

## **PART 1 : GENERAL**

### **1.1 REFERENCES**

- 1.1.1 Security code for construction works.
- 1.1.2 Health and Safety at Work Act.
- 1.1.3 Devis normalisé du Bureau de Normalisation du Québec – BNQ-1809-300 (R2007) « Watermain and sewer pipes ».
- 1.1.4 Directive N° 004 of the Environmental Ministry – Directive on the sewer networks.
- 1.1.5 ASTM C 478 : Standard Specification for Precast Reinforced Concrete Manhole Sections.
- 1.1.6 ASTM C 443: Standard Specification for Joints for Concrete Pipe and Manholes, using Rubber Gaskets.
- 1.1.7 NQ 2622-420: Reinforced prefabricated cement concrete sewer manholes, sumps and valve chambers.

### **1.2 GENERAL REQUIREMENTS**

- 1.2.1 The present section of the specifications is the complement to the BNQ-1809-300 (R2007) "Watermain and sewer pipes". The Contractor has to make sure that all the requirements specified in this document are all satisfied in addition to these in the technical clauses of the present specifications. He also has to comply with the manufacturer's recommendations as well as all the amendments given in the particular technical clauses of the present section.
- 1.2.2 Be aware of the laws, regulations, decrees, and security codes that apply to the works involved in this section of the specifications and comply with them.
- 1.2.3 Review the geotechnical report attached to the contract documents.

### **1.3 DEFINITIONS**

- 1.3.1 "Section of pipeline" means the pipeline length included between two sewer drains or two consecutive manholes.

## **1.4 DOCUMENTS TO SUBMIT**

- 1.4.1 Submit shop drawings for approval at least two (2) weeks prior to the beginning of the works for the following equipment:
  - .1 Pipes and stones used for the base and pipe coatings.
  - .2 Manholes and sumps along with their frame, grid, and cover.
- 1.4.2 Submit the required samples, upon request from the Ministry's Representative.
- 1.4.3 Make sure that the pipes convey the certification stamp.

## **1.5 WORK SCHEDULE**

- 1.5.1 Submit the project schedule so that the existing services are the least disrupted and the evacuation flow is maintained normal throughout the construction works.
- 1.5.2 Submit the expected interruptions' schedule for approbation and then follow it.
- 1.5.3 When a service interruption is required, the Ministry's Representative and the building manager must be informed at least 48 h ahead of time.

## **1.6 TRANSPORTATION, STORAGE AND HANDLING**

- 1.6.1 Transport, store and handle material in compliance with the BNQ 1809-300/2004 (R2007) standard and the manufacturer's recommendations.

# **PART 2 : PRODUCTS**

## **2.1 STORM SEWER PIPES**

- 2.1.1 Storm sewer pipes are made of concrete CL IV (TBA) or polyvinyl chloride (PVC) DR-35: complies with the ASTM D 3034 and CSA-B182.2 standards.
- 2.1.2 Connections: installed sealing gaskets and interlocking assembly.
- 2.1.3 Rubber gaskets are required for all sewer works.

## **2.2 MANHOLES**

- 2.2.1 Concret storm sewer manholes, which also includes manholes-catch basins, must have a minimum diameter of 900 mm et must comply with the BNQ 1809-300 (R2007) standard.
- 2.2.2 Manholes must be equipped with a frame and grid that are made of ductile iron "standard" type.

- 2.2.3 Catch basins and manholes-catch basins must be equipped with a net that has  $\pm 10$  mm openings. It is fixed to concrete with stainless steel bolts and brackets, installed at a sufficient depth in a way that it is inaccessible from the surface grid. It must be installed as it is shown on the plan.

## **2.3 CATCH BASINS**

- 2.3.1 Clause 6.3.15 "Prefabricated concrete catch basins" of the NQ 1809-300/2004 (R2007) standard is completed with the following specifications:

.1 Catch basins have a minimum diameter of 600 mm and they are equipped with:

- a) Ductile iron catch basin grid;
- b) Removable catch basin trap;
- c) Connection pipe.

- 2.3.2 Catch basins and manholes-catch basins must be equipped with a net that has  $\pm 10$  mm openings. It is fixed to concrete with stainless steel bolts and brackets, installed at a sufficient depth in a way that it is inaccessible from the surface grid. It must be installed as it is shown on the plan.

## **2.4 COVERS AND GRIDS FOR BOLTED STRUCTURES**

- 2.4.1 All covers and grids of the proposed structures must be bolted in accordance to the following specifications:

- .1 Drill three equidistant holes of a diameter of 20 mm into the cover/grid.
- .2 Hexagonal bolts of a diameter of 16 mm made of stainless steel;
- .3 Drill and tap the structures' frame in order for it to receive the cover/grid bolts. Anticipate the use of fixation bases if needed.
- .4 The sinking depth of the bolts must be at least 50 mm;
- .5 Embed the bolts' washers and heads in a way that an outcrop finish is obtained.

## **2.5 COATING AND BASE MATERIALS**

- 2.5.1 Crushed stones of MG-20 calibre compacted at 95% of the modified Proctor: complying with the MTMDDET standards and the CCDG requirements.
- 2.5.2 Locations where it will not be possible to compact the material with the conventional methods, the Contractor must install, upon request from the Ministry's Representative, unshrinkable fill.
- 2.5.3 Manholes and catch basins must be covered with a geotextile as specified in the section 31 32 19 "Geosynthetic Soil Stabilization and Layer Separation".

## 2.6 BACKFILL MATERIALS

- 2.6.1 Backfill materials: B class, complying with the section 31 23 00 – Excavation and Fill from the structural works specifications.

## 2.7 PIPES' THERMAL INSULATION

- 2.7.1 When the pipe crown is at a depth less than 2 m from the top finished surface, the pipe must be protect against frost using polystyrene insulating panels that are expanded and extruded, which can resist a load of 415 kPa (60 Psi).. Throughout transportation, handling and storage processes of the panels, the Contractor must take the appropriate measures in order to protect them against sun rays damaging effects and fire risks.

- 2.7.2 The Contractor must execute the rigid insulation installation by complying with the following instructions:

- .1 Cover the pipes with a 150 mm thick granular material, properly leveled in order to ensure a uniform support to the rigid insulation panels.
- .2 The minimum dimensions for the insulator for a sewer pipe depends on the depth. The width and thickness of the insulation are determined using the following formulas:

$$I = D + 1.4 (1.4 - X) - 0,3$$

$$e = 25 \text{ mm by } 300 \text{ mm of missing backfill in order to achieve } 1.4 \text{ m cover (minimum thickness of } 50 \text{ mm)}$$

$$D = \text{pipe diameter (m)}$$

$$e = \text{insulation thickness (mm)}$$

$$I = \text{insulation width (m)}$$

$$X = \text{depth at the location (m)}$$

or in accordance with the manufacturer's recommendations that is approved by the Ministry's Representative.

- .3 Insulation panels have to be positioned horizontally on the granular material, by taking good care of centering them with respect to the pipes, properly joining them and alternate them from one thickness to the other.
- .4 Carefully backfill with excavated materials by avoiding any displacement of the panels and any damage to them.
- .5 Before using any heavy equipment for the compaction of the backfill materials, the panels must be covered with a minimum thickness of 0.3 m of material.
- .6 The Contractor must acknowledge the fact that an extra width of the trench can be required to allow the rigid insulation panels installation.

## 2.8 PERIMETER INTRUSION DETECTION SYSTEMS (PIDS)

- 2.8.1 The PIDS (soil system for movement detection) can be disturbed by the metallic pipes and by the liquids at variable flows, the pipes that cross the surrounding fences of medium and

highly secured establishments have to be at a depth of at least 1,5 m from the ground level. It is not necessary to follow this requirement in the vehicles' entrance.

- 2.8.2 All liquid flow with variable mass, such as the variable flow in a sewer or storm pipe that is partially filled, must also be located at a depth of at least 1,5 m from the ground level, even if the pipes are non-metallic.

## **PART 3 : EXECUTION**

### **3.1 PRELIMINARY WORK**

- 3.1.1 Clean and drain out the pipes and the connections before the installation.
- 3.1.2 Pipes and connections must be approved by the Ministry's Representative before the installation.

### **3.2 TRENCH EXCAVATION**

- 3.2.1 Trench excavation must be performed in accordance to the instructions in section 31 23 00 – Excavation and Fill of the structural works specifications,

### **3.3 FIRST CLASS MATERIALS EXCAVATION**

- 3.3.1 Perform the excavation of the first class material in accordance with the section 31 23 00 – Excavation and Fill of the structural works specifications. The Contractor must consult the geotechnical report in order to be aware of the bedrock's level on site.

### **3.4 BASE GRANULAR MATERIAL**

- 3.4.1 Use defrosted base materials.
- 3.4.2 Base granular materials must be installed in accordance with the BNQ 1809-300/2004 (R2007) standard and as shown on the plans.

### **3.5 MANHOLE INSTALLATION**

- 3.5.1 Clause 10.5 "Manhole installation" of the BNQ 1809-300 standard is complemented with the following specifications :

.1 Laser ray device usage is mandatory to determine the pipe alignment and slope.

### **3.6 WORK EXECUTION**

- 3.6.1 For the manholes' frame and cover installation, make sure that the final land level is 25 mm above the cover.
- 3.6.2 Throughout the works, a woven geotextile has to be installed underneath the grid of each catch basin and the covers of each manhole. The geotextile must be removed at the end of the works.

### **3.7 CONNECTION TO THE EXISTING PIPES**

- 3.7.1 Perform the connection to the existing pipes as shown on the plans and in accordance to the BNQ 1809-300/2004 (R2007) standard.

### **3.8 EXCAVATION WORK LIMITS**

- 3.8.1 In case the project is stopped for more than one day, the Contractor must backfill the trenches as far as the incurred work limits. The Contractor will be responsible of any problem that might occur from an open trench.
- 3.8.2 The Contractor must restrain his work within the limits shown on the plans. However, the Contractor can, if the work execution method enforce it, negotiate by himself an extra right of way or easement on the adjacent private lands. The Contractor will then be the only responsible of all extra cost incurred from this extra easement including the lands' repairs.
- 3.8.3 The Contractor must take into considerations that part of the excavation can necessitate support in accordance to C.N.E.S.S.T. standards.

### **3.9 GROUNDWATER TABLE**

- 3.9.1 Clause 9.1.17 "Trench exhaustion" of the NQ 1809-300/2004 (R2007) standard is modified or completed with the following specifications:
- .1 The Contractor must include, in his pipe installation price, the pumping work in order to decrease the groundwater table level where it is necessary, work related to the groundwater control throughout the project and all other additional work required to counter the existing conditions.
  - .2 The Ministry's Representative will not grant more time or delays on the initial schedule due to the pumping or the decreasing of the groundwater table level.
  - .3 Also, the Contractor must use a control system for the pumped water to allow the rejection of clear water only (suspended materials' concentration must be equal or less than 25 mg/L).

### **3.10 PROTECTION MEASURES**

- 3.10.1 Clause 9.2 "Filling and compaction" of the NQ 1809-300/2004 (R2007) standard is modified or completed with the following specifications:
- .1 The Contractor must, on an ongoing basis during the project, protect the excavations against softening or against frost and in case this happens, he must remove softened soil and replace it, at his own expense by crushed stones of MG-20 calibre.
  - .2 In addition to that, the Contractor must protect the excavated materials from bad weather by using a suitable storage method. In this regard, the Contractor must cover the backfill materials with an impermeable cover during the nights and weekends, when rain is forecasted or when the works are stopped because of rain.

- .3 If the materials are no more suitable for usage due to a bad storage or an improper handling methods from the Contractor, he must replace them at his own expense.

### **3.11 TRENCH BACKFILL**

- 3.11.1 Throughout excavation process, the Contractor must separate large blocks higher than 300 mm in diameter, frosted soil blocks and unusable materials such as demolition debris, black earth, trees, strains, etc., and reject them in accordance with the specifications of the present tender documents.
- 3.11.2 The backfilling process must be performed by layers of no more than 300 mm each, even if it is an excavated backfill material or granular material. The onsite density of the backfill must achieve 90% of the modified Proctor in compaction and must be verified on site by an external laboratory approved by the Ministry's Representative. The Contractor must give the laboratory technician enough time for him to undertake the onsite density tests, on the granular base and coating of the pipes or on the backfill material.

### **3.12 INSITU TESTS**

- 3.12.1 Repair or replace inappropriate pipes, connections or base material.
- 3.12.2 The Contractor must write and submit a compliance report in accordance with the clause 11 "Tests and acceptance criterias" of the BNQ 1809-300 standard.
- 3.12.3 The Ministry's Representative must be informed, 24 hours ahead of time, of the different suggested tests to be performed.

### **3.13 REPAIRING EXISTING SURFACES AFFECTED BY THE WORK**

- 3.13.1 The Contractor must repair all affected surfaces by the works undertaken in the project in accordance to the sections 31 23 00 – Excavation and Fill of the structural works specifications, 32 91 19.13 – Topsoil Placement and Grading and 32 92 23 – Sodding.

**END OF SECTION**

