

SECTION 43 25 00.1 - SUBMERSIBLE PUMPS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Finish all labor, materials, equipment and incidentals required and install, complete and ready for operation a duplex (or quadraplex) pumping station, including pumps, base elbows, guide rails and lifting cables, control panels and appurtenances as shown on the Drawings and as specified herein. See also the Palm Beach County Water Utilities Department's "Minimum Design and Construction Standards," Latest Edition.

1.2 DESCRIPTION OF SYSTEMS

- A. All equipment for the pump station specified herein and shown on the Drawings is intended to be standard equipment for pumping raw sewage.

1.3 QUALIFICATIONS

- A. The submersible pumps shall be the standard product of a manufacturer having a successful record of manufacturing and servicing. The equipment shall be designed, constructed and installed in accordance with the best practices and methods.
- B. The submersible pumps shall be as indicated on the Drawings.

1.4 SUBMITTALS

- A. Copies of all materials required establishing compliance with the Technical Specifications shall be submitted in accordance with the provision of the General Conditions and Section 01 33 00 – Submittals Procedure. Submittals shall include at least the following:
 - 1. Certified shop and erection drawings showing all important details of construction, dimensions and anchor bolt locations.
 - 2. Descriptive literature, bulletins, and/or catalogs of the equipment.
 - 3. Data on the characteristics and performance of each size pump. Data shall include guaranteed performance curves, based on actual shop tests and duplicate units, which show that they meet specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift, and horsepower. Factory certified curves shall be submitted on 8½ -inch x 11-inch sheets.
 - 4. The total weight of the equipment including the weight of the single largest item.
 - 5. A complete total bill of materials for all equipment.

6. A list of the manufacturer's recommended spare parts with the manufacturer's current price for each item. Include gaskets, packing, etc. on the list.

1.5 OPERATING INSTRUCTIONS

- A. Copies of an operating and maintenance manual for each size pump shall be furnished to the ENGINEER as provided for in Section 01 78 23 – Operating and Maintenance Data. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

1.6 WARRANTY

- A. All equipment under this section of the Technical Specifications shall be warranted for a period of five (5) years from start-up by the equipment manufacturers. The warranty shall be prorated and include parts and labor. Warranty period shall commence on the date outlined in Section 01 75 00 – Starting and Adjusting.
- B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and restored to service at no expense to the OWNER.
- C. The manufacturer's warranty period shall run concurrently with the CONTRACTOR's warranty period. No exception to the provision shall be allowed.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All parts shall be so designed and proportioned as to have liberal strength, and stiffness and to be especially adapted for the work to be done. Ample room and facilities shall be provided for inspection, repairs, and adjustment.
- B. Stainless steel nameplates, giving the name of the manufacturer, the rated capacity, head, speed, serial number, horsepower, voltage, amperes, and all other pertinent data shall be attached to each pump.
- C. The nameplate ratings for the motors shall not be exceeded, nor shall the design service factor be reduced when its pump is operating at any point on its characteristic curve at maximum speed.

2.2 SUBMERSIBLE PUMP

- A. The pumps shall be of the heavy-duty, non-clog impeller, submersible type as manufactured those included in the Approved Materials and Equipment List.

- B. Performance Requirements: The pumps shall be designed and manufactured as specified for the conditions of service stated in the Drawings.
- C. The casing for the pump station shall be cast iron and have flanged discharge.
- D. Motors shall be oil-filled for continuous duty, 240 volts, 60 hertz, 3-phase. Motors shall have four (4) wires for temperature and moisture detection. Motors shall be rated for Class 1, Division I hazardous locations.
- E. Shaft shall be heavy-duty stainless steel.
- F. Controls shall be provided to control the starting/stopping of the pumps. The pumps shall operate per the controls shown on the instrumentation loop drawings. A NEMA 4X, 316 Stainless Steel control panel shall be provided to control the pumps locally as well as from the plant computer system. Motor starters are provided under Division 26 - Electrical, refer to the electrical drawings for requirements. The panel shall include for each pump Hand-Off-Auto selector switches, pump On/Off indicators and Low/High level indicators. In the HAND mode the pumps shall be started from the panel, In the OFF position pump shall not run, in the AUTO mode the pumps will be controlled via local control system. Control panel shall operate from a 120 Volt AC power. The control panels shall have a disconnect switch. Control panel shall be constructed in accordance with Division 26 - Electrical and the details in the Drawings.
- G. Pump manufacturer shall supply base elbow, guide rails, lifting cables, cable rack and miscellaneous hardware as shown on the Drawings and required for submersible pump installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Anchor bolts shall be set by the CONTRACTOR in accordance with the manufacturer's recommendations.
- B. Supply all anchor bolts, temporary lift equipment, power, water, labor, and all other incidentals required for the propose installation of the pumps.

3.2 PAINTING

- A. Surface preparation and shop prime painting shall be as specified in Division 9 - Finishes.
- B. Field painting shall be as specified in Division 9 - Finishes.

3.3 INSPECTION AND TESTING

- A. Furnish the services of a factory representative for one (1) day that has complete knowledge of proper operation and maintenance to inspect the final installation and supervise a test run of the equipment.
- B. After all pumps have been completely installed, and working under the direction of the manufacturer, conduct in the presence of the ENGINEER, such tests as are necessary to indicate that pump efficiently and discharge conform to the Technical Specifications. Each pump shall be hydrostatically tested at 100 psig. Field test shall include all pumps included under this Section. Supply al electrical power, water or wastewater, labor, equipment, and incidentals required to complete the field test.
- C. If the pump performance does not meet the Technical Specifications, corrective measures shall be taken by the CONTRACTOR, or pumps shall be removed and replaced with pumps which satisfy the conditions specified. A 24- hour operating period of the pumps will be required before acceptance. During this 24-hour operating period, the CONTRACTOR shall supply all power necessary.
- D. The components of each lubricating system shall be completely tested by the CONTRACTOR in the presence of the ENGINEER. Any component parts which are damaged as a result of testing or which fail to meet the requirements of the Technical Specifications shall be replaced, reinstalled and retested at the CONTRACTOR's expense.

END OF SECTION

SECTION 43 25 00.2 – NEW MOPS FIBER GLASS WETWELL AND APPURTENANCES

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Payment shall be based on the number of MOPS fiberglass wetwells furnished installed including full aluminum frame with hinged gas-tight lid, lockable hatch and stainless steel hardware (300 p.s.f. rated) gas-tight hatch with padlock post, gas-tight conduits, fabricated fiberglass wet well piping boss, upper guide rail bracket stainless steel material, double guide rail pull out system, architectural grade, stainless steel, lifting cables stainless steel material, float cable holder stainless steel material, odor/gas scrubber (model 'b') to be located next to control panel (raised to required elevation) (up to 20' from wetwell), influent flexible connector, float control switches w/ internal weight, pipe support bracket over 12' depth, discharge piping and fittings (up to 4") and to 3' outside of wetwell, conduit and pipe penetrations, quick disconnect municipal style two-piece discharge elbow, concrete ballast collar, 1:1 slope fiberglass fillet, min. 6-inch gravel base, and solid circular fiberglass anti-floatation ring twice wall thickness. Manufacturer's submittal shall be signed and sealed by a Licensed Professional Engineer in the State of Florida.
- B. The Contract price and shall include materials, labor, equipment, dewatering, trench safety to install MOPS fiberglass wetwell and appurtenances installed per the manufacturer's recommendation and as shown on the Contract Documents. All new fiberglass wetwells shall be 4 feet in diameter and vary in depth from 5 feet to 15 feet deep.
- C. The unit cost for this item shall be full compensation to provide all clearing, excavation, dewatering, trench safety, backfilling and grading for the proper construction of all work as shown on the Contract Documents.

PART 2 – EXECUTION

2.1 INSTALLATION AND EQUIPMENT NEW MOPS OPEN BOTTOM VALVE BOX (Pipes up to 4")

- A. Payment shall be based on the number of mops valve vaults furnished installed including full aluminum frame with hinged, lockable, hatch and s.s. hardware 300 p.s.f. rated, min. 6-inch gravel, emergency bypass with quick disconnect and cap, AWWA gate valve (2 typ.), slanted teflon seated disc check valve (2 typ.), pad lock post, stainless steel pipe support assembly, discharge piping and fittings (up to 4") and to 3' downstream of valve box
- B. The Contract price and shall include materials, labor, equipment, dewatering, trench safety to install MOPS open bottom valve box and appurtenances.

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- C. The unit cost for this item shall be full compensation to provide all clearing, excavation, dewatering, trench safety, backfilling and grading for the proper construction of all work as shown on the Contract Documents.

2.2 NEW MOPS PUMPS (1HP to 3HP)

- A. Payment shall be based on the number of MOPS pumps (2 typ.) furnished and installed including the pump cable, routing of the cable, cable connection to termination point, and pump start up to be provided by the Manufacturer.
- B. The Contract price and shall include materials, labor, equipment, dewatering, trench safety to install MOPS pumps and preform startup with the pumps. All new MOPS pumps shall be from 1HP up to 3HP.
- C. The unit cost for this item shall be full compensation to provide for furnishing and installation of the 2 pumps and start-up including the proper construction of all work as shown on the Contract Documents.

2.3 NEW MOPS PUMPS (3.1 HP to 5 HP)

- A. Payment shall be based on the number of MOPS pumps (2 typ.) furnished and installed including the pump cable, routing of the cable, cable connection to termination point, and pump start up to be provided by the Manufacturer.
- B. The Contract price and shall include materials, labor, equipment, dewatering, trench safety to install MOPS pumps and preform startup with the pumps. All new MOPS pumps shall be from 3.1HP up to 5 HP.
- C. The unit cost for this item shall be full compensation to provide for furnishing and installation of the 2 pumps and start-up including the proper construction of all work as shown on the Contract Documents.

2.4 NEW MOPS CONTROL CENTER AND RACK

- A. Payment shall be based on the number of Control Centers and Racks furnished and installed including the control center designed to meet all D.E.P. requirements, NEMA 4X stainless steel single door enclosure with pad lock hasp 30"hx30"wx8"d, panel labeled for U.L 508A "MOTOR CONTROL CENTERS" and U.L. 698A "HAZARDOUS LOCATION PANELS" (intrinsically safe), complete back-up, self-charging battery, with visual/audio alarm system per RSWF-45. Panel components including: alarm light, alternator (on disc), alarm silence switch, motor breakers, control breaker, emergency breaker, main breaker, power supply breaker, receptacle breaker, contactor motor starter, convenience

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receptacle, duplex intrinsically, safe controller, elapsed time meter, ground block, generator receptacle, hand-off-auto (on disc), power distribution, neutral block, pilot light (on disc), phase monitor, power supply, relay, battery relay, silence relay, seal fail relay, RTU transformer, surge/light protection device, terminal strip for pumps, and terminal strip for floats. Stainless steel support unistrut, 3" aluminum support posts, and elastomer end caps. Incoming power supply conduit and wiring (conduit to 3' beyond slab), stainless steel connectors, remote telemetry unity (RTU) monitor antenna, grounding rod, and grounding. Rack shall be installed in concrete supports per the manufacturer's recommendation. Manufacturer's submittal shall be signed and sealed by a Licensed Professional Engineer in the State of Florida.

- B. The Contract price and shall include materials, labor, equipment, dewatering, trench safety to install MOPS control center, rack, appurtenances, and preform startup with the control center. . All new MOPS control centers and racks shall be support pumps up to 5 HP.
- C. The unit cost for this item shall be full compensation to provide for furnishing and installation of the control center and rack and start-up including the proper construction of all work as shown on the Contract Documents.

END OF SECTION

SECTION 43 30 00 – VALVES GENERAL

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. The requirements of Section 46 00 00 – Equipment General Provisions, apply to the WORK of this Section.
- C. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated.
- D. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.
- E. Support
 - 1. Where a valve is to be supported by means other than the piping to which it is attached, obtain from the valve manufacturer a design for its support and foundation that satisfies the criteria in Section 46 00 00 – Equipment General Provisions.
 - 2. Submit the support design, including drawings and calculations sealed by an engineer, with the Shop Drawings.
- F. Unit Responsibility
 - 1. The CONTRACTOR shall assign a single manufacturer to be responsible for the supply, coordination of design, assembly, testing, and furnishing of each valve; however, the CONTRACTOR shall be responsible to the OWNER for compliance with the requirements of each valve Section. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve.
- G. Single Manufacturer
 - 1. Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Submittal Procedures.
- B. Furnish the following information on Shop Drawings:
 - 1. Valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number;
 - 2. Complete information on the valve actuator, hydraulic power units (HPU), pneumatic air supply system including size, manufacturer, model number, limit switches, and mounting;
 - 3. Cavitation limits for control valves;

4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;
 5. Data in accordance with Section 40 05 93 – Common Motor Requirements for Process Equipment, for electric motor-actuated valves;
 6. Complete wiring diagrams and control system schematics; and,
 7. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.
- C. Furnish a technical manual containing the required information for each valve, as indicated.
- D. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.
- E. Factory Test Data
1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.
 2. Furnish a certification of quality and test results for factory-applied coatings.
- F. Field Test Data
1. Submit signed, dated, and certified field test data for each valve.

PART 2 – PRODUCTS

2.1 PRODUCTS

A. General

1. Provide valves and gates of new and current manufacture.
2. Provide valves 6-inch and larger with actuators with position indicators.
3. Buried valves shall be provided with valve boxes and covers containing position indicators and valve extensions. Manual shut-off valves mounted higher than 7-feet above working level shall be provided with chain actuators.
4. Unless otherwise indicated, provide valve actuators in accordance with Section 43 30 12 – Valve and Gate Actuators.
5. All materials, fittings and appurtenances intended for use in pressure pipe systems shall be designed and constructed for a minimum working pressure of 150 psi unless the specific application dictates a higher working pressure.

B. Protective Coating

1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 2-inch and larger in accordance with the requirements of Section 09 96 00 – Protective Coatings.

2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.
3. Do not coat the machined flange faces of valves except where such flanges are not adjoining a mating flange as shown in the Contract Documents. Apply rust inhibitor coating on machined surfaces of the flange prior to shipment.

C. Valve Labeling

1. Except when such requirement is waived by the ENGINEER in writing, provide a label on shut-off valves and control valves except for hose bibbs and chlorine cylinder valves.
2. Furnish a label composed of 1/16-inch plastic or stainless steel, a minimum of 2 inches by 4 inches in size, as indicated in Section 40 50 02 – Piping Identification, and permanently attached to the valve or on the wall adjacent to the valve as directed by the ENGINEER.

D. Valve Testing

1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.
2. Factory-test valves 4 inches in diameter and larger as follows:
 - a. Hydrostatic Testing
 - 1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.
 - 2) Metallic valves rating pressures shall be based at 100 degrees F.
 - 3) Plastic valves rating pressures shall be based at 73 degrees F, or at a higher temperature according to material type.
 - 4) During the hydrostatic test, there shall be no visible leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.
 - 5) Allow test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - b. Seat Testing
 - 1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.
 - 2) Provide test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - 3) The leakage rate shall be the more stringent of the following:
 - a) As recommended by the reference standard for that type of valve; or

- b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves, and drop-tight for resilient seated valves.

c. Performance Testing

- 1) Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Certification

1. Prior to shipment of valves with sizes larger than 12-inches in diameter, submit certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

F. Valve Markings

1. Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.2 MATERIALS

A. General

1. Provide materials suitable for the intended application.
2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.
3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.
4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:
 - a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - b. Ductile Iron: ASTM A 538 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
 - c. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications. Bronze materials in contact with potable water service shall be free of lead content meeting the Lead Reduction Act.
 - d. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
 - e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel

- f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454
- g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447
- h. Elastomeric materials used for seat, seals and O-rings shall be compatible with temperature, pressures and fluid or gas service.
- i. NSF Standard 61: Materials shall be listed for use in contact with potable water.

2.3 VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.
2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.
3. Perform welds on welded bodies by certified welders and ground welds smooth.
4. Provide valve ends as indicated, and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.
2. Provide valves 3 inches in diameter and larger with flanged end connections.
3. Flanges, bolts and gaskets shall be as specified in Section 43 05 00 - Piping, General.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.
2. Provide bonnets of the same material, temperature, and pressure rating as the body.
3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercially-available material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal. Bronze materials in contact with potable water shall be NSF 61 approved and free of lead. Elastomeric materials shall be compatible with fluid service.
2. Where subject to dezincification, bronze valve stems shall conform to ASTM B 62.

3. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used, except that the zinc content shall not exceed 16 percent.

E. Stem Guides

1. Provide stem guides spaced with an L/R ratio not to exceed 200:1. Submit calculations for L/R ratios and guide spacing to the ENGINEER for review.
2. Stem guides shall have slotted holes and shall be adjustable in two directions.
3. Construct submerged stem guides from Type 316 stainless steel.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.
2. Where not indicated, construct valve trim from Type 316 stainless steel or other material best-suited for the intended service.

G. Nuts and Bolts

1. Unless otherwise indicated, provide nuts and bolts on valve flanges and supports in accordance with the requirements of Section 05 50 00 – Miscellaneous Metalwork and Section 43 05 00 – Piping, General.

2.4 VALVE ACTUATORS

- A. Valve actuators shall be as indicated and as specified in Section 43 30 12 – Valve and Gate Actuators

2.5 VALVE ACCESSORIES

- A. Provide valves complete with the accessories required to provide a functional system.

2.6 SPARE PARTS

- A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.
- B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.
- C. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.7 MANUFACTURERS

- A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

2.8 VALVE BOXES

- A. All buried valves shall be provided with valve boxes as indicated on the Contract Drawings, with a minimum thickness of 1/2" and constructed so that the removable cover will not be thrown out by travel over it.

- B. Valve boxes shall be of sufficient length to operate all valves buried in the ground.
- C. Valve boxes shall be the telescope extension type with not less than a five-inch (5") diameter shaft and with cast iron covers marked "SEWER". Boxes shall be Model No. 6850 as manufactured by Tyler Union, or approved equal.
- D. The valve boxes and valve box covers shall be of sound close grained cast iron, free from flaws and defects, and built strong and rugged enough to withstand the shock of street traffic.
- E. Two (2) valve operating wrenches shall be supplied in 4-foot lengths with handles. Valve wrenches shall be Model No. 144908 (UP Code) as manufactured by Tyler Union, or approved equal.

2.9 EXTENSION STEMS

- A. Extension stems shall be provided and installed on all valves in buried locations and where indicated on the Contract Drawings.
- B. Extension stems shall be fabricated from solid steel shafting capable of withstanding the torque imposed, but not smaller than 1.25 inches in diameter.
- C. Stem couplings shall be keyed and of approved design and construction.
- D. Extension stems for buried valves shall extend to within six inches (6") of the surface of the ground. Each extension stem shall be connected to the valve operator with a suitable universal joint type of coupling. All connections shall be pinned.
- E. Each extension stem shall be provided with spacers which will center the stem in a valve box having an inside diameter of six inches (6"), and shall be equipped with a standard AWWA wrench nut as described in AWWA C500, except where handwheels are indicated on the Contract Drawings.
- F. A position indicator shall be provided with each buried valve which shows the valve position, number of turns to go from full open to full closed, and type and size of valve. The entire unit shall be constructed of non-corrosive materials.

PART 3 – EXECUTION

3.1 VALVE INSTALLATION AND TRIAL OPERATION

A. General

1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.
2. Adequately brace gates in order to prevent warpage and bending under the intended use.
3. Firmly support valves in order to avoid undue stresses on the pipe.
4. Where required for satisfactory operation of valves or gates, extension stems, stem guides, valve boxes, floor boxes and other valve appurtenances shall be provided.
5. Extension stems shall be complete with guide bearings, wrench nut, and tee handle wrench.

6. All valve stems where packing is specified shall be packed with material properly selected for the service intended.
7. .
8. All valves shall be manually opened and closed before installation to check their operation, and the interior of the valve shall be cleaned.

B. Installation

1. Install valves with stems upright or horizontal, not inverted.
2. Use plug valves for wastewater unless otherwise noted.
3. Install valves so that they are easily accessible for operation, visual inspection and preventative maintenance.
4. Buried valves shall be firmly set on a foundation or footing of solid concrete, not less than eight inches (8") nor less than one cubic foot (1 cu. ft.) in volume, which shall have been placed on firmly compacted ground.
5. All buried valves shall be provided with valve boxes. The riser shall rest on the valve and be adjusted so that the cover may be set flush with existing sidewalk, bike path, paved streets, unpaved streets, driveways, road right-of-way, etc. The valve box shall be set to allow equal movement above and below finished grade when located in utility easements not subject to street traffic. The riser shall be centered over the valve. The entire assembly shall be plumb.
6. Valves located on branching pipe shall be tied to mains with tie rods or anchor tees.

C. Access

1. Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

D. Valve Accessories

1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.
2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

E. Trial Operation

1. After installation, schedule trial operation witnessed by the ENGINEER and the OWNER representative.
2. All valves shall be cleaned thoroughly of all foreign materials and final adjustments made. The valves shall then be operated through one complete cycle from a fully closed position to a fully open position and back to a fully closed position to verify that the assembly is functional.
3. For control valves that operate in multiple operating scenarios, the CONTRACTOR shall simulate all operational scenarios including the hydraulic power units, pilot control

system or pneumatic air supply system to demonstrate compliance to the specifications.

4. A field leakage test meeting the maximum allowable specified requirement shall be conducted.
5. Test certificate shall be signed by the valve manufacturer and the CONTRACTOR and shall be submitted to the ENGINEER.

- END OF SECTION -

SECTION 43 30 16 – CHECK VALVES

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide check valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 - Valves General apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 43 30 00 – Valves General.
- B. Swing check valves shall have undergone a proof-of-design test to demonstrate that the valve components operate at the service flow, pressure, temperature, and fluid conditions, free from binding, excessive noise, and premature failures. Proof-of-design test results shall be available to the ENGINEER on request. The proof-of-design test shall be conducted in accordance with the applicable provisions of AWWA C508.

PART 2 – PRODUCTS

2.1 SWING CHECK VALVES (3-INCHES AND LARGER)

- A. **General:** Swing check valves for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, in accordance with AWWA C 508 - Swing-Check Valves for Waterworks Service, 2-in. through 24-in. NPS, unless otherwise indicated, with full-opening passages, designed for a water-working pressure of 150 psi. Units shall have a flanged cover piece to provide access to the disc. Where indicated, swing check valves shall be provided with position indicators.
- B. **Body:** The valve body and cover shall be of cast iron conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with flanged ends conforming to ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or be mechanical joint ends, as indicated. Protective coating shall be as specified in Section 43 30 00 – Valves General.
- C. **Disc:** The valve disc shall be of cast iron, ductile iron, or bronze conforming to ASTM B 62 – Specification for Composition Bronze or Ounce Metal Castings.
- D. **Seat and Rings:** The valve seat and rings shall be of bronze conforming to ASTM B 62 or B 148 - Aluminum-Bronze Castings or of Buna-N.
- E. **Hinge Pin:** The hinge pin shall be of bronze or stainless steel.
- F. **Dashpot:** A side-mounted hydraulic dashpot shall be provided to prevent reverse flow and to alleviate water hammer during the closing cycle of the valve. The dashpot shall have 2 stage closing rates: For the 2 stage closing rate, the first stage shall be adjustable from 100 to 10 percent. The second stage shall be adjustable from 10 to zero percent. Each rate shall be infinitely and independently field adjustable depending on the system requirement. The dashpot shall be a self-contained oil system separate and independent from the pipeline fluid. The oil reservoir for the closing cycle shall be stainless steel, open to the atmosphere with an air breather cap to allow oil level changes in the reservoir and also to prevent contamination of the oil from any outside source. The oil reservoir for the opening cycle shall be stainless steel, be hermetically sealed to contain pressure (air over

oil), and shall be equipped with a 3-inch diameter pressure gauge and pneumatic fill valve. There shall be a provision for disconnecting each dashpot from the valve for servicing, without removal of the valve.

- G. **Limit Switches:** Limit switches shall be provided on check valve swing arms where indicated. Switches shall be roller lever rotary actuated type, with contacts rated for 10 amp at 120 VAC. Switches shall be located to actuate when the check valve is fully closed and deactivate when the valve begins to open. Switches shall be **Honeywell Microswitch Model 1LS1, Square D 9007 C, or approved equal.**
- H. **Manufacturers for water and wastewater applications:**
1. **APCO** (for water and wastewater treatment plant applications)
 2. **Georgia-Alabama Valve & Control** applications
 3. **Val-Matic** (7800 Series for water treatment plants)
- I. **Manufacturers for waste water systems:**
1. **M & H 159-02**
 2. **Mueller 2600-6-01**
 3. **Kennedy 106LW**
 4. **Clow 5382**
 5. **American 50SC (lever & weight)**

2.2 PLASTIC BALL CHECK VALVES

- A. **General:** Plastic ball check valves for corrosive fluids, in sizes up to 4-inches, shall be used for vertical up-flow conditions only, unless the valves are provided with spring actions.
- B. **Construction:** The valve bodies and balls shall be of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polyvinylidene fluoride (PVDF), or polypropylene (PP) construction, as best suited for each individual service condition. They shall have unions with socket connections or flanged ends conforming to ASME B16.5 - Pipe Flanges and Flanged Fittings, class 150. Seals shall have Viton O-rings, and valve design shall minimize possibility of the balls sticking or chattering. The valves shall be suitable for a maximum working non-shock pressure of 150 psi at 73 degrees F.
- C. **Manufacturers, or approved equal**
1. **ASAHI-AMERICA**
 2. **George Fischer, Inc.**
 3. **NIBCO Inc. (Chemtrol Division)**

2.3 INTERNAL SPRING-LOADED CHECK VALVES (GLOBE STYLE)

- A. **General:** Internal spring-loaded check valves for water pumps, compressors, gas, air, and steam shall be of the full-flow internal spring-loaded poppet type. The valves shall be designed for a water-working pressure of not less than 150 psi unless otherwise indicated.
- B. **Body:** The bodies of valves 3-inches and larger shall be of cast iron conforming to ASTM A 126 with 125 lb flanged ends conforming to ASME B 16.1 unless otherwise indicated. Where necessary, there shall be a positive, watertight seal between the removable seat and the valve body. The stem guide shall be integrally cast with the body or screwed into the body.
- C. Valves smaller than 3-inches shall have bronze bodies with screwed ends conforming to ASME B 1.201, suitable for a minimum working pressure of 200 psi, and a temperature of 250 degrees F, unless otherwise indicated. The type of bronze shall be suitable for the intended service.
- D. **Disc and Stem:** The disc and stem of all valves in sizes 3-inches and larger shall be of bronze conforming to ASTM B 584 - Copper Alloy Sand Castings for General Applications, or stainless steel. The stem shall have 2 point bearings. The downstream bearing shall have a bronze or other suitable bushing, to provide a smooth operation.
- E. Valves smaller than 3-inches shall have discs and retaining rings of Teflon, nylon, or other suitable material, and stems of bronze, brass, or stainless steel, suitable for the intended service.
- F. **Stem Guide:** The stem guide shall be either firmly fixed in the valve body to prevent it from sliding into the adjacent pipe and damaging the pipe lining, or the valve manufacturer shall provide each valve with one matching flange compatible with the adjacent pipe and its lining to prevent damage to the lining. The compatible flange shall be part of the Shop Drawing submittal.
- G. **Seat:** Valves for general service at temperatures up to 250 degrees F shall have bubble-tight shut-off with resilient seats of Buna-N, Teflon, or other suitable material. Valves for steam service and temperatures over 250 degrees F shall have metal-to-metal seating of bronze or stainless steel, as recommended by the manufacturer for the specific service condition. Resilient seats shall be firmly attached to the seating ring by compression molding or other acceptable method.
- H. **Spring:** Valves in sizes 3-inches and larger shall have Type 316 stainless steel springs, and valves smaller than 3-inches shall have stainless steel or beryllium copper springs, as suitable for the service. The spring tension of the valves shall be designed for the individual pressure condition of each valve.
- I. Manufacturers, or approved equal
 1. **APCO (Valve and Primer Corp.)**
 2. **Henry Pratt Company**
 3. **VAL-MATIC (Valve and Manufacturing Corporation)**

2.4 SLANTING DISC CHECK VALVES

- A. **General:** Slanting disc check valves for water service shall have a seating angle of approximately 55 degrees. Valves shall have replaceable seat rings and disc rings. The

water passage cross-sectional area shall be equal to the full pipe area. Valves shall have sufficient clearance around the pivot pins to permit free seating of the disc without binding and shall be guaranteed not to stick in the closed position. Slanting disc check valves shall have position indicators and 2 flanged connections for attachment of dashpots or hydraulic snubbers. The valves shall be designed for a water working pressure of 150 psi, unless otherwise indicated.

- B. **Body:** The valve body shall be of cast iron conforming to ASTM A 48 - Gray Iron Castings, or A 126, Class B, with flanged ends conforming to ASME B 16.1, Class 125, unless otherwise indicated.
- C. **Disc:** The valve disc shall be designed with an "airfoil" configuration of cast iron or ductile iron, with bronze seating face, except for valves 10-inches or smaller, which may have solid bronze or aluminum bronze discs. The disc shall be partially balanced with a short travel to resist slamming.
- D. **Seat Ring:** The seat ring shall be of centrifugally-cast bronze, aluminum bronze, or stainless steel, with beveled edges, firmly clamped or screwed into the valve body.
- E. **Pins:** The pivot pins and bushings shall be of stainless steel, bronze, or aluminum bronze to allow free movement of the disc without binding.
- F. **Dashpot:** A side-mounted hydraulic dashpot shall be provided to prevent reverse flow and to alleviate water hammer during the closing cycle of the valve. The dashpot shall have 2 stage closing rates: For the 2 stage closing rate, the first stage shall be adjustable from 100 to 10 percent. The second stage shall be adjustable from 10 to zero percent. Each rate shall be infinitely and independently field adjustable depending on the system requirement. The dashpot shall be a self-contained oil system separate and independent from the pipeline fluid. The oil reservoir for the closing cycle shall be stainless steel, open to the atmosphere with an air breather cap to allow oil level changes in the reservoir and also to prevent contamination of the oil from any outside source. The oil reservoir for the opening cycle shall be stainless steel, be hermetically sealed to contain pressure (air over oil), and shall be equipped with a 3-inch diameter pressure gauge and pneumatic fill valve. There shall be a provision for disconnecting each dashpot from the valve for servicing, without removal of the valve.
- G. **Limit Switches:** Limit switches shall be provided on check valve swing arms where indicated. Switches shall be roller lever rotary-actuated type with contacts rated for 10 amp at 120 volts. Switches shall be located to actuate when the check valve is fully closed and deactivate when the valve begins to open. Switches shall be Honeywell Microswitch Model 1LS1, Square D 9007 C, or equal.
- H. **Manufacturers, or approved equal**
 - 1. **APCO (Valve and Primer Corp.)**
 - 2. **VAL-MATIC (Valve and Manufacturing Corporation)**

2.5 RUBBER FLAPPER SWING CHECK VALVES

- A. **General:** Rubber flapper swing check valves for water, sewage, sludge, and abrasives shall have full pipe size flow areas, one moving part only, and body seats at 45 degrees to permit horizontal and vertical up-flow. Valves shall be designed for a minimum water-working pressure of 150 psi, with a flanged cover plate holding down the rubber flapper. The valves shall be of the non-clog design.

- B. **Body:** The valve body and cover shall be of cast iron conforming to ASTM A 126 with flanged ends conforming to ASME B 16.1. There shall be a threaded tapping in the bottom of the body for insertion of a back-flow device, and provision for mounting of a signal switch.
- C. **Disc:** The valve disc or flapper shall be of Buna-N or other best-suited elastomer one-piece construction, precision molded, with integral O-ring type sealing surface, steel and nylon or fabric reinforced, with non-slam closing action through a 35 degree disc stroke, for bubble-tight shut off at high and low pressures.
- D. **Manufacturers, or approved equal**
 - 1. **APCO (Valve and Primer Corporation)**
 - 2. **Crispin Valves**

PART 3 – EXECUTION

3.1 GENERAL

- A. Valves shall be installed in accordance with provisions of Section 43 30 00 - Valves, General.

END OF SECTION

SECTION 43 30 22 – GATE VALVES

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide gate valves and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 43 30 00 – Valves General apply to this Section.
- C. The requirements of Section 43 30 12 – Valve and Gate Actuators apply to this Section.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 43 30 00 – Valves General.
- B. Gate valves shall have undergone a proof-of-design test to demonstrate that the valve components operate at the service flow, pressure, temperature, and fluid conditions, free from binding, excessive noise, and premature failures. Proof-of-design test results shall be available to the ENGINEER on request. The proof-of-design test shall be conducted in accordance with the applicable provisions of AWWA C509.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Buried valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems, in accordance with Section 43 30 12 – Valve and Gate Actuators.
- B. Gate valves 18-inches and larger shall be provided with a bypass line and isolation valve.

2.2 KNIFE-GATE VALVES (2- TO 96-INCH)

- A. Construction: Knife-gate valves shall be of the flanged or wafer design, with raised face and resilient seats for positive seating. Wetted parts shall be constructed of Type 316 stainless steel, and the gates shall be finish-ground on both sides to prevent packing or seat damage. Valves 2- to 12-inches in size shall be furnished with cast stainless steel bodies; valves 14-inches and larger shall have semi-steel bodies with stainless steel linings. The valve stem shall be of stainless steel with a long life packing. The stainless steel gate shall have a square bottom with a knife edge. The valve body port shall be no less than 95% of the nominal pipe diameter.
- B. Flush Ports: The valve body shall be complete with two flush ports consisting of not less than 1-1/2" diameter pipe taps.
- C. The valves shall be rated for tight shut-off at the following pressures:
 - 1. Valve sizes 4- to 12-inches 150 psi (bi-directional)
 - 2. Valve sizes larger than 12-inches 50 psi
- D. Actuators: Actuators shall be provided in accordance with Section 43 30 12 – Valve and Gate Actuators.

- E. **Manufacturers, or approved equal**
 - 1. **DeZURIK Water Controls Corporation**
 - 2. **Fabri-Valves**

2.3 RESILIENT-SEATED GATE VALVES

- A. **General:** Resilient-seated gate valves may be provided in lieu of metal-seated double-disc or solid-disc gate valves, at the discretion of the ENGINEER.
- B. **Construction:** Resilient-seated gate valves shall conform to ANSI/AWWA C 509 - Resilient-Seated Gate Valves for Water and Sewerage Systems. The valves shall be suitable for a design working water pressure of 200 psig, with flanged, bell and spigot, or mechanical joint ends. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of ANSI/AWWA C509. The stem, stem nuts, glands, and bushings shall be of bronze, with the stem seal per ANSI/AWWA C 509.
- C. **Pressure Ratings:**
 - 1. AWWA C509 valves that are 3, 4, 6, 8, and 12 inches in size shall be rated for 200 psig minimum design working water pressure, and valves 16 and larger shall be rated for 150 psig minimum design working water pressure.
- D. **Protective Coating:** Valves shall be factory coated in accordance with Section 09 98 00 - Protective Coatings. The CONTRACTOR shall submit a test report from a coating inspector that the coating is holiday-free. The CONTRACTOR shall be aware that it may retain the services of a third party coating applicator to achieve the holiday-free requirement.
- E. **Actuators:** Unless otherwise indicated, resilient-seated gate valves shall have manual actuators in accordance with Section 43 30 12 – Valve and Gate Actuators.
- F. **Manufacturers, or approved equal**
 - 1. **Mueller Valve 2360**
 - 2. **American 2500 (MM,FF)**
 - 3. **Kennedy Ken-Seal II**
 - 4. **M & H Valve 4067**
 - 5. **Clow Valve F-6100, F-6102**
 - 6. **US Pipe**

2.4 GATE VALVES (SMALLER THAN 3-INCHES)

- A. **Construction:** Gate valves smaller than 3-inches, for general purpose use, shall be non-rising stem, heavy-duty type for industrial service, with screwed or soldered ends to match the piping. The bodies shall have union bonnets of bronze conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings. The stems shall be of bronze conforming

to ASTM B 62, or ASTM B 371 - Copper-Zinc-Silicon Alloy Rod. The solid wedges shall be of bronze conforming to ASTM B 62. The valves shall have malleable iron hand wheels unless otherwise indicated, and stem seals shall be of Teflon-impregnated or other acceptable non-asbestos packing. Valves shall have a pressure rating of minimum 125 psi steam and 200 psi cold-water, unless otherwise indicated.

B. Manufacturers, or approved equal

- 1. Mueller Valve**
- 2. American**
- 3. Kennedy Valve**
- 4. M & H Valve**
- 5. Clow Valve**
- 6. US Pipe**

PART 3 -- EXECUTION

3.1 GENERAL

- A. Gate valves shall be installed in accordance with the provisions of Section 43 30 00 – Valves, General. Care shall be taken that valves in plastic lines are well supported at each end of the valve.**

END OF SECTION

SECTION 43 55 10 - PUMP STATION - FALL PROTECTION SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work covered by this Section consists of furnishing all labor, equipment and materials, and performing all operations required for the installation and certification of an approved pump station grate system for fall protection (fall through prevention).
- B. An approved fall protection system shall be installed within the wetwell hatch openings of the submersible wastewater pump station.
- C. Prior to final acceptance of the fall protection system by OWNER, the CONTRACTOR will be required to remove and reinstall all pumps in order to demonstrate that the fall protection system does not cause an obstruction to the pumps.
- D. The fall protection system shall be permanently and professionally installed using acceptable construction practices. The manufacturer shall certify that each fall protection system is installed as per the manufacturer's recommendations. The fall protection system shall be warranted for a minimum of ten (10) years for safety grates to include materials, workmanship and installation.
- E. The pump station grate system must be furnished, installed and certified to meet OSHA Standards in CFR 29 – 1926 by the manufacturer. The manufacturer shall perform the installation or train and certify a CONTRACTOR to perform the installation of the fall protection system as per the manufacturer's instructions. Documentation of CONTRACTOR certification is to be submitted prior to the start of work.

1.02 RELATED WORK

- A. **Section 01 11 00: Summary of Work.**
- B. **Section 01 33 00: Submittals Procedures.**
- C. **Section 01 77 00: Close-Out Procedures.**

1.03 SUBMITTALS

- A. Submit shop drawings and other information for review in accordance with **Section 01 33 00 – Submittals Procedures**, including hardware description and quantity, grate material and other applicable information.

1.04 CERTIFICATION

- A. All pump station fall protection systems must be certified as to proper installation by the manufacturer of the fall protection system. Proof of certification for each installation must be provided as part of Section 01 77 00 – Closeout Procedure.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The pump station fall protection system shall be a safety grate product as described below or approved equal.
- B. Each safety grate must have an engraved or embossed aluminum identification tag stating the date of installation, size of grate, name and contact information of the manufacturer. The inside of each wetwell hatch cover shall be fitted with an adhesive warning sign stating that the wetwell is equipped with a fall protection system and that the safety grate must be in place prior to leaving the station. The warning sign must be water and hydrogen sulfide gas resistant.
- C. No more than six inches (6") vertical clearance between the concrete top slab and the fall protection system shall be allowed. The fall protection system shall be centered on the hatch opening with no more than six inches (6") horizontal clearance on either end between the concrete top slab edge and the fall protection system.

2.02 SAFETY GRATE

- A. The Hinged Hatch Safety Grate is a permanent fall through prevention system that allows limited accessibility into the wetwell.
- B. The fall through prevention system shall consist of a grate made of 6061-T6 aluminum and be designed to withstand a minimum pedestrian load of 300 lbs. per square foot. The grate openings shall be a minimum of four inches by six inches (4"x6") to allow both visual inspection and limited accessibility for maintenance purposes when the grate is closed.
- C. The grate will pivot on an aluminum hinge device with 316 Stainless Steel hardware that permits it to rotate upward 90 degrees and automatically lock in place. In its open position the grate will act as barrier to help prevent anyone from stepping into the hatch opening. An aluminum pull rod will be attached to the grate so the operator is positioned with the grate between him and the hatch's opening whenever he pulls on it to raise the grate. A 316 Stainless Steel rod will automatically engage to secure the grate in its open position, and can be lifted upward to permit the grate to close. The hatch cover will not be able to shut until the grate is closed--thereby insuring the grate is in position when the next operator opens the hatch cover.
- D. The grate shall be powder coated with an OSHA safety orange or yellow color to increase visual awareness of the safety hazard.

- E. A padlock hasp for owner-supplied padlock shall be provided.
- F. All mounting hardware shall be manufactured of Type 316 Stainless Steel.
- G. The safety grate system shall be installed by the manufacturer or the manufacturer shall train and certify a CONTRACTOR to perform the installation of the safety grate as per the manufacturer's instructions.
- H. The safety grate system shall be manufactured by a company listed in the PBCWUD's Approved Materials and Equipment List.

PART 3 - EXECUTION

3.01 PREPARATION

- A. The fall protection system must be anchored to the solid concrete top slab. If degraded concrete exists, the surface must be water blasted to reach a solid concrete surface suitable for anchoring in accordance with manufacturer's recommendations.
- B. Prior to installation, the manufacturer/installer will provide and secure a temporary debris liner to prevent tools and hardware from entering the wetwell. The CONTRACTOR shall be responsible for damage to pumps, corrosion barrier coating, cables, floats, etc. due to dropped tools or hardware. Puncturing of the existing wetwell corrosion barrier coating to install the debris liner shall not be acceptable.

3.02 INSTALLATION

- A. The grate and hatch frame shall be cast into the concrete top slab wall to allow for unobstructed removal of the pumps.
- B. Prior to final acceptance of the fall protection system by MCU, the CONTRACTOR will be required to remove and reinstall all pumps in order to demonstrate that the fall protection system does not cause an obstruction to the pumps.
- C. Provisions shall be made to protect against galling of hardware with similar metals. CONTRACTOR shall apply a Teflon or graphite based lubricant such as Neversieze to threads prior to assembly in accordance with manufacturer's recommendations.
- D. A drill jig shall be used to ensure proper depth of bolt into concrete top slab.
- E. Installation of the fall through prevention system shall be in accordance with the instructions provided by the manufacturer.
- F. The complete grate assembly shall be warranted against defects in material, installation and workmanship for a period of ten (10) years from the date of installation.

END OF SECTION

**PBCWUD
REVISION DATE – 03/31/2017**

**PUM STATION - FALL PROTECTION SYSTEM
PAGE 43 55 10 - 4**

SECTION 43 60 00 - INSIDE DROP SYSTEM

PART 1 – GENERAL

- A. **Basic Application:** INSIDE DROP SYSTEM is a plastic composite collection device that facilitates the controlled drop of effluent into the main stream flow of a sanitary manhole or wetwell. Adjustable stainless steel straps fully support the drop pipe.

PART 2 - PRODUCTS

- A. **Composition and Materials:** DROP BOWL is fabricated from marine grade fiberglass. The clamping pipe supports are of 304 stainless steel with 18-8 stainless nuts and bolts.

The bowl size shall be determined by incoming pipe size and flow rates. The bowl shall be installed as per manufacturer's instructions using stainless steel fasteners. The appropriately sized drop pipe of SDR 35 PVC shall be securely attached to the manhole/wetwell wall using stainless steel adjustable clamping brackets and stainless steel fasteners. The connection of Drop Bowl to drop pipe shall be by flexible external pipe coupler. The turn-out at the base end of the drop pipe shall be accomplished with an appropriately angled PVC pipe elbow.

- B. **INSIDE DROP components consist of:**

1. Standard size composite Drop Bowls
2. Stainless steel clamping brackets
3. Standard composite flume drop ends

Composite components are hand and chopper gun laminations of these properties:

Physical Properties of Unsaturated Polyester Resin Reinforced Laminates (33 / 66 Glass / Resin 1.5 oz mat Laminates .125 in.)

| | |
|-----------------------------------|-----------|
| Flexural Strength (psi) ASTM D790 | 27,100 |
| Flexural Modulus (psi) ASTM D790 | 1,157,000 |
| Tensile Strength (psi) ASTM D638 | 16,700 |
| Tensile Modulus (psi) ASTM D638 | 1,457,000 |
| Tensile Elongation (%) ASTM D638 | 1.54 |
| Hardness, Barcol 934.1 ASTM D2583 | 55 - 60 |

Physical Properties of ISO Gel Coat

| | <u>Room Temperature Cured for 45 hours</u> | <u>Post Cured at 50 for 24 hours</u> |
|---|--|--|
| Tensile Strength | 6,218 | 6,581 |
| Elongation, % | 2.70 | 1.90 |
| Flexural Strength, psi | 11,363 | 11,329 |
| Heat Distortion, °F | 0.544 x 10 ⁶ | 0.713 x 10 ⁶ |
| Mandrel Flex, Mandrel Diameter in Inches | -- | 1.0 |

Stainless steel clamping bracket materials:

304 series non-magnetic stainless steel - 11GA

18-8 series non-magnetic stainless steel 3/8 x 18

PART 3 - EXECUTION

3.1 GENERAL

- A. Select Drop Bowl of size appropriate to flow rate and pipe diameter.
(The "A" Bowl 6" outlet will service up through full 8" inlets. Can be used for 10" and 12" inlet moderate flows. The "B" Bowl is sized to fit around 12" concrete pipe inlet.)
- B.
 - 1. Trim incoming pipe so that only 2" maximum protrudes into manhole.
 - 2. For improved flow control, cut a "V" shaped notch at bottom edge of incoming pipe.
- C. Center Drop Bowl directly under incoming pipe, allow approximately 1" clearance between pipe and bowl.
- D. Attach Drop Bowl to manhole wall with 3/8" diameter stainless steel bolts in lead expansion anchors. (See following instructions).
 - 1. Drill a 3/4" hole into the base material to the required depth.
 - 2. Blow the hole clean of dust and other material.
 - 3. Insert the anchor into the hole (Lead shield out).
 - 4. Position the setting tool in the anchor. (The outer rim of the tool should seat onto the lead shield rim.)
 - 5. Using the tool, set the anchor by driving the lead sleeve over the cone using several sharp hammer blows. (Be sure the anchor is at the required embedment depth.)
 - 6. Position the fixture, insert screw or bolt and tighten.
 - 7. Install brackets at 4ft intervals (min. of 2 brackets).
- E. Cut and mount C-900 SDR 18 PVC drop pipe of diameter appropriate to Drop Bowl size and flow using RELINER adjustable stainless steel clamping brackets (RELINER clamping brackets will adjust to allow drop pipe to maintain correct stand off from wall).
- F. Connection from Drop Bowl to drop pipe shall be by flexible external pipe connector, Fernco or pre-approved equal.
- G. Install appropriate pipe elbow to provide smooth transition into wetwell beyond concrete fillet. Install pipe to the pump-off elevation.
- H. Patch and/or repair penetrations or damaged corrosion barrier system as recommended by corrosion barrier system manufacturer.
- I. Install optional drop bowl force main hood for high flow and/or force main connections to wetwell.

OPTIONAL DROP BOWL INSTALLATION KIT includes:

- (8) 3/8 X 1" X 16 18-8 stainless hex cap screw full thread**
- (8) 3/8 18-8 stainless washers**
- (8) 3/8 16 x 1-1/4 lead tamp-in expansion anchors**

3.2 MANUFACTURER

Manufacturer shall be RELINER® INSIDE DROP SYSTEM, or approved equal.

RELINER® is manufactured by Duran Inc. of Lyme, CT and is sold nationally through:

Best Management Products, Inc.
53 Mt. Archer Rd.
Lyme CT 06371
800-504-8008
860-434-0277
860-434-3195 Fax
duran@bestmp.com

Duran Inc.
53 Mt. Archer Rd.
Lyme CT 06371
Phone: (800) 504-8008, (860) 434-0277
Fax: (860) 434-3195
E Mail: duran@reliner.com
Web site: <http://www.reliner.com>

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