Section 02537

Water Distribution System

REVISION TABLE

Revision Number	Revision Date	Description
2025-01	*12/19/2025*	• *Various minor edits throughout.* • *Repair Sleeves removed from Section.* • *Foster Adapters defined as approved for use.* • *Restrained Joint Gasket options added to approved manufacturers.* • *ROMAC tapping saddles added to approved manufacturers.* • *Triple Tap Tapping Sleeve added to approved manufacturers.* • *Deflection limit for installing ductile iron pipe defined.* • *Field torque test for hydrant requirement removed.*
2026-01	*8/13/26*	• *Approved manufacturers for Ductile Iron Pipe revised.*

PART 1 - GENERAL

1.01 SCOPE

A. This section includes the furnishing and installing of ductile iron and PVC water pipe and ductile iron or cast iron fittings as specified.

1.02 SUBMITTALS

A. Submittals shall be provided by the Contractor to the Owner as outlined in Section 01300 for the following items related to the water distribution system, as required by the specific project. Not required for Owner supplied materials:

1. Bolts
2. Corporation Stop
3. Copper Pipe
4. Curb Stop
5. Cut in Sleeve
6. Ductile Iron Fittings
7. Ductile Iron Pipe
8. Insertion Valve
9. Fire Hydrant
10. Pipe Joint Restraint

11. Polyethylene Encasement (Poly Wrap)

12. PVC Pipe

13. Resilient Seated Gate Valve

14. Restrained Joint Gaskets

15. Service Box and Rod

16. Service Saddle

17. Stainless Steel Repair Clamp

18. Tapping Sleeve

19. Temporary plug

20. Tracer Wire & Marking Tape

21. Valve Box

PART 2 - PRODUCTS

2.01 GENERAL

A. Upon approval of the proposed Manufacturer and Product Series, the Contractor shall utilize that source for said material for the entirety of the Work unless otherwise approved by the Engineer to maintain consistency throughout the project.

B. Pipe delivered for construction shall be strung and protected so as to prevent entrance of any foreign material. Pipes that require cleaning as deemed necessary by the Owner shall be cleaned by the Contractor.

C. Any defective or imperfect materials furnished by the Contractor shall be marked as such and removed immediately from the site. Satisfactory materials shall be substituted for that rejected at no additional cost to the Owner.

D. All materials, products and coating that contact drinking water shall be certified to meet NSF/ANSI Standard 61 – latest revision, Drinking Water System Components – Health Effects.

2.02 BOLTS

A. Stainless Steel

1. Stainless steel bolts shall be Type 304 and contain the addition of Molybdenum to the nickel-chromium steels.

B. High Strength/Low Alloy Steel

1. Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel, and chrome (Cor-Blu).

2.03 CORPORATION STOP

A. Conforming to AWWA C-800.

B. 3/4-inch to 2-inch curb stops shall be ball valve design with brass ball that is Teflon coated or brass ball with Teflon seats.

C. The ball shall be supported by seats which are water tight in either direction.

D. The valve shall have a full port opening.

E. The body of the corporation stop shall be of heavy-duty design.

F. The valve working pressure shall be 300-psi.

G. Approved Manufacturers:

1. A.Y. McDonald

2. Cambridge Brass

3. Ford Meter Box Co.

4. Mueller Co.

2.04 COPPER PIPE

A. Conforming to ASTM B88.

B. Pipe shall be Type K.

C. Conforming to NSF/ANSI 61.

2.05 CURB STOP

A. Conforming to AWWA C-800.

B. 3/4-inch to 2-inch curb stops shall be ball valve design with brass ball that is Teflon coated or brass ball with Teflon seats.

C. The ball shall be supported by seats which are water tight in either direction.

D. The valve shall have a full-port opening.

E. The valve shall open with 1/4 turn (90°) with a check or stop.

F. The valve shall not have a drain.

G. The valve stem shall have 2 “O” rings and a bronze ring lock which holds the stem solidly in the valve body.

H. The valve body shall be of heavy-duty design.

I. The valve working pressure shall be 300-psi.

J. Approved Manufacturers:

1. A.Y. McDonald

2. Cambridge Brass

3. Ford Meter Box Co.

4. Mueller Co.

2.06 CUT-IN SLEEVE

A. The sleeve shall be mechanical joint to plain-end type.

B. The sleeve shall fit over either AB or CD pattern pipe.

C. Interior coating– Seal-coated – AWWA C104-74, min. 4 mils D.F.T.

D. Exterior coating – Bituminous coated, min. 4 mils D.F.T.

E. Mechanical joint connections

1. Glands: Duck-tipped for AB pipe, Plain Gaskets for CD pipe

F. Cut-in sleeves shall have at least one stop-screw in sizes up through 10-inch and at least 2 stop-screws in 12-inch size.

G. The stop-screw “O” ring shall be recessed into the body of the sleeve between stop-screw and body.

H. Approved Manufacturers

1. Mueller Co.

2.07 DUCTILE IRON FITTINGS

A. Fittings include but are not limited to bends, reducers, off-sets, tees and sleeves.

B. Material shall be ASTM A536 (latest revision), grade 70-50-05, in accordance with AWWA C110 (latest revision) for fittings larger than 24-inch and C153 (latest revision) for fittings 3-inch through 24-inch.

C. Fittings shall be cement lined AWWA C104 (latest revision) or fusion bonded epoxy coated with a 5-mil nominal thickness per AWWA C550 and C116.

D. Interior seal coated AWWA C104 with minimum of 4 mils dry film thickness.

E. Exterior bituminous coated, 4 mils minimum dry film thickness or fusion bonded epoxy coated with a 5-mil nominal thickness per AWWA C550 and C116.

F. Sleeves shall not be cement lined, but shall be bituminous coated inside to 4 mils dry film thickness. All sleeves shall be long body type.

G. Class 350 pressure rating in accordance with AWWA C153 - 3-inch - 24-inch sizes.

H. Class 250 pressure rating in accordance with AWWA C110 - 30-inch - 48-inch sizes.

I. The "compact design" fittings must provide adequate space for the MJ joint and accessories to be installed without special tools (i.e., Lowell wrench can be used).

2.08 DUCTILE IRON PIPE

A. Ductile iron pipe shall meet requirements of AWWA Standard C-151 (latest revision) and be cement lined and seal coated to meet AWWA Standard C-104 (latest revision).

B. Joints shall meet requirements of AWWA C-111 (latest revision).

C. Interior seal coated, bituminous paint oil cut, emulsion not acceptable, thickness minimum of 2 mils dry film thickness.

D. Exterior bituminous coated with minimum of 2 mils dry film thickness.

E. The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The zinc coating system shall conform to ISO 8179-1

F. Class 52 wall thickness.

G. State nominal laying length and mark shorter lengths near bell.

H. Approved Manufacturers

1. American Cast Iron Pipe Company

2. U.S. Pipe

2.09 FIRE HYDRANT

A. The hydrant shall open right.

B. Operating nut shall be DI or bronze, pentagon in shape with dimensions:

1. Top 1-13/16-inch tapering to 1-7/8-inch on bottom

C. Nozzles:

1. Two (2) each: 2-1/2-inch National Standard Thread

2. One (1) each: 4-1/2-inch National Standard Thread

D. Port covers shall be supplied without chains and shall have the same size pentagon operator as specified in 3.0(b) above.

E. Traffic model hydrant with breakaway feature.

F. Barrel Length

1. 6 ft. cover, 6.5 ft. bury; or

2. 5.5 ft. cover, 6 ft. bury; or

3. 5 ft. cover, 5.5 bury

G. Hydrant shoe or base shall have 6-inch MJ inlet and 5-1/4-inch valve opening with non-draining bronze seat that is permanently plugged. Valve seat and sub-seat arrangement shall be bronze to bronze. Horizontal and vertical blocking planes manufactured into hydrant base.

H. Protective Coatings

1. All paintings and coatings shall be a minimum of 3 mils total dry film thickness, unless noted

2. The internal area of the hydrant base, which is normally exposed to water and which includes the internal body of hydrant shoes, including lower valve plate, shall be epoxy coated

3. All internal and external cast iron or ductile iron components shall be coated with an approved bituminous coating, 3 mils minimum.

4. Coatings for upper barrel - exterior:

a. Surface preparation blast clean SSPC-SP-6

b. Primer Sherwin Williams Red Oxide E61RC21, 1.5 mils, dry

c. Finish coat Sherwin Williams – Regal Yellow, F78Y30, 1.5 mils, dry or sufficient paint to hide the second coat

d. Total dry film thickness - 3 mils minimum

5. Coatings for bonnet, operating nut, port cap:

a. Surface preparation: Blast clean, SSPC-SP-6

b. Exterior primer

c. Exterior aluminum

d. Total dry film thickness: 3 mils minimum.

I. The Owner shall install flow indicator collars on all new hydrants.

J. Approved Hydrants:

1. Clow Medallion

2. American Darling Models: B62B-1, B62B-5

3. Kennedy Guardian Model: K81D

2.010 INSERTION VALVE

A. Valve shall meet or exceed all requirements of ANSI/AWWA C-515 and ANSI/NSF 61.

B. Valve shall have a working pressure rating of 350psi.

C. Valve body, bonnet, stuffing box, and operating nut shall be made of ductile iron meeting ASTM A536. Body and bonnet shall meet the minimum wall thickness outlined in AWWA C-515. Operating nut shall be two (2) inch square.

D. Valve shall have a non-rising stem.

E. Valve ends shall be mechanical joint.

F. Valve stem diameter and number of turns shall be in line with AWWA C-515. Valve stem shall be bronze alloy meeting ASTM B98.

G. Valve shall be of type such that it shall seat on itself.

H. Valve shall open right.

I. Concrete base support shall be installed as required by the Manufacturer.

J. Approved manufacturers

1. Mueller PERMASEAL

2. TEAM InsertValve

2.011 HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

A. HDPE pipe shall be manufactured in accordance with AWWA C906. This material shall have a long-term Hydrostatic Strength of 1600 psi when tested in accordance with ASTM D2837. HDPE shall be manufactured from PE 4710 polyethylene compounds that meet or exceed ASTM D3350 cell classification 445574. The manufacturer shall comply with NSF Standard 61 and/or Standard 14 and must be certified by the NSF International for potable water.

B. The pipe and fittings shall have a Standard Dimension Ratio (SDR) of 11 and be rated for a working pressure of 200 psi at a temperature of 75 degrees Fahrenheit with a service life of 50 years. All pipe and fittings shall be ductile iron pipe size.

2.012 PIPE JOINT RESTRAINT

A. Use in conjunction with mechanical joint fittings.

B. The joint restraint ring and its wedging components shall be made of ductile iron conforming to ASTM A536-80.

C. Gasket should be made of styrene butadiene rubber (SBR) or nitrile butadiene rubber (NBR) as directed by the Engineer.

D. Dimensions of the restrainer must allow use with standard M.J. bell conforming to AWWA C111 and AWWA C153.

E. Restrainer must restrain up to 350-psi of working pressure in 3-inch to 16-inch sizes and 250-psi of working pressure in 18-inch to 48-inch sizes with a 2:1 safety factor.

F. Torque limiting twist off nuts shall be used to ensure proper actuation of the restraining wedges where applicable.

G. Approved Manufacturers

1. Sigma ONE-LOK

2. Ford Uni-Flange Series 1400

3. EBAA Mega Lug

4. Romac Grip Ring

5. Star Grip Series 300

6. Romac Romagrip

7. MJ FIELD LOK Gasket

2.013 POLYETHYLENE ENCASEMENT

A. Tube type polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA Standard C105 - latest revision, Method A.

B. Polyethylene encasement shall be V-Bio variety comprised of a three-layer LDPE material with anti-corrosivity properties and a total thickness of at least 8mm.

C. Circumferential wraps of tape or plastic tie straps shall be placed at 2-ft. intervals along the barrel of the pipe.

D. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight or watertight enclosure. All lumps of clay, mud, cinders, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embankment material from becoming trapped between the pipe and the polyethylene.

E. The polyethylene film shall be fitted to the contour of the pipe to affect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene

due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement in place until backfilling operations are complete.

F. Three layers of polyethylene adhesive tape shall be wrapped around any polyethylene wrapped pipe where a tapping machine will be placed. All copper services connected to a pipe wrapped in polyethylene encasement shall be wrapped within three feet of the pipe.

2.014 PVC PIPE

A. Pipe shall be AWWA C-900 Pressure Class 305-psi (DR-14).

B. The pipe shall conform to standard ASTM 2241.

C. The pipe shall be provided in 20-foot lengths. If approved by the Engineer, field cutting per Manufacturer's recommended practices.

D. The gasket or O-Ring material shall be rubber meeting ASTM F 477 and of the "permanent use" type.

E. Where pipe slip joints are called to be restrained, restrained joint gaskets shall be internally installed from the manufacturer.

F. All small diameter service connections shall be made with tapping saddles.

G. Tracer wire and marking tape shall be installed along the length of the main.

H. Approved Manufacturers:

1. J-M Manufacturing - Blue Brute

2. Certainteed – Yelomine

3. Victaulic – Aquamine

4. IPEX – Blue Brute

2.015 RESILIENT SEATED GATE VALVE

A. Valve shall meet the latest revision of the AWWA C-515 and AWWA C-509 standards for 4-inch diameter valves and larger and 2-inch diameter valves, respectively.

B. Valve shall have a smooth unobstructed water way which shall be a minimum diameter of the valve.

C. Valve shall be rated for zero leak rate at 200-psi differential working pressure and have a 400-psi hydrostatic test for structural integrity.

D. Sealing - Valve shall have a minimum of 2 "O" rings situated such that the "O" rings above the thrust collar can be replaced with the valve under pressure and in the open position.

E. Valve stem shall:

1. Open right with a stem nut made of copper-alloy

2. Be on-rising

3. Include a thrust collar integrally cast to the stem

4. Include with two (2) thrust washers, placed one above and one below the stem thrust collar

5. Be constructed of copper-alloy or stainless steel

6. Constructed such that the thrust washers are made of a synthetic polymer with physical properties required or stainless steel

F. The body, including the stuffing box and the bonnet, shall be constructed of cast iron or ductile iron, meeting the latest revision of AWWA C-153

G. Wedge shall be constructed of ductile iron (less guiding mechanism), fully encapsulated and permanently bonded with a resilient elastomer, constructed such to allow the flushing of any interior exposed surface during operations.

H. Coatings

1. the internal and external valve body, including the stuffing box, bonnet, and interior of the wedge shall be fusion bonded epoxy coated with 8 mils D.F.T.

2. interior shall meet latest version of AWWA C-550

3. shall be holiday free, interior and exterior, per testing method described in AWWA C-550, Sec. 5.1

I. Operating nut shall be two inch (2-inch) square gray iron or ductile iron with a hold down nut (made of 316 stainless steel or silicone bronze), for tapered stems. Or, a stainless-steel pin inserted through the stem for full diameter stems.

J. Bolts – The seal plate and bonnet bolts shall be stainless steel (Type 316 or Type 304)

K. Valves 12-inch nominal diameter and smaller shall be directly operated by the nut on the valve stem and mounted vertically. Number of turns to open or close shall match the formula: (3 x D) + 2 within +/- 2 turns. For example, a 12-inch valve should open or close with (3 x 12) + 2 = 38 turns of the operating nut.

L. Valves larger than 12-inch nominal diameter shall be designed to be installed horizontally and shall have bevel gear operators driven by the operating nut. Valves 14-inch – 24-inch nominal diameter shall have 4:1 bevel gear operators. Valves with 30-inch – 36-inch nominal diameters shall have 6:1 bevel gear operators and valves with 42-inch – 48-inch nominal diameters shall have 8:1 bevel gear operators. Number of turns to open or close shall match the formula: ((3 x D) + 2) times the bevel gear ratio within +/- 4 turns. For example, a 24-inch valve should open or close with approximately ((3 x 24) + 2) x 4 = 296 turns of the operating nut.

M. Contractor may be required to supply a valve for inspection and approval of the coating system.

N. Approved Manufacturers (4-inch diameter and larger)

1. AFC Series 2500

2. Mueller A-2361/62

3. Clow Model 2638

O. Approved Manufacturers (2-inch diameter)

1. Mueller A-2361/62

2. Clow Model 2639/2640

2.016 RESTRAINED JOINT GASKETS

A. Accepted restrained joint gaskets in the Portland Water District distribution system shall be rated in accordance with the performance requirements of ANSI/AWWA C111/A21.11.

B. Required applications:

1. Any hydrant branch or service with a distance greater than 18-foot shall have an approved restrained joint gasket in the bell ends.

2. Where a casing is required, all joints within the casing shall have an approved restrained joint gasket unless restrained joint pipe is used.

3. At any time as required by the Owner or Engineer.

4. Any live service taps where there is a joint between the connection and the end of the service.

C. Approved Manufacturers

1. American Fast-Grip Gasket – American Pipe

2. Gripper Gasket FT Series – American Pipe

3. Field Lok 350 Gasket – US Pipe

4. ROMAC Piranha Gasket – US Pipe

5. Gripper Gasket GG Series –US Pipe

2.017 SERVICE BOX AND ROD

A. Service box

1. Shall be 1-inch Schedule 40 steel pipe with top having 1-inch N.P.T. pipe threads for screw-on cover or coupling.

2. Shall be Erie style with 6-foot slide-type riser.

3. Any extension of a service box requires a threaded merchant coupling with no set screw.

4. Approved Manufacturers

    a. Laroche

    b. Clow Canada

    c. Bibby

B. Cover

1. Cover shall allow for screw-on assembly with service box and meet ASTM A-48 Grade 30B. Shall be tapped with a 1-inch rope thread with a solid brass plug with pentagon operating head

2. Approved Manufacturers

    a. Bibby

    b. Laroche

    c. Clow Canada

    d. QWP

C. Service box foot piece

1. The standard foot piece shall be heavy duty (Ford style or equal) cast iron design.

2. The large, heavy-duty foot piece shall have an arch that will fit over 2-inch ball-valve curb stops

3. Approved Manufacturers

    a. Bibby

    b. Laroche

D. Service Rod

1. Shall have a self-aligning design

2. 36-inch length for all services

3. 24-inch length for air valves

4. Shall be round and constructed of stainless steel (304) with an epoxy coating (minimum 4 mil D.F.T.)

5. Shall have a yoke design that is an integral part of the rod

6. The curb-stop attachment pin shall be a brass cotter pin

7. The rod “wrench-flat” shall have a minimum thickness of 1/4-inch tapered to 1/16-inch and width of 5/8-inch or 1/2-inch.

8. Diameter:

    a. 1/2-inch for 1/2-inch, 3/4-inch, and 1-inch services

    b. 5/8-inch diameter for 1.5-inch and 2-inch services

2.018 SERVICE SADDLE

A. GENERAL

1. The saddle body shall be constructed of epoxy coated ductile iron.

2. The sealing gasket(s) shall be either Buna-N rubber or SBR rubber (ASTM D2000).

3. Service saddles shall be of a CC tap type.

B. PVC MAIN REQUIREMENTS

1. Service saddles installed on PVC mains shall have stainless steel straps.

C. HDPE MAIN REQUIREMENTS

1. Service saddles installed on HDPE mains shall have spring washers.

D. Approved Manufacturers (see accompanied table below)

1. Smith Blair

2. ROMAC

MAIN TYPE	MAIN SIZE	TAP SIZE	APPROVED SADDLES
GALV	2-inch	3/4-inch & 1-inch	Smith-Blair 315 Smith-Blair 317 ROMAC 101NU ROMAC 202NU
CAST	2.25-inch	3/4-inch & 1-inch	Smith-Blair 315 Smith-Blair 317
CAST & DI	4-inch - 12-inch	1.5-inch	Smith-Blair 313 Smith-Blair 331 ROMAC 101NU ROMAC 202NU
CAST & DI	4-inch - 12-inch	2-inch	Smith-Blair 313 ROMAC 101NU ROMAC 202NU
CAST & DI	16-inch	1.5-inch & 2-inch	Smith-Blair 313

CAST & DI	20-inch - 36-inch	1.5-inch & 2-inch	Smith-Blair 366
PVC	1-inch	3/4-inch	Smith-Blair 315
PVC	1.5-inch	3/4-inch & 1-inch	Smith-Blair 315 Smith-Blair 317 ROMAC 101NS
PVC	2-inch	3/4-inch & 1-inch	Smith-Blair 315 Smith-Blair 317 Smith-Blair 397 ROMAC 101NS ROMAC 202NS
PVC	4-inch - 12-inch	3/4-inch - 2-inch	Smith-Blair 317 Smith-Blair 397 ROMAC 101NS ROMAC 202NS
HDPE	2-inch	3/4-inch & 1-inch	Smith-Blair 317 ROMAC 101N-H
HDPE	4-inch - 12-inch	3/4-inch - 2-inch	Smith-Blair 317 ROMAC 101N-H ROMAC 202N-H

2.019 STAINLESS STEEL REPAIR CLAMP

A. The sleeve shall be of full circle design, either one piece or two pieces, for pipe sizes 2-inch through 12-inch

B. Body: Shall be 18-8 stainless steel shell.

C. Gasket: Shall be full length and diameter of the body size. This gasket shall form a multiple O-ring, or grid, sealing barrier for the entire length and circumference. Shall be virgin SBR rubber (ASTM D2000 AA 415)

D. Lugs, sidebar, and lifting bar shall be heavy gauge 18-8 stainless steel with TIG/MIG welding and chemical passivation of all welds.

E. Bolts and Nuts shall be Teflon coated 18-8 heavy gauge stainless steel.

F. Armor: The armor, or bridging plate between the side bars shall be heavy gauge 18-8 stainless steel bonded to the gasket to bridge the lug area.

2.020 TAPPING SLEEVE

A. 12-inch Diameter or Less

1. Tapping sleeve shall be ductile iron, stainless steel, or approved fabricated steel.

2. Tapping sleeve shall be mechanical joint with recessed outlet flange for tapping valve.

3. Tapping sleeve shall conform to AWWA C-207, Class D, with rated maximum working pressure of 200-psi.

4. The side rubber gaskets shall be rectangular in cross-section and fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve and shall not require cutting or trimming to match MJ end gaskets.

5. Tapping sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.

6. All flange outlet bolts shall be stainless steel (Type 304).

7. Interior and exterior to be bituminous coated with a minimum of 4 mils dry film thickness or fusion bonded epoxy coated.

8. The sleeve shall be provided with a 3/4-inch F.I.P.T. test port and brass lug.

9. Approved Manufacturers

    a. AFC

    b. Mueller Co.

    c. US Pipe

    d. Tyler / Union

    e. Powerseal Model 3490 and 3490 MJ (Fabricated Steel)

    f. Romac SST

    g. TPS Triple Tap

B. 16-inch Diameter or Greater

1. tapping sleeve shall be fabricated steel:

2. Body and Flange - A-36

3. Coating - Fusion-bonded epoxy coating with minimum D.F.T. of 5 mils, inside and out

4. Bolts, Nuts - Stainless Steel (Type 304)

5. Gaskets – SBR

6. Flange - AWWA Class D plate flange with ANSI 150# drilling, proper recessing for tapping valves

7. Sleeves shall be provided with 3/4-inch F.I.P.T. test port and plug

8. Approved Manufacturers

    a. Romac FTS 420

    b. Ford FTSC

c. Smith Blair 622

d. JCM 412

e. Powerseal Model 3490 and 3490 MJ (up to 24-inch)

f. JCM 415 or approved equal (for RCCP pipe only)

g. TPS Triple Tap

2.021 TRACER WIRE & MARKING TAPE

A. Water Main Marking Tape

1. Lineguard III by Tri-Sales, Inc., 2" wide, blue; detectable with magnetic locators, or approved equal.

B. Tracer Wire

1. Copperhead Industries part number 1230-SF, or approved equal.

C. Tracer Wire Splice Kits:

1. 3M Brand DBR Direct Bury Splice Kit, or approved equal.

D. Grounding Rod

1. Copperhead 1-lb, Drive-In Magnesium anode (part number ANO-1005 with part number SCB-01SR Connector), or equal.

2.022 VALVE BOX

A. General

1. Material shall be cast iron or ductile iron free from defects.

2. Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

3. The minimum total length of valve box top and bottom sections shall be as follows:

a. Projects in Windham, Raymond, Standish: 78-inches.

b. Projects in all other municipalities: 72-inches.

4. Valve boxes shall be two (2) piece sets (i.e., top and bottom section).

5. Valve box sections and cover shall be round.

6. Valve box sections shall be of a slide or slip design.

7. Valve box bottom sections are not required to be of the same manufacturer as the top section.

8. Valve box top section and cover must be of the same manufacturer.

B. Valve Box Bottom-Section

1. The valve box bottom section shall have a bell-type base with bottom lip and have an inside diameter between 5-inches and 5.5-inches.

2. Approved manufacturers:

a. Bibby St-Croix

b. EJ

c. Bingham & Taylor

d. Tyler Union

e. Sigma

C. Valve Box Top-Section

1. The valve box top section shall not have a top flange or “bead” or bottom flange and have an inside diameter of between 6-inches and 6.5-inches measured from the base.

2. Approved manufacturers:

a. Bibby St-Croix

b. EJ

c. Bingham & Taylor

d. Sigma

D. Valve Box Cover

1. The valve box cover shall be a drop-type design and have a 2-inch depth.

2. The word ‘water’ shall be cast into the cover

3. Approved manufacturers:

a. Bibby St-Croix

b. EJ

c. Bingham & Taylor

PART 3 - EXECUTION

3.01 PIPE LAYING CONDITIONS

A. Pipe shall not be laid in water, or when trench conditions or weather conditions are unsuitable for such work.

B. The interior of each pipe shall be inspected while being joined to see that the alignment is preserved and to assure that no dirt or debris has entered the pipe after laying and partial backfilling.

C. Pipe fittings and accessories shall be carefully lowered into the trench, piece by piece, by means of derrick, crane, slings and other suitable tools and equipment, in a manner such as to prevent damage to the material or to its protective coating and linings. No chain or slings shall be passed through the inside bore of any pipe or valve or fitting. Under no circumstances shall piping materials be dropped or dumped into the trench.

3.02 LAYING DUCTILE IRON & PVC PIPE

A. As soon as the excavation is completed and the existing trench bottom has been brought to the proper grade, the pipe shall be laid.

B. All pipe, before being lowered into the trench, shall be inspected inside and out. Both ends shall be cleaned and any visible dirt or debris removed from inside the pipe and the interior of all affected pipe and fittings shall be swabbed with a 5% hypochlorite solution immediately before they are installed. Care shall be taken to lay the pipe to true lines and grades as shown on the drawings.

C. Coupling holes shall be excavated so that the barrel of the pipe shall bear upon the trench bottom.

D. Blocking under the pipe will not be permitted.

E. Each section shall rest upon the pipe bed for the full length of its barrel.

F. The circular rubber gasket shall be inserted in the gasket seat provided. A thin film of gasket lubricant shall be applied to the inside surface of the gasket. Gasket lubricant shall be an NSF60 certified solution of vegetable soap or other solution supplied by the pipe manufacturer.

G. The spigot end of the pipe shall be cleaned with an approved soap solution and entered into the rubber gasket in the bell, using care to keep the joint from contacting the ground. The joint shall then be completed by forcing the plain end to the seat of the bell. Pipe which is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.

H. Pipe shall be aligned with the preceding unit and laid so as to form a close joint with the adjoining pipe and bring the inverts continuously to the required line and grade.

I. No length of pipe shall be laid until the previous length has had sufficient material tamped about it to firmly secure it in place so as to prevent any movement or disturbance.

J. The pipe shall be laid with the bell ends facing the direction of the laying, unless otherwise permitted by the Engineer.

K. Maximum pipe deflection shall not exceed 76% of the manufacturer's maximum listed deflection.

L. Joints, when made, shall be done in the manner prescribed by the manufacturer of the pipe. In the case of rubber gasket joints, these joints shall be made up in accordance with the American National Standards for the jointing of cast iron pressure pipe and fittings. (ANSI/AWWA C111/A21.11).

M. Joints of all pipes in the trench shall be completed before work is stopped; and all openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons.

N. Thrust blocks shall be used behind tees, bends, or other fittings where shown. Size shall be appropriate for soil conditions and thrust forces acting on the specific fitting.

3.03 TRENCH BOTTOM

A. Should the trench bottom contain unsuitable material, as indicated in Section 02217, Article 3.2-b, the Contractor shall over-excavate and replace with bedding material as required and authorized by the Engineer. The quantity of unsuitable material will be measured from the bottom outside of the pipe.

B. Should ledge be encountered, it shall be removed to a depth of 6-inch below the bottom of the pipe, and replaced with bedding material.

3.04 CUTTING PIPE

A. All ductile iron pipe and PVC shall be cut using abrasive wheel cutter, rotary wheel hand cutter (with carbide cutter) or a guillotine pipe saw. All cuts shall be square and even with no ragged rough ends.

B. Field cut pipe lengths shall be beveled and filed to avoid damage to the gasket and facilitate making the joint.

C. When the cut end of pipe is to be used as a joint, the outside of the cut end shall be tapered back about 1/8-inch at an angle of about 30 degrees with the center line of the pipe. This shall be done with a coarse file or a portable grinder.

3.05 TEMPORARY PLUGS

A. When pipelaying is not in progress, the openings of pipes shall be closed by mechanical joint cap or approved equal as reviewed by the Owner.

3.06 RETAINER GLANDS

A. Install retainer glands on all mechanical joints of fittings, valves and hydrants.

3.07 POLYETHYLENE ENCASEMENT

A. Tube type polyethylene encasement shall be installed on all ductile iron pipe and fittings in accordance with AWWA Standard C105 - latest revision, Method A. Circumferential wraps of tape or plastic tie straps shall be placed at 2-ft. intervals along the barrel of the pipe.

B. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight or watertight enclosure. All lumps of clay, mud, cinders, and so forth, on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be exercised to prevent soil or embankment material from becoming trapped between the pipe and the polyethylene.

C. The polyethylene film shall be fitted to the contour of the pipe to affect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, plastic tie straps, or any other material capable of holding the polyethylene encasement in place until backfilling operations are complete.

3.08 VALVE BOX INSTALLATION

A. Valve boxes shall be installed centered on the valve.

B. Valve boxes shall be installed level such that the valve may be operated when the trench is back-fill and when pavement is installed.

C. Valve box top and bottom sections shall have a minimum of six (6) inches of overlap between the two sections when installed.

D. Contractor shall determine the length of valve box top and bottom sections based on field conditions (e.g., if the valve is installed deeper than the plan due to a utility conflict, a taller top or bottom section may be required).

1. Multiple valve box bottom sections may not be stacked to provide sufficient height.

3.09 TAPPING SADDLE INSTALLATION

A. DUCTILE IRON & CAST IRON MAIN REQUIREMENTS

1. Service saddles shall be used for all new 1.5-inch and 2-inch services on ductile iron water mains.

2. Service saddles shall be used for all 2-inch non-service connections to existing ductile iron or cast iron water mains (e.g., temporary main connections).

B. PVC MAIN REQUIREMENTS

1. 2-INCH MAINS

a. Service saddles shall be required for all new 3/4-inch and 1-inch services tapped on PVC mains.

2. 4-INCH AND GREATER MAINS

a. Service saddles shall be required for all new 1-inch services tapped against a pressurized PVC main.

b. Service saddles shall not be required for new 1-inch service taps against non-pressurized PVC mains.

c. Service saddles shall be required for all new 1.5-inch and 2-inch services on PVC mains.

d. Service saddles shall be required for all 2-inch non-service connections to existing PVC mains (e.g., temporary main connections).

C. HDPE MAIN REQUIREMENTS

1. Service saddles shall be used for all new 1-inch, 1.5-inch, and 2-inch services on HDPE water mains.

2. Service saddles shall be used for all 2-inch non-service connections to existing HDPE mains (e.g., temporary main connections).

3.010 TRACER WIRE & MARKING TAPE INSTALLATION

A. Warning Tape

1. Install warning tape continuously along the PVC/HDPE water main. At ends of rolls and repairs, splice tape with 3-foot overlap connected with duct tape. Tape should be installed at a depth of two (2) feet above the water main.

B. Tracer Wire

1. Install tracer wire continuously between each end of the PVC/HDPE water mains. It shall be installed in the same trench as the pipe and secured to the pipe as required to ensure the wire remains adjacent to the pipe.

2. Tracer wire shall be grounded at all ends of the wire by connecting the wire to an approved waterproof connection to a grounding anode, buried at the same depth as the tracer wire.

3. Tracer wire shall be installed up through a valve box at each end of the PVC/HDPE water main. The wire shall accessible by hand from the surface, and shall be installed with enough slack to allow for adjustments to the elevation of the valve box for paving.

a. At the point of connection between existing conductive pipes where there is not a valve box installed, the tracer wire shall not be connected to the iron pipe.

3.011 TRACER WIRE TESTING

A. After trench backfill is completed, perform continuity and trace tests on all tracer wire in the presence of the Owner. If the tracer wire is found to be not continuous after testing, the Contractor shall repair or replace the failed segment of wire. The Contractor shall be responsible for all costs to confirm, locate, and repair any breaks in the tracer wire identified during testing.

3.012 SERVICE BOXES INSTALLED IN SIDEWALKS OR DRIVEWAYS

A. All service boxes installed in a sidewalk, driveway, or otherwise drivable surface regardless of material, shall be installed in a valve box top section.

3.013 LARGE DIAMETER SERVICE/HYDRANT PIPING RESTRAINT

A. When installing larger diameter (4-inches and greater) ductile iron service and hydrant branch piping, all slip joints shall be installed with restrained joint gaskets.

3.014 MAINS INSTALLED WITHIN CASING PIPES

A. All mains installed within a large diameter casing pipe shall be installed with end seals and spacers within the casing. Spacing of the spacers shall be as outlined in the drawings.

-- END OF SECTION --