Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 REFERENCES

.1 ASTM International

.1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 CSA Group

.1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 407 - November 2015, Construction Specification for Maintenance Hole, Catch Basin, Ditch Inlet and Valve Chamber Installation.

.2 OPSS 408 – November 2015, Construction Specification for Adjusting or Rebuilding Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers.

.3 OPSS.MUNI 1010 – November 2013, Material Specification for Aggregates – Base, Subbase, Select Subgrade and Backfill Material.

.4 OPSS 1351 – November 2014, Material Specification for Precast Reinforced Concrete Components for Maintenance Holes, Catch Basins, Ditch Inlets, and Valve Chambers.

.5 OPSS 1850 – April 2013, Material Specification for Frames, Grates, Covers and Gratings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings: per Section 01 33 00 - Submittal Procedures.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect maintenance holes and catch basin structures from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Materials: remove for reuse and return of pallets, crates, padding and packaging materials.

Part 2 Products

2.1 MATERIALS

.1 Precast maintenance hole units: to OPSS 1351.

.2 Precast catch basin sections: to OPSS 1351.

.3 Joints: to OPSS 1351.

.4 Mortar:

.1 Masonry Cement: to CAN/CSA-A3002.

.5 Ladder rungs: to OPSS 1351.

.1 Rungs to be safety pattern (drop step type).

.6 Adjusting rings: to OPSS 1351.

.7 Frames, gratings, covers: to OPSS 1351.

.8 Granular bedding and backfill: to OPSS.MUNI 1010.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for maintenance holes and catch basin structures 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.

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

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 maintenance holes 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 Set precast concrete base on 150 mm minimum of granular bedding compacted to 100% maximum density to ASTM D698.

.5 Precast units:

.1 Set bottom section of precast unit in bed of cement mortar and bond to concrete slab or base.

.2 Make each successive joint watertight with Departmental Representative's approved rubber ring gaskets, bituminous compound, cement mortar, epoxy resin cement, or combination of these materials.

.3 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.

.4 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.6 For sewers:

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

.2 Bench to provide smooth U-shaped channel.

.1 Side height of channel to be 0.75 times diameter of sewer.

.2 Slope adjacent floor at 1 in 20.

.3 Curve channels smoothly.

.4 Slope invert to establish sewer grade.

.7 Compact granular backfill to 95% maximum density to ASTM D698.

.8 Installing units in existing systems:

.1 Where new unit is installed in existing run of pipe, ensure full support of existing pipe during installation, and carefully remove that portion of existing pipe to dimensions required and install new unit as specified.

.2 Make joints watertight between new unit and existing pipe.

.3 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready for operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.

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

.1 If adjustment required use concrete ring.

.10 Clean units of debris and foreign materials.

.1 Remove fins and sharp projections.

.2 Prevent debris from entering system.

.11 Install safety platforms in maintenance holes having depth of 5 m or greater, as indicated.

3.4 ADJUSTING TOPS OF EXISTING UNITS

.1 Remove existing gratings, frames, and I beams and store for re-use at locations designated by Departmental Representative.

.2 Sectional units:

.1 Raise or lower straight walled sectional units by adding or removing precast sections as required.

.2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.

.1 When amount of raise is less than 600 mm use standard maintenance hole brick, moduloc or grade rings.

.3 Raise or lower valve box to match finished grade by adjusting top section or extensions as necessary.

.1 When amount of raise is greater than 100 mm, a new extension or top section shall be substituted as necessary.

.2 Self leveling valve boxes shall be adjusted as per manufacturers recommended adjustment procedures.

.3 Regular valve boxes shall be adjusted by encasing the unit with 35 MPa cast-in-place concrete. The concrete shall have a smooth top finish and that shall not encroach into the designed, or existing, pavement structure.

.4 Where adjustment or rebuilding of structures occur in a roadway with concrete base or pavement, the area so affected by the work shall be properly reinstated.

.5 A maximum vertical tolerance of 5 mm below finish grade shall be acceptable for the final adjustment of all iron frames. The tolerance shall be measured anywhere along the length of a 1.5 m straight edge laid across the top of the frame in the direction of traffic flow.

3.5 SEALING OVER EXISTING UNITS

.1 Cut galvanized iron sheet to extend 50 mm beyond opening of existing maintenance hole or catch basin grating.

.1 Center iron sheet over existing grating and spot or stitch weld to grating.

.2 Fill with material approved by Departmental Representative.

3.6 FIELD QUALITY CONTROL

.1 Leakage Test: to OPSS 407.

3.7 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.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 - Aggregate Materials.

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

1.2 REFERENCES

.1 ASTM International

.1 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.2 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 409 – November 2013, Closed Circuit Television Inspection of Pipelines.

.2 OPSS 410 – November 2015, Pipe Sewer Installation in Open Cut.

.3 OPSS.MUNI 1010 – November 2013, Material Specification for Aggregates – Base, Subbase, Select Subgrade and Backfill Material.

.4 OPSS 1359 – November 2006, Material Specification for Unshrinkable Backfill.

.5 OPSS 1801 – November 2014, Material Specification for Corrugated Steel Pipe (CSP) Products.

.6 OPSS 1820 – November 2014, Circular Concrete Pipe.

.7 OPSS 1841 – November 2015, Non-Pressure Polyvinyl Chloride (PVC) Pipe Products.

.8 OPSS 421 – November 2015, Pipe Culvert Installation in Open Cut.

1.3 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings: per Section 01 33 00 - Submittal Procedures.

.1 Shop drawings to indicate proposed method for installing carrier pipe for undercrossings.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Certification to be marked on pipe.

1.5 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.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials.

Part 2 Products

2.1 CONCRETE PIPE

.1 Reinforced and non-reinforced non-pressure circular concrete pipe: to OPSS 1820.

2.2 PLASTIC PIPE

.1 Type Poly Vinyl Chloride (PVC): to OPSS 1841.

2.3 PIPE BEDDING AND SURROUND MATERIAL

.1 Granular material in accordance with Section 31 05 16 - Aggregate Materials.

2.4 BACKFILL MATERIAL

.1 Backfill to be approved native material or Select Subgrade Material. Select Subgrade Material to: OPSS.MUNI 1010.

2.5 INSULATION

.1 Insulation for shallow sewers to be extruded expanded polystyrene thermal insulation with Grade A or higher compressive strength.

2.6 UNSHRINKABLE FILL

.1 Unshrinkable fill shall be in accordance with OPSS 1359 except the 28-day compressive strength shall be in the range of 0.4 to 0.7 MPa.

2.7 CORRUGATED STEEL CULVERT PIPE

.1 Installation of pipe culvert: OPSS 1801.

Part 3 Execution

3.1 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 drawings.

.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 Departmental Representative.

3.2 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 Departmental Representative prior to placing bedding material and pipe.

3.3 GRANULAR BEDDING

.1 Place 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.

.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 % maximum density to ASTM D698.

.6 Fill excavation below bottom of specified bedding adjacent to manholes or catch basins with compacted bedding material.

3.4 INSTALLATION

.1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative. Installation shall be in accordance with OPSS 410.

.2 Handle pipe using methods approved by Departmental Representative.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.3 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.

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

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

.6 Water to flow through pipes during construction only as permitted by Departmental Representative.

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

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

.9 Plug lifting holes with Departmental Representative approved prefabricated plugs, set in shrinkage compensating grout.

.10 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.

.11 Make watertight connections to manholes and catch basins.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.12 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.

.1 Joint to be structurally sound and watertight.

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

3.5 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.

.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150 mm 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 % maximum density to ASTM D698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 90 % maximum density to ASTM D698.

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

3.6 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 % maximum density to ASTM D698. In other areas, compact backfill to at least 90 % maximum density to ASTM D698.

3.7 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 Departmental Representative.

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

.4 Television and photographic inspections: per Section 01 33 00 - Submittal and Procedures.

.1 Carry out inspection of installed sewers by television camera, photographic camera or by other related means, in accordance with OPSS 409.

3.8 ABANDONMENT OF EXISTING SEWERS

.1 Sewers to be abandoned in place shall have their openings for services and at manholes or catch basins plugged.

.2 The entire volume of the pipe and any attached service leads shall be completely filled with unshrinkable fill from the invert to obvert over their entire length.

3.9 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.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION