

## CONSTRUCTION SPECIFICATION

### **51. CORRUGATED METAL PIPE**

#### 1. SCOPE

The work shall consist of furnishing and placing circular, arched or elliptical corrugated metal pipe and the necessary fittings.

#### 2. MATERIALS

Pipe and fittings shall conform to the requirements of Material Specification 551 or Material Specification 552, whichever is specified.

Unless otherwise specified in Section 11 of this specification, perforated pipe furnished shall conform to the requirements for Class I perforations as described in ASTM A 760 or A 762.

#### 3. COUPLING BANDS AND HARDWARE

Pipe joint coupling bands shall be provided meeting the requirements specified in Section 11 of this specification.

Hardware consisting of coupling bands and band fastening devices such as connecting bolts, rods, lugs and angles used in conjunction with zinc-coated iron or steel pipe shall be galvanized by the hot-dip method. Hardware used in conjunction with aluminum pipe and aluminum or aluminum-zinc alloy-coated iron and steel pipe shall be of the same material as the pipe except that hot-dip galvanized or cadmium-plated fasteners may be used. The surface of all band fastening devices for pipe specified with bituminous or polymer coating shall be coated with asphalt-mastic materials meeting the requirements of ASTM A 849. The coupling band shall be coated similar to that specified for the pipe unless otherwise specified in Section 11 of this specification.

Coupling bands shall be installed to provide straight alignment of the connecting pipe ends. Unless otherwise specified in Section 11 of this specification, the band width shall be as specified in ASTM A 760 and A 762. The bands shall be positioned to overlap adjacent pipe ends equally. The coupling bands shall be corrugated to match the corrugations of the pipe section ends being connected.

#### 4. FABRICATION

Fabrication of appurtenant sections shall be performed as shown on the drawings and described in Section 11 of this specification. The items may consist of inlet sections, outlet sections, end sections, elbows, skew or beveled sections, rod reinforced ends, cut-off collars, or headwalls. Fabrication of these appurtenant sections shall be made from metallic-coated materials identical to those from which the attached pipe is fabricated. Fabrication shall be of a quality and finished workmanship equal to that required for the pipe.

## 5. HANDLING THE PIPE

The Contractor shall furnish equipment as necessary to install the pipe without damaging the pipe or coating. The pipe shall be transported and handled in a manner to prevent damage to the pipe and coating.

## 6. LAYING AND BEDDING THE PIPE

Unless otherwise specified, the pipe shall be installed in accordance with the manufacturer's recommendations. Pipe shall be installed so no reversal of grade between joints results unless otherwise shown on the drawings. The pipe shall be installed with the outside laps of circumferential joints pointing upstream and with longitudinal laps at the sides near the vertical midheight of the pipe.

Field welding of corrugated galvanized iron or steel pipe will not be permitted. The pipe sections shall be joined with fabricator-supplied coupling bands meeting the specified joint requirements. The coupling shall be installed as recommended by the fabricator.

The pipe shall be firmly and uniformly bedded throughout its full length to the depth and in the manner specified on the drawings.

Perforated pipe shall be installed with the perforations down and oriented symmetrically about a vertical centerline. Perforations shall be clear of any obstructions at the time the pipe is installed in its final position.

The pipe shall be loaded sufficiently during backfilling to prevent displacement from line and grade, and to maintain full contact with the bedding during the placement operations.

## 7. STRUTTING

When required, struts or horizontal ties shall be installed in the manner specified on the drawings. Struts and ties shall remain in position until the backfill has been placed above the top of the pipe to a height of five (5) feet or the pipe diameter, whichever is greater, or to the surface of the completed earth backfill when the fill height is less than five (5) feet above the top of the pipe. The Contractor shall remove the struts or ties following completion of the earth backfill requirements that apply.

## 8. EMBEDMENT IN CONCRETE

Special treatment shall be provided to pipe surfaces when embedded or attached to concrete and the pipe material is aluminum or aluminum-coated and aluminum-zinc alloy coated. Potential contact surfaces in contact with concrete and masonry surfaces shall be coated with two (2) coats of a bituminous paint of the cut-back type. Placement of the pipe shall be such that direct metal-to-metal contact with

other metallic materials, such as embedded steel reinforcement or water control gates, is prevented.

## 9. REPAIR OF DAMAGED COATING

Any damage to the metallic coating shall be repaired by cleaning the damaged surface area by sand blasting, power disk sanding or wire brushing. All loose and cracked coating, dirt, and any products of corrosion shall be removed prior to application of paint. Oil and grease materials shall be removed by use of a solvent. The surface shall be clean and dry during the painting period and until the coating has completely dried.

Painting shall be accomplished by one of the following options based upon installed exposure conditions of the pipe as determined by the Engineer.

### Normal exterior or interior atmospheric exposure:

- a. Zinc dust - zinc oxide primer, ASTM D 79 and D 520
- b. Singles package, moisture cured urethane prime in silver metallic color, or
- c. Zinc-rich cold galvanized compound, brush, or aerosol application.

### Submergence in water exposure:

- a. Zinc dust-zinc oxide primer, ASTM D 790 and D 520
- b. Zinc dust paint, ASTM D 4146

When the metallic coating is damaged in any individual area larger than twelve (12) square inches, or if more than 0.2 percent of the total surface area of a single pipe section is damaged, that section of pipe will be rejected.

Breaks or scuffs in bituminous coatings that are less than 36-square inches in area shall be repaired by the application of two coats of hot-asphaltic paint or a coating of cold-applied bituminous mastic. The repair coating shall be a minimum of 0.05-inches thick after hardening and shall bond securely and permanently to the pipe and coating. The material shall meet the minimum physical requirements for bituminous coating contained in ASTM A 849 and A 885. Whenever individual breaks exceed 36-square inches in area or when the total area of breaks exceeds 0.5 percent of the total surface area of an individual pipe section, that section of pipe will be rejected.

Bituminous coating damaged by welding of coated pipe or pipe fittings shall be repaired as specified in this Section for breaks or scuffs in bituminous coatings.

Breaks or scuffs in polymer coatings that are less than 36-square inches in area shall be repaired by the application of a polymer material similar to and compatible

with the durability, adhesion and appearance of the original polymer coating, as described in ASTM A 849, paragraph 6.8. The repair coating shall be a minimum thickness of 0.010-inches (10 mils) after drying. Whenever individual breaks exceed 36-square inches in area or when the total area of breaks exceed 0.5 percent of the total surface area of the individual pipe section, that section of pipe will be rejected.

## 10. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined to the nearest 0.1 foot by measurement of the laid length of the pipe along the centerline of the pipe. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work, except items designated as "special fittings". Special fittings are those sections of pipe requiring special fabrication to meet layout requirements. Payment for special fittings will be made at the contract unit price for special fittings (CMP).

Method 2 For items of work for which specific unit prices are established in the contract, the quantity of each type, class, size and gauge of pipe will be determined as the sum of the nominal laying lengths of the pipe sections installed. Payment for each type, class, size and gauge of pipe will be made at the contract unit price for that type, class, size and gauge of pipe. Such payment will constitute full compensation for furnishing, transporting and installing the pipe and fittings and all other items necessary and incidental to the completion of the work except items designated as "special fittings". Special fittings are those sections of pipe requiring special fabrication to meet layout requirements. Payment for special fittings will be made at the contract unit price for special fittings (CMP).

Method 3 For items of work for which specific lump sum prices are established in the contract, payment for corrugated metal pipe structures will be made at the contract lump sum price. Such payment will constitute full compensation for furnishing, fabricating, transporting, and installing the pipe structure complete with metal pipe, fittings, and appurtenances, and all other items necessary and incidental to completion of the work which includes, except as otherwise specified, required excavation, dewatering, and earth backfill.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in Section 11 of this specification.