1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Section 31 05 16 - Aggregate for Earthwork

.3 Section 32 11 23 – Aggregate Base Courses

1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

.1 Not used.

1.03 PRICE AND PAYMENT PROCEDURES

.1 Television and photographic pipe inspections, if requested by DR:
- .1 Television inspection is incidental to work and included in unit price of pipe installation.
- .2 If defective work is found, contractor will pay for addition television inspection.

.2 Measurement procedures:
- .1 Measure excavation and backfill under Section 31 23 33.01 - Excavating, Trenching and Backfilling – included in unit price for pipe installation.
- .2 Measure supply and installation of storm sewer including testing and including excavation and backfilling and granular bedding and surround horizontally from manhole face to manhole face in metres of each pipe size and depth class installed.
- .3 Measure granular bedding and surround in cubic metres compacted in place, included in unit price for pipe installation.

.3 Pipe unit price will include supply and install of storm sewer, television inspection, required bedding, backfill up to granular sub-base course, coring into existing catch basin, grouting connections to ne and existing manholes and any other cost incurred.

1.04 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C 12-17, Standard Practice for Installing Vitrified Clay Pipe Lines.
- .2 ASTM C 14M-15A, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
- .3 ASTM C 76M-18, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
- .4 ASTM C 117-17, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
- .5 ASTM C 136-14, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.6 ASTM C 425-04(2018), Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
.7 ASTM C 428-2011 e1, Standard Specification for Asbestos-Cement Nonpressure Sewer Pipe.
.8 ASTM C 443M-10, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
.9 ASTM C 506M-10b, Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe.
.10 ASTM C 507M-10b, Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe (Metric).
.11 ASTM C 663-98(2008), Standard Specification for Asbestos-Cement Storm Drain Pipe.
.12 ASTM C 700-11, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
.13 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
.14 ASTM D 1056-07, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
.15 ASTM D 1869-95(2010), Standard Specification for Rubber Rings for Asbestos-Cement Pipe.
.16 ASTM D 2680-01(2009), Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
.17 ASTM D 3034-08, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
.18 ASTM F 405-05, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
.19 ASTM F 667-06, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.
.20 ASTM F 794-03(2014), Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-M89, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
.3 CAN/CGSB-34.9-94, Asbestos-Cement Sewer Pipe.

.3 CSA Group (CSA)
.1 CAN/CSA-A3000-18, Cementitious Materials Compendium.
.2 CSA A257 14 (R2019) Series-M92(R2009), Standards for Concrete Pipe.
.3 CAN/CSA-B1800-18, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.
.4 CSA G401-14 R2019, Corrugated Steel Pipe Products.

1.05 SCHEDULING

.1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

1.06 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 pipes, and backfill and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
  .1 Inform DR at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.
  .2 If requested, Submit to DR for testing, at least 2 weeks prior to beginning Work, following samples of materials proposed for use.

.4 Certification to be marked on pipe.

.5 Test and Evaluation Reports: submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.6 Manufacturer's Instructions: submit to DR 1 copy of manufacturer's installation instructions.

1.07 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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.

2 PRODUCTS

2.01 CONCRETE PIPE

.1 Not used.

2.02 VITRIFIED CLAY PIPE

.1 Not used.

2.03 CORRUGATED STEEL PIPE

.1 Not used.

2.04 ASBESTOS CEMENT PIPE

.1 Not used.

2.05 PLASTIC PIPE

.1 Type PSM Poly Vinyl Chloride (PVC): to CAN/CSA-B1800.
- .1 Standard Dimensional Ratio (SDR): 35.
- .2 Locked-in gasket and integral bell system.
- .3 Gaskets shall be manufactured from nitrile rubber that is hydrocarbon resistant.
- .4 Nominal lengths: 6 m.

2.06 PIPE BEDDING AND SURROUND MATERIAL

.1 Pipe bedding to be Granular “A” material as in Section 32 11 23 – Aggregate Base Courses.

2.07 BACKFILL MATERIAL

.1 Backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.08 JOINT MORTAR

.1 Portland cement: to CAN/CSA-A3000, normal Type GU.

.2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

3 EXECUTION

3.01 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 requirements of authorities having jurisdiction.
- .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 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of DR.

3.02 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Protect trench from contents of sewer.

.3 Trench alignment and depth to approval of DR prior to placing bedding material and pipe.

3.03 CONCRETE BEDDING AND ENCASEMENT

.1 Not used.

3.04 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.

.2 Place 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.
.1 Do not use blocks when bedding pipes.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% corrected maximum density to ASTM D 698.

3.05 INSTALLATION

.1 Lay and join pipes to: ASTM C 12.

.2 Lay and join pipe in accordance with manufacturer's recommendations and to approval of DR.

.3 Handle pipe using methods approved by DR.
.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.4 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.5 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.6 Joint deflection permitted within limits recommended by pipe manufacturer.

.7 Water to flow through pipes during construction only as permitted by DR.

.8 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.9 Install plastic pipe and fittings in accordance with CAN/CSA-B1800.

.10 When any stoppage of Work occurs, restrain pipes as directed by DR, to prevent "creep" during down time.

.11 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.12 Make watertight connections to manholes and catch basins.
.1 Use non-shrinkage grout reviewed and approved by DR 4 weeks before start of work.

.13 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

3.06 PIPE SURROUND

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after DR has inspected pipe joints, surround and cover pipes as indicated.
.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150mm compacted thickness as indicated.

.4 Place layers uniformly and simultaneously on each side of pipe.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95 % standard maximum density to ASTM D 698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 95 % standard maximum density to ASTM D 698.

.7 When field test results are acceptable to DR, place surround material at pipe joints.

3.07 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 100% corrected maximum density to ASTM D 698.

3.08 UNDERCROSSING

.1 Not used.

3.09 FIELD TESTS AND INSPECTIONS

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 Draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction directed by DR.

.3 Remove foreign material from sewers and related appurtenances by flushing

with water.

.4 Television and photographic inspections:
.1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means if requested by DR.
.2 Provide means of access to permit DR to do inspections.
.3 Payment for inspection services in accordance with Price and Payment Procedures in PART 1.

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 00 - Cleaning.

END OF SECTION