

54.9 CULVERT INSTALLATION

54.9.1 GENERAL

The Work consists of installing new or salvaged culverts less than 1500 mm in diameter of various sizes and types, including preparing the culvert base and placing granular and/or soil backfill.

54.9.2 MATERIALS

When installing new culverts, the Contractor shall supply culverts material in accordance with Specification 54.7, Supply Culvert Pipe and Couplers.

When required, the Contractor shall supply and produce granular material in accordance with Specification 55.4, Supply of Aggregate and Specification 55.3, Aggregate Production and Stockpiling, for the designation and class of material specified.

54.9.3 EQUIPMENT

The Contractor shall supply all equipment necessary to complete the Work.

54.9.4 PROCEDURE

54.9.4.1 General

All Work shall be performed during daylight hours only. No Work shall be performed when the visibility is less than 700 metres.

Traffic control and signing shall be performed in accordance with Specification 55.1, Traffic Accommodation and Temporary Signing.

54.9.4.2 Excavation and Preparation of Base

Excavation for the culvert base shall be to a depth of not less than 0.3 m below the culvert invert elevation, as established by the Engineer, and shall be of sufficient width to permit assembly of the pipe and the operation of compaction equipment on either side of the pipe. All soft, yielding, or unsuitable material at this level shall be removed to a depth as directed by the Engineer and replaced with granular or other acceptable material to provide a firm foundation of uniform density throughout the entire length of the pipe.

On completion of excavation for the culvert base and the removal and replacement of any soft, yielding or unsuitable material, the Contractor shall compact the exposed surface to a uniform density. The Contractor shall then construct and thoroughly compact the culvert bed to the established elevation using granular or other material acceptable to the Engineer. The width of the culvert bed shall be 3 times the culvert diameter.

When the culvert installation is in rock, excavation for the culvert base shall be carried out to a depth of not less than 0.2 m below the invert grade. The width of the culvert bed shall be a minimum of 1.5 times the diameter of the pipe.

Where gravel bedding or backfill is used, impervious, compacted clay cut-offs shall be constructed at both ends of the culvert as shown in drawing CB6-2.4 M1.

54.9.4.3 Installation

54.9.4.3.1 General

The culvert shall be installed on the prepared base, true to the elevations lines and grades established by the Engineer. Separate sections shall be securely joined together in accordance with the manufacturer's specifications. Coupler bands shall be used for metal and polyethylene pipe.

The Contractor shall use due care when installing pipe to avoid damaging the pipe. Damaged pipe shall be removed and replaced by the Contractor at his expense.

54.9.4.3.2 Installation of Corrugated Metal Pipe and Pipe Arches

When required, elbows shall be installed to accommodate sharp changes in gradient or direction of the pipe. Pipe shall be carefully handled to prevent damage to the protective coating. Any damage to coatings shall be repaired by the Contractor at his own expense in accordance with CAN 3-G401.

54.9.4.3.3 Installation of Corrugated Polyethylene Pipe

Using a template, the Contractor shall shape the culvert bed to the curvature of the pipe to a depth of 75 mm.

Blocking shall not be used to bring the pipe to grade. Temporary hold-downs shall be used to maintain the position of the pipe during installation.

Sections of pipe with a minimum length of 6 m shall be used on each end of each culvert.

54.9.4.3.4 Installation of Downdrains

When required, downdrain pipes shall be installed as shown in the drawings, at the locations as shown on the plans or designated by the Engineer. A trench shall be excavated to the established depth and grade required for the installation of the downdrain pipe and connecting elbows, and its bottom surface shall provide a uniform, firm foundation throughout the length of the installation, with sufficient width to permit satisfactory jointing and thorough compaction of the backfill material around the pipe.

54.9.4.3.5 Extension of Existing Culverts

Extensions to existing culverts will be considered new installations. Where an existing culvert is to be extended, the removal, salvage and reinstallation of the existing sloped end sections may be required, as shown in the drawings or as directed by the Engineer.

Where the existing pipe was manufactured to imperial dimensions and the new pipe is manufactured to metric dimensions resulting in a mismatch at the joint, the Contractor shall couple and caulk the joint with oakum to obtain a secure joint.

54.9.4.4 Backfilling

54.9.4.4.1 General

Backfill under the haunches and immediately adjacent to the pipe, extending from the culvert base up to an elevation of 30 percent of the vertical height of the pipe, shall be comprised of select granular or soil material, as directed by the Engineer. Backfill immediately adjacent to the pipe above this level shall be comprised of select soil material. All backfill material shall be free of frozen lumps and organic material. Backfill within 300 mm of the pipe wall shall be free of stones larger than 80 mm in diameter.

All backfill material shall be placed in layers not exceeding 0.15 m in depth. Each layer shall be thoroughly compacted at optimum moisture content by means of pneumatic or other mechanical tamping equipment. Backfill and compaction layers shall be brought up simultaneously and evenly on both sides of the pipe, filling all corrugations and ensuring firm contact with the entire bottom surface of the pipe. This compaction procedure shall be continued until the backfill reaches a minimum elevation of 0.3 m above the top of the pipe, or greater if necessary to carry the weight of construction equipment without damage to the pipe.

Backfilling of the remainder of the culvert excavation, beyond the immediate region of the pipe, shall be carried out in accordance with applicable specifications.

54.9.4.4.2 Backfilling Corrugated Polyethylene Pipe

The minimum height of fill above the top of the pipe shall be 0.6 m.

When saw cutting of sloped ends is required by the Engineer, it shall be performed immediately after backfill is completed.

54.9.5 TIME TO COMPLETE

In urgent situations, the Contractor shall complete the Work within 14 calendar days of the issuance of the Work Order. In all other cases, the Contractor shall complete the Work within 60 calendar days of the issuance of the Work Order.

54.9.6 MEASUREMENT AND PAYMENT

Measurement will be in metres based on the total invert length of pipe installed, including elbows and end sections.

Payment will be made at the applicable unit price bid per metre for "Culvert Installation" for the various types and sizes of culverts specified. This payment will be full compensation for installing the pipe, traffic accommodation and signing, and all labour, equipment, tools and incidentals necessary to complete the Work.

Payment for the culvert base and structural backfill will be made in accordance with Specification 53.2, Pit-Run, or Specification 53.3, Granular Base Course, and/or Specification 53.1, Excavation and Backfill.

Payment for excavation will be made in accordance with Specification 53.1, Excavation and Backfill.

Payment for supplying the culvert pipe will be made in accordance with Specification 54.7, Supply Culvert Pipe and Couplers.

In urgent situations where the Contractor is required to complete the Work within 14 calendar days of the issuance of the Work Order, an additional payment will be made at the unit price bid per occurrence for "Culvert Installation - Premium". This payment will be full compensation for complying with the accelerated scheduling required to complete the Work.

54.9.6.1 WARRANTY

The warranty period for this Work shall be 1 year.