



## **5005 - SPECIFICATION FOR INSTALLING PIPE CULVERTS BY TUNNELLING**

### **5005 - 1 DESCRIPTION**

- 1.01 The work shall consist of corrugated metal pipe culverts or reinforced concrete pipe culverts installed by tunnelling at locations and in conformity with the lines and grades shown on the plans or designated by the Engineer.
- 1.02 The work shall include installing all types and sizes of corrugated metal pipe and reinforced concrete pipe culverts but does not include the installation of steel liner plate.

### **5005 - 2 MATERIALS**

- 2.01 The Department will supply and pay for the culvert material including couplers, gaskets and other jointing material .
- 2.02 The Contractor shall supply all cement mortar and grout material. Cement mortar shall consist of one part by volume of Portland cement and two parts clean sharp sand with sufficient water to produce a stiff mix. Grout material shall consist of one part by volume of Portland cement and three parts clean sharp sand with sufficient water to produce a stiff mix. Bentonite slurry may be added to the grout if required.
- 2.03 The Contractor shall supply all forming, bracing, sheathing and shoring material and grouting nipples.
- 2.04 Granular materials used for foundations and backfills shall conform to the requirements for Granular Backfill (Specification 6600).

### **5005 - 3 CONSTRUCTION**

#### **General**

- 3.01 The Contractor shall repair or replace, at no expense to the Department, any culvert materials damaged by his operations.
- 3.02 The culvert installation shall be carried out in such a manner that damage or settlement will not occur to the roadway pavement structure and surface.
- 3.03 The location and invert elevations for the culvert will be staked by the Engineer.
- 3.04 The installed culvert shall provide positive drainage and at any one point shall not deviate by more than 80 millimetres from the specified alignment and grade.

#### **Excavation and Backfilling**

- 3.05 The tunnel excavation shall be by a boring or coring machine or by hand excavation combined with jacking the culvert pipe into the excavated tunnel.

- 3.06 The excavated tunnel opening shall fit closely the outside shape of the culvert pipe and shall allow no more than an 80 millimetre spacing between the pipe and the outside wall.
- 3.07 The Contractor shall during construction, keep all holes, trenches and tunnels free from water by pumping, bailing or other methods approved by the Engineer. If required, the Contractor shall use temporary bulkhead casing pipe or other methods approved by the Engineer, to prevent the flow of ground water or the caving in of soil material into the tunnel excavation and to maintain the insitu density of the subsoil about the tunnel excavation. The installing of bulkhead casing pipe will be considered as Extra Work.
- 3.08 If required for the safety of workers, and a form of ventilation shall be required to replace the air inside the tunnel.
- 3.09 Excavation trenches or holes made in the embankment sideslope shall be no closer than one metre from the roadway shoulder. Sufficient bracing, sheathing or shoring shall be provided to prevent the sides of the trench or hole from falling, sliding or caving in.
- 3.10 Unless otherwise specified, excavated materials shall be used for trench or hole backfill.
- 3.11 The pipe culverts outside the tunnel shall be backfilled in accordance with Standard Plan 22130 (Backfilling Pipe Culverts Embankment Density Not Specified).
- 3.12 Granular backfill shall be placed under and around the pipe culverts outside the tunnel in accordance with the requirements for Granular Backfill (Specification 6600).
- 3.13 The embankment sideslope shall be levelled and trimmed to its original slope. Excess or unsuitable material shall be disposed of as designated by the Engineer.
- 3.14 Explosives shall not be used for tunnel excavation without prior approval of the Engineer.

#### **Assembling and Jacking Culverts**

- 3.15 The pipe culverts shall be jacked or drawn in a smooth operation across the roadway along the required alignment and grade using adequate pressure starting at the downstream end.
- 3.16 The pressure shall not be too great to cause buckling of steel culverts or spalling of ends or cracking of walls of concrete culverts.
- 3.17 The pressure shall be applied concentrically and uniformly over the ends of the pipes. When jacking a pipe, a piece of plywood or some other material acceptable to the Engineer shall be used to protect the pipe end and to distribute the jacking or drawing pressure uniformly around the pipe.
- 3.18 Corrugated metal pipe culverts shall be placed with the inside circumferential laps pointing downstream and with the longitudinal laps at the sides or quarter points. The sections of the culvert shall be firmly joined with coupling bands. Joints shall be as tight as possible.
- 3.19 If the movement of the culvert meets with unusual resistance, the jacking or drawing operation shall be stopped and the resistance determined and nullified before further jacking or drawing is attempted.

#### **5005 - 4 MEASUREMENT**

- 4.01 Culverts will be measured in metres. Measurements to determine the length of installed culvert will be taken along the invert, including culvert extensions and sloped end and end sections, parallel to the barrel of the culvert.

#### **5005 - 5 PAYMENT**

- 5.01 Payment for INSTALLING CORRUGATED METAL PIPE CULVERTS BY TUNNELLING, INSTALLING CORRUGATED METAL PIPE ARCH CULVERTS BY TUNNELLING and INSTALLING REINFORCED CONCRETE PIPE CULVERTS BY TUNNELLING, will be at the contract unit price per metre for the size specified in the tender form. The unit price will be full compensation for unloading, storing, handling and hauling culvert materials; excavating the tunnel; excavating and shoring working areas at the end of the culvert; assembling and jacking or drawing the culvert into place including the installation of gaskets; preparing the culvert bed; installing and removing grouting nipples, grouting between the soil and pipe culvert; backfilling the culvert; backfilling and trimming excavated areas and disposing of excavated materials.
- 5.02 Payment for granular backfill will be in accordance with the requirements for Granular Backfill (Specification 6600).