

DIVISION 15MECHANICALScope of Work

Provide, install and test all equipment and appurtenant work in complete accordance with the Drawings and Specifications.

Contractor's Duties

Except as specifically noted, provide and pay for all labor, materials, equipment, tools, machinery, water, heat, other facilities and services necessary for proper execution and completion of the Work.

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END OF SECTION

SECTION 15088COUPLINGS & CONNECTORSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install couplings and connectors of the type(s) and size(s) in the location(s) specified herein.
- B. Related Work Specified Elsewhere: "Pipe & Pipe Fittings - General" is specified in Division 2.

1.2 QUALITY ASSURANCE

- A. Minimum pressure rating equal to that of the pipeline in which they are to be installed.
- B. Couplings and connectors, other than those specified herein, are subject to the District's approval.

PART 2 - PRODUCTS2.1 MATERIALS

- A. All Couplings and Connectors:
 - 1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipes.
 - 2. Diameters to properly fit the specific types of pipes on which couplings and connectors are to be installed.
- B. Sleeve Type Couplings (When Applicable):
 - 1. Exposed Couplings (When Applicable):
 - a. Steel middle ring,
 - b. Two steel follower rings,
 - c. Two wedge-section gaskets,
 - d. Sufficient steel bolts to properly compress the gaskets,
 - e. Acceptable Manufacturers:
 - (1) Dresser Manufacturing Co. - Style 38,
 - (2) Rockwell - Style 431,
 - (3) Or equivalent.
 - 2. Buried Couplings (When Applicable):
 - a. Cast iron or epoxy coated steel middle rings with pipe stops removed,
 - b. Two malleable iron or epoxy coated steel follower rings with ribbed construction,
 - c. Two wedge-section gaskets,
 - d. Sufficient ASTM A588 or galvanized steel nuts and bolts to properly compress the gaskets,
 - e. Acceptable Manufacturers:
 - (1) Dresser Manufacturing Co. - Style 38 and/or 153,
 - (2) Rockwell - Style 431, and/or 441,
 - (3) Or equivalent.
- C. Split Type Couplings (When Applicable):
 - 1. Constructed from malleable or ductile iron.

2. For use with grooved or shouldered end pipe with minimum wall thickness as required so as not to weaken pipe.
 3. Cast in two segments for 3/4 inch through 14 inch pipe sizes, four segments for 15 inch through 24 inch pipe sizes, and six segments for pipe sizes over 24 inch.
 4. Coating: Enamel.
 5. Bolts: Carbon steel.
 6. Acceptable Manufacturers:
 - a. Victaulic Company of America, Style 77 for IPS Pipe, Style 31 for Ductile Iron Pipe.
 - b. Gustin-Bacon Co.,
 - c. Or equivalent.
- D. Flanged Adapters (When Applicable):
1. For joining plain end or grooved end pipe to flanged pipes and fittings.
 2. Adapters shall conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150 pound standard unless otherwise required for connections.
 3. Exposed Sleeve Type:
 - a. Constructed from steel.
 - b. Coating: Enamel.
 - c. Bolts: Carbon steel or ASTM A588 steel.
 - d. Acceptable Manufacturers:
 - (1) Dresser Manufacturing Co. - Style 128 for cast iron, ductile iron and steel pipes with diameters of 2 inches through 96 inches,
 - (2) Or equivalent.
 4. Buried Sleeve Type:
 - a. Constructed from cast iron.
 - b. Bolts: ASTM A588 steel or galvanized steel.
 - c. Acceptable Manufacturers:
 - (1) Dresser Manufacturing Co. - Style 127 locking type for cast iron, ductile iron, asbestos cement and steel pipes with diameters of 3 inches through 12 inches,
 - (2) Or equivalent.
 5. Split Type:
 - a. Constructed from malleable or ductile iron.
 - b. For use with grooved or shouldered end pipe.
 - c. Coating: Enamel.
 - d. Acceptable Manufacturers:
 - (1) Victaulic Company of America - Style 741 for IPS pipe, or Style 341 for Ductile Iron Pipe, for pipe diameters of 2 inches through 12 inches,
 - (2) Victaulic Company of America - Style 742 for IPS pipe, or Style 342 for Ductile Iron Pipe, for pipe diameters of 14 inches through 16 inches,
 - (3) Or equivalent.
- E. Flexible Joints:
1. Expansion Joints:
 - a. Materials shall be capable of withstanding the temperature, pressure and type of material in the pipeline.
 - b. Shall be the filled arch type that will prevent sediment build up for all sludge, sewage, and other lines with similar service.

- c. Supplied with control rods to restrict elongation and compression.
 - d. Metal retaining rings shall be split and bevelled galvanized steel for placement against the flange of the expansion joint.
2. Deflection Joints:
- a. Joints designed to permit a nominal maximum deflection of 15 degrees in all directions from the axis of the adjacent pipe length, will prevent pulling apart, and will remain water-tight at any angle of deflection under 15 degrees.
 - b. Material to be manufactured from a composition material suitable for exposure to the liquid, pressure and temperature to be contained within the pipe.
 - c. Supplied with control rods as required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Sleeve Type Couplings (When Applicable):
- 1. Thoroughly clean pipe ends for a distance of 8 inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
 - 2. Slip a follower ring and gasket (in that order) over each pipe and place the middle ring centered over the joint.
 - 3. Insert the other pipe length into the middle ring the proper distance.
 - 4. Press the gaskets and followers evenly and firmly into the middle ring flares.
 - 5. Insert the bolts, finger tighten and progressively tighten diametrically opposite nuts uniformly around the adapter with a torque wrench applying the torque recommended by the manufacturer.
 - 6. Insert and tighten the tapered threaded lock pins.
 - 7. Insert the nuts and bolts for the flange, finger tighten and progressively tighten diametrically opposite bolts uniformly around the flange to the torque recommended by the manufacturer.
- B. Split Type Flange Adapters (When Applicable): Install in the same manner as Split Type Couplings.
- C. Buried Cast Iron Couplings, Adapters and Connectors (When Applicable): Thoroughly coat all exterior surfaces, including nuts and bolts, after assembly and inspection by the District with a heavy-bodied bituminous mastic as approved by the District.
- D. Buried Epoxy Coated Steel Couplings: Thoroughly coat all exterior surfaces, including nuts and bolts after assembly and inspection by the District with a coal tar approved by the District. Prior to coating, roughen the epoxy with emory paper and follow with a solvent cleaner (aeromatic similar to xylol). Dry film thickness of the coal tar is to be 12-16 mils.
- E. Install thrust rods, supports, and other provisions to properly support pipe weight and axial equipment loads.
- F. All sleeve couplings shall be restrained with tie rods when used on pressurized lines.

END OF SECTION

SECTION 15092PIPE SLEEVES & SEALSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install wall sleeves and seals of the type(s) and sizes(s) and in the location(s) specified herein.
- B. Related Work Specified Elsewhere: "Pipe and Pipe Fittings - General" is specified in Division 2.

1.1 QUALITY ASSURANCE

- A. Provide and install all sleeves of the types specified herein, as shown on the Drawings and as directed by the District.
- B. Provide sleeves that are airtight, gastight or watertight as required.

PART 2 - PRODUCTS2.1 TYPES AND LOCATIONS

- A. Concrete Tank Walls:
 - 1. Steel pipe with 1 inch x 1/8 inch thick welded fin in middle, hot-dip galvanize after fabrication.
 - 2. Schedule of pipe and size of pipe as required by seal manufacturer.
 - 3. Rubber link compression seal.
- B. Concrete Foundation Walls, Pipe Below Grade and into Interior Space: Same as concrete tank walls.
- C. Foundation Walls Below Grade:
 - 1. Schedule 40 or max. 3/8 inch thick wall galvanized steel sleeve.
 - 2. Minimum 1/2 inch annular space.
 - 3. Firmly pack with oakum and seal both ends with elastic cement.
- D. Other conditions shall be sleeved as shown on the Drawings or as approved by the District.
- E. Rubber Link Seals:
 - 1. Multi-rubber link type with pressure plates, bolts, nuts and sealing element providing a leakproof seal.
 - 2. General Service:
 - a. Delrin plastic pressure plate.
 - b. Carbon steel zinc-phosphated nut and bolt.
 - c. Sealing element: EPDM rubber.
 - d. -40°F. to 250°F. rating.
 - 3. Corrosive Service: (Where Applicable):
 - a. Pressure plate: Delrin plastic.
 - b. Bolt and nut, 18-8 stainless steel.
 - c. Sealing element: EPDM rubber.
 - 4. Acceptable Manufacturers:
 - a. Link Seal by Thunderline Company
 - b. Or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. New construction: Set sleeves in proper location prior to placing concrete.
- B. Existing Construction:
 - 1. Concrete: The location must be approved by the District prior to cutting hole.
 - 2. Holes shall be located to avoid the reinforcing steel when possible.
 - 3. Holes bored with equipment leaving a smooth hole, less than 1/2 inch larger than the pipe, will not require a sleeve, unless otherwise specified.
 - 4. Fill the opening around the pipe with a non-hardening sealant.
 - 5. Place a non-shrink sleeve grout in other holes.
 - 6. Use sleeves with water stop fins at locations required to be watertight.
 - 7. Masonry: Cleanly cut block and brick as required and grout sleeve in place.
- D. Rubber Link Seals: Install as required and in strict accordance with the manufacturer's instructions and recommendations.

END OF SECTION

SECTION 15094PIPE HANGERS & SUPPORTSPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install pipe hangers and supports to rigidly support pipes, maintain the necessary pitch, prevent vibration, and to allow expansion and contraction of the type(s) and in the location(s) specified herein.
- B. Related Work Specified Elsewhere: "Pipe & Pipe Fittings - General" is specified in Division 2.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Overhead Hangers:
1. For pipes 8 inches in diameter and smaller:
 - a. Adjustable clevis.
 - b. Acceptable manufacturers:
 - (1) Grinnel Co., Fig. 260.
 - (2) Fee & Mason Mfg. Co., Fig. 104 or 239
 - (3) Or approved equal.
 2. For pipes larger than 8 inches in diameter:
 - a. Single pipe rolls and sockets.
 - b. Acceptable Manufacturers:
 - (1) Grinnel Co., Fig. 171 or 181.
 - (2) Fee & Mason Mfg. Co., Fig. 170.
 - (3) Or approved equal.
 3. For insulated pipe use insulation protection shield, Grinnel Co., Fig. 167 or equivalent.
 4. For copper piping:
 - a. Copper plated malleable iron.
 - b. Acceptable manufacturer:
 - (1) Grinnel Co., Fig. CT-122-R.
 - (2) Fee & Mason Co., Fig. 307.
 - (3) Or approved equal.
 5. Threaded hanger rods:
 - a. Right-hand and left-hand machine threads.
 - b. Suspended from beam clamps or galvanized inserts in concrete.
 - c. Acceptable manufacturers:
 - (1) Grinnel Co., Fig. 140 or 253.
 - (2) Fee & Mason Mfg. Co., Fig. 267.
 - (3) Or approved equal.
- B. Pipe Saddle Supports:
1. Adjustable type with pipe and floor flanges.
 2. When used under base fittings, substitute matching floor flanges for saddle sections.
 3. Acceptable manufacturers:
 - a. Grinnel Co., Fig. 264.
 - b. Fee and Mason Mfg. Co., Fig. 291.
 - c. Or approved equal.

- C. Wall and column supports:
 - 1. Welded steel brackets with anchor chairs.
 - 2. Install additional wall bearing plates where required for wall brackets.
 - 3. Acceptable manufacturers:
 - a. Grinnel Co., Figs. 194, 195, and 199.
 - b. Fee & Mason Mfg. Co., Figs. 151, 153 and 155.
 - c. Or approved equal.
- D. Brick and Concrete Piers:
 - 1. Locate where shown on the Drawings and/or where required for proper support.
 - 2. Construct piers to accurately conform to the bottom one-third to one-half of the pipe.
- E. Plastic Pipe Hangers:
 - 1. Plastic coated hangers.
 - 2. Acceptable manufacturers:
 - a. Grinnel Co., Fig. 97C.
 - b. Fee & Mason Mfg. Co., Fig. 200.
 - c. Or approved equal.
- F. Miscellaneous Hangers: As approved by the District.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- 1. Install hangers or supports at all changes in direction and at the end of piping runs.
- 2. Install all hangers, supports, rods, inserts, clamps, bolts and other supporting devices of sizes and spacings to prevent loads from exceeding the manufacturer's maximum recommended loading with a safety factor of 5.
- 3. Secure hangers to beams or approved concrete inserts where possible.
- 4. When piping is installed on structural steel supports, provide blocking of pipe rolls to prevent lateral pipe movement.
- 5. Do not support piping from other pipes or from stairs and walkways.
- 6. Set all inserts before the concrete is placed.
- 7. Hangers secured to precast concrete plank construction shall be attached by means of steel plates placed on the upper side of the plank, with the hanger rod extending through the plate and secured by means of a nut and lock washer. The hole in the plank shall be grouted to fill the void through which the hanger rod protrudes in order to distribute the load over the full area of the hanger plate. Plates shall conform to the following schedule.

Size of Pipe Supported (inches)	Plate Thickness (inches)	Minimum Plate Size (inches)
1/2 to 1	3/16	4 x 4
1-1/2 to 2	3/16	5 x 5
2-1/2 to 4	1/4	6 x 6
5 to 6	1/4	10 x 10
Over 6	1/4	12 x 12

- B. Expansion and Contraction:
1. Rigidly support all piping with adequate provisions for expansion and contraction.
 2. Firmly anchor horizontal runs over 50 feet in length at the midpoint of the runs to force expansion equally toward the ends.
- C. Spacing:
1. Install hangers and supports at sufficiently close intervals to maintain alignment and prevent sagging.
 2. Maximum spacing of hangers and supports:

<u>Pipe Size (inches)</u>	<u>Spacing (feet)</u>
1 & smaller	6
1-1/4 to 2	9
2-1/2 to 3	11
4 and larger	14
C.I. Soil Pipe (all sizes)	5
P.V.C. (all sizes)	As recommended by manufacturer
Fiberglass	As recommended by manufacturer

- D. Supporting Vertical Piping:
1. Support at each floor level.
 2. Support at all points necessary to insure rigid installation with adequate provisions to allow expansion and contraction and prevent vibration.
 3. Support by approved pipe collars, clamps, brackets, or wall rests.
- E. Supporting PVC and Fiberglass Piping (when applicable):
1. Support in strict accordance with the manufacturer's instructions and recommendations for the conditions of operation temperature and size of pipe.
 2. Support in a manner which will prevent subsequent visible sagging of the pipe between supports due to plastic deformation.
- F. Drain, waste, and vent piping: Support by adjustable hangers.
- G. Valves, Fittings & Specialties: Independently support pipe connected to pumps, equipment and piping systems.
- H. Temporary pipe supports:
1. Lay out each section of pipeline and make connections while the pipe is held in temporary supports.
 2. After the completion of connections in each section of pipeline, hold the section in place with temporary clamps.
 3. Do not remove the temporary clamps until the piping is correctly installed on the permanent supports.

END OF SECTION

SECTION 15100VALVES, AND SPECIALTIES - GENERALPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install, support, and test valves, gates, hydrants, cocks, stops, and faucets, when applicable, (hereinafter referred to as "valves") in the location(s) and of the size(s) and quantities as specified herein.
- B. Related Work Specified Elsewhere (When Applicable):
 - 1. Pipe, fittings, pipe hangers and supports, and piping insulation are specified in the appropriate Sections in this Division.
 - 2. Valves are specified in the appropriate Sections in this Division.

1.2 SUBMITTALS TO THE ENGINEER

- A. Certificates: Submit manufacturer's certification that valves and accessories meet or exceed the requirements of these Specifications.

1.3 INSTALLATION

- A. Shipping:
 - 1. Prepare valves and accessories for shipment as required for complete protection.
 - 2. Seal valve ends to prevent entry of foreign matter into valve body.
 - 3. Box, crate, completely enclose, and protect valves and accessories from accumulations of foreign matter.
- B. Storage:
 - 1. Store valves and accessories in an area on the construction site protected from weather, moisture, or possible damage.
 - 2. Do not store valves or accessories directly on the ground.
- C. Handling: Handle valves and accessories to prevent damage of any nature to the interior and the exterior surfaces.

1.4 INSPECTION

- A. Carefully inspect all materials for:
 - 1. Defects in workmanship and materials.
 - 2. Removal of debris and foreign material in valve openings and seats.
 - 3. Proper functioning of all operating mechanisms.
 - 4. Tightness of all nuts and bolts.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Materials are specified in appropriate Sections in this Division.
- B. The specifications direct attention to certain required features of the valves and gates but do not purport to cover all details entering into their design and construction. Nevertheless, the Contractor shall furnish the valves and gates complete in all details and ready for operation for the intended purpose.

PART 3 - EXECUTION

3.1 PREPARATION

A. Apply shop coatings in accordance with Section 02610.

3.2 INSTALLATION

- A. Install valves and accessories in strict accordance with manufacturer's instructions and recommendations, as shown on the Drawings and/or as specified herein.
- B. Carefully erect all valves and support them in their respective positions free from distortion and strain.
- C. Independently support all valves connected to pumps and equipment, and in piping systems that cannot support valves.
- D. Repair any scratches, marks and other types of surface damage etc. with original coating as supplied by the factory.

3.3 ADJUSTMENTS

A. Check and adjust all valves and accessories for smooth operation.

3.4 TESTING

A. The Contractor shall test all valves and gates in the presence of the District to demonstrate that each valve and gate complies with specified requirements and allowable leakage rates.

END OF SECTION

SECTION 15101GATE VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test gate valves of the type(s) and size(s) and in the location(s) specified.
- B. Related Work Specified Elsewhere: "Valves and Specialties - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. All gate valves of same type and style shall be manufactured by one manufacturer.

PART 2 - PRODUCTS2.1 VALVE, LOCATION AND USE

- A. As shown on the Drawings.
- B. Water Supply Piping:
 - 1. Buried: AWWA Type.
 - 2. Exposed: AWWA OS&Y.
 - 3. Exposed with floor box or floor stand: AWWA NRS.
- C. General Service & Piping (liquids containing solids):
 - 1. 2-1/2 inches and smaller: 125 bronze.
 - 2. 3 inches and larger: IBBM - OS&Y.
- D. General Service - Non rising stem:
 - 1. Where specifically shown on the Drawings.
 - 2. When approval is given by District.
 - 3. When required due to space limitations.
 - 4. Use with floor boxes.
- E. Fire Protection Service: UL & FM approved.
- F. Knife Gates: Where shown on the Drawings.
- G. Accessories: As shown on the Drawings and required for proper operation.

2.2 MATERIALS

- A. Waterworks type NRS valves (AWWA):
 - 1. Iron body bronze mounted (IBBM).
 - 2. Non rising stem (NRS).
 - 3. Double disc, parallel seat.
 - 4. Meet or exceed AWWA C-500.
 - 5. Acceptable Manufacturers:
 - a. Kennedy.
 - b. M & H.
 - c. Mueller.
 - d. American-Darling.
 - e. Clow.
 - f. Or approved equal.

6. Integral bronze disc ring, dovetail groove type or securely fastened with rivets.
 7. Bronze seat rings.
 8. End Connections: As shown on the Drawings and as required for pipe.
 9. Working pressure:
 - a. 12 inches and smaller: 200 psi water.
 - b. 14 inches and larger: 150 psi water.
 - c. Unless otherwise shown on the Drawings.
 10. Stuffing Box:
 - a. Rust-proofed bolting.
 - b. "O" ring or similar design.
 - c. Capable of replacing under pressure with valve open.
 11. Buried Valves:
 - a. AWWA bituminous coating system.
 - b. Gate box or curb box required.
 - c. Sufficient quantity of tee-handle valve wrenches for operating valves of various depths.
 - d. 2 inch square operating nut, securely fastened to shaft.
 12. Exposed valves:
 - a. Hand wheel with direction arrow for opening.
 - b. 2 inch square operating nut for floor-box operated valves.
 - c. Enamel or varnish finish.
 13. Valve operation: Open by turning counter-clockwise, unless otherwise shown on the Drawings or when approved by the District.
- B. Waterworks type OS&Y valves (AWWA):
1. Iron body, bronze mounted (IBBM).
 2. Open screw and yoke (OS&Y).
 3. Double disc, parallel seat.
 4. Meet or exceed AWWA C-500.
 5. Equal in all respects to non-rising stem valve specified above, except as required for OS&Y operation.
- C. General Service - 2-1/2 inch and smaller:
1. Bronze construction - 125 pound steam.
 2. Union bonnet.
 3. Inside screw, rising stem.
 4. Solid disc, taper wedge.
 5. End connections:
 - a. Threaded.
 - b. Or solder ends for copper pipe systems.
 6. 200 psi non-shock WOG.
 7. Malleable iron, or steel handwheel.
 8. Acceptable Manufacturers:
 - a. Stockham B-105.
 - b. Craine 428-UB.
 - c. Powell 2700S.
 - d. Jenkins 47U.
 - e. Kennedy 525.
 - f. Or approved equal.
- D. General Service OS&Y - 3 inches and larger:
1. Iron body bronze mounted (IBBM).
 2. Open screw and yoke (OS&Y), rising stem.
 3. Solid bronze or bronze fitted cast iron wedge disc.
 4. 125 class body unless shown otherwise.

5. Flanged ends: 125 pound drilling, ANSI B16.1.
6. Face to face dimensions: ANSI B16.1.
7. Water working pressure:
 - a. 12 inches and smaller: 200 psi.
 - b. 14 inches and larger: 150 psi.
8. Operator:
 - a. Handwheel standard.
 - b. Chain operator:
 - (1) Required for all valves shown.
 - (2) When required for proper operation.
 - (3) For all valves with centerline 7 feet above finished floor or equipment stand.
 - (4) With chain guides.
 - (5) Chain shall extend to 3 feet above floor.
 - (6) Provide wall hooks for chain.
9. Acceptable Manufacturers:
 - a. Stockham 9-623.
 - b. Craine 465 1/2.
 - c. Powell 1793.
 - d. Jenkins 651A.
 - e. Kennedy 061.
 - f. Or approved equal.
- E. General Service NRS - 3 inches and larger:
 1. Iron body bronze mounted (IBBM).
 2. Non-rising stem (NRS).
 3. Bolted bonnet.
 4. 125 class body.
 5. Solid bronze or bronze fitted solid cast iron wedge.
 6. Flanged ends: 125 pound drilling, ANSI B16.1.
 7. Face to Face dimensions: ANSI B16.1.
 8. Water working pressure:
 - a. 12 inches and smaller: 200 psi.
 - b. 14 inches and larger: 150 psi.
 9. Operator:
 - a. Handwheel standard.
 - b. 2 inch square operating nut when shaft extension, floor box, or floor stand is required or shown on the Drawings.
 - c. Chain wheel:
 - (1) Same as General Service OS&Y.
 10. Acceptable Manufacturers:
 - a. Stockham 9-612.
 - b. Craine 461.
 - c. Powell 1787.
 - d. Jenkins 326.
 - e. Kennedy 058.
 - f. Or approved equal.
 - F. Knife Gates:
 1. Wafer body, rising stem, bonnetless construction.
 2. Body:
 - a. Cast iron or cast or fabricated stainless steel with mild steel flanges.
 - b. Working pressure: 150 pound WOG.
 3. All wetted parts to be stainless steel.

4. Blade shall have guillotine edge.
 5. Blade to pass through packing.
 6. Neoprene or equal single "O" ring seat on downstream side of valve.
 7. Blue asbestos and molded neoprene packing or approved equal.
 8. Flange holes tapped to match ANSI 150 pound flange.
 9. Provide "v" seats where shown for metering service.
 10. Handwheel operator standard unless shown otherwise on Drawing.
 11. Acceptable Manufacturers:
 1. Fabri-valve Figure 37-R.
 2. DeZurik series L.
 3. Or approved equal.
- G. Extension Stems:
1. Cold-rolled steel shaft.
 2. Or extra strong steel pipe.
 3. Handwheel couplings, stem or yoke bushing couplings: malleable iron.
 4. For non-rising stem or OS&Y valves.
 5. Complete with required steady bedrings.
 6. Size as required or as shown.
- H. Floor Stands:
1. Acceptable height: 30 to 36 inches or as shown on the Drawings.
 2. Non-rising stem valves: with indicator.
 3. OS&Y valves: as required.
- I. Floor Boxes:
1. Iron body.
 2. Size as required for valve stem or extension stem.
 3. Cast iron or bronze screwed cover plate.
 4. Suitable for cast concrete floors of thickness shown.
- J. Bypass Valves:
1. OS&Y rising stem.
 2. Screwed or flanged.
 3. Required where shown on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves with stem position horizontal to vertical.
- B. Allow sufficient clearance around valve operator for proper operation.
- C. Install and test in accordance with AWWA C500 latest revision and the "Valves and Specialties - General" Section in this Division.

END OF SECTION

SECTION 15104PLUG VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test plug valves and actuators of the type(s) and size(s) and in the location(s) specified herein.
- B. Related Work Specified Elsewhere: "Valves and Specialties - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. All plug valves of same type, style, and duty shall be of one manufacturer.
- B. All actuators shall be supplied by the valve manufacturer who shall be responsible for proper operation of all valves with the actuators specified.
- C. Acceptable Manufacturers:
 - 1. DeZurik Corporation.
 - 2. Or equivalent.

1.3 JOB CONDITIONS

- A. Piping as shown on the Drawings is detailed to accommodate standard design flanged plug valves having face-to-face dimensions of standard flanged gate valves.
- B. Make all necessary adjustments to piping, subject to review of the District, to accommodate plug valves furnished with face-to-face dimensions not of standard flanged gate valves.
- C. Valves 2 inches and smaller may be of screwed type unless indicated otherwise.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Two Way Valves:
 - 1. Non-lubricated, eccentric type, cast iron body with end type as shown on the Drawings.
 - 2. Shall have an unobstructed shaped waterway, when open, of not less than 80% of nominal pipe area.
 - 3. Body shall be of gray cast iron, ASTM A126 Class B with resilient plug facings of neoprene for applications to 180°F.
 - 4. Packing shall be BUNA (VEE) with a maximum temperature of 350°F. Packing shall be adjustable.
 - 5. Bearings shall be stainless steel or bronze as required.
 - 6. Suitable for particular service in piping in which installed.
 - 7. Welded-in nickel or stainless steel seat.

- B. Three Way and Four Way Valves:
 - 1. Equal to that specified for two way valves.
 - 2. Port location, style, and arrangement as shown on the Drawings and as required.
- C. Actuators (type as shown on the Drawings and specified herein):
 - 1. Lever Actuators: Size and length as required with a 2 inch square socket end for use on 2 inch square actuating nut. Attach handle to valve with a 4 foot length of chain.
 - 2. Handwheel Actuators:
 - a. Totally enclosed gear type.
 - b. Sized for the operating conditions encountered.
 - c. Use on all valves 8 inches in size and larger, and on smaller valves when valve location does not allow lever actuator.
 - d. Plug position indicator required.
 - 3. Chain Wheel Actuators:
 - a. Totally enclosed type.
 - b. Chain shall extend to 3 feet above floor unless otherwise shown.
 - c. Supplied with chain guides and chain wheel, chain guides shall be galvanized.
 - d. Use for all valves that are located with centerline 7 feet or more above floor.
 - 4. Pneumatic Actuators:
 - a. Totally enclosed type.
 - b. Supply pressure shall be 60 psi unless otherwise shown on the Drawings.
 - c. Spring-to-open, air-to-close unless otherwise shown on the Drawings.
 - d. Sized for the operating conditions.
 - e. Provide pre-piped, 120 volt electric three way solenoid valve on actuator.
 - 5. Hydraulic Actuators:
 - a. Double acting, solenoid valve controlled with manual override and rapid close feature.
 - b. Provide opening and closing speed control valves; switch valve to control cylinder supply; manual/automatic selection; valve position indicator; water fitted cylinder; operating nut to allow manual operation; all preassembled and piped for operation with 120V power and sized to operate with 80 psi hydraulic pressure and a maximum valve shutoff pressure of 100 psi.
 - c. Provide a separate supply line strainer, unpiped for each actuator.
 - d. Actuators shall be suitable for operation of valves installed in vertical piping.
 - e. Provide time delay relays, contacts and appurtenant equipment to activate an alarm in the pump station control panel if the position indicator switch does not indicate the valve has closed within 2 minutes of receiving a close signal.

- f. Opening and closing of the valve shall be activated by high and low wet well levels respectively with the pump starting against a closed valve and stopping as the valve closes to prevent water hammer.
 - g. Install hydraulic actuators on the discharge of the sewage pump at the Water Street Pump Station only.
 - h. All electrical controls to be housed in NEMA 3R enclosure.
 - i. DeZmik Pump Check FIG391,R.
- D. Accessories (When Applicable):
- 1. Extension (for lever actuated valves):
 - a. Shall include extension pipe, bearing plate and couplings of the sizes as required.
 - 2. Floor Stand (for handwheel actuated valves):
 - a. Shall include stand, coupling, handwheel mounted on stand and extension rod.
 - b. Stand shall have a dial valve position indicator.
 - 3. Extended Actuator Mounting: Supplied when actuators are extended above ground.
 - 4. Floor Boxes:
 - a. Iron body, size as required for valve.
 - b. Cast iron or bronze screwed cover plate.
 - c. Suitable for cast concrete floors of thickness as shown.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves with stem position horizontal to vertical.
- B. Allow sufficient clearance around valve for proper operation, maintenance and removal.
- C. Install and test in accordance with AWWA C500 latest revision and the "Valves and Specialties-General" Section in this Division.

END OF SECTION

SECTION 15110CHECK VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and install check valves of the type(s) and size(s) and in the location(s) specified herein.
- B. Related Work Specified Elsewhere: "Valves & Specialties - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. All check valves of same type and duty shall be by one manufacturer.
- B. Qualifications of Manufacturer: Products have proven reliable in similar installations over a reasonable number of years.

1.3 JOB CONDITIONS

- A. Whenever possible, install check valves in pipelines conveying sewage or sludge in horizontal positions.
- B. When horizontal positions are not possible, provide and install check valves of a type suitable for mounting in a vertical position in pipelines conveying liquids containing high concentrations of solids.

PART 2 - PRODUCTS2.1 VALVES - 3 INCHES AND LARGER

- A. Meet the materials requirement of AWWA C508.
- B. Iron body, bronze mounted, single disc.
- C. Flanged ends faced and drilled to the 125 lb. Standard.
- D. The working water pressure shall be 175 psig up through 12-inch, inclusive and 150 psig for 16-24 inch, inclusive.
- E. So constructed that disc and body seat may easily be removed and replaced without removing the valve from the line.
- F. Fitted with extended hinge arm with outside lever and weight.

2.2 VALVES - SMALLER THAN 3 INCHES

- A. Standard, all brass or bronze, swing check with screwed ends.
- B. Suitable for 150 psi. working steam pressure.

PART 3 - EXECUTION3.1 INSTALLATION

- A. Install in accordance with the "Valves and Specialties-General" Section in this Division.

END OF SECTION

SECTION 15127AIR RELEASE VALVESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish, install and test air release valves of the size (s) and the type (s) and in the location (s) specified herein.
- B. Related Work Specified Elsewhere: "Valves and Specialties - General" is specified in this Division.

1.2 QUALITY ASSURANCE

- A. All air release valves, for the same service, shall be manufactured by one manufacturer.
- B. Acceptable Manufacturers:
 - 1. Valve & Primer Corporation (APCO Valves).
 - 2. Or equivalent.

PART 2 - PRODUCTS2.1 MATERIALS

- A. General:
 - 1. All valves shall be suitable for the intended services.
 - 2. Valve sizing shall be as recommended by the manufacturer to suit the pressure and flow condition of each application.
 - 3. The valve manufacturer shall furnish installation and maintenance manuals with each valve.
- B. Sewage and Sludge Service:
 - 1. Air Release Valves.
 - a. Shall be designed to operate (open) while pressurized, allowing entrained air to escape through the air release orifice. After entrained air escapes through the air release orifice, the valve orifice shall be closed by a needle mounted on float energized compound lever mechanism and prevent sewage media from escaping
 - b. Shall be specially adapted for use with sewage and sludge.
 - c. The venting orifice and mechanism and the valve body shall be capable of being back-flushed with water.
 - d. Cast iron body and covers, stainless steel float and lever pins, bronze seat with the mechanism cast bronze and Buna-N needle.
 - e. Furnished with 2-inch inlet shutoff valve; 1-inch blow off valve; ½-inch valve, quick disconnect coupling and 6-feet of hose to permit backflushing without dismantling valve.
 - f. Valve shall be capable of with standing 500 psi line pressure.
 - g. Equal to Model 400 APCO sewage air release valve.

2. Air and Vacuum Release Valves:
 - a. Shall allow unrestricted venting or re-entry of air, through it, during filling or draining of a pressurized pipe, to prevent water column separation or pipeline collapse due to vacuum.
 - b. Valve shall incorporate one upper and one lower stainless steel float, connected by a common stainless steel float guide, thereby maintaining an air gap between the bottom float and top shut-off float. The air gap shall retard waste solids from fouling or clogging the top shut-off float.
 - c. The internal baffle shall be fitted with a guide bushing and act to protect the shut-off float from direct air flow. The baffle shall retain the 45 Durometer Buna-N seat in place without distortion, for tight shut-off.
 - d. Cast iron body, cover and baffle; brass internal parts.
 - e. All internals shall be easily removed through the top covers without removing the main valve from the lines.
 - f. Both floats shall withstand 1,000 psi or more.
 - g. Valve shall be fitted with blow off valves, shutoff valves, quick disconnect couplings and minimum 6-feet of hose, to permit backflushing after installation without dismantling valve.
 - h. The valve inlet shall have 2-inch N.P.T. and the outlet 1-inch N.P.T.
 - i. Equal to Model 400 APCO sewage air and vacuum valves.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves in accordance with manufacturer's instructions and recommendations and as shown on the Drawings.
- B. Install all valves in the vertical position and allow sufficient clearance around valve for proper maintenance and removal.
- C. Provide gate valve between air release valve and pipeline.
- D. Inlet piping to the air valves shall be brass.
- E. The exhaust lines from the air valves shall terminate in down turned position 18 inches above the floor.

END OF SECTION

SECTION 15188BOUTSIDE PIPE INSULATIONPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Furnish and apply insulation and heat trace cables, with fiberglass reinforced polyester protective jacket, to all piping and devices as specified herein.
- B. Work Not Included: Trench pipe and manhole insulation shall be as specified on the Drawings.
- C. Related Work Specified Elsewhere (When Applicable):
 - 1. Excavation and backfill are specified in Division 2.
 - 2. Piping, pipe hangers, and piping specialties are specified in the appropriate sections of this Division.

1.2 QUALITY ASSURANCE

- A. All insulation work shall be executed by skilled insulation workmen regularly employed in the trade.

1.3 SUBMITTALS TO THE ENGINEER

- A. If requested by the District, submit samples for approval.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in suitable containers to protect from damage.
- B. Store materials so as to be completely protected from the weather.
- C. Do not allow adhesives and sealants to be subject to temperatures below 40°F.

PART 2 - PRODUCTS2.1 MATERIALS

- A. Insulation Performance: Rigid cellular foam urethane meeting HH-1-530A, Type 1, Grade, 2, Class 1, with the following requirements:
 - 1. Density: 1.8 to 2.2 lb/cu. ft. (ASTM D 1622 at 74°F)
 - 2. Dimensional stability: 4%.
 - 3. Thermal conductivity (BTU-in/hr/sq.ft./°F) (ASTM C 518 at 75°F)
 - a. Initial: 0.14
 - b. Design: .14 to .16
 - c. Aged: .18
 - 4. Compressive strength: 25 psi with 10% deflection. (ASTM D 1621 at 74°F)
 - 5. Open cell content: 10% or less by volume.
 - 6. Temperature range: -320°F. to +300°F.
- B. Insulation Requirements:
 - 1. Supply all insulation in curved cylindrical segments.
 - 2. Fabricate insulation in contact with the pipe to suit pipe outside dimensions.
 - 3. Insulation thickness shall be not less than 2-inches thick.

4. Acceptable Manufacturers:
 - a. Owens Corning.
 - b. Armstrong.
 - c. CPR Upjohn.
 - d. Or approved equal.
- C. Insulation Adhesive, Sealants, and Coatings:
 1. Adhesives, sealants, and coatings shall be compatible with materials to which they are applied, and shall not corrode, soften or otherwise attack insulation in any state or manner. Materials shall be suitable for intended service.
 2. Suitable for a -320°F. to 300°F. operating service.
 3. Seal all exposed edges of insulation with two coats of suitable flexible sealer.
- D. Insulation Protective Covering
 1. Protective covering shall be fiberglass reinforced polyester, 1/8-inch thick with the following properties:
 - a. Flexural Strength 40k psi
 - b. Tensile Strength 33.3k psi
 - c. Izod Impact 27.7 ft.lb/in

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pipe sections shall be factory insulated and delivered to the job site ready for placement on hangers or in the trench, as indicated on the Drawings.
- B. Pipe joint field closures shall be insulated in the field after pipe is tested and approved. Field closures shall be installed by conduit manufacturer utilizing thermal setting resins and reinforcement identical to conduit jacket. Minimum seam lap shall be 3 inches.
- C. All exposed edges of the insulation shall receive two layers of Pittsburg-Corning PC 300 Asphalt mastic with 10-10 mesh, or equivalent.

END OF SECTION

APPENDIX A - STANDARD DETAILS

SANITARY SEWER TRENCH DETAILS

- Typical Trench Detail
- Multiple Pipe Trench Section
- Pipe Crossing Detail
- Culvert Crossing Detail
- Typical Water Main Relocation Detail
- Trench Pipe Insulation Detail
- New Sewer Connection Detail
- Chimney Detail
- Thrust Block/Concrete Encasement
- Concrete Cradle Detail
- Temporary/Permanent Paving

SANITARY SEWER STRUCTURES DETAILS

- Typical 4 Ft. Dia. Manhole
- Drop Manhole with PVC Pipe
- Air Release Manhole
- Standard Cover and Frame
- Watertight Cover and Frame
- Manhole Frame Installation