

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Materials and installation for concrete open span culverts and accessories.
<u>1.2 RELATED SECTIONS</u>	.1	Section 01 33 00 - Submittal Procedures.
	.2	Section 03 30 00 - Cast-In-Place Concrete.
	.3	Section 03 41 00 - Precast Structural Concrete.
	.4	Section 31 05 16 - Aggregate Materials.
	.5	Section 31 23 33.01 - Excavating, Trenching and Backfilling.
	.6	Section 31 24 13 - Temporary Roadway Embankment.
<u>1.3 REFERENCES</u>	.1	American Society for Testing and Materials International, (ASTM) .1 ASTM C1433-136, Standard Specification for Precast Reinforced Concrete Box Section for Culverts, Storm Drains and Sewers. .2 ASTM C877-08 External Sealing Bands for Concrete Pipe, Manholes and Pre-Cast Box Sections. .3 ASTM C 117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregate by Washing. .4 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. .5 ASTM C 144-11, Standard Specification for Aggregate for Masonry Mortar. .6 ASTM D 698-12, Standard Test Method 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-8.2-M88, Sieves, Testing, Woven Wire, Metric.

- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-S6 Canadian Highway Bridge Design Code.

1.4 DESIGN CRITERIA

- .1 Live Loading: CL-625 Truck.
- .2 Design unit weight of soil of 22 kN/m3.
- .3 Span (bottom): as indicated. Rise: as indicated.
- .4 Seismic acceleration ratio = 0.10g.
- .5 Design height of cover as indicated, considering both finished road grade and temporary travel grades.

1.5 SUBMITTALS

- .1 Submittals to be in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative at least 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 4 weeks prior to beginning Work. Refer to Section 03 41 00 - Precast Structural Concrete.
- .4 Certification to be marked on culvert.
- .5 Shop drawings in accordance with Section 03 41 00 - Precast Structural Concrete.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Manufacturer's written instruction and Section 01 61 00 - Common Product Requirements.
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1.7 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .5 Divert unused concrete materials from landfill facility as approved by Departmental Representative.
- .6 Divert unused aggregate materials from landfill to quarry facility for reuse as approved by Departmental Representative.
- .7 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 CONCRETE OPEN
SPAN CULVERTS

- .1 Reinforced concrete culverts: to Section 03 41 00 - Precast Structural Concrete.
- .2 Span (bottom): as indicated.
- .3 Rise: as indicated.

2.2 FOUNDATION
BEDDING AND
BACKFILL

- .1 Concrete mixes and materials for foundation bedding, cradles, encasement, supports to Section 03 30 00 - Cast-in-Place Concrete.
 - .2 Granular bedding and backfill material to Section 31 05 16 - Aggregate Materials and Section 31 23 33.01 - Excavating, Trenching and Backfilling, as follows:
 - .1 Clean Rock Fill
 - .2 Fill Against Structure
 - .3 Unshrinkable Fill
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| <u>2.3 WING WALLS</u> | .1 | Precast wingwalls: to Section 03 41 00 -
Precast Structural Concrete. |
| | .2 | Required geometry: as indicated. |

PART 3 - EXECUTION

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| <u>3.1 EXCAVATION</u> | .1 | Do excavation Work in accordance with
Section 31 23 33.01 - Excavating Trenching
and Backfilling. |
| | .2 | Obtain Departmental Representative's
approval of excavation extents and depth
prior to placing foundation or culvert. |
| | .3 | Dewater excavation, as necessary, to allow
placement of culvert in dry condition. |

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| <u>3.2 FOUNDATION</u> | .1 | Connect or anchor culvert and wingwalls to
cast-in-place concrete foundation in
accordance with manufacturer's instructions. |
| | .2 | Footings to be founded on competent bearing
stratum consisting of dry base of compact to
dense glacial till or bedrock. Footings to
be underlain directly by layer of Clean
Rock Fill in accordance with Section 31 23
33.01 - Excavating, Trenching and
Backfilling. |
| | .3 | Bearing stratum to be inspected by
professional geotechnical engineer
designated by Departmental Representative,
as required. |
| | .4 | Shape bedding to fit footing or lower
segment of culvert exterior, free from sags
or high points. |
| | .5 | Place Clean Rock Fill on a firm, dry base,
in lifts not exceeding 300 mm and compacted
to a minimum of 100% of Maximum Dry Density
in accordance with ASTM D698. |
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- 3.3 LAYING CONCRETE
BOX AND ARCH CULVERT
- .1 Begin at downstream end of culvert with flanged end of first culvert section facing upstream.
 - .2 Ensure bottom of each section is in contact with foundation throughout its length.
 - .3 Do not allow water to flow through culverts during construction except as permitted by Departmental Representative.

- 3.4 JOINTS:
CONCRETE CULVERTS
- .1 Units joined in accordance with manufacturer's shop drawings.
 - .2 Supply and place non-shrink grout in the footing key way in accordance with manufacturer's instructions.
 - .3 Seal joints: apply primer and membrane in accordance with manufacturer's instructions.

- 3.5 BACKFILLING
- .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
 - .2 Place Fill Against Structure, as approved by Departmental Representative, in 200 mm compacted thickness 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% of Standard Proctor Maximum Dry Density to ASTM D 698.
 - .4 Place backfill in unfrozen condition.