## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 The list of work sections in this division is indicative and non-exhaustive. It does not exclude the works described in the other specification sections, shown in the drawings or necessary for the execution of the works in keeping with overall intent of the plans.

.2 Section 31 23 33.01 – Excavation, trenching and backfill.

### 1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A 53/A 53M-02, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.

.2 ASTM A 307-02, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.3 ASTM B 88M-99, Standard Specification for Seamless Copper Water Tube Metric.

.4 ASTM C 117-95, Standard Test Method for Material Finer Than 75 MU m (No. 200) Sieve in Mineral Aggregates by Washing.

.5 ASTM C 136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.6 ASTM C 478M-97, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.

.7 ASTM D 698-00a, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m³)).

.8 ASTM D 2310-01, Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.9 ASTM D 2657-97, Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

.10 ASTM D 2992-01, Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fitting.

.11 ASTM D 2996-01, Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.

.12 ASTM F 714-01, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

.13 ASTM C 618-01, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

.2 Canadian General Standards Board (CGSB

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.

.4 CAN/CGSB-34.1-M94, Pipe, Asbestos Cement, Pressure.

.5 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.

.3 Bureau de normalisation du Québec (BNQ)

.1 BNQ-1809-300-2004, latest edition.

.4 Ministère des Transports du Québec

.1 Cahier des charges et devis généraux (CCDG), latest edition.

## 1.3 SUBMITTALS

.1 Submittals in accordance swith Section 01 33 00 – Submittals Procedures.

.2 Datasheets :

.1 Submit manufacturer's printed product literature. Specifications ans datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets.

.3 Quality assurance submittals : Submit following in accordance with section Section 01 45 00 – Quality Control.

.1 Submit certificates signed by manufacturer, certifying that products, materials and equipment comply with specified performance characteristics and physical properties.

## 1.4 QUALITY ASSURANCE

.1 Pre-installation Meetings : Convene pre-installation meeting one week prior to beginnig work of this Section, with contractor's representative and Departmental Representative. Address the following items :

.1 Project requirements.

.2 Installation and substrate conditions.

.3 Co-ordination with other building sub-trades.

.4 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 reuse and recycling in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

## Part 2 Products

### 2.1 MATERIALS

.1 Potable water pipe : chloride polyvinyl PVC solid wall :

.1 PVC pipes shall be solid wall and DR18 minimum. A copper wire RWU-90 number 12 must connect each iron accessories. A warning tape must also be placed 300 mm above the water pipe.

.2 Fittings shall be made of ductile iron with mechanical or push-on joints. They shall be of same nominal diameter as the main line, conceived to withstand the same internal and external pressure and same outside, and installed as directed by the pipe manufacturer. The use of a Polyethylene envelope (PE) type « LLDPF » (linear low-density polyethylene film) of 200 mm (0,008 po) minimal thickness true to the AWWA C105/A21.5 standards is required to protect the fitting from corrosion.

.3 Gaskets used for PVC pipe joints shall be made of rubber or elastomer with physical specifications true to the requirements of the NQ 3624-250 standard, ASTM F 477.

.4 Restraint systems for pipe accessories shall meet the manufacturer's recommendations

.1 Accepted products :

.1 Compatible models by Star Pipe.

.2 Compatible models by Uniflange.

.3 Compatible models by Sigma.

.4 Compatible models by Clow.

.5 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.2 Ductile iron potable water pipe (connections in front of the Armoury) :

.1 Ductile iron pipes must be of class 350 with mortal lining, and Tyton joints.

.1 Accepted products :

.1 Compatible models by CPC Tuyauterie Canada ltée.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.2 Fittings shall conform to Article 6.2.2.2 of the standard NQ 1809-300.

.3 Anchors and accessories should come from a single supplier/manufacturer.

.1 Accepted products :

.1 Model series 1450 (pipe-pipe) from Uni-Flange.

.2 Model series 1450 and series 1400 (pipe fitting-pipe) from Uni-Flange.

.3 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.3 Drinking water connection for « Wall A » supply :

The 19 mm drinking water connection for « Wall A » supply shall include a main-stop, a constant slope towards the structure to allow the draining of the pipe, a curb-stop provided with its valve box, and polyethylene aluminum composite pipe.

.1 Accepted products :

.1 Q-Line model by IPEX.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.2 Main-stop :

.1 Accepted products :

.1 B25008NSF model by Mueller.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.3 Curb-stop :

.1 Accepted products :

.1 B25209NSF model by Mueller.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.4 Curb-stop valve box :

.1 Accepted products :

.1 A-726 or A-728 models by Mueller.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.4 Valves :

.1 For pipes of less than 350 mm diameter, valves must be straight through style :

.1 Accepted products :

.1 F6100 or F6112 type R/W model by Clow

.2 A2360-23 or A-2360-40 by models Mueller

.3 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.5 Hydrants :

.1 Hydrants must be in iron with a 150 mm nominal diameter inlet. They shall be of compression type, verified under a 2070 kPa pressure and true to the AWWA C503 standard. Hydrants must include at least two 65 mm nominal diameter side threaded outlets « Québec standard », 7 threads per 25,4 mm and a 100 mm

nominal diameter front outlet with « STORZ » type quick-connect true to the CAN/ULC-S520 standard.

.1 Accepted products :

.1 D-67-M model by Clow.

.2 B50-B24 model by Mueller.

.3 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.6 Insulation :

.1 Insulation to be placed above pipes :

.1 Accepted products :

.1 50 mm thick HI-60 sheets model by DOW.

.2 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.7 Valve sign post (VSP) :

.1 150 and 200 mm diameter valves : Nuts and bolts shall be stainless steel 304.

.1 Accepted products :

.1 M609 with mechanical joints by NIBCO.

.2 Equivalent model by VIKING.

.3 Equivalent model by GRINNELL.

.4 Equivalent model by CRANE MCAVITY.

.5 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.2 Valve sign post :

.1 Accepted products :

.1 NIP-1AJ model by NIBCO.

.2 Equivalent model by VIKING.

.3 Equivalent model by GRINNELL.

.4 Equivalent model by CRANE MCAVITY.

.5 Materials or products alternative : approved in addendum as specified in the Instructions to bidders.

.3 The valve and the sign post shall be compatible and from the same manufacturer.

.4 For the VSP connection to the alarm panel inside the armoury, refer to electricity/plumbing documents.

## Part 3 Execution

### 3.1 DEPTH OF BURY

.1 Install water pipes with a minimum depth of 2.15 meters.

.2 Avoid water main line installation near manholes or sewer/storm sewer that could cause freezing. Pay special attention to culverts, storm sewer outfalls, overflow pipe systems, etc. Install, if needed, adequate insulation as directed by the Departmental Representative.

**3.2 MANUFACTURER`S INSTRUCTIONS**

.1 Compliance : Comply to written requirements, recommendations and specifications recommendations et specifications of the manufacturer, including any available technical bulletins, instructions for handling, storage and product installation, datasheets indications.

**3.3 EXCAVATION AND BACKFILL**

.1 Do trenching work in accordance with section 31 23 33.01 – Excavating, trenching and backfilling.

.2 Excavations must be approved by the Departmental Representative before manhole and catch basins installation.

**3.4 EXISTING PIPES**

.1 Notify Departmental Representative, at least two weeks prior to any connection to the existing water network.

.2 Departmental Representative has the right to require that every connection to the existing water network be done at night (low flow period), at no extra cost from the Contractor.

**3.5 EXISTING SERVICES MAINTENANCE (5.6 AND 5.9)**

.1 When existing water system or existing private system is to be interrupted for a period longer than one hour, obtain authorization from the Departmental Representative, install a temporary system for users deprived of water. The system must be approved for potable water. It must allow for fire protection if the existing network already has fire protection.

.2 Maintain service in perfect operating conditions until normal service is operational, in accordance with article 5.9 (NQ 1809-300).

**3.6 TEMPORARY WATER SUPPLY WITH FIRE PROTECTION**

.1 Contractor shall submit, before the beginning of the work, a detailed work program describing each stage of installation and commissioning work of the temporary water supply. Also, Contractor shall submit a plan from an accredited company showing the location of main and distribution water lines, existing and temporary hydrants, all accessories required for proper functioning of temporary network, isolation valves for the existing water network, points for purging and sampling, buried crossings and any other relevant information.

.2 Temporary water supply shall offer fire protection through the temporary hydrants while maintaining, at all times, fire protection for the surrounding buildings affected by the work. Temporary network shall offer service similar to the existing network.

.3 The main line for the temporary water supply shall have a **150 mm** diameter. Contractor must take into account that the temporary system will be connected to the City of Québec water network, located on the Wilfrid-Laurier avenue and any intervention requiring interruption of the network must be performed during the evening or at night, according to the City of Quebec directives and must be authorized and coordinated with the various project's representatives.

.4 Temporary water supply must be designed, installed and anchored to resist to a 1 035 kPa service pressure, and all water hammer that could occur in the network.

.5 Contractor shall maintain in operation the temporary water supply for all of the work's duration.

.6 Temporary hydrants shall include a 100 mm ϕ mouth supply with « Storz » connection and two (2) 65 mm ϕ mouth supply.

.7 Before the connection of the temporary network to the existing network and the commissioning of the surface network, Contractor shall perform by a specialized firm, disinfection, flushing and bacteriological tests on the temporary water supply and forward the results to the Departmental representative.

.8 For emergency, Contractor must give an emergency phone number and assign resource person to contact, at all times, 24 hours a day, 7 days a week.

.9 Contractor is fully responsible for installation, commissioning, maintenance, repairs, water quality verifications through weekly sampling and their analysis, as well as the decommissioning of the temporary supply network. All cost for temporary water supply offering fire protection must be included to the corresponding items of the bid form.

## 3.7 VALVE INSTALLATION

.1 Provide a minimum clearance of 900 mm with any material (manhole, pipes, etc.).

.2 During backfilling, surround the valve and the inferior part of the valve box, with one (1) cubic meter of 20 mm crushed stone, to allow for adequate draining of the elements.

.3 Center the valve box on the valve's head nut. Adjust the valve box 7 mm under the finish grade. Make sure it stay vertical and in place during backfill operations. Realign if it moved, if needed, replace if the box is damaged.

## 3.8 INSULATION

.1 Install insulation at undercrossing between a potable water and a sewer pipe, when the minimum depth of bury is not respected or as designated by the Departmental Representative, in accordance with the insulation drawing details.

.2 Place insulation over hydrants connection pipes in order to cover the whole length where depth of bury is inferior to 2.15 meters.

.3 Consider, as a minimum, the insulation type for a depth of 1.5 to 2.15 as shown on the drawings. Increase insulation depending of the depth of bury, as shown on the plans.

## 3.9 FIRE HYDRANTS

.1 Cover the hydrants with a mesh bag until operational.

.2 Location of hydrants shall be coordinated with the engineer. Hydrant must be installed 900 mm behind the curb.

.3 Unless otherwise noted, the rupture flange shall be located 150 mm above the concrete curb.

.4 The sign post must be installed 750 mm behind the hydrant.

.5 Installation of the fire hydrant must be performed according to the typical section shown on plans.

## 3.10 WIRE LOCATOR, INDICATOR TAPE AND CONDUCTIVITY ENDS

.1 Install the wire locator 150 mm above the polyvinyl chloride PVC pipes.

.2 Connect the wire to every metallic accessory (hydrants, valves, elbows, couplings, etc.) excluding service connections. Connections shall be made to allow electric conductivity in the wire locator and accessories along the pipes.

.3 Install an indicator tape 600 mm above the polyvinyl chloride PVC pipes.

.4 A minimum of three (3) conductivity ends per joints must be installed for ductile iron pipes to insure conductivity.

## 3.11 CORROSION PROTECTION

.1 Ductile iron network :

.1 Install and polyethylene sheath to cover the pipe, accessories and the first two (2) meters of each copper pipes.

.2 Install four (4) 175 grams « protecto-caps » per gland on each accessory in addition to the polyethylene sheath.

.2 PVC network :

.1 Install a polyethylene sheath to cover any metallic accessory and the full lenght of each copper or ductile iron pipes (including the fire hydrant’s connection to the main line).

.2 Install four (4) 175 grams « protecto-caps » per gland on each accessory in addition to the polyethylene sheath.

## 3.12 ON SITE QUALITY CONTROL

.1 Perform testing in accordance with BNQ 1809-300/2007, latest edition and with « Devis des clauses techniques générales – Volume 1 – Conduites d'eau potable, égouts et voirie », latest edition.

.2 Water pipe verification (article 11.1 of the BNQ 1809-300/R2007 standard) :

.1 Contractor must perform, by a specialized firm, approved by the Departmental representative, the cleaning (torpedo, chloration, etc.), disinfection and sealing tests on pipes, accessories and newly installed connections. Contractor is fully responsible to prove the conformity of the network as much on the sealing as on the desinfection stand point. Contractor is responsible for all costs, submit his work method before the beginning of the work, coordinate the tests and submit a summary report at the end of the work, before the provisional acceptance of the works. Departmental representative reserves the right to perform additional tests at the expense of the Contractor.

.2 Inform the Departmental representative, of the proposed tests at least two (2) days in advance. Perform additional tests at the expense of the Contractor.

.3 When an element includes a concrete stop, testing shall be performed at least five (5) days after pouring the concrete or two (2) days if the concrete is quick taking type.

.4 Cleaning operations shall be true to the article 11.1.2 of the BNQ 1809-300/R2007 standard.

.5 Sealing tests shall be true to article 11.1.3 of the BNQ 1809-300/R2007 standard.

## 3.13 CLEANING (11.1.2)

.1 Perform cleaning operations in accordance with section 01 74 11 - Cleaning.

.2 Once installation and quality control works are completed, evacuate work site of all material, surplus materials, waste, tools and equipment.

**END OF SECTION**