

## **PART 1 - GENERAL**

### 1.1 Related Sections

- .1 Section
  - .1 CW 3170-Earthworks
  - .2 CW 3110-Subgrade, Sub-base and Base Course

### 1.2 Measurement Procedures

- .1 Supply and installation of pipe culvert including excavation and backfill will be paid for by Lump Sum as specified in the Bid Opportunity.
- .2 Cost of supply and installation will include base material, drain pipe, geotextile, clay liner and stone mulch.
- 3 Cost of supply and installation will include any necessary dewatering prior to placing of bedding.

### 1.3 References

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM C 14M-[95], Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe.
  - .2 ASTM C 76M-[98], Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
  - .3 ASTM C 117-[95], Standard Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .4 ASTM C 136-[96a], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .5 ASTM C 144-[97], Standard Specification for Aggregate for Masonry Mortar.
  - .6 ASTM C 443M-[98], Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  - .7 ASTM D 698-[91(1998)], Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m<sup>3</sup>).
  - .8 ASTM D 1248-[98], Standard Specification for Polyethylene Plastics Molding and Extrusion Materials for Wire and Cable.
  - .9 ASTM F 667-[97], Standard Specification for 8, 10, 12, and 15 inch Corrugated Polyethylene Tubing and Fittings.
- .2 Canadian Standards Association (CSA)
  - .1 CAN/CSA-A5/A8/A362-[M93], Portland Cement/Masonry Cement/Blended Hydraulic Cement.
  - .2 CAN/CSA-A257 Series-[M92], Standards for Concrete Pipe.
  - .3 CAN3-G401-[93], Corrugated Steel Pipe Products.
- .3 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.1-[88], Sieves Testing, Woven Wire.
- .2 CAN/CGSB-8.2-[M88], Sieves Testing, Woven Wire, Metric.

1.4 Samples

- .1 Submit samples in accordance with City of Winnipeg Specification CW1110 General Instructions.
- .2 Inform Contract Administrator at least 4 weeks prior to commencing work, of proposed source of bedding materials and provide access for sampling.
- .3 Submit to Contract Administrator for testing, at least 4 weeks prior to commencing work, following samples of materials proposed for use:
  - .1 Pipe Culvert
  - .2 Geotextile
  - .3 Stone Mulch
  - .4 Clay Liner

1.5 Material Certification

- .1 Submit manufacturer's test data and certification at least 4 weeks prior to commencing work for corrugated pipe.
- .2 Certification to be marked on pipe.

**PART 2 - PRODUCTS**

2.1 Corrugated Steel Pipe

- .1 Corrugated steel pipe: to CAN3-G401.

2.2 Corrugated Polyethylene Pipe

- .1 To ASTM F 667.
  - .1 Polyethylene resin: to ASTM D 1248
  - .2 Weathering resistance: to ASTM D 1248, Class C.

2.3 Granular Bedding and Backfill

- .1 Granular bedding and backfill material to CW 3110

**PART 3 - EXECUTION**

3.1 Bedding

- .1 Dewater excavation, as necessary, to allow placement of culvert bedding in the dry.
- .2 Place minimum thickness of 100 mm of approved granular material on bottom of excavation and compact to minimum 98% of corrected maximum dry density.
- .3 Place bedding in unfrozen condition.

3.2 Laying Pipe Culverts

- .1 Commence pipe placing at downstream end.
- .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
- .3 Ensure bottom of pipe is in contact with shaped bedding throughout

pipe length.

- .4 Do not allow water to flow through pipes during construction except as permitted by Contract Administrator.
- .5 Ensure Bentonite clay liner covers entire length of the pipe culvert and extends 1000mm at end and sides of pipes.

### 3.3 Backfilling

- .1 Backfill around and over culverts as indicated or as directed by Contract Administrator.
- .2 Place backfill material, approved by Contract Administrator, in 150 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 98% corrected maximum dry density.
- .4 Place backfill and clay liner in unfrozen condition.