall comply with the prescriptions of pertinent details shown in the plans for the production of the joints.

.10 The connection to an existing sidewalk shall be carried out by piercing four holes measuring 12 mm in diameter by 400 mm in length into the existing structure, into which smooth 10 mm-diameter bars measuring 1,0 m in length shall be inserted. Next, after

injecting unshrinkable mortar into the holes, pins shall be inserted. A 10 mm bituminous fibre shall separate the two structures. In the case of a curb connection, the same procedure using two smooth bars shall apply.

.11 The edges of the curb shall be rounded using appropriate tools.

.12 The connection to an existing curb shall be carried out by piercing two holes measuring 12 mm in diameter by 400 mm in length. After injecting unshrinkable mortar into these holes, pins are then inserted.

3.10 CONTRACTION JOINTS

.1 Contraction joints shall be produced in the surface of the sidewalks using a tool designed specifically for this purpose. The maximum distance between the joints shall be 1,5 m (5 ft.), unless otherwise specified in the plans. They shall have a maximum depth of 40 mm (1 ½ in.), a width of 10 mm (⅜ in.) and slightly rounded edges. Contraction joints shall be produced between 4 and 12 hours following concreting.

.2 For curbs, contraction joints shall be produced every 3,0 m (10 ft.), using an appropriate tool measuring 3 mm (⅛ in.) in width, around the entire edge of the curb.

.3 Comply with prescriptions of pertinent details shown in the plans for the production of the joints.

3.11 ISOLATION JOINTS

.1 Isolation joints are required to separate the sidewalks from adjacent works and obstacles such as manhole chimneys, catch basins, building foundations or any other permanent structure. Isolation joints shall be like expansion joints but without the reinforcement bar studs or wooden board.

3.12 WEATHER PROTECTION

.1 The Contractor shall maintain, on the job site and throughout the duration of the work, an adequate quantity of membranes such as polyethylene tarps to properly cover sidewalks and curbs poured during the day from possible rain or other poor weather.

3.13 CONCRETE CURING AND PROTECTION

.1 Generalities

.1 Concrete, which has just been placed, shall be protected against frost, high temperature, overly rapid drying and moisture loss for a period of time sufficient

to allow the concrete to develop the projected characteristics (CSA-A23.1 standard).

.2 Pedestrian traffic on the sidewalk and automotive traffic in curb cuts shall be prohibited for a period of 48 hours after the concrete has been placed.

.3 The Contractor shall supply and maintain barricades and signals preventing any traffic on concrete, which has not sufficiently hardened.

.4 The Contractor shall be responsible for any deterioration of the concrete caused during the period of time when traffic on the sidewalk is prohibited.

.5 A curing product shall be applied in a uniform manner to form a continuous film as per the manufacturer's instructions.

.6 Curing during the initial setting period, i.e. obtaining a compressive strength equal to 35 % of the strength specified at 28 days, shall involve a water spray and the application of a curing membrane. The use of a water-soaked fabric can also ensure cooling through evaporation.

.7 The curing product shall be applied mechanically using a vaporizer-mixer to obtain a homogenous mix and ensure a uniform application over the entire surface.

.2 Protection against overly rapid drying

.1 Immediately following finishing operations and when the concrete has taken sufficiently, the surface of the sidewalk and/or curb shall be protected and kept continually moist, in compliance with the CAN/CSA-A23.1 standard for a period of 72 consecutive hours, or sprayed with a curing product as described in the article "Concrete curing materials". The Contractor shall have a sufficient quantity of tarps or waterproof paper to completely cover all sections of the sidewalk and/or curb poured during the previous 8 hours. A minimum period of 30 days following concreting is required before de-icing salts can be applied.

.2 During curing, all exposed concrete surfaces shall be protected from moisture loss and rapid changes in temperature.

.3 When burlap is used for curing, two previously soaked layers shall be placed on the concrete surfaces to keep them moist throughout the curing period.

.4 The addition of water on the work site shall be carried out in compliance with the CSA-A23.1 standard.

.3 Protection against extreme temperatures

.1 High temperatures (> 27 °C):

.1 Delivery temperature must not be over 35 °C.

.2 For curing during high temperatures, during low humidity or dry wind periods, a mist shall be sprayed following placement of the concrete to keep shrinkage cracks from forming. Spraying shall be ongoing until conditions lend themselves to the application of a liquid curing membrane or other curing product. The Canada Parks Representative shall determine when spraying is required.

.2 Low temperatures (< 5 °C):

.1 Delivery temperature must not be less then 15 °C.

.2 To provide protection during low temperatures, the Contractor shall be responsible for the concrete's quality and compressive strength. Any concrete damaged by the cold shall be removed and replaced at the Contractor's expense.

.3 During cold weather, starting at 5 °C or under, the concrete shall be protected against frost for a period of at least 7 days, using insulating blankets or straw covered with a plastic sheeting. Never use a curing product on concrete exposed to frost until at least one month after it has been placed.

.4 Protection against rain

.1 When rain starts, any concrete operation must stop and all the surface of the concrete likely to be diluted or damaged by the rain must be protected. When the rain has stopped, the protection is put out and the Contractor must carry out the surface corrections of required.

3.14 CONNECTION TO SIDEWALKS OF EXISTING PROPERTIES

.1 When the sidewalk to be built is to be connected to existing sidewalks, the Contractor shall demolish their shoulders and, if need be, rebuild the adjacent section of the existing sidewalk in order to correct defects and adjust the level. The same requirements shall apply to the concrete curb. In the event that an existing sidewalk leads to a private residence, the Contractor shall, if need be, demolish a section and produce an expansion joint at the point where the two sidewalks meet, all to the Canada Parks Representative's satisfaction.

3.15 TRAFFIC

.1 In carrying out his work, the Contractor shall use every means at his disposal to facilitate traffic by installing, if required, overpasses straddling the fresh concrete, etc. and he shall be required to comply with the Canada Parks Representative's instructions in this regard.

3.16 TOLERANCES

.1 Monolithic and slab sidewalks:

.1 Allowable differences in finished surfaces shall be 5 mm ($^{3}/_{16}$ in.) measured using a 3,0 m (10 ft.) ruler. All sidewalks shall have a slope to the street or curb of 2,0 % unless otherwise specified by the Canada Parks Representative.

.2 The minimum thickness of sidewalks shall be the specified thickness minus 8 mm ($^{5}/_{16}$ in.). If the difference in thicknesses exceeds 8 mm ($^{5}/_{16}$ in), the sidewalk shall be removed and rebuilt.

.3 Sections of sidewalk identified by the Canada Parks Representative as unacceptable shall be cut using a saw, removed and replaced by the Contractor to their full width.

.2 Curbs:

.1 Allowable difference in finished surfaces shall be 3 mm (⅛ in.) measured using a 3,0 m (10 ft.) ruler parallel to the axis of the work. The difference in the structure's alignment shall not exceed 3 mm (⅛ in.).

3.17 BACKFILLING

.1 Allow the concrete to harden for 7 days before backfilling.

.2 As the forms are stripped, fill behind the curb and sidewalk up to the indicated levels, using materials approved by the Canada Parks Representative, then compact and profile in keeping with curb levels indicated or as per the Canada Parks Representative's instructions.

.3 Unless otherwise indicated, if connecting slopes are required, these shall not have a ratio of less than 1 V : 3 H.

3.18 REPAIRS TO THE SUB-BASE AND PAVEMENT

.1 All damaged sub-bases and pavement shall be repaired to the Canada Parks Representative's satisfaction and in compliance with the requirements of Section 32 11 00 - Civil - Roadworks.

.2 In the case of a sidewalk poured in an existing street, the Contractor shall repair, at his expense, the damaged pavement, in compliance with the requirements of Section 32 11 00 - Civil - Roadworks.

3.19 REPAIR WORK

.1 Repairs to cracks in curbs and sidewalks

.1 Cracks and other defects, which could appear in curbs and sidewalks during the warranty period, shall be repaired at the Contractor's expense.

.2 No vertical displacement of the sidewalk or curb section shall be tolerated.

.2 Sidewalks

.1 Saw into shrinkage joints on each side of sections containing one or more cracks and/or defects, remove and dispose of the damaged sections, place studs on each side (4 studs on each side as called for in the article on "Expansion joints"), replace the concrete sections and repair adjacent surfaces (asphalt coating, cement concrete, pavers, lawns, etc.).

.3 Curbs

.1 Saw the damaged section on each side of the crack or defect over a minimum length of 1,5 m (if the defect is located les than 1,5 m from an expansion joint, the Contractor must cut as far as that joint), remove and dispose of materials, place studs on each side (2 studs on each side as called for in the article on "Expansion joints"), replace the damaged section and repair adjacent surfaces (asphalt coating, cement concrete, pavers, lawns, etc.).

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 32 92 23 – Civil - Sodding

1.2 SCOPE OF WORK

.1 Ensure supervision of the work and supply all manpower, equipment, tools, materials, transportation and other services required to carry out and complete the work described and specified in this section and contract documents, including but not limited to: the excavation and backfilling of specified areas and the application of topsoil in preparation for sodding work.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (B.N.Q.) latest edition.

.1 NQ 0605-100 (latest edition) : Landscaping using vegetation.

1.4 ELEMENTS TO BE SUBMITTED

.1 Advise the Canada Parks Representative of the proposed source of topsoil and provide access allowing said representative to conduct the analysis of materials. The acceptance of the topsoil will depend on the results of soil analyses and the inspection, Work shall not start until the topsoil has been approved by the Canada Parks Representative.

.2 Topsoil tests and analyses shall be carried out by a laboratory with the Canada Parks Representative assuming the cost of these.

.3 Analyze the topsoil prior to stripping and stockpiling to determine its contents of clay, sand, mud, phosphorous, potassium (NPK), magnesium (Mg), soluble salts, growth inhibitors, and soil sterilizers as well as its pH.

.4 Provide the Canada Parks Representative with a copy of the soil analysis report as well as recommended soil improvements.

1.5 WORK SCHEDULE

.1 Topsoil shall be spread and finish earthwork carried out at the appropriate time for undertaking sodding work under the best possible conditions, within ten (10) days following the end of the initial spreading work.

1.6 TOPSOIL AND FINISH EARTHWORK

.1 Topsoil and finish earthwork consist in, but are not limited to, supplying the materials and manpower required to carry out the spreading of topsoil and finish earthwork, according to good engineering practices, including:

.1 The supply and application of topsoil to a minimum thickness of 150 mm,

.2 Topsoil mixes including granulometry and specified amendments,

.3 Finish earthwork,

.4 Finish levelling according to specified tolerances,

.5 The cleaning and off-site disposal of non-reusable materials at a location complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

PART 2 - PRODUCTS

2.1 SOIL IMPROVEMENT MATERIALS

.1 Fertilizer: commercial, synthetic, granular with a fast-acting source of phosphorous, containing no more than 35 % soluble nitrogen.

.1 Composition for sodding : 10-25-10 fertilizer.

.2 Compost : commercial AA or B-type screened commercial mix whose components have fully decomposed.

.3 Ground agricultural lime with a carbonate content of at least 85 %.

.1 Granulometric requirements: passing percentage by weight: 90 % passing through a sieve with openings of 1 mm; 50 % passing through a sieve with openings of 125 µm.

.2 Using the quantity of lime needed, as determined by the soil analysis, to obtain the required degree of acidity (pH).

.4 Bone meal: raw or steamed bone meal, finely ground, containing at least 3 % nitrogen and 20 % phosphoric acid.

.5 Coarse sand: hard, granular sand, complying with the CSA A62-56-M1976 standard, well cleaned and free of any impurities, chemical product or organic matter.

2.2 MIX OF SCREENED TOPSOIL

.1 Mix for areas to be sodded and seeded:

.1 Two parts loam,

.2 One part black soil,

.3 One part coarse sand,

.4 3 % to 7 % organic matter.

2.3 CHARACTERISTICS OF MIXES

.1 The cation exchange capacity (C.E.C.) must be between 10 and 20.

.2 The chemical verification of the soil shall be carried out using the "Walkey Black" oxidation method.

.3 The acidity level (pH) must be 6.5.

.4 Include the following chemical element in the proportions shown:

Chemical elements	**Proportion**
Phosphorus (P)	100 ppm
Potassium (K)	125 ppm
Magnesium (Mg)	200 ppm
Calcium (Ca)	2 000 ppm

.5 Fall within the following grading range:

Screen	**Passing %**
10 mm	100
5 mm	98 to 100
1,25 mm	90 to 97
630 µm	65 to 90
315 µm	25 to 65
160 µm	15 to 25
80 µm	5 to 15

.6 Water retention capacity: maximum 20 %.

PART 3 - EXECUTION

3.1 PREPARATION OF EXISTING AREA

.1 Level the ground, filling dips and creating a slope favoring the flow of water. Remove soil that has been contaminated by toxic materials, remove debris as instructed by the Canada Parks Representative.

.2 Loosen to a depth of 100 mm the entire area covered by the foundation layer to be covered in topsoil, Repeat the operation wherever the transportation material and spreading of the soil have compacted said foundation layer.

.3 Clear the surface of debris, roots, vegetation branches and stones more than 50 mm in diameter.

3.2 SPREADING OF THE TOPSOIL

.1 Have the Canada Parks Representative inspect and approve the condition of the foundation layer before starting to spread the topsoil.

.2 Where planting and seeding work is to be carried out (as specified by the Canada Parks Representative and the plans), spread the topsoil on the approved and non-frozen foundation layer in even layers containing an adequate amount of water.

.3 Spread the topsoil according to instructions, to a thickness of at least 150 mm on the areas to be sodded.

.4 Where slabs of sod are to be laid, spread the topsail leaving a thickness of 15 mm for the surface layer.

.5 Manually spread topsoil around places where it is hard to use motorized equipment

.6 Take into account 25 % settling of soil volume when placing the soil, to comply with projected levels.

3.3 SOIL IMPROVEMENT MATERIALS

.1 Incorporate soil improvement materials in prescribed quantities based on the results of soil sample analyses.

.2 Ensure the penetration of the compost and soil improvement materials into the full thickness of the topsoil layer before incorporating the fertilizer.

3.4 SPREADING OF THE FERTILIZER

.1 Spread the fertilizer at least one week after the application of lime.

.2 Spread the fertilizer evenly over the entire surface of the topsoil, in quantities based on results of sample analyses.

.3 Ensure the penetration of the fertilizer into the entire topsoil layer.

3.5 FINISH EARTHWORK

.1 Level and move the soil so as to eliminate any irregularities and dips, ensuring the flow of surface water. Apply a layer of loosened loam, breaking it up and raking it.

.2 Use a 50 kg roller measuring at least 900 mm wide to firm up the layer of topsoil over which the sod is to be laid, making it smoother, more even, with a fine, loose texture, to the satisfaction of the Canada Parks Representative.

3.6 RESTORATION OF STOCKPILING AREAS

.1 Restore the condition of the stockpiling areas used for the work, to the satisfaction of the Canada Parks Representative.

3.7 SURPLUS MATERIALS

.1 Excavation surplus refused by the Canada Parks Representative for the project's backfilling purposes (except for contaminated materials, demotion materials and special waste) must be disposed off-site.

.2 All of the aforementioned disposal work must be carried out in compliance with the MELCC's Directives and/or Regulations which, in the event of discrepancy with the above, will prevail over the preceding requirements.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 32 91 21 – Civil - Topsoil and Finish Earthwork

1.2 SCOPE OF WORK

.1 The Contractor shall assume, in compliance with plans and other documents, the supervision of work, and supply all manpower, equipment, tools, materials, transportation and other services required to carry out and complete the work described and specified in this section and contract documents, including but not limited to: covering the specified surfaces with a permanent lawn.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (B.N.Q) latest edition.

.1 NQ 0605-100 : Aménagement paysager à l'aide de végétaux [Landscaping using vegetation].

.2 NQ 0605-300 : Produits de pépinières et de gazon [Nursery and lawn products].

.3 NQ 0640-0640-050 : Gazon en plaques - Classification et caractéristiques [Grass sod - Classification and characteristics].

1.4 ELEMENTS TO BE SUBMITTED

.1 Cultivated sod must be approved at the supply source by the Canada Parks Representative.

.2 Once the sod source has been approved, no other source shall be used without written authorization.

.3 Submit a sample of each type of grass sod.

.4 Samples must be approved by the Canada Parks Representative before work is undertaken.

1.5 CALENDAR

.1 The installation of grass sod must coincide with the spreading of topsoil.

1.6 SODDING A LAWN

.1 Work related to sodding consists in, but is not limited to, supplying the materials and manpower required for installing a lawn on the specified areas, in compliance with good engineering practices, including:

.1 Supplying the manpower, equipment and materials for the excavation and repair of surfaces,

.2 Supplying and applying topsoil,

.3 Supplying and spreading fertilizer,

.4 Supplying and installing sod slabs or rolls,

.5 Controlling weeds,

.6 Anchoring using stakes,

.7 Ensuring maintenance during the installation and warranty period,

.8 Disposing of non-reusable materials on a site complying with the directions of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 No. 1 cultivated sod: the quantity of sod and the source of supply must comply with standards described in section 17 of the "Guide Specifications for Nursery Stock", latest edition, published by the Canadian Nursery Landscape Association.

.1 No. 1 Kentucky bluegrass: cultivated sod grown from a mix of at least 3 varieties. The sod will be delivered in slabs or large rolls, depending on contract specifications.

.2 Broken, dried, or yellowed slabs will be refused by the Canada Parks Representative.

.3 Quality of cultivated sod:

.1 Grass containing no more than 2 dicotyledon seeds (broadleaf weeds) or 10 other seeds per 40 m^2 area,

.2 Grass whose density is such that no soil remains visible from a height of 1 500 mm, after mowing to a height of 40 mm,

.3 Maximum mowed height: 35 mm to 65 mm,

.4 Thickness of the sod slabs' soil: 6 mm to 15 mm,

.5 Characteristics of the sod slabs' soil: sandy. Any other type of supporting soil will be refused.

.2 Water: potable.

.3 Fertilizer: 1-2, 5-1 granular fertilizer.

.4 Herbicide: the type, rate and application method are subject to the approval of the Canada Parks Representative.

PART 3 - EXECUTION

3.1 PREPARATION WORK

.1 Ensure that the soil's relief is adequate and that areas to be sodded are prepared as prescribed in Section 32 91 21 - Civil - Topsoil and Finish Earthwork. Notify the Canada Parks Representative of any discrepancy with the drawings and wait for instructions from the Canada Parks Representative before starting the work.

.2 Carry out levelling for the finish earthwork to create a gentle, even slope, free of dips and mounds, within 10 mm, in keeping with the required contours and levels, to favor natural surface drainage.

.3 Before undertaking the installation of the sod, have the level and thickness of the topsoil approved by the Canada Parks Representative.

3.2 INSTALLATION OF THE SOD

.1 Sod slabs must be installed within 36 hours of the time they have been harvested.

.2 The sod must have a minimum thickness of 40 mm and be moist enough to withstand transportation. It must be loaded and unloaded by hand and installed without delay. A chemical fertilizer is used.

.3 It is forbidden to install slabs of sod when the ground is excessively wet, when temperatures are below the freezing point, or on frozen soil. Slabs of sod must be dense, green, of even composition, and virtually weed-free. Slabs must be of a uniform thickness and the part of the slab consisting of soil must not be thicker than 15 mm. Grass that allows the soil to be visible when it is mowed to a height of 40 mm will not be accepted.

.4 The Contractor shall spread evenly, over the entire area to be sodded, a fertilizer applied according to the Manufacturer's instructions, mixing it well with the layer of topsoil.

.5 Install the slabs of sod in parallel lines perpendicular to the slope, flush with adjacent surfaces and with staggered joints. Move the slabs as close together as possible without overlapping. Using a sharp knife, cut out asymmetrical or overly thin slabs. In embankments, position slabs starting at the bottom of the embankment, and secure them using small stakes. Use a sufficient number of anchoring stakes on slopes whose ratio is below 1 V : 3 H.

.6 If required, place the stakes as follows:

.1 At 200 mm centre-to-centre, 100 mm from the top edge of the first slabs covering the slope.

.2 Use at least 3 to 6 stakes per square meter.

.3 Use at least 6 to 9 stakes per square meter, in surface water; modify the placement of the stakes as directed by the Canada Parks Representative.

.4 Plant the stakes so that they protrude from the surface of the soil by 20 mm.

.5 Using a light roller, press the slabs of sod into the soil to ensure good soil to sod contact. It is forbidden to use a heavy roller to correct surface irregularities.

.7 In the water stream, slabs are laid transversely to the direction of the flow, with joints made outside the water.

.8 The sod is rolled using a lawn roller weighing no more than 30 kg and must be watered well until the provisional acceptance of the work by the Canada Parks Representative.

.9 Once the sod has been laid, it must be watered sufficiently to allow the moisture to seep into the sod and soil to a depth of 150 mm.

3.3 PROTECTION OF SODDED AREAS

.1 Protect sodded areas using fencing if necessary.

3.4 MAINTENANCE DURING THE ROOTING PERIOD

.1 Maintain sodded areas from the start of the work until its provisional acceptance.

.2 Water the grass as much and as often as needed to ensure that the layer of soil directly below the grass is always moist to a depth of 75 mm to 100 mm.

.3 Mow the grass, the first time, to a height of 40 mm when it has reached a height of 60 mm. Remove grass clippings likely to choke the grass. Mow the grass until provisional acceptance, maintaining a mowed height of 40 cm to 60 cm.

.4 Maintain sodded areas, keeping them 100 % weed-free. Comply with prevailing municipal by-laws on the use of pesticides. If necessary, use a mechanical process.

.5 Spread a nitrogen-rich natural fertilizer once sodding work has been completed. Spread the fertilizer evenly over the sodded area at a rate of 0,5 kg per 100 m^2 and water well to foster penetration. Re-apply approximately one month after completion of the work.

.6 Postpone fertilization to the following spring if the work must be carried out within four weeks of the end of the growth season.

3.5 ACCEPTANCE OF WORK

.1 Sodded areas will be accepted at the time of inspection, provided that:

.1 The grass is growing well and the sod has taken root.

.2 The grass is free of weeds and bare areas.

.3 The soil is not visible from a height of 1 500 mm when the grass has been mowed to a height of 40 mm.

.4 The grass has been mowed at least twice.

.2 Areas sodded in the fall will be approved the following spring, one month after the start of the growing season, provided conditions for acceptance have been met.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11 – Civil - Excavation and Backfilling - Underground Services

.2 Section 32 11 00 – Civil - Roadwork

.3 Section 33 31 00 – Civil - Sanitary and Storm Sewers

1.2 SCOPE OF WORK

.1 Ensure the supervision of the work and provide all manpower, equipment, tools, materials, transportation and other services required to carry out and complete all work described and specified in this section and Contract documents, including but not limited to: the dismantlement of sections of the waterworks system, the supply and installation of water mains including valves and valve boxes, etc. and all accessories required, as well as the execution of tests and the commissioning of the system.

.2 Water supply pipes including pipes of normal or short length, special parts, connectors, and all other accessories needed for the system's complete installation.

.3 The Contractor shall visit the work site in order to take stock of conditions imposed by the location: services, labour, accessibility, constraints, etc, in order to evaluate the work.

.4 The bidder shall never be able to maintain, after tabling his bid or during the course of the contract's execution, that he had not been informed of conditions imposed by the site. The Canada Parks Representative shall at no time and in no way be held responsible or blamed for losses or damages occurring during the site visit.

.5 The Contractor shall coordinate the pipe route, check the location of existing pipes, whether or not they appear on the plans (public utilities, municipal and private networks), and conduct the necessary digs.

.6 The Contract shall provide shop drawings of all equipment.

.7 Restoration of sites to their original condition: as the case may be, sodding, concrete curbs/sidewalks, pavement.

1.3 REFERENCES

.1 NFPA 1 - Uniform Fire Code.

.2 NFPA 14 - Standard for the Installation of Stand Pipe and Hose Systems.

.3 NFPA 24 - Standard for the Installation of Private Fire Service Mains and their Appurtenances.

.4 National Fire Code of Canada.

.5 National Plumbing Code of Canada, latest edition.

.6 Municipal standards in effect.

.7 Bureau de normalisation du Québec (B.N.Q. – Quebec Standards Bureau) latest edition.

.1 BNQ 1809-300: Construction Work — General Technical Clauses — Drinking water and sewer pipes.

.2 NQ 3624-250: Non-plastified polyvinyl chloride (PVC-U) pipes and connectors — Rigid pipes for the conveyance and distribution of water under pressure — Characteristics and test methods.

1.4 SHOP DRAWINGS

.1 Shop drawings of equipment and/or materials shall be provided to the Canada Parks Representative prior to the start of work.

.2 Required shop drawings include, but are not necessarily limited to the following:

.1 Pipes and accessories,

.2 Valves,

.3 Valve boxes,

.4 Joints and retention collars,

.5 Anodes,

.6 Valve and meter chambers,

.7 Service connection accessories

.3 Work related to the drawings shall not begin until the drawings have been reviewed by the Canada Parks Representative.

.4 The Contractor shall present an exhaustive list of materials to be used, including the names of manufacturers and suppliers.

.5 Within the framework of the Contract, all materials shall be uniform and come from the same manufacturer.

1.5 CERTIFICATION OF MATERIALS

.1 At least two weeks prior to the start of work, present the results of tests conducted by the manufacturer and the certificate attesting that the pipes and accessories comply with the requirements of this section.

.2 Ensure that pipes bear the certification stamp.

1.6 TRANSPORTATION, STORAGE AND HANDLING

.1 Deliver, store and handle materials in compliance with the manufacturer's instructions.

.2 The Contractor shall take the following precautions when handling pipes:

.1 Pipes shall be handled so as not to touch sharp objects.

.2 Avoid impact when lifting.

.3 Storage surfaces shall be flat and clean.

.4 Pipes shall not be dropped or allowed to knock against another pipe.

.5 Packing shall be protected from excessive exposure to heat, direct sunlight, oil and grease.

.3 All materials found to be damaged or in poor condition, shall be rejected and replaced at the Contractor's expense.

1.7 WORK BY OTHER COMPANIES OR CONTRACTORS

.1 If need be, the Contractor shall be required to coordinate his work with that of the Municipality or any other contractor, company or public utility, which may need to carry out work of any nature whatsoever, before or during the execution of the work covered by this contract.

1.8 ALIGNMENT AND LEVELS

.1 Pipes shall be laid in compliance with the alignment shown on the plans, to a minimum cover depth of 1,8 m (6 ft.). Accessories such as valves, stop valves and fire hydrants shall be located where required. Socket joints shall be well centred and valves shall be vertical.

.2 In the event that obstructions not covered by the drawings interfere with work to the point of requiring changes to the plans, the Canada Parks Representative can require that work be modified or displaced accordingly, or he can make the necessary arrangements with the owners of said obstructions for their demolition, displacement or reconstruction However, vertical deviations shall be carried out where an underground pipe if located at the same level as the projected pipe.

1.9 WORK ON THE EXISTING WATERWORKS SYSTEM

.1 The Municipality alone is authorized to operate existing valves. When part of the waterworks system is closed, burlap covers or other clear indicators are installed over the fire hydrants, which are out of commission, to prevent fire departments from connecting their equipment to them in an emergency. The burlap shall cover at least 600 mm of the top part of the hydrants and shall be firmly secured. The fire department shall be notified prior to the work.

1.10 FIRE PROTECTION AND WATER MAIN PUT OUT OF COMMISSION

.1 Work to put sections of the fire protection pipe and water main out of commission consists in, but is not limited to, the supply of materials and manpower required for the removal, or condemnation according to good engineering practices, of sections indicated in the plans and specifications, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of excavations,

.5 The removal of pipes, valves, fire hydrants, accessories, thrust blocks, retention systems,

.6 The supply and installation of lean concrete,

.7 The supply and placement of approved backfill material, up to the infrastructure,

.8 Restoration of sub-bases and pavement,

.9 Protection and repair of public utilities,

.10 All other work required for the full use of these structures.

1.11 NEW WATER AND FIRE PROTECTION MAINS

.1 Work related to new water and fire protection mains consists in, but is not limited to, the supply of materials and manpower required for the installation, according to good engineering practices, of new water pipes, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of excavations,

.5 The supply and installation of accessories such as plugs, tees, crosses, elbows, reducers, couplings, etc,

.6 Cathodic protection,

.7 The contact wire,

.8 Thrust blocks,

.9 Retention systems,

.10 The supply and installation of the base course, surround and backfilling with approved material up to the infrastructure,

.11 Cleaning, watertightness tests, flushing, disinfection, and conductivity tests,

.12 Protection and repair of public utilities,

.13 All other work required for the full use of these structures.

1.12 VALVES AND VALVE BOXES

.1 Work related to valves and valve boxes consists in, but is not limited to, the supply of materials and manpower required to carry out, according to good engineering practices, the installation of new valves and valve boxes including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of excavations,

.5 Accessories,

.6 Cathodic protection,

.7 Thrust blocks,

.8 Retention systems,

.9 The supply and installation of the base course, surround and approved backfill up to the infrastructure,

.10 Protection and repair of public utilities,

.11 All other work required for the full use of these structures.

1.13 CONNECTION TO EXISTING SYSTEMS

.1 Work consists in, but is not limited to the connection, according to good engineering practices, of new systems to existing ones, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of excavations;

.5 The clearing of existing structures,

.6 Connection in compliance with the BNQ 1809-300 standard,

.7 Cathodic protection,

.8 Accessories,

.9 The supply and installation of the base course, surround and approved backfill up to the infrastructure.

PART 2 - PRODUCTS

2.1 GENERALITIES

.1 All pipes, connections, flanges, valves, fire hydrants and all accessories used in fire protection shall be ULC, UL and F.M. listed and certified. All equivalents shall comply with requirements of AWWA standards for drinking water.

.2 Parts shall be from a single manufacturer of fire protection equipment certified to ULC, UL and F.M. standards, bearing the manufacturer's name and trademark on the equipment along with the "Factory Mutual" designation plate bearing the serial number and nominal pressure. Unless otherwise prescribed or indicated, the equipment shall be designed to withstand hydraulic service pressure of 1.2 MPa (175 psi).

2.2 VALVES

.1 Resilient seat valves

.1 Gate valves shall have a resilient seat and mechanical joints. The cast-iron seat shall be entirely covered in rubber permanently bound to the seat. The body shall be produced from cast iron covered inside and out by an epoxy-based product complying with the AWWA C550 standard. The stem shall be fixed and made of bronze. The stem nut shall be 50 mm^2.

.2 Valves shall comply with AWWA standard C-509 and other more recent applicable AWWA standards. They shall have at least two O-ring joints at the packing box level to ensure watertightness. They shall have an epoxy coating inside and out, in compliance with the AWWA C-550 standard. They shall have a sliding gate with a 100 % urethane coating.

.3 Valve gates shall be capable of withstanding an operating pressure of 850 kPa. All bolts shall be of stainless steel, grade 304.

2.3 VALVE BOX

.1 Unless otherwise indicated, 150 mm valve boxes shall be of grey cast-iron, Grade 30, complying with the ASTMA48 standard, sliding model whose base shall adapt flawless to the valve. The length of the top part shall be fixed while that of the lower part shall vary depending on the conditions of the site, and shall rest on a guide plate. The box shall be maintained at the centre of the valve by a cast-iron disk designed for this purpose. An adjustable ductile-iron head shall be fitted onto the box's two sliding parts.

2.4 SERVICE CONNECTIONS

.1 The connection pipe is K-type copper.

.2 Connection

.1 The connection shall use a stainless steel or bronze connection collar (saddle) (bolts shall be of stainless steel); the support surface shall surround the entire pipe and shall be at least 50 mm wide, measured lengthwise on the pipe. The choice and installation of collars shall comply with the recommendations of the saddle manufacturer. Piercing of the pipe shall use a drill designed especially for this purpose, in good condition, according to the pipe manufacturer's recommendations.

2.5 ACCESSORIES AND FITTINGS

.1 All pipe sleeves, fittings or flanges and other accessories required within the framework of this project shall comply with the specifications of the National Board of Fire Underwriters and Factory Mutual and shall be capable of withstanding service pressure of 1,2 MPa (175 psi).

2.6 BEDDING AND SURROUND MATERIALS

.1 Base course and cover materials shall comply with the requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

2.7 FILL MATERIALS

.1 Fill materials shall comply with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

2.8 CATHODIC PROTECTION

.1 Plan to install high potential magnesium anodes for all service entrances, valves and fire hydrants.

.2 For the selection of anodes, the following table presents the size and number of anodes required based on the cast iron or steel accessories to be protected.

CAST-IRON ACCESSORIES	TYPE OF ANODE	WEIGHT/MODEL
Elbows, tees, crosses, etc.	High potential magnesium	1 X 32 lbs./AS32
Service entrances (2 in. max.)	High potential magnesium	1 X 32 lbs./AS32

.3 Magnesium anodes used shall be of the high potential type and shall comply with the most recent version of ASTM G97 and ASTM B843 grade M1C standards.

2.9 EXPANDED POLYSTYRENE INSULATION

.1 Extruded expanded polystyrene insulation shall comply with the requirements of the CAN/ULC S701-97 type 4 standard (formerly the CAN/CGSB 51.20 – M87standard), and shall have a minimum compressive strength of 415 kPa (60 psi).

.2 Extruded expanded polystyrene insulation shall be supplied in panels measuring 600 mm x 2 400 mm.

2.10 BUOYANCY PROTECTION

.1 Wherever there are angles, changes in direction, intersections with a tee, the ends of the pipelines (plugs), pipes and fire hydrants shall be protected from pressure by a concrete buttress poured on site or prefabricated thrust blocks (of dimensions approved by the Canada Parks Representative), positioned between the pipe and the reworked soil. The use of rubble stone is prohibited. The Canada Parks Representative shall designate each location where buttresses are required. See this section's article on "Buttresses and Retention Devices (thrust blocks)".

PART 3 - EXECUTION

3.1 PREPARATION WORK

.1 Before proceeding with placement, remove water or debris, which may have accumulated inside the pipes, connections, valves, fire hydrants and accessories. Check the material carefully for defects and have it approved by the Canada Parks

Representative. Defective material shall be removed from the site, according to the Canada Parks Representative's instructions.

.2 The Contractor shall turn off existing valves in order to isolate sectors where work is to be carried out, empty water from the pipes to be decommissioned and pump out this water before proceeding with the work.

3.2 VERIFICATION OF THE SITE

.1 After marking the location of underground installations and before cutting or removing pavement or conducting excavation work for the installation of pipes, the Contractor shall verify, in the presence of the Canada Parks Representative, the location of existing water pipes.

.2 The Contractor shall take measures to determine the depth of existing water pipes at the points where connections are to be made.

.3 Following excavation work, the Contractor shall verify the dimensions, type and condition of the exposed water pipe.

.4 In the event that a condition significantly different from contract prescriptions is discovered, the Contractor shall immediately notify the Canada Parks Representative of the situation.

.5 When necessary, the profile shall be adjusted according to the Canada Parks Representative's instructions, so as to avoid any sudden changes in the slope and alignment of the pipe and connection.

3.3 DIGGING TRENCHES

.1 Trenches shall be dug in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.4 CONNECTION TO THE EXISTING SYSTEM

.1 Connections perpendicular to an existing waterworks pipe are carried out under pressure. A sliding gate valve box shall be installed at all times.

3.5 BASE COURSE FOR PIPES AND STRUCTURES

.1 Have the layout and depth of the trench approved by the Canada Parks Representative before placing the base course material.

.2 The base course and surround of the pipes and underground structures shall be carried out in compliance with the requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

.3 The loading, transportation and disposal of excavation surplus from work on the base course and surround for pipes and structures shall be at the Contractor's expense.

3.6 INSTALLATION OF PIPES

.1 The Contractor shall supply and install fire protection pipes as well as waterworks pipes in compliance with the diameters and locations shown on the plans and at a minimum cover depth of 1,8 m (6 ft.), including all connectors and accessories needed.

.2 The Contractor shall supply and use all equipment required for the safe and easy handling and installation of pipes. He shall take all precautions to prevent the deterioration of the pipes. He shall clean and dry the interior of the curb box bases and male extremities prior to assembly. He shall examine all pipes and connectors prior to installation, since he shall be required to remove and replace any defective parts, even those, which have already been incorporated in the fire protection pipelines.

.3 The Contractor shall take special care to keep soil or debris from entering the pipes during installation. To this end, he shall place a plug at the end of the last sheet installed. This plug shall only be removed to place the following sheet.

.4 All pipes shall be installed in a straight line. An elbow shall be used for each change in direction. Each of the elbows and connectors installed shall be accompanied by restrained joints to counter buoyancy at these points.

.5 The installation of pipes and their junctions shall be carried out in strict compliance with the requirements of the pipe manufacturer.

.6 If, following installation, a pipe is found to be defective, the Contractor shall, at his expense, remove and replace it with a pipe in good condition and of the quality stipulated in these specifications.

.7 All pipe parts (pipe sections, elbows, couplings, etc) in contact with drinking water and used to connect the new main to the existing system shall be cleaned and disinfected using a 5 % chlorine solution prior to their installation.

.8 The Contractor shall anchor accessories. Wherever there is a vertical or horizontal change in direction and when placing all accessories (elbows, tees, plugs, valves and others) and fire hydrants, the Contractor shall supply and install retention devices and thrust blocks. See this section's article on "Buttresses and retention devices (thrust blocks)".

3.7 CATHODIC PROTECTION

.1 Install the magnesium anode at the bottom of the excavation, allowing a minimum lateral clearance of 600 mm from the cast iron or copper element to be protected.

.2 Anodes shall be installed with their anolyte. If the tube or sack containing the anolyte is damaged during handling and 20 % or more of the anolyte is lost, the Contractor shall be required to replace the damaged anode with a new one, at his expense.

.3 In order to minimize stress on the connection, prior to its connection to the cast iron or copper structure, the cable shall be wrapped around the pipe section.

.4 The anode shall be connected to the cast iron or copper element to be protected by either an aluminothermic weld or mechanical connection. In the case of an aluminothermic weld, it shall be necessary to comply with the following:

.1 A mould whose dimensions are suited to the connector's diameter shall be used.

.2 The following steps shall be followed when welding the cables to the pipes:

.1 Clean and polish a surface of the element to be protected with a file, until the metal is bright,

.2 Strip the cable to be welded to a length of 35 mm,

.3 Insert and pinch to the exposed part of the cable,

.4 Place the cable on the prepared part of the connector,

.5 Place and firmly secure the mould to the cable and light the powder using a lighter specially designed for this purpose,

.6 Remove all slag or weld deposits,

.7 Check the integrity of the weld by lightly tapping it sideways with a hammer,

.8 Any failed or questionable weld shall be redone,

.9 Check the connection by pulling on it strongly.

.5 It is imperative that the mechanical or aluminothermic weld connection be protected against any humidity. To this end, a Mastic coating shall be applied to the connection, so as to cover it entirely.

.6 Backfill the anode using subsoil compacted to 90 % M.P.

3.8 THERMAL INSULATION

.1 In places where the cover is less than 1,8 m (6 ft.), thermal insulation shall be installed to provide adequate protection against the effects of frost.

.2 Place the insulation over the granular cover material surrounding the pipe, in compliance with the Canada Parks Representative's specifications on the plans' details.

.3 Place sheets lengthwise and parallel to the pipe's middle line, staggering the traverse joints.

.4 Butt all sheets together and secure to keep them from moving.

3.9 BUTTRESSES AND RETENTION DEVICES (THRUST BLOCKS)

.1 The Contractor shall build concrete buttresses where there are elbow connectors, tees, fire hydrants and plugs, and wherever they are required by the Canada Parks Representative. These buttresses shall be of the size and weight indicated on the details plan, in keeping with the type of direction change and the pipe's diameter. They shall be supported by firm, stable soil, preventing any shifting.

.2 A compressible asphalt sheet-type material measuring 12,5 mm (½ in.) thick shall be placed between the pipe and the concrete buttress.

.3 Behind the existing pipes where a perpendicular connection is to be made, a concrete buttress shall be installed to transfer all possible thrust exerted by the unworked soil.

.4 Wherever there is a vertical or horizontal change in direction and during the placement of all valve and fire hydrant connectors (elbows, tees, crosses, couplings, etc.), the Contractor shall install, in addition to thrust blocks, a retention system in compliance with the BNQ 1809-300 standard.

3.10 INTERSECTING SERVICES

.1 Wherever there is an intersection with buried municipal services or public utilities, a minimum clearance of 300 mm (12 in.) shall be maintained, except in the case of municipal service entrances where this value can be reduced to 150 mm (6 in.). The minimum clearance shall be increased to 500 mm (20 in.) in the event that a water main is built parallel to another municipal service or public utility. In the event that the normal clearance cannot be respected, work shall be carried out in compliance with the requirements of the MELCC.

3.11 BACKFILLING

.1 Backfilling shall be carried out in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.12 CLEANING AND DISINFECTION

.1 Service interruption

.1 When work requires a partial closing of the existing system, a request to interrupt water service shall be submitted to the Municipality by the Canada Parks Representative at least 48 hours in advance. The latter will coordinate, with the Municipality, the closing and opening of valves or the distribution of notices to citizens. The handling of the existing system's valves shall be carried out exclusively by municipal employees.

.2 Connection to the existing system

.1 The part used for connecting to the existing system shall be installed at the end of the work, before the flushing, rinsing and disinfection stages. The Contractor shall ensure that the parts are clean and that no dirt can be introduced into the pipe.

.2 The Contractor shall plan for the installation of a main stop with a K-type soft copper pipe end near the point of connection and as indicated on the commissioning plan, making it possible for the specialized firm to inject the chlorine solution used to disinfect the existing system.

.3 Drinking water and fire hydrant pipes

.1 All inspections shall be carried out by specialized firms and all inspection reports with recommendations shall be signed by an engineer.

.2 As soon as the Contractor has received the order to start the work, he shall entrust the specialized firm to prepare a plan for flushing, disinfecting and commissioning the drinking water pipes, in keeping with the approved plans.

.3 Generalities

.1 The Contractor shall produce an appropriate scaled plan proportioned to accurately show the new drinking water pipe, its accessories and connections, as well as the part of the existing system affected by the work. The plan shall pinpoint the location of interventions on the drinking water pipe for cleaning, rinsing, disinfection and sampling work. This plan and the equipment required to carry out the work shall be reviewed by

the Canada Parks Representative before the Contractor can proceed with the tests. Furthermore, it is imperative that these tests be carried out by a specialized firm accredited by the Canada Parks Representative and in his presence.

Note: A specialized firm is defined as a company, which has the proper equipment and competencies to carry out the flushing, cleaning, restoration and disinfection of drinking water pipes as well as conduct watertightness tests on drinking water and sewer pipes.

.2 The recognized specialized firm shall advise the project manager at least 24 hours prior to the start of the work.

.3 The final connection of a new pipe to the existing network can only be carried out after all required tests have been conducted and the Canada Parks Representative's approval has been obtained.

.4 Cleaning

.1 Cleaning work shall be carried out so as to keep water or mud from re-entering the pipes.

.2 In the presence of the Canada Parks Representative, the Contractor shall clean all newly installed water pipes. The use of non-abrasive pigs is favoured for small diameters (600 mm or under) while a manual cleaning shall be used for larger diameters. In the latter case, a CCTV inspection shall validate the quality of the cleaning. The recording format shall be pre-approved by the Canada Parks Representative.

.3 The method used shall keep dirt from being drawn into the cavity of the pipes' assembly joint.

.4 Work shall be carried out so as to keep water or mud from re-entering the cleaned pipes. To this end, the Contractor shall plan measures such as excavation, pumping or the discharge of water into a ditch or storm sewer. In collaboration with the Canada Parks Representative, the Contractor shall also anticipate the impact and repercussions of chlorinated water discharged into the environment. In this regard, he shall be required to take appropriate measures to prevent such discharge through neutralization or other means.

.5 All pipe parts (pipe sections, elbows, couplings, etc.) used to connect the new pipe to the existing system and which will be in contact with the drinking water, shall be cleaned then disinfected using a 5 % chlorine solution (50 g/L) prior to their installation. The length of the connecting section shall not exceed 6,0 m.

.6 In new or existing parts of the system, which have been isolated to allow connection to an existing pipe and in which cleaning pigs cannot be used, the Contractor shall eliminate all particles from the pipe by running water through the pipe at a speed of at least 1 m/s for a minimum of 30 minutes. However, he must flush at least three times the volume of water contained in this entire part of the system before it can be put back into service.

.7 During the flushing, when butterfly valves are called for, the latter shall be replaced by pipe sections of the same diameter. After each pig has been removed in collaboration with the specialized firm, equipment that had been removed shall be immediately reinstalled, allowing watertightness tests to be carried out.

.5 Watertightness test for drinking pipe

.1 After filling the trench and immediately following the cleaning work, the pipe and connections shall be subjected, section by section (from one valve to another), to a watertightness test. This test shall be carried out as follows:

.1 First, ensure that the air has been well purged using appropriate equipment if required.

.2 Next, apply a minimum hydrostatic pressure of 850 kPa, measured simultaneously by two different manometers of adequate precision graded on a scale of no more than 50 kPa at the lowest point or a point approved by the Canada Parks Representative. Manometers shall be of the viscous damping type and shall have a scale making it possible to measure approximately twice the test pressure required.

.3 Plan for a pressure stabilization period to compensate for the absorption of water or expansion of the pipe.

.4 Maintain this constant pressure for 60 consecutive minutes.

.5 During this period, measure the quantity of water needed to maintain this test pressure.

.2 The quantity of water to be added must be inferior, for each section tested, to 1 L/mm nominal diameter per kilometre in length per 24-hour period, which in the case of the principal nominal diameters corresponds to the following values:

Acceptable leak, in litres per hour per 100 m of pipe with a joint every 5,5 m on average								
Nominal diameter of the pipe (mm)	50	100	150	200	250	300	350	400
Quantity of water, (l/hr.)	0,21	0,42	0,63	0,83	1,04	1,25	1,46	1,67

Note:
For nominal diameter values exceeding 400 mm or nominal diameter values different from those in the table, the acceptable leak value is determined by calculations based on the following:

$$\left(\frac{\text{1 L/mm of nominal diameter}}{\text{1 km of pipe length * 24 hr.}} \right)$$

When the joints between the pipes are not at a distance of 5,5 m but at a shorter or longer distance, it is necessary to calculate the acceptable leak based on the total number of joints (pipes and accessories) as follows:

$$L = \frac{ND\sqrt{P}}{130{,}400}$$

L = value of the acceptable leak, in litres per hour
N = number of joints in the pipe, including those at the extremities
(Example of calculations: for a pipe measuring 100 m in length, with no accessories and with an average distance of 4.0 between joints, the number of joints is 26).
D = value of the nominal value of the pipe, in millimetres;
P = pressure within the pipe during the test, in kilopascal (850 kPa, see article e 11.1.3.1 b of BNQ 1809-300).

.3 When the leak in a given section exceeds the aforementioned maximum values, the Contractor shall locate and correct this leak at his expense. He shall repeat the test at his expense until the quantity of water added to the system is below the prescribed limit. The correction to the work shall be inferior to the quality of the projected work and must be accepted by the Canada Parks Representative. Defective parts shall be replaced by new parts and the use of repair saddles is prohibited.

.4 Furthermore, all visible leaks shall be corrected by the Contractor, even if they fall below acceptable leak values.

.5 For provisional acceptance, watertightness tests must be conducted under the responsibility of the Contractor who shall then provide all the collaboration needed to carry out all tests. All test results, including non-compliant results shall be contained in a report. This report shall be transmitted to the Canada Parks Representative for approval and is required for the provisional acceptance of

the work. If the result is negative, article 4.12 of the NQ 1809-900 standard shall apply.

.6 Disinfection

.1 Generalities

.1 If need be, once the results of watertightness tests have been accepted and before the water pipes and their connections to the property line are put into service, the Contractor shall disinfect them as well as their accessories.

.2 Disinfecting part of an existing system

.1 If the connection to the existing pipe has not been carried out under pressure, work shall include the disinfection of existing pipes, which had to be closed to carry out the connection, as well as the disinfection of the new pipes (as per the approved disinfection plan). In this instance, the disinfection is necessarily carried out with a free chlorine concentration between 25 ppm and 50 ppm at every point of the disinfected pipe, including fire hydrant supply pipes. The chlorine solution must remain in the pipe for a minimum of one hour, in order not to interrupt the water supply for too long a period. After a full rinsing of the pipe, the concentration of residual chlorine shall not exceed that of the existing system.

.2 Once the system is back in service, the specialized firm shall take a water sample from the existing system, which has been disinfected, for bacteriological analysis by a laboratory accredited by the Ministry of the Environment. The results of the bacteriological analysis shall be sent to the Contractor by the specialized firm. The Contractor shall then communicate the results to the Canada Parks Representative within 24 to 48 hours following the lifting of the sample.

.3 The installation of corporation valves required to introduce the chlorine solution into the existing system as well as in the new pipes, is carried out by the Contractor.

.4 The Municipality notifies citizens affected by the interruption in water service.

.3 Disinfection of the new pipe.

.1 The specialized firm shall carry out the disinfection of the new pipe using a free chlorine concentration between 25 ppm and 50 ppm at every

point in the disinfected pipe including pipes supplying the fire hydrant, and with a residual minimum of 10 ppm after 24 hours (AWWA'S continuous feed method).

.2 The specialized firm shall ensure that the chlorine solution is evenly distributed throughout all the pipes. To this end, it measures chlorine concentrations at several points in the pipes.

.3 The results of the residual chlorine measurement shall be noted in a table of results i. The residual chlorine test shall be conducted after the system's disinfection but prior to its rinsing.

.4 To ensure that no chlorine made its way back into the existing system during disinfection, the specialized firm shall check the concentration of free chlorine at a supply point on the existing system as close as possible to the connection point.

.5 Immediately following disinfection, the Contractor shall turn off valve(s) located at the point of connection to the existing system, which supply the new drinking water pipe.

.6 As soon as the contact period is over, all pipes without exception and all fire hydrants shall be emptied to restore the chlorine concentration to a value that does not exceed that of the existing system.

.4 Sampling by a specialized firm.

.1 After notifying the Canada Parks Representative, the specialized firm shall lift control samples from locations identified in the approved flushing plan. In addition, a control sample of the quality of the existing system's water shall be lifted. It must ensure that new pipes are cleared of their chlorine content at the time of sampling. To this end, it is necessary to measure residual chlorine at each sampling point and on the existing system. Results of these measurements shall appear on the certificate of compliance issued for the flushing, disinfection and commissioning of new waterworks pipes.

.2 Samples shall be sent by the specialized firm to a laboratory accredited by the Ministry of the Environment for analysis.

.3 The Contractor shall close the valve(s) located at the point of connection to the existing system and which supply the new drinking water pipe immediately after disinfection.

.5 Analysis

.1 Control analyses requested from the laboratory accredited by the Ministry of the Environment at each sampling points are:

.1 Turbidity measurement.

.2 Total coliform count using the membrane filter technique.

.3 Atypical colony count.

.4 Heterotrophic, aerobic and anaerobic bacteria count.

.2 When the results of the analyses reveal water of good quality, the Contractor shall transmit them to the Canada Parks Representative. Water of good quality is defined as one whose turbidity is under 1 UNT with a total coliform count under 1/100 ml and an atypical colony count equal to or below the number found in the existing system.

.6 Certificate of compliance

.1 When all work has been completed as required, the Contractor shall provide a certificate of compliance to the Canada Parks Representative who shall then validate it and add it to the work acceptance document.

.7 Washing:

.1 The first stage consists in eliminating all particles from the pipe by allowing water to circulate at a speed of at least 1 m/s for a minimum of 30 minutes, to change the total volume of water contained in the pipe. This washing shall be carried out at the pressure of the neighbouring system while maintaining a minimum residual pressure of 275 kPa in this system and using a temporary connection system that meets with the Canada Parks Representative's satisfaction. To wash a pipe with a diameter of 300 mm or less, the Contractor shall use a fire hydrant outlet of 65 mm in diameter located at one end of the pipe. For a pipe with a diameter of 350 mm or more, he shall use at least two fire hydrant outlets. To wash the connectors, the Contractor must bleed them to the Canada Parks Representative's satisfaction.

.8 Filling:

.1 Subsequently, the Contractor shall fill the pipe with a chlorinated water solution whose concentration is at least 50 mg/L of free chlorine. The quantities required to obtain this concentration are shown in Table 1.

TABLE 1
MINIMUM QUANTITY OF CHLORINE REQUIRED PER 100 m OF PIPE TO OBTAIN A SOLUTION WITH A CONCENTRATION OF 50 mg/L

(Article 11.1.4.3 of BNQ 1809-300 and 5.4.8.6 of Directive 001)

Nominal diameter of the pipe mm (in.)		**100 % chlorine in kg**	**1 % chlorine solution in litres**
50	(2)		1,0
75	(3)		2,2
100	(4)	0,04	3,97
150	(6)	0,09	9,06
200	(8)	0,16	16,27
250	(10)	0,25	26,33
300	(12)	0,36	36,51
350	(14)	0,50	49,54
400	(16)	0,65	64,83
450	(18)	0,82	82,09
500	(20)	1,02	101,22
600	(24)	1,44	145,81
750	(30)	2,26	227,77
900	(36)	3,28	327,97
1050	(42)	4,46	446,58
1200	(48)	5,84	583,30
These values were obtained based on values contained in ANSI/AWWA C651 standard			
NOTE: .1	*The weight of chlorine at 100 %, expressed in grams, is obtained by multiplying, using a factor of 10, the volume, in litres, of the chlorine solution at 1 %.*		
.2	*Since it is necessary to bleed the fire hydrants to ensure that the chlorine solution has penetrated the entire network, the quantity of chlorine injected must be higher than that calculated using the table.*		

Note: Chlorine solutions deteriorate over time, i.e., their initial concentration is reduced after a period of time. As a result, it is common practice to consider that chlorine solutions have a maximum service life of 45 days. Chlorine sold in the form of tablets and whose concentration is 100 % does not deteriorate over time. It is common commercial practice to use the nominal concentration percentage to designate chlorinated

solution; for example, a solution with a nominal concentration of 12 % may contain only 10,4 % of free chlorine.

.9 Disinfection:

.1 The Contractor shall ensure that the chlorinated water solution with a concentration of 50 mg/L penetrates each of the system's pipes and accessories. To this end, the valves and fire hydrants are opened for a few minutes. At the start of the 24-hour test period, the Contractor shall use a chlorimeter to confirm that the concentration of free chlorine, has a minimum value of 25 mg/L is all of the system's pipes and accessories. At the end of the 24-hour test period, the Contractor shall check the concentration of free chlorine using a chlorimeter. This concentration must have a minimum value of 10 mg/L, if this value is not reached, the system disinfection test must be repeated.

.2 When a drinking water pipe has been soiled (dirty water, sand, soil, debris or other matter) during installation work, a second sampling must be conducted 16 hours after the first sampling. If the results of these analyses do not comply with the requirements of this article, the disinfection must be repeated at the Contractor's expense.

.10 Rinsing:

.1 When test results comply with requirements, the Contactor shall rinse out each of the system's pipes and accessories as described above, until the concentration of chlorine is below 1 mg/L as measured by a chlorimeter. Then, bacteriological analyses using the membrane filter technique shall be conducted by a Laboratory accredited by the MELCC on samples lifted by a representative of the accredited Laboratory in the presence of the project manager. Two samples shall be analyzed for each 150 m of disinfected pipe.

.11 Acceptance:

.1 The disinfection of the pipe shall be accepted once a laboratory examination of samples reveals the presence of no total and fecal coliform bacteria in 100 ml of water, no enterococcal bacteria, no atypical bacteria (non-coliform) and the HAAB does not exceed 100 UFC/ml of water. All test results including those showing non-compliance must be noted in a report. This report shall be signed and sealed by an engineer and given to the project manager for approval. It is required for the provisional acceptance of the work. If analyses fail to meet requirements, the disinfection of the pipe and laboratory analysis of new samples shall be repeated. This work and related charges shall be at the Contractor's expense.

Note:
UFC: units forming calories
HAAB: Heterotrophic aerobic and anaerobic bacteria

3.13 COMMISSIONING

.1 The Contractor shall provide the Canada Parks Representative with a commissioning plan prepared by the specialized firm for approval, and make whatever modifications may be requested. This plan shall be produced using AutoCad software (latest version).

.2 The plan shall indicate if work includes the use of temporary systems as well as installation and disinfection details if applicable. If required, this plan shall also indicate the part of the existing system that shall be out of service during connection work. The plan shall be transmitted and approved by to the Canada Parks Representative for verification and correction, if deemed necessary.

.3 The illustration of pipes shall correspond to true condition with regards to length, orientation of pipes as well as the position of equipment. Sketches need not be to scale, but must provide a clear and concise visual interpretation.

.4 Plans shall include, at the very least, the following information:

.1 Regulation and bid numbers.

.2 Name of the Engineer as well as the name and contact information of the individual in charge.

.3 Temporary numbering of fire hydrants and valves.

.4 Street names or numbers.

.5 Pipe lengths.

.6 Pipe diameters.

.7 Location of valves.

.8 Location of fire hydrants, plugs, drainage valves and others.

.9 Relevant sections of the existing system.

.10 Cleaning pig insertion and removal points.

.11 The pipeline route of each cleaning pig.

.12 Chlorine injection and rinsing points.

.13 Location of sampling points (1/150 m of pipe for new pipes as well as the existing system).

.14 Location of excavations required for flushing, rinsing, disinfection and sampling work.

.5 Upon reception of the commissioning plan approved by the Canada Parks Representative, the Contractor shall start work on the installation of new pipes and conduct connection work to the existing waterworks system as per the plan.

.6 On the work site, the Contractor shall identify fire hydrants (numbering consistent with the approved plan) using firmly secured labels.

3.14 VERIFICATION OF CONDUCTIVITY

.1 Once the installation of the pipes has been completed, the Contractor shall check the electrical transmission in the pipe and/or the copper conductor. These tests shall be carried out at the Contractor's expense but conducted by a specialized firm and are included in the bid. All inspection reports with recommendations shall be signed by an engineer.

.2 Using a generator, current of 200 A at 50 V shall run between two contact points located less than 150 m from each other. The Contractor shall take all measures required to prevent any accident or damage to individuals or private property.

3.15 RESTORATION OF THE SITE

.1 Once the installation of the pipes and accessories has been completed, surfaces must be restored to their original condition, as per the Canada Parks Representative's instructions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 11 – Civil - Excavation and Backfilling - Underground Services

.2 Section 32 11 00 – Civil - Roadworks

.3 Section 33 11 16 – Civil - Waterworks System and Fire Protection

1.2 SCOPE OF WORK

.1 Ensure the supervision of the work and provide all the manpower, equipment, tools, materials, transportation and other services required to carry out and complete all work described and specified in this section and Contract documents, including but not limited to: the dismantlement of existing sewer networks including underground structures, the supply and installation of pipes, connectors and accessories, manholes, catch basin manholes, catch basins, service connections, joints, connections to existing pipes or manholes, trench maintenance, dewatering of excavations, trench filling, watertightness tests, etc.

1.3 REFERENCES

.1 Bureau de normalisation du Québec (B.N.Q. – Quebec Standards Bureau) (latest edition).

.1 BNQ 1809-300: Construction Work – General technical clauses – Drinking water and sewer pipes.

.2 NQ 2622-126: Pipes and monolithic lateral connections made of reinforced and non-reinforced concrete for the evacuation of sanitary and storm sewers.

.3 NQ 2622-420: Sewer manhole, catch basins and manifold chambers of prefabricated reinforced cement concrete.

.4 NQ 3221-500: Frames, gratings, manhole covers, catch basins and valve boxes – cast of grey or ductile cast iron for civil engineering works - Characteristics and test methods.

.5 NQ 3624-110: Polyethylene pipes and connectors (PE) – Semi-rigid or flexible pipes for the evacuation of surface water, soil drainage and culverts - Characteristics and test methods.

.6 NQ 3624-120: Polyethylene pipes and connectors (PE) - Open or closed profile pipes with a smooth interior wall for the storm sewer and soil drainage - Characteristics and test methods.

.7 NQ 3624-130: Rigid non-plastified polyvinyl chloride (PVC) pipes, with a diameter equal to or smaller than 150 mm, for underground sewers.

.8 NQ 3624-135: Non-plastified polyvinyl chloride (PVC-U) pipes - -200 mm to 600 mm-diameter Pipes for underground sewers and soil drainage - Characteristics and test methods.

.2 National Plumbing Code of Canada (latest edition).

1.4 DEFINITIONS

.1 Accessories: devices and apparatus other than the sewer pipe, which are used along with the sewer. This includes connectors such as tees, crosses, elbows and stoppers.

.2 Backfilling: operation consisting in filling the trench with foundation, cover and fill materials.

.3 Gasket: a rubber ring, which provides a watertight joint for connectors, pipes and couplings, etc.

.4 Manhole: a specially built opening, usually in the upper part of a sewer, chamber or other infrastructure, for maintenance or other purposes.

.5 Service connection: pipe draining sanitary or storm water from the property line to the main sanitary or sewer pipe respectively.

1.5 SAMPLES

.1 Present samples for testing purposes to the Canada Parks Representative at the latter's request, and at the Contractor's expense.

1.6 SHOP DRAWINGS

.1 Shop drawings are required but are not necessarily limited to the following:

.1 Connectors (tees, elbows, couplings),

.2 Rubber joint gaskets,

.3 Sewer pipes,

.4 Frames, covers and gratings.

.5 Adjustment units,

.6 Manholes,

.7 Catch basins,

.8 Catch basin manholes,

.9 Culverts and accessories,

.10 Flow regulator,

.11 Geotextile membranes,

.12 Overflow chamber,

.13 Check valve,

.14 Safety stop.

.2 Work related to the drawings may only start after said drawings have been revised by the Canada Parks Representative.

.3 The Contractor shall present an exhaustive list of the materials to be used, including the name of the manufacturer and supplier.

.4 Within the limits of the Contract, all materials must be uniform and come from the same manufacturer.

1.7 CERTIFICATION OF MATERIALS

.1 At least 2 weeks prior to the start of the work, present the results of tests conducted by the manufacturer and the certificate attesting that the pipes, manholes, catch basin manholes and catch basins comply with the requirements of this section.

.2 Ensure that pipes bear the certification stamp.

1.8 TRANSPORTATION, STORAGE AND HANDLING

.1 Deliver, store and handle materials in compliance with the manufacturer's instructions.

.2 The Contractor shall take the following precautions when handling pipes:

.1 The pipe shall be handled so as not to touch sharp objects.

.2 Avoid impact in lifting.

.3 Storage surfaces shall be flat and clean.

.4 Pipes shall not be dropped or allowed to knock against another pipe.

.5 Gaskets shall be protected from excessive exposure to heat, direct sunlight, oil and grease.

.3 All materials found to be damaged or in poor condition shall be rejected or replaced at the Contractor's expense.

1.9 WORK SCHEDULE

.1 Prepare the work schedule so as to minimize interruptions to existing services and maintain a normal flow rate during construction work.

.2 Provide the Canada Parks Representative with the schedule of projected interruptions for approval, and comply with this duly approved schedule.

.3 When service interruptions are required, inform the Canada Parks Representative and Authorities involved at least 48 hours in advance.

1.10 WORK BY OTHER COMPANIES OR CONTRACTORS

.1 If need be, the Contractor shall be required to coordinate his work with that of the Municipality or any other contractor, company or public utility, which may need to carry out work of any nature whatsoever, before or during the execution of work covered by this contract.

1.11 ALIGNMENT AND LEVELS

.1 The Contractor shall strictly respect the layout and profile of the sewer (or sewers) called for in the contract drawings, as well as the class and diameter of pipes, the number, positions and elevations of the manholes, catch basin manholes, and catch basins.

.2 The final location of an underground structure must not be more than 100 mm (4 in.) from that shown in the contract drawings. The final elevation of an underground structure must not be more than 25 mm (1 in.) from that indicated on these same drawings.

.3 In the event that obstructions not covered by the drawings interfere with work to the point of requiring changes to the plans, the Canada Parks Representative can require that work be modified or displaced accordingly, or he can make the necessary arrangements with the owners of said obstructions for their demolition, displacement, or reconstruction.

.4 The Contractor shall take necessary precautions during excavation work, to locate known or unknown underground structures, and shall be responsible for their repair should they be damaged as a result of his negligence.

1.12 REMOVAL OF SEWER PIPES

.1 Work related to the removal of sewer sections consists in, but is not limited to, the supply of materials and labour required for the removal, according to good engineering practices, of sections shown in the plans and specifications, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of trenches and diversion of water in the pipes,

.5 The complete removal of existing sewer pipes, as well as their transportation to the site designated by Owner authorities,

.6 The sealing of pipe extremities,

.7 The supply and application of lean concrete,

.8 The protection and repair of public utilities,

.9 Backfilling and placement of approved material up to the infrastructure,

.10 The restoration of sub-bases and pavement.

.2 The Contractor shall carry out work to seal the openings of connectors in compliance with the BNQ 1809-300/ standard.

1.13 SEWER PIPES TO BE CONDEMNED

.1 Work related to the condemnation of sewer sections consists in, but is not limited to, the supply of the materials and labour needed for the condemnation, according to good engineering practices, of sections shown in the plans and specifications, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of trenches and diversion of water in the pipes,

.5 The supply and application of lean concrete for filling the condemned pipes,

.6 The sealing of pipe extremities and/or openings in an existing manhole,

.7 The protection and repair of public utilities,

.8 Backfilling and placement of approved material up to the infrastructure,

.9 The restoration of sub-bases and pavement.

.2 The Contractor shall carry out work consisting in sealing the openings of connectors in compliance with the BNQ 1809-300 standard.

1.14 MANHOLE TO BE REMOVED

.1 Work related to the removal of the manhole consists in, but is not limited to, the supply of materials and labour needed for the removal, according to good engineering practices, of existing manholes shown in the plans and specifications, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The dewatering of trenches and diversion of water in the pipes,

.5 The complete removal of the manhole,

.6 The sealing of the extremities of pipes in place,

.7 The protection and repair of public utilities,

.8 Backfilling and placement of approved material up to the infrastructure,

.9 The restoration of sub-bases and pavement.

.2 The Contractor shall carry out work to seal the opening of connectors in keeping with the BNQ 1809-300 standard.

1.15 INSTALLATION OF SEWER PIPES

.1 Work related to sewer pipes consists in, but is not limited to, the supply of materials and labour needed to carry out, according to good engineering practices, the installation of sewer pipes, in keeping with the diameters and materials specified in the plans, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 Supply and installation of pipes,

.5 The dewatering of trenches and diversion of water in the pipes,

.6 Supply and installation of the base course and cover,

.7 Supply and installation of sewer pipes,

.8 Accessories,

.9 Backfilling and placement of approved material as far as the infrastructure,

.10 Distortion tests (PVC pipe) as well as infiltration and watertightness tests (sanitary sewer pipe) and CCTV inspection (sanitary sewer pipe and storm sewer pipe),

.11 Repairs to existing pavement, curbs and sidewalks,

.12 Protection and repair of public utilities and all other work required for the full use of these structures.

1.16 INSTALLATION OF PREFABRICATED MANHOLES AND CATCH BASIN MANHOLES

.1 Work related to prefabricated manholes consists in, but is not limited to, the supply of materials and labour needed to carry out, in keeping with good engineering practices, the installation of new sewer manholes and catch basic manholes, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The supply of manholes as specified in the plans,

.5 The dewatering of excavations,

.6 The supply and installation of the base course,

.7 Accessories, gutters,

.8 The connection of pipes to the manhole,

.9 The supply and installation of the machined frames and covers,

.10 In-depth cleaning of the manhole,

.11 Backfilling and placement of approved material as far as the infrastructure,

.12 Watertightness tests,

.13 Repairs to existing pavement, curbs and sidewalks,

.14 Protection and repair of public utilities.

1.17 INSTALLATION OF CATCH BASINS

.1 Work related to catch basins consists in, but is not limited to, the supply of materials and labour needed to carry out, in keeping with good engineering practices, the installation of catch basins including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 The supply of catch basins as specified in the plans,

.5 The dewatering of trenches,

.6 The supply and installation of the base course,

.7 Connection of the catch basins to the network,

.8 Accessories,

.9 In-depth cleaning of the catch basin,

.10 Backfilling and placement of approved material as far as the infrastructure,

.11 Infiltration tests and CCTV inspection,

.12 Repairs to existing pavement, curbs and sidewalks,

.13 Protection and repair of public utilities.

1.18 CATCH BASINS TO BE REMOVED

.1 Work related to the removal of catch basins consists in, but is not limited to, the supply of materials and labour needed to carry out, in keeping with good engineering practices, the removal of the catch basin including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 The excavation, loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 Sealing of the connection point to the water main,

.5 The dewatering of trenches,

.6 Backfilling and placement of approved material up to the infrastructure,

.7 Repairs to existing pavement, curbs and sidewalks,

.8 Protection and repair of public utilities.

.2 The Contractor shall carry out work to seal the opening of connectors in keeping with the BNQ 1809-300 standard.

1.19 UNDERGROUND RETENTION POND

.1 The underground retention pond must meet the characteristics, requirements and details presented on the project plans. The retention volume must be equivalent to the one specified on the plans.

1.20 CONNECTION TO AN EXISTING PIPE

.1 Work related to connections to an existing pipe consists in, but is not limited to, the supply of materials and labour needed to carry out, in keeping with good engineering practices, the connection to an existing pipe, including:

.1 Saw cuts,

.2 Removal of the pavement and infrastructure,

.3 Loading, transportation and disposal of excavation surplus and waste to a site complying with the requirements of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy,

.4 Clearing of the existing structure,

.5 Cleaning of pipes and joints,

.6 Production of the watertight connection joint,

.7 Connection in compliance with the BNQ 1809-300 standard,

.8 The supply and installation of the base course and surround,

.9 Accessories,

.10 Backfilling and placement of approved material up to the infrastructure.

1.21 STOPPERS OR GRATINGS

.1 Work related to stoppers or gratings consists in, but is not limited to, the supply of materials and labour needed to carry out, in keeping with good engineering practices, the installation of stoppers and gratings, including:

.1 The supply and installation of stoppers or gratings as per instructions provided in the plans.

PART 2 - PRODUCTS

2.1 PIPES

.1 Reinforced concrete pipes:

.1 Unless otherwise stipulated in the plans, storm sewer pipes measuring 300 mm or more in diameter are to be made of Class IV reinforced concrete. The concrete shall be sound, free of chips and flaws, and pipes shall be of regular shape. Joints shall have rubber gaskets complying with the requirements of the NQ 2622-126 or ASTM C443M standard. When required, the lubricant shall comply with the recommendations of the pipes' supplier.

.2 Pipes shall bear the manufacturer's name or trademark, production date, and class of pipe as well as their BNQ number.

.3 Prior to the start of the work, the Contactor shall make known the name of the manufacturer of the pipes he intends to use, and which must hold a BNQ certificate for the diameter and class of pipe supplied.

.4 The Contractor shall be particularly careful when handling and unloading the pipes, as well as lowering them into the trench to avoid cracking, chipping or breaking them. Any pipe that is damaged in any way whatsoever will be refused by the Canada Parks Representative and the Contractor shall be required to replace them, whether or not they have been incorporated into the structures.

.5 The Canada Parks Representative reserves the right to require that reinforced concrete pipes be checked for their resistance to collapsing under outside loads. These tests shall be carried out in compliance with the method and requirements of NQ 2622-126 standards. These tests shall be entrusted to a Laboratory selected by the Contractor and approved by the Canada Parks Representative. Laboratory reports shall be sent to the Canada Parks Representative at least three (3) days prior to the installation of pipes.

.6 A standard part of each diameter and from each manufacturer shall be tested in this manner, for each 500 m (1,640 ft.) of pipe to be installed. However, the Canada Parks Representative reserves the right to require that a larger number of samples be tested, should he deem it necessary.

.7 All costs incurred for these tests, except for Laboratory tests, shall be the responsibility of the Contractor, including the supply of samples, their transportation to the Laboratory and all related expenses.

.8 For each delivery, the Contractor shall provide the Canada Parks Representative with an attestation of compliance. The attestation of compliance must contain the following information, for each production lot:

.1 The name of the pipes manufacturer.

.2 The production date and place.

.3 The class, category and nominal dimensions.

.4 Results of analyses, tests and quality control measures required by the NQ 2622-125 standard "Tuyaux circulaires en béton armé et non armé – Guide de fabrication et de contrôle de la qualité en usine " (Circular reinforced and non-reinforced concrete pipes — Guide to production and quality control in the plant).

.5 The production lot number.

.9 A production lot consists of pipes of the same class, category and dimension, which have been manufactured during a single ongoing production cycle under the same conditions.

.2 Polyvinyl chloride (PVC) pipes:

.1 Unless otherwise specified in the plans, sanitary and storm sewer pipes in diameters of 250 mm or less, as well as catch basin connectors shall be of polyvinyl chloride (PVC).

.2 Polyvinyl chloride (PVC) pipes for gravity applications shall comply with the requirements of standard NQ 3624-130, type DR-28, for diameters of 100 to 150 mm and standard NQ 3624-135, type DR-35, for diameters of 200 mm or more.

.3 Connectors shall be of the "wide-mouthed" type and consist of a section with a solid wall and rubber gasket installed in the plant and securely blocked to keep it from moving.

.4 Monolithic tees used for connecting pipes to the sanitary sewer shall be made of polyvinyl chloride (PVC) complying with the requirements of NQ 3624-130 and NQ 3624-135 standards.

.3 High density polyethylene (HDPE) pipes :

.1 High Density Polyethylene (HDPE) pipes has to meet the latest CSA B182.13, CSA B182.14, CSA B182.15 and ASTM F2562 standards.

2.2 SECURITY GRATE, LANDING, PLATFORM (UNDERGROUND STRUCTURE)

.1 All landings, platforms, footbridges, security grates and other similar works, as well as their supports to be installed in underground structures shall be made of galvanized steel. All of these steel components shall be produced in the plant. All shall be welded and must be sturdy.

.2 Security grates are required for manholes whose depth is equal to or greater than 3 m while landings, platforms and footbridges are required in manholes 6 or more meters deep.

.3 Galvanized steel safety landings consist of two grates, which can be opened independently from each other and shall be installed at regular intervals (spaced every six meters maximum). The diameter of chimneys housing said landings shall be at least 1 200 mm (see detail).

2.3 GALVANIZED STEEL ACCESSORIES

.1 When galvanized steel parts are required, hot dip galvanizing shall comply with the CAN/CSA-G164M-92, class C standard. The quantity of zinc deposited must be at least 610 g/m^2 of exposed surface.

.2 The special paint, which can be used on the job site to protect a non-galvanized cut surface shall be a ready-mixed zinc-rich coating complying with CAN/CGSB-1.181 and ONGC 1-GP-181M standards.

.3 The mechanical anchors used to secure accessories to the concrete walls must be of grade 316 stainless steel.

2.4 ALUMINIUM ACCESSORIES

.1 Aluminum bars, pins, wires and extrusions, sheets or plates shall comply with the ACNOR HA.4-M1990 (6061-T6) standard. Rivets and bolts shall be of galvanized steel, except for the concrete wall's mechanical anchoring bolts, which shall be of grade 316 stainless

steel. All aluminum elements shall be anodized after welding. Aluminum welding shall comply with the ACNOR HA.6-1980 (4043) standard. All aluminum in contact with the concrete, masonry or any material other than aluminum should be separated from the latter by neoprene at least 5 mm thick over the entire contact surface.

2.5 SEWER MANHOLE AND CATCH BASIN MANHOLE

.1 Prefabricated sewer and catch basin manholes.

.1 Manholes and catch basin manholes shall be of reinforced concrete in compliance with the NQ 2622-420 standard. Unless otherwise indicated in the plans, manholes and catch-basin manholes shall be of the 1200 mm diameter and shall have rubber gaskets complying with NQ 2622-420 and ASTM C443M standards.

.2 On sanitary sewer pipes, manholes shall be watertight with rubber gasket joints and monolithic base poured on the bottom section of the manhole. The bottom of these manholes is built so that water is discharged through a semi-circular canal (gutter). The canal is smooth and even, and the curvature's radii are the longest allowed by available space; no sharp turn shall be accepted. The bottom is made entirely of concrete.

.3 Manholes on storm sewers shall be of the same type as those described above, the bottom featuring a semi-circular canal (gutter) as described in the preceding point. If the angle makes the use of a gasket impossible, a flexible watertight joint shall be produced using activated oakum. No rigid joint shall be accepted.

.4 The manufacturer shall hold a certificate of compliance with the ASTM C-443 standard for joint gaskets, issued by a Laboratory recognized by the Ministère des Transports du Québec (MTQ – Quebec Department of Transport).

.5 Concrete used in the construction of these manholes shall have a compressive strength of 40 MPa at 28 days, and these manholes shall be built in compliance with the NQ 2622-420 and ASTM C-478 standards. In all cases, the strictest standard shall prevail. The surfaces of the manhole shall be those obtained upon removal of forms. The use of a surface coating or finishing mortar is not allowed.

.6 Manhole elements likely to be located 600 mm or less from the profile of the street shall meet the requirements of tests with de-icing salts to determine resistance to freeze/thaw cycles, as described in the "Cahier des charges et devis généraux" issued by the Ministère des Transports du Québec (MTQ — Quebec Department of Transport). This compliance must be attested to by a Laboratory accredited by the MTQ.

.7 All horizontal and vertical joints, which are not watertight, shall be immediately repaired by a specialized firm, which shall produce a special report confirming said repairs along with a two (2) years guarantee. This specialized firm must be approved by the Canada Parks Representative. Only flexible repair methods such as activated oakum, acrelamide or polyurethane injection are allowed. Any other flexible repair method shall be subject to an equivalence application. No rigid repair shall be permitted.

.2 Rungs and ladders

.1 Materials used in the production of ladders and rungs are cold worked. Ladder bars are produced of 15 M deformed reinforcing steel with a spacing of 300 mm (12 in.) c/c at ± 25 mm and rungs made of 20 M deformed reinforcing steel with a spacing of no more than 300 mm (12 in.). The steel shall be galvanized. The ladder shall be secured to the wall using bolts screwed into anchors set in the concrete at the time of pouring.

.2 The middle of the top bar shall never be more than 660 mm below the final elevation from the cover. Wall clearance shall be 150 mm from the recess.

.3 Frames, covers and grates

.1 The frame and cover shall be of the adjustable type with guide rings and no other standard type shall be installed without the authorization of the Canada Parks Representative.

.2 Cast iron and shaping for frames, guides and covers shall comply with the NQ 3221-500 standard. Parts shall be flawlessly moulded with no cracks, scars, blisters or other defects. The warping tolerance in all directions shall be less than 1 mm (1/32 in.). All parts whose weight is less than 95% of the weight indicated by the manufacturer shall be rejected. All cast-iron parts shall bear the manufacturer's name or trademark. All unidentified parts shall be refused.

.3 In the case of all manholes and catch basin manholes located above grade, the frame shall be of class 30 grey cast iron while the cover and the grate shall be of class 65-45-12 ductile cast iron.

.4 In the case of manholes located in paved areas, the frame and cover shall be produced from class 65-45-12 ductile cast iron while the conic guide shall be produced of grey cast iron in self-adjusting model for the cover, with resilient frame seat for the frame and the guide channel.

.5 The frame shall not rest directly over the guide channel. There shall be a space of at least 40 mm (1 1/2 in.) between the underside of the frame and the top of the guide channel. To this end, it is necessary to raise one side of the adjustable part

and tamp down the bituminous mix between the supporting rim and the top of the concrete section of the manhole or catch basin manhole. Repeat the process on the other side to obtain even support under the entire rim, and exceed the level of surrounding pavement by 50 mm (2 in.) before running the roller.

.6 In the case of catch basin manholes located in paved areas, the frame shall be self-adjusting model with resilient frame seat. The frame and grate shall be of class 65-45-12 ductile cast iron and the guide channel shall be of class 25 grey cast iron.

.7 Frames, covers and grates for manholes and catch basin manholes shall be capable of withstanding heavy traffic.

.8 Covers must bear the following inscriptions, as the case may be:

"Storm sewer", "Sanitary sewer".

.9 For the standard type, the cast iron, shaping and machining of the frame and cover shall comply with ASTM standards for class 25 grey cast iron (Standard Specification Gray Iron Casting, Designation A-48).

.4 Adjustment

.1 To adjust manholes and chambers to the proposed elevation, the Contractor shall use heads whose heights shall vary from 200 to 475 mm. Heads shall have a continuous groove on the top face, to accommodate the installation of a strip of butyl as well as a lip to hold the frame or levelling ring.

.2 A standard ring measuring 300 mm in height shall be installed beneath the head, when the height of the manhole allows. No ring of a height other than 300 mm shall be installed directly beneath the head of the manhole.

.3 Stacking rings shall be installed in heights of 300, 600, 900, 1 200 and 1 800 mm.

.5 Identification of parts

.1 To ensure that parts are installed at the right location, it is necessary for them to be identified on the inside, respecting the numbering of manholes on the plans of the Canada Parks Representative.

.6 Rubber adjustment risers

.1 To adjust manholes measuring no more than 100 mm in height, the Contractor shall use rubber risers.

.2 The types of rubber rings, which the Contractor may use, based on the adjustment height, are the following:

.1 Flat 12.5, 25, 38, 50 and 75 mm rubber rings.

.2 Angled 12.5-25, 25-38, 38-50, 50-63 and 63-75 mm rubber rings.

2.6 CATCH BASIN

.1 Catch basin

.1 Catch basins shall be of reinforced concrete in compliance with the NQ 2622-420 standard. Unless otherwise indicated in the plans, catch basins will be 610mm diameter and have a butyl gasket.

.2 The catch basin's concrete shall have a compressive strength of 35 MPa while the head and levelling rings shall have a compressive strength of 40 MPa.

.3 Elements of all catch basin models shall meet the durability requirements of freeze/thaw cycle tests using de-icing salts, as described in the "Cahier des charges et devis généraux" issued by the Ministère des Transports du Québec (MTQ – Quebec Department of Transport). This compliance must be attested to by a Laboratory accredited by the MTQ.

.4 The base course rests on a stable sub-course and consists of a 150 mm cushion of MG-20b calibre crushed stone.

.5 Catch basins are connected to the storm sewer main by the DR-35 PVC pipe with a minimum diameter of 200 mm. The pipe's connection to the main uses a monolithic tee or appropriate saddle, and the Contractor shall only pierce mains using special drills produced specifically for this purpose.

.6 The connection between the pipe and the catch basin must have a rubber gasket. At every joint, sections of the catch basin must have a rubber gasket or butyl tape.

.7 When two (2) catch basins are connected in a series, the connection to the water main shall use a 300 mm-diameter PVC pipe.

.8 The use of a hammer to pierce the pipe is prohibited at all times.

.9 Backfilling around the catch basin shall be with MG-20b crushed stone compacted to 90 % of M.P. over a 600 mm width.

.2 Frames, grates and traps

.1 The catch basin shall be of the adjustable type with guide rings and no other standard type can be installed without the authorization of the Canada Parks Representative.

.2 The cast iron and shaping of frames, guides and covers shall comply with the NQ 3221-500 standard. They shall be flawlessly moulded with no cracks, scars, blisters or other defects. The warping tolerance in all directions shall be less than 1 mm (1/32 in.). All parts whose weight is less than 95 % of the weight indicated by the manufacturer shall be rejected. All cast-iron parts shall bear the manufacturer's name or trademark. All unidentified parts shall be refused.

.3 In the case of the catch basin located above grade, the frame and grate shall be of ductile cast iron.

.4 In the case of the catch basin located in paved zones, the frame and the guide channel shall be self-adjustable model. The frame and grate shall be of class 65-45-12 ductile cast iron and the guide shall be of class 25 cast iron.

.5 Frames and grates shall be capable of withstanding heavy traffic.

.6 In the case of standard types, catch basins shall have a ductile cast iron grate. Grates shall have a diameter of 750 mm and weigh a minimum of 75 kg. Grates rest on a cast iron seat anchored in the plant to the catch basin's head section. When subjected, in a position of use, to load test using a 200 mm-diameter plate the catch basin's grate shall be capable of withstanding a 150 kN load.

.7 Catch basins shall be fitted with a class 30 grey cast iron trap.

.3 Rubber adjustment risers

.1 To adjust the catch basin measuring no more than 100 mm in height, the Contractor shall use rubber risers.

.2 The types of rubber rings, which the Contractor may use based on the adjustment height, are the following:

.1 Flat 12.5, 25, 38, 50 and 75 mm rubber rings.

.2 Angled 12.5-25, 25-38, 38-50, 50-63 and 63-75 mm rubber rings.

2.7 RUBBER JOINTS

.1 All rubber joints for sewer and waterworks pipes shall comply with the standard applicable to the type of pipe involved.

2.8 ASPHALT MASTIC

.1 In these exceptional cases when it is used in the production of sewer pipe joints, asphalt mastic shall comply with the ASTM's C-14 and C-76 standards. It shall be cold formed, lend itself to trowel application, be freeze and water resistant, be unaffected by waste water, and harden over time while retaining its elasticity. The mastic used shall provide a high level of adhesion to concrete and adequate tensile strength.

2.9 BEDDING AND SURROUND MATERIALS

.1 Base course and cover materials shall comply with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

2.10 BACKFILL MATERIALS

.1 Backfill materials shall comply with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

2.11 EXPANDED POLYSTYRENE INSULATION

.1 Extruded expanded polystyrene insulation shall comply with the requirements of the CAN/ULC S701-97 type 4 standard (formerly the CAN/CGSB 51.20 - M87 standard), and shall have a minimal compressive strength of 415 kPa (60 psi).

.2 Extruded expanded polystyrene insulation shall be supplied in panels measuring 600 mm x 2,400 mm.

~~2.12~~
2.12

2.12 GEOTEXTILE MEMBRANE

.1 Geotextile membranes shall comply with the MTQ's standard 13101 - Geotextiles and shall be type III.

2.13 UNSHRINKABLE FILL

.1 The unshrinkable fill shall comply with article "Unshrinkable Fill" of section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

PART 3 - EXECUTION

3.1 PREPARATION WORK

.1 Clean and dry pipes and connectors prior to their installation and remove all defective material from the site, to the Canada Parks Representative's satisfaction.

.2 Have pipes, connectors, manholes, catch basin manholes, and catch basins approved by the Canada Parks Representative prior to their installation.

.3 Retain and protect existing structures.

3.2 VERIFICATION OF THE LOCATION

.1 After marking the location of underground installations, and before any pavement cutting or removal, or excavation activities for the installation of the pipes have been carried out, the Contractor shall verify, in the presence of the Canada Parks Representative, the location of existing sewer pipes.

.2 The Contractor shall take measures to determine the depth of existing sewer pipes at the point where connections are to be made.

.3 Following the excavation work, the Contract shall verify the dimensions, type and condition of the exposed sewer pipe.

.4 In the event that a condition, which is significantly different from those prescribed in the contract be discovered, the Contractor shall immediately notify the Canada Parks Representative of this finding.

.5 When necessary, the profile shall be adjusted according to the Canada Parks Representative's instructions, so as to avoid any sudden changes in the slope and alignment of the sewer pipe and connection.

3.3 DIGGING OF TRENCHES

.1 Dig trenches in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.4 PIPE BEDDING AND STRUCTURES

.1 Have the layout and depth of the trench approved by the Canada Parks Representative before placing the bedding material.

.2 The bedding and surround materials for pipes and underground structures shall be produced in compliance with the requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.5 PIPE INSTALLATION

.1 Pipes shall be installed in compliance with contract drawings, with all necessary connections and accessories. The Contractor shall clean the extremities and interior of the various parts prior to their assembly. All pipes shall have rubber gaskets.

.2 Installation work shall be carried out dry at the bottom of the trench, in keeping with the requirements of Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services. The Contractor shall install pipes starting with the lowest point in the system, moving up the slope. Female pipe extremities shall be positioned upstream. The Contractor shall keep earth or debris from entering the pipes during installation. All pipes shall be installed in a straight line; each change in direction shall involve only one manhole. All pipes incorrectly aligned or collapsing following installation shall be removed and placed on a new bed.

.3 Seal all lifting holes using prefabricated plugs approved by the Canada Parks Representative and secured with unshrinkable grout.

.4 As needed, pipes shall be cut to accommodate special gaskets, connections and plugs, according to the manufacturer's instructions, without damaging the pipe or its coating, and to ensure that the tip of the pipe is smooth and perpendicular to the latter's axis.

.5 Prefabricated saddle tees or connectors produced on site shall be used to connect new pipes to existing sewer pipes. Ensure that joints are solid and watertight.

.6 When work is to be interrupted, temporarily block the ends of the pipes upstream, using removable watertight plugs.

.7 Polyvinyl chloride (PVC) pipes shall be checked for distortion of the interior diameter upon final reception of the work or before paving work, or at a period specified by the Canada Parks Representative. The Contactor shall refer to this section's article "Distortion Tests".

.8 On the 300 mm or less pipes, lubricant must be applied on the male end exclusively. The quantity used must be the minimal quantity recommended by the pipe manufacturer. No lubricant excess is tolerated inside the pipe.

3.6 PIPE INSULATION

.1 Thermal insulation of all sewer pipes installed at a depth of less than 1,5 m is required.

.2 Place the insulation over the compacted granular surround material covering the pipe as described in the detail provided.

.3 Place the sheets lengthwise and parallel to the pipe's middle line, staggering the transversal joints.

.4 Sheets shall be butt jointed and secured to prevent movement.

3.7 MANHOLE, CATCH BASIN MANHOLE AND CATCH BASIN

.1 The Contractor shall supply and install, in locations indicated in contract drawings, prefabricated reinforced concrete sewer manholes, catch basin manholes and catch basins. Prefabricated underground structures shall be pre-approved by the Canada Parks Representative.

.2 The Contractor shall take the following parameters into account when ordering these structures, including:

.1 The density of the fill material to be considered in the structural proportioning shall be that of saturated clay.

.2 The elevation of the ground water table to be taken into account is that which is equivalent to the finished ground surface. To this end, all structures shall take buoyancy into account.

.3 The structure shall be capable of withstanding heavy vehicle traffic.

.3 Before proceeding with production, the Contractor shall provide the Canada Parks Representative with shop drawings, plans and diagrams of the installation, fitting and/or assembly related to the production and installation.

.4 These structures shall be delivered in monolithic modules fitted with a lifting device allowing each unit to be easily handled and assembled with others on the work site. If lifting holes are required for lifting, these shall have been designed so as not to completely run through the element involved and not compromise watertightness. Only handling systems adapted to the lifting device and recommended by the supplier shall

be used. The Contractor shall store the various modules on the work site so as not to damage them, particularly at the joints; all parts with cracks or signs of impact shall be replaced at the Contractor's expense.

.5 Joints between each of the elements to constitute a given underground structure shall be fitted with a rubber gasket or a key path preventing lateral movement following assembly with a butyl gasket. Joints must first have been cleaned, lubricated and cleared of all materials and/or malformation, which could compromise assembly and/or watertightness.

.6 Following assembly, all cavities or lifting holes present on the surface of the prefabricated elements shall be sealed using a filling compound.

.7 In the case of prefabricated underground structures, the clear interior dimensions shall not vary by more than 12 mm (1/2 in.) from those shown in the contract drawings. The thicknesses of walls, floor and roof shall not vary by more than 6 mm (1/4 in.) from those required. Following assembly, no divergence greater than 25 mm (1 in.) from the vertical determined by a plumb line shall be accepted for any wall of a prefabricated underground structure. No joint shall have an opening greater than 10 mm (3/8 in). Watertightness shall subsequently be verified by visual inspection; any infiltration noted during the inspection shall be caulked by the Contractor, to the Canada Parks Representative's satisfaction, using an epoxy-based compound.

3.8 CATCH BASIN CONNECTION

.1 Unless otherwise indicated in the plans, the catch basins' connections to the main sewer line shall use DR-35 polyvinyl chloride (PVC) pipes with a diameter of 200 mm (8 in.) and joints with rubber gaskets. They shall be built at a minimum angle of 30° from the main sewer line's horizontal half-diameter. The construction of catch basin connections shall use a saddle tee installed on the main sewer.

.2 A minimum clearance of 1,0 m shall be ensured between a catch basin connection and a main sewer joint or between two catch basin connections. In the latter case, it shall be preferable to carry out the connection on each side of one of the main pipe's joints.

3.9 BACKFILLING

.1 Backfilling shall be carried out in compliance with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services.

3.10 UNDERGROUND RETENTION POND

.1 Excavation of the underground retention pond

.1 The Contractor shall build a retention pond as stipulated in the plans and details. Excavation and backfilling work shall comply with Section 31 23 11 - Civil - Excavation and Backfilling - Underground Services and the manufacturer recommendations.

.2 Before proceeding with the excavation of the basin, the Contractor shall first remove the topsoil, load it, transport it and dispose of it at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy.

.3 The Contractor shall then excavate, load, transport and dispose of 1st and 2nd class materials at a site complying with the directives of the MELCC's Soil Protection and Contaminated Sites Rehabilitation Policy. In order to limit reworking of the bottom of the pond, the backhoe used by the Contractor shall be fitted with a shovel-type bucket rather than one with teeth.

.4 The Contractor must then install the geotextile, accessories and any other material indicated on the plans.

.5 The Contractor shall provide an adequate drainage method and system to keep the floor of the excavation dry.

.2 Levelling and final cleaning

.1 Once work has been completed, the Contractor shall remove from the site not only his materials, but also all unused materials, waste and debris, pebbles and stones, wood, stumps, roots, bags of cement. He shall also clear the site of all materials and tools, restore the condition of the ditches and watercourses that had been obstructed, repair or rebuild fences and other existing works, which he may have demolished or damaged, and dispose of all materials removed by transporting them, at this expense, to a site acceptable to the Canada Parks Representative.

.2 The Contractor shall repair, at his expense, any damage, which he may have caused to public or private property. The site must be left in good condition, to the Canada Parks Representative's satisfaction.

3.11 CONNECTION TO EXISTING PIPES OR UNDERGROUND STRUCTURES

.1 Projected pipes:

.1 The Contractor shall carry out the connection of all projected pipes to existing pipes or underground structures. To this end, he shall first locate and clear existing pipes or underground structures and determine their exact profile and diameter

to ensure that that parts needed for connecting work are available on site when the work is to be carried out. He shall then empty existing pipes, pierce existing underground structures, provide the special connectors required and produce all watertight joints needed to connect the proposed pipes to existing pipes or underground structures.

.1 Connections without rubber gaskets: For sanitary pipes of more than 610 mm and storm sewers, all pipe connections to existing sewer manholes shall be carried out using a form, outside the manhole, into which a minimum 15 cm thickness of unshrinkable mortar shall be placed. It is necessary to ensure that the excavation remains dry until the concrete has set.

.2 Interior finish of sewer manholes: The interior finish of existing sewer manholes calls for concreting the bottom of the sewer manholes so as to adopt the form of sewer pipes in place by forming a semi-circular channel up to half the pipe's diameter. This correction immediately follows the progression of the work. The channel shall be smooth and even, with radii as long as available space allows, with no sharp turns shall be allowed.

.2 Projected underground structures (manholes, catch basins, etc.):

.1 The Contractor shall carry out the connection of all projected or existing pipes to projected underground structures. To this end, he shall first locate and clear existing pipes to determine their exact profile and diameter. He shall then supply the special connectors required by the pipes and produce all watertight joints needed for the connection to projected underground structures.

3.12 SERVICE INTERSECTIONS

.1 Wherever underground municipal services or public utilities intersect, a minimum clearance of 300 mm (12 in.) shall be maintained except in the case of municipal service entrances where this value can be reduced to 150 mm (6 in.). The minimal clearance shall be increased to 500 mm (20 in.) in the event that a sewer pipe is built parallel to another municipal service or public utility.

.2 Where proposed pipes intersect or a proposed pipe crosses under an existing service, the Contractor shall fill the space between the two services using a Class A granular material compacted to 95 % M.P. Furthermore, the last space beneath the top service, which cannot be correctly filled with compacted Class A material, shall be filled with unshrinkable fill to prevent compaction.

3.13 REPAIRS

.1 All work to be redone or repaired shall be carried out at the Contractor's expense before the Canada Parks Representative recommends the provisional acceptance of the work.

.2 If major repairs are required following tests described in the aforementioned articles, the Canada Parks Representative shall require that a special CCTV inspection be carried out, at the Contractor's expense, where repairs were made.

.3 When the floors and rises have been located, a maximum tolerance of 10 % of the nominal diameter shall be accepted. Should the floors or rises exceed this tolerance, the Contractor shall be required to redo the defective part of the sewer, rendering it acceptable.

.4 Sewer lines must end with a female end. In the event of the impossibility of a straight alignment of the services, only long radius bends are accepted.

3.14 WATERTIGHTNESS TESTS AND ACCEPTANCE (SANITARY SEWERS)

.1 Generalities

.1 A watertightness test shall be carried out on all sanitary sewer pipes, including all of their accessories (sewer manholes, pumping stations, connectors) and on all of their connections.

.2 The Contractor shall carry out watertightness tests in compliance with the flowing articles and the most recent version of the BNQ 1809-300. All of these tests shall be conducted, at the Contractor's expense, by an independent specialized firm approved by the Canada Parks Representative. All of these expenses are included in the bid.

Note: A specialized firm is defined as a company, which has the proper equipment and competencies to carry out cleaning and disinfection work as well as conduct watertightness tests on drinking water and sewer pipes.

.3 All positive and negative results of said tests must be included in reports produced and signed by the specialized firm's Engineer.

.4 The Contractor shall produce an appropriate scaled plan proportioned to accurately show the new sewer pipes, their accessories (sewer manhole, pumping station) and connections as well as the part of the existing network affected by the work. This plan must indicate where interventions have been carried out to ensure the watertightness of the sewer pipes and, if required,

distortion measurements. This plan and equipment for the execution of this work shall be revised by the Canada Parks Representative before the Contractor can proceed with the tests.

.5 The recognized specialized firm shall advise the project manager at least 24 hours prior to the start of the work.

.6 The final connection of a new pipe to the existing network can only be carried out after all required tests have been conducted and the Canada Parks Representative's approval has been obtained.

.7 The following table illustrates the tests, which must be successfully passed in order for work to be accepted.

.8 In the case of sanitary sewers built on an existing street where residents must remain connected, the Contractor shall install a Y at each property line, allowing him to insert a balloon for testing the sewer section involved. Once all tests have been carried out, a plug is fitted on the Y which is cut at a level 1 m beneath the final ground elevation.

TESTS TO BE CONDUCTED

FOR NEW SANITARY SEWER NETWORKS

Type of structure	Test methods to be respected				
	CCTV inspection with video recording	Verification of water infiltration	Low air-pressure leak test	Joint by joint low air-pressure leak test	Water exfiltration leak test
Pipes with a nominal diameter of < 600 mm (24 in.)	To be conducted	To be conducted	To be conducted		
Connections		To be conducted	To be conducted		

Note: 1 : Low air-pressure leak test b section
2 : It is necessary to conduct and successfully pas the low air-pressure leak test "by section" or "joint by joint".
3 : Visual inspection only.

.9 Instrumentation of units for watertightness tests:

.1 Plugs to be installed upstream and downstream from the section or segment being tested, shall be fitted with 2 manometers making it possible to obtain 2 pressure readings.

.2 Monometers shall be of the viscous damping type with a range of 0 kPa to 50 kPa, graded in intervals of no more than 1 kPa, and accurate to within 0.5 kPa.

.3 A clear tube measuring 2,4 m in length shall make it possible to check manometers.

.4 A chronometer.

.5 A pressure release system making it possible to avoid pressures exceeding 42 kPa in the pipes being tested.

.2 Cleaning

.1 Throughout the duration of the work and until its provisional acceptance by the Canada Parks Representative, it shall be necessary to keep all drains, sewer pipes, manholes, catch basins and their connections absolutely clean and free of all obstructions. The Contractor shall also be responsible for any damage resulting from the sewer's poor operation.

.2 Prior to a CCTV inspection, before the works have been accepted and the pipes put into service, a complete cleaning shall be carried out. No product or coating shall be applied to the structures before the tests.

.3 Should the volume of debris be significant, the Contractor shall hire a specialized firm to produce a report attesting to the cleaning of the pipes. The Canada Parks Representative shall be provided with a certificate attesting to the disposal of sludge at an authorized site. The Contractor shall then be required to run clean water through the system from the point(s) upstream from the system until the water runs downstream filling every possible floor.

.3 CCTV inspection

.1 The Contractor shall arrange to have a specialized firm conduct an inspection, using a camera with a rotating head and video recording, of all sewer pipes installed within the framework of this contract. Any irregularities in the pipes, joints, connectors, or lack of cleanliness in the system etc, shall be located and photographed. The Contractor shall provide the Canada Parks Representative with the report of the televised inspection along with two (2) copies of the videocassette or DVD. The Contractor shall, at his own expenses, carry out any work required to redo, clean or repair structures deemed to so require.

.2 Should major repairs be required following a first inspection, the Canada Parks Representative may, if he deems it necessary, demand a second CCTV

inspection of strategic locations. This second inspection shall be carried out at the Contactor's expense.

.4 Water infiltration tests

.1 When checking for the infiltration of water in the pipes and underground structures, there shall be no trace of water except for that resulting from the condensation of steam contained in the air or, in the case of concrete, from natural oozing.

.2 Should the presence of water, drops of water or dripping be visible, a test measuring the infiltration of water shall be conducted.

.3 The Contractor shall install a plug upstream from the pipe and a weir downstream from the pipe, depending on the method chosen.

.4 The water infiltration rate measured in the pipes shall not exceed 18,5 L per millimetre of the pipe's inner diameter per kilometre of length per 24 hour period (18.5 L/mm•km•24 hr.).

.5 In the case of underground structures, the maximum allowable infiltration rate, including the joints of pipes to the structures, shall be 2 L per hour per metre in height (2 L/hr.•m), but shall never exceed 10 L per hour for each structure checked individually.

.6 The test may be conducted on one or several pipe sections, provided the length of the main pipe subjected to the test does not exceed 200 m. If the rate of water infiltration is measured using to volumetric method or with the help of a weir, two measurements must be taken at 10 minute intervals. The results must appear in the test report.

.7 If the test is positive, the exfiltration test must then be conducted. If the test is negative, the sections involved shall be refused and the Contractor shall be required to carry out repairs as quickly as possible.

.5 Exfiltration test using low air-pressure leak method on sanitary sewer pipes measuring no more than 900 mm in diameter

.1 Fields of application and procedures:

.1 Air tests are applied section by section or by segment of pipe, excluding sewer manholes but including lateral connections, connections to the street's right of way as well as, in the case of sewers, those of catch basins.

.2 The maximum allowable air loss must be verified by measuring the time required for a 7 kPa drop in pressure (1 psi) in the section or segment being tested, following a stabilization at 3 kPa (0.5 psi) above the highest pressure point from which the time required for the drop in pressure was measured, without ever exceeding 42 kPa (6 psi). This time is called the "measured drop time".

.3 When the water table is lower than the crown of the pipe at the time when the test is conducted, the top starting pressure is 24 kPa (3.5 psi). If the water table reaches or exceeds the crown of the pipe, the top starting pressure is 34 kPa (5 psi).

.2 Measures of implementation:

.1 Clean the pipe section or segment to be tested, particularly where pneumatic plugs come into contact with the pipe.

.2 In the case of concrete, a preliminary soaking of the pipe is accepted. However, the soaking time shall not exceed 72 hours. No product can be added to the water during the soaking period, nor during the watertightness test.

.3 Isolate the section by adequately sealing all of the openings on the section, segment or joint using pneumatic plugs inflated to the internal pressure recommended by the manufacturer.

.4 Add air slowly to the section or segment on which testing is being conducted until the internal pressure reaches 27 kPa (4 psi) or 37 kPa (5.5 psi) without ever exceeding 42 kPa (6 psi).

.5 Once the internal pressure of 27 kPa (4 psi) or 37 kPa (5.5 psi) has been obtained, allow the pressure and air temperature to stabilize for at least two (2) minutes, adding only the amount of air required to maintain pressure.

.6 Once the temperature and pressure have been stabilized, the air supply is cut off and the pressure allowed dropping to 24 kPa (3.5 psi) or 34 kPa (5 psi). The test per se begins once the pressure is 24 kPa (3.5 psi) or 34 kPa (5 psi), the moment when the chronometer is started. Once the pressure reaches 17 kPa (2.5 psi) or 27 kPa (4 psi), the chronometer is stopped.

The drop time is compared to the value specified in the minimum drop time tables for a 7 kPa (1 psi) drop in pressure. Refer to the "Tables of Minimum Drop Time Required. If this time is higher than or equal to the required test period, the section or segment is accepted. If not, the test is refused.

3.15 WATERTIGHTNESS TESTS AND ACCEPTANCE (STORM SEWER)

.1 Generalities

.1 In the case of the storm sewer, no watertightness test will be carried out IN the joints of these pipes; only a CCTV inspection with video recording shall be conducted. Infiltrations detected by the CCTV inspection shall be caulked by the Contractor to the Canada Parks Representative's satisfaction.

.2 Cleaning

.1 Throughout the duration of the work and until its provisional acceptance by the Canada Parks Representative, it shall be necessary to keep all drains, sewer pipes, manholes, catch basins and their connections absolutely clean and free of all obstructions. The Contractor shall also be responsible for any damage resulting from the sewer's poor operation.

.2 Prior to a CCTV inspection, before the work has been accepted and the pipes put into service, a complete cleaning shall be carried out. No product or coating shall be applied to the structures before the tests.

.3 Should the volume of debris be significant, the Contractor shall hire a specialized firm to produce a report attesting to the cleaning of the pipes. The Canada Parks Representative shall be provided with a certificate attesting to the disposal of sludge at an authorized site. The Contractor shall then be required to run clean water through the system from the point(s) upstream from the system until the water runs downstream filling every possible floor.

.3 CCTV Inspection

.1 The Contractor shall arrange to have a specialized firm conduct an inspection, using a camera with a rotating head and video recording, of all sewer pipes installed within the framework of this contract. Any irregularities in the pipes, joints, connectors, or lack of cleanliness in the system etc, shall be pinpointed and photographed. The Contractor shall provide the Canada Parks Representative with the report of the televised inspection along with two (2) copies of the videocassette or DVD. The Contractor shall, at his own expense, carry out any work required to redo, clean or repair structures deemed to so require.

.2 Should major repairs be required following a first inspection, the Canada Parks Representative may, if he deems it necessary, demand a second CCTV

inspection of strategic locations. This second inspection shall be carried out at the Contactor's expense.

3.16 DISTORTION TEST

.1 The distortion test shall comply in every regard to the requirements of the BNQ 1809-300 standard.

.2 The distortion test applies to the following types of pipes: polyvinyl chloride (PVC), high-density polyethylene (PEHD), corrugated aluminized steel or aluminum, and ribbed aluminized steel.

.3 After proper cleaning, the Contractor shall check the distortion of every storm and sanitary sewer pipe. It is recommended that this measure be combined with the CCTV inspection test, which would make it possible to better visualize distortion.

.4 Any distortion of the true inner diameter exceeding 5 %, verified after the complete backfilling of the pipe and prior to the provisional inspection of the pipe shall result in the replacement of the pipe involved.

.5 Any distortion of the true inner diameter exceeding 7,5 %, verified between 60 and 30 days prior to the final reception of the work shall result in the replacement of the pipe involved.

.6 Verification of the true inner diameter shall be carried out in the presence of the Canada Parks Representative and to the latter's satisfaction, using a unit providing at least 9 points of contact with the pipe or a laser profilometer whose measuring accuracy is at least 0,25 %.

.7 Verification of distortions shall be carried out by a specialized firm approved by the Canada Parks Representative and the original of its report shall be signed by an engineer who is a member in good standing of the Ordre des Ingénieurs du Québec or a technologist employed by the firm, and handed to the Canada Parks Representative. The use of a vibration dissolution unit is prohibited.

END OF SECTION

ENVIRONMENT

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29 - Health and Safety for Contaminated Sites

1.2 REFERENCE STANDARDS

.1 Transportation and Dangerous Goods Act (1999)

.2 Canadian Council of Ministers of the Environment (CCME) Documentation

1.3 REGULATORY REQUIREMENTS

.1 Provide erosion control.

.2 Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish.

.3 Les travaux doivent satisfaire aux exigences minimales des lois et règlements fédéraux et provinciaux applicables, ou les dépasser.

.1 L'Entrepreneur doit s'assurer de respecter les modifications apportées aux lois et aux règlements, une fois celles-ci mises en œuvre.

.4 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify the Parks Canada Representative immediately.

1.4 SOIL STOCKPILING FACILITIES

.1 Provide, maintain, and operate storage/stockpiling facilities as required.

.2 Install liner below proposed stockpile locations to prevent contact between stockpile material and ground. Equip facility with tarps capable of covering stockpiled material until the Parks Canada Representative advises Contractor to dispose of material off site.

1.5 VEHICULAR ACCESS AND PARKING

.1 Maintenance and Use

.1 Prevent contamination of access roads. Immediately remove debris or material on access roads which is suspected to be contaminated as determined by Parks Canada Representative. Transport and dispose of in appropriate off-site disposal facility.

.2 Parks Canada Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to the Parks Canada Representative.

1.6 DUST AND PARTICULATE CONTROL

.1 Execute Work by methods to minimize raising dust.

.2 Implement and maintain dust and particulate control measures as determined necessary by the Parks Canada Representative during construction and in accordance with provincial regulations.

.3 Provide positive means to prevent airborne dust from dispersing into atmosphere. Use potable water for dust and particulate control.

.4 Use chemical means for water misting system for dust and particulate control only with the Parks Canada Representative's prior written approval.

.5 As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.

.6 Prevent dust from spreading to adjacent property sites.

.7 Install geotextile over the fences around the site to prevent wind erosion. Keep the geotextile in good condition throughout the work.

.8 The Parks Canada Representative will stop work at any time when Contractor's control of dust and particulates is inadequate for wind conditions present at site, or when air quality monitoring indicates that release of fugitive dusts and particulates into atmosphere equals or exceeds specified levels.

.9 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Contractor must discuss procedures that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dust or particulates.

1.7 POLLUTION CONTROL

.1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

.2 The Contractor must be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on site.

.3 Promptly report spills and releases potentially causing damage to environment to:

.1 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department;

.2 The Parks Canada Representative.

.4 Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.

.5 Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.

.6 Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

.7 Volatile Organic Compounds (VOC) Control:

.1 Have an organic vapour detector equipped with an alarm on-site to provide a warning in the event worker health criteria are exceeded.

.2 If air quality monitoring indicates that release of volatile organics in air at site boundary exceeds Personnel Protective Equipment threshold for air quality, stop work that is the cause of these emissions. The Parks Canada Representative and the Contractor shall discuss methods that Contractor proposes to continue work while protecting site workers and users.

1.8 WATER CONTROL

.1 Maintain excavations free of water.

.2 Protect site from puddling or running water. Grade site to drain.

.3 Prevent surface water runoff from leaving work areas.

.4 Do not discharge decontaminated water, or surface water runoff, or groundwater which may have come in contact with potentially contaminated material, off site or to municipal sewers.

.5 Prevent precipitation from infiltrating or from directly running off stockpiled soil. Cover stockpiled soil with an impermeable liner during periods of work stoppage including at end of each working day.

.6 Direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.

.7 Dispose of water in manner not injurious to public health or safety, to property, or to any part of Work completed or under construction.

.8 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water.

.9 Contain water from stockpiled contaminated soil. Transfer potentially contaminated surface waters to wastewater storage tanks separate from wastewater from Personnel Hygiene/Decontamination Facility.

.10 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.

1.9 DEWATERING

.1 Dewater various parts of Work including, without limitation, excavations, structures, foundations, and work areas.

.2 Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.

.3 Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions.

.4 Provide sufficient and appropriate labour, plant, and equipment necessary to keep Work free of water including standby equipment necessary to ensure continuous operation of dewatering system.

.5 Take precautions necessary to prevent uplift of structure or pipeline and to protect excavations from flooding and damage due to surface runoff.

.6 Test and analyse water generated from dewatering activities and treat to meet required discharge or disposal criteria.

1.10 EROSION AND SEDIMENT CONTROL

.1 Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

.2 Provide and maintain temporary measures which may include, silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off site or to other areas of site where damage might result, or that might otherwise be required by Laws and Regulations. Make sediment control measures available during construction.

.3 Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

.4 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

.5 If soil and debris from site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in the Departmental Representative's determination it is undesirable, remove accumulation and restore area to original condition.

1.11 PROGRESS CLEANING

.1 Maintain cleanliness of Work and surrounding site to comply with federal, provincial, and local fire and safety laws, ordinances, codes, and regulations.

.2 Co-ordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.12 FINAL DECONTAMINATION

.1 Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to removal from site.

1.13 REMOVAL AND DISPOSAL

.1 Remove surplus materials and temporary facilities from site.

.2 Dispose of non-contaminated waste materials, litter, debris, and rubbish off site.

.3 Do not burn or bury rubbish and waste materials on site.

.4 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

.5 Do not discharge wastes into streams or waterways.

.6 Dispose of following materials at appropriate off-site facility identified by Contractor and approved by Parks Canada Representative:

- .1 Debris including excess construction material.
- .2 Non-contaminated litter and rubbish.
- .3 Wastewater removed from excavations.

.7 Wastewater sample and analysis: Stantec Consulting Ltd. will perform sampling and analysis of] stored wastewater for disposal purposes prior to removal from site. Results of analyses will determine appropriate methods of disposal.

.8 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

1.14 RECORD KEEPING

.1 Provide contaminated soil shipment records to Parks Canada Representative

.2 Conserver les lettres de transport pour une période d'au moins 375 jours à partir de la date d'expédition ou pour une période plus longue, selon les exigences des lois et règlements applicables.

END OF SECTION

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCE STANDARDS

.1 Province of Quebec

.1 Act Respecting Occupational Health and Safety, R.S.Q. (2002).

.2 Canada Labour Code, Canada Occupational Safety and Health Regulations (2002).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan, within seven (7) days after date of Notice to Proceed and prior to mobilization to site. Address following items:

.3 Safety and health risk or hazard analysis for each site task and operation found in work plan.

.4 Develop checklist for items to be inspected on a daily basis.

.5 Document actions taken. Personnel training requirements including:

.1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.

.2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.

.6 Personal protective equipment (PPE) program addressing:

.1 Donning and doffing procedures.

.2 PPE selection based upon site hazards.

.3 PPE use and limitations of equipment.

.4 Work mission duration, PPE maintenance and storage.

.5 PPE inspection procedures prior to, during, and after use.

.6 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.

.7 Medical surveillance requirements for personnel assigned to work at site.

.8 Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.

.9 Site control measures employed at site including site map, site work zones, use of "buddy system," site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.

.10 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.

.11 Written respiratory protection program for project activities.

.12 Procedures dealing with heat and/or cold stress.

.13 Spill containment program if drummed waste material is generated, excavated, stored, or managed on site.

.7 The Parks Canada Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven (7) days after receipt of plan. Revise plan as appropriate and resubmit plan to the Departmental Representative within seven (7) days after receipt of comments from the Parks Canada Representative.

.8 Respirator Fit Testing, if needed: submit proof of respirator fit testing for site personnel, within seven (7) days after date of Notice to Proceed and prior to mobilization to site, a document certifying that the respirators used by the workers on the site have been subjected to an adjustment test.

.9 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

.10 Off-site Contingency and Emergency Response Plan:

.1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.

.2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from site.

1.4 REGULATORY REQUIREMENTS

.1 Comply with specified standards and regulations to ensure safe operations at site containing hazardous or toxic materials.

1.5 SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Soil contaminated with polycyclic aromatic hydrocarbons (PAH), metals or benzene, toluene, ethylbenzene and xylene (BTEX).

1.6 GENERAL REQUIREMENTS

.1 Develop Health and Safety Plan prior to commencing site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Ensure Health and Safety guidelines provide for safe and minimal risk working environment for site personnel and minimize impact of activities involving contact with hazardous materials or hazardous wastes on general public and surrounding environment.

.3 Relief from or substitution for portion or provision of minimum Health and Safety Guidelines specified or reviewed site-specific Health and Safety Plan must submitted to the Parks Canada Representative in writing. The Parks Canada Representative will respond in writing, either accepting or requesting improvements.

1.7 RESPONSIBILITY

.1 Be responsible for safety of persons and property on site and for protection of persons off 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, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.8 HAZARD COMMUNICATION REQUIREMENTS

.1 Comply with Information on Controlled Products Regulation, O.C.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations, Part X - Hazardous Substances.

.3 Provide the Parks Canada Representative with Material Safety Data Sheets (MSDS) and documentation on any "hazardous" chemical that Contractor or Contractor Representatives plan to bring onto site.

1.9 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.

.2 Assign responsibility and obligation to Health and Safety Officer where required to stop or start Work when, at Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. The Parks Canada Representative may also stop work for health and safety reasons.

1.10 UNFORESEEN HAZARDS

.1 Should unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, stop work and immediately advise the Parks Canada Representative verbally and in writing.

1.11 PERSONNEL HEALTH, SAFETY, AND HYGIENE

.1 Medical Surveillance:

.1 Conduct medical surveillance of personnel as required by specified regulations.

.2 Personal Protective Equipment:

.1 Provide site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.

.3 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:

.1 Ensure prescription eyeglasses worn are safety glasses. Contact lenses are forbidden on site within work zones.

.2 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.

.3 Dispose of or decontaminate PPE worn on site at end of each workday.

.4 Decontaminate reusable PPE before reissuing.

.4 Hygiene procedures: Provide at a minimum potable water and suitable sanitation facilities.

.5 Emergency and First-Aid Equipment:

.1 Locate and maintain emergency and first-aid equipment in appropriate location on site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.

.6 Site Communications:

.1 Post emergency numbers near site telephones.

.2 Ensure personnel use of “buddy” system and develop hand signal system appropriate for site activities.

.3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.

.4 Provide selected personnel with 2-way radios.

.5 Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

1.12 CONTINGENCY AND EMERGENCY RESPONSE

.1 Meet specified requirements.

.2 Arrange and attend co-ordination meeting held with appropriate authorities including City, Fire, Hospital, Provincial and City Police, Ministry of Transportation, Ministry of Health, and Community Emergency Co-ordinator; meeting will identify off-site Emergency Response Co-ordinator through whom information and co-ordination will occur in event of incident.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 35 43 – Environmental Procedures.

.3 Section 01 56 12 – Temporary Barriers and Enclosures.

.4 Section 01 74 19 – Waste Management and Disposal.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Pre-backfill Submittals:

.1 At least 10 business days prior to placement of the selected materials, notify Parks Canada Representative of the proposed source of the backfill materials and ensure access to the source for sampling and approval.

.2 Submit grain size analyses for the proposed backfill materials to the Parks Canada Representative.

.3 Submit laboratory analysis to the Parks Canada Representative confirming that the backfill aggregate is pyrite free and DB (concrete slab) certified.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

.2 Divert excess aggregate materials from landfill to local recycling facility or quarry for reuse.

1.4 EXISTING CONDITIONS

.1 Buried utilities:

.1 Ensure that location of all underground public and private utilities is done prior to the start of work by a company with relevant expertise (Info-excavation and/or other private companies). Where

necessary, use a hydro-vac excavation system to visually confirm position of underground pipes prior to digging.

.2 Where applicable, relocate any existing utility (underground or other) that could adversely affect safe performance of the work. Repair any non-dismantled utility (underground or other) that breaks or is damaged during the work at Contractor expense and ensure that all utilities in question are operational upon completion of the work.

.3 Remove obsolete buried utilities within 2 m of foundations: cap cut-offs.

.4 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.5 Record location of maintained, re-routed and abandoned underground lines.

.6 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 the Parks Canada Representative.

.3 Where required for excavation, cut roots or branches as directed:

.1 Comply with the exclusion zone (12-m radius) around the cottonwood tree.

.2 Outside the exclusion zone, prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Fill: properties to the following requirements:

.1 Class B fill compactable to 95% modified Proctor density.

.2 MG-112 material.

PART 3 EXECUTION

3.1 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

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

3.2 PREPARATION/PROTECTION

.1 Protect existing features in accordance with Section 01 56 12 - Temporary Barriers and Enclosures and applicable municipal regulations.

.2 As the building foundations are fragile, uncover no more than 3 linear metres of foundation sections at a time during excavation operations.

.3 If vertical cracks are observed in the building foundations during excavation, fill the cracks with an injectable sealant compatible with the foundation materials.

.4 Keep excavations clean, free of standing water, and loose soil.

.5 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.

.6 Protect buried services that are required to remain undisturbed.

3.3 STOCKPILING

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.4 SHORING, BRACING AND UNDERPINNING

.1 No underpinning is allowed under the contract. No excavation beneath the buildings is planned and any excavation near the foundations of a building must be done in a way that does not damage the building or foundations.

.2 Contractor is responsible for installing appropriate temporary retaining as necessary along the edges of excavation done on the boundaries with neighbouring properties to allow the work to be done safely and ensure integrity of soil and all structures and infrastructure of the neighbouring properties is maintained at all times during the work.

.3 The design of the temporary retaining shall be done by a specialist contractor with expertise in this area.

.4 A copy of the report and/or calculation notes and/or specifications required by the specialist contractor shall be provided to the Engineer at least five business days prior to the start of installation of support.

.5 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act and Section 01 35 29 – Health and Safety.

.1 Where conditions are unstable, carry out the necessary inspections and agree on methods to be used with the Parks Canada Representative.

.6 Construct temporary structures at depth and height and in locations indicated by Parks Canada Representative.

.7 During backfill operation:

.1 Unless otherwise indicated or directed by the Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 300 mm above toe of sheeting.

.8 When sheeting is required to remain in place, cut off tops at elevations as indicated.

3.5 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide to the Parks Canada Representative the details of proposed dewatering methods.

.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 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 Excavation must not interfere with bearing capacity of adjacent foundations.

.2 Excavation of soil near the building foundations must not uncover more than 3 linear metres of foundation sections at a time.

.3 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 saw, according to the recommendations in the BNQ standard, landscaping with plants.

.4 If any disused sewer pipe is exposed, cap the pipe permanently.

.5 Keep excavated and stockpiled materials safe distance away from edge of trench.

.6 Restrict vehicle operations directly adjacent to open trenches.

.7 Dispose of surplus and unsuitable excavated material off site.

.8 Do not obstruct flow of surface drainage or natural watercourses.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Obtain Parks Canada Representative approval of completed excavation.

.11 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the Parks Canada Representative.

.12 Install geotextile if excavated material will be used to backfill the excavation.

.13 If vertical cracks are observed in the building foundations during excavation, fill the cracks with an injectable sealant compatible with the foundation materials and prevailing conditions.

3.7 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below.

.1 From the excavation bottom to 700 mm from the surface: use class B compactable material, unfrozen, to 95% modified Proctor density, or MG-112 material.

.2 From 700 mm from the surface to 300 mm from the surface: use MG-112 material.

.3 From 300 mm to the surface: use MG-20 crushed rock.

.2 Install geotextile prior to placement of MG-112 material.

3.8 BACKFILLING

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

.1 Inspection and approval of work by Parks Canada Representative

.2 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.

3.9 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 19 – Waste Management and Disposal, trim slopes, and correct defects as directed by the Parks Canada Representative.

.2 Clean and reinstate areas affected by Work.

.3 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

ELECTRICITY

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. 10-10, Code de construction du Québec, Chapitre V - Électricité.

.3 CAN/CSA-C22.3 No.1-10, Overhead Systems.

.4 CAN/CSA-C22.2 No. 7-15, Underground Systems.

.5 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.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.

.2 Shop Drawings:

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

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit eight copies to authority having jurisdiction.

.6 If changes are required, notify Parks Canada Representative of these changes before they are made.

.3 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and material is not available, submit such equipment and material to authority having jurisdiction for special 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.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Parks Canada Representative.

.4 Manufacturer's Field Reports: Submit to Parks Canada 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 operation and maintenance 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 for each principal system and item of equipment.

.2 Procedures to be followed in event of equipment failure.

.3 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Submit As-built drawings.

1.4 DELIVERY, STORAGE, AND HANDLING

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

.2 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 in dry location in accordance with manufacturer's recommendations in clean, dry, and well-ventilated area.

.2 Store and protect from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: Remove for reuse by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan, in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Operating Voltages: To CAN3-C235.

.2 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.

2.2 MATERIALS AND EQUIPMENT

.1 Material and equipment to be CSA certified. Where CSA certified material and equipment are 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.

2.3 WIRING TERMINATIONS

.1 Ensure lugs, terminals, and screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.4 WIRING IDENTIFICATION

.1 When colour jacket conductors are not available, identify wiring with permanent indelible identifying markings, numbered, and 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 EXAMINATION

.1 Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for 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 Do complete installation in accordance with CSA C22.1, except where specified otherwise.

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

.3 Do underground systems in accordance with CAN/CSA-C22.3 No. 7, except where specified otherwise.

3.3 NAMEPLATES AND LABELS

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

3.4 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.5 FIELD QUALITY CONTROL

.1 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Power distribution system including voltage and grounding.

.2 Lighting and its control.

.3 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.

.2 Carry out tests in presence of Parks Canada Representative.

.3 Provide instruments, meters, equipment, and personnel required to conduct tests during and at conclusion of project.

.4 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 manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.6 SYSTEM START-UP

.1 Instruct Parks Canada Representative and operating personnel in operation, care and maintenance of systems, system equipment, and components.

3.7 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools, and equipment.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM A82/A82M-05a, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A185/A185M-05a, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.3 ASTM C139-05, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

.4 ASTM C 478/C478M-06, Standard Specification for Precast Reinforced Concrete Manhole Sections.

.5 ASTM D1056-00, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

.2 CSA Group (CSA).

.1 CAN/CSA-A3000-03(R2005), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.1 CSA-A3001-03, Cementitious Materials for Use in Concrete.

.2 CSA A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

1.3 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 data sheets, and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: Convene pre-installation meeting two weeks prior to beginning work pertaining to this Section, with Parks Canada Representative in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Coordinate with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling, and unloading:

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

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

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 PRODUCTS

2.1 PVC DUCTS

.1 PVC ducts, complying with CSA C22 No. 211-1, DB2 type, encased in the reinforced concrete, dimensions as per indications.

.2 PVC ducts for electrical entrance, type DB2, encased in reinforced concrete, complying with Hydro-Quebec's E.21 Standard and dimensions as per indications.

2.2 PVC DUCT FITTINGS

.1 Rigid PVC opaque solvent welded type couplings, bell end fittings, plugs, caps, and adaptors, as required to make complete installation.

.2 Expansion joints.

.3 Rigid PVC, 5°, 22.5°, 45°, and 90° angle couplings according to requirements, bend radius: 915 mm, unless otherwise indicated.

2.3 ADHESIVE SOLVENT

.1 Adhesive solvent approved for PVC conduit assemblies.

2.4 CABLE PULLING EQUIPMENT

.1 Pull Rope: 6-mm stranded nylon, tensile strength 5 kN.

2.5 WARNING TAPE

.1 Standard 4-mil polyethylene 76 mm wide tape, yellow with black letters, imprinted with "ATTENTION - CÂBLE ÉLECTRIQUE ENFOUI ".

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 data sheets.

3.2 DUCTS - GENERAL

.1 Install underground duct banks, including formwork.

.2 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum Proctor dry density.

.1 Avoid concrete touching the soil containing iron pyrite.

.3 Open trench completely between manholes before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.

.4 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.

.5 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.

.6 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts at not less than 40 mm horizontally and vertically.

.1 Stagger joints in adjacent layers at least 150 mm and make joints watertight.

.2 Encase duct bank with 75 mm thick concrete cover.

.3 Use galvanized steel conduit for sections extending above finished grade level.

.7 Make transpositions, offsets, and changes in direction sections.

.8 Use bell ends at duct terminations in manholes or buildings.

.9 Use conduit to duct adapters when connecting non-metallic conduits to metallic conduits.

.10 Terminate duct runs with duct coupling set flush with end of concrete envelope when dead ending duct bank for future extension.

.11 Cut, ream, and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.

.12 Allow concrete to attain 50% of its specified strength before backfilling.

.13 Use anchors, ties, and trench jacks as required to secure ducts and prevent moving during placing of concrete.

.1 Tie ducts to spacers with twine or other non-metallic material.

.2 Remove weights or wood braces before concrete has set and fill voids.

.14 Clean ducts before laying:

.1 Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

.15 Duct cleaning:

.1 Pull 300 mm long x diameter 6 mm less than internal diameter of duct steel mandrel through each duct, immediately after placing of concrete.

.2 Then pull stiff bristle brush through duct; avoid disturbing or damaging ducts where concrete has not set completely.

.3 Pull stiff bristle brush through each duct immediately before pulling-in cables.

.16 Install four 3-m lengths of 10M reinforcing rods, one in each corner of duct bank when connecting duct to manholes or buildings.

.1 Wire rods to 10M dowels at manhole or building and support from duct spacers.

.2 Protect existing cables and equipment when breaking into existing manholes.

.3 Place concrete down sides of duct bank filling space under and around ducts.

.4 Rod concrete with flat bar between vertical rows filling voids.

.17 Install pull rope continuous throughout each duct run with 3-m spare rope at each end.

3.3 FIELD QUALITY CONTROL

.1 Site Tests/Inspections:

.1 Inspection of duct will be carried out by Parks Canada Representative prior to placing.

.2 Placement of concrete and duct cleanout to be done when Parks Canada Representative present.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 00 - 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 26 05 00 - Common Work Results for Electrical.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish, and limitations.

1.3 QUALITY ASSURANCE

.1 Quality Assurance Submittals: Submit following in accordance with Section 01 45 00 - Quality Control.

.1 Certificates: Signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: For installation and special handling criteria, installation sequence, cleaning procedures, and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

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

.2 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 and return by manufacturer of pallets crates padding packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

PART 2 PRODUCTS

2.1 PVC DUCTS AND FITTINGS

.1 Rigid PVC Duct: Type DB2/ES2 is prohibited.

.2 Rigid PVC Split Ducts:

.1 Nominal length: 6 and 3 m plus or minus 12 mm.

.3 Rigid PVC bends, couplings, reducers, bell end fittings, plugs, caps, adaptors same product material as duct to make a complete installation.

.4 Rigid PVC 90°, 45° bends, and 5° angle couplings as required.

2.2 SOLVENT WELD COMPOUND

.1 Solvent cement for PVC ducted 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 Slope ducts with 1 to 400 minimum slope.

.4 Install plugs and cap both ends of ducts to prevent entrance of foreign materials during and after construction.

.5 Pull through each duct wooden 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.

.6 Install a pull rope continuous throughout each duct run with 3 m spare rope at each end.

.7 Place continuous strip of warning tape 300 mm above duct before backfilling trenches.

.8 Notify the Parks Canada 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 00 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools, and equipment.

END OF SECTION