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**Part 1 General****1.1 RELATED REQUIREMENTS**

- .1 Section 31 23 20 Excavating, Trenching and Backfill.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .4 Section 01 74 11 - Cleaning.

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM D698-12e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort ((12,400 ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>)).
  - .2 ASTM D2241-09, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  - .3 ASTM D3034-14a, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .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 CSA International
  - .1 CSA B137 Series-13, Thermoplastic Pressure Piping Compendium.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling:
  - .1 Schedule Work to minimize interruptions to existing services.
  - .2 Submit schedule of expected interruptions and adhere to schedule approved by Departmental Representative.
  - .3 Notify Departmental Representative and building manager a minimum of 24 hours in advance of interruption in service.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for for pipes and backfill and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
  - .2 Submit shop drawings showing proposed method of installation for sewage force main and restraining mechanisms.
- .4 Samples:
  - .1 Submit 2 weeks minimum before beginning Work, with proposed source of bedding materials and provide access for sampling.
- .5 Certification to be marked on pipe.

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- .6 Test and Evaluation Reports: submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
  - .7 Manufacturer's Instructions: submit to Departmental Representative 1 copy of manufacturer's installation instructions.

## **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect pipes from damage.
  - .3 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse of pallets, crates, padding, and packaging materials as specified in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Polyethylene pressure pipes: to CRA B137; CGSB 41-GP-25M:
  - .1 Type: HDPE
  - .2 Series: DR17
  - .3 Joints: to ANSI/AWWA C207, thermal butt fusion or flanged with aluminum backing flanges.
  - .4 Polyethylene fittings: to CSA B137, for pipes sizes 4" and less.

### **2.2 PIPE BEDDING AND SURROUND MATERIALS**

- .1 Granular A material in accordance with OPSS 1010.

### **2.3 BACKFILL MATERIAL**

- .1 As indicated.
- .2 Type 3, in accordance with Section 31 23 20 - Excavating, Trenching and Backfilling.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Pipes and fittings to be clean and dry.
- .3 Prior to installation, obtain Departmental Representative's approval of pipes and fittings.

### **3.3 TRENCHING**

- .1 Do trenching Work, in accordance with Section 31 23 20 - Excavating, Trenching and Backfilling.
- .2 Trench alignment and depth require approval from Departmental Representative prior to placing bedding material or pipe.

### **3.4 GRANULAR BEDDING**

- .1 Place granular bedding in unfrozen condition.
- .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
- .4 Shape transverse depressions as required to suit joints.
- .5 Compact each layer full width of bed to at least 95% corrected maximum dry density.
- .6 Fill excavation below design elevation of bottom of specified bedding with compacted bedding material.

### **3.5 INSTALLATION**

- .1 Avoid damage to machined ends of pipes in handling and moving pipe.
- .2 Maintain grade and alignment of pipes.
- .3 Align pipes carefully before jointing.
- .4 Joint deflection permitted within limits in accordance with pipe manufacturer's written recommendations.
- .5 Support pipe firmly over entire length, except for clearance necessary at couplings.
  - .1 Do not use blocks to support pipe.
- .6 Keep pipe and pipe joints free from foreign material.

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- .7 Avoid bumping gasket and knocking it out of position, or contaminating with dirt or other foreign material. Remove disturbed gaskets clean, lubricate and replace before jointing is attempted.
  - .8 Support pipes using hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
  - .9 Apply sufficient pressure in making joint to ensure that joint is complete to manufacturer's recommendations.
  - .10 Apply restraint to pipe to ensure that joints when completed are held in place, by tamping fill material under and alongside pipe, or otherwise as approved by Departmental Representative.
  - .11 When stoppage of Work occurs, block pipe as directed by Departmental Representative to prevent creep during downtime.

### **3.6 RESTRAINING MECHANISM**

- .1 Restrain bends, tees and fittings using mechanical restraint

### **3.7 PIPE SURROUND**

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated. Leave joints and fittings exposed until field testing is completed. Hand place surround material in uniform layers simultaneously on each side of pipe not exceeding 150 mm compacted thickness as indicated.
- .3 Compact each layer from pipe invert to mid height of pipe to at least 95% corrected maximum dry density.
- .4 Compact each layer from mid height of pipe to underside of backfill to at least 90% corrected maximum dry density.
- .5 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

### **3.8 BACKFILL**

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
- .3 Under paving and walks, compact backfill to at least 95% corrected maximum dry density. In other areas, compact to at least 90% corrected maximum dry density.

### **3.9 FIELD TESTING OF FORCE MAIN**

- .1 Testing of force main to be carried out in presence of the Departmental Representative.
- .2 Strut and brace caps, bends and tees, to prevent movement when test pressure is applied.
- .3 Expel air from force main, by slowly filling main with water.
  - .1 Drill and tap high points and install suitable cocks to vent air and to be shut when pressure is applied.

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- .2 Remove cocks after satisfactory completion of test and seal holes with tight fitting plugs.
  - .4 Apply hydrostatic test pressure of 1000 kPa based on elevation of lowest point in line and corrected to elevation of test gauge for hydrostatic test and 500 kPa for leakage test.
  - .5 Apply pressure for 1 hour for pressure test and 2 hours for leakage test.
  - .6 Examine exposed pipe, joints and fittings while system is under pressure.
  - .7 Remove defective joints, pipe and fittings and replace with new sound material.
  - .8 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for 2 hours.
  - .9 Do not exceed allowable leakage of 2.2L/mm of pipe size/km/day.
  - .10 Locate and repair defects if leakage is greater than amount specified.
  - .11 Repeat test until leakage is within specified allowance for full length of force main.
  - .12 Complete backfill.
  - .13 Repeat test after completing backfill. Locate and repair defects and backfill. Repeat tests, repairs and backfills as needed until leakage is less than amount specified.

### **3.10 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **END OF SECTION**