

ITEM 31
CONCRETE PIPE
FOR
STORM SEWERS AND CULVERTS

31.01 SCOPE OF WORK

(a) This item shall consist of concrete pipe of the types, classes, sizes and dimensions required on the Plans and Profiles, or by the Engineer, in accordance with these Specifications and in conformity with the lines and grades given.

(b) The items shall include in the bid price per linear foot of pipe complete-in-place, the cost of common excavation, stone, backfill, and bedding, the cost of furnishing and installing all trench bracing, all fittings required to complete the drain as shown on the Plans, and the material for and the making of all joints, including all connections to existing drainage pipes and structures.

31.02 MATERIALS

The pipe shall be of the type called for on the Plans or in the Bid Schedule, and shall be in accordance with the following appropriate requirements. When the Plans or the Bid Schedule permit a choice of pipe, the Contractor shall indicate in the bid the type proposed to be furnished.

31.03 CONCRETE SEWER PIPE, STANDARD, NON-REINFORCED

Concrete sewer pipe, standard, non-reinforced shall conform to the requirements of AASHTO, "Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe," Serial Designation M 86. Standard strength concrete sewer pipe may be used to provide drainage outside the roadway boundary.

31.04 CONCRETE SEWER PIPE - STANDARD OR REINFORCED

Concrete sewer pipe, standard or reinforced, shall conform to the requirements of AASHTO, "Interim Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe," Serial Designation M 170, "Standard Specification for Reinforced Concrete Arch Culvert Storm Drain, and Sewer Pipe," Serial Designation M 206, and Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe," Serial Designation M 242, and AASHTO M506, M507 AND ASTM C76.

31.05 MORTAR

Mortar for pipe joints and connections to other drainage structures shall be composed of one part, by volume, of Portland Cement and three (3) parts of mortar sand. The Portland Cement shall conform to the requirements of ASTM "Standard Specification for Portland Cement," Serial Designation C 150, Type 1. The sand shall conform to the requirements of AASHTO, "Standard Specification for Aggregate for Masonry Mortar," Serial Designation M 45. Hydrated lime may be added to the mixture of sand and cement in an amount equal to fifteen percent (15%) of the weight of cement used.

31.06 CONCRETE

Concrete for pipe cradles shall be Class "A" in accordance with Item 3 of these Specifications.

31.07 EQUIPMENT-CONSTRUCTION METHOD

(a) All equipment necessary and required for the proper construction of storm sewers, and culverts shall be on the project, in first-class working condition, and shall have been approved by the Engineer before construction is permitted to start.

(b) The Contractor shall provide hoisting equipment to handle the pipe in unloading and placing it in its final position, without damage to the pipe.

(c) The Contractor shall provide such hand tampers and pneumatic tampers to obtain the compaction of the pipe bed and the backfill as specified.

31.08 EXCAVATION

(a) Common excavation shall be in accordance with Item 1, "Common Excavation".

(b) Rock excavation shall be in accordance with Item 2, "Rock Excavation,"

(c) When the rock or non-cushioning material is encountered in trench excavation, a cushion at least four inches (4") thick shall be placed between the rock and the bottom of the pipe. The cushion shall consist of clean sand, crushed stone or equivalent granular material. The cost of furnishing and placing the cushion material shall be included in the bid price per unit of storm sewer. The bottom of the trench shall be excavated to a horizontal section as far as is practicable.

(d) The depth of the sewer shown on the Plans is from the surface grade to the invert of the pipe line. In case the depth of cut is changed from that shown on the Plans, the change shall not exceed six inches (6") without a revision in the contract unit price per linear foot of pipe. However, if the cut is changed more than six inches (6"), compensation or deduction of work involved, whether decreased or increased shall be provided for in a supplemental agreement.

(e) The minimum width of the trench at the top of the pipe, when placed, shall be a width which will permit the proper construction of joints and compaction of backfill around the pipe, but shall be at least equal to the outside diameter of the pipe plus six inches (6") on each side of the pipe. The trench shall be excavated accurately to the established lines so that a six-inch (6") space will exist between the side of the trench and the side of the pipe.

(f) The sides of the trenches shall be vertical, unless otherwise approved by the Engineer. The maximum allowable width of trench shall not exceed twelve inches (12") on each side of the pipe, when placed, unless otherwise approved by the Engineer.

(g) The bed for the pipe shall be so shaped that at least the lower quarter of the pipe shall be in continuous contact with the bottom of the trench. Spaces for the pipe bell shall be excavated accurately to size to clear the bell so that the barrel supports the entire weight of the pipe.

(h) The Contractor shall do such bracing, sheathing, or shoring necessary to perform and protect the excavation, also, as required for safety and to conform to governing laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the completion of the backfill to at least six inches (6") over the top of the pipe. The cost of bracing, sheathing or shoring, and the removal of same, shall be included in the unit price bid per foot for the pipe.

31.09 LAYING AND INSTALLING PIPE

(a) The Contractor shall provide the necessary mason's line and supports to insure installation of the pipe to line and grade, as staked by the Engineer. The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.

(b) The Engineer shall inspect all pipe before it is laid, and reject any section that is damaged by handling or is found to be defective to a degree which would materially affect the function and service of the line.

(c) The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. When bell and spigot pipe is used, the bell shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade.

(d) The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. The pipe shall be protected from water during placing and until the mortar in the joints has thoroughly set.

(e) Pipe shall not be laid on frozen ground.

(f) When placing concrete pipe constructed with elliptical reinforcing, the pipe shall be oriented in accordance with the manufacturer's markings of top or bottom.

(g) The upgrade end of pipe lines not terminating in a structure shall be plugged with a cap or plug approved by the Engineer.

(h) Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and re-laid without extra compensation.

31.10 PIPE JOINTS

Closed joints for storm sewers and for culvert pipe shall be made as follows:

(a) All pipe shall be carefully laid, bell or groove upgrade, with spigot or tongue fully entered into the adjacent hub and true to lines and grades given on Plans.

(b) The joints of the concrete pipe shall be caulked and filled with the specified mortar or butyl mastic conforming to AASHTO M-198. Joints of concrete pipe shall be thoroughly wet before making a mortar joint.

(c) Before succeeding sections of pipe are laid, the lower portions of the bell or groove of the pipe shall be filled on the inside with cement mortar of sufficient thickness to bring the inner surface of the abutting pipes flush and even. After the pipe is laid, the remainder of the joints shall be solidly filled with mortar of sufficient thickness to bring the inner surface of the abutting pipes flush and even. After the pipe is laid and sufficient additional mortar used to form a bead ring around the outside of the joint, the inside of the joint shall be wiped and finished smoothly. After the initial set, the mortar on the outside shall be protected from the air and sun with a cover of thoroughly wetted earth or burlap.

31.11 BACKFILL

(a) Backfilling shall be as shown on the Plans and as specified in Item 1. This backfill material shall be used for bedding the pipe unless otherwise indicated in the Plans.

(b) Backfill material above the pipe shall be deposited in lifts tamped uniformly to six-inches (6").

31.12 CONNECTIONS

(a) Where the Plans call for connections to existing or proposed structures, these connections shall be water tight and so made that smooth flow lines will be obtained throughout the drainage system.

(b) After all work is completed, the Contractor shall remove all of his/her tools and other equipment used, leaving the entire site free, clear, and in good condition.

(c) Performance of the work described in this section is not payable directly, but shall be considered as a subsidiary obligation of the Contractor covered under the contract unit price for the pipe.

31.13 INSPECTION

Prior to final approval of the drainage system, the Engineer, accompanied by the Contractor's representative, shall make a thorough inspection, by an appropriate method, of the entire installation. Any indication of defects in material or construction technique in the pipe system shall be further investigated and corrected by the Contractor without additional compensation, and as directed by the Engineer.

31.14 METHOD OF MEASUREMENT (IF APPLICABLE)

The quantities of concrete pipe storm sewers and culverts, including excavation, shoring, joints, fittings, stone, and earth backfill for which payment will be allowed, shall be measured in linear feet, measured along the centerline of the pipe from inside surface of structure to inside surface of structure or from end to end of pipe of each size, type, and class.

31.15 BASIS OF PAYMENT (IF APPLICABLE)

Payment for concrete pipe storm sewers and culverts shall be made per linear foot measured as shown above and shall include the cost of furnishing all materials, labor, tools, and services necessary to complete the installation.

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