54.9 SUPPLY AND INSTALLATION OF CULVERTS

54.9.1 GENERAL

The Work consists of excavating existing material to proper elevation and 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 the new culvert material in accordance with the Alberta Transportation Recognized Products list. The Engineer will determine the type, size, wall thickness and required coatings for the culvert and will indicate this information on the Work Order.

When required, the Contractor shall supply 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 and asphalt concrete pavement material in accordance with Specification 53.11, Production of Asphalt Concrete Pavement Material.

54.9.3 PROCEDURES

54.9.3.1 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.

54.9.3.2 Installation

54.9.3.2.1 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.

54.9.3.2.2 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.

54.9.3.2.3 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.

54.9.3.2.4 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.

54.9.3.2.5 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.

54.9.3.3 Backfilling

54.9.3.3.1 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.

54.9.3.3.2 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.

54.9.4 ACCEPTANCE CRITERIA

To be acceptable, the Work shall comply with the following:

- Drainage through the culvert is in the correct direction.
- The surface is left at design slope, with no excess spoil. The work area is cleaned up to remove obstructions and prevent erosion damage.
- Backfill is properly compacted so that there will be no significant settling.
- Surplus pieces of culvert are removed from the worksite.

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

54.9.6.1 Supply and Installation of Culverts

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

Payment will be made at the applicable unit price bid per metre for "Culverts - Install" for the various sizes of culverts specified. This payment will be full compensation for installing the type of pipe required by the Engineer, and all labour, equipment, tools and incidentals necessary to complete the Work.

Payment for supplying the culvert pipe will be made as Extra Work in accordance with Specification 51.2, General (For Maintenance Work).

54.9.6.2 Excavation and Backfill for Installation of Culverts

Measurement will be in cubic metres of the volume of the excavation required to install the culvert. If an existing culvert is being removed, the volume of the existing pipe will be subtracted from the volume of the excavation.

Payment will be made at the unit price bid per cubic metre for "Culverts - Excavation and Backfill". This payment will be full compensation for excavating to the extent necessary to install the culvert, salvaging or disposing of the excavated material and backfilling the installed culvert with salvaged or new material.

If new material is required for backfill, the Contractor shall supply such material suitable to the Engineer. Payment for the supply and haul of new backfill material will be made as Extra Work in accordance with specification 51.2 General (For Maintenance Work).

54.9.6.3 Culverts For Major Roadways

Culverts across primary highways and major intersecting roadways require a culvert base, clay cut-offs and structural backfill. 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. Asphalt concrete pavement material required to restore the structure shall be supplied and paid for in accordance with Specification 53.13, Asphalt Pavement Surface Patching.

54.9.6.4 Reduced Time to Complete

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. If the culvert installation is performed in conjunction with the removal of a culvert under Specification 54.8, Removal of Culverts, only one of the "premium" payments will be paid. (Culvert Installation - Premium or Culvert Removal - Premium)

54.9.6.5 Traffic Control for Centreline Culverts

When a highway centreline culvert is installed, a supplemental payment will be made at the unit price per metre of pipe installed for “Centreline Culvert - Traffic Control”. This payment will be a full compensation for the additional traffic control involved to install the culvert.

54.9.6.6 WARRANTY

The warranty period for this Work shall be 1 year. If, during the warranty period, the backfilled area has settlement to the extent that it becomes a hazard to the public, the Work shall be repaired.