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 Excavating, Trenching and Backfilling.

1.2 REFERENCES

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

.1 ASTM C117-04, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM C139-05, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.

.4 ASTM C478M-06, Standard Specification for Precast Reinforced Concrete Manhole Sections Metric.

.5 ASTM D698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).

.2 Canadian General Standards Board (CGSB).

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

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

.3 Canadian Standards Association, (CSA International).

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

.2 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

.3 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Government of Québec, Minister of Transport.

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

.2 Bureau de Normalisation du Québec : 1809-300/2004, latest edition.

.5 Health Canada - Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

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

.2 Datasheets :

.1 Submit manufacturer's printed product literature, specifications and 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 01 45 00 - Quality Control.

.1 Certificates: 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 beginning 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 Precast manhole units : in accordance with ASTM C478M requirements, circular or egg-shaped.

.1 Precast reinforced concrete manhole units must be in accordance with NQ 2622-420 requirements and must have, among other things, whether sealing gaskets made of rubber with characteristics that meet requirements set out in appendix A of NQ 2622-420 standard or ASTM C C443M.

.2 Butyl cords are generally forbidden and are only allowed in places where sealing gaskets made of rubber are used due to geometry of the structures. The physical characteristics of butyl must comply either with requirements of Appendix C of the standard NQ 2622-420 or ASTM C 990M standard. Cords butyl diameter must be specified by manufacturer of manholes and must be installed as recommended and with the Departmental representative's authorization.

.3 The sealing gaskets in the pipe connecting joints to precast reinforced concrete manholes must be made of a rubber whose physical characteristics must comply either with requirements of appendix B of the standard NQ 2622-420 or ASTM C 923 M standard.

.4 Contractor must check with the manufacturer if the gaskets are lubricated or not (see Figures 55a, 55b, 55c et 57 of BNQ 1809-300 standard).

.5 Contractor must install around each manhole a geomembrane model Tex-O-Flex of Solmax brand or Géoflex model from Innovex brand or approved equivalent, a minimal height of 1.8 meters, to protect structures against uplift due to freezing, the smaller value prevails. Fixing around manhole is guaranteed with 2 pins.

.6 Parts for frames and covers must be cast gray iron or ductile iron, as required by the standard NQ 3221-500. Frames and covers must be from the same manufacturer.

.7 The collars framework must be cast gray iron or ductil iron. The 50 mm collars are required on all cast iron work installed in a paving blocks surface.

.8 Frames and covers of precast reinforced concrete manholes underneath the pavement (except for the manhole-catch basin RP-1) must be self-adjusting with a cover 572 mm diameter, with two lifting holes of 25 mm. The guider frame is in gray cast iron straight or tapered, the adjustable frame is in ductile iron and the cover in gray cast iron. They must be brand Laperle, C-50 M1 model or brand Laroche, adjustable 572 model or approved equivalent.

.9 Frames and covers for precast reinforced concrete manholes located off the roadway or in concrete roadway must be standard with a cover 572 mm diameter, with two lifting holes of 25 mm. Frames and covers are gray cast iron. All frames must include a 50 mm ductile iron ring. They must be brand Laperle, C-46 model or brand Laroche, standard 572 model or approved equivalent.

.10 The frame and cover for precast reinforced concrete manhole-catch basin P-10 located under the paved roadway must be self-adjusting with a 775 mm lid. The guider frame is in gray cast iron straight or tapered, the adjustable frame is in ductile iron and the cover in gray cast iron. They must be brand Laperle, C-50 MS (with lid model P-3V) model or brand Laroche, self-leveling 775 model or approved equivalent.

.2 Catch basin structures in precast elements.

.1 Precast reinforced concrete catch basin must be in accordance to the requirements of the standard NQ 2622-420 be fitted with seals made of rubber. Butyl cords are prohibited.

.2 The physical characteristics of rubber must be in accordance to the requirements either of appendix A of the standard NQ 2622-420 or standard ASTM C 443M.

.3 The sealing gaskets in the pipe connecting joints to precast reinforced concrete catch basin must be made of a rubber whose physical characteristics must comply either with requirements of appendix B of the standard NQ 2622-420 or ASTM C 923 M standard.

.4 Contractor must check with the manufacturer if the gaskets are lubricated or not (see Figures 60b, 61a et 61b of BNQ 1809-300 standard).

.5 Contractor must install around each catch basin a geomembrane of minimal height of 1.8 meters, to protect structures against uplift due to freezing, the smaller value prevails. Fixing around the catch bassin is guaranteed with 2 pins.

.1 Accepted products :

.1 Tex-O-Flex 40-12 by Solmax.

.2 Géoflex by Innovex.

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

.6 The inside diameter of the catch basin must be 750 mm.

.7 The branch pipe must be PVC, class DR-35 and have a diameter of 200 mm.

.8 Catch basins frames located underneath the pavement must be self-adjusting and frames must be cast gray iron and grid ductile iron. All these parts must be in accordance to the requirements of the standard NQ 3221-500. Frames, grid and extension collar, must be from the same manufacturer.

.1 Accepted products :

.1 P-51A model from Laperle.

.2 14x24 with auto-blocking high capacity grid from Laroche.

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

.9 Catch basins frames located off the roadway or in the concrete roadway are standard and frames must be cast gray iron and grid ductile iron. All these parts must be in accordance to the requirements of the standard NQ 3221-500. Frames, grids and extension collars, must come from the same manufacturer.

.1 Accepted products :

.1 P-45A model from Laperle.

.2 GL 14x24 with ductile cast iron grid from Laroche.

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

.3 Precast reinforced concrete regulation chamber (2 400 mm x 2 400 mm) and retention basin.

.1 General :

.1 The precast reinforce concrete regulation chamber must respect the requirements of the standard NQ 2622-420 and provided, among other things, either with rubber gasket whit physical caracteristics in accordance with Appendix A of the NQ 2622-420 standard or the ASTM C443M.

.2 Butyl cords are generally forbidden and are only allowed in places where sealing gaskets made of rubber are used due to geometry of the structures. The physical characteristics of butyl must comply either with requirements of Appendix C of the standard NQ 2622-420 or ASTM C 990M standard. Cords butyl diameter must be specified by manufacturer of the chamber and must be installed as recommended.

.3 The sealing gaskets in the pipe connecting joints to precast reinforced concrete regulation chamber must be made of a rubber whose physical characteristics must comply either with requirements of appendix B of the standard NQ 2622-420 or ASTM C 923M standard.

.4 Contractor must check with the manufacturer if the gaskets are lubricated or not.

.5 Contractor must install around the precast reinforced concrete regulation chamber a geomembrane model Tex-O-Flex of Solmax brand or Géoflex model from Innovex brand or approved equivalent, a minimal height of 1.8 meters, to protect structures against uplift due to freezing. Fixing around manhole is guaranteed with 2 pins.

.6 Parts for frames and covers must be cast gray iron or ductile iron, as required by the standard NQ 3221-500. Frames and covers must be from the same manufacturer.

.7 The collars framework extensions must be cast gray iron or ductil iron.

.8 Frames and covers of precast reinforced precast reinforced concrete regulation chamber, underneath the concrete, must be standard with a cover 775 mm diameter, with two (2) lifting holes of 25 mm. Frames and cover are gray cast iron. All frames must include a 50 mm ductile iron ring.

.1 Accepted products :

.1 C-6S model from Laperle.

.2 Standard 775 model from Laroche.

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

.2 Wall-mounted valve :

.1 The wall-mounted valve must have a strong frame and a non-rising stem. The valve must withstand positive and negative pressure of 6 meters of water.

.1 Accepted products :

.1 Model series 20 no 202 from Fontaine.

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

.2 Valve is made of stainless steel type A1-304L. All welds must be performed in accordance to the ASME section IX standards. Also, welds and all surfaces of the valve must be cleaned by sandblasting. It must have a rigid frame (Flange Back).

.3 The bottom seal must be made of neoprene and incased within the valve's frame. Sides and top seals must be made of ultra-high density polyethylene (UHMWPE) and the friction coefficient must be below 0,2. The continuous sliding between the rubber and the metal will be considered unacceptable.

.4 The rod is threaded according to the AOME standards and made of stainless steel type 304. The brass nut must meet the ASTM-B148 alloy C95200 standards.

.5 Wall-mounted valve is of type CWX to anchor directly on a concrete wall. The valve must be anchored to the wall with chemical type stainless steel anchor bolts as made by Hilti or approved equivalent. These anchors will be selected according to the manufacturer's recommendations.

.6 All bolts for installation must be made of type 304 stainless steel. A seal must seal between the valve and the wall. Non-shrink grout must be inserted between the valve and the wall for sealing.

.7 Concrete must have a 30 days resistance of 30 MPa, to give anchors sufficient peel strength.

.8 The flow control's valve will be operated with a removable « T » key which will activate the 50 mm x 50 mm squared nut located to the floor within a valve housing. A « T » shaped key must be provided by the Contractor.

.9 Leak test for the wall mounted valve will be performed at the same time as the leak test by exfiltration for the retention basin whose procedures are described in section 33 41 00 –Sewer Pipes.

.3 Telescopic ladders :

.1 Unless otherwise noted on the plans, ladders are made of aluminium only after manufacturing. They must be made and installed as shown on the plans.

.2 All ladders are to be provided with a retractable aluminum section allowing for a 1 500 mm clearance. The retractable section must be equipped with a simple lock mechanism allowing the installation of the ladder's extension. Contractor must indicate the location of each ladder in the shop drawings.

.1 Accepted products :

.1 PTL 120 model from Pretal.

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

.3 For each ladder, verify if a 150 or 250 mm clearance is required between the wall and the steps.

.4 Flow control regulator :

.1 The flow control regulator is of type vortex. It must be of brand John Meunier model 150 FV-VHV-2. The controller must have a 32 l/s capacity under a 2.475 meter water head. The instrument must be installed on a sliding plate with chemical anchors as manufactured by Hilti.

.2 The regulator must be entirely made of type A1-304L stainless steel. All welds must be performed in accordance with the ASME section IX.

.3 The flow control regulator must be installed in accordance with the manufacturer's recommendations. A calibration test must be performed on the site with a representative from the supplier/manufacturer at the same time as leak test by exfiltration for the retention basin whose procedures are described in section 33 41 00 – Sewer pipes

.5 Vents :

.1 Pipe, casing and vent fittings :

.1 Vents piping will be stainless steel and comply to a minimum with ASTM A778 standard, type 304L.

.2 Piping including bends and other singular parts must resist to a pressure of 1380 KPa and to full vacuum.

.3 If necessary, piping is to be reinforced at any point deemed necessary to support static and dynamic loads.

.4 Casing will be welded joints in stainless steel and comply to a minimum with ASTM A249/A269 standard.

.5 Casing, including fittings and other singular parts, must resist to a pressure of 1380 kPa and full vacuum.

.6 If necessary, casing is to be reinforced at any point deemed necessary to support static and dynamic loads.

.7 Install flanges, removable connectors and / or sleeves, anywhere shown on the plans and/or where required for flexibility, dismantling and cleaning of the pipe.

.8 Unless otherwise stated, fittings dimensions will, in general, comply with the standard ANSI B 16.1, class 150.

.9 All joints, rigid or flexible types shown on the plans are a required minimum; no reduction in the number of joints will be accepted.

.10 Tips for flanges of 300 mm or less must be of type swage collar pressed of a 3.2 mm thickness and those of 350 mm and more, of angular rolled collar of a thickness equal or superior to the piping of the same diameter.

.11 When flanged joints are used, the caps are of the rolled Vanstone type. The retaining clips are steel ASTM A 36 galvanized. The flange drilling pattern is in accordance with ANSI B16.5 , Class

150. The joints are designed for the operating pressure of 1380 kPa.

.12 Bolts and nuts are plated with cadmium and built to ANSI B18 grade 2 semifinished UNC, strong hexagonal series. Submerged bolts and nuts or located in an environment where the air is humid (ex.: wet wells, basins, basement, etc.) will be stainless steel 316. The full width fittings are in red natural rubber and a thickness of 3 mm.

.2 Welds :

.1 Welders shall be qualified and hold a permit issued by the Canadian Bureau or by the Ministry of Manpower under the CSA specifications W47.1.

.2 Welds must be full thickness and free from defects such as gutters (side cut), porosity, inclusions, excessive thickness or other.

.3 Welding process GTAW (Gas Tungsten Arc Welding) must be used for the root pass with argon protection to the opposite side or for the internal welding (if accessible), followed by the outside of a gouging until melting of the pass made by the inside.

.4 The SMAW process can be used to fill the groove when the seal is in the position 2G and 1G or to the corner welds.

.5 It is important that the amount of heat during the welding is kept to a minimum; it is prohibited to oscillate.

.6 It is not allowed to oscillate during welding. Interpass temperature in the region to be welded must be less than 350 ° F (175 ° C). It is not possible to make the heating points to straighten or to other reasons. The use of other processes requires approval of the Engineer before use.

.7 Pipe, brackets, and welds, must undergo a passivation after manufacture according to the following method: nitric acid 20 % to 40% by volume, the rest with water, temperature 55° C – 70 °C for 30 to 60 minutes, washing with hot water.

.8 Passivation must be made in the presence of the Contractor and a representative of the Engineer; otherwise, a certificate shall be delivered to the Contractor, for transmission to the Departmental Representative before delivery to the site, attesting that the passivation was made on the pipe. The Contractor may use, if necessary, passivation pasta. To this end, it must be approved by the Departmental Representative, through the Contractor, the products used and methods of application.

.9 After the complete installation of piping, passivate and clean welds to the site and to give a final wash all piping, according to the manufacturer's recommendations.

.10 If required, the welds on stainless steel pipes will be a test to X-rays, in order to control their quality. A test report shall be provided to the Engineer for approval.

.3 Vent post :

.1 Provide vent poles at the locations shown in the plans. Vent post are made of centrifugal concrete with exposed aggregate. The posts are provided with a circular steel enamel louvre on the head of the vent.

.2 Vent poles are PV series, as manufactured by Les Bétons Centrifugés division Meloche inc., or approved equivalent.

.4 Concrete base for vent posts :

.1 Concrete base as shown in the plan details must come with the vent posts.

.4 Granular materials seating and backfill: as specified in section 31 05 16 – Aggregate materials.

.5 Dimensionally stabilized backfill: as specified in section 31 23 33.01 – Excavation, trenching ans backfilling.

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 EXCAVATION AND BACKFILL

.1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling, and as indicated.

.2 Obtain approval of Departmental Representative before installing manholes or catch basins.

3.3 INSTALLATION

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

.2 Complete units as pipe laying progresses.

.1 Maximum of three units behind point of pipe laying will be allowed.

.3 Dewater excavation to approval of Departmental Representative and remove soft and foreign material before placing concrete base.

.4 Place precast concrete base on a granular bedding in accordance with BNQ 1809-300, latest edition.

.5 Precast Manholes and Catch Basins :

.1 Install manholes and catch basins in accordance with standards.

.2 Make each successive joint watertight with rubber ring gaskets approved by the Departmental Representative.

.6 For Sewers :

.1 Place stub outlets and bulkheads at elevations and in positions indicated.

.2 Manhole base to include a U-shaped channel.

.1 Depth of this channel to be equal to half the diameter of the outlet pipe.

.2 Manhole base to be equipped with two adjacent benches, with a slope of 1:20.

.3 Curve channel smoothly.

.4 Slope channel to sewer grade.

.7 Compact backfill in accordance with Section 31 23 33.01 – Excavation, trenching and backfill of these specifications.

.8 Place frame and cover on top section to elevation as indicated.

.1 If adjustment required, use concrete ring.

.9 Clean units of debris and foreign materials.

.1 Remove fins and sharp projections.

.2 Prevent debris from entering the network.

.10 Install safety platforms in manholes having depth of 5 m or greater, as indicated.

.11 Install the galvanized steel plate for the emergency spillway in site after installation and backfill operations have been completed for the flow regulation chamber.

3.4 FIELD QUALITY CONTROL

.1 Departmental Representative will issue Test Certificate for each manhole that passes testing.

.2 Perform tests in accordance with BNQ 1809-300/2004, latest edition.

.3 Leak tests (article 11.2.2 of BNQ 1809-300/R2007) :

.1 Perform tests at the same pace as the work. Faire réaliser les essais au fur et à mesure de la réalisation des travaux. In the presence of negative results, make repairs and retest until specified criteria are met.

.2 Provide blanking plugs on connections when the private section is non-existing. When the private section is existent, submit work method. In cases where it is

chosen to use a lateral and a pipe section up to the surface level to insert the test plugs (NQ 1809-300, figure 63), remove the pipe section after the test all the way to the lateral and seal the latter with a blanking plug.

.3 No mortal or or any other coat or product cannot be applied to the works before testing. No product can be added to the water during soaking and leak tests.

.4 Submit to the Engineer for acceptance, method, and products designed to repair pipes and manholes after a negative leak test.

.5 Repair defective joints to retain the original flexibility. Mortar or other rigid substance are banned. Use only tow on, gels or approved equivalent.

.4 Video inspection or additional testing :

.1 The Departmental Representative reserves the right to make, at any time since the end of the work until final acceptance, all television inspection or additional testing, at the expense of the Contractor.

3.5 CLEAN UP

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

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.6 OPERATION WARRANTY OF THE FLOW CONTROL CHAMBER AND CONTRACTOR'S EXPERIENCE

.1 Equipment must be delivered in operating condition. Contractor shall include in its price, all parts and accessories required for proper operation of all specified equipment.

.2 Contractor performing the work described in this section must have experience in at least five (5) similar work.

3.7 INSTRUCTION MANUAL FOR THE REGULATION CHAMBER'S EQUIPMENTS

.1 Contractor must provide the operating staff, three (3) instruction manuals regarding all installation's information received, manufacturer's directions required for operation and maintenance of the equipment.

3.8 OPERATING STAFF FORMATION FOR THE OPERATION AND MAINTENANCE OF THE WALL-MOUNTED VALVE AND THE FLOW CONTROL REGULATOR

.1 Contractor must plan, coordinate and provide a formation class to the regulation chamber operating staff.

.1 During the training sessions, explain to the operating staff the operation and maintenance of every supplied and installed equipment.

.2 Conduct training once equipments is operational and instruction manuals are accepted and available.

.3 Training sessions must be planned and given by competent representatives of implicated suppliers. Training session must include theoretical class about the equipment's operation and instructions directly on the equipments.

END OF SECTION