

Section 2575

Wastewater Lift Stations

PART 1: General

- 1.1 *Scope of Work* – The Contractor shall furnish, install, test and place in operation the lift station shown on the approved drawings and specified hereinafter. All applicable sections of the ECUA Engineering Manual shall be considered part of this work. All references to Industry Standards (ASTM, ANSI, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in the ECUA Engineering Manual, shall be installed. All materials shall be new unless specifically called for otherwise.
- 1.2 *Oversizing* – For System Extension projects, lift stations at times allow oversizing opportunities due to ECUA system growth patterns and the need to accommodate such growth with efficient planning and design of proposed stations. Oversizing options for lift stations include but are not limited to parcel size, pumping rate, wetwell size, force main size, etc. All oversizing decisions should be made by ECUA during the review process in accordance with Procedure 6 – Oversizing, and shall be documented in the Utility Service Agreement for the applicable project.
- 1.3 *Permits* – The Contractor shall secure and pay for all plumbing, electrical, right-of-way and other required permits and make application for electric and water meter. The Contractor shall be responsible for all costs associated with utilities used during construction and testing of the lift station.
- 1.4 *Pre-Construction Submittals* – ECUA requires at a minimum four types of submittals to be submitted, reviewed, and approved prior to the Contractor commencing lift station work. These submittals are Schedule of Submittals, Work Schedules, Delegated Engineering Documents, and Shop Drawings.
 - 1.4.1 *Schedule of Submittals* – Contractor shall prepare a Schedule of Submittals that lists each Submittal requiring submission along with expected timeframes for submittal dates, along with reasonable review time for the Engineer of Record and ECUA.
 - 1.4.2 *Work Schedule* – Contractor shall prepare and submit a detailed Work Schedule identifying critical project timelines, to include but not be limited to:
 - 1.4.2.1 Site clearing date and excavation date for wetwell.
 - 1.4.2.2 Wetwell delivery date and installation date.
 - 1.4.2.3 Pump delivery date and installation date.
 - 1.4.2.4 Control panel delivery date and installation date.
 - 1.4.2.5 Start-up date and final inspection date.
 - 1.4.2.6 Other critical timelines that control the Work Schedule.

- 1.4.3 *Delegated Engineering Documents* – The EOR plans, ECUA Engineering Manual, and contract/agreement language contain various performance and design criteria requiring the Contractor to provide professional design services in the form of Delegated Engineering Documents. The Contractor shall:
- 1.4.3.1 Coordinate the complete assemblage of all required Delegated Engineering Documents per requirements set forth here and in ECUA’s Lift Station Design Standard Drawings. Contractor shall supply 6 full-size sets of engineering design drawings, each section being signed and sealed by the appropriate Delegate Engineer (Professional Engineer registered in Florida). Provide design calculations and supporting information on 8 ½” x 11” size documents.
 - 1.4.3.2 Title sheet of Delegated Engineering Documents shall include the following certification and shall be signed by the Contractor:

I certify that I have thoroughly reviewed the contents of these Delegated Engineering Documents for completeness and that the designs meet the requirements of the Contract Drawings and Specifications, and that any deviations are clearly listed and marked, and are hereby approved by me and are submitted for review and approval.

Certified by: _____ Date: _____
 - 1.4.3.3 Provide engineered design for fiberglass wetwell to satisfy load rating requirements and manufacturing conformance to ASTM D3753.
 - 1.4.3.4 Provide engineered design for pump mounting baseplate to satisfy ECUA minimum baseplate requirements found in the Design Standard Drawings, as well as pump weight, thrust, torque, vibration, stress, etc.
 - 1.4.3.5 Provide engineered design for wetwell’s concrete anti-flotation base to satisfy anti-flotation needs and structural support for bottom of wetwell per manufacturer’s requirements.
 - 1.4.3.6 Provide engineered design for wetwell’s concrete cover to satisfy design load rating requirements.
 - 1.4.3.7 Provide engineered design for control panel’s concrete base to satisfy control panel dimensions, wind load, etc.
 - 1.4.3.8 Provide engineered design for control panels as outlined in ECUA’s Lift Station Design Standard Drawings.
 - 1.4.3.9 Provide engineered design for work light and security light poles and base.
 - 1.4.3.10 If applicable, provide engineered design for concrete pole and base used for SCADA antenna to satisfy wind load based on proposed antenna height.
- 1.4.4 *Shop Drawings (includes Product Data sheets)* – Contractor shall coordinate the assemblage of all catalog data, brochures and descriptive literature for materials and equipment that will be used on the project. The Contractor shall:

- 1.4.4.1 Provide 6 sets, and review and approve all shop drawings prior to submittal to the Engineer and ECUA for review. As part of the review, the Contractor shall certify the following and include this statement on each submittal:

I certify that I have thoroughly reviewed the contents of these Shop Drawings for completeness and that the materials and equipment shown meet the requirements of the Contract Drawings and Specifications, and that any deviations are clearly listed and marked, and are hereby approved by me and are submitted for review and approval.

Certified by: _____ Date: _____

- 1.4.4.2 Provide sample warranty certificates for pumps, wetwells, hatches, etc.
- 1.4.4.3 Provide aluminum hatch information, including sizes and locations, and safety grating information.
- 1.4.4.4 Provide certified pump test curves. See Section 3.5 for required factory testing requirements.
- 1.4.4.5 Provide pump cables, pump materials, and lifting bale information.
- 1.4.4.6 Provide base elbow and guide rail system information.
- 1.4.4.7 Provide plug, gate, air-release, and check valve information.
- 1.4.4.8 Provide backflow prevention device information.
- 1.4.4.9 Provide 316 stainless steel riser piping and fittings information.
- 1.4.4.10 Provide pipe bracing information.
- 1.4.4.11 Provide float and float hangar rod assembly information.
- 1.4.4.12 Provide level transducer information.
- 1.4.4.13 Provide flow meter information (if applicable).
- 1.4.4.14 Provide pressure transducer and transmitter information.
- 1.4.4.15 Provide pipe supports and location schematic information.
- 1.4.4.16 Provide miscellaneous mechanical parts information.

1.4.5 *EOR's and ECUA's Review* – Review will be performed in accordance with the agreed upon Schedule of Submittals for general conformance with the Contract Documents.

1.5 *Quality Assurances* – Comply with the latest published editions of AWWA and ASTM Standards:

AWWA C515	Gate Valves for Water & Sewerage Systems
AWWA C509	Swing Check Valves for Waterworks

AWWA C151	Ductile Iron Pipe
ASTM A746	Ductile Iron Pipe
ASTM C478	Concrete Pipe Manholes
ASTM D2241	Poly Plastic Pipe
ASTM F477	Elastomeric Seals for Plastic Pipe

PART 2: General Requirements

- 2.1 *Project Schedule and Cooperation* – The project schedule shall be established on the basis of working a normal work schedule. Unless approved otherwise by ECUA, normal or general items of work such as setting wet well, field pump test, density testing and final inspections, shall be scheduled during the normal work schedule. Due to operational and manpower limitations on the ECUA systems, ECUA may require the Contractor to perform work outside of the normal work schedule in order to minimize customer service outages or due to physical system limitations. The Contractor shall plan and anticipate the cost impact of these systems limitations and provide such work or services at no additional cost to ECUA. Unless approved otherwise, an ECUA representative shall be present to observe the excavated area prior to setting (installing) the wet well. The date and time for setting (installing) the pre-cast or fiberglass wet well shall be reviewed and approved by ECUA, prior to the actual work.
- 2.2 *As-Built Drawings* – As-built drawings are required on all sewer, force main and pump station projects, including projects for ECUA, City of Pensacola, Escambia County, DOT, private developments, and other Authorities, etc. As-built drawings shall be reviewed and approved by ECUA. The cost to provide as-built drawings shall be included as part of the related work requirements or general conditions for the utility work. Contractor shall submit “As Built” drawings and operation and maintenance manuals before lift station start-up, no exceptions.
- 2.3 *Workmanship* – All work shall be constructed in accordance with the EOR’s design drawings, the Delegated Engineering Drawings, the ECUA Engineering Manual, and applicable contracts and/or agreements.
- 2.3.1 *Materials* – All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purpose specified. All defects disclosed by tests and inspections shall be remedied immediately by the Contractor with no additional compensation.
- 2.3.2 Unless indicated otherwise on the drawings, all metal components in the wet well, with the exception of pumps and motors shall be 316 stainless steel as specified herein or on the plans.
- 2.3.3 The pumps, motors and guide rail system shall be supplied by the pump supplier to ensure unit compatibility.
- 2.3.4 Station piping shall conform to ECUA Water and Sewer Standards. Specifically, station piping shall be as follows:

- 2.3.4.1 Piping within the wet well shall be flanged schedule 10 316 stainless steel, (intermediate joints shall be welded). Fittings within the wet well shall be flanged 316 stainless steel. All nuts, bolts and accessories within the wet well shall be 316 stainless steel. All stainless steel bolts, washers and nuts shall be coated with anti-seize compound.
 - 2.3.4.2 Pipe and fittings outside of the wet well and above ground shall be 316 stainless steel (flanged, schedule 10). All fabricated fittings shall be constructed to ANSI dimensions. If a spool piece is required, the length of the “run” or “through” dimension of a standard tee fitting of equal diameter to facilitate emergency replacement. Any variance shall be pre-approved by ECUA prior to installation. All bolts, washers and nuts shall be 316 stainless steel and shall be coated with anti-seize compound.
 - 2.3.4.3 Force main piping below ground, outside of the wet well shall be in accordance with Section 2576-“Sanitary Sewer Force Mains” of this standards manual.
- 2.4 *Reference Points and Layout* – The Contractor shall be responsible for setting all grade stakes, lines and levels. The Contractor or Contractor’s Surveyor will provide centerline of construction and will establish a bench mark. Any reference points, points of intersection, property corners, or bench marks, which are disturbed during construction, shall be restored by a Land Surveyor registered to practice in the State of Florida, and all costs thereof shall be borne by the Contractor. The Contractor shall assume all responsibility for the correctness of the grade and alignment stakes.

PART 3: Submersible Pumps

- 3.1 *Pump Selection* – Pumps shall be selected from the ECUA approved *Pump Selection Worksheet* as incorporated into the plans. Alternate pump options may or may not be considered by ECUA. At no time shall a pump be used without the pre-approval of the ECUA and Engineer of Record.
- 3.2 *Pump Equipment* – Pumping equipment shall be premium quality submersible non-clog pumps for sewage service. Equipment furnished and installed shall be fabricated, assembled, erected and placed in proper operating condition in full accordance with approved drawings, specifications, engineering data, instructions and recommendations of the equipment Manufacturer, unless exceptions are noted and approved by ECUA. Submersible pumps shall be complete with a submersible electric motor, floor-mounted discharge base and elbow, guide rails, motor electrical cable (minimum 50 feet in length) to connect at the control panel, disconnect, or junction box (no splicing allowed) and all other appurtenances specified or otherwise required for proper operation. Supplied pump cables are not to be trimmed without prior authorization. If trimmed, ECUA Lift Station Maintenance Staff must witness.
- 3.3 *Lifting Bale* – Pump removal shall be facilitated by a lifting bale only, no chains or cables are allowed unless specifically noted by ECUA. Lifting bales shall be stainless steel and shall be easily “hooked” from the top of the wet well. Lifting bale shall be designed for the full weight of the pump with a safety factor of 1.6.
- 3.4 *Service Conditions* – Pump performance shall be stable and free from cavitation and excessive vibration and noise throughout the specified operating head range at minimum suction submergence. Pump shall be designed so that reverse rotation at rated head will not cause damage to any component.

3.5 Solids Handling Pumps –

- 3.5.1 *Impeller* – The impeller casing shall have well-rounded water passages and smooth interior surfaces free from cracks, porosity, blowholes, or other irregularities. The impeller shall be a semi-open or enclosed one-piece casting and must pass a minimum 3-inch solid sphere. Vortex impellers may be used with prior authorization from ECUA staff on a case-by-case basis. The interior water passages shall have uniform sections and smooth surfaces and shall be free from cracks and porosity. The impeller shall be dynamically balanced and securely locked to the shaft by means of a key and self-locking bolt or nut. All interior surfaces of the wet end (impeller, volute and back plate) shall be coated with Belzona 1321 Ceramic S-metal. Hardened metallurgy may be required in sewer collection areas that are known to have a high grit content. Coatings shall be applied in accordance with coating Manufacturer’s recommendations. The pump impellers shall be re-balanced after being trimmed and coated.
- 3.5.2 *Mechanical Seals (Upper and Lower Seals)* – Pumps shall have mechanical seals, which shall require neither maintenance nor adjustment and shall be readily accessible for inspection and replacement. The seals shall not rely upon the pumped media for lubrication and shall not be damaged if the pump is run un-submerged for extended periods while pumping under load. Mechanical seals shall be solid hard faced, (not laminated type). The bottom and top seals shall be silicon carbide.
- 3.5.3 *Mating Surfaces* – All mating surfaces (pump assembly), of major components shall be machined and fitted with O-rings where watertight sealing is required.
- 3.5.4 *Wear Rings* – Impeller and volute must have stainless steel wear ring system (except vortex impellers). Impeller wear ring shall be 350 series Brinnell hardness, minimum, and volute wear ring shall be 400 series Brinnell hardness, minimum. Wear rings may not be required if hardened metallurgy components are utilized.
- 3.5.5 *Discharge Base and Elbow* – The pump Manufacturer shall furnish a discharge base and discharge elbow for the pump supplied. The base shall be sufficiently rigid to firmly support the guide rails, discharge piping and pump under all operating conditions. The base shall be bolted to the pump mounting baseplate designed for the wetwell. All bolts shall be supplied with a fender and lock washer. The face of the discharge elbow inlet flange shall make contact with the face of the pump discharge nozzle flange. The discharge elbows will be coated with Belzona 1321 Ceramic S-metal on the inside. The pump and motor assembly shall be a “quick disconnect” type connected to and supported by the discharge base and guide rails allowing the pump to be removed from the wet well and replaced without the need for unbolting any flange or requiring personnel to enter the wet well. Pump shall be provided with a sealing flange and guide rail sliding bracket. The bracket shall be designed to obtain a leak proof seal between flange faces as final alignment of the pump occurs in the connected position. The bracket shall maintain proper contact and a suitably sealed connection between flange faces under all operating conditions. Metal to metal mating surfaces are unacceptable. Pump discharge base elbow shall be leveled, plumbed and aligned into position to fit connecting piping. The discharge base elbow shall be solidly secured to the wet well floor per the pump mounting baseplate design. This work shall be inspected by ECUA prior to any liquid being allowed into the wet well. After final alignment and bolting, pump discharge base elbow and all connections shall be inspected. If any movement or opening of any joints is observed, any and all piping, including pump discharge base elbow, shall be corrected.

- 3.5.6 *Motors* – The pump shall be driven by a totally submersible electric motor rated for service utilizing an adjustable-speed drive (VFD). Pump motor shall be of sufficient horsepower as to be non-overloading over the entire length of the pump curve unless the plans state otherwise. The stator housing shall be a watertight casing. Motor insulation shall be moisture resistant, Class H, at a minimum. Motor shall be NEMA Design B for continuous duty at 40°C ambient temperature and designed for at least 10 starts per hour. All motors shall be 3 phase unless preapproved by ECUA. Motor bearings shall be anti-friction, permanently lubricated type. Motor shall be oil-cooled and designed to operate in a totally or partially submerged condition without damage to the motor. Pump cable assembly shall bear a permanently embossed code or legend indicating the cable is suitable for submerged and hazardous duty use. Cable sizing shall conform to NEC requirements. The cable shall enter the pump(s) through a heavy-duty stainless steel assembly with grommet. An epoxy seal system shall be provided to this cable entrance assembly to achieve water tightness. The system used shall ensure a watertight submersible seal. Cable shall terminate in a junction chamber. Junction chamber shall be sealed from the motor by a compression seal and epoxy dam system. All motors shall be explosion proof. Provide motors that are FM or UL listed for use in Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.
- 3.5.7 *Balance* – All rotating parts shall be accurately machined and shall be in as nearly perfect rotational balance as possible. Excessive vibration shall be sufficient cause for rejection of the equipment.
- 3.6 *Factory Testing* – The pump Manufacturer shall perform the following tests on each pump prior to shipment. Pump test report must be provided to the Engineer prior to pump installation.
- 3.6.1 Megger the pump motor and cable for insulation breaks or moisture intrusion.
- 3.6.2 Prior to submergence, run pump dry “bump” and check for correct rotation.
- 3.6.3 Pump shall be run continuously for 30 minutes in a submerged condition, with a minimum submergence of 10 feet.
- 3.6.4 Monitor vibration and report test results, along with allowable vibration limits per Hydraulic Institute Standards.
- 3.6.5 Pump shall be removed from test tank, meggered immediately for moisture and all seals checked for water intrusion.
- 3.6.6 Pumps shall be operated at a minimum of 6 points to establish the hydraulic curve. Variable speed pumps shall be reduced in speed in increments of 200 rpm down to the minimum speed and operated at a minimum of 6 points to establish the hydraulic curves for each of the speeds. KW input shall be monitored and recorded. One test point shall be performed with discharge valve closed. Pumps shall develop appropriate capacity and head within Hydraulic Institute Standards without excessive noise or cavitation.
- 3.6.7 For pumps less than 100 HP, the pump supplier shall submit copies of certified Hydraulic Institute test reports including factory pump curves for each individual pump provided to ECUA.

- 3.6.8 For pumps 100 HP and greater, the above certified pump performance test (at a minimum) must be completed on each actual pump supplied. An ECUA representative(s) may be required to witness the certified test (ECUA's travel expenses by ECUA).
- 3.7 *Guide Rails* – Pump shall be equipped with two guide rails (no cable wire assembly). Guide rails shall be minimum schedule 40 pipe, 316 stainless steel, minimum of 2-inches in diameter and sized to fit the discharge base and the sliding bracket and shall extend upwards from the discharge base to the access hatch cover at the top of the wet well. Provide a minimum of three 316 stainless steel rail braces, evenly spaced. Add additional rail braces if brace spacing exceeds 10'. Braces secured to the discharge piping shall not be accepted.

PART 4: Access Hatches

- 4.1 *Design Coordination* – It shall be the Contractor's responsibility to coordinate with the wet well supplier, pump supplier, and its Delegated Engineer providing concrete cover design on the sizing and placement of the hatches based on pump size and spacing, riser pipe size and location, etc.
- 4.2 *Hatch Sizing* – Minimum pump access hatch size shall be 36" x 42". Typical float access hatch size shall be 24" x 24". Pump access hatches shall be sized to provide a 4-inch minimum clearance between leafs, frame, safety grates and edge of the pump volutes as measured from all sides, to include the pump and rail system, as pumps are lifted up along guide rails through access hatch.
- 4.3 *Leafs* – Leafs shall be skid-proof aluminum. Single leafs shall not exceed 48" in width, else provide multiple, equal-sized leafs, each not exceeding 48" in width. Leafs shall be designed with a minimum load rating of 300 pounds per square foot, or higher when called for on the drawings. The leaf may rely upon safety grating for structural support. Load rating shall be affixed to the top of hatch frame. Provide 316 stainless steel spring assist feature for each leaf.
- 4.4 *Safety Grating* – Provide aluminum safety grating, powder coated in OSHA safety orange, with minimum load rating of 300 pounds per square foot. Grates shall provide openings large enough for visibility while still providing an adequate safety barrier. Provide the same number of grates to match number of leafs. Safety grate hinges shall be installed on same side of frame as leaf hinges. Installation of the safety grating shall be completed by the manufacturer and the hatch assembly shall be delivered complete with safety grating to the jobsite.
- 4.5 *Frames and Gaskets* – Hatch frames shall be either angle or channel. Hatches shall be gasketed to minimize water intrusion and escaping of odors. Drainage channels not required.
- 4.6 *Locking Mechanism* – Provide 316 stainless steel exterior locking mechanism as in padlock bar or padlock staple for easy lock access. Locking mechanisms shall not be recessed, nor coffin style, nor slam-lock. ECUA will provide locks.
- 4.7 *Hinge Locations/Hatch Opening Directions* – For pump access hatch, provide 316 stainless steel hinges on side of opening nearest riser piping exiting through wetwell such that leaf(s) open towards riser piping. The hinges shall be bolted to the leaf(s) with 316 stainless steel carriage bolts and nuts. The nuts shall be welded to the bolts on both leaf(s) and frame. For float access hatch, provides 316 stainless steel hinges on side of opening nearest pump access hatch such that leaf opens toward pump access hatch.

- 4.8 *Miscellaneous* – All hinges, fasteners and miscellaneous hardware shall be 316 stainless steel. Provide hold-open arms for leafs and grates that automatically engages to hold the leafs and grates in their full upright and locked position. Provide upper guide holder and cable holder.
- 4.9 *Warranty* – The complete access hatch assembly shall have a limited life time warranty on all components and warranted against defects in material and workmanship.
- 4.10 *Allowable Manufacturers* – Halliday Products, USF Fabrication.

PART 5: Valves

5.1 *General* –

- 5.1.1 The Contractor shall furnish and install check valves, plug valves, and appurtenances as shown on the drawings and as specified in the ECUA Engineering Manual.
- 5.1.2 The coating system for the valves and appurtenances (as needed) shall be manufactured by Sherman Williams and shall be Tower Gray in color. Surface Preparation shall be based on the guidelines set forth by the Society for Protective Coatings (SSPC) as follows: 1.) New Materials - SP6, Commercial Blast, or 2.) Refurbishing Existing Piping, Valves, and Appurtenances - SP6, Commercial Blast or SP10, Near White Metal depending on level of corrosion and paint damage.

Coating for Valves and Appurtenances		
Level	Paint	Dry Film Thickness (Microns)
Primer	Macropoxy 646	6-9
Intermediate	Macropoxy 646	6-9
Top	Acrolon 218	2-4

In addition, the surface preparation requirements shall be field verified by ECUA Maintenance or Engineering Representatives.

- 5.1.3 Unless otherwise noted, painting system shall be applied in accordance with the Manufacturer’s recommendations.
- 5.1.4 Tower gray is ECUA’s standard color for all above-grade valves. Any variance from these standards must be approved by ECUA Engineering staff prior to application.
- 5.2 *Check Valves (Lever & Weight Style)* – Check valves shall conform to the requirements of AWWA C508. Check valves larger than 2-inch nominal size shall be iron body with stainless steel bolts and nuts, flanged ends, 316 stainless steel shaft connected to a steel outside lever and weight, swing-type with straight-away passageway of full pipe area. The valve shall have renewable bronze seat ring and rubber-faced disc. Check valves shall be 150 psi working pressure. Any springs shall be 316 stainless steel. It is the responsibility of the contractor/vendor to change all springs to 316 stainless steel. All interior and exterior ferrous surfaces shall be coated with fusion bonded epoxy in accordance with AWWA Standard C-550.
- 5.3 *Plug Valves (Above Ground Only)* – Plug valves shall be of the non-lubricated, 100 percent port eccentric type with resilient faced plugs with flanged ends, furnished with all necessary joint materials. Valves are to be rated for 150 psi (non-shock working pressure), cast-iron body, nickel

seat, and hard rubber Hycar coated plug with a flushing port. Valves shall be installed with the seat on the downstream side of the flow path, to provide a positive seal when closed. Valve shall include hand- wheels for operation. Valves shall be as manufactured by Dezurik. Unless otherwise approved by ECUA, plug valves will not be allowed in direct bury applications. Direct bury valves shall be resilient seated gate valves as specified in Section 2576-“Sanitary Sewer Force Mains” of the specifications. All interior and exterior ferrous surfaces shall be coated with fusion bonded epoxy in accordance with AWWA Standard C-550.

PART 6: Acceptance Testing

- 6.1 *Pre-Final Inspection* – Prior to final inspection, the Contractor shall conduct a pre-final site inspection (including energizing each pump), in the presence of an ECUA representative. Any deficiencies noted at this time shall be corrected prior to scheduling of the final inspection.
- 6.2 *Final Inspection* –
- 6.2.1 *Scheduling Inspection* – The Contractor shall be responsible for scheduling ECUA representatives, the Engineer, pump representative, control panel representative, and all appropriate subs. The Contractor’s request shall be made at least 3 full business days prior to requested inspection date, and shall be confirmed by ECUA based on availability. The Contractor shall furnish all labor, piping, equipment, and materials required to perform the acceptance testing. Contractor shall supply clean water at its own expense via the use of fire hydrant flow meters or the lift station water meter. The pumps shall not be field tested by recirculating water through the wet well.
- 6.2.2 *Pump Removal* – The Contractor shall demonstrate that the pump mounting and guide rail systems are fully operational. The Contractor shall provide lifting equipment to remove and reinstall the pumps in the presence of the ECUA representative, prior to conducting the performance test.
- 6.2.3 *Pump Operation* – Pumps shall operate without excessive vibration or overheating. Pumping rates shall be determined by pumping a calculated volume of water in a specified time interval. Water levels during testing shall fall within the pump control levels shown on the drawings. Head and flow conditions shall be measured and recorded on the factory curve and shall include a minimum of three (3) points. Pumps shall deliver rated GPM at rated TDH comparable to system head curve. The test shall be repeated until satisfactory results are obtained. The test results shall be recorded on a Pump Test Report. Pump test data will include the factory curve and the start-up curve. If the Contractor is unable to demonstrate to ECUA that the pumping unit performs satisfactorily, the unit shall be rejected. The Contractor shall then remove and replace the defective unit at its own expense.
- 6.2.4 *Electrical Testing* – Amperage draws shall be monitored to determine effectiveness and efficiency of equipment. Running amperage shall be noted and recorded on each leg of power cord while pump is operating under full load. All self-test trip relays shall demonstrate ability to simulate a fault condition. Following performance testing, pumps shall be meggered for pump-moisture intrusion.

PART 7: Water Service / Wash-down Station

- 7.1 *Water Service* – Water service shall include a 1.5” water meter, service lines, fittings, meter box, backflow preventer hose bibb, and hose rack per detail in Lift Station Design Standard Drawings. ECUA will install the meter. See paragraph below for instructions on applying for meter from ECUA.
- 7.2 *Water Meter* – The Contractor apply for the water meter by filling out an ECUA water meter application. There is no fee for a water service for an ECUA CIP Lift Station. If ECUA is not the provider of water service, the Contractor/Developer shall be responsible for all installation fees, including but not limited to permitting and tap fees from the water provider. The Contractor shall be responsible for the cost of all water used during construction and testing. The water service account name will then be transferred to ECUA upon final acceptance of the lift station.
- 7.3 *Backflow Preventer* – The Contractor shall furnish and install a 2 -inch diameter (minimum) reduced pressure backflow preventer which meets the requirements of ECUA’s Cross Connection Control Policy and Lift Station Design Standard Drawings.

PART 8: Operation and Maintenance Manuals

8.1 *Submittals* –

- 8.1.1 *Coordination* – Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, coordinate and assemble all information furnished by representatives for inclusion into one manual.
- 8.1.2 *Initial Submittal* – Submit 3 copies of draft manual at least 15 days before final inspection. Include a complete table of contents. Engineer will return 2 copies with comments within 15 days of submission.
- 8.1.3 *Final Submittal* – Submit 3 copies of corrected manual within 15 days of receipt of Engineer’s comments. Each manual shall contain 1 compact disk with pdf file version of full Operation and Maintenance Manual. Each manual shall also include aluminum nameplate for each pump, to include pump model number, serial number, motor size, voltage, flow, TDH, and other pump related data. Nameplate shall be glued to the inside front panel of the manual.

8.2 *Manuals, General* –

- 8.2.1 *Binders* – Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets. Maximum binder size shall be 3-inches in thickness.
- 8.2.2 *Organization* – Create sections for each lift station component and/or system

8.3 *Contents* -

8.3.1 Title page

- 8.3.1.1 Project name, number, address
- 8.3.1.2 ECUA name and address

- 8.3.1.3 Submittal date
- 8.3.1.4 Contractor name, address, and telephone number
- 8.3.1.5 Engineer's name and address
- 8.3.2 Table of contents
 - 8.3.2.1 Equipment Information
 - 8.3.2.1.1 Manufacturer's name, product name, model number, serial number
 - 8.3.2.1.2 Equipment function and operating characteristics
 - 8.3.2.1.3 Standard printed data - Include only sheets for installed equipment Mark each sheet to identify equipment incorporated into the Work. If tabular data is included, identify the appropriate equipment incorporated into the Work. Prepare supplementary data if Manufacturers' standard printed data are not available and where additional information is necessary for proper operation and maintenance of equipment or systems.
 - 8.3.2.1.4 Operational data
 - 8.3.2.1.5 Limiting conditions
 - 8.3.2.1.6 Care and maintenance information
 - 8.3.2.1.7 Performance curves
 - 8.3.2.1.8 Engineering data and tests
 - 8.3.2.1.9 Copy of pump data plate
 - 8.3.2.2 Drawings – Include accurate shop drawings, plan drawings, record drawings, Manufacturer's drawings and/or create drawings that correctly illustrate completed installation, Attach reinforced, punched binder tabs on drawings and bind with text. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual.
 - 8.3.2.3 Project Photos: - Include photos of project showing various stages of progression from initial clearing to final construction.
 - 8.3.2.4 Warranties and Bonds – Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.

PART 9: Warranty

- 9.1 *Contractor Warranty* – Notwithstanding the longer warranties periods mentioned below, the Contractor shall supply to ECUA a two (2) year unconditional warranty after final acceptance or any designated portion thereof. The warranty shall include materials and installation and shall

constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

- 9.2 *Fiberglass Wet Well Manufacturer Warranty* –The fiberglass wet well Manufacturer shall warrant the wet well against defects for at least twenty (20) years after final acceptance of the lift station by ECUA for operation and maintenance. Defects are defined as cracking, delamination or leaking. The warranty shall require the Manufacturer to supply all necessary labor, materials, and equipment to repair defects to the satisfaction of ECUA. The Contractor and/or Manufacturer shall not make any exemption or exception to the above stated conditions or warranty.
- 9.3 *Pump Manufacturer Warranty* –
- 9.3.1 The Manufacturer shall warrant to ECUA for permanent installation in municipal sewage service submersible pump and motor against defects in materials and workmanship including normal wear and tear to the following parts for a period of 5 years after final acceptance of the lift station, mechanical seals, bearings, shafts, motor electrical cables and motor stators.
- 9.3.2 The warranty shall include no less than 100 percent coverage for original equipment manufacturer (OEM) parts and in-shop labor for pump/motor repairs for the full 5 years at NO COST to ECUA. This warranty shall not apply to parts that fail due to abuse, neglect, mishandling, or acts of God.
- 9.3.3 Verification of guarantees of performance and warranty certificate shall be included in the shop drawing submittal and in the operation and maintenance manuals and disks (Adobe Acrobat or Microsoft Word).
- 9.3.4 The pump distributor shall employ and make available proficient manufacturer-authorized service technicians to perform service calls to pumps supplied to ECUA. Service personnel shall adhere to all ECUA Safety Rules & Regulations and be trained and certified for confined space entries and carry liability and workers compensation insurance.
- 9.3.5 During the warranty period, the pump distributor shall, at no cost to ECUA, repair the subject pump. The location address, contact names, phone numbers, (including emergency, mobile, etc.) and fax numbers of the Manufacturer- authorized warehouse and warranty service center shall be indicated in the shop drawing submittal and in the operation and maintenance manuals and disks (Adobe Acrobat or Microsoft Word).
- 9.4 *Access Hatch Warranty* – The manufacturer shall provide a complete access hatch assembly limited life time warranty on all components and warrant against defects in material and workmanship.