

Concrete Culvert, Irrigation or Drain Pipe

1. SCOPE

The work shall consist of furnishing and installing concrete pipe or concrete drain tile and the necessary fittings as shown on the drawings.

2. MATERIALS

Concrete Pipe

Concrete pipe shall meet the requirements of the following specifications:

Non-reinforced

ASTM C 14 Concrete Sewer, Storm Drain, and Culvert Pipe

ASTM C 118 Concrete Pipe for Irrigation or Drainage

ASTM C 412 Concrete Drain Tile

ASTM C 505 Non-reinforced Irrigation Pipe with Rubber Gasket Joints

Reinforced

ASTM C 76 Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

ASTM C 361 Reinforced Concrete Low-Head Pressure Pipe

ASTM C 506 Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe

ASTM C 507 Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe

ASTM C 655 Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe

ASTM C 789 Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers

Perforated Pipe

ASTM C 444 Perforated Concrete Pipe

Special Sections

ASTM C 478 Precast Reinforced Concrete Manhole Sections

ASTM C 913 Precast Concrete Water and Wastewater Structures

Rubber Gasket Joints

When rubber gasket joints are specified, the joints and gaskets shall conform to the requirements of ASTM C 443.

Sealing Compound

Sealing compound for filling joints in concrete pipe shall meet the requirements of the following specifications:

ASTM C 990 Joints for concrete pipe, manholes, and precast box sections using preformed flexible joint sealants.

ASTM C 877 External sealing bands for non-circular concrete sewer, storm, drain, and culvert pipe.

ASTM D 6690 Joint and Crack Sealants, Hot Applied for Concrete and Asphalt Pavements.

ASTM C 920 Elastomeric joint sealants for cold applied sealing and caulking of joints not subject to fuel spills. Use type S or M, grade NS for vertical joints; type S or M, grade P or NS for horizontal

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materials shall be used for both vertical and horizontal joints unless otherwise specified.

Joint Packing

Packing shall be commercial grade oakum.

Preformed Expansion Joint Filler

Preformed expansion joint filler shall meet the requirements of the following specifications:

ASTM D 994 or D 1751 Preformed Expansion Joint Filler, Type I, II, or III for Concrete Paving and Structural Construction.

ASTM D 1752 Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

3. LAYING AND BEDDING

Pipe and tile shall be laid to the line and grade shown on the drawings. Unless otherwise specified, pipe shall be laid with the bell or groove at the upstream end of each section.

Concrete Cradles or Bedding

Pipe to be cradled or bedded on concrete shall be set to the specified line and grade and temporarily supported on precast concrete blocks or wedges until the cradle or bedding concrete is placed. Concrete blocks or wedges used to temporarily support the pipe during placement of bedding or cradle shall be of a class of concrete equal to or better than that used in the bedding or cradle.

Earth, Sand, or Gravel Bedding

The pipe shall be firmly and uniformly bedded throughout its entire length to the

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depth and in the manner specified on the drawings. The pipe shall be loaded sufficiently during backfilling around the sides to prevent it from being lifted from the bedding.

Perforated pipe shall be laid with the perforations down and oriented symmetrically about a vertical centerline. Perforations shall be clear of any obstructions when the pipe is laid.

Elliptical pipe and pipe with elliptical or quadrant reinforcement shall be laid so that the vertical axis, as indicated by markings on the pipe, is in a vertical position.

4. JOINTS

Pipe joints shall conform to the details shown on the drawings and to the requirements of the Special Provisions applicable to the type of joint specified. Except where unsealed joints are indicated, pipe joints shall be sound and watertight at the pressure specified.

5. JOINING BELL AND SPIGOT PIPE

Rubber Gasket Joint, Pressure Pipe

Just before the joint is connected, the connecting surfaces of the spigot and the bell or coupling band, sleeve or collar shall be thoroughly cleaned and dried, and the rubber gasket and the inside surface of bell or coupling band, sleeve or collar shall be lubricated with a light film of soft vegetable soap compound (flax soap). The rubber gasket shall be stretched uniformly as it is placed in the spigot groove to insure a uniform volume of rubber around the circumference of the pipe.

The joint shall be connected by means of a pulling or jacking force so applied to the pipe that the spigot enters squarely into the bell, or connected in accordance with the manufacturer's recommendations.

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When the spigot has been seated to within 1/2-inch of its final position, the position of the gasket in the joint shall be checked around the entire circumference of the pipe by means of metal feeler gauge. In any case where the gasket is found to be displaced, the joint shall be disengaged and properly reconnected. After the position of the gasket has been checked, the spigot shall be completely pulled into the bell and the section of the pipe shall be adjusted to line and grade.

Rubber Gasket Joints, Sewer and Culvert Pipe or Irrigation Pipe

The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.

Mastic Sealed Joints

At the time of assembly the inside surfaces of the bell and the outside surfaces of the spigot shall be clean, dry and primed as recommended by the manufacturer of the sealing compound. A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient length to pass around the pipe and lap at the top. The gasket shall be laid in the bell throughout the lower third of the circumference. The end of the spigot shall be laid in the bell throughout the lower third of the circumference. The end of the spigot shall be laid on the gasket and the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot.

a. Hot-Pour Joint Sealer

The sealing compound shall be heated to within the temperature range recommended by the manufacturer and shall not be over-

heated or subjected to prolonged heating. After the joint is assembled, with the pipe in its final location, a suitable joint runner shall be placed around the joint with an opening left at the top. Molten sealing compound shall be poured into the joint as rapidly as possible without entrapping air until the annular space between bell and spigot is completely filled. After the compound has set, the runner may be removed. Alternate joints may be poured before the pipe is lowered into the trench. In this case, the joint shall be poured with the pipe in a vertical position without the use of the runner. The compound shall have thoroughly set before the pipe is placed in the trench, and the pipe be handled so as to cause no deformation of the joint during placement.

b. Cold-Applied Sealing Compound

The annular space between bell and spigot shall be completely filled with the sealing compound. The compound shall be mixed on the job in accordance with the manufacturer's recommendations and in relatively small quantities so that setting will not be appreciable before application.

c. Preformed Sealing Compound

Joint packing will not be required, except as recommended by the manufacturer of the sealing compound. Preformed strips or bands of the sealing compound shall be applied to the bell and spigot prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.

Cement Mortar Sealed Joints

Cement mortar for joints shall consist of one part by weight of Portland cement and two parts by weight of fine sand with enough water added to produce a workable consistency. At the time of assembly the

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inside surface of the bell and the outside surface of the spigot shall be clean and moist.

a. With Packing

A closely twisted gasket of joint packing of the diameter required to support the spigot at the proper grade and to make the joint concentric shall be made in one piece of sufficient length to pass around the pipe and lap at the top. The gasket shall be saturated with neat cement grout, laid in the bell throughout the lower third of the circumference and covered with mortar. The end of the spigot shall be fully inserted into the bell so that the pipe sections are closely fitted and aligned. A small amount of mortar shall be placed in the annular space throughout the upper two-thirds of the circumference. The gasket then shall be lapped at the top of the pipe and thoroughly packed into the annular space between the bell and the spigot. The remainder of the annular space then shall be filled completely with mortar and beveled off at an angle of approximately 45 degrees with the outside of the bell. If the mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a person to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.

b. Without Packing

The lower portion of the bell shall be filled with stiff mortar of sufficient thickness to make the inner surface of the abutting sections flush. The spigot-end of the pipe to be joined shall be fully inserted into the bell so that the sections are closely fitted and aligned. The remaining annular space between the bell and spigot shall then be filled with mortar and the mortar neatly beveled off at an angle of approximately 45

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degrees with the outside of the bell. After the mortar has set slightly, the joint shall be wiped inside the pipe. In pipe too small for a person to work inside, wiping may be done by dragging an approved swab through the pipe as the work progresses.

Unsealed Joints

When unsealed joints are specified, they shall conform to the details shown on the drawings.

6. JOINING TONGUE AND GROOVE PIPE

Cement Mortar Sealed Joint

Mortar shall be as specified for bell and spigot joints. The tongue end of the section being placed shall be covered with mortar and firmly pressed into the groove of the laid section in such a manner that the tongue fits snugly and truly in the groove and that mortar is squeezed out both on the interior and exterior of the joint. Care shall be taken that no mortar falls from the groove end during the abutting operation. Immediately after the pipe sections have been abutted, exposed external surface mortar shall be pressed into the joint and any excess mortar removed, after which the interior surface of the joint shall be carefully pointed and brushed smooth, and all surplus mortar removed.

Mastic Sealed Joints

Strips or bands of preformed sealing compound shall be applied to the tongue and groove prior to assembly of the joint in accordance with the manufacturer's recommendations. Any compound extruded from the interior side of the joint during assembly shall be trimmed even with the interior surface of the pipe.

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Rubber Gasket Joints

The pipe shall be joined in accordance with the gasket manufacturer's recommendations except as otherwise specified.

Unsealed Joints

When unsealed joints are specified, they shall conform to the details shown on the drawings.

7. BANDING

When external mortar bands are specified, they shall conform to the details shown on the drawings.

8. CURING MORTAR JOINTS AND BANDS

The external surfaces of mortar joints shall be covered with moist earth, sand, canvas, burlap or other approved materials and shall be kept moist for 10 days or until the pipe is backfilled.

Water shall not be turned into the conduit within 24 hours after the joints are finished. Hydrostatic pressure shall not be applied to the conduit prior to 14 days after the joints are finished.

9. PRESSURE TESTING

If required by the Special Provisions the pipeline shall be pressure tested as follows:

Prior to the placement of concrete or earthfill around the conduit, the conduit shall be tested at the specified test pressure for a period of at least two hours. Any leaks shall be repaired and the conduit shall be retested. The procedure shall be repeated until the conduit is watertight.

The pipe joints shall show no leakage. Damp spots developing on the surface of the pipe will not be considered as leaks.

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10. MEASUREMENT AND PAYMENT

(Used only if applicable)

For items of work for which specific unit prices are established, each item will be measured to the nearest unit applicable. Payment for each item will be made at the agreed-to unit price for that item. For items of work for which specific lump sum prices are established, payment will be made at the lump sum price.

Such payment will constitute full compensation for all materials, labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Compensation for any item of work shown on the drawings or described in the special provisions but not listed on the bid schedule will be considered incidental to and included in the pay items listed on the bid schedule.