

SECTION 02320 – UTILITY CASINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section provides the general requirements for the installation of casing pipe at the locations shown on the drawings. This section includes the following:
 - 1. Steel Casing Pipe.
 - 2. Reinforced Concrete Pipe (RCP) Casing Pipe.
 - 3. Fiberglass Reinforced Pipe (FRP) Casing Pipe.
 - 4. Polyvinyl Chloride (PVC) Casing Pipe.
 - 5. Casing Spacers and Casing End Seals.
- B. Casings to protect water mains from potential contamination from Non-Potable Fluid Lines and Structures shall comply with Section 01016 – Water Mains near Sewers.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 02200 – Earthwork.
- E. Section 02250 – Trenching, Pipe Embedment and Backfill.
- F. Section 02618 – Ductile Iron Pipe for Water Mains.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - ASTM A36 Standard Specification for Carbon Structural Steel
 - ASTM A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - ASTM C33 Standard Specifications for Concrete Aggregates
 - ASTM C361 Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
 - ASTM C76 Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - ASTM D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- C. American Petroleum Institute (API):
 - API RP 1102 Steel Pipeline Crossing Railroads and Highways

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|----|---|--|
| | API 1104 | Standard for Welding Pipelines and Related Facilities |
| D. | American Water Works Associations (AWWA): | |
| | AWWA C200 | Steel Water Pipe 6 Inches and Larger |
| | AWWA C206 | Field Welding of Steel Water Pipe |
| | AWWA C900 | Polyvinylchloride Pipe |
| | AWWA C-905 | Polyvinylchloride pipe |
| E. | Steel Structure Painting Council (SSPC): | |
| | SSPC SP3 | Surface Preparation Specification 3, Power Tool Cleaning |

1.05 DEFINITIONS

- A. Not used.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the contract documents.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals
- B. Shop Drawings:
 - 1. When requested by the City or Design Professional.
- C. Product Data:
 - 1. Submit descriptive and engineering data for:
 - (a) Casing pipe material.
 - (b) Casing pipe coatings and linings.
 - (c) Pipe alignment skids.
 - (d) Guide spacer bands.
 - (e) Casing spacers.
 - (f) Casing end seals.
 - (g) Polyethylene encasement.
- D. Other Submittals:
 - 1. Manufacturer's design calculations for casing spacer service load.
 - 2. Minimum design and installation requirements for the highway department, railroad, or organization having jurisdiction.

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Accepting casing pipe on site: inspect for damage and store (see paragraph 1.09).
- C. Contractor: The contractor specializing in the installation of the products specified in this Section shall have a minimum of three years of documented experience.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Follow the provisions for the delivery, storage and handling of products to and at the site as provided in Section 01000 – General Project Requirements.

PART 2 - PRODUCTS

2.01 STEEL PIPE

- A. Pipe: Pipe shall be smooth-walled, welded steel pipe fabricated conforming to ASTM A36 plate or ASTM A1011 sheet with a minimum yield point of 248 MPa (36,000 psi), conforming to AWWA C200.
- B. Wall Thickness: Unless otherwise indicated on the Drawings or in Section 01015 – Specific Project Requirements, Table 1 provides a listing of minimum casing diameters and thicknesses:

Table 1. Minimum Casing Dimensions

Encased Pipe Diameter (inches)	Minimum Casing Diameter (inches) ⁽¹⁾	Wall Thickness (inches)	
		Under Highways	Under Railroads
6	18	0.250	0.312
8	18	0.250	0.312
12	24	0.281	0.375
16	30	0.312	0.438
20	36	0.344	0.563
24	42	0.375	0.625
30	44	0.375	0.625
36	48	0.375	0.625

- 1. Inside Diameter: The inside diameter of the casing pipe shall exceed the outside diameter of the carrier pipe joints or couplings by a minimum of 4 inches.
- C. Joints: All joints in steel pipe casings shall be field welded to conform to API 1104 or AWWA C206.
- D. Cleaning:
 - 1. Clean pipe to SSPC-SP3 and apply iron oxide field coating to all exterior joints after field welding.
 - 2. Clean to SSPC-SP3 and apply iron oxide field coating to all interior joints on 24-inch diameter casings and larger after field welding.
- E. Factory Coatings and Linings:
 - 1. Unless otherwise specified on the Drawings or in Section 01015 – Specific Project Requirements, the exterior and interior of all casing pipe shall be coated with iron oxide primer applied at 33 microns (1.5 mils) minimum thickness.
 - 2. Hold coatings and linings back from end joints to be welded at least 2 inches each side of joint.

2.02 REINFORCED CONCRETE PIPE (RCP)

- A. Pipe: ASTM C76 circular pipe and shall be the class and length specified on the Drawings. Pipe shall be a minimum Class IV.
- B. Joints: Steel end joints with a groove in the spigot end for an O-ring gasket.
- C. Gasket: Synthetic Rubber, ASTM C361.

2.03 FIBERGLASS REINFORCED PIPE (FRP)

- A. Pipe to be manufactured by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure conforming to ASTM D3262, ASTM D 4161, and ASTM D2412.
- B. Joints:
 - 1. Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets made of EPDM rubber compound as the sole means to maintain joint water tightness.
 - 2. The joints must meet the performance requirements of ASTM D4161.
- C. Diameter: The actual outside diameter and the minimum wall thickness of the pipes shall be in accordance with ASTM D3262.
- D. Pipe Length: Pipe shall be supplied in nominal lengths of 20 feet.
- E. Minimum Pipe stiffness of 36 psi when tested in accordance with ASTM D2412.

2.04 POLYVINYL CHLORIDE (PVC) PIPE

- A. Pipe: PVC pipe shall conform to AWWA C-900 or AWWA C-905.
- B. PVC pipe used for encasement shall only be used for the protection of the carrier when installed near a gas main. See paragraph WATER MAINS NEAR GAS MAINS.

2.05 CASING SPACERS

- A. Casing spacers shall be used to install the carrier pipe inside the casing pipe. Casing spacers shall fasten tightly onto the carrier pipe so that when the carrier pipe is being installed the spacers will not move along the pipeline.
- B. Casing spacers shall be designed by the Manufacturer to adequately support and electrically isolate the carrier pipe within the casing pipe under all conditions.
- C. Casing spacers shall be doubled on each end of the casing pipe.
- D. Each casing spacer shall be capable of providing support for the carrier pipe in service at a maximum spacing of 10 feet. Calculations prepared by the manufacturer shall be submitted in accordance with paragraph SUBMITTALS showing that the casing spacer will support the service load at the recommended spacing, including a factor of safety of two (2).
- E. Casing spacers used under this specification shall meet or exceed the specifications described herein as projection-type that has a minimum of projections around the circumference totaling the number of diameter inches.
- F. Projection-type casing spacers panels, risers and fasteners shall be constructed of Stainless Steel type 304. Casing spacer skids shall be constructed of UHMV Polyethylene.
- G. Allowable manufacturers and model (or City approved equal):
 - 1. Cascade Waterworks Manufacturing, Model CCS.
 - 2. Power Seal, Model 4810.

2.06 CASING END SEALS

- A. Casing shall be fitted with end seals at both ends to reduce the intrusion of water and fines from the surrounding soils. The seal shall be formed with a flexible material that will inhibit the formation of a waterway through the casing.
- B. Allowable manufacturers and model (or City approved equal):
 - 1. Cascade Waterworks Manufacturing, Model CCES.
 - 2. Power Seal, Model 4810ES.

2.07 POLYETHYLENE ENCASEMENT

- A. Polyethylene encasement shall conform to Section 02618 – Ductile Iron Pipe for Water Mains, paragraph 2.08 POLYETHYLENE ENCASEMENT.

2.08 CATHODIC PROTECTION

- A. Cathodic protection for either the casing pipe and/or carrier pipe shall be as indicated on the Drawings and/or in the Contract Documents.

PART 3 - EXECUTION

3.01 TRENCHING, EXCAVATION, BACKFILL AND COMPACTION

- A. Comply with Section 02200 – Earthwork and Section 02250 – Trenching, Pipe Embedment and Backfill.

3.02 CASING INSTALLATION

- A. Casing pipe material, diameter, and wall thickness to be used shall be indicated on the Drawings.
- B. Casings shall be installed as specified herein and in accordance with drawing 02320-1.
- C. All work shall meet the minimum requirements of API RP1102, and the highway, railroad, or utility having jurisdiction. Installation shall be subject to their inspection and approval.
- D. Install Casing Pipes:
 - 1. Boring: Continuous flight auger, pneumatic or hydraulic jacking, or method approved by City. Reinforce leading end of casing with jacking band.
 - 2. Install to line and grade indicated on the Drawings within 1% tolerance
 - 3. Excavate working pits of adequate size to provide safe working conditions and in such a manner as not to disrupt traffic or damage the roadway grade or surface.
 - 4. Casings rejected due to misalignment or other failures shall be abandoned in place and filled with controlled low strength material (CLSM) as specified in 02200 – Earthwork and Section 02250 – Trenching, Pipe Embedment and Backfill.
 - 5. Casing pipe installed by trenchless methods that are misaligned or rejected shall not be recovered for reuse.

3.03 CASING SPACERS

- A. Casing spacers shall be used for all carrier pipe being installed in a casing.
- B. Furnish casing spacers for pipe alignment guides as indicated on drawing No. 02320-1:
 - 1. Outside diameter of spacer to be sized slightly smaller than casing pipe inside diameter to limit carrier pipe movement.
 - 2. Install in accordance with casing spacer manufacturer's recommendations.

3.04 END SEALS

- A. End seals shall be used on all casing pipe.
- B. Install end seals as indicated on drawing 02320-1 and as follows:
 - 1. After inside of casing has been thoroughly cleaned.
 - 2. After carrier pipe has been permanently placed inside casing.

3.05 WATER MAINS NEAR GAS MAINS

A. General:

1. Casings shall be installed as specified herein and in accordance with drawing 02320-2.
2. A water main shall be encased in PVC pipe when it will be installed within 10 feet of a metallic gas main with impressed current.
3. Water mains being constructed near non-metallic pipe do not require encasement.
4. Locations for which PVC pipe encasement is required shall be shown on the Drawings.
5. If the Contractor exposes a metallic gas main that is not shown on the Drawings, the City shall be notified immediately for further direction before the water main is installed.
6. Water mains installed with PVC casings shall also be protected by two layers of polyethylene encasement.
7. Casing spacers shall be installed in accordance with manufacturer's recommendations, see drawing 02320-2.

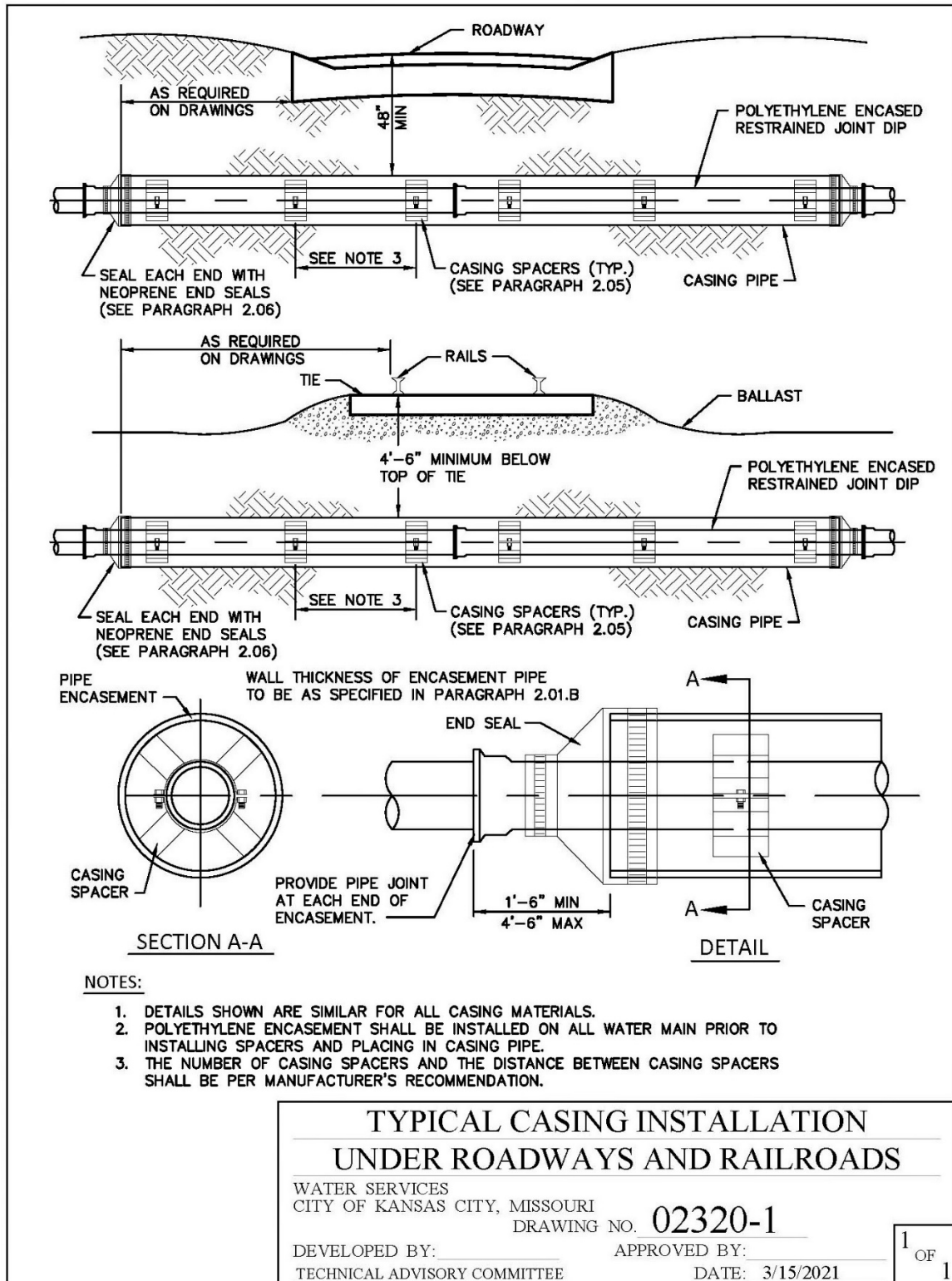
B. Pipe Crossings:

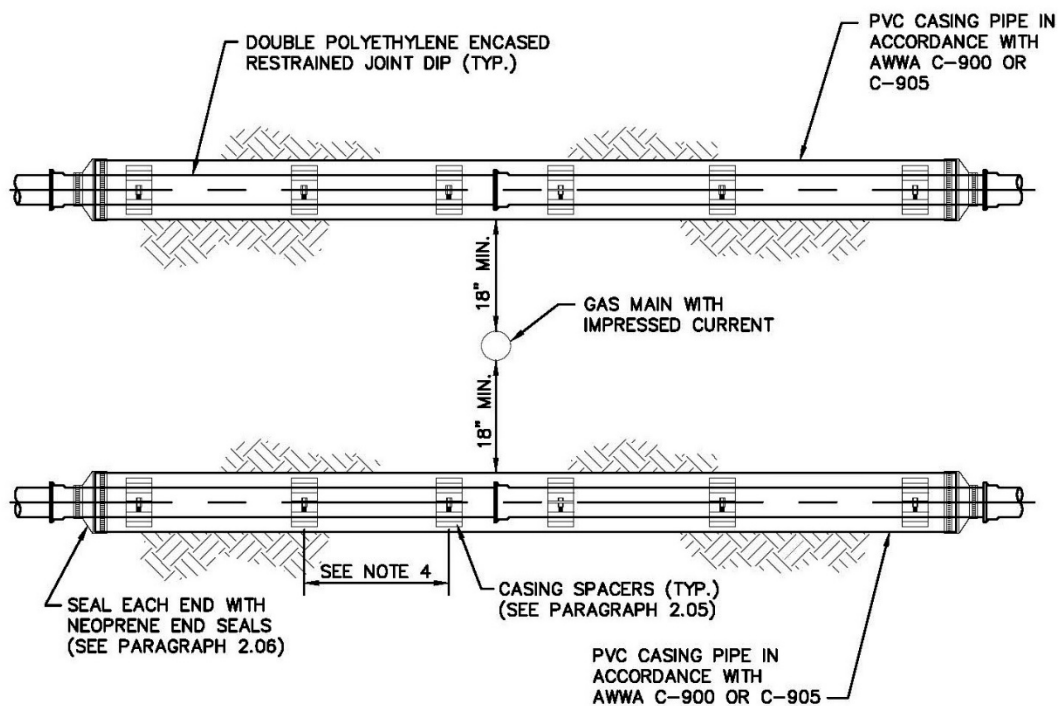
1. PVC casing pipe shall be extended for a distance of at least 10 feet on each side of the gas main being crossed, or as indicated on the Drawings.
2. Double polyethylene encasement shall be extended a minimum of 25 feet on each side of the crossing, or as indicated on the Drawings.

C. Parallel Installations:

1. The carrier pipe shall be encased at all locations where the carrier pipe is within 10 feet of the gas main.
2. Double polyethylene encasement shall be installed to a point at least 25 feet beyond the end of the casing.

Drawings 02320-1 and 02320-2 are on the following two pages.





NOTES:

1. INSTALL DOUBLE THICKNESS OF POLYETHYLENE ENCASEMENT ON WATER MAIN A MINIMUM 25' BEYOND THE END OF THE CASING ON EACH SIDE.
2. INSTALL CASING PIPE LENGTH REQUIRED TO EXTEND 10' BEYOND EACH SIDE OF GAS MAIN.
3. MINIMUM DIAMETER OF CASING PIPE SHALL BE PER PARAGRAPH 2.01.B.
4. THE NUMBER OF CASING SPACERS AND THE DISTANCE BETWEEN CASING SPACERS SHALL BE PER MANUFACTURER'S RECOMMENDATION.

WATER MAIN / GAS MAIN CROSSINGS

WATER SERVICES

CITY OF KANSAS CITY, MISSOURI

DRAWING NO. **02320-2**

DEVELOPED BY: _____

APPROVED BY: _____

TECHNICAL ADVISORY COMMITTEE

DATE: 3/15/2021

1 OF 1

END OF SECTION