SECTION 15116 - SUPPLEMENTAL

METAL-SEATED BONNETTED GATE VALVES

PART 1 - GENERAL

1.1 SCOPE. This section covers the furnishing of twenty five (25) 48-inch (600 mm) metal-to-metal seated bonneted gate valves, with bevel gear operators for wastewater service as indicated in the Contract Drawings.

The valves shall be furnished complete with actuators and accessories as specified herein as indicated in the valve schedule in the Contract Drawings.

The valve shall be Full Port Open and shall be used for Bi Directional Services. The Valve shall be operated thru Manual Bevel Gear Operator, coupled thru 90 deg. miter box of adjustable length (13'' thru 19'') to match the existing core holes located in cast iron floor box mounted in the ceiling core hole at ground level, connected thru extension rod having a 2 square nut at the top to operate the valve. The location of the valve is on second level below the grade of the B-house basement at 89 elevation. The Valve Horizontal centerline is 40'' (+/-) above the floor level at an elevation of 924 feet (+/-). The average height of the basement, from the floor to the ceiling slab varies between 211'' and 223''. The ceiling slab is 18 thick. The horizontal centerline distance between the valve shaft and the bevel gear operating shaft varies between 13'' and 20'' and depends on core holes locations. (Field verification for each clarifier to match the Centerline of existing core holes is required). The overall valve height from the valve center line up to the spindle Cover top not to exceed more than 190'' and the manual gear actuator square nut depth should be at an elevation of 108'4'' (+/-) Approx. 2'' below the grade. (Field verification required). The flanges face to face distance 30 with 32 RMS finish having minimum port opening/seat ID not less than 46.5''. The Gate and Seat finish shall not exceed more than 32 RMS.

The valve shall be rated for a working pressure for not less than 125 psi (865 kPa) and shall be in conformity with the current AWWA C-500, Gate Valves (except as noted below).

The valve will be supplied with a floor box which will replaced with existing floor box and shall be in accordance with DWSD master spec 15180

1.2 GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

Valves shall be furnished with all necessary parts and accessories indicated on the drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1.2.01 General Equipment Requirements. The General Equipment Stipulations in Master Specification Section 01180, Equipment, Materials, Parts, and Tools shall apply to all equipment and material furnished under this section.

1.2.02 Governing Standard. Except as modified or supplemented herein, all bonneted gate valves shall conform to the applicable requirements of ANSI/AWWA C-500 (except as noted).

1.2.03 Marking. Supplementing the requirements of Section 7.1 of the governing standard, the name of the country where the valve body was manufactured shall be cast on the exterior of the body. The name of the country where the gate was manufactured shall be molded into the resilient seat material.

1.2.04 Temporary Number Plates. Each valve shall be tagged or marked in the factory with the identifying number listed in the Valve Schedule.

1.2.05 Permanent Number Plates. All valves, except buried or submerged valves, shall be provided with a permanent number plate. The location of number plates and the method of fastening shall be acceptable to Engineer. Numerals shall be at least 1 inch (25 mm) high and shall be black baked enamel on anodized aluminum plate or as indicated in the Contract Documents.

1.3 RELATED WORK

Section 01080 Project Submittals

Section 01180 Equipment, Materials, Parts, and Tools

Section 09900 Painting

Section 15010 Valve Installation

Section 15180 Valve and Gate Actuators

1.7 SHIPPING AND UNLOADING. The valve shall be shipped fully assembled. The valve flange faces and machined surfaces of the pads shall be coated with an approved type of grease and protected by means of wooden pieces bolted in place. The shipping crates shall incorporate all necessary skids and lifting devices for crane slings.

Devices not attached to the valve during shipment shall be packed in boxes and properly labeled for assembly. All such devices shall be shipped machined and fitted. No machining of these devices in assembly shall be required.

The valve shall be drained of all test water and closed before shipment.

1.8 SUBMITTALS. The bidder shall submit drawings and/or general descriptive data showing the principal dimensions and design features of the valve he proposes to furnish. The bidder shall also furnish the following information with his bid for each size of valve, and each size and type of operator he proposes to furnish. Bids submitted without this information may be rejected.

1. Type of Valve (Wedge Gate Valve/Knife Gate Valve).
2. Port Size/Seat ID, inches (millimeters).
3. Total weight, each complete assembly, lbs. (kgs.).
4. Total Height (From valve center to the top of the valve stem cover/ in full open position).
5. Width, face to face of flanges, inches (mm).
6. Rated working pressure of valve, psi (kPa).
7. Valve shaft diameter, inches (mm).
8. Minimum thickness of metal in body of valve, inches (mm).
9. Thickness of metallic seat, inches (mm).
10. Material of valve body, gate, seat and spindle.
11. Number of turns to manually operate valve for full travel with and without operator.
12. Maximum input force required at hand wheel to manually Operate valve, lbs. (N).
13. Torque limit of shear pin, ft.-lbs. (N-M).
14. Required Torque to open and close the valve in ft.-lbs. (N-M).

1.9 DRAWINGS. Within fifteen (15) days after the date of the Purchase Order, the contractor shall furnish and deliver to the Engineer for approval, six (6) copies of drawings showing the exact dimensions of the valve. These drawings shall be with sufficient details to permit the design of the foundation and connecting piping.

Within thirty days after the date of the Purchase Order, the contractor shall furnish and deliver to the Engineer for approval, six (6) copies of certified drawings as follows:

A. Assembly drawings in sufficient detail to identify every part of the valve and operator.

B. General dimensions drawings showing the principal dimensions of the valve and all operating appurtenances. Weight of valve and operator shall be indicated on the drawing.

C. Detail drawings of the various parts of the valve and operator subject to normal maintenance and repair. Bolt torque requirements shall be indicated on the drawing, for all bolted joints.

D. Detail drawings showing materials of construction and design information required to be approved by the Engineer.

E. Recommended Spare Parts list for valve and operator with all the necessary information required by the manufacturer for replacement for on orders for replacement parts.

Drawings that do not meet the approval of the Engineer will be returned with notations marked thereon for verification. Drawings not approved shall be revised and resubmitted. Drawings that meet the approval of the Engineer will be stamped with the Engineers approval stamp. One copy of each drawing will be returned to the Vendor.

Manufacture and assembly shall proceed in conformity with drawings bearing the approval of the Engineer. All fabrication and assembly of equipment prior to the approval of drawings applying to same shall be done at the Vendors risk and he shall bear all expenses incurred in making changes required to conform with the drawings as finally approved.

1.10 GUARANTEE AND SERVICE. For a period of one year from the date of acceptance and final payment under this specification, the Vendor shall repair or remove and replace to the satisfaction of the Engineer, without additional cost to the City, any and all parts which in the opinion of the Engineer prove defective either in design, material or workmanship and shall supply without charge any service required because of such defects.

PART 2 - PRODUCTS

2.1 MATERIALS. Materials in contact with water or the wetted parts shall be tested and certified as meeting the Standards of UL / NSF for contaminants leaching into drinking water in plant service.

A. Ductile Iron

All ductile iron castings shall be true to the design dimensions and shall be clear, smooth, strong, tough, close-grained and free from blow or sand holes, porosity, shrinkage, cold shuts, cracks or other physical defects. Plugging, welding, or patching of defective castings will not be permitted, and castings repaired in such a manner will be rejected. Ductile iron shall conform to the current ASTM designation: A-536, Specification for Ductile Iron Castings, Grade 65-45-12

Tests shall be made to determine the chemical composition and tensile properties of the ductile iron used in the castings in conformity with the requirements of the applicable ASTM Specification. Three certified copies of the results of the tests shall be furnished to the Engineer.

B. Carbon Steel

All Carbon Steel shall comply with the latest edition of ASTM A36, ASTM A108, ASTM A240.

C. Stainless Steel

All stainless steel used in the construction of valve parts shall be in conformity with the requirements of the current ASTM Specification: A-167, Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip, Type 316; or the current ASTM Designation: A-276, Stainless and Heat-Resisting Steel Bars and Shapes, Type 316; or the current ASTM designation A564, Standard specification for Hot-Rolled and Cold-Finished Age Hardening Stainless and Heat-Resisting Steel Bars and Shapes, Type 630 (17-4 PH).

D. Cast Brass

All cast brass used in the construction of valve parts shall be in conformity with the requirements of the current ASTM Designation: B-62, Composition Bronze or Ounce Metal Castings, UNS No. C83600, or approved equal.

E. Rolled, Forged and Extruded Bronze

All rolled, forged or extruded bronze used in the construction of valve parts shall be in

conformity with the requirements of the current ASTM Specification: B-138, Manganese Bronze Rods, Bars and Shapes, UNS No. C67500, HO2 (formerly half-hard), or approved equal.

F. Bolts, Studs and Nuts

All bolts and nuts shall be threaded in conformity with the current ANSI B1.1, Screw Threads, Coarse-Thread Series, Class 2 Fit.

All ferrous bolts, studs and nuts used in the assembly of the valves shall be Stainless Steel Grade 316.

All bronze bolts, studs and nuts shall be in conformity with the requirements of the current ASTM Specification B-98, Copper Silicon Alloy Rods, Bars and Shapes, UNS C65100, C65500, C65800, or C66100. Bolts having cold-formed heads shall be made of Alloy B-133, UNS No. 65100, HO4 (formerly hard); and bolts, studs, and nuts machined from bar stock shall be made of Alloy UNS No. 65500, HO4, or approved equal.

2.1.01 Design. The Gate valve shall be of the tight closing, metal to metal seated type, rising stem. To limit the travel of gate for valve safety, adjustable mechanical stops shall be incorporated in the valve to limit the travel of the gate to open and close the valve.

2.1.02 Valve Body. The body and bonnet of each valve shall be made of Carbon steel with SS 316 liner or stainless steel. To prevent excessive distortion under any operating conditions or test, the valve body and bonnet shall have adequate reinforcing. In case the valve body is carbon steel all the wetted parts shall have stainless steel lining SS-316. Each valve body shall have an approved permanent manner in a conspicuous place, the manufacturers name, initials or insignia, AWWA Class and the year of manufacture. These letters shall have minimum height of inch (13 mm). The valve body shell thickness shall be as per AWWA specification C-500.

2.1.03 Flanges. The valve shall have raised flanged ends, which shall be faced and drilled, per ANSI B 16.1 Class 125. Flanges shall be spot faced on the backside. The degree of smoothness of flange face shall be 32 R.M.S. The bolt holes shall be located to accurately straddle centerlines.

2.1.04 Valve Base. Each valve shall be equipped with mounting base floor plate, the surface of which shall be parallel to the horizontal centerlines of the valve. The base

shall have machined bearing surfaces. The machined surface shall be finished to a tolerance of surface finish of not more than 125 RMS micro-inches. The valve base shall be machine leveled to 0.0005 inch for every 12 inch span. The mounting base shall be either integral with the body or separately fabricated. The fabricated base shall be made of ASTM A-36. Prior DWSD approval required.

2.1.05 Valve Shaft/Stem. The valve shaft shall be made of stainless steel 316 turned or17-4 PH Martensitic Stainless steel bars, ground and polished in conformity with the requirements of the current ASTM Designation A 564. The shaft shall be of one piece, extend through the bearings fitted into the valve body and will be secured to gate with pre approved design .

The valve shaft/stem shall be securely attached to the valve gate by using a stem nut which will fit in to the disc slot. Which shall be provided with sufficient clearance so that side thrust from the gate will not imparted to the valve stem. The design of the attachment of the valve shaft to the gate shall be indicated on the shop drawing for review by the Engineer.

2.1.06 Stuffing Box and Gland. The valve shall be provided with a carbon steel stuffing box at the projections of the valve shaft from the valve body. Stuffing boxes for rectangular section packing shall be bushed in an approved manner with bushings made of cast bronze or 316 stainless steel. Stuffing boxes for Vee type packing shall be fitted with a cast bronze or 316 stainless steel bottoming ring. The stuffing box gland and follower shall be made of cast bronze or 316 stainless steel and the gland studs and nuts shall be made of bronze or 316 stainless steel. The follower shall be of split construction. Lantern rings if provided shall be of split construction.

The stuffing box shall be packed with graphite packing Garlock Style 200, Garlock Style 432 or approved equal.

2.1.07 Bronze Mounting. All bearing surfaces of wedges, all glands through which shafts and stem pass, all recesses for roller spindles, and all other wearing and bearing surfaces shall be bronze or bronze bushed or approved equal. The size, location, design and chemical composition of all bronze mountings shall be as approved by the engineer.

2.1.08 Direction to Operate. All valves shall be designed to open Counter Clockwise per Wastewater Standards .

2.1.09 Yoke. The yoke supporting the operator shall be made of carbon steel or stainless steel and shall be strong enough and designed to provide convenient access for adjustment or removal of packing without disturbing any part of valve or operator assembly. The support shall be adequate to withstand any forces that the operator and valve produce.

2.1.10 Manual Operator. The manual operator shall be mounted pre approved design supporting the operator and shall operate through gears, which shall be totally enclosed in an approved type oil-tight ductile iron case. The gear case may be either oil lubricated or grease lubricated. Oil lubricated gear case shall be equipped with oil-tight filling and drain connections of approved design and with high and low oil level try cocks. Grease lubricated gear case shall be equipped with approved button type pressure fittings.

The gears shall have machine cut teeth and the gear ratios shall be designed for ease of valve operation having stem diameter not less than 2.5, torque capability of 5200 lb-ft thrust capability 105000 pounds. The gear reduction shall result in the minimum number of turns for operating the valve from fully open to fully closed consistent with the foregoing requirements.

Operation of the valve in a counterclockwise direction shall open the valve. A direction arrow with the word Open shall be tagged on suitable pre approved location. The valve shall be shall be supplied with floor box with cover to be mounted on existing ceiling hole.

2.2 ACCEPTABLE MANUFACTURERS.

Bids will be considered only from the manufacturers of Gate Valves or who are known to be skilled and have been regularly engaged in the manufacture of equipment of the type, class and size specified herein for a period of not less than ten years. The Manufacturers shall be limited as indicated, without exception:

1- LVC VALVE
2- ITT FABRI VALVE
3- HILTON VALVE

2.3 TESTING

After assembly, the Gate valve and the valve operator shall be thoroughly lubricated, adjusted and tested in the shop for performance in operation. The valve shall operate

throughout the full travel in both directions with free and smooth functioning of all parts in the intended manner.

Tests shall be conducted in conformity with the requirements of the AWWA C-500 Specifications, except that the leakage test shall be conducted in both the directions per MSS-SP-81. The tests shall be conducted in the following sequence:

1. Hydrostatic Test
2. Leakage Test
3. Performance Test

The parts under stress during the hydrostatic test shall be sounded with a test hammer to detect any defects not apparent upon visual inspection. Any excessive distortion, leakage, or sweating through or around any of the valve parts or joints shall be cause for rejection. If leakage is due to defective machining of the joints, the defect may be corrected by refinishing the surface. If leakage, sweating or dull sound is such as to indicate defective material in any part, such part will be rejected and shall be replaced.

A. Witnessed Shop Tests

The following requirements apply to witnessing shop tests:

1. The DWSD Engineer or his representative shall witness shop test of each valve 16 inch (400 mm) and larger in the manufacturers facilities. The Vendor shall submit for approval, detailed test procedure forty-five (45) days in advance of the test date. The tests shall be conducted strictly in accordance with above specifications. Proof of calibration of gauges shall be provided before the start of the tests.

2. The Engineer shall be given forty five- (45) days advance notice in writing of all shop tests in order that arrangements may be made for his representatives to attend. All travel expenses of the DWSD representatives shall be provided by DWSD. The shop performance tests will be witnessed by two (2) representatives of the Engineer.

3. If the Engineers representatives are required to come back to complete the tests, or in the event a retest is required, all the expenses incurred by Two (2) representatives of the Engineer to witness these tests, shall be paid by the vendor / contractor.

2.4 CERTIFICATION OF TESTS. The Vendor shall furnish to the Engineer, Five (5) certified copies of the results of all tests performed on the valves. The certification shall include a brief description of how the tests were made.

2.5 PAINTING.

A. The coating shall be applied in strict conformity with the manufacturers application directions. The interior coating shall have no deleterious effect upon the quality, color, taste, or odor of potable water and be NSF Standard 61 approved.

B. All interior and exterior ferrous metal surfaces, except machined, cadmium plated, galvanized, or plastic covered surfaces, shall be thoroughly cleaned of all rust and other items. Cleaning shall be performed per the requirements of SSPC SP-10 for interior surfaces and SSPC SP-6 for exterior surfaces.

C. Machined and finished surfaces shall be protected with a suitable lubricant to prevent rusting.

D. Interior non wetted surfaces shall be coated with two (2) coats of epoxy paint, Amerlock 400, or equal for total Dry Film Thickness 10 to 12 mils thick. The paint shall be approved for use on potable water per NSF List 61.

E. All exterior ferrous surfaces shall be coated with two coats of Polyamide paint or equal. The color of the exterior finish shall be green.

2.6 SPECIAL TOOLS. One complete set of wrenches, spanners and other tools necessary for the adjustment and dismantling of each valve shall be furnished. Standard open-end and pipe wrenches need not be included among these tools, but socket wrenches and offset wrenches which can be used to better advantage than standard open-end wrenches shall be included among the tools to be furnished with the valves. All wenches and spanners shall be case hardened steel forging and shall have a bright finish with working face dressed to fit nuts.

2.7 SPARE PARTS. The following spare parts shall be provided.

1. (1) Complete valve/actuator unit.

2. (2) Complete manual Actuators
3. (2) Gear boxes for manual actuator
4. (4) O Ring Kits
5. (4) Bonnet Gaskets
6. (4) Gland Follower
7. (4) Gland Package Kit VEE Type
8. (2) Stuffing Box

PART 3 - EXECUTION

3.1 INSTALLATION. Valves shall be handled and installed in accordance with Master Specification Section 15010, Valve Installation.

3.1.01 Installation Check. An experienced, competent, and authorized representative of the manufacturer shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. The representative shall be present when the equipment is placed in operation in accordance with Master Specification Section 01180, Equipment, Materials, Parts, and Tools, and shall revisit the job site as often as necessary until any problems are corrected and the equipment installation and operation are satisfactory in the opinion of Engineer.

The manufacturer's representative shall furnish a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping and appurtenances; and has been operated under full load conditions and that it has operated satisfactorily.

3.2. SCHEDULE. See the Valve Schedule as indicated in the Contract Drawings.

End of Supplemental Section

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