PART 1 - GENERAL

1.1 Related Work

.1 Refer to other Specifications for related information.

1.2 Reference Standards

.1 ASTM C478, Precast Reinforced Concrete Manhole Sections.

.2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) Standard Specification, Highway Construction & Maintenance (current edition).

1.3 Material Certification

.1 At least two weeks prior to commencing work, submit manufacturer's test data and certification that materials meet requirements of this section. Include manufacturer's drawings, information and shop drawings where pertinent.

1.4 Measurement for Payment

.1 Precast concrete catch basins will be measured in accordance with **Section 01 29 00.**

PART 2 - PRODUCTS

2.1 Materials

.1 Precast catch basins sections: to ASTM C478 and as detailed on the drawings.

.2 Joints: to be made watertight using rubber rings.

.3 Adjusting rings: to ASTM C478.

.4 Cast-in-place concrete to **Section 03 30 00**.

.5 Frames, gratings, covers to plan dimensions and following requirements:

.1 Metal gratings and covers to gear evenly on frames. A frame with grating or cover to constitute one unit.

.2 Catch basin frames and covers: heavy duty municipal type for road service.

PART 3 - EXECUTION

3.1 Excavation and Backfill

.1 Excavate and backfill in accordance with **Section 31 23 10**.

.2 Obtain approval of *Departmental Representative* before installing catch basins.

3.2 Installation

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

.2 Complete units as pipe laying progresses.

.3 Pump excavation free of standing water and remove soft and foreign material before placing concrete base.

.4 Cast bottom slabs directly on 300 mm minimum of well compacted granular sub-base material, 98% standard proctor density as per **Section 32 11 19.**

.5 For precast units:
.1 Set bottom section of precast unit on 300 mm minimum of compacted granular sub-base. If within tide zone, use substitute clear stone. Make each successive joint watertight with approved rubber ring gaskets.
.2 Clean surplus mortar and joint compounds from interior surface of unit as work progresses.
.3 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.

.6 Installing units in existing systems:
.1 Where a new unit is to be installed in an 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 to be put in operation, complete installation with appropriate breakouts, removals and redirection of flows, blocking unused pipes or other necessary work.

.7 Place granular backfill material, approved by Departmental Representative, in 300 mm layers to full width, alternately on each side of the catch basin, so as not to displace it laterally or vertically.

.8 Compact each layer to 95% maximum density to ASTM D 698.

.9 Place frame and cover on top section to elevation indicated. If adjustment is required, use concrete ring.

.10 Clean units of debris and foreign materials. Remove fins and sharp projection. Prevent debris from entering system.

PART 1 - GENERAL

1.1 Related Work

.1 Refer to other Specification Sections for related information.

1.2 References Standards

.1 CSA International
  .1 CSA-GA257.2, Standards for Concrete Pipes
  .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) Standard Specification, Highway Construction & Maintenance (current edition).

1.3 Submittals

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

.2 Submit list of all pipe, indicating location, type, diameter, length and invert elevations for *Departmental Representative* Review, at least 4 weeks prior to ordering of pipe.

.3 Product Data:
  .1 Submit manufacturer’s instructions, printed product literature and data sheets for pipes and backfill and include project characteristics, performance criteria, physical size, finish and limitations.

.4 Samples:
  .1 Inform Departmental Representative at least 4 weeks before beginning work, or proposed source of bedding materials and provide access for sampling.

.5 Certifications: to be marked on pipe.

.6 Test and Evaluation Reports:
  .1 Submit manufacturer’s test data and certification at least 4 weeks prior to beginning work.

1.4 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.

1.5 Measurement for Payment

.1 Measurement for payment will be in accordance with **Section 01 29 00.**

PART 2 - PRODUCTS

2.1 Concrete Pipe

.1 Reinforced concrete pipe: to CSA A257.2 diameter as indicated, strength classification 65-D.

.2 Rubber gaskets for joints: to CSA A257.

.3 Cement mortar joint filler:
- .1 Portland cement: to CSA A3000 type 10.
- .2 Sand: to ASTM C144.
- .3 Mortar: one part by volume of cement to two parts of clean, sharp sand mixed dry. Add sufficient water after mixing to give optimum consistency for hand application.

2.2 Granular Bedding and Backfill

.1 Material to be in accordance with Section 32 11 23 – Aggregates Base Courses

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections are acceptable for pipe culvert 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 Preparation

.1 Existing Culverts shall be disposed of in accordance with Section 01 74 22 – Construction/Demolition Waste Management and Disposal.

.2 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 requirement or 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.

3.2 Trenching

.1 Do trenching work in accordance with Section 31 23 10 – Excavating and Backfilling.

.2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.3 Bedding

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.

.2 For culverts place minimum thickness of 150 mm of approved granular material on bottom of excavation and compact to minimum 95% maximum density to ASTM D 698.

.3 Bed outlet pipes in embankment material only.

.4 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by Departmental Representative, free from sags or high points.

.5 Place bedding in unfrozen condition.

3.4 Laying Concrete Pipe Culverts

.1 Begin at downstream end of culvert with flanged end of first pipe section facing upstream.

.2 Ensure barrel of each pipe is in contact with shaped bed throughout its length.

.3 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

.4 End sections of pipe to be bevel cut at 1.5 to 1 slope to blend into roadway slope.

3.5 Joints

.1 Joints may be made with rubber gaskets, bituminous jointing compound or Portland cement mortar.

.1 Rubber gasket joints:

.1 Install in accordance with manufacturer's written recommendations.

.2 Ensure that tapered ends are fully entered into flanged ends.

.2 Bituminous filled joints:

.1 Make joint with excess of filler to form continuous bead around outside of pipe and finish smooth on inside.

.3 Mortar joints:

.1 Prepare mortar as specified herein.

.2 Clean pipe ends and wet with water before joint is made.

.3 Place mortar in lower half of flanged end of pipe section in place.

.4 Apply mortar to upper half of tapered end of pipe section being installed.

.5 Join pipe ends and force joint up tight, taking care to ensure inner surfaces of abutting pipe sections are flush and even.

.6 Clean inside of pipe and annular space between ends of pipes after each joint is made.

.7 Fill joint with mortar and finish smooth and even.

.8 For pipes 800 mm or less diameter, fill joints before mortar in joints has set

.9 For pipes over 800 mm diameter, postpone filling joint until backfilling has been completed. Re-clean joints before applying mortar.

3.6 Backfilling

.1 Backfill around and over culverts as indicated or as directed by Departmental Representative.

.2 Place granular backfill material, approved by Departmental Representative, in maximum 200 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.

.3 Compact each layer to 95% maximum density to ASTM D 698 taking special care to obtain required density under haunches.

.4 Protect installed culvert with minimum 1 metre cover of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 1:2.

.5 Place backfill in unfrozen condition.