

April 16, 2021

**RE: WASTEWATER SYSTEM IMPROVEMENTS
DELMONT, SOUTH DAKOTA
SPN #15186**

BID LETTING: WEDNESDAY, APRIL 28, 2021 @ 2:00 PM

ADDENDUM NUMBER 1

The following modifications are to be made to the plans and specifications for the Wastewater System Improvements Project.

Section 33 01 30.72, Cured-In-Place Pipe Lining – Paragraph 2.01 A shall be deleted and replaced with the following:

Refer to Section 33 31 30

Section 33 01 30.72, Cured-In-Place Pipe Lining – Paragraph 2.02 A shall be deleted and replaced with the following:

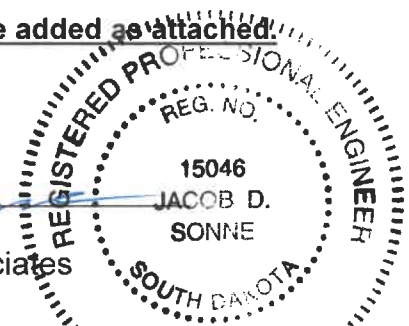
Refer to Section 33 31 30

Section 33 31 50, Sanitary Manholes – Paragraph 1.01 B4 shall be deleted in its entirety.

Section 33 32 11, Submersible Pump Station Rehabilitation shall be added as attached.

All other items of the plans and specifications remain unchanged.


Jacob Sonne, Project Engineer
Schmucker, Paul, Nohr & Associates



The undersigned hereby acknowledges receipt of Addendum Number 1 to the plans and specifications for the *DELMONT WASTEWATER SYSTEM IMPROVEMENTS*.

FIRM NAME _____
BY _____
TITLE _____
DATE _____

ATTACH THIS SIGNED ADDENDUM NO. 1 TO THE BID FORM WHEN SUBMITTING.

SECTION 33 32 11 SUBMERSIBLE PUMP STATION REHABILITATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The general provisions of the Contract including General and Supplementary Conditions apply to work covered by this section.
- B. Related work specified elsewhere:
 - 1. Electrical - Division 26

1.02 DESCRIPTION OF WORK

- A. The Work covered by this Section includes all labor, material and equipment necessary to remove the existing duplex submersible pumping system and furnish, install and place in satisfactory operating condition a new duplex submersible pumping system including, but not limited to, submersible pumps, electrical wiring and control system, pump installation and removal system, and other appurtenances as described herein and as shown on the plans which may be required to make a complete operating unit.
- B. The existing air relief valves shall be removed and replaced as specified herein.
- C. The pipe, valves and fittings located in the wet well and the valve vault shall be recoated after proper surface preparation.
- D. The equipment furnished and installed by the contractor under this section shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturers.
- E. The Contractor shall satisfy himself regarding all local conditions affecting his work by personal investigation.
- F. The wastewater bypass pumping necessary to keep the existing system in continuous operation shall be provided. The Contractor shall furnish and operate the pump(s) and temporary piping as necessary to avoid excessive surcharging of the existing gravity sewer pipelines.

1.03 PUMP OPERATING CONDITIONS

- A. The proposed pumps shall operate at 160 gallons per minute against a total dynamic pumping head of 63 feet. The pump shall have a 29% minimum pumping efficiency.
- B. The power supply is three-phase, 120 / 240 volt 3-phase delta. The motors shall have a maximum speed of 1800 R.P.M. and a maximum rated power of 5.4 horsepower.

1.04 FUNCTIONAL DESCRIPTION AND OPERATIONAL PROTOCOL

- A. The pumps shall be provided with a control switch, clearly labeled "Pump No. 1" and "Pump No. 2", capable of operation in the HAND, OFF and AUTO modes. "RUN" indicator lights shall notify the operator when the pumps are running. Red pilot lights shall indicate a fault condition for each pump.

- B. The control system will monitor inputs and control all of the pumps in the lift station as described herein when the pumps are in the automatic position of the HOA. The hand position of the HOA switches is to have NO PLC control. As such, the pump will run in the hand position whether or not the PLC is operating properly. The off position of the HOA shall leave the pump in the off position no matter what inputs it may receive. When the generator is running only one pump shall be operational.
- C. The following set points will be used:
1. Low transducer level
 2. Lead pump off
 3. Lag pump off
 4. Lead pump start
 5. Lag pump start
 6. High transducer level
- D. The wastewater level in the wet well shall be read by a submersible level transmitter. The desired operation will be as follows:
1. When the water level in the wet well reaches a “start-pump” level, the pump operation will be initiated .
 2. Should the water level in the wet well continue to increase to the “lag pump on” level, the operation of the lag pump shall be initiated. The operation of both the lead and lag pumps shall be continued until the water level in the wet well is lowered to the “pump off” level.
- E. The water level set points for the “pump off”, “start pump”, “intermediate”, “lag pump on”, “high water alarm” and the “low water alarm” shall be manually adjustable and established at the pump control panel.
- F. The control panel shall automatically alternate lead and lag pumps. Should one pump fail or be out of service for maintenance or repairs the control panel shall automatically select the next available pump for the lag pump or alternating pumps.
- G. The lead pump shall be selectable via the operator interface. The operator interface selector shall have the option of selecting Pump #1, Automatic, and Pump #2. The setting of the selector shall determine which pump will be called when the automatic control system is calling for the operation of the pumps. When the switch is set on automatic, the starting of the pumps shall alternate.
- H. Other Monitored Conditions:
- a) A level transducer and two float switches shall be furnished and installed in the wet well to sense the level of the wastewater. The level of the wet well shall be displayed on the operator interface.
 - b) The rate of change of the signal from the submersible level transducer shall be used to calculate an estimated rate of inflow into the wet well. This estimated rate in gallons per minute shall be displayed on the OIT.
 - c) Provide a generator run signal from the automatic transfer switch for single pump operation.

- I. All alarm signals shall have associated timer delays which shall be adjustable by the operator. The alarm conditions shall be recorded for troubleshooting purposes. The following alarm conditions shall all be provided with set points and time delays:

Alarms

1. Pump #1 Fail
2. Pump #2 Fail
3. Phase Fail
4. High Wet Well Transducer Level
5. Low Wet Well Transducer Level
6. High/Low Flow
7. High Wet Well Float
8. Low Wet Well Float

The operator shall be able to choose between two options of alarm function:

- Level 1: Display date, time of day, and event description.
- Level 2: Alarm for immediate or emergency service via remote alarm notification system

1.05 QUALITY ASSURANCE

- A. The pump manufacturer shall have a minimum of 1,000 units of similar type pump, installed and operating for no less than five years in the United States.
- B. The pump manufacturer shall have a factory trained service representative within 200 miles of the point of installation.
- C. Each pump shall be tested at start-up by the Contractor's electrician. The motor voltage, amperage draw and other significant parameters shall be recorded and furnished to the Engineer and Owner. The manufacturer shall provide a formal test procedure and forms for recording data.

1.06 SUBMITTALS

- A. Shop drawing submittals shall conform to Section 01 33 23 and the requirements as specified hereinafter.
- B. Included with the shop drawings, if requested by the Engineer, the manufacturer shall furnish a listing of installations, including names and addresses of contact persons.
- C. Submittal of Operation and Maintenance Manuals shall be as per the requirements of Section 01 78 23.
- D. A copy of the manufacturer's warranty shall be submitted with the shop drawings.
- F. For each pump, a written report with the results of the tests specified in Paragraph 1.05 C shall be submitted to the Engineer.

1.07 MEASUREMENT AND PAYMENT

- A. No separate measurement will be made for the lift station improvements. Payment shall be made at the contract unit prices as indicated on the Bid Form. Payment shall be full compensation for all labor, materials and equipment required to provide and install the lift station improvements including, but not limited to, removing and replacing pumps, guide rails,

base elbow, and piping, valves, electrical and control systems level sensors, and other related work as described herein and within the limits shown on the plans.

- B. Payment for the removal and replacement of the air release valve shall be on a lump sum basis at the contract unit price as shown in the Bid Form. The payment shall include all labor, materials and equipment to replace the equipment as specified herein.
- C. Payment for the surface preparation and re-coating of the piping, fittings, valves and appurtenances in the wet well and valve vault shall be based on a lump sum price as shown in the Bid Form.
- D. No separate measurement or payment for wastewater bypassing shall be made. Payment for wastewater bypassing shall be included in prices shown in the Bid Form. Payment shall be full compensation for furnishing pumps, piping and/or appurtenant items used to maintain the service of the wastewater collection system. The payment shall include the cost of maintaining and operating such equipment.

1.08 WARRANTY

- A. The requirements of the General Conditions and the requirements as specified hereinafter shall apply.
- B. The Contractor shall be responsible for the costs of materials, repair or replacement, at point of installation and use, without cost to the Owner, such equipment, or any part thereof, that is found to be defective
- C. Warranties by the manufacturer, or as specified herein, which extend beyond the period specified above, shall be extended in writing to the Owner.
- D. Specifically exempted from the warranty shall be those items such as oil, grease, filters, etc., which are normally consumed in service. These items shall be considered as part of routine station operation and maintenance.

1.09 PREBID APPROVAL

- A. Where specific manufacturers or equipment are listed in these specifications, the intent is to establish a standard of excellence and principal of operation. Naming of specific manufacturers or equipment is not intended to preclude the submittal of substitute equipment by qualified manufacturers. Unless such approval is granted, the bid shall be considered as providing the specific manufacturers and models as listed in these specifications.
- B. Bidders wishing to supply alternate equipment shall obtain the Engineer's approval according to the procedures outlined in Section 00200 (Instructions to Bidders) and Section 00700 (General Conditions) as modified by Section 00800 (Supplementary Conditions). A submittal for alternate equipment approval shall include information to indicate compliance with Paragraphs 1.03 through 1.05 and Part 2 of these specifications. In addition, a price list of major components of the equipment shall be submitted for review and comparison of similar approved equipment and materials.

PART 2 PRODUCTS

2.01 SUBMERSIBLE SEWAGE PUMP

- A. Two pumps for the duplex pump station shall be provided and installed.
- B. Rotation
 - 1. The pump will be clockwise rotation when viewed from the driver end looking at the pump.
- C. Impeller
 - 1. Impeller shall be of the balanced non-clogging type matched to its constant velocity equalizing pressure volute and be made of close-grained cast iron conforming to ASTM A48 CL30. It shall be of one-piece construction, single suction, enclosed bladeless, radial flow design with well-rounded leading vanes and then tapered toward the trailing edge for a circular flow pattern to prevent the accumulation of solids and stringy material.
 - 2. The clearance between the impeller outside diameter and cutwater shall be capable of passing a 3" sphere. The impeller is to be balanced and secured to the shaft by means of a bolt, washer, and key. The arrangement shall be such that the impeller cannot be loosened from torque in either forward or reverse rotation.
 - 3. Wiper vanes on the back impeller shroud are not allowed.
 - 4. Impeller shall be trimmed to specifically meet the conditions of operation.
- D. Volute/Casing
 - 1. Volute is to be cast with extra thick walls made of close-grained cast iron conforming to ASTM A48, Class 30. It is to be one-piece, constant velocity equalizing pressure with smooth fluid passages large enough to pass any size solid that can pass through the impeller.
 - 2. The volute shall have an integral tapered suction inlet area to direct flow to the impeller eye and have a centerline-flanged discharge. Volute discharge shall be minimum 4" diameter.
 - 3. A sliding bracket assembly shall be a part of the pumping unit constructed so that when lowered to the discharge base/elbow, the knifing action of the vertical metal-to-metal seal provides a self-cleaning, non-clogging.
- E. Wear Rings
 - 1. Wear rings shall be provided on both the impeller and fronthead so that clearances can be maintained throughout the life of the rings and minimize recirculation.
 - 2. Impeller wear rings shall be of the axial- or face-type.
 - 3. Fronthead wear rings shall be of the axial- or face-type.
 - 4. Wear rings shall be attached to the impeller and fronthead using an interference fit and Loctite.

5. Wear ring clearance adjustment shall be attained through impeller adjustment shims.

F. Guide Rails/Bracket

1. The manufacturer's standard stainless steel rail system shall be provided to guide the pump when being raised or lowered in the sump.
2. The rail system shall align the pump with the discharge elbow as it is lowered into place.
3. A stainless steel upper rail guide bracket shall be furnished to support and align the rail system at the top of the sump. For all rail lengths greater than 20 feet, a stainless steel intermediate rail guide bracket shall be included.
4. Each unit shall be fitted with stainless steel lifting chain of adequate strength to permit raising and lowering the pump. The chain will extend from the lift ring to the top of the station at ground level. A hook shall be provided and attached to end of the chain.

G. Discharge Base

1. The installation shall include a rigid discharge base-elbow to support the total weight of the pumping unit.
2. The base is to be bolted directly to the floor with the 90 degree elbow having a 125 lb. ANSI flange discharging vertically.

H. Shaft Seal Arrangement

1. Pump(s) shall be provided with two separate tandem-mounted mechanical seals to prevent the pumped liquid from entering the rotor/stator cavity area to ensure reliability of operation. The upper and lower seals are mounted to rotate in the same direction.
2. The upper seal shall be immersed in an oil bath and seals the oil chamber and the motor housing. The lower seal mating surfaces are to be immersed in the oil bath sealing the pump volute and the oil chamber. Each seal shall be held in contact by its own spring system and require neither maintenance nor adjustment, but shall be easily inspected and replaceable. The inner seals shall be installed using a snap ring on the polymeric body and positive locator machined in the ID of polymeric body. Outer seals shall be positively driven via a stainless steel lock collar clamped to the body of the bellows. All O-rings shall be high temperature FKM O-rings. A solid polymeric elastomer bellows shall provide lower seal compression and by design be impervious to stringy material in the pumped fluid.
3. Seal materials for the upper seal shall be stainless steel and Buna-N components, carbon rotating face and ceramic stationary face lapped to within 3 helium light bands. Lower seal construction shall be stainless steel and Buna-N components with manufacturer's standard faces. Use of mechanical seals utilizing single or multiple metal springs that may collect stringy material are prohibited.
4. Two moisture detection probes shall be installed so that they will detect moisture in either the seal or stator cavity measuring resistivity between the probes. They shall be wired internally to the control cable connection at the top of the motor. Float type devices located in the rotor/stator area or single probe-to-ground moisture detectors measuring continuity are not acceptable. O-ring sealed inspection plugs shall be provided in the mechanical seal oil chamber for ease of inspection, draining and filling of oil.

- I. The pump shall rotate on a grease lubricated-for-life thrust bearing (oil lubricated in 210 frame) and grease lubricated radial bearing (oil lubricated in 210 frame). Lower shaft bearings shall be locked in place to prevent shaft movement and to take thrust loads.
- J. Fits and Hardware
 - 1. All machined bolts, nuts, and capscrews shall be stainless steel and be of the hex-head type and will not require the use of any special tools.
 - 2. A heavy-duty stainless steel lifting bail shall be included and be of adequate strength to lift the entire pump and motor assembly.
- K. Testing
 - 1. Field testing by the Engineer after pump installation will be completed to determine conformance with the pump capacity requirements. Differences in performance in excess of those defined in the Hydraulic Institute Standards, latest edition for Acceptance Grade 2B will require a remedy.
- L. The pumps shall be Model SLV.30.A30.80 by Grundfos, or approved equal.

2.02 SUBMERSIBLE MOTOR

- A. Each submersible sewage pump shall be driven by a completely sealed electric submersible motor conforming to the requirements of Paragraph 1.03. The motor nameplate horsepower rating shall not be exceeded by the brake horsepower requirements of the pump for the specified head and flow conditions.
- B. The pump motor shall be squirrel cage, induction, shell type design, housed in an oil filled, watertight chamber. The stator winding and stator leads shall be insulated with moisture resistant Class F insulation which will resist a temperature of 155 degrees C (311 degrees F). The motor shall be designed to run up to one hour without motor damage in dry conditions. Automatic reset, normally closed thermal overloads shall be installed in adjacent phases of the motor winding to provide the overheating protection.
- C. The pump/motor shaft shall be one-piece stainless steel. The pump shaft shall rotate on 2 permanently lubricated bearings with a minimum B10 rated bearing life of 40,000 hours.
- D. Each pump motor unit shall be provided with a tandem mechanical rotating shaft seal system. Each seal shall be held in contact by its own spring contact. Each unit shall be provided with an oil chamber for the shaft sealing system. The oil chamber drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside. The unit shall be furnished with moisture sensing probes to detect any influx of conductive liquid past the outer seal and provide ample warning of first seal failure. Said probes will activate a moisture alarm system but will not cause motors to shut down.
- E. Connection between the power cable conductors and stator leads shall be made without soldering. The cable entry water seal design shall preclude specific torque requirements to insure a watertight and submersible seal. All leads and cables are to be sealed and designed to prevent cable-wicking to or from the motor junction chamber. The junction chamber shall be sealed from the motor by O-ring or other approved method to isolate the motor interior from foreign material gaining access through the pump top.

- F. The pump motor and control cables shall be suitable for submersible pump application in sewage. Cable sizing shall conform to NEC specifications for pump motors. The electrical cable shall be without splices between the motor and the control panel. The pump cable end will be sealed with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.

2.03 ELECTRICAL SERVICE AND POWER CENTER

- A. The system voltage and ampacity shall be as indicated herein or as required to power the proposed equipment. It shall be the responsibility of the Contractor to contact the utility serving the project sites and coordinate the details of modifications to the electrical equipment. The Contractor shall be responsible for furnishing and installing all wiring and related work as required.
- B. The electrical utility for this project is Northwestern Energy with a phone number of 800-245-6977.

2.04 CONTROLS AND ELECTRICAL SERVICE CONNECTION

- A. It is the intent of the contract documents that the electrical control center as specified in this section of the specifications be furnished as a coordinated package by the pump supplier. The manufacturer and pump supplier shall assume full responsibility along with the Contractor for the furnishing, installation and start-up procedures as required for the proper operation of the system as specified and intended.
- B. All wiring shall conform to the National Electrical Code and with local regulations and ordinances of the community for which the station is constructed.
- C. Existing conduits shall be used to run the power and control cables into the wet well. .
- D. Power and control cables from the control panel and the lift station pumps and level controls in the wet well shall conform to Paragraph 2.02 F of these specifications.
- E. All control wiring in the switching and control assemblies shall be color coded. Conductors shall be laid out neatly so they may be followed by eye from one terminal to another. All wiring shall be vertical or horizontal. Color coding shall be such that electrically common interconnections of devices are the same color. Colors may be used more than once but not in the same circuit or cable grouping.

2.05 CONTROL PANEL

A. Unit Description

1. The pump station controls shall include all equipment necessary to provide comprehensive control of the pumping system, including time delay relays, general purpose relays, etc.
2. The control panel shall include panel mounted display and monitoring equipment for all system equipment.

B. Enclosure

1. The control panel shall be free standing, located as shown in the plans and shall be rated NEMA 3R.
2. The enclosure shall be provided with a dead front with separate removable inside panel. Operator handles for the disconnect mechanisms shall be located on the exterior of the inner swing panel with interlocks which permit the swing panel to be opened only when the circuit breakers are in the "OFF" position. A locking hasp shall be provided for the outside door.
3. The control panel shall conform to the National Electrical Code specifications and shall be UL listed and labeled in accordance with UL standards No. 508 for Industrial Control Panels. In accordance with U.L. procedures, a U.L. label shall be affixed to the control panel.
4. Properly sized, heavy-duty, molded case thermal magnetic air circuit breakers shall be provided for branch disconnects service and over-current protection of all auxiliary circuits. Each circuit breaker will have a minimum UL listed symmetrical RMS interrupt rating of 10,000 amperes.
5. The enclosure shall have an ANSI 61 gray polyester powder coating inside and out over phosphatized surfaces and shall include the following features:
 - a. All of the seams shall be continuously welded and ground smooth with no holes or knockouts.
 - b. Door and body stiffeners shall be provided for extra rigidity.
 - c. Captive door screws threaded into sealed wells.
 - d. Heavy gauge continuous hinge
 - e. Removable and reversible print pocket
 - f. Oil resistant gasket and adhesive
 - g. Collar studs shall be provided for mounting inner panels
 - h. Inner panels shall be painted white enamel
6. The electrical power and control wiring shall be continuous from the control panel to the pump motor. The use of junction boxes located in the wet well shall not be allowed. The ends of the wiring conduits from the panel to the wet well shall be sealed at both ends to prevent moisture and gases from the wet well from entering the control panel.

C. Surge Protection

1. A surge arrester shall be provided in the control panel and connected to each line of the incoming side of the power input terminals. The arrester shall protect the control panel against damage as the result of transient voltage surges caused by lightning interference, switching loads and power line interferences. It shall begin shunting to ground 150 volts maximum. The lightning arrester shall be designed to withstand repeated transient voltage pulse currents up to 20 amperes. The surge protection device shall be by Square D or approved equal.

D. Selector Switch Operators

1. The control panel shall have 3-position selector switches for HAND-OFF-AUTO control of pumps as previously described. All switches shall be clearly identified as to their function with laminated engraved nameplates.

2. Selector switches shall operate the starter when it is in either the "Hand" position or the "Automatic" position and the automatic control system is calling for the operation of the equipment in the manner, as herein described.
3. Selector switches shall be of the maintained position type.

E. Running Time Meters

1. A running time meter measuring hours and tenths of hours of operation up to 99,999.9 hours shall be furnished for each pump. This shall be a 120 volt AC device operating from the control voltage by an auxiliary contact of the motor starter.

F. Motor Starters

1. An open frame, across-the-line NEMA rated, adequately sized magnetic motor starter for each motor.

G. Time Delay

1. The controls shall be supplied with software time delay to provide a time delay on the starting and stopping of the pumps. The time delays shall prevent cycling of the pump due to potentially errant readings of the wet well level.
2. The time delay shall be operator adjustable.

H. Condensation/Freeze Protection

1. A 150-200 watt, 120 VAC condensation/freeze protection heater with a high temp cutout thermo switch shall be supplied in the control panel. The heater shall maintain internal panel temperature higher than outside ambient temperature to prevent condensation/freezing of electronic and hydraulic components. Condensation/freeze protection heater shall be Hoffman Design Aire or approved equal.

I. Programmable Logic Controllers

1. Programmable logic controller shall be capable of performing relay logic, timing, counting, sequencing, mathematical, PID control, and other functions as required by the description of pump operation. Provide complete unit with rack, power supply, modules, cables and connectors.
2. PLC shall have 12K word minimum, random access CMOS memory (RAM) for program.
3. PLC shall provide 32K word EEPROM to retain program during power outages.
4. In the event of a power failure, the PLC shall retain program and set points so that system starts automatically when power is restored.
5. The PLC shall provide live digital and analog inputs/outputs as specified, plus live spares and extra slots.

6. PLC Input and Output Requirements:
 - a) Digital inputs
 - LED indicator
 - Maximum of sixteen (16) inputs.
 - b) Relay outputs
 - LED indicator
 - Individually isolated high current relay outputs
 - c) Analog inputs
 - Field selectable 4-20 mA DC or 1-5 VDC input on each channel
 - 16-bit analog to digital conversion
 - 250 ohm input impedance
 - d) Analog outputs
 - 0 to 20-mA DC range. Nominal span of 4-20 mA DC
 - Capable of driving up to a 750-ohm load.
7. The PLC shall be programmable in ladder logic using IBM compatible computer PLC's shall have "data highway" and serial ports to allow communication between PLC's and computers, all as described in the functional description in this section.
8. The PLC shall be Allen Bradley MicroLogix 1400 or approved equal.

J. Operator Interface

1. An operator interface shall be provided for the local viewing and/or setting of all levels, set points, time delays and alarm conditions.
2. Communication with PLC shall be via Ethernet.
3. Operator interface shall be Schneider Electric Magelis Series HMISTU855 - 5.7" Color Touch Screen, or approved equal.

K. Alarm and Monitoring System

1. Indicator Pilot Lights:
 - a. All indicator lights shall be clearly identified as to their function with laminated engraved nameplates.
 - b. The indicator lights shall be front panel mounted.
 - c. Indicator pilot lights shall be size 22 mm diameter NEMA 4, full voltage type. Connection shall be made by screw type compression terminals.
 - d. The pilot lights shall be provided with the push to test feature.
2. The pump controls shall include green indicator lights for the pump running indication.
3. Pump controls shall include red indicator lights for the following alarm conditions:
 - a. Phase Failure
 - b. High Wet Well Float
 - c. Low Wet Well Float
 - d. Pump #1 Failure
 - e. Pump #2 Failure

4. The other alarm conditions to be monitored are:
 - a. High or Low Wet Well Transducer Level
 - b. A manual reset relay for each motor providing overload and short circuit protection to be pre-calibrated to match motor characteristics and factory sealed to insure trip setting is tamperproof.
 - c. Overload reset button operable from the inner door.
 - d. High temperature shutdown for the motor shall utilize the temperature switches embedded in the motor windings. In a high motor temperature condition, the switch shall open, de-energize the motor starter and stop the pump motor. The shut-down shall activate pump fail indicator light.
 - e. Moisture detection control for each pump senses moisture in the oil cavity if the lower seal fails. Sensor probes located in the oil cavity will detect the influx of moisture and activate an alarm display on the HMI. The pump may remain operational.
5. The contacts for each alarm condition shall be wired to a common terminal block and sent to the remote alarm system.
6. LOCAL ALARM MONITORING - To provide a local indication of an alarm condition, an exterior alarm system shall be provided. A flashing red beacon light and horn shall be UL listed 120 VAC and approved for outdoor weatherproof installation. Features shall include a Xenon strobe lamp with low current draw. The panel shall have a "test" push button for checking the alarm light and horn. The light shall flash and the horn shall sound during an alarm condition. The alarm horn shall have a silencer. The unit shall be 860 Series by Edwards Signaling or approved equal. The light and horn shall be mounted on the exterior of the building.
7. Alarm Dialer
 - a. The dialer shall be a Sensaphone 800 or approved equal eight-channel alarm dialer. The alarm dialer shall be set up to call out upon an alarm condition after a given period of time has elapsed. The dialer shall be programmed and wired with each separate alarm signal as follows (the signals may change if desired by the Engineer):

Channel#

- 1) Pump Fail
- 2) Phase Fail
- 3) High Wet Well Transducer/Float
- 4) Low Wet Well Transducer/Float
- 5) Generator Warning
- 6) Generator Fault
- 7) Spare
- 8) Spare

L. Uninterruptable Power Supply (UPS)

1. An uninterruptible power supply shall be mounted in the bottom of the control panel. The UPS shall be Eaton Model 5P750 or approved equal.

M. Duplex Receptacle

1. The control panel shall have one internally mounted duplex receptacle to facilitate servicing of the unit.

N. Phase/Power Monitor

1. The control panel shall include a three-phase monitor/control connected to the incoming side of the power input terminals. The unit shall provide instantaneous drop-out protection in the event of phase unbalance, phase loss, phase reversal, incorrect phase sequence or low line voltage (under voltage). The phase monitor shall include automatic reset circuitry and a time delay to prevent drop-out due to momentary transients.

2.06 LIQUID LEVEL SENSORS

- A. The primary wet well water level sensor shall be a submersible level transmitter. The transmitter shall measure the height of the liquid above the position in the wet well referenced to the atmospheric pressure. The sensor shall be suitable for use in all hazardous areas.
- B. The transmitter shall consist of a piezo-resistive sensing element, encased in a 316 SS housing. A large diameter 316 SS diaphragm seal shall be non-clogging and damage resistant to floating solids.
- C. The unit shall incorporate lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strikes transients. A DIN rail mounted surge protector shall be included for protection with local failure indication light.
- D. The submersible level transmitter shall have automatic compensation for changes in air temperature, density etc. The transmitter shall be able to be suspended by a 270 pound tensile strength shielded and vented cable. The vent shall be protected with a maintenance free filter eliminating particulate or water droplets from entering the transducer.
- E. The transmitter output shall be an isolated 4-20 mA dc signal linearly proportional to the measured level range. Accuracy of the transmitted signal shall be plus or minus 1.0 percent of the level range.
- F. An appropriate length of sensor to transmitter signal cable shall be furnished.
- H. The level sensor shall be Model 01 as manufactured by Blue Ribbon Corp with the Model BCP3000 Surge Protector paired for life-time surge protection warranty; Model 750 by KPSI with the lightning protection with the lifetime warranty option; or approved equal.

2.07 FLOAT SWITCHES

- A. Liquid level sensors for backup measurement with sufficient cable length shall be supplied and installed. Liquid level sensors (floats) shall be furnished for the following conditions:
 1. Low level pump shut-down and alarm
 2. High water level pump activation and alarm

- B. The float switch shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have a heavy neoprene jacket. The float switch shall include a weight the location of which can be adjusted and securely affixed to the cord. The float switch shall be supported by the cable/cord holder and chain holder that is to be affixed to the wet well access hatch.
- C. The low level pump shut down shall automatically shut down the pump and lock out until the pump startup float is tripped.

2.08 PIPING / FITTINGS

- A. Refer to Section 33 31 00.

2.09 AIR RELEASE VALVE

- A. Air-release / vacuum valves shall allow unrestricted venting or re-entry of air through the valve during filling or draining of the water line, to prevent water column separation or pipeline collapse due to vacuum.
- B. The air and vacuum valve shall be of a single body, double orifice design. The large orifice shall expel air during the filling of the pipeline as well as allow the entrance of air during the draining of the pipe. The small orifice shall allow the continuous venting of air pockets as they accumulate in the pipeline.
- C. All internals shall be easily removed through the top cover without removing the main valve from the lines.
- D. The valve inlet shall be 2-inch NPT and outlet shall be 1.5 inch NPT.
- E. The body shall be reinforced nylon with a polypropylene float and stainless steel interior components.
- F. The air-release / vacuum valve shall be as manufactured by A.R.I. Model D-025 Combination Air valve or approved equal.
- G. The discharge of the air release valves shall be piped with Schedule 40 PVC pipe and fittings to the floor drain.

2.10 FASTENERS

- A. All anchor bolts, fasteners, structural supports, lifting chains, etc. to be installed shall be stainless steel.

2.11 PAINT

- A. Painting Schedule

1. Ductile iron or steel interior pipe, valves, fittings, pipe supports and related equipment Shop prime coating with epoxy enamel, Sherwin Williams Macropoxy 646, or approved equal. Then apply two coats of epoxy enamel, Sherwin Williams Macropoxy 646, or approved equal. Each coat of Sherwin Williams Macropoxy 646 shall have a thickness not less than 6 mils and no greater than 10 mils.

- B. Color: Wastewater piping shall be grey.

PART 3 EXECUTION

3.01 WASTEWATER BYPASS

- A. The continuous operation of the lift station shall be maintained. A system of temporary piping, fittings and pump(s) shall be provided, maintained and operated to ensure continuous operation. The wastewater levels in the existing gravity system shall not be surcharged excessively. Refer to the Sequence of Operations in Section 01 11 00.
- B. Wastewater flows shall not be conveyed in open trenches or in the trench excavation, and at no time shall wastewater be allowed on the ground surface or other places which may constitute a health hazard. Bypassed sewage must be returned to the system for treatment or transported to an acceptable treatment facility.
- C. The Contractor shall be responsible for any damage resulting from a back-up of sewage during the installation of the facilities.

3.02 INSTALLATION

- A. Each pumping unit shall be leveled, plumbed, aligned and wedged into position during the installation and connection of the discharge piping. Installation procedures shall be as recommended by the pump manufacturer, the Hydraulic Institute Standards and as required herein.
- B. Special care shall be taken to maintain alignment of pumping unit components. No stresses shall be transmitted to the pump flanges. After final alignment and bolting, pump connections shall be tested for applied piping stresses by loosening the flange bolts. If any movement or opening of the joints is observed, piping shall be adjusted to proper fit.
- C. Couplings shall be realigned after grouting. Shimming between machined surfaces will not be permitted.

3.03 PROTECTIVE COATING

- A. All exposed surfaces of the existing piping, valves, fittings and related items shall be tool ground for adequate surface preparation for prime coating. Coatings shall be applied as recommended by the manufacturer.

3.04 INSPECTION, SUPERVISION AND STARTUP

- A. Each pump supplier shall furnish a qualified process engineer for supervision of installation procedures and the system's start-up. He shall train the operating personnel in the operation and maintenance of the system.
- B. It is expected as part of this project that the Contractor, Supplier and Electrician perform the typical startup procedures before the Owner, Engineer and others are provided training and witness the startup of the system. The setup and testing of the alarm notification system shall be part of the startup procedures. The training shall also include a review of the Operation and Maintenance manuals.

- C. Each pump supplier shall furnish a minimum of two trips and eight hours of startup assistance and operator training to the Owner's operators on the operation and maintenance of the pumps. After the system has been placed in operation, the supplier's representative shall make all final adjustments for the proper operation of the equipment.

* * * END OF SECTION * * *