SECTION 11306

SUBMERSIBLE PUMP LIFT STATION

PART 1 - GENERAL

1.1 SCOPE

A. This section of the specifications covers the rehabilitation of the lift station complete with wet well, valve pad, valves and piping, pumps, electrical wiring, and control panel and re-installation of the existing submersible pumps after rehabilitation of the wet well is complete.

B. The installation shall comply with all local, state and federal laws and ordinances applicable to the project.

C. The Contractor shall obtain all permits, and after completion of the work, shall furnish the Engineer a certificate of final inspection and approval from the applicable local inspection departments.

1.2 OPERATION

A. Liquid Level Control: The liquid level in each lift station wet well shall be controlled by a ultrasonic transducer with four (4) back-up float switches as shown on the Drawings and adjusted in the field during start-up.

B. On sump level rise, and the “FIRST PUMP ON ELEV” will start the lead pump. With lead pump operating, if the sump level lowers to “ALL PUMPS OFF ELEV” and pump shall stop. Alternating relay shall index on stopping of pump so that lag pump will start on next operation.

C. If sump level continues to rise when first pump is operating, operation shall start second pump when sump level rises to the “SECOND PUMP ON ELEV”. Both pumps shall operate together until low level switch turns off both pumps.

D. If level continues to rise when all three pumps are operating, alarm switch shall signal the alarm when the sump levels rises to the “HIGH LEVEL ALARM” float. If one pump should fail for any reason, the next pump shall operate on the override control and alarm shall signal.

E. All level switches/elevations shall be adjustable for level setting from the surface. The system shall include an alternator to alternate the "lead" pump each time the pumps

cycle. The circuit must be such that, if either pump is disabled, turned off or trips its breaker, the other pumps will continue to operate normally and control the level.

1.3 RELATED REQUIREMENTS

A. Earthwork: Section 02200

B. Ductile Iron Pipe: Section 02619

C. Valves and Accessories: Section 2640

D. Telemetry: Section 13315 Lift Station Telemetry Installation

E. Electrical, Instrumentation and Controls: Division 16 drawings and specifications.

1.4 SHOP DRAWINGS

A. The Contractor shall submit shop drawings to the ENGINEER for review in accordance with Section 01340 for all major equipment and shall have the Engineer approve same in writing before ordering the equipment.

B. Shop drawing submitted for the submersible, sewage pumps shall include, at a minimum, the following:
   1. Pump Outline Drawing
   2. Station Drawing for Accessories including Base Elbows, and Guide Rail system
   3. Electrical Motor Data
   4. Control Panel Drawing and Data
   5. Access Hatch Drawing
   6. Typical Installation Guides
   7. Technical Manuals
   8. Parts List
   9. Printed Warranty
   10. Precast Structures

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store material to prevent physical damage and theft.

B. Protect equipment during transportation and installation to avoid damage.

C. When large precast sections are to be used, verify weight and reach capability of equipment on site, as well as access roads.

PART 2 - PRODUCTS

2.1 FIBERGLASS WETWELL LINER FOR LIFT STATION T-25 REHABILITATION

Fiberglass reinforced polyester wetwell liner shall be manufactured from commercial grade polyester resin or vinyl ester resin with fiberglass reinforcements. The resin system shall be suitable for atmospheres containing hydrogen sulphide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems. The liner shall be reinforced and self supporting. The wetwell shall be a one piece unit manufactured by L. F. Manufacturing, Inc., Giddings, Texas or Associated Fiberglass Enterprises, Fort Worth, Texas or an approved equal.

2.2 PUMP STATION ACCESSORIES

Two out of three existing Grundfos pumps shall be re-installed into the wet well after the wet well rehabilitation is complete. Third Grundfos pump shall be delivered to the Owner at the location specified by the Owner. The following new pump accessories shall be procured from Grundfos to ensure compatibility with the existing pumps.

A. Base elbows and base elbow anchoring system shall be provided by Grundfos to ensure compatibility with the existing pumps being re-installed.

B. Guide rail system shall be provided by Grundfos to ensure compatibility with the existing pumps being re-installed.

Guide rail system shall be provided for guiding the pump unit in raising and lowering. The guide bars shall not support any portion of the weight of the pump. The lower guide bar holders shall be integral with the discharge elbow. Guide cables shall not be considered equal to guide bars and will not be accepted. The pump unit shall be guided on the bars by a guide bracket which shall be an integral part of the pump. The pump(s) shall be guided by no less than two guide bars extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. Use of a rubber sealing grommet between the base elbow and the pump slide bracket shall also be acceptable.

The anchor bolts, upper guide bar brackets and cable holder shall be fabricated from 316L series stainless steel.

C. Each pump shall be provided with and fitted with stainless steel lifting chain or cable after re-installation. The working load of the lifting system shall be 50% greater than the pump unit weight.

D. A new Pump Control Panel shall be provided in conformance with the contract drawings and the electrical part of these technical specifications.

E. The precast flat slab top shall be a minimum of 10" thick, and cast with 5000 psi concrete. Reinforcing shall be in accordance with the manufacturers recommendations.

F. The wet well access hatch shall be aluminum with angle ribbing welded in place and lockable bracket. The access hatch shall be sized and aligned as recommended by the pump manufacturer to provide adequate room for pump removal. A safety/fall prevention dual grate as manufactured by USF Fabrication or approved equal shall be provided with the hatch.

G. Access hatches shall be provided allowing easy access for pump installation/removal and float maintenance. All wet well hardware and accessories shall be 316 stainless steel.

2.3 VALVE PAD

A. The concrete valve pad shall be constructed of commercial grade fiber reinforced concrete with a 28-day compressive strength of 4,000 psi. Pad shall have a minimum thickness of 6 inches and shall have a light-broom finish. Pad shall extend a minimum of 12” beyond all piping and valves, except the emergency quick-disconnect piping.

2.4 FIBERGLASS WETWELL LINER FOR LIFT STATION T-25 REHABILITATION

Fiberglass reinforced polyester wetwell liner shall be manufactured from commercial grade polyester resin or vinyl ester resin with fiberglass reinforcements. The resin system shall be suitable for atmospheres containing hydrogen sulphide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems. The liner shall be reinforced and self supporting. The wetwell shall be a one piece unit manufactured by L. F. Manufacturing, Inc., Giddings, Texas or Associated Fiberglass Enterprises, Fort Worth, Texas or an approved equal.

2.5 ELECTRICAL

A. Electrical and motor components of the lift stations shall be in compliance with Division 16 of the specifications.

B. All electrical equipment shall be manufactured and installed in accordance with the NEMA requirements, and any local laws and ordinances as last revised.

C. All materials used shall be new and unused, of the highest quality, and of proper type for the use intended. Where applicable, all materials shall carry the approval of the

Underwriters Laboratory. Substitutes which tend to lower the quality of the work will not be permitted.

D. The power cable shall be sized according to appropriate standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber.

E. The project is to result in a complete and operable lift station. Any items not specified, but normally included in such installations, shall be furnished and installed, regardless of omissions from specifications. However, specified omissions are not affected by this requirement.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall ensure that the fiberglass liner is installed in accordance with the manufacturer's recommendations. All items of equipment shall be installed, piped, and wired in accordance with the pump manufacturer's (Grundfos) recommendations and the Contractor shall place all equipment in satisfactory operation. The equipment shall be checked by a pump manufacturer's representative to be sure that it has been installed in compliance with recommendations.

B. All work shall be tested and subject to final approval of the Engineer.

3.2 FIBERGLASS LINER INSTALLATION FOR LS T-25 REHABILITATION

A. INSTALLATION: Remove top slab, pumps, and equipment needed to permit insertion of fiberglass liner into the existing wetwell. Lower fiberglass liner into the old wetwell and mark contour of the bench area at the bottom onto the inside wall of the fiberglass wetwell liner. Remove fiberglass liner and cut away the marked area at the bottom of the fiberglass liner. In the old wetwell measure depth and size of all incoming sewer lines. Measure and mark the fiberglass liner for cutouts to be made for incoming sewer lines. Make the cutouts 1/2 inch larger than the outside diameter of the incoming sewer pipe. After the cutouts have been made, line up the cutouts with the incoming sewer lines and lower the fiberglass liner into place. Center the fiberglass liner up and chock into place. Seal the inside bottom of the fiberglass liner using a non-shrinking epoxy grout. Take a piece of PVC pipe the same size of your incoming sewer lines and cutout about a one inch wide strip horizontally. Band the PVC pipe together and insert them into the incoming sewer lines. Take the bands off the PVC pipe and let it expand against the incoming sewer line walls.

B. BACKFILL WITH GROUT: Brace the fiberglass liner walls at the bottom before beginning backfill. Pour two vertical feet of concrete grout in one foot lifts between the walls of the old wetwell and the new fiberglass liner. Let the concrete grout set-up before continuing backfill procedure. Pour about four vertical feet of concrete grout in one foot lifts and let the concrete set-up. Pour the remainder of the concrete grout backfill in one foot lifts.

C. COMPLETION OF INSTALLATION: Remove the cut PVC from all incoming lines. Use a non- shrinking grout to seal area between the wall of the old wetwell and the new fiberglass liner. Replace all the pumps and equipment that had to be removed and set concrete top slab back on top of wetwell.

D. HANDLING: Do not drop or impact the wetwell liner. The wetwell liner shall be chocked if stored horizontally. If wetwell liner must be moved by rolling, the ground transversed shall be smooth and free of rocks, debris, etc. Fiberglass wetwell liner may be lifted by the installation of two lifting lugs as specified by the manufacturer on the inside surface near the top or by a sling or "choker" connection around the center. Use of chains or cables in contact with the wetwell surface is prohibited. Wetwell liners may be lifted horizontally using one support point.

E. CUTOUTS: Cutouts in wetwell wall should be made with proper cutting tools, such as jig saw or hole saw. Do not use axe or other impact-type tools.

F. FIBERGLASS WETWELL LINER TOP: The fiberglass top may have stubouts installed or may have a raised fiberglass collar around the hatch opening. The fiberglass top has been designed to withstand the weight of a concrete reinforced slab to be installed over it.

G. TOP SLAB SUPPORT: Fiberglass wetwell liner without a fiberglass top should have a reinforced concrete slab support around the outside of fiberglass wetwell wall. The slab shall be specified and designed by project engineer.

3.3 WET WELL AND VALVE PAD INSTALLATION

A. Wet well top slab and valve pad shall be installed at the elevation identified on the Drawings. At at minimum, the top of the slab shall be six (6) inches above the grade elvation.

3.4 PUMP AND ACESSORIES INSTALLATION

A. Pump accessories and Pump installation shall be in accordance with Manufacturer’s recommendations.

B. The pump(s) shall be automatically and firmly connected to the discharge connection. There shall be no need for personnel to enter the wet-well.

C. No portion of the pump shall bear directly on the sump floor.

D. The pump manufacturer shall certify that the installation of the pumps has been tested and all equipment is installed and operating in accordance with their requirements.

3.5 WARRANTY

A. The Contractor shall guarantee the satisfactory operation for all apparatus and machinery against defects in workmanship, material and installation for a period of one (1) year. The Contractor, shall in turn protect himself with similar guarantees from all his suppliers and subcontractors.

3.6 STARTUP AND OPERATION

A. The Contractor shall review and demonstrate the operation of the lift station with the City representatives completely familiarizing the operator with all operation procedures.

B. The pump manufacturer shall furnish the services of a qualified factory trained field service engineer for 8-hour working day(s) at the site to inspect the installation and instruct the owner's personnel on the operation and maintenance of the pumping units. After the pumps have been completely installed and wired, the CONTRACTOR shall have the manufacturer do the following:
   1. Megger stator and power cables
   2. Check seal lubrication
   3. Check for proper rotation
   4. Check power supply voltage
   5. Measure motor operating load and no load current

3.7 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall turn over to the Engineer two copies of operation and maintenance manuals for each piece of equipment installed.

END OF SECTION

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