

INDEX FOR
SPECIFICATIONS FOR REMOVING CULVERTS AND PLACING CULVERTS

		<u>Page</u>
400.	1	SCOPE..... 1
400.	2	REMOVING CULVERTS AND TIMBER STRUCTURES
	2.1	Concrete and Metal Pipe Culverts 1
	2.2	Structural Plate Culverts 1
	2.3	Concrete Box Culverts 1
	2.4	Timber Structures 1
	2.5	Excavation..... 1
	2.6	Filling Depressions..... 1
400.	3	SUPPLYING CULVERTS
	3.1	Corrugated Metal Culverts 1
	3.2	Concrete Culverts 2
400.	4	CONSTRUCTION METHOD 2
	4.1	Culvert Foundation and Bedding 2
	4.2	Culvert Gravel for Bedding..... 2
	4.3	Backfilling Haunch Area..... 3
	4.3.1	Mechanical Method..... 3
	4.3.2	Water Jetting Method..... 3
	4.3.3	Compaction to Springline 3
	4.5	Backfill..... 3
	4.6	Trenches 4
400.	5	CLASSIFICATION OF CULVERTS TO BE PLACED..... 4
400.	6	PLACING CULVERTS 4
	6.1	Corrugated Metal Culverts 4
	6.2	Concrete Culverts 4
	6.3	Tie Straps on Concrete Pipe..... 5
	6.4	Extending Existing Culverts 5
	6.5	Through Existing Embankments..... 5
400.	9	METHOD OF MEASUREMENT 5
	9.2	Culvert Length..... 6
	9.3	Culvert Gravel 6
	9.4	Shoo-Fly Detours 6
400.	11	BASIS OF PAYMENT 6
	11.2	Placing Culverts 6
	11.3	Culvert Gravel 6
	11.4	Unsuitable Material 6

SPECIFICATIONS FOR REMOVING CULVERTS AND PLACING CULVERTS

400. 1 SCOPE

These specifications govern all operations necessary for and pertaining to the removal and disposal of existing culverts and other drainage structures, and the placement of culverts as classified herein.

400. 2 REMOVING CULVERTS AND TIMBER STRUCTURES

2.1 Concrete and Metal Pipe Culverts

All culverts removed shall become the property of the Contractor.

2.2 Structural Plate Culverts

Prior to dismantling structural plate culverts, the Contractor shall match mark each plate and prepare a plan for the Engineer showing the relative position of each plate.

Similar plates shall be securely banded together in convenient quantities and stored neatly at a designated location on the right-of-way. The Contractor shall repair or replace any portion of the culvert damaged during removal.

2.3 Concrete Box Culverts

Reinforced concrete box culverts to be removed shall be demolished. Explosives shall not be used for demolition purposes unless permission has been granted by the Engineer. When permission has been granted it will not relieve the Contractor of liability for damage to persons or property resulting from the use of explosives. Broken concrete shall be disposed of in accordance with the requirements for Loose Rock disposal in the Specifications for Grading.

2.4 Timber Structures

Material obtained from removing designated timber structures shall become the property of the Contractor. Material salvaged by the Contractor shall be removed from the right-of-way. Debris and unsalvageable material shall be collected and disposed of by burning or burying. Timber or metal piles shall be cut off at ground level unless otherwise specified by the Engineer.

2.5 Excavation

Excavation required for the removal of culverts and structures will not be paid for directly but will be considered incidental to the applicable unit price for removing culverts or timber structures.

2.6 Filling Depressions

Construction methods for ground preparation and backfilling of depressions resulting from the removal of culverts and timber structures shall be in accordance with the Specifications for Grading. The material used for backfilling depressions will be paid for at the applicable unit price for the type of material used.

400. 3 SUPPLYING CULVERTS

3.1 Corrugated Metal Culverts

The Department will supply the culverts and the supplier shall deliver and unload the culverts at one or more locations on or near the project. The Department will accept and be

responsible for the culverts until the Contractor arrives on the site and receives the culverts into his custody. The Contractor shall store, transport and install metal culverts.

400. 3.2 Concrete Culverts

The Department will supply the culverts and the Supplier shall deliver and unload the culverts at specified locations. The Contractor shall contact the Supplier to arrange for the time of delivery, and shall receive, store and install the concrete culverts.

400. 4 CONSTRUCTION METHOD

The Contractor shall have at least two plate type mechanical compactors on the job site before commencing any culvert installations.

4.1 Culvert Foundation and Bedding

The culvert foundation means the natural soil, underlying the excavation, upon which the culvert bedding or the culvert is to be placed.

The culvert foundation shall be prepared and compacted to the staked gradeline and for a width sufficient to permit compaction of the bedding under the culvert haunches. Unsuitable material from below the staked gradeline shall be removed to an approved depth and replaced with suitable bedding and suitable geotextile if required, to provide uniform continuous support. Supply and installation of the geotextile will be paid for as Extra Work.

The culvert bedding means a layer of selected material, generally culvert gravel, constructed on the culvert foundation so as to uniformly support the culvert. In general, culvert gravel shall be used at through grade installations and under concrete culverts installed at any location.

4.2 Culvert Gravel for Bedding

Culvert gravel shall be well graded and shall consist of sound, durable particles of gravel, stone, sand and fines, free from sod, roots and organic material and shall meet the following gradation requirements:

Passing	37.5	mm		100%
Passing	4.75	mm		25 - 80%
Passing	425	um	(a)	15 - 40% when mechanically compacted
			(b)	5 - 40% when water jetted
Passing	75	um	(a)	6 - 18% when mechanically compacted
			(b)	0 - 8% when water jetted

The shale content shall not exceed 25% by weight of the particles retained on a 4.75 mm sieve.

Culvert gravel for bedding shall be spread uniformly along the full length of the culvert foundation. For metal culverts the bedding shall be constructed so that after compacting, a depth of at least 150 mm of gravel remains under the full length of the culvert. For concrete culverts, the bedding shall be constructed so that after compacting, a depth of at least 100 mm of gravel remains under the full length of the culvert. For concrete culverts, an additional layer of culvert gravel shall then be spread loosely and uncompacted at a uniform depth of 100 mm along the full length of the culvert foundation. After the culvert has been installed and assembled on the loose bedding, the bedding on both sides of the culvert shall be compacted. Culvert bedding shall be compacted at optimum moisture content to a minimum of 95% AASHTO Standard Dry Density. The supply of water for compaction will be considered as an incidental operation to Culvert Gravel.

400. 4.3 Backfilling Haunch Area

Placement and compaction of fill material in the haunch area may be carried out by mechanical methods or by water jetting.

4.3.1 Mechanical Method

Fill material under haunches shall be placed alternately in 150 mm layers on both sides of the pipe to permit thorough compaction. The material under the haunches must be in firm contact with the entire bottom surface of the structure. (Backfill and compaction under haunches is a manual job, consisting of shovel placement, timber rammer or hand held packers).

4.3.2 Water Jetting Method

Water jetting, when approved by the Engineer, may be used as an alternative method for backfilling haunches. Free draining backfill material shall be water jetted.

The water jet pipe shall be 25 mm in diameter, pinched at the outlet end, have a shut off valve and in general be at least one metre long. The operational pressure shall be sufficient so as to produce a horizontal throw of six metres.

Gravel shall be placed uniformly on each side of the culvert at the same time so as to construct and compact at least two uniform lifts of gravel between the bedding and the springline of the culvert.

Each lift shall be water jetted at not more than one-half metre intervals to consolidate the aggregate under the haunches and parallel to the pipe. Water shall be forced into the aggregate until the voids are filled and water is rejected.

No direct payment will be made for water jetting backfill, as this work will be considered incidental to the unit price for placing culverts.

4.3.3 Compaction to Springline

After the haunch area has been backfilled and compacted, additional bedding material shall be placed adjacent to the pipe haunches in lifts not exceeding 150 mm. Each lift shall be compacted with a plate type mechanical compactor. Bedding material shall be placed in this manner up to the level of the springline. Material placed above the springline shall be placed as described in Backfill.

400. 4.5 Backfill

Backfill will mean culvert gravel or selected material used for fill adjacent to and over an assembled culvert. The level of backfill on both sides of the culvert shall be maintained approximately equal at all times to prevent disturbing the culvert. Excavated material or material similar to the roadway embankment should be encouraged as backfill in frost susceptible soils.

Backfill used above the springline of the culvert to the subgrade elevation, shall be culvert gravel or other suitable material. Backfill material other than material excavated from the culvert trench will be paid for at the applicable unit price.

When culvert gravel is not used, material placed under the haunches shall be carefully selected to ensure that it is free of rocks and lumps.

Culverts placed through private access roads shall be backfilled in uniform layers not exceeding 200 mm and compacted.

400. 4.5 Backfill (Cont'd)

Culverts placed at other than through private access roads shall be backfilled in uniform layers not exceeding 150 mm and shall be compacted to a minimum of 95% AASHTO Standard Dry Density. Heavy clay material shall not be used as backfill immediately adjacent to a culvert at these locations. A select material or culvert gravel shall be used.

Backfill shall be placed and compacted in uniform layers until the embankment has been constructed to a sufficient height above the top of the culvert so that normal grading equipment can operate without distorting the culvert. Further filling and compacting shall be performed in accordance with the Specification for Grading.

4.6 Trenches

Trenches, when required, shall be excavated wide enough to allow for compaction on both sides of the culvert. If conditions and safety requirements permit, trench walls shall be vertical to at least the top of the culvert. Excavated material shall be stockpiled not closer than one metre from the edge of the trench.

No direct payment will be made for excavating material from trenches and replacing it as backfill, as the work will be considered incidental to the unit price for Placing Culverts.

400. 5 CLASSIFICATION OF CULVERTS TO BE PLACED

Culverts to be placed will be classified as follows, based on the nominal diameter or span:

Diameter or Span	Metal	Concrete
Less than 800 mm	Group "A"	Group "D"
800 – 1300 mm	Group "B"	Group "E"
Exceeding 1300 mm	Group "C"	Group "F"

All culverts not falling into these categories will be classed as Group "G".

400. 6 PLACING CULVERTS

Culverts shall be placed at the location, grade and alignment as directed by the Engineer.

6.1 Corrugated Metal Culverts

Riveted culverts shall be placed so that horizontal seams are located in the upper half of the culvert with inside circumferential laps pointing in the direction of the flow.

Culvert sections shall be placed so that the coupler corrugations shall properly engage pipe corrugations with the minimum gap between section ends. Coupler bolts shall be fully tightened.

6.2 Concrete Culverts

Concrete culverts shall be placed with the bell or groove on the upstream end of the culvert; the foundation or bed shall be contoured to receive the bells.

Rubber gaskets shall be lubricated and installed on cleaned and lubricated joints in accordance with the specifications of the Manufacturer. Culvert sections shall be joined to form a watertight joint, with an opening not to exceed 20 mm.

Culvert sections shall be secured tightly together until sufficient fill material is tamped in place to prevent the joints from opening.

Culvert sections with lift holes shall be laid so that the lift holes are at the top. The lift holes shall be filled with non-shrink mortar before the culvert is covered.

400. 6.3 Tie Straps on Concrete Pipe

The Contractor shall use galvanized steel tie straps to secure the outer two joints at each end of the culvert installation. The straps shall be anchored at the ten and two o'clock positions on culverts up to 1 050 mm in diameter, and ten, twelve and two o'clock positions on larger culverts. Holes for wedge anchors shall be drilled to appropriate depth and diameter.

Wedge anchor fasteners will be supplied as followed;

Culvert Diameter (mm)	WEDGE ANSHOR FASTENERS				
	DIAM (mm)	Length (mm)	Minimum Drill Hole Depth (mm)	Size of Drill Hole (mm)	No. Required Per Installation
300 – 600	9.5	69	38	9.5	16
750 – 1050	13	95	57	13	16
1200 – 1800	13	95	57	13	24

Tie straps and wedge anchors will be supplied by the Department.

No direct payment will be made for the additional securing of culverts as it will be considered as an incidental operation to Placing Culverts.

6.4 Extending Existing Culverts

Damaged ends of existing metal culverts to be extended shall be straightened or cut off. Damaged sections of existing concrete culverts shall be removed. At least 600 mm existing culvert shall be exposed prior to installation of the extension.

Removing and disposing of damaged ends will be paid for at the unit price for "Removing Metal Pipe Culverts" or "Removing Concrete Pipe Culverts".

Extending existing culverts, including the necessary excavation, preparation and coupling will be paid for at unit price for "Placing Culverts", based on the length of the extension and the applicable Group.

6.5 Through Existing Embankments

When placing culverts through an existing embankment, and the roadway is open to traffic, the Contractor shall construct a shoo-fly detour at each location. At the completion of the installation, the detour shall be removed and the material used in the construction of the embankment.

When the Contract requires a shoo-fly detour it shall be constructed at applicable unit prices. The Contractor shall maintain it. Traffic control devices shall be supplied, installed and maintained by the Contractor. The removal of the detour, if required, will be paid for as "Extra Work".

400. 9 METHOD OF MEASUREMENT

9.1 The length of pipe culvert removed will be determined by linear measurement along its invert.

The number of concrete box culverts, timber structures and structural plate pipe removed will be determined by counting.

400. 9.2 Culvert Length

The length of culvert placed will be determined by linear measurement along its invert excluding any gaps that occur between sections of pipe.

9.3 Culvert Gravel

Depending on the unit shown on the tender bid page, culvert gravel will be measured in tonnes or in cubic metres.

When the aggregate is measured by volume, the rated capacity of the hauling vehicles will be established by the Engineer to the nearest 0.1 m³ using the Department's Vehicle Measurement form. The rated capacity of a vehicle shall not be changed without the consent of the Engineer. Loads will be checked at the point of delivery and, when requested by the Engineer, shall be levelled by the Contractor. No payment will be made for any portion of a load greater than the rated capacity. Deductions will be made in 0.1 m³ units for loads less than the rated capacity.

9.4 Shoo-Fly Detours

Traffic control shoo-fly detours will be measured by counting each installation constructed.

400. 11 BASIS OF PAYMENT

11.1 The unit bid price set forth for:

- a) Removing Metal Pipe Culverts
- b) Removing Structural Plate Culverts
- c) Removing Concrete Pipe Culverts
- d) Removing Concrete Box Culverts
- e) Removing Timber Structures

will be payment in full for performing all work necessary or incidental thereto, as herein described.

11.2 Placing Culverts

The unit price set forth for "Placing Culverts, Group "A", "B "C", "D", "E", "F", or "G" will be payment in full for preparing the foundation and placing the culvert and for performing all work necessary or incidental thereto, as herein described.

11.3 Culvert Gravel

The unit price set forth for "Culvert Gravel", will be payment in full for supplying, loading, hauling, depositing, watering and compacting the gravel and doing all work necessary and incidental thereto, as herein described.

11.4 **Unsuitable Material**

Unsuitable material removed from below the foundation gradeline will be measured and paid for on the basis of "Extra Work".