



Part 1 General

1.1 DESCRIPTION OF WORK

- .1 The word 'culvert' as used in this Section shall include pipe culverts and pipe arches. This work shall consist of the supply and transporting of culverts to the point of construction site installation, performing the necessary excavation, placing the culverts, floodgates (if applicable), and backfilling as set forth in this Section.

1.2 STANDARDS

The following organizations publish Standards which have been referred to in this Section:

- .1 A.S.T.M. - American Society For Testing and Materials
100 Barr Harbor Drive
West Conshohocken PA 19428-2859 U.S.A
- .2 Manitoba Infrastructure and Transportation
215 Garry Street
Winnipeg MB R3C 3Z1

The Standards referred to shall be the most recent edition.

1.3 INSPECTION

- .1 Inspection shall be performed by the Engineer prior to and during backfilling operations.

Part 2 Products

2.1 MATERIAL

- .1 CULVERTS - The Owner shall supply the culverts, couplers and bolts for the work required under this Contract in accordance with Section 024350, Supply of Corrugated Steel Pipe or as shown on the Plans or otherwise specified in Section 01001, Special Provisions.



- .2 COMPACTED COMMON BACKFILL – The material obtained from the excavation or suitable borrow area.
- .3 COMPACTED SELECT GRANULAR BACKFILL – When directed by the Engineer, material meeting the following gradation:

<u>Sieve</u>	<u>% Passing</u>
37.5 mm	100
25 mm	80-100
4.75 mm	40-70
75 um	0 - 15

shall be supplied and hauled by the Contractor, unless otherwise specified in Section 01001, Special Provisions.

Part 3 Execution

3.1 COMPACTION OF BACKFILL

Backfill shall be compacted in the following manner:

- .1 COMPACTED COMMON BACKFILL – shall be placed in 300 mm lifts and compacted to 98% of maximum standard Proctor dry density ASTM D698, at a moisture content between 0.9 and 1.2% of optimum.
- .2 COMPACTED SELECT GRANULAR BACKFILL – shall be placed in 150 mm lifts and compacted to 98% of maximum standard Proctor dry density ASTM D698.

3.2 PROCEDURE

- .1 The Contractor shall transport the culverts with care to avoid damage to the galvanized or bituminous coating. The culverts shall be transported to the point of installation as directed by the Engineer.
- .2 The excavation shall be made to the required depth so that the invert of the pipe is true to the grade staked on the ground by the Engineer. When a trench is required,



the width at the top of the trench shall be sufficient to permit thorough tamping of backfill under the haunches and around the pipe.

- .3 If, in the opinion of the Engineer, the foundation for the pipe, at the grade established, is a soft, spongy, or otherwise unsuitable material, this material shall be excavated to the depth required by the Engineer, and to a width of three times the width of the pipe being installed, or as otherwise directed by the Engineer. Such excavation material shall be disposed of, and replaced with suitable material, as directed by the Engineer.
- .4 Where possible, culverts shall be laid so that the horizontal seams are aligned at the sides with horizontal seams in alternate lengths, placed on alternate sides. Separate sections of pipe shall be butted at the ends and joined with tightly drawn couplers. Fabricated laps on riveted sections shall face the downstream end of the culvert.
- .5 Floodgates, where required, shall be placed in as near a vertical plane as possible.
- .6 Where directed by the Engineer, a 150 mm bedding of compacted select granular backfill shall be placed under the invert of culverts. For culverts less than 900 mm in diameter the foundation shall be shaped to the contour of the pipe and shall be compacted to the satisfaction of the Engineer prior to the placing of the pipe.
- .7 The backfill material shall be placed in the trench in uniform layers and compacted in accordance with Clause 3.1.
- .8 Special care shall be taken to ensure the compaction of material under the haunches of the pipe. If the backfill material is dry, sufficient water shall be added to bring it to its optimum moisture, and tamping shall then be continued until all material under the haunches of the pipe is thoroughly compacted and free from voids.
- .9 Backfill material shall be placed uniformly on each side of the pipe, and at no time shall there be a difference of more than one 150 mm layer of backfill between one side of the pipe and the other.
- .10 Backfilling shall continue in uniform layers up to a minimum of 600 mm above the top of the pipe. If directed by the Engineer, backfilling shall be continued in lifts not exceeding 150 mm up to the elevation of the adjacent grade.
- .11 All materials used in backfilling shall be as approved by the Engineer. Frozen material shall not be permitted to be used as backfill.



3.3 TRAFFIC CONTROL

- .1 The Contractor shall provide warning signage, detours, flag persons and any other device or procedure required in accordance with the latest edition of the Manitoba Infrastructure and Transportation work zone traffic control manual.