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SECTION 15 12 16

WATER VALVES, HYDRANTS, FITTINGS AND MISC. APPURTENANCES

PART 1.00 - GENERAL

1.01 Description

The work covered in this Section includes the furnishing and installation of all valves, hydrants, fittings, blowoffs and other miscellaneous appurtenances as shown on the drawings, required in these specifications, or as directed by the Engineer.

1.02 Quality Assurance

- A. The Contractor shall use sufficient workmen and competent supervisors in the execution of this portion of the work to ensure adequate and proper installation throughout.
- B. The class numbers or pressure ratings shall be clearly shown on the valve or fitting.
- C. Loading, unloading, inspection, storage and handling shall be in accordance with AWWA C600 and AWWA C605 and as specified herein.
- D. Storage: Store pipe, fittings, valves and appurtenances off the ground using sound wood blocks, placed on stable foundation or using other appropriate means. Allow space between rows, individual pieces and bundles with clearance below and above to allow full view for inspection purposes.
 1. Store in well-drained area away from brush and accessible for inspection.
 2. Keep ends of valves and fittings clean and clear for dimensioning purposes
 3. Don not place excavated or other material over or against stored material.
 4. PVC pipe shall be stored so that it does not deform or bend. Pipe stored outdoors or otherwise exposed to direct sunlight shall be covered with canvas or other opaque material with provision for adequate air circulation.
- E. Handling: unload and handle materials with crane, backhoe, or equipment of adequate capacity, equipped with appropriate slings or padding to protect materials from damage.

1.03 Submittal

- A. Prior to the installation of any pipe, the Contractor shall submit and receive the Engineer's approval of shop drawings and/or manufacturer's material certification of compliance with specifications.
- B. Submittals shall be in five (5) copies and shall be provided to the Engineer at least 15 days prior to the planned installation time.

PART 2.00 - PRODUCTS

Allowable materials on this project are as follows:

A. Fittings

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Fittings shall be in accordance with Section 15 11 13

B. Gate Valves

All gate valves shall open turning left (counter-clockwise). Valves for direct burial shall have non rising stems (NRS) with a two inch(2") square (four sided) operating nut.

All gate valves shall have a minimum rated working pressure of two hundred (200) psi, four hundred (400) psi minimum test pressure.

1. Two inch (2") gate valves shall be iron body, bronze mounted, double-disc parallel seated and fully bituminous. Two inch gate valves shall be Mueller or approved equal.
2. Three inch (3") through twelve inch (12") gate valves shall be Resilient-Seated type manufactured in accordance with AWWA C509.
 - i. The body and bonnet shall be coated with fusion bonded epoxy both interior and exterior, complying with AWWA C550 and be NSF 61 approved. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body.
 - ii. The wedge shall be of cast iron completely encapsulated with rubber.
 - iii. The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM Test for rubber metal bond ASTM D429.
 - iv. Stems for NRS assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS & Y stems shall be bronze. The NRS stem stuffing box shall be the o-ring seal type with two o-rings located above thrust collar and one o-ring below. The two o-rings above the thrust collar shall be replaceable with valve fully open and subjected to full rated working pressure.
 - v. There shall be two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of wedge and shall be made of solid bronze. There shall be a smooth unobstructed waterway free of all pockets, cavities and depressions in the seat area.
 - vi. Valves shall be Clow, Mueller or approved equal.
3. Sixteen inch (16") through Forty-Eight inch (48")- For use on tapping sleeves only
 - i. Gate valves shall be iron body, bronze mounted, double disc parallel seated and fully bituminous coated.
 - ii. Gate valves shall have a minimum working pressure of one hundred fifty (150) psi, three hundred (300) psi test pressure.

C. Butterfly Valve (16" and Larger)

1. Unless otherwise shown on the Drawings, all valves on water mains sixteen inch (16") in diameter and larger, except tapping valves, shall be rubber seated, butterfly valves manufactured in accordance with AWWA C504.

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- i. All butterfly valves shall be Class 150(B) minimum with a rated working pressure of one hundred and fifty (150) psi, three hundred (300) psi minimum test pressure.
- ii. Unless otherwise noted on the Drawings, all butterfly valves shall be provided with mechanical joint or "Victaulic," grooved end connections.
- iii. Valves shall have ductile iron bodies and discs with full epoxy coatings, twelve (12) mils minimum, in accordance with AWWA C500. Valve seats shall be stainless steel, bronze matting or resilient material. Resilient seats shall be mechanically attached to the valve disc or body and shall be fully field adjustable by mechanical means. Valve disc shafts shall be stainless steel of either the stub or through-shaft design. Valve shaft bearings shall be heavy duty bronze.
- iv. All butterfly valves shall be provided with an integral manual operator with a two inch (2") square (4 sided) operating nut which shall open turning left (counter clockwise). The valve and operator shall be assembled for installation in a horizontal line with the main valve and the operator shaft and operating nut aligned vertically. Valve operators shall be worm gear type manufactured by Philadelphia or approved equal.

D. Valve Boxes

1. All valve boxes, except as noted otherwise, shall be two (2) piece adjustable (telescoping) screw type of cast iron construction and fully bituminous seal coated with tops marked "Water" or "Sewer" as appropriate for the installation. Cast iron valve boxes shall conform to ASTM A48 Class 30. Boxes shall be East Jordan Iron Works 8550 or approved equal.

E. Tapping Sleeve and Valve

1. Tapping sleeves shall be cast iron mechanical joint or stainless steel meeting the requirements of ANSI B.16.1 and NSF 61 with one hundred and fifty (150) psi minimum working pressure, ductile flanged valve connection, test tap and plug.
 - i. If stainless steel sleeves are utilized all bolts, nuts and components shall be stainless as well.
2. All tapping valves furnished under these specifications shall be resilient seat gate valves and shall conform with AWWA Standard C509 and as described above. Valves shall be furnished with the tapping flange having a raised face or lip conforming to MSS SP-60 Standard designed to engage the corresponding recess in the tapping sleeve to assure the proper alignment required to prevent damage by a misaligned shell cutter.

F. Check Valve

1. Check valve shall be iron body, bronze mounted swing type with flanged ends manufactured in accordance with AWWA C508.
 - i. Check valve shall have a cast iron clapper with bronze face and bronze seat ring. Check valve shall provide "full flow," clear passageway for

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nominal diameter of pipe when fully open.

- ii. Valves shall have an adjustable external lever and weight or external lever and spring operation. Working parts of the valve shall be fully removable through top cover.
 - iii. Valves shall be rated for one hundred and seventy-five (175) psi minimum working pressure and three hundred (300) psi test pressure.
 - iv. Valves shall be fully bituminous or epoxy coated for use in potable water systems.
 - v. All check valves shall be housed in a precast manhole or vault as depicted on the Plans or approved by the Engineer.
2. Check valve shall have a swinging dismantling joint on the upstream side in order to facilitate easy removal and maintenance. Fitting shall be the Romac DJ 400 Dismantling Joint or approved equal.

G. Fire Hydrants

1. All fire hydrants furnished shall be Dry-Barrel Type manufactured in accordance with AWWA C502.
 - i. All hydrants shall be compression type, dry top, traffic model using breakaway flanges, clips, couplings, or lugs as the union between the upper and lower barrel.
 - ii. All hydrants furnished are to be bronze to bronze threads between the seat or seat-ring and the seat attaching assembly with a bronze drain ring.
 - iii. Hydrant valve opening shall be four and one-half inches (4 1/2"). Operating nut shall be National Standard. Operating nut threads and hydrant rod threads shall be completely enclosed in "O" ring sealed, lubricating chamber.
 - iv. Hydrants shall have two (2) 2 1/2" hose nozzles and one (1) 4 1/2" pumper nozzle, all with National Standard threads, complete with caps and chains. Hydrant barrel shall be designed for traffic safety flange or breakable couplings at the ground line.
 - v. Hydrant inlet connection shall be a six inch (6") mechanical joint, complete with mechanical joint accessories
 - vi. All hydrants shall open left and have a minimum bury of 3-1/2 feet
 - vii. The main valve assembly must be removable through the upper barrel section. Removal of the nozzle section of disassembly at the ground-line shall not be required for this removal.
 - viii. Hydrant shall be painted in accordance with the City's standard color scheme.
 - ix. Hydrants furnished shall be Mueller Super Centurion 250 (A-421), American Flow Control's American-Darling Mark-73-1, or approved

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equal, in full compliance with AWWA Standard C-502.

H. Post (Blow off) Hydrant

1. Blow off hydrants shall be installed to facilitate line flushing, especially at line termini for water mains 4 inches (4") and larger when a fire hydrant is not required and as directed by the Engineer. Blowoff hydrant shall be a non-freezing post hydrant self draining type.
 - i. Hydrant shall have a non-turning operating rod and shall open counter-clockwise.
 - ii. The outlet shall also be bronze 2 ½ inch NST and fitted with protective cap.
 - iii. Hydrants shall be locked to prevent unauthorized use.
 - iv. Blowoff hydrants shall be Mueller A412, Eclipse or approved equal.

I. Blowoff Hydrant(Buried)

1. When directed by the Engineer, in-ground blowoffs shall be a non-draining type for placement in pavement.
 - i. Blowoff shall be a compression type closing with pressure and furnished with a two inch (2") FIP Inlet.
 - ii. Blowoff shall be operated by use of a portable top stock coupling with the hydrant at or near ground level.
 - iii. All working parts shall be brass and removable from the hydrant without the need for excavation.
 - iv. Brass thread protector shall have a 2' square nut.
 - v. Blowoff shall be encased in a standard valve box as described herein
 - vi. Blowoff shall be Eclipse 2000-B or approved equal.

PART 3.00 - EXECUTION

3.01 Installation

A. Fittings

Fittings shall be installed in accordance with Section 15 11 13

B. Gate Valves and Valve Boxes

1. General

- i. All valves shall be installed in accordance with the manufacturer's recommendations, as directed by the Engineer and as herein specified.
- ii. Valves shall be installed at locations as shown on the drawings or as directed by the Engineer.
- iii. Before installation exercise valve to ensure proper working order.

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- iv. Installed valves shall be properly aligned, plumbed, and braced when required.

2. Buried Valves

- i. Valve boxes shall be installed for each buried valve. Boxes shall be centered over valve operating nut and shall be adjusted to finished ground elevation, unless otherwise directed by the Engineer.
- ii. Valves and boxes shall be installed as shown on drawings and backfilled and compacted per the pipeline installation requirements described in Section 15 11 13 and as directed by the Engineer.
- iii. Valves buried greater than 48" in depth shall be equipped with a solid steel extension stem. Stem shall be extended to within 12" of final grade.
- iv. Valves which are at a line terminus with a stubbed section shall be rodded with at least two rods to a thrust collar located on the stubbed section. Rods shall be a 3/4" or 5/8" diameter steel rods.
- v. Testing of valves shall be an integral part of the pipeline installation.
- vi. Buried valves shall be properly bedded to prevent settlement. Valves in pits shall be properly supported.
- vii. Buried valves off of the right-of-way, in unpaved areas or as depicted on the plans and/or directed by the Engineer shall have a valve marker sign installed.

3. Valve Boxes

- i. Valve boxes shall be provided for each buried valve and installed as shown on the drawings. Boxes will be centered over the valve operating nut and will be set plumb. Top of boxes shall be adjusted to be flush with finished ground elevation, unless otherwise directed by the Engineer.
- ii. All valve boxes in roadways shall be encased in 2' x 2' x 6" concrete pads (3,000 psi) beneath the asphalt pavement.
- iii. All valve boxes outside of roadways shall be encase in 1' x 1' x 6" concrete pad (3,000 psi) flush with the ground.
- iv. Valve boxes shall not be considered to be properly set, unless the valve wrench fits easily on the valve.

C. Tapping Sleeve and Valve

1. General

- i. Before placing sleeve, clean existing pipe and check pipe outside diameter and roundness to verify that the sleeve will fit.
- ii. Keep closes edge of sleeve a minimum of 12 inches from face of existing joint bell for ductile iron and gray iron pipe
- iii. For cast iron sleeves on gray iron or DIP, field coat tapping sleeve with

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approved primer as necessary

- iv. Hydrostatically test sleeve following manufacturer's instructions to ensure watertightness in presence of Engineer before making tap.

2. PVC Pipe Tapping:

- i. Use only cutting/tapping tools and machines made specifically for cutting AWWA C900 or C905 pipe.
- ii. Keep closes edge of sleeve minimum of 15 inches from face of existing joint bell.
- iii. Install tapping machine without damage, scarring or distortion to pipe.
- iv. Support tapping sleeve and valve so that its weight is not carried by the pipe.
- v. Before backfilling, fill void under sleeve with compacted granular material or flowable fill.

D. Fire Hydrants

1. General

- i. Hydrants shall be located in accordance with the Drawings.
- ii. Base beneath hydrant, lead and valves shall be firm, compacted and level.
- iii. Hydrants shall be rodded back to valves with at least two tied rods as shown on Drawings; tie rods shall be either 3/4" or 5/8" diameter steel rods.
- iv. Centerline of pumper cap shall be approximately eighteen (18) to twenty-four (24) inches above finished ground line. The pumper connection shall be set parallel with the lead.
- v. Ten (10) cubic feet of clean stone shall be furnished and placed at the base of the hydrant by the Contractor and hydrant body shall be plumb; a concrete thrust block shall be placed behind hydrant tee and the hydrant shall sit on a concrete setting slab as depicted in the Standard Details.
- vi. Hydrant tees shall be used at all hydrants unless otherwise directed by the Engineer.
- vii. Hydrant valve shall be within eight (8) feet of hydrant unless otherwise directed by the Engineer.
- viii. Backfill and compaction of material around hydrant and valves shall be in accordance with the pipeline installation requirements described in Section 15 11 13.

E. Post (Blowoff) Hydrants

1. General

- i. Post Hydrants shall be installed per manufacturer's recommendation.

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- ii. Two (2) cubic feet of clean stone shall be furnished and placed at the base of the hydrant by the Contractor and hydrant body shall be plumb; a concrete thrust block shall be placed behind hydrant tee and the hydrant shall sit on a concrete setting slab as depicted in the Standard Details.
- iii. Centerline of the outlet connection shall be approximately eighteen (18) to twenty four (24) inches above the finished ground line.

F. Blowoff Hydrants (Buried)

1. General

- i. Post Hydrants shall be installed per manufacturer's recommendation.
- ii. Buried blowoff shall only be installed as depicted on plans or as approved by the Engineer.
- iii. Blowoff shall be connected to a watermain via a 2" brass or copper pipe running from a mechanical joint tapped plug off of the main to the blowoff tee. See Standard Details.
- iv. Two (2) cubic feet of clean stone shall be furnished and placed at the base of the hydrant by the Contractor and hydrant body shall be plumb; a concrete thrust block shall be placed behind blowoff tee and the hydrant shall sit on a concrete setting slab as depicted in the Standard Details.
- v. Valve box encasing the blowoff shall be installed as described herein.

PART 4.00 – MEASUREMENT AND PAYMENT

4.01 Water Valves

- A. Measurement: By the each of various sizes and types provided and installed as part of the completed and accepted work.
- B. Payment: At unit price for each size and type of valve installed as listed in the Bid Schedule.
 1. Payment includes work for location of utilities, excavation, trenching, bedding backfilling, connection to watermains, field priming, furnishing and installation of valve boxes and riser stems, installation of thrust restraints and rods, installation of tracing wire, installation of concrete valve box pad, pressure and leakage testing,
 2. Payment for non-buried valves shall also include any painting or assembly that may be required. Compensation for valve pits or vaults shall be considered a separate pay item unless otherwise identified by the Engineer.

4.02 Fittings (Measurement and Payment as identified in Section 15 11 13)

4.03 Hydrants (Fire and Post)

- A. Measurement: By the each of various types provided to include accessories.
- B. Payment: At unit price for each size and type of hydrant installed as listed in the Bid Schedule as part of the completed and accepted work.

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1. Payment includes work for location of utilities, excavation, trenching, bedding backfilling, connection to watermains, furnishing and installation of hydrant assembly and associated fittings, installation of concrete thrust restraints and concrete setting slabs, installation of rods, installation of tracing wire, pressure and leakage testing,

4.04 Blowoff Hydrants (Buried)

- A. Measurement: By the each provided to include accessories.
- B. Payment: At unit price for each type installed as listed in the Bid Schedule as part of the completed and accepted work.
 1. Payment includes work for location of utilities, excavation, trenching, bedding backfilling, connection to watermains to include 2" brass or copper pipe, furnishing and installation of blowoff assembly and associated fittings, installation of concrete thrust restraints and concrete setting slabs, installation of rods, installation of tracing wire, pressure

END OF SECTION