

ITEM W11

DUCTILE IRON PIPE AND FITTINGS

1.0 DESCRIPTION. The Contractor shall furnish ductile iron pipe (DIP) and fittings in accordance with these material specifications. This includes, but is not limited to, pipe, fittings, joint restraints, and other appurtenances specified herein.

2.0 SUBMITTALS. The contractor shall submit the following information:

A. Reference Standards. Latest revisions:

1. ASTM A193.
2. ASTM A536.
3. ASTM D4976.
4. AWWA C104.
5. AWWA C105.
6. AWWA C111.
7. AWWA C150.
8. AWWA C151.
9. AWWA C153.
10. NSF/ANSI 61.

B. Shop Drawings.

1. All shop drawings submitted electronically for review and approval shall be returned within two weeks either approved or marked up for further design.
2. After examination of such drawings by the Engineer and the return thereof, the Contractor shall make such correction to the shop drawings as have been indicated and shall furnish the Engineer with electronic corrections.
3. Shop drawings shall be complete in details and indicate all materials as specified herein.
4. Manufacturer's catalog or general web-site information will not be sufficient to fulfill shop-drawing requirements.

C. Calculations. This section is not applicable.

D. Certifications. This section is not applicable.

3.0 MATERIALS. Only materials approved by the Stark County Metropolitan Sewer District may be used for this project.

A. Ductile Iron Pipe – General.

1. All ductile iron pipe shall conform to AWWA C151 with the ends being designed for one of the type joints as specified herein.
2. To assure that the iron is suitable for satisfactory drilling and cutting the chemical constituents shall meet the physical property recommendations of ASTM A536.
3. Mechanical Joints and Push-on Joints including their respective appurtenances shall conform to AWWA C111.

B. Ductile Iron Pipe – Push-on Joints (for Open-Cut Installation).

1. Ductile iron pipe shall be Fastite Joint Pipe by American Cast Iron Pipe Company, Tyton Joint Pipe by McWane Ductile, or Tyton Joint Pipe by US Pipe.
2. The ductile iron pipe furnished under this specification shall be a minimum thickness of Class 52 conforming to AWWA C150.

C. Ductile Iron Pipe – Restrained Joints (for either HDD or Open-Cut Installation).

1. Ductile iron pipe shall be Flexring Ductile Iron Pipe by American Cast Iron Pipe Company, TR Flex Ductile Iron Pipe by McWane Ductile, or TR Flex by US Pipe.
2. The ductile iron pipe furnished under this specification shall be designed for a water working pressure of 350 psi conforming to AWWA C150.

D. Fittings.

1. All fittings shall be ductile iron, unless otherwise noted.
2. All standard and special ductile iron fittings (e.g., reducers, bends, tees, plugs, etc.) shall conform to the applicable AWWA specifications for pressure fittings with end conditions as specified herein.
3. AWWA C153 shall be applicable for all standard-bodied compact ductile iron mechanical joint fittings.
4. Fittings for pipe sizes of 12-inch diameter and smaller shall be rated for 350 psi working pressure conforming to AWWA C153.

E. Bolts and Nuts.

1. Bolts and nuts shall be corten (COR-TEN) weathering steel.
2. All ancillary hardware (washers etc.) not available in corten shall be stainless steel.
3. All bolts shall be sized to accommodate a 6 oz. zinc anode cap on every bolt thread.
4. All Bolts and nuts shall conform to the chemical and mechanical requirements of ASTM A193.

F. Mechanical Joint Restraint System.

1. Restrained joint devices shall be Megalug as manufactured by EBAA Iron, Inc. or approved equal.
2. Restrained joint devices shall conform to AWWA C111 or AWWA C153.
3. The DIP restraint system shall be Series 1100 or 1700.
 - a. Working pressure rating shall be 350 psi, with a minimum 2-to-1 safety factor.
4. The C-900 PVC pipe restraint system shall be Series 2000PV or 1900.

- a. Working pressure rating shall be 235 psi for DR18 pipe, with a minimum 2-to-1 safety factor.
5. 'Field-lock' type gaskets will not be accepted.

G. Coating and Lining.

1. The outside surface of all ductile iron pipe and fittings shall be shop coated with either a coal tar or asphalt base bituminous material.
2. If this coating material is found to be damaged prior to the pipe trench being backfilled, the Contractor shall provide and apply material of that required by the manufacturer to repair the damages.
3. The Contractor shall have sufficient coating material available at the job site prior to laying the pipe.
4. The interior of the pipe and fitting shall be lined with cement mortar and seal coated in complete conformance with AWWA C104.

H. Polyethylene Encasement.

1. Polyethylene encasement shall be furnished and installed in accordance with AWWA C105 to all piping, castings, fittings, valves, and couplings for the entire length of ductile iron pipe to be supplied and installed on the project including DIP to be installed by horizontal directional drill.
2. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material, but it is not intended to be completely airtight or watertight.
3. Contractor shall supply 8-mil (minimum) thickness polyethylene tube manufactured in accordance with AWWA C105 for encasement of ductile iron waterline.
4. Linear low-density polyethylene film shall be manufactured of virgin polyethylene material in accordance with ASTM D4976, physical properties of finished film:
 - a. Tensile strength: 3,600 psi *
 - b. Elongation: 800 percent *
 - c. Dielectric strength: 800 V/mil thickness minimum
 - d. Impact Resistance: 600 g minimum
 - e. Propagation Tear Resistance: 2,550 grams force minimum *
 - f. *Minimum in machine and transverse direction
5. Polyethylene tube to be supplied shall be blue in color.
6. Tube or sheet width sizes shall be per AWWA C105 as shown on the following chart:

TABLE 2	
NOMINAL PIPE DIAMETER:	MIN. POLYETHYLENE WIDTH FOR FLAT TUBE:
6"	16"
8"	20"
10"	24"
12"	27"
14"	30"
16"	34"

7. The polyethylene film supplied shall be clearly marked every two feet along its length with the following information in one-inch-high letters:
 - a. Manufacturer's name or trademark.
 - b. Year of manufacture.
 - c. ANSI/AWWA C105/A21.5.
 - d. Minimum film thickness and material type.
 - e. Applicable range of nominal pipe diameter size(s).
 - f. Warning – Corrosion Protection – Repair any damage.
8. Polyethylene adhesive tape 1-1/2" wide shall be used to seal joints.

I. Tracer Wire.

1. Shall be Snakebite by Copperhead Industries, LLC or approved equal.
2. Provide for installation of two (2) direct drilling/bore tracer wires.
 - a. One (1) primary and one (1) duplicate/secondary.
3. Tracer wire shall be direct burial #12 AWG Solid (0.0808" diameter) hard drawn solid extra-high-strength copper clad steel core conductor horizontal drill tracer wire with a 30-volt rating and minimum 30 mil HDPE insulation jacket thickness complying with ASTM D1248 as manufactured by Copperhead or approved equal.
4. THHN wire shall not be approved for tracer wire.
5. Tracer wire shall have 21% conductivity and an average wire tensile break load of 1150 lb. minimum.
6. Tracer wire color shall be blue for potable water installation.
7. Tracer wire shall be a single continuous wire from access point to access point except where approved for spliced in repairs or replacement connections.
8. All engineering approved spliced in connections or replacement connections shall be made with moisture displacement connectors by same manufacturer.
9. Tracer wire accessories shall include:
 - a. Access Points at every termination of the wire, each access point shall include:
 - i. Two terminal light duty switchable lid (ground switch) attached to a companion base.
 - ii. Locking cover.
 - iii. Encapsulated magnet to facilitate detection.
 - iv. Lid color shall be blue.
 - v. Both lid and base shall be non-corrosive.
 - vi. Ground switch when "off" may be used to ground locator transmitter.

- vii. Set screws shall be used to secure all wire and anti-corrosion gel shall be supplied to protect all electrical connections.
- b. Grounding rods in the quantity and locations as determined by the tracer wire manufacturer.
 - i. Grounding rod shall be capped with a non-corrosive material and include at least 20 feet of approved tracer wire for grounding.
 - ii. A connector shall be supplied for splicing, filled with a non-hardening, dielectric, moisture displacing silicon for corrosion protection.
- c. Waterproof connectors as necessary to prevent cutting the main tracer wire.
- d. Accessory products shall be supplied by the same manufacturer as the tracer wire.

J. Polyethylene Tape Marker.

- 1. Where open-cut installation is utilized, the contractor shall also furnish 3" wide printed polyethylene blue "WATER" tape.

4.0 EXECUTION. This section is not applicable.

5.0 ELECTRICAL. This section is not applicable.

6.0 QUALITY ASSURANCE. The items covered under this section of the Specification is intended to be the materials as described above. All material used on this project shall be new and unused unless otherwise specified and all workmanship shall be of the best quality.

A. Testing. This section is not applicable.

B. Observation. This section is not applicable.

C. Warranty.

- 1. Refer to Item W34 - Water Line Construction, for warranty requirements.

7.0 MEASUREMENT. The lengths pipe to be paid for under this Item, shall be the total number of lineal feet and size of main actually furnished and placed in accordance with the Specifications, measured along the axis of the pipe after the pipe and fittings have been connected in place..

8.0 PAYMENT. The unit price stipulated in Item W34 for Water Line Construction shall include the items specified herein.

<u>Item</u>	<u>Unit</u>	<u>Description</u>
W11	LF	__" Diameter DIP Water Main, Complete

END OF SECTION