



SECTION 728

CORRUGATED POLYVINYL CHLORIDE CULVERT PIPE

728.1 Description. This work shall consist of providing corrugated PVC pipe of the diameter designated, laid upon a firm bed and backfilled as specified.

728.1.1 The contract will specify either the type of pipe or the group of permissible types of pipe. If a group of permissible types is specified, the contractor shall use any of the types listed within the specified group as follows:

Group A	Reinforced Concrete Culvert Pipe Vitrified Clay Culvert and Sewer Pipe
Group B	Reinforced Concrete Culvert Pipe Vitrified Clay Culvert and Sewer Pipe Polymer Coated Corrugated Metal Culvert Pipe Corrugated Aluminum Alloy Culvert Pipe Corrugated Polyethylene Culvert Pipe Corrugated PVC Culvert Pipe Corrugated Aluminum-Coated Steel Culvert Pipe
Group C	Reinforced Concrete Culvert Pipe Vitrified Clay Culvert and Sewer Pipe Polymer Coated Corrugated Metal Culvert Pipe Corrugated Aluminum Alloy Culvert Pipe Corrugated Polyethylene Culvert Pipe Corrugated PVC Culvert Pipe Bituminous Coated Corrugated Metal Culvert Pipe Corrugated Aluminum-Coated Steel Culvert Pipe Corrugated Zinc-Coated Steel Culvert Pipe

728.1.2 If the contract specifies corrugated PVC pipe or if the contract specifies pipe culverts by group and the contractor elects to furnish corrugated PVC pipe, the allowable overfill height shall be in accordance with the plans, unless specified otherwise. Minimum cover will be measured as shown on the plans.

728.1.3 If the contract specifies pipe culverts by group and the contractor elects to furnish metal pipe, the culvert shall be constructed in accordance with [Sec 725](#). If the contractor elects to furnish concrete or vitrified clay pipe, the pipe culvert shall be constructed in accordance with [Sec 726](#). If the contractor elects to furnish corrugated polyethylene pipe, the culvert shall be constructed in accordance with [Sec 730](#).

728.1.4 When Group B and Group C pipe are specified, two pipe diameters will be shown on the plans at those locations. The first dimension will indicate the diameter of pipe that shall be provided if the contractor elects to provide pipe for that location with a corrugated interior wall, and the second dimension provided in parenthesis will indicate the diameter of pipe that shall be provided if the contractor elects to provide pipe for that location with a smooth interior wall. The specified diameters may be the same or different and will be dependent upon the design features for that pipe location. Regardless of which diameter of pipe is

selected for a given location, the pipe flow line shall be maintained at the elevations shown on the plans.

728.1.5 If corrugated PVC pipe is specified in the contract or elected for use by the contractor, none of the corrugated PVC pipe shall be exposed to sunlight after installation. This will require the exposed portion of pipe and pipe end sections to be one of the other pipe material of the group of pipe specified, unless approved otherwise by the engineer. The minimum distance required to protect the corrugated PVC pipe from exposure to sunlight will be one-half of the pipe diameter from the opening. This requirement will be waived when the corrugated PVC pipe is connected to drop inlets, manholes, box culverts or similar structures.

728.1.6 Pipe used for storm sewers may be any pipe listed under Group B pipe, with the following exceptions. All corrugated metal culvert pipes shall be Type IA or Type IR. Sewer pipe placed beneath the paved portion of roadways with average daily traffic greater than 3500 vehicles per day shall be Group A pipe. No other substitutions will be permitted, regardless of what type or group of pipe is specified for storm sewers outside of the paved portion for these roadways.

728.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Metallic-Coated Steel End Sections	1020
Corrugated PVC Pipe	1028
Precast Concrete Flared End Sections	1032

728.3 Construction Requirements.

728.3.1 Handling. All pipe shall be handled to avoid damage. Damaged pipe will be rejected regardless of previous approvals, and shall be replaced or repaired to the satisfaction of the engineer at the contractor's expense.

728.3.2 Laying Pipe.

728.3.2.1 Pipe shall be laid true to lines and grades shown on the plans, with bell ends upstream and with the spigot end entered the full length into the adjacent section of pipe. Any pipe that is not in true alignment or that shows any undue settlement after laying but before the fill is placed, shall be taken up and relaid at the contractor's expense. Camber shall be built into the pipe structure to allow for settlement from fill loads if shown on the plans or directed by the engineer.

728.3.2.2 Joints shall be soil-tight unless specified otherwise. Joints shall be installed such that the connection of pipe sections will form a continuous line free from appreciable irregularities in the flow line. Suitable field joints may be obtained with bell and spigot pipe ends with rubber gaskets meeting ASTM F 477, or double bell couplings.

728.3.3 Bedding & Backfill Material.

728.3.3.1 Backfill material for corrugated PVC pipe shall consist of gravel, sand or sandy silt soil as shown on the plans. Backfill shall be free of organic material or frozen clumps. Backfill for pipe with diameters 15 inches (375 mm) or less shall have a maximum particle size of 3/4 inch (19 mm). Backfill for pipe with diameters greater than 15 inches (375 mm) shall have a maximum particle size of 1 1/2 inches (38 mm).

728.3.3.1.1 Gravel and sand shall consist of a well-graded mixture of stone fragments, gravel and sand and shall be in accordance with AASHTO M 145, Class A1 or A3.

728.3.3.1.2 Sandy silt soil shall consist of non-plastic granular material with silt content higher than that of gravel or sand, and shall be in accordance with AASHTO M 145, Class A2-4 or A2-5.

728.3.3.2 Bedding material for pipe with diameters 15 inches (375 mm) or less shall have a maximum particle size of 3/4 inch (19 mm). Bedding material for pipe with diameters greater than 15 inches (375 mm) shall have a maximum particle size of 1 1/4 inches (30 mm).

728.3.4 Installation.

728.3.4.1 Trench Requirements. The pipe shall be installed in a trench whether installed below grade or in an embankment. The construction sequence shall be as shown on the plans. When pipe is installed in an embankment, the embankment shall be placed and compacted to the required density to a minimum elevation of one foot (300 mm) above the top of pipe before a subtrench is excavated. The bedding shall be placed to the required thickness and grade, taking care to avoid compaction of the bedding under the middle one third of the pipe. The bedding outside the middle one third of the pipe shall be compacted to the required density shown on the plans before placing the pipe. The material under the haunches of the pipe shall be properly compacted.

728.3.4.2 Bedding in Unsuitable Material. If rock is encountered, the bedding depth shall be increased to 6 inches (150 mm) below the bottom of the pipe. If soft, spongy or unstable material is encountered, that material shall be removed and excavated to a minimum depth of 10 inches (250 mm) below the bottom of the pipe, and replaced with a suitable granular material. Payment for removal of unsuitable material and for backfilling will be made in accordance with [Sec 206.6.3](#), unless the unsuitable material is a result of the contractor's operations, in which case the removing and backfilling shall be at the contractor's expense.

728.3.4.3 Backfilling. Backfilling shall be completed as soon as practical. Suitable backfill material free from large lumps, clods or rocks shall be placed alongside the pipe and compacted as shown on the plans. The placement of the remainder of the backfill shall be conducted in such a manner as to prevent misalignment of the pipe, and in accordance with [Sec 203](#). Backfill shall be compacted to a minimum of 90 percent standard maximum density or otherwise specified embankment density.

728.3.4.4 Construction Loading. Before heavy construction equipment is operated over the pipe, the contractor shall provide adequate depth and width of compacted backfill or other cover to protect the pipe from damage or displacement. Any damage or displacement shall be repaired or corrected at the contractor's expense.

728.3.4.5 Pipe Plugs. The ends of all pipe stubs for future connections at inlet and manhole structures and of all pipe installed as a portion of future sewers shall be sealed with suitable plugs. The plugs shall be installed in such a manner as to prevent infiltration of dirt into the pipe.

728.3.5 Inspection. The internal diameter of the barrel shall not be reduced by more than 7.5 percent of the pipe's nominal inside diameter when measured no less than 30 days following completion of installation. After the roadway has been completed and before final inspection of the project, the engineer will inspect all pipe locations for proper installation. Any section of pipe found to be improperly installed, shall be replaced or repaired by the contractor at the contractor's expense to the satisfaction of the engineer. Repaired or replaced pipe will be re-inspected by the engineer. The contractor shall provide equipment and

assistance as deemed necessary by the engineer to perform any testing. Pipe deflections will be determined by the engineer by having the contractor pushing or pulling a mandrel through the pipe, or verifying deflections by other methods approved by the engineer. Mandrels used for deflection testing may have either fixed or adjustable arms, but shall be approved by the engineer prior to use. The following will constitute improper installation:

- (a) If any horizontal or vertical alignment is in excess of 15 percent from plan alignment, will restrict flow or will cause excessive ponding within the pipe.
- (b) Any section of pipe with deflections greater than 7.5 percent, based upon the units of measurement used in fabricating the pipe.
- (c) If settlement is greater than one inch (25 mm) at 5 percent or more joints.
- (d) The pipe shows evidence of being crushed or buckled at any location.
- (e) The pipe shows evidence of joint separation.

728.4 Method of Measurement. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. When two different diameters of pipe are shown on the plans for a given location for Group B or Group C pipe, the quantity of pipe installed will be based on the plan quantity for the larger diameter pipe and will not be considered an appreciable error in the contract quantity if the smaller allowed diameter pipe is used. Where required, measurement of corrugated PVC pipe, complete in place, will be made to the nearest foot (0.5 m) along the geometrical center of the pipe. Measurement will include any other pipe used to protect the corrugated PVC pipe from exposure to sunlight. The revision or correction will be computed and added to or deducted from the contract quantity.

728.5 Basis of Payment.

728.5.1 The accepted quantities of pipe, complete in place, including all necessary tees, bends, wyes, cutting and joining new pipe to existing pipe, unless otherwise specified, will be paid for at the contract unit price for each of the pay items included in the contract. When two different diameters of pipe are shown on the plans for a given location for Group B or Group C pipe, the contract unit price for the larger diameter pipe will be used for payment purposes.

728.5.2 Unless specified otherwise, no direct payment will be made for the following:

- (a) Material or work required for placing couplings on exposed ends of the pipe.
- (b) Any required backfilling, except as specified in [Sec 206.6.3](#).
- (c) Construction of bedding or for bedding material.
- (d) Trench excavation and backfilling, except when Class 3 Excavation is specified in the contract documents for a given pipe location. When specified, payment for Class 3 Excavation will be made in accordance with [Sec 206](#).
- (e) Furnishing and installing plugs.
- (f) Work or equipment to perform deflection testing.