

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 32 11 16 Granular Sub-Base.
	.2	Section 32 11 23 Granular Base.
<u>1.2 Measurement Procedures</u>	.1	<u>Concrete Pipe Culvert</u> : The supply and installation of the concrete pipe culvert and bedding will be measured as a lump sum pay item.
	.2	Trenching for culvert: Include cost of trenching for culvert in Section 02 41 13 Site Work Preparation and Removal.
<u>1.3 References</u>	.1	ASTM International
	.1	ASTM C 117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
	.2	ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.3	ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³)).
	.2	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
<u>1.4 Submittals</u>	.3	CSA International
	.1	CSA A257 Series-09, Standards for Concrete Pipe and Manhole Sections.
	.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 include product characteristics, performance criteria, physical size, finish and limitations.

- .3 Samples:
 - .1 Inform Departmental Representative at least 4 weeks before beginning Work, of proposed source of bedding materials and provide access for sampling.
 - .4 Certification: to be marked on pipe.
 - .5 Test and Evaluation Reports:
 - .1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work.
- 1.5 Delivery, Storage and Handling
- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .2 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.

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Reinforced concrete pipe: to CSA A257, 900 mm nominal inside diameter.
 - .1 Acceptable manufacturers:
 - .1 Shaw Precast Solutions.
 - .2 Lafarge.
 - .3 Strescon Limited.
 - .2 Rubber gaskets for joints: to CSA A257.
 - .3 Granular backfill material to Section 32 11 16 Granular Sub-Base.
 - .4 Granular bedding for pipe to Section 32 11 23 Granular Base.

PART 3 - EXECUTION

3.1 Trenching

- .1 Do trenching work in accordance with Section 31 23 10 - Excavation, Trenching and Backfilling.
- .2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material.

3.2 Bedding

- .1 Place 150 mm minimum thickness of approved granular material on bottom of excavation and compact to 95% minimum of maximum density to ASTM D 698.
- .2 Shape bedding to fit lower segment of pipe exterior so that width of at least 35% 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.
- .3 Place bedding in unfrozen condition.

3.3 Laying Pipe

- .1 Install pipe as per manufacturer's recommendations.
- .2 Ensure barrel of each pipe is in contact with shaped bed throughout its length.
- .3 Allow water to flow through pipes during construction only as permitted by Departmental Representative.

3.4 Joints

- .1 Rubber gasket joints:
 - .1 Install in accordance with manufacturer's written recommendations.
 - .2 Ensure that tapered ends are fully entered into flanged ends.

3.5 Backfilling

- .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
- .2 Place granular backfill material 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 95% maximum density to ASTM D 698 taking special care to obtain required density under haunches.
- .4 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross.
 - .1 During construction, width of fill, at its top, to be at least twice diameter of pipe and with slopes not steeper than 1:2.
- .5 Place backfill in unfrozen condition.