

PART 1 - GENERAL

- |                             |    |  |
|-----------------------------|----|--|
| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures  |
|                             | .2 | Section 03 30 00 - Cast-in-Place Concrete  |
|                             | .3 | Section 31 23 10 - Excavating, Trenching and Backfilling   |
|                             | .4 | Section 31 23 13 - Roadway Embankments   |
|                             | .5 | Section 31 05 16 - Aggregate Materials   |
| <u>1.2 REFERENCES</u>       | .1 | Canadian General Standards Board (CGSB):<br>.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.<br>.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.                         |
|                             | .2 | Canadian Standards Association (CSA International):<br>.1 CAN/CSA A23-09, Concrete Materials and Methods of Concrete Construction.<br>.2 CAN/CSA S6-06, Canadian Bridge Design.                |
|                             | .3 | American Society for Testing of Materials (ASTM):<br>.1 ASTM C1433-2010, Standard Specification for Precast Reinforced Concrete Monolithic Box Sections, for Culverts Storm Drains and Sewers. |
| <u>1.3 SUBMITTALS</u>       | .1 | Submit samples if requested in accordance with Section 01 33 00.   |
|                             | .2 | Inform Departmental Representative at least four (4) weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.                                   |
|                             | .3 | Submit manufacturer's test data and certification at least four (4) weeks prior to beginning Work.   |
|                             | .4 | Certification to be marked on culvert sections.  |
|                             | .5 | Submit drawings in accordance with Section 33 42 16  |
-

- |  |    |  |
|--|----|--|
| 1.4 DELIVERY,<br>STORAGE AND<br>HANDLING | .1 | Deliver, store and handle materials to prevent damage in accordance with instructions of supplier. |
|--|----|--|

## PART 2 - PRODUCTS

- |                     |    |  |
|---------------------|----|--|
| 2.1 DESIGN CRITERIA | .1 | Design code: CSA S6.   |
|                     | .2 | Design to accommodate geometry and soil and live load conditions as indicated on the drawings. Live load to be CS-625.   |
| 2.2 PRECAST UNITS   | .1 | Only proprietary precast rigid frame culverts are acceptable.  |
|                     | .2 | Provide Departmental Representative with six (6) sets of complete working drawings and one (1) copy of design calculations for review at least four (4) weeks prior to construction. Drawings at design calculations to bear signature and stamp of qualified professional engineer registered in Nova Scotia.   |
|                     | .3 | Provide the following information on the working drawings: <ul style="list-style-type: none"><li>.1 Plan layout of wall.</li><li>.2 Profiles.</li><li>.3 Developed wall elevations (elevations of top and bottom of wall to be identified) and lengths of walls.</li><li>.4 Wall cross-sections showing the supported structures, beam seat configuration, required finished grades, location and slope of surcharge on top of the wall structure and maximum water table elevation behind wall.</li><li>.5 Design Codes.</li><li>.6 Traffic Surcharge (kPa).</li><li>.7 The magnitude and location of all loads to be carried by Structure.</li><li>.8 Seismic acceleration coefficient value (a/g).</li><li>.9 Internal angle of friction for the backfill material (minimum 34 degrees), backfill behind the reinforced soil zone (30 degrees) and foundation material under backfill (30 degrees).</li><li>.10 Unit mass (t/m<sup>3</sup>) for the backfill and backfill behind the reinforced soil zone.</li><li>.11 The allowable bearing capacity of the foundation soil under the backfill.</li><li>.12 The total and differential settlement.</li><li>.13 All information on the stability of the foundation soils if slope stability is a concern.</li></ul> |
-

- |                          |    |          |
|--------------------------|----|----------|
| <u>2.2 PRECAST UNITS</u> | .3 | (Cont'd) |
| <u>(Cont'd)</u>          |    |          |
- .14 Details of all joints and connections to other structures.
  - .15 A statement that bearing resistance, internal stability and external stability are satisfactory
  - .16 Service life for the structure to be 75 years.

- |                     |    |  |
|---------------------|----|--|
| <u>2.3 BACKFILL</u> | .1 | Backfill: selected backfill material as specified in Section 31 23 10. |
|---------------------|----|--|

PART 3 - EXECUTION

- |   |    |  |
|---|----|--|
| <u>3.1 MANUFACTURER'S RECOMMENDATIONS</u> | .1 | Install precast culvert units in accordance with manufacturer's's recommendations. Manufacturer's representative is to visit site to verify Contractor's installation methods. |
|---|----|--|

- |                    |    |  |
|--------------------|----|--|
| <u>3.2 FOOTING</u> | .1 | Obtain Departmental Representative's acceptance of footing prior to placing precast culvert units. |
|--------------------|----|--|
- .2 Place fibreboard bearing strip under precast culvert units.
  - .3 Use temporary measures to hold precast unit in place during installation. Grout bearing seat area at foot of precast units when temporary support no longer required.
  - .4 Connect precast units together in accordance with manufacturer's recommendations.
  - .5 Joints between units to be waterproofed.

- |                                  |    |  |
|----------------------------------|----|--|
| <u>3.3 PLACING CULVERT UNITS</u> | .1 | Begin at downstream end of culvert with first culvert section. |
|----------------------------------|----|--|
- .2 Ensure leg of each unit is in contact with footing throughout its length.
  - .3 Do not allow water to flow through culvert during construction except as permitted by Departmental Representative
-

3.4 BACKFILLING .1 Backfilling: as specified in Section 31 23 10.

3.5 RIP RAP .1 Provide hand placed rip rap and armour stone  
AND ARMOUR STONE carefully around the culvert structure, as specified  
in Section 31 23 10 and as shown on the drawings.

.2 Ensure backfilling procedure and temporary roadway  
locations are in accordance with design calculations.