



**CITY OF
SWIFT CURRENT**
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**SECTION 08040
CULVERTS**

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1 GENERAL

1.1 DESCRIPTION

- 1.1.1 This section includes the supply and installation of culverts within areas required by the City.
- 1.1.2 The Contractor shall provide all labour, products and equipment required for the work, including but not limited to:
- culvert Installation
 - bedding under and over pipe

1.2 DEFINITION

- 1.2.1 **Culvert:** means a galvanized corrugated steel pipes acting as drainage conduits to conduct the flow of surface drainage water.

1.3 TERMINOLOGY

- 1.3.1 **CSP:** means Corrugated Steel Pipe.
- 1.3.2 **CSP Arch:** means Corrugated Steel Pipe Arch.
- 1.3.3 **SPCSP:** means Structural Plate Corrugated Steel Pipe

1.4 REFERENCES

- 1.4.1 The latest version of the publications listed below form part of this Specification to the extent specified in this Section:
- 1.4.2 CSA Standard G401
- 1.4.3 Corrugated Steel Pipe Institute (CSPI):
- 1.4.4 501-78 Metric Specification for Corrugated Steel Pipe Products.

1.5 RELATED SECTIONS

- 08000 Trenching and Backfilling for Utilities

1.6 INSPECTION AND TESTING

- 1.6.1 Supply, fabricate, and install CSP culverts strictly in accordance with manufacturer's instructions and recommendations and as specified.

2 PRODUCTS

2.1 PRODUCT DELIVERY AND HANDLING

- 2.1.1 Deliver to site, handle, and store pipes, sections, fittings, and hardware in a manner to prevent distortion or bending and damage to metal or galvanized coating.

2.2 MATERIALS

- 2.2.1 Culvert pipe shall be galvanized corrugated steel pipe complying with CSA Standard G401.
- 2.2.2 Culvert pipes up to 600 mm diameter shall have a wall thickness of 1.6 mm and larger pipe up to and including 900 mm diameter, shall have minimum 2.0 mm wall thickness.
- 2.2.3 Specified wall thicknesses shall not include the thickness of galvanized coating.
- 2.2.4 The zinc coating mass shall be not less than 1100 g/m² when tested by the single spot test.
- 2.2.5 Corrugation profile for the pipes shall be 68 x 13 mm.
- 2.2.6 End sections (square or beveled as indicated), couplers, fittings and hardware shall match the culvert pipe.

3 EXECUTION

3.1 TRENCHING AND EXCAVATION

- 3.1.1 Trench shall be properly drained and free of unsuitable material prior to placing and compaction of bedding material.
- 3.1.2 The excavation for the culvert base shall be carried to a depth of not less than 150 mm below the invert grade, as established by the City and shall be of sufficient width to permit pipe assembly and to accommodate operation of compaction equipment on either side of the culvert.

3.2 CULVERT BEDDING

- 3.2.1 Place minimum 150 mm thick layer of compacted granular material on bottom of excavation. Place material in uniform layers not exceeding 150 mm thickness, and compact each layer to at least 95% Standard Proctor Density before placing succeeding layer. Any soft and yielding or other unsuitable material below this level shall be removed to the depth required by the City and backfilled with approved granular material compacted to a uniform density of 95% of Standard Proctor Density throughout the entire length of the culvert.
- 3.2.2 The base for culverts installed along main water courses or through yielding areas shall consist of gravel bedding compacted to the excavated depth and extending over a width of three (3) times the diameter of the pipe. The depth of this base shall be not less than 300 mm. An impervious compacted bedding material shall be provided for a minimum length of 3 m or three (3) times the diameter of the pipe, whichever is greater, at the inlet end of the culvert to achieve a seal against seepage.
- 3.2.3 Trench line and grade requires the City's approval prior to placing bedding material or pipe.
- 3.2.4 Do not backfill until pipe grade and alignment are checked and accepted by the City.

3.3 LAYING CORRUGATED STEEL PIPE CULVERTS

- 3.3.1 Commence pipe placing at downstream end on the prepared granular bedding with separated sections securely joined together by means of a coupling band.
- 3.3.2 The couplers are to match thickness and corrugations of the pipe.
- 3.3.3 Corrugations of pipes and couplers must mate before tightening and joints shall be tapped with a mallet during tightening to ensure proper seating of couplers.
- 3.3.4 Do not allow water to flow through pipes during construction except as permitted by the City.
- 3.3.5 All culverts shall be laid so that the horizontal seams fall at the sides of the culverts.
- 3.3.6 The pipe shall be laid true to line and grade as established by the City and the pipe shall be carefully handled to prevent damage to the galvanized coating. Damaged pipe sections shall be immediately reported to the City and repaired and replaced according to his direction. Damaged protective coating shall receive two coats of zinc rich paint.
- 3.3.7 Centreline of culvert shall not vary from the designated horizontal alignment by more than 75 mm. Invert grade shall not vary from the designated invert grade elevation by more than 12 mm provided positive flow is maintained.
- 3.3.8 All culverts shall be installed in accordance with the manufacturer's recommendations.
 - In high density residential developments, all culverts shall be installed with bevelled end sections on both the inlet and outlet sides, with the invert extended to the toe of the side slope.

3.4 CULVERT BACKFILL

- 3.4.1 After assembly of the culvert on the bedding, the culvert shall be backfilled with approved granular and random backfill. Backfill shall be brought up on both sides of the culvert simultaneously in 150mm lifts and shall be compacted with a method approved by the City to a minimum density of 98% Standard Proctor.
- 3.4.2 The backfill shall be spread and compacted in 150 mm layers and special care shall be taken to ensure proper filling and compacting under the haunches and within the culvert corrugations. Heavy equipment shall not be allowed over the culvert until a minimum of 0.5 m of fill is obtained above the crown of the pipe.
- 3.4.3 All culverts, except those in industrial developments, shall be installed to provide a minimum depth of cover of 300 mm or one-half the culverts diameter, whichever is greater. This should be measured from the finished shoulder grade of the roadway to the top of the culvert as shown on the Standard Detail Drawing. Installation. Culverts in industrial developments shall be installed to provide a minimum depth of cover of 500 mm or one-half the culverts diameter, whichever is greater, as measured from the finished shoulder grade of the roadway to the top of the culvert.

3.5 ROCK RIP – RAP

- 3.5.1 The ends of the culvert shall be finished with the placement of rock rip–rap as shown in the detailed sketches.
- 3.5.2 Rip-rap shall be placed around the inlet and outlet of each culvert, with the rip-rap extending a minimum of 1.0 metre beyond the ends of the culvert. Rip-rap material shall consist of rock ranging in size from 150 mm to 350 mm with 50 % of the rock material being larger than 200 mm. A typical rip-rap installation is illustrated in the Standard Detail Drawing.

3.6 ADJUSTMENT AND CLEANING

- 3.6.1 Inlet and outlet ends and waterway through the pipe shall be kept free from debris or foreign matter, to prevent restriction to flow of water through the culvert.

3.7 JOB CONDITIONS

- 3.7.1 Protect CSP pipes before, during and after installation and protect installed work and materials.
- 3.7.2 In the event of damage, make repairs or replacements necessary to the City's approval.

4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- 4.1.1 Removal and disposal of culverts will be measured in meters. Measurements will be taken along the invert, including sloped ends, wing walls, or end sections, parallel to the barrel of the culvert.
- 4.1.2 Measurement for culvert installation will be based on as-built drawings, or actual field measurements.

4.2 PAYMENT

- 4.2.1 Payment for culverts, remove and dispose will be at the contract unit price per meter. The unit price will be full compensation for removing and dismantling, cutting, cleaning, hauling, disposing of the culvert materials, and restoring and levelling the ground surface with compacted material.
- 4.2.2 Payment for the culvert installation will be made at the unit price specified in the contract and the correlating measurement.

END OF SECTION