



March 26, 2024

**CITY OF MASON, TEXAS  
TXCDBG SMITH ST LIFT STATION IMPROVEMENTS**

**Addendum No. 2**

Attention is called to the following modifications to the referenced Plans, Specifications and Contract Documents for the above referenced project. The City of Mason, Texas will receive sealed bids for the TXCDBG Smith St Lift Station Improvements Project until **2:00 p.m., local time on Thursday, April 4, 2024**, at the City of Mason City Hall, located at 124 Moody Street, Mason, Texas 76856. Proposals will be publicly opened and read aloud at this time. We hereby modify the documents as follows:

**CONTRACT:**

1. Appendix A: Bore Log: **ADD** the attached boring log as Appendix A to the Contract Documents.

**PLANS:**

1. Sheet 4: Lift Station Plan and Section: Lift Station Section 1 – **MODIFY** the note on the wetwell as follows: "INSTALL 8'Ø FIBERGLASS WETWELL."
2. Sheet 4: Lift Station Plan and Section: Lift Station Section 1 – **ADD** a float at elevation 1501.22 with the following note: "LOW LEVEL LOCKOUT FLOAT ELEV. 1501.22."
3. Sheet 7: Lift Station One Line Diagram – **MODIFY** from Float Switches (6) to Float Switches (5)."

**SPECIFICATIONS:**

1. Section 11307: Sewage Lift Station – **REMOVE** all references to VFDs from this Specification Section.
2. Section 11307 Part 2.2 Paragraph A. – **REPLACE** paragraph A in its entirety with the following:
  - A. Pump Station Assembly: The system shall include: sewage wet well with hatches, three (3) submersible sewage pumps with inverter-duty motors, quick disconnect rail system, valve vault with valves, control panel, with primary control via float system, motor high temperature shutoff, high water alarm, and external alarm panel and electrical connection point. Provide all pipe, wiring, controls, and other work and materials required for a complete and operable system.
3. Section 16100: Sewage Lift Station Control Panel – **REPLACE** this Specification Section in its entirety with the attached Section 16100.

**ADDITIONAL APPROVED MANUFACTURERS:**

1. Specification Section 02607 – NOV shall be added as an approved manufacturer for FRP manholes.
2. Specification Section 02722 – NOV shall be added as an approved manufacturer for the FRP wetwell.
3. Specification Section 11307 – FLYGT shall be added as an approved manufacturer for lift station pumps.

**CLARIFICATIONS:**

1. It is acceptable for the 480V to 120/240V transformer to be mounted on the exterior of the pump control panel and utilize a mini-power zone in a NEMA 4X rated enclosure.

This addendum consists of sixteen (16) pages and becomes a part of the referenced plans, specifications and contract documents and shall be acknowledged by the proposer and attached to the proposal packet submitted.



By Colden S. Rich, P.E.  
Vice President

*3/26/24*



# **APPENDIX A**

## **Bore Log**

## LOG OF BORING

Project: **MASON CDBG WW IMPROVEMENTS**

Date: 21 MARCH 2024

Location: **SMITH STREET LIFT STATION**

Type: AIR ROTARY

Boring No.: **B-1**

DEPTH IN FEET	SYMBOL	SAMPLE	MATERIAL DESCRIPTION	N-BLOWS PER FOOT	TEXAS CONE PENETROMETER		Qp (tsf)	DEPTH SCALE
					1st 6"	2nd 6"		
5		ST	DARK BROWN SANDY CLAY				4.5+	
		ST					4.5+	
		SS		7				
		AU	BROWN SANDY CLAY TO CLAYEY SAND					
10		AU						
		SS		14				
		SS	BROWN CLAYEY SILTY COARSE SAND					
15		SS		24				
		SS		22				
20								
25		*						

\*TOTAL DEPTH OF BORING 24 FEET\*

**NOTE**

NO GROUNDWATER WAS PRESENT DURING OR AT COMPLETION OF DRILLING ACTIVITIES.  
 \* NO SAMPLE WAS TAKEN AT A DEPTH OF 25 FEET DUE TO CAVING SANDS

**SECTION 16100**

**SEWAGE LIFT STATION CONTROL PANEL (Primary Level Control System)**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES:**

- A. Furnish and install a new pump control panel (PCP) with all necessary installation accessories and appurtenances, training, and start-up to control a complete and functional three-pump sewage lift station as specified.
- B. The PCP shall be provided by the sewage lift station supplier.
- C. The system shall be provided with a primary float switch level control system.
- D. The drawings and specifications are complementary. What is shown on one is binding whether shown or specified in the other or not. Failure to check both the drawings and the specifications will not be grounds for a change order if additional equipment or material is required to be provided by the Contractor after the Engineer reviews, or deficiencies are identified during testing, either in the Factory or the field.
- E. Related Work Specified Elsewhere:
  - 1. Division 1.
  - 2. Division 11.
  - 3. Division 16.

**1.2 SUBMITTALS:**

- A. Submit under provisions of Section 01300.
- B. Product Data: For each type of control panel provide manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
- C. Shop Drawings: For control panel or system.
  - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:
    - a. Control panel outline drawings showing elevation, plan and interior views, front panel arrangement, dimensions, weight, conduit entrances and anchor bolt pattern. Indicate all options, special features, ratings and deviations from this Section. Furnish complete Bill of Materials indicating manufacturer's part numbers.

- b. Power and control schematics including external connections. Show wire and terminal numbers and color coding.
  - c. Instruction and replacement parts books.
  - d. Certified shop test reports.
  - e. As-built final drawings.
- D. Field quality-control test reports.
- E. Float Switches.

**1.3 OPERATIONS & MAINTENANCE MANUAL:**

- A. Manufacturer shall provide copies of installation, operation and maintenance procedures to Owner in accordance with general requirements of Division 1. Operation and maintenance (O&M) manuals shall be provided complete, including technical data sheets, wiring diagrams, guide to trouble shooting, and information for ordering replacement parts.
- B. Wiring diagrams shall have their terminals identified to facilitate installation, operation, and maintenance and shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
- C. Each component shall be provided with the manufacturer's information for that component.
- D. Provide O&M manual in three ring binder with name of project, contractor, and manufacture's name on the outside of the binder. Binders shall be no more than three inches thick. Provide additional binders if required.
- E. Provide the name and contact information of the contactor and manufactures representative in the first section of the O&M manual.
- F. Submit operation and maintenance data based on factory and field-testing, operation, and maintenance of the specified products.

**1.4 WARRANTY:**

- A. Warranty shall be manufactures standard warranty that shall cover 12 months from date of startup but limited to 18 months from date of shipment.

**1.5 QUALITY ASSURANCE:**

- A. **Manufacturer Qualifications:** PCP manufacturer shall demonstrate at least three years of continuous field operating experience in control panel design and fabrication. Submit customer/user list with telephone numbers, addresses and names of customer/user representatives.

- B. The PCP shall be constructed in compliance with Underwriters Laboratories Inc. The panels shall bear the Underwriter's Laboratories (or similar nationally recognized accreditation agency) label indicating the equipment is built in accordance with the practices and requirements of the agency's category and suitable for use as service entrance equipment.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**PART 2 PRODUCTS**

**2.1 MANUFACTURER:**

- A. The PCP shall be provided by the manufacture of the submersible pumps.

**B. U. L. SERIALIZED LABEL:**

1. The Pump Control Panel shall be constructed in compliance with Underwriter's Laboratories Category 698A – "Enclosed Industrial Control Panel Relating to Hazardous Locations with Intrinsically Safe Circuit Extensions" listing and following-up service. The control panel shall bear the Underwriter's Laboratories serialized label for "Enclosed Industrial Control Panel Relating to Hazardous Locations with Intrinsically Safe Circuit Extensions".
2. While the use of U.L. listed components is encouraged, their use alone and/or the alternate use of a U.L. 508A – "Enclosed Industrial Control Panel" serialized label will not be considered an acceptable or satisfactory alternate to the "Enclosed Industrial Control Panel Relating to Hazardous Locations with Intrinsically Safe Circuit Extensions" serialized label specified above. Upon request from the Engineer, the panel manufacturer shall supply documentation to the Owner proving they are a U.L. recognized manufacturing facility for the type of equipment required. Only the labeled product of U.L.698A "Enclosed Industrial Control Panel Relating to Hazardous Locations with Intrinsically Safe Circuit Extensions" recognized panel manufacturer shall be considered acceptable for use on this.

**2.2 PUMP CONTROL PANEL REQUIREMENTS:**

- A. It is the intention that this specification shall cover a complete pump control panel as hereinafter described, and indicated on the drawings, and all necessary appurtenances which might normally be considered a part of the complete electrical system for this installation.
- B. The power supply to the PCP will be 480/277 volts, 3 phase, 4-wire 60 Hz.
- C. The PCP shall be provided with a NEMA 4X enclosure with hinged front door. Both enclosure and inner door shall be a minimum of 14 gauge steel and shall be painted on both sides with enamel finish. Interior of panel shall be white. Provide a back panel, minimum 12 gauge steel. Door shall include three point latching assembly and door stop. Panel shall include: hand-off-

automatic selector switch, start-stop push button, combination starters, and three adjustable ambient compensated quick-trip overload relays suitable for the applicable pump motor service. The panel shall also be equipped with pump running light and non-resettable elapsed running time meter for each motor.

- D. A separate hinged dead front inner door shall be provided in the enclosure. All control switches, lights, and overload resets shall be mounted through the inner door. The pump circuit breaker and control circuit breaker shall be mounted with operating handles through the inner door, and shall have locking tabs that prevent the inner door from being opened with the breakers in the "ON" position.
- E. Provide a 125 volt, 20-ampere specification grade ground fault interrupter receptacle in a steel box with cover plate inside the panel enclosure.
- F. Provide the following circuit breakers inside the panel enclosure (or outside of panel enclosure utilizing a CPT / Panel if generates too much heat. Vendor to ensure the CPT / Panel is a Nema 4X as well). Each circuit breaker shall be labeled with its intended service and shall be powered directly from the incoming power supply. Connect circuit breakers to different phases.
  - 1. Provide a 15-ampere, single-pole, molded cased circuit breaker for the panel mounted receptacle.
  - 2. Provide a 20-ampere, single-pole, molded cased circuit breaker for service to power the Contractor Provided SCADA Panel.
  - 3. Provide a 20-ampere, single-pole, molded cased circuit breaker for future service.
  - 4. Provide a 20-ampere, single-pole, molded cased circuit breaker for future service.
  - 5. Provide a 20-ampere, single-pole, molded cased circuit breaker for future service.
- G. The lift station pumps shall operate in response to variations in the liquid level in the wetwell based on the following float switches:
  - 1. High level alarm.
  - 2. Lag pump on.
  - 3. Lead pump on.
  - 4. Pump off.
  - 5. Low level cutoff.

An alternating scheme shall be provided to automatically alternate between the three pumps to turn the lead pump "ON" on a particular increasing level in the wetwell and turn the lead pump "OFF" on a particular decreasing level in the wetwell, as indicated on the drawings. After the pump stops, the alternating scheme shall switch the lead pump and lag pump. Provide Hand-Off-Auto selector switch



for each pump. If one pump is off, the alternating scheme shall automatically start the remaining pump. If the level in the wetwell continues to rise, an intermediate level probe shall be provided between the lead pump start and the high level alarm to start the lag pump. Pumps shall then continue to operate until the level in the wetwell drops to the pump stop level. If a pump fails, or the level in the wetwell rises to a high level alarm level, a contact shall be provided to remotely indicate alarm and a red strobe light (mounted on top of the enclosure) and horn shall be activated and shall stay activated until manually reset.

- H. The PCP shall be provided with a top mounted, weatherproof, LED strobe alarm indication light assembly with a shatter resistant polycarbonate red lens, mounted on a polycarbonate/ABS blend case. The alarm light shall be NEMA 4X rated, suitable for outdoor mounted and rated to operate on 120 VAC. The strobe shall provide a minimum 300,000 peak candela output and shall be rated for a 3,000 hour life. The bulb shall be arranged for easy replacement. The strobe shall be PLC and triac compatible.
- I. A weatherproof audible alarm horn assembly, with silence pushbutton, shall be provided. The alarm horn shall be rated NEMA 4X rated, suitable for outdoor mounted and rated to operate on 120 VAC. The horn shall provide a minimum of 78 dB output and shall be rated for at least a 400 hour life @ 50% duty cycle. The pushbutton shall be 30.5 mm, NEMA 4X.
- J. Power Distribution: The power system shall contain incoming power terminals, wiring, main circuit breaker, motor circuit breakers and control circuit breaker.
  - 1. Circuit breakers: All circuit breakers shall be heavy duty thermal magnetic, equal to Square D type FAL. Each breaker shall be sized to adequately meet the operating conditions of the load and have a minimum interrupting capacity of 10,000 amps at 230 V and 18,000 at 460 V. Breakers shall be indicating type, providing an "on-off-tripped" positions of the handle. They shall be quick make-quick break on manual and automatic operation and have inverse time characteristics. Breakers shall be designed so that tripping of one pole automatically trips all poles.
  - 2. WIRING. All wiring shall have not less than 600 volt, 105 degree C insulation and all power wiring and bus shall be in complete conformity with the National Electric Code and state and local and NEMA Electrical Standards. Control wiring shall be properly labeled at both ends of the conductor corresponding to the wiring diagram. All job connections required to conveniently replace control components shall be made at approved type terminal blocks with engraved Bakelite marker strips or similar approved means minimum wire size shall be 14 AWG.
  - 3. A lightning-transient protector shall be provided. The device shall be a solid state device with a response time of less than 5 Nano-seconds with a withstanding surge capacity of 6500 amperes. Units shall be instant recovery, long life and have no holdover currents.

4. The PCP shall be provided with a control power transformer to convert the incoming three-phase service to 120 volt AC or 24 volt AC as required for the pump control and intrinsically safe circuits. The control power transformer shall be provided with primary and secondary fusing.
- K. All motor starters (controllers) and control equipment required for the proper operation of the control panel shall be furnished.
1. Magnetic Starter (Full Voltage): Starters shall be individual units, combination starter/molded case circuit breaker units, IEC or NEMA.
  2. Units shall be of Allen-Bradley, Square D, Eaton or Engineer-approved equal.
  3. Provide pushbutton stations, pilot lights and HAND-OFF-AUTOMATIC switches as required. Provide auxiliary contacts on starters to accomplish interlocks and control as specified.
  4. Provide all starters with solid-state overload elements. Overloads shall be sized in accordance with the National Electrical Code and lock out the affected motor and send an alarm.
  5. Provide adjustable 1-60 second "on" time delay relay to prevent motors from automatically restarting immediately after a power outage. Set one pump to 15 seconds and the other pump to 30 seconds.
- L. PHASE FAILURE/UNDERVOLTAGE PUMP PROTECTION:
1. A power monitor shall be provided for each motor to monitor the incoming voltage and provide protection to the motor. A single monitor shall not be used for all pumps. The power monitor shall detect incoming service abnormalities including phase-loss, unbalance, reversal, over voltage, under-voltage and rapid cycling protection and provide automatic cutout of pumps and provide local alarm. Upon detection that the incoming power has returned to normal, the unit shall restore pump operation and discontinue alarm. The power monitor shall be protected against overcurrent by the use of separately mounted extractor-type line voltage fuses. This device shall have a nominal 2-4 second dropout delay and (2-300 second) adjustable restoration time delay.
  2. The power monitor shall have built in dual color LED indicator. The indicator shall be green when system is normal and shall turn red upon detection of improper three phase power. The unit shall protect itself from voltage spikes and transients with internal transient protection meeting IEEE 587 standards.
  3. The power monitor system shall also include a stagger time delay function providing time delay between pump starts to eliminate simultaneous starting of motors upon return of system power. This feature shall be operation in all modes of pump operation.

4. The power monitors shall be programmed or designed such that when the utility power supply abnormality is corrected, the relay will reset and allow the pump motor to operate.
  5. Do not lock out the affected motor on any of these events but allow the system to reset after the time delay.
- M. The PCP shall be equipped with MiniCAS relays, one for each pump, to function in conjunction with the motor thermistors and FLS sensor. The MiniCAS is a solid state device that provides a signal to the pump moisture and thermal measuring devices. The relay, in conjunction with the monitoring device, shall measure the moisture and thermal conditions in the motor stator and provide an indication of an out of tolerance condition. The relay shall operate from a 110 VAC or 24VAC power source and shall provide a signal current of less than 7 volts at 30 mA to the control device.
- N. **INTRINSICALLY SAFE BARRIER:**
- The PCP shall be provided with UL Listed intrinsic safety barriers that have been UL tested with the specific equipment furnished for this application to render the equipment suitable for use in Class 1, Division 1 or 2, Groups A, B, C and D; Class II, Division 1 or 2, Groups E, F and G; and Class III, hazardous locations.
- O. **NAMEPLATES:**
1. Provide permanently attached nameplate to clearly indicate the purpose and operation of the panel and all control devices or indicating lights.
    - a. Nameplates attached to the exterior of the control panel door or interior panel shall be engraved nameplates constructed from laminated phenolic plastic, at least 1/16" thick, 3-ply, with black surfaces and white core. Engraving shall be condensed gothic, at least 1/4" high, appropriately spaced. Nameplates shall be attached with stainless steel, self-tapping screws.
    - b. Nameplates or diagrams attached to the back side of panel fronts may be thermal transfer laminated tape and shall be attached with water-proof adhesive that is heat-resistant up to 250° degrees Fahrenheit.
  2. All devices shall be identified on the front and back of the applicable panel door or interior panel.
- P. Additional PCP requirements shall be as follows:
1. All selector switches and pushbuttons shall be rated NEMA 4X.
  2. Indicating lights shall be LED type with push to test feature.
  3. Run/Overtemperature/Moisture indicator light for each pump.
  4. Interior LED work light with door switch.
  5. 50 watt condensation heater with thermostat.

6. Indicating light for phase/voltage monitor alarm.
- Q. The PCP shall be provided with the following alarm output dry contacts.
1. Pump overload alarm for each pump.
  2. Over/under voltage alarm that exceeds five minutes (adjustable).
  3. MiniCAS over temperature and leak detection for each pump.
  4. High wetwell level alarm.
  5. Low water cutoff.
  6. Loss of power. Provide normally closed contact that will close on loss of power.
- R. Protect the PCP from surges on the incoming power line. Surge protection shall provide common-mode protection (between each Line and Ground), with impulse discharge capacity (Imax) of 40 kA.

2.3 FLOAT SWITCHES:

- A. Float switches shall control the submersible pumps and provide alarms when the water level in the wetwell reaches specific elevations. Provide float switches for low level lockout, pump stop, lead pump start, lag pump 1 start, lag pump 2 start and high level alarm or as indicated on the Drawings.
- B. Float switches shall be float-tilt type level switches.
- C. The following manufacturers are acceptable, subject to compliance with the Contract Documents:
1. Anchor Scientific Inc.
  2. Consolidated Electric.
  3. Warrick Controls.
  4. Engineer-approved equivalent.
- D. Materials:
1. Float material: Polypropylene or Teflon coated type 316 stainless steel.
  2. Cable jacket: PVC, neoprene or equal.
  3. Cable clamp: Polypropylene or 316 stainless steel.
- E. Design and fabrication:
1. Mercury-free switch in float.
  2. Provide switch complete with flexible electrical cables.
  3. SPDT contact rated at 4.5 A at 120 V AC.
  4. Direct acting float switch:
    - a. Switch shall activate on rising level.
    - b. Switch shall deactivate when liquid falls one inch below actuation level.
  5. Terminate cables in junction box.
  6. Process temperature: 0-30 Degrees C.

7. Install floats in accordance with the Drawing details and the manufacturer's requirements and/or recommendations.

**2.4 CABLE HOLDERS:**

- A. Cable holders shall be constructed of 316 stainless steel.
- B. Install, on opposite sides of the wet well hatch opening, separate cable holders with Kellum grips to support pump power cables (one for each pump in the lift station). Cables shall be routed such that any individual pump can be raised from the wet well without interference with adjacent pump cable(s).
- C. Install cable holders with a Kellum grip to support each float switch.

**2.5 FASTENERS:**

- A. All fasteners within the wet well shall be constructed of 316 stainless steel.

**2.6 CONTROL STRATEGY:**

- A. The sewage pumps shall be controlled by the PCP. A float switch system shall be provided for level control.

**B. AUXILIARY DEVICES:**

1. All devices shall be mounted on the front of the enclosure. No devices shall be mounted on the sides of the enclosure. Devices mounted on the enclosure shall have the same NEMA rating as the enclosure.
2. Pushbuttons shall be of the heavy-duty oiltight type, mounted on the front of the starter enclosure.
3. Selector switches shall be of heavy duty, oiltight type, mounted on the starter cover.
4. The operator button shall be molded Bakelite and solid in color throughout the material. Painted buttons are not acceptable. A suitable and clearly legible nameplate shall be provided for each button to designate its function.
5. All contact blocks shall be made of molded, high arc resistant material and shall have a minimum of one normally open, and one normally closed contact, with a continuous current rating of 10 amperes, 600 volts. All terminals shall be readily accessible, contact blocks shall be easily changed, or be arranged for the addition of contacts.
6. Pilot lights shall be an integral part of control station when indicated. Indicating lights shall be LED type, push to test, rated for the enclosure. Contractor shall install pushbuttons and selector switches not factory mounted.

7. Provide adjustable 1-60 second "on" time delay relay for each motor to stop the motor on loss of power. Set the first motor relay at 30 seconds and stagger each motor 30 seconds.

**C. LOCAL ALARM:**

A flashing red alarm light shall be provided. The alarm light shall be weatherproof and shatterproof with a minimum 4 inch diameter and an LED lamp. The alarm light shall be located on the panel. The alarm light shall be activated under the following conditions:

1. Wetwell High Level.
2. Any pump lockout condition.

**D. CONTROL POWER:**

1. Provide a control power transformer to step-down power from 480 volts to 120 volts and/or 24 volts. The control power transformers shall be sized to provide all control power requirements for the control panel.
2. Control power transformer shall be minimum 1.0 kVA with primary and secondary fuses.
3. Control power for the alarm system shall be provided with a battery backup that provides backup power for a minimum of 24 hours.

**4. PRIMARY LEVEL CONTROL SYSTEM:**

The Contractor shall furnish the following for each PCP required, and calibrate the instruments to the specific sewage lift station equipment.

5. The liquid level of the sewage lift stations shall be sensed by a level detecting device that shall consist of float switches with a mercury switch inside and flexibly supported by a PVC jacketed, heavy-duty cable system.
  - a. The number of floats and the mounting regime shall be as directed by the Engineer. Each system shall be installed in accordance with the Manufacturer's instructions.
  - b. Each float switch shall have a 20 A rating at 115 VAC and 10 A at 230 VAC. The float shall be type SO with three # 14 AWG fine-stranded copper conductors. The float shall be mounted using Type 316 stainless steel hardware.
  - c. The float switch system shall be furnished in quantities and with such accessories as are required by the Engineer to perform the specified control and alarm functions of these applications.

6. Each float switch system shall contain a SPST-NO/NC switch that makes or breaks circuit as the sensed liquid level rises or falls past the float mounting elevation. The ON/OFF level differential is less than 1-inch so the float essentially senses a single level.
7. Basic float switch system equipment features shall be as follows:
  - a. Floats: Type 316 SS, 5½-inch diameter, # 20 gauge, permanently assembled to switch and cable.
  - b. Cable: Type SO, 5/8-inch O.D., Nitrile PVC jacket, 3- #14 AWG fine-stranded conductors for heavy flexing, underwater service. Switches shall be colored black and white.
  - c. Switch:Tilt type, NO or NC. Low tilt angle shall give less than 1-inch level differential. AC resistive rating 20 amps at 115, 10 amps at 230. AC lamp load 1000 watts. Encapsulated permanent. NO floats are orange. NC floats are red.
  - d. Mounting: Clamp tube, bracket and U-bolts are 316 SS.
8. The float switch system shall conform to the following:
  - a. Provide wetwell high level alarm signal to station SCADA. Such service shall be capable of operating the alarm light, and alarm annunciating station, bells, horns, etc.
  - b. When installing the float switch system, the green conductor of the three-wire cable is to be connected to the float body and shall be run to an electrical ground.
  - c. The float switch system shall be guaranteed against defects in materials and workmanship for three (3) years from date of shipment from the factory. Defective floats shall be replaced FOB factory in exchange for the defective floats shipped prepaid to the factory.
  - d. The float switch system shall be connected to the pump and alarm controller specified above.

**E. CABLE HOLDERS:**

1. Cable holders shall be constructed of 316 stainless steel.
2. Install, on opposite sides of the wet well hatch opening, separate cable holders (Kellums grips) to support pump power cables (one for each pump in the lift station), float switches, and submersible level transducer. Ensure cables are routed such that any individual pump can be raised from the wet well without interference with adjacent pump/float/transducer cables.

**PART 3 EXECUTION**

**3.1 INSTALLATION:**

- A. The pump control panel shall be installed as indicated on the plans.
- B. The sewage lift station and all related appurtenances shall be installed by the lift station supplier.
- C. All conduit entering the wetwell shall be airtight to prevent gases, including hydrogen sulfide gas, from entering electrical boxes, as required by the National Electrical Code.
- D. Responsibility for Materials. The PCP supplier shall be responsible for all material furnished by him and he shall replace, at his own expense, all material that is found to be defective in manufacture. The Supplier shall also be responsible for all material that has become damaged during delivery, handling, installation or start-up. Protect all equipment after installation until final acceptance by Owner.

**3.2 FIELD TESTING, TRAINING AND STARTUP:**

- A. Provide the services of a factory-trained and fully-qualified representative for one day to inspect the completed installation, make all adjustment necessary to place the system in trouble-free operation.
- B. Provide one day of training for the Owner's operating personnel in the proper operation, care and maintenance of the equipment. Visit to be after water is available and pumps can be operated for extended periods.
- C. Test and demonstrate proper operation of system.
- D. Set pump control to occur at the various wet well levels indicated on the Plans and demonstrate pump operation at each level.
- E. Fill basin and allow pump to cycle several times. Then shut off pump and allow basin to fill to trip the high water alarm. Demonstrate that all normal operations and alarm functions of the installed station work as designed and intended.
- F. Measure motor current and voltage during testing and submit readings in accordance with section 01300.

**3.3 SCHEMATIC:**

A schematic diagram of wire coloring shall be permanently fastened to the inside of the enclosure. Schematic shall be specific to the control panel and shall reflect as-built conditions. An installation and service manual shall also be included with control panel.

**END OF SECTION**