

# Special Specification 4024

## Reinforced Concrete Low-Head Pressure Pipe



### 1. DESCRIPTION

Furnish and install reinforced concrete low-head pressure pipe. Install the pipe of the various classes, sizes, and dimensions to the lines and grades shown on the plans or as directed. The installation of pipe includes all joints or connections to new or existing pipe, wells, vents, inlets, headwalls, etc., as required to complete the work.

### 2. MATERIALS

Furnish materials in accordance with the following:

- Item 400, "Excavation and Backfill for Structures,"
- Item 402, "Trench Excavation Protection," or Item 403, "Temporary Special Shoring," and
- Item 464, "Reinforced Concrete Pipe".

Provide reinforced concrete low-head pressure pipe that conforms to the requirements of ASTM C 361 except for the following modifications:

- 2.1. The article entitled "Classification" is voided and replaced by the correspondingly named article of ASTM C 76 for Class II, III, IV, and V pipe.
- 2.2. The article entitled "Bases of Acceptance" is voided and replaced by the correspondingly named article of ASTM C 76.
- 2.3. The following section of the article entitled "Materials" is supplemented by the following:
  - 2.3.1. Cement: Type II cement will be required unless otherwise shown on the plans.
  - 2.4. All reference to methods pertaining to testing the strength of the concrete contained in articles entitled "Materials" and "Physical Test Requirements" are voided and replaced by the following:
 

The strength requirements for the concrete must meet the design requirements of ASTM C 76 for Class II, III, IV, and V pipe.

Perform 3-edge bearing tests for Class II, III, IV, and V pipe on 1 pipe for each 100 pipe or fraction of each size and class for the load to produce a 0.01 in. crack and, at the discretion of the Engineer, the ultimate load. Plainly mark "TEST" with durable paint on both top and bottom and do not use the pipe sections tested only to the 0.01 in. crack.
- 2.5. The article entitled "Design" is voided and replaced by the correspondingly named article of ASTM C 76 with the exception of the following:
  - 2.5.1. **Circumferential Reinforcement:** Use circumferential reinforcement at each end of the pipe unit that consists of 2 complete coils or rings in which the end is lapped or welded. Unless otherwise shown on the plans, the clear distance of the end coil or ring must not be less than 1/2 in. nor more than 1 in. from the end of the pipe unit.
  - 2.5.2. **Longitudinal Reinforcement:** Extend the longitudinals the full length of the pipe. The longitudinal bars provided in the bell may be continuous bars or spliced to the main longitudinal bars.

- 2.5.3. **Joints:** Construct all joints to the requirements of ASTM C 361.
- 2.6. In addition to the requirements included under the section "Joints" of ASTM C 361, the joints must meet the following requirements (see attached typical joint drawing for illustration of joint details for pipe having an internal diameter of 12 to 60 in. inclusive; for pipes with internal diameters larger than 60 in., joint design details will be submitted to the Engineer for approval).
- 2.6.1. Construct a joint of all concrete design with gasket retained in a groove, using an endless gasket of round cross-section.
- 2.6.2. Construct the thickness of spigot shell at end of spigot that is not less than 80% of thickness of pipe shell.
- 2.6.3. Use a finish of the inner surface of the bell or groove and surfaces of the spigot or tongue that is in accordance to the requirements of ASTM C 443.
- 2.7. The article entitled "Physical Test Requirements" is supplemented by the following:  
  
Use a method and equipment to manufacture the pipe that produces a uniformly dense concrete free from porous areas. When tested for absorption as provided in ASTM C 76 "Absorption Test Requirement of Concrete", the absorption shall not exceed 5%.
- 2.8. The article "Hydrostatic Tests" is voided and replaced with the following:  
  
For Class II, III, IV, and V pipe, hydrostatic tests on pipe will not be required.
- 2.9. The article entitled "Hydrostatic Test on Rubber Gasket Joints" is voided and replaced with the following:  
  
For Class II, III, IV, and V pipe, hydrostatic tests on rubber gasket joints will not be required provided the manufacturer provides adequate gauging devices and properly checks the pipe with same to assure that all dimensions of pipe affecting water tightness of the joints are within the required tolerances. Gauge tests of pipe sections selected for other tests in the presence of the inspector.

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### 3. CONSTRUCTION

The construction methods are to be in accordance with Item 464, "Reinforced Concrete Pipe", except for the following modifications.

- 3.1. References to jointing are voided.
- 3.2. Install rubber gasket joints by forcing the spigot or tongue of each pipe section (with the gasket in place) into the bell or groove of the previously laid joint with approved device that will smoothly force the sections together and so that the gasket is properly seated and compressed. Adequately lubricate the bell and spigot or groove and tongue with soft soap or other approved lubricant before the sections are forced together.
- 3.3. Construct angles or bends in pipe lines by using either prefabricated angle joints or a reinforced concrete collar. Unless otherwise shown on the plans, use collars of such width that each pipe section will be imbedded in the collar a minimum of 6 in. Construct the thickness of the collar outside the pipe that is a minimum of 6 in. Furnish reinforcement in the collar that consists of at least one layer of 6 in. x 6 in., No. 6 gage x 6 gage steel wire fabric or heavier, supplemented by additional circumferential reinforcing steel as required to provide reinforcing at least equal to that in the pipe. Lap the fabric at least 6 in. Furnish Class A or C concrete and form and place monolithically.
- 3.4. Where pipe connects to headwalls or wells at the bell end of pipe lines, cut off the bell and lay the pipe so that the normal pipe section extends into the headwall or well.

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**4. MEASUREMENT**

This Item will be measured by the foot of pipe. Such measurement will be made between the ends of the pipe barrel along the central axis as installed. Where spurs or branches, or connections to existing pipe lines are involved, measurement of the spur or new connecting pipe will be made from the intersection of its central axis with the outside surface of the pipe into which it connects. Where inlets, manholes, junction chambers or other structures are included in lines of pipe, that length of pipe provided for tying into the structure wall will be included for measurement but no other portion of the structure length or width will be included.

Excavation in natural ground for installing concrete pipe will be measured as prescribed in Item 400, "Excavation and Backfill for Structures".

Unless otherwise shown on the plans, structural excavation for pipe headwalls will not be measured but will be considered subsidiary to the various bid items.

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**5. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Reinforced Concrete Low-Head Pressure Pipe" of the class and size specified. This price is full compensation for constructing, furnishing, transporting, placing, and jointing the pipe; the excavation, hauling and placing of earth cushion material where required for bedding pipe in rock excavation; the preparation and shaping of beds; hauling, placing and jointing of pipes; for end finish; for all connections to existing structures and for all materials, labor, equipment, tools, and incidentals necessary to complete the work, except excavation and backfill which will be paid for in accordance with Item 400, "Excavation and Backfill for Structures". The excavation of rock or other incompressible materials, as may be required in providing proper bedding, will be paid for in accordance with Item 400, "Excavation and Backfill for Structures". Where pipes are laid on a skew, full compensation for cutting the ends parallel with the centerline of the highway will be considered as included in the price paid for linear foot for the designated item of pipe and no additional allowance will be made.

Protection methods for excavations greater than 5 ft. in depth will be measured and paid for as required under Item 402, "Trench Excavation Protection," or Item 403, "Temporary Special Shoring."

