DIVISION 11 - EQUIPMENT

DETAILED SPECIFICATIONS

SECTION 1124 - SUBMERSIBLE TURBINE PUMPS (Well Pump)

PART 1.00 - GENERAL

1.01 Description

The work covered by this Section includes the furnishing and installation of complete, motor-driven deep well submersible turbine pumps.

1.02 Submittals

A. Shop Drawings

Prior to pump fabrication, the Contractor shall submit in five (5) copies, complete shop drawings for the pumps showing all dimensions, materials, hook-ups, installations, pump performance curves, and any available or necessary information requested by the Engineer.

B. Pump Test

Prior to pump shipment, the manufacturer shall provide test data to the Engineer for review and approval.

The pumps shall be fully tested on water at the manufacturer's plant before shipment. Tests shall consist of checking the unit at its rated speed, head, capacity, efficiency and brake horsepower, and at such conditions of head and capacity to property establish the performance curve. Flow measurements shall be made with magnetic flow meter. The Standards of the Hydraulic Institute shall govern all procedures and calculations for these tests.

1.03 Quality Assurance

The Contractor shall provide at least one person who shall be thoroughly trained and experienced in deep well construction, who shall be present at all time during the execution of this work, and who shall personally direct the construction and installation of this work.

The Contractor shall comply with all pertinent codes and regulations and shall secure all necessary building and electrical permits and certificates.

1.04 Product Handling

Use all means necessary to protect pump unit materials before, during, and after installation and to protect the installed work and materials of all other contracts. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2.00 - MATERIALS

2.01 Operating Conditions

The following are the operating conditions for the pumping units for the Columbus County Deep Wells:

Description	U.S. Hwy 74/76 Well	Old Lake Road Well
Size of Well (Inside Diameter)	8-inch	8-inch
Depth of well (Finish floor to bottom)	258.5 feet	252.5 feet
Static water level (MSL) (assumed)	10.0 feet	6.5 feet
Pumping Level at Rated Pump Capacity (MSL)	-137.4 feet	-123.0 feet
Static Head (Pumping level to tank overflow)	331 feet	317 feet
Total Pumping Head	351 feet	347 feet
Capacity of Pump	100 GPM	180 GPM
Maximum Horsepower	15 HP	25 HP
Pump Overall Setting including Bowl (MSL)	-145 feet	-128 feet
Motor Voltage	480, Phase 3, 4-Wire, Cycles 60	
RPM		
Surface Discharge	4-inch	4-inch

The total pumping head does not include losses in the pumping unit, which must be allowed by the bidder. The field efficiency of the pumping unit shall be as high as good engineering will permit. All things being equal, consideration will be given to overall pumping costs.

2.02 Motor

The motor shall be of the vertical, submersible squirrel cage induction type designed for continuous duty under-water operation on 480 volt, 3 phase, 60 cycle circuit. The motor shall be designed with normal starting torque and low starting current for across-the-line starting. The motor shall have a 1.15 service factor rating. The motor shall not be loaded in excess of 110% of its nameplate rating with the normal operating range of the pump. Motor and pump shall have integrated design, and be supplied by sole manufacturer that assumes single warranty on entire pump and motor unit.

The motor shall be enclosed in a water-filled housing. Means shall be provided for circulating the water within the motor for adequate heat distribution and transfer for motor cooling. The manufacturer shall provide any special baffling required to direct flow around

motor for cooling. The baffle shall come included with pump and motor with no field assembly required. A suitable seal shall be provided to limit the interchange of well water with the motor cooling water. A protective sand collar shall be provided over the seal to protect it from sand and abrasives in the well water, and flushing ports provided to prevent accumulation of abrasives around the seal when the unit is stopped.

Any difference in pressure between the well water and cooling water shall be equalized through the action of a neoprene diaphragm at the bottom of the motor. The use of a check valve for equalizing of pressures will not be permitted. The motor shall be designed in accordance with the latest standards of NEMA for the class of insulation used. The motor shall be provided with a pivot-shoe type thrust bearing of ample size to carry the hydraulic thrust of the pump under all operating conditions. An adequate upthrust bearing arrangement shall be provided.

All parts of the motor in contact with the well water shall be stainless steel and/or bronze.

2.03 Discharge Column Assembly

The discharge column shall be made from CertaLok PVC pipe. The column pipe shall be not less than 4.0 inches inside diameter.

2.04 Bowl Assembly

The pump bowls shall be of AISI Type 304 stainless steel having a minimum tensile strength of 70,000 pounds per square inch, free from blow holes, sand holes, and all other faults; accurately machined and fitted to close dimensions.

The impeller shaft shall be of stainless steel of not less than 12% chrome content and shall be supported by cutless rubber bearings located on both sides of each impeller. The impellers shall be stainless steel, of heavy construction, finished all over, accurately fitted and perfectly balanced both mechanically and hydraulically. They shall be locked securely to the impeller shaft with a tapered lock bushing. The bowls and impellers shall be designed with open and smooth passages to assure efficient operation. The impellers shall be adjustable by means of a nut at the pump head.

A stainless steel strainer having a net inlet opening area of not less than four times the area of the suction pipe shall be provided at the suction intake.

2.05 Discharge Elbow and Base

The discharge elbow shall be of close-grained cast iron having a minimum tensile strength of 35,000 psi or shall be of fabricated steel. It shall be provided with 125# American Standard Flange. The supporting base plate shall be of ample size to carry the complete weight of the suspended parts plus the hydraulic load with a factor of safety. Two openings shall be provided in base plate. One opening for a 1 ½" screened vent pipe, and the other for a 1 ¼" pipe for well level transducer. The base plate shall provide for lifting eye-bolts

and/or other means to install and service the pump.

2.06 Power Cable

The power cable to the motor shall be impervious to moisture in addition to having high abrasive resistance. The cable shall be protected with a steel guard where it passes by the bowl assembly to prevent damage from contact with the well casing. A NEMA 4X weatherproof terminal box shall be furnished on top of the base plate. The cable terminations at the box shall be provided with terminal lugs. The cable shall be sized for the voltage drop does not exceed 3% between the motor and pump. Stainless steel cable clamps shall be provided to support the cable along the column pipe at intervals of not more than 20 feet.

2.07 Submersible Pressure Transducer

See Specification Section 1197.

2.08 Pump Selection

Final selection of the pumping unit shall be made by the Engineer and shall be determined from the following submittals:

A. Pump efficiency (Minimum efficiency of 59%)
B. Kilowatt consumption
C. Horsepower input
D. Operating curve

2.09 Air and Vacuum Valve

Air valves for deep well pumps shall be designed to allow large quantities of air to escape out of the orifice when the pump is started and close water tight when the liquid enters the valve. The air valve shall also permit large quantities of air to re-enter thru the orifice when the pump is stopped to prevent a vacuum from forming in the pump column.

Valve to be Model #100ST Air and Vacuum Valve for well service, as manufactured by Val-Matic or approved equal.

PART 3.00 - EXECUTION

3.01 Installation

Pumps shall be installed in accordance with the manufacturer's instructions and the contract drawings, and shall be capable of continuous operation under full load without damage to the motor.

3.02 Warranty

The pump manufacturer shall warrant the pumping units supplied to this project for a period of one (1) year after initial start-up or as stated in the manufacturer's literature, which ever is greater.

3.03 Start-up

The pump manufacturer shall provide the services of a factory-trained representative for up to three (3) days, three (3) trips as needed (at no cost to the Owner) to:

A. Supervise installation of the pumps
B. Initial start-up and check-out, and
C. Provide a service school for the Owner's personnel.

3.04 Work by Others

The electrical work in connecting these pumps to the power source and controls shall be done by the Contractor performing the electrical work for the project.

3.05 Sterilization

All wells shall be disinfected upon completion of construction by placement of chlorine into the well in sufficient quantities to produce a chlorine residual of 100 parts per million (100 ppm).

The chlorine shall be placed in the well by either dropping tablets into the top of the well and allowing to settle to the bottom or by placing a chlorine solution into the bottom of the well through the drill rod or a hose.

The chlorine shall stand in the well for a period of 24 hours.

Water supply well facilities shall not be placed into service until bacteriological test results of representative water samples analyzed by a certified laboratory are found to be satisfactory.

END OF SECTION

DIVISION 13 - SPECIAL CONSTRUCTION

DETAILED SPECIFICATIONS

SECTION 1367 - FLOW MEASURING (Magnetic Flow Meter)

PART 1.00 - GENERAL

1.01 Description

The Contractor shall furnish and install magnetic meter(s) at locations as shown on the drawings and as herein described.

1.02 Shop Drawing

Prior to the receipt of any flow measuring system equipment on the job site, submit in five (5) copies, shop drawings of all materials and assemblies to the Engineer for review and approval.

PART 2.00 - PRODUCTS

2.01 Magnetic Flowmeter

Meter shall be a velocity sensing electromagnetic type flanged tube meter with sealed housing for 150 PSI working pressure. The meter shall be sized to match station piping and shall be equipped with a 9-digit digital totalizer. Meter reading shall be accurate within 0.5% of actual flow. The meter assembly shall operate within a range of 0.2 FPS to 32 FPS. Meter shall be McCrometer (Ultra Mag), or equal.

2.02 Meter Tube (Sensor)

Meter Tube shall be fabricated stainless steel pipe and use 150 lb. AWWA Class "D" flat face steel flanges. The internal and external of the meter tube shall be blasted and lined with a NSF approved fusion bonded epoxy, applied by the fluidized bed method. Meter tubes shall have a constant nominal inside diameter offering no obstruction to the flow. Electrodes shall be 316 stainless steel.

2.03 Mag Shield

Mag Shield shall be welded to the tube providing a completely sealed environment for all coils, electrode connections and wiring harness capable of NEMA 6P/IP68 operation.

2.04 Signal Converter

Signal Converter shall be pulsed DC coil excitation type with auto zeroing. The converter shall indicate direction of flow and provide a flow rate indication and a totalization of flow volume for both forward and reverse directions. Both forward and reverse totalizers shall be electronically resettable. The flow meter converter shall be microprocessor based with a keypad for instrument set up and LCD displays for totalized flow, flow rate engineering units and velocity. The converter shall power the flow sensing element and provide galvanically isolated dual 4-20mA outputs. It shall be possible, in the test mode, to easily set the converter outputs to any desired value within the range. The 4-20mA scaling, time constants, pipe size, flow proportional output, engineering units and test mode values shall be easily set via the keypad and display. Four separate fully programmable alarm outputs shall be provided to indicate empty pipe, forward/reverse polarity (normally open/close), analog over-range, fault conditions, high/low flow rates, percent of range and pulse cutoff. The converter shall periodically perform self-diagnostics and display and resulting error messages. All set up and data and totalizer values may be protected by a password. The converter shall be integrally mounted our remotely mounted up to 500 feet from the sensor, and shall be supplied in a sealed IP67 rated enclosure. Calibration will be completed at the manufacturer's location in accordance with customer supplied application-based requirements.

2.05 Grounding Rings

Grounding rings shall be 316 stainless steel and shall be provided with the meter tube.

2.06 Power and Signal Isolation

The power supplied between the converter and the meter tube (sensor) and signal between the meter tube and the converter shall be isolated and placed in separate submersible cables.

2.07 Volumetric Testing and Calibration

Volumetric Testing of all meters must be performed at a facility located in the United States and approved prior to shipment. The complete meter assembly and signal converter must be wet accuracy tested and calibrated. The test facility must be rigorously traceable to an accuracy of ±0.15% with the National Institute of Standards and Technology. A copy of the certified accuracy test record must be furnished at no charge to the Owner.

PART 3.00 - EXECUTION

3.01 Installation

Contractor shall install meter(s) as shown on drawings in accordance with manufacturer's recommendations.

END OF SECTION