

SECTION 02710
FLOODED SUCTION STEEL UNDERGROUND
SEWAGE PUMPING STATION

PART 1 - GENERAL

- 1.1 **SCOPE:** The scope of this section of the specifications includes the furnishing and installation of one or more factory built automatic underground flooded suction sewage pumping station with all needed equipment factory installed in a welded steel chamber with steel entrance tube and aluminum ladder to provide access. The principal items of equipment shall include non-clog sewage pumps, internal piping, valves, control panel, lighting, ventilation, heater, dehumidifier, sump pump, cathodic protection and all internal wiring, all as shown on the plans and specified herein.
- 1.2 **COMPLETE INSTALLATION:** The complete installation includes items specified in other sections and/or shown on the plans; precast concrete wet well, connecting piping, electrical service, submersible grinder system, electric service, telephone service, water service with yard hydrant, standby generator, wood framed standby generator building, fencing and gravel surfacing.
- 1.3 **RELATED SECTIONS:** 02221 Trenching Backfilling and Compacting, 02711 Sanitary Sewer(PVC Force main), 03400 Pre-Cast Concrete.
- 1.4 **MANUFACTURE:** The pump station manufacture shall own and operate a fully equipped pump repair facility located within 300 miles of the project site. This service center shall be staffed with factory service technicians on call 24 hours a day. This service center shall also be equipped with service vehicle with necessary equipment for pump, valve and general station maintenance and repair. Equipment proposed by suppliers lacking this type service, maintenance and repair facility will be rejected.
- 1.5 **APPROVED EQUAL:** The plans and specifications are prepared to insure the equipment provided is compatible and interchangeable with the other equipment used within the system.

Alternate equipment will be considered if it is stocked by the manufacture and considered a standard service item.

1.6 OPERATING CONDITIONS:

A. Badger Pump Station

1. 2 vertical dry pit centrifugal 4" non-clog 25hp, 460 volt, 3 phase, 60 hertz, 1750 rpm and 350 gpm sewage pumps operating against 110 feet total design head.

B. No Heart Station

1. 2 vertical dry pit centrifugal 4" non-clog 25hp, 460 volt, 3 phase, 60 hertz, 1750 rpm and 150 gpm sewage pumps operating against 120 feet total design head.

PART 2 – PRODUCTS

2.1 PUMP STATION ENCLOSURE: The package pump station shall be built in two major sections for ease in handling, shipment and installation. The two sections are the pump / equipment chamber and the entrance tube. These two sections shall be welded together at the jobsite to form the complete installation. This weld shall be adequately cleaned and wire brushed prior to application of an epoxy coating, which is supplied with the station.

A. Pump / Equipment Chamber

1. The chamber shall be rolled from steel plate meeting or exceeding the requirements of ASTM A36 steel plate to a nominal inside diameter of 10 feet. The clear minimum inside height shall be 8 feet (height to be adjusted by the manufacture to accommodated equipment). Lifting hooks shall be provided in the ceiling above each pump / motor assembly adequate for disassembly of the equipment using chain or cable hoist attached to the lifting hook(s). The thickness of the vertical cylinder shall be determined by the structural requirements for the depth of bury as shown on the plans, but shall not be less than 3/8-inch. It shall be the responsibility of the station manufacture to determine the structural requirements based on the external loads specified on the plans. Structural calculations shall be provided certified and stamped by a professional registered engineer.
2. The top and bottom of the chamber shall be a minimum 3/8" thick steel plate reinforced by wide flange steel beams. The beams shall be continuously welded to the plate so that all the seams between them are sealed against water penetration. The plate forming the top and bottom of the equipment chamber shall be assembled and welded to the vertical wall to form Tee joint which shall be continuously welded to form a watertight seal.

3. A nine inch deep sump fabricated of 3/8-inch steel plate shall be provided to accept the specified sump pump.
4. Mechanical joint wall sleeves shall be provided where the suction and discharge lines pass through the station wall. The wall sleeve shall have two compression joints with rubber gaskets; one inside and one outside to receive the pipe specified. The wall sleeve shall be so designed to absorb any vibration and/or distortion in normal settling and maintain a leak proof seal.

B. Entrance Tube

1. The entrance tube constructed of a minimum 1/4-inch thick ASTM A-36 structural grade steel plate shall be provided in one or more sections, as required, as required, as required, and the diameter shall be as shown on the plans.
2. The entrance tube shall be provided with an OSHA approved aluminum ladder, with a folding extension on the upper section that shall automatically extend in line with the ladder when the entrance tube cover is in the raised position. The entrance tube shall be provided with a domed fiberglass cover with an angle iron frame attached to a single, wide hinge pin. The cover shall be provided with a suitable drip lip around the edge and shall be fitted with a weatherproof lock of the pin and tumbler type with an inside keyless release. The lock shall be self locking upon closing the cover. When the cover is in the full open position, a lock open device will engage to prevent accidental closing of the cover.

C. Welding

1. All welding shall be in accordance with standard AWS practices, with proper fillet section and continuity to assure a sound, watertight structure. All welds shall be sound and free from embedded scale or slag, shall have tensile strength across the weld not less than that of the thinner of the connected sections, and shall be watertight. All welds in contact with soil or water shall be tested with a dye penetrant to assure the watertight integrity of the weld system.

D. Painting

1. All mill scale, rust, weld flux and other foreign matter shall be removed from all steel surfaces by sandblasting to SSPC SP-10 specification for near-white blast cleaning. Surface irregularities shall be removed by grinding.
2. Exterior surfaces, below grade elevation, shall be coated with coatings and by coating procedures approved by the Steel Tank Institute for underground steel tanks. The coating shall be self priming, chemically cured, and either catalyzed epoxy or polyurethane material. The coating shall have superior adhesion qualities and shall be highly resistant to disbanding. The coating shall be applied in a single coat to provide a minimum 16 mil dry film with no runs, sags or pinholes.
3. Interior and exterior above grade surfaces shall receive a single coat of epoxy primer followed by a minimum of two coats of hi-build epoxy coating.

The coating material shall show excellent resistance to immersion in seawater as well as to splash or spillage of water, petroleum products or salt solutions. The prime coat shall be applied to a minimum thickness of 1.5 mils. The two finished coats shall be a minimum of 2 mils each coat. Paint touch-up kits shall be provided with the station for coating field welds and damaged areas.

4. The floor in all working areas within the station shall be protected with heavy dielectric neophrene matting.

E. Cathodic Protection

1. The exterior surfaces of the "package" steel pumping station shall be protected from corrosion by a complete, factory installed impressed current cathodic protection system. The system shall be designed by a National Association of Corrosion Engineers (NACE) accredited Corrosion Specialist. System suppliers shall provide (NACE) accreditation verification with the bid documents.
2. The cathodic protection system shall be designed to maintain one or more of the NACE criteria for corrosion control of buried or submerged steel structures for the duration of the 30 year warranty period. The system shall be capable of providing complete corrosion control in soil environment up to 100,000 ohm centimeter resistivities.
3. The rectifier shall have a minimum of 300 volt/amp output and housed in a dust proof enclosure utilizing heat sinks for cooling by natural air convection. The unit shall be capable of operating in the following modes without tap settings:
 - a. Constant current with electronic voltage limiting.
 - b. Constant voltage with electronic current limiting.
4. The unit shall contain environmentally sealed components and utilize self diagnostic, plug-in control modules to facilitate quick troubleshooting and easy maintenance.
5. The rectifier shall be capable of operating with 100-130 VAC or 200-260 VAC, 60 Hertz single phase input with the DC output filtered to less than 1% ripple. Current and voltage control shall have a linear adjustment 0-100% of rated output. The unit shall be provided with indicator lights to facilitate easy monitoring and shall include a down time circuit capable of storing the actual time of acceptable operating level during the life of the system.
6. The installed anodes shall be Dimensionally Stable Anodes comprised of mixed metal oxides catalyst sintered to a high purity grade titanium base materials. The anode element(s) shall be 3-inches in diameter by 40-inches long.
7. A long-life monitoring electrode shall be of the copper/copper sulfate type designed for underground application with a stability of plus or minus 5 millivolts.
8. All anode lead wires and the monitoring electrode wire shall enter the pump station thru a compression type fitting. No anode lead wire shall be exposed to direct contact with the soils.

9. The impressed current system shall be set into operation and tested by NACE accredited corrosion technician or engineer. The owner shall be provided with three complete Operation and Maintenance Manuals, a complete copy of all pertinent test data along with an on-site training seminar to insure the systems continuous performance. The owner shall also be notified of the required cathodic protection system inspections to maintain the 30 year warranty status.

F. Pumps Built-Together

1. The pump(s) shall be vertical, built-together, non-clog sewage pumps of heavy cast iron construction and shall include a vertical motor with the pump impeller mounted directly to the motor shaft.
2. The pump volute and suction elbow shall be made of close grain cast iron and shall be furnished with large cleanouts and inspection openings. The pump shall be designed to permit the removal of the rotating assembly without disturbing the suction or discharge piping.
3. The impeller shall be made of close grained cast iron and shall be of the one-piece, single suction, enclosed, non-clog design. The impeller shall be statically and dynamically balanced, securely keyed and locked to the motor shaft. The pump shall be equipped with 300-350 brinell hardness stainless steel impeller and casting wear rings. The common pump and motor shaft shall be of high strength alloy steel with a minimum tensile strength of 90,000 PSI, of sufficient size to carry the maximum loads imposed and shall have renewable 400 series stainless steel shaft sleeves in the seal area. The pump shaft shall be sealed against leakage by a double mechanical seal installed in a one-piece cast iron housing. The mechanical seal shall be of a double carbon and ceramic construction held in a mating position by a stainless steel spring.
4. The pump motor(s) shall be vertical solid shaft, open drip proof ball bearing induction motors. The motors shall be NEMA design B with normal starting torque, class B insulation rated for continuous duty with low starting current and a 1.15 service factor. The motor shall have grease lubricated ball bearings of sufficient size to carry all pump loads and have a minimum B-10 life of 40,000 hours. Bearing calculations shall be provided.
5. The pump's limits of vibration as set forth in the standards of the Hydraulic Institute shall govern the procedures and calculations of the following: The pumps shall be tested at the manufactures plant before shipment. The tests shall consist of checking the unit at the specified rated speed, capacity, efficiency, brake horsepower and at such other conditions of head and capacity to properly establish and provide a certified performance curve.

G. Filtered Water

1. The mechanical seal shall be pressurized and lubricated by water taken from the pump volute and passed through a filter that will screen out solids larger than 50 microns.

H. Motor Control and Protection

1. The control equipment shall be mounted within a NEMA type 1 enclosure with hinged door, fabricated of steel and reinforced as required. All circuit breakers, motor starters, reset buttons and pump control switches shall be mounted so they are operable without opening the door.
2. The control panel shall conform to the National Electric Code specifications and shall be UL listed and labeled in accordance with UL standard No. 508.
3. The pump motors shall have short circuit and overload protection by means of properly sized motor starters and thermal magnetic molded case circuit breakers shall be provided as disconnect switches and to provide protection against short circuits or grounds of each pump motor. Circuit breakers shall have an interrupting rating of 14,000 amps at 460 volts and shall be UL listed. The operating mechanism shall allow manual switching and shall indicate when the breaker has tripped.
4. A wall mounted convenience duplex outlet shall be provided for operating 115 volt AC devices.

I. Across-the-Line Starters

1. The magnetic across-the-line starters with manual reset shall be provided with melting alloy type overload relays for each phase to assure positive motor protection. Starters shall be minimum Nema rated size 1.

J. Panel Mount Load Center

1. As part of the station's control panel, an electrical distribution center consisting of thermal magnetic circuit breakers with a minimum capacity of 15 amps, shall be provided for each branch circuit including the following:
 - Control
 - Sump Pump
 - Dehumidifier
 - Blower
 - Heater
 - Convenience Receptacles
 - Lighting
 - Extra 1
 - Extra 2
 - Extra 3
2. The circuit breakers shall indicate when the circuit is open and shall have means provided for manual switching. All breakers shall be labeled as to function with permanently attached phenolic nameplates.

K. Duplex Logic

1. The sewage pumps shall alternate automatically on the completion of each pumping cycle. One pump shall start as the lead pump and the other pump shall be started if the wet well level continues to rise to the start level for the lag pump. After each operating cycle the lead and lag positions will alternate. A manual selector switch shall also be provided so that the

operator can designate either pump to stay in the lead position continuously. Adjustable time relays shall be provided to prevent simultaneous starting of the pumps after power failure.

L. Stored Air System

1. To control the operation of the pumps with variations of sewage level in the wet well, an air bubbler system shall be provided, complete with two air compressors, air receiver, flow indicator, wet well level gage, bubbler line and sensitive pressure switches for each pump.
2. The compressors shall be of the close-coupled oil-less type. Each compressor shall be capable of supplying 0.9 CFM free air at 50 PSIG. A three gallon air receiver with drain cock shall be provided. The compressor shall be controlled by individual pressure switches and an automatic alternator to maintain 20 to 40 PSIG pressure in the air receiver. The air compressors shall be mounted on the air tank and the entire assembly mounted on the station wall remote from any operating devices to prevent vibration from being transmitted to these devices. The wiring and air lines shall be arranged so that removing one compressor from service does not interrupt the air supply.
3. The air shall be reduced in pressure by means of a pressure reducing valve. The air flow rate shall be indicated with a purge type rotometer with a needle valve to regulate the rate. A wet well level gauge, 0 to 160 inch range shall be provided. A purge system shall be provided to divert the full tank pressure to the system to blow out the bubble line. The air control system shall contain check valves to prevent back flow through the compressors.

M. Wiring

1. All wiring shall comply with the National Electric Code and applicable state and local codes. Wiring shall be completely factory installed except for the power lines that run to the control panel continuously from the external disconnect switch, and any wires connecting to any operating device not mounted in the station.
2. All wiring within the equipment chamber and outside the control panel shall be run in PVC rigid conduit except for the liquid tight metallic flexible conduit to connect to the pump motors. Accessory items such as the sump pump, dehumidifier, etc. with approved manufacture's rubber cord may be plugged into dedicated polarized grounded outlets.
3. It shall be the responsibility of the contractor to employ the services of a licensed electrician. The contractor shall furnish and install the correctly sized service wires from the point of service outside the equipment chamber to the control panel. The contractor is responsible to furnish and install, if required, standby power units, disconnect and transfer switching and submersible grinder units in the wet well and their controls.

N. Lights

1. The equipment chamber shall be well lighted by 2 dual, 40 watt, rapid start fluorescent light fixtures with guards installed within the equipment chamber. An automatic and manual light switch shall be provided and shall be conveniently located at the top of the entrance tube.

O. Piping

1. The pump suction lines shall be 6-inch class 53 ductile iron pipe terminating in mechanical joint wall sleeve. Each suction line shall be fitted with an isolation valve inside the chamber.
2. The discharge line from each pump shall be fitted with a check valve and isolation valve. The common discharge shall be class 53 ductile iron pipe, which pass through a mechanical joint wall sleeve terminating in a plain end. The valves shall be as specified herein and sized as shown on the plans.

P. Gate Valves

1. Gate valves, sized as shown on the plans, shall be of the resilient wedge type, handwheel operated, non-rising stem design. The valve body shall be of high quality cast iron construction, bronze stems with O-ring seals located above the thrust collar. Gates for all valve sizes shall be encapsulated in rubber where exposed to line velocity, be field replaceable and provide a dual seat on the mating body seat. The valve shall meet or exceed AWWA specifications.
2. Swing Check Valves (Outside Lever and Spring)
Horizontal swing check valves, sized as shown on the plans shall be installed in the discharge piping. The valve shall permit flow in one direction only and close tightly without slamming when the discharge pressure exceeds the inlet pressure. The valve shall be provided with an outside lever and spring to accomplish quicker closing and to minimize slamming when rapid flow reversal is encountered. The valve in the full open position shall permit full flow through the valve equal to the nominal pipe diameter. The valve body shall be of high quality cast iron construction, bronze fitted with stainless steel hinge pins and with O-ring packing.

Q. Sump Pump

1. The station shall be provided with an automatic float operated submersible sump pump with a vertical close coupled motor.
2. The pump shall be of high grade cast iron construction. The integral pump and motor shaft shall be with sealed bearings and replaceable mechanical seal to exclude water from the motor housing. The motor shall be thermally protected and of adequate horsepower to meet the operating conditions of 1,200 GPH at finished grade.
3. The sump pump shall discharge through 1-1/4" PVC pipe with two check valves and a gate valve terminating in a steel coupling welded to the chamber wall. The line shall continue to and terminate in the wet well. An enclosure of heavy mesh shall surround the sump pump to keep out debris.

R. Dehumidifier

1. A package dehumidifier assembly with hermetically sealed refrigeration type compressor, expansion coil, fan and condenser coil shall be furnished to maintain the relative humidity of the air to prevent condensation on the walls. The dehumidifier shall be controlled automatically by an adjustable humidistat located on the dehumidifier, and shall have automatic defrost control, with low temperature cut out.
2. The dehumidifier shall be housed in a heavy steel enclosure securely fastened to the wall of the station. The condensate shall be drained to the station sump.
3. The dehumidifier shall have a capacity of 24 pints per 24 hours at 80 degrees F and 60% relative humidity. The dehumidifier performance shall be certified by the Association of Home Appliance Manufactures.

S. Ventilation

1. The ventilation system shall be provided to maintain a fresh air supply in the equipment chamber. The exhaust blower shall be sized and rated to change the equipment chamber air 30 times per hour.
2. The blower shall be of the centrifugal squirrel cage design with statically balanced wheel to assure quiet performance and maximum air delivery. The blower shall be located a minimum of 18 inches above the floor and exhaust through sufficient sized duct for efficient air circulation. The exterior ports shall be above ground elevation and be protected against weather, foreign matter and vandalism.
3. An automatic cover operated switch shall operate the blower and lights when the access cover is opened. A manual control switch shall also be provided near the top access tube to operate the blower and lights when the cover is in the closed position. The blower shall operate full time when the lights are on.

T. Heater

1. The equipment chamber shall be provided with a wall mounted 1500 Watt electric heater suitable for 120 volt, single phase service.
2. The heater shall be of the fan-forced type complete with an integral automatic dial type thermostat, copper anodized aluminum reflector, safety grill. The heater shall be provided with a UL approved electric cord and 3 prong plug.

U. Magnetic Flow Meter

1. The pump station shall be supplied with a magnetic flow meter. The flow meter shall be installed in the common discharge line. The magnetic flow meter shall be a Fisher Porter COPA-XE unit or equal. The flow meter shall be of the low frequency electromagnetic induction type and shall produce a DC pulse signal directly proportional and linear to the liquid flow rate. The meter shall be designed for operation on 120 volts AC, 60 Hertz with a power consumption of less than 15 watts. The meter shall be provided with a

neoprene liner, metering tube and electrodes of 316 stainless steel construction. The meter shall be provided with 150 lb class ANSI, carbon steel flanges. Ultrasonic cleaning of the electrodes shall be provided. The electrodes portion of the magnetic flow meter shall include both a magnetic driver to power the magnetic coils and signal converter. The output signal shall be 4-20 ma DC analog frequency. The signal converter shall be completely solid state with integral circuitry. The meter shall be hydraulically calibrated and shall be in accordance with the national bureau of standards. The accuracy of the metering system shall be 1% of rate for maximum range settings of 1 to 31 feet per second. Complete zero stability shall be an inherent characteristic of the meter system to eliminate the need to zero adjust the system with a full pipe at zero flow. The meter housing shall be of the splash-proof and water resistant design. The meter shall be capable of submergence of up to 40 feet of water for up to 48 hours without damage to the electronics.

2. The flow meter electronics shall include a local flow rate readout in the control panel. The system shall include a transistorized recorder in a separate wall mounted NEMA 4 enclosure. The recorder shall plot the flows on a chart at one inch per hour chart drive. The recorder shall be a single pen, rectilinear strip chart with one month per chart system capable of recording a full range of flows from 0 to 700 gpm. The system shall be complete with a three year supply of charts and pens etc.
3. The flow meter system shall include a six inch, Helicoid 400 series dial pressure gage on the stations discharge pipe. The installation shall include stainless steel pressure snubber, nipples, valves and bleed valves required for a complete installation

V. Automatic Dialer

1. Automatic Dialer - the Contractor shall furnish and install a wall mounted Automatic Dialer. The Automatic Dialer shall relay alarm conditions from the Pump Station, Sewage Grinder, Standby Power Unit and Wet Well. The dialer shall be a solid-state, microprocessor based system and shall communicate using electronically recorded or synthesized speech. The Auto-dialer shall be able to accept a minimum of ten alarm inputs programmed by the owner and be able to dial a minimum of six different telephone numbers. The dialer shall continue to contact the numbers until the system is acknowledged. The dialer shall have a four hour rechargeable battery back-up, allowing it to operate should AC power be lost. Alarm conditions shall include: power failure, pump failure, well failure, high pumping rate, and grinder failure.

W. Spare Parts and Documents Cabinet

1. The pump station shall be provided with a separate heavy gage steel, wall mounted spare parts and document cabinet.

- 2.2 PRECAST CONCRETE WET WELL: The contractor shall furnish and install a wet well complete. The wet well shall be constructed of precast reinforced single box culvert sections modified for vertical construction. A reinforced concrete base, monolithic with the bottom wall section, shall be installed at the elevation indicated on the drawings. The base shall be a minimum of ten inches thick and shall include a PVC waterstop. The wet well dimensions, elevation and size of penetrations are shown on the plans.
- A. Wet Well Cover
1. The wet well cover shall be precast reinforced concrete capable of carrying H-20 highway loading. The cover shall be a minimum of 10-inches thick and joined to the wall sections with two plies of Ram-Neck mastic seal. The aluminum access doors, portable hoist socket and screened vent shall be cast integral with the cover as shown in the plans.
 2. The wet well shall be provided with a portable hoist capable of lifting 1,330 pounds a minimum of 64" above the wet well cover over the influent pipe as shown on the plans.
 3. The wet well cover shall have two 24" x 36" aluminum access doors integrally cast in the concrete as shown on the plans.
 4. The wet well cover shall be vented with a 4-inch screened stainless steel vent pipe as shown on the plans.
- B. Mechanical Wall Seals (Link Seal)
1. Interlocking links of solid synthetic rubber connected by corrosion-resistant bolts and nuts to form a sealing belt in an annular pipe/wall space.
- C. Sectional Joints
1. A mastic seal equal to Ram-Nek shall be used to join the precast sections. The Wet Well Cover shall be joined to the precast sections with a minimum of two plies of mastic sealant.
- D. Wet Well Interior
1. The wet well invert shall be formed as shown on the plans.
 2. All surface defects and abandon wall penetrations shall be sealed and plugged with non-shrink grout equal to Sikagrout 212. Grout shall be applied in strict conformance to the manufactures recommendations.
 3. The interior of the wet well shall be cleaned to remove dirt, debris and other contaminants. The wet well shall be coated with a polyamine epoxy, Tnemec Perma Glaze, or approved equal. Coating shall be applied in strict conformance to the manufactures recommendations.
 4. All metal appearances and fasteners within the wet well shall be stainless steel.

E. Water Supply

1. The contractor shall install a complete residual water service to a location within the fenced yard within 10' of the wet well and there install a $\frac{3}{4}$ inch, frost proof yard hydrant equal to Any Flow Model No. AFB 7507 as manufactured by Merrill. The hydrant shall be installed as per manufactures recommendations on a concrete base with a minimum of six cubic feet of drainage gravel.
2. The contractor shall provide a fifty-foot heavy duty $\frac{5}{8}$ inch rubber hose with brass fittings. The hose shall be installed on a hanger inside the standby power building.

2.3 SEWAGE GRINDER: The Sewage Grinder shall be Wet Well Mounted at the influent point of the wet well. The wall mounted frame assembly (including wall brackets, rails and removable trash basket) shall be constructed of 316 Stainless Steel. The frame assembly shall be such that the grinder or trash basket can be installed and removed on a 2-inch guide pipe, rail system without bolting as shown on the plans. Wall brackets shall be mounted at a maximum of 6-foot spacing, closer in manufacture recommends.

A. Grinder

1. The grinder unit shall be equal to a CC-12" Sewer Chewer with 29:1 speed reducer gear and 5hp 230/460v/3ph/60Hz submersible electric motor. This is a performance specification and the grinder shall be equal to the CC-12 in all details as though the full specification was included herein.

B. Operation-Digital Control Panel

1. The control panel shall be wall mounted on an unistrut steel frame within the standby power building. Normal operation is continuous forward motion. When an impediment condition is detected, the controller shall instantaneously stop the rotation, pause and momentarily reverse the grinder rotation to clear the obstruction. When the jam is cleared, the controller will return to standard forward operation. If the obstruction persists, the controller shall repeat the reverse cycle for a total of three (3) times within a 30 second time window. If the grinder attempts a fourth reversal, it will shut down, display grinder jam on the LCD screen, sound the horn once every 10 seconds until the alarm is reset and send an "grinder jam" alarm code to the auto dialer in the Pump Station.
2. The controller enclosure shall be a NEMA 4X Type 316 Stainless Steel capable of being locked for safety and security.
3. The controller shall include an internally mounted circuit breaker that is operated with a pass through lever that will not allow the controller door to be opened when the lever is in the "ON" position.
4. The controller shall include a door mounted digital interface. This interface shall provide messaging, operating and programming functions. An LCD display will provide text messages to communicate the operation of the grinder. Operating buttons will be incorporated in the keypad of the interface. The digital interface controller system includes back lit LCD digital and

keyboard based PLC controller. The digital panel will have the following features:

- Audible alarm and alarm contacts connected to the AutoDIALER
- Forward and reverse interlock motor starters
- Reverse pushbutton
- Main circuit breaker disconnect with external hand operator and lock feature
- Fused control circuit transformer
- Programmable logic controller w/text based (readable) prompts
- Adjustable current sensing relay
- Forward/Start pushbutton
- Local/Remote selection by OID Selection
- PLC operator interface
- Grinder jam/motor overload remote alarm(s)
- Power fail recovery
- Local emergency Stop pushbutton
- Terminals for remote Start/Stop signal
- Maintenance reminder messages
- Readable alarm messages
- Reset/Stop pushbutton
- Tri Voltage rated (208/230/460-3-60)

The system monitor shall have non-resettable registers which track and digitally display total power on time, motor running time, total grinder jams and total motor overloads. A second set of resettable registers shall be provided to track activity between inspections or time periods.

Controller logic shall be managed with an EEPROM base PLC (programmable Logic Controller). PLC shall be factory programmed.

Overload Relay shall be used to monitor phase status and motor FLA (Full Load Amps). Relay will activate grinder reverse when amp load exceeds present limit. Amp load shall be dial adjustable so that operation may be optimized in the field.

Reversing motor starters shall be full voltage type. Starters shall operate with 120 volt operating coil, interlock, and captive terminal screws. The relay shall be appropriately sized to the motor's FLA rating.

The controllers shall be listed by Underwriters Laboratories, Inc. UL-508 standards for industrial control equipment and meet or exceed the National Electric Code requirements.

PART 3 - EXECUTION

- 3.1 **INSTALLATION:** The installation of the Flooded Suction Steel Underground Pump Station, precast concrete wet well, connecting piping, submersible grinder system, electric service, telephone service, water service with yard hydrant, standby generator, wood framed standby generator building, fencing, gravel surfacing, level switches, external alarm light, Control Panel(s) and all required interconnected wiring is to comply with the National Electric Code and local codes and conform to the recommendations of the manufacturer.

END OF SECTION 02710