SECTION UC-610

PUMP STATION CONTROL PANEL

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish and install an aboveground pump station control panel, which shall include the pump controller, motor starters, breakers, relays, switches, lamps, and all electrical equipment, devices and material specified herein, as shown on the drawings or required for a complete installation.

1.02 RELATED SECTION

Section UC-600 - Pump Station Electrical Materials

1.03 QUALITY ASSURANCE

A. All electrical materials and equipment shall be new, of recent domestic manufacture, and approved by the Underwriters' Laboratories, Inc. Material or equipment damaged in the course of installation or test shall be replaced or repaired in a manner meeting with the approval of the Engineer (ie the Chief, Engineering Division, MD-WASD or his representative). Further, said repairs or replacement shall be performed by personnel qualified such that the UL approval will not be lost. The Contractor shall provide satisfactory evidence of these qualifications to the MD-WASD prior to the work being performed.

B. All electrical material and installation shall comply with the codes and standards listed in Section UC-600.

1.04 SUBMITTALS

The Contractor shall provide all submittals in accordance with Section UC-600, Subsection 1.04.

PART 2 - PRODUCTS

2.01 GENERAL

A. The Control Panel shall be designed and built as integrated, pre-wired equipment. It shall control the operation of two pumps, based on the level in the wet well.

1. Pump controller (specified in Section UC-615) shall monitor the wet well level and actuate the sewage pumps in sequence with rising water level. Once a pumping cycle has started, it shall continue until the stop level is reached. All start/stop levels shall be adjustable, based on design levels shown on the Plans. Controller shall maintain level to within ± 1% of full scale (ie maximum depth).

2. The pump controller shall automatically change the sequence of the pumps after each cycle of operation. A three position selector switch shall be provided for manual

selection of pumps sequence. An alarm shall be annunciated whenever the lag pump is called on, indicating failure of lead pump. Signals to operate the pumps shall come from the level transducer.

B. The Panel shall include the pump controller, motor starters, breakers, relays, switches, lamps and any other device shown on the Plans, or required for the function as specified. Shop drawings of every device shall be submitted and approved before the panel is assembled.

C. The manufacturer of the control system shall be certified by the Underwriters Laboratories (UL) as a UL 508 listed system panel manufacturer certified to install serialized label for quality control and insurance liability considerations.

D. Each major component shall be identified by an engraved phenolic nameplate.

E. All wiring shall be a flexible, stranded type and each conductor shall be tagged and numbered according to wiring diagrams and neatly tied.

F. The Control Panel shall be dimensioned to facilitate maintenance. Enclosure shall be as specified in Subsection 2.07, herein.

2.02 MISCELLANEOUS EQUIPMENT

A. Circuit breakers shall be thermal magnetic, molded case, Square D, type FA, or approved equal.

2.03 ALARMS

Control panels shall be capable of reporting, a minimum, of the following alarm points:

A. Dry Well High Level (Float switch)(Dry well only)

B. Wet Well High Level

C. Wet Well Low Level (With auxiliary contact to stop sewage pumps.)

D. Pump Controller Failure

E. Sewage Pump High Temperature or Failure (with pump shut down, lock out relay and reset push button.)

F. Loss of Phase Voltage

G. Sump Flood (Dry well only)

H. Provide three spare alarm points and one set of N.O./N.C. contacts from common alarm relay for remote signaling. Every alarm shall be indicated by a labeled red pilot light mounted in the control panel. A red light with guard protector, as Series VDA manufactured by Crouse-Hinds, or approved equal and a bell with silencing buttons shall be

mounted in the service enclosure. The alarm lights shall remain "on" until alarm signal is reset at control panel.

2.04 MOTOR STARTERS

Motor starters shall be sized as indicated on the drawings, with overloads to match the supplied motors. One set of N.O/N.C. spare contacts shall be provided in the sewage pump starter. Motor starters to be Square D, Cutler Hammer, or approved equal.

A. Starters for sewage pumps shall be three-phase, sized in accordance with the following table:

MOTOR SIZE (Horsepower)	NEMA SIZE STARTER		
	SINGLE PHASE	THREE PHASE	
	240 Volt	240 Volt	480 Volt
Up to 5	2	1	1
7½	2	2	1
10	-	2	2
15	-	3	2
20	-	-	2
25	-	-	3
30	-	-	3
40	-	-	3
50 to 75	-	-	4
100 to 150	-	-	5

B. All wiring shall be a flexible, stranded type and each conductor shall be tagged and numbered according to wiring diagrams and neatly tied.

C. All external wiring shall terminate in a terminal block, Square D type G class 9080, or equal.

D. Relays shall be socket-mounted for ease of replacement, Square D type K Class 8501, or equal.

E. Lamps, push bottoms, and switches shall be heavy duty oil-tight/watertight, Square D, type K Class 9001, or equal.

F. Elapsed time meters shall be provided to indicate total running time of each sewage pump in "hours" and "tenths of hours". Meters shall be Eagle Signal Series HK or approved equal. An extra elapse time meter shall be furnished and installed to indicate the total time for all pumps simultaneous runs.

2.05 PUMP CONTROLLER

As specified in Specification Section UC-615

2.06 TELEMETRY

Telemetry (RTU) provided by the M-DWASD shall be installed by the Contractor in its own weather-proof and corrosion-resistant enclosure separate from the control panel enclosure. The manufacturer of the control system shall provide the hardware required to interface the controller with the M-DWASD SCADA System to remotely start-stop the pumps and monitor the operation of pumps and alarms

2.07 SERVICE ENCLOSURE (or Control Panel)

A. The enclosure shall be a gasketed, NEMA 3R, free standing, stainless steel, 12 gauge minimum construction, with same material continuous hinges and dead front anodized aluminum inner door. Finishing of the enclosure to be No. 2B. Padlocking of motor circuit breakers shall not obstruct the closing of the inner doors. Inside panels shall be NEMA 12, constructed of .080 inches thick anodized aluminum or 14 gauge 316 stainless steel. Control wiring shall be color coded (minimum of 16 different colors), 16 gauge, 600 volts, 90 degree C. standard tinned copper, PVC insulated with crimped terminal connections.

B. Enclosure shall be approximately 48" W x 48" H x 12" D. In any case, it shall be sized to facilitate maintenance of enclosed equipment. Total length of the enclosure will depend on the size of the pumps but shall be sized to provide enough space so that every piece of equipment can be easily reached for service and maintenance. The outer doors shall be furnished with a locking latch and staple for padlock, to be furnished by the MD-WASD. All hardware shall be stainless steel. Provide every outer door with a limit switch to trip a remote alarm in case of unauthorized opening. Panel seams shall be continuously welded and ground smooth. All exterior joints shall be ground level and polished smooth. Stiffeners shall be added to panel sides and doors as necessary to ensure rigidity. Lifting eyes and a rolled lip around three sides of the outside doors shall be provided. Provide also a rain shield over the generator outlet or access opening. Enclosure shall be 12-inches deep minimum.

C. The door shall be made of the same material as the enclosure. All edges of the door shall be folded inward, similar to the cabinet to form a rigid non-flexing door. The door shall be hung on a continuous stainless steel hinge with stainless steel bolts and nuts. The door shall be equipped with a three-point locking latch, a handle and a heavy-duty stainless steel staple for a padlock. Provide a friction type latch on hinge side to keep the door in position desired and to keep it from being closed by the wind.

D. Cabinet anchorage shall consist of chemical adhesive anchor cartridge system 5/8" φ, minimum, stainless steel anchor threaded rod with 5-1/2", minimum, depth of embedment. The cabinet shall be secured to the concrete base at a minimum of four locations.

E. An external red LED strobe light, vapor tight with aluminum lens protector shall be mounted on a side of the enclosure. The voltage of the strobe light shall be 120 Volts AC and will flash on an alarm condition. The strobe light will continue to flash after the alarm silence button is pressed until the alarm condition has cleared.

F. The alarm bell shall be 120 volt A.C., 6 inches diameter, 90 db, weatherproof with protecting guard. Bell shall be Simplex Series 4090 or approved equal.

G. A cast or stamped plate, with the legend "Miami-Dade Water and Sewer Department, Tel. (305) 274-9272" in characters a minimum of 2-inches high, shall be firmly attached to the upper portion of the door by welding or tamper-proof bolting.

H. Provide stainless steel weather and sun shield welded to top of panel enclosure as shown on drawings if Variable Frequency Drives (VFD) or Soft-Start equipment are included and located within the enclosure. Shield shall be factory installed.

2.08 PANEL MOUNTED AIR CONDITIONING UNIT (VFD APPICATIONS ONLY)

A. The enclosure shall be Stainless Steel NEMA 4X rating fully gasketed for tight, leakproof installation. It shall be UL/CUL listed with closed loop cooling to allow the interior airflow system to be isolated from the ambient airflow system. The system shall be designed so no ambient air can invade the cool, dehumidified sensitive compartment.

B. Condenser Coils shall be Epoxy-Coated. This coating shall withstand 1000 hours of salt spray per the ASTM B 117 test method.

C. An air cured coating shall be sprayed on interior copper lines and brazed joints on the condenser side to provide protection from corrosive environments. The coating shall withstand 1000 hours of salt spray per the ASTM B 117 test method.

D. The unit shall include thermostatic Low Temperature Control to prevent over-cooling and to provide energy-efficient operation. Refrigerant shall be R410A.

E. Filters shall consist of a multi-layer grid of sturdy corrugated aluminum, securely held in a one-piece aluminum frame. Filters are required wherever air is drawn into an electronics enclosure or related cooling equipment to keep internal parts as clean as possible.

F. A short cycle relay shall be installed to protect the compressor from possible damage due to harmful short cycling, (frequent starting) where temperature controls enable the compressor to restart frequently or after a power interruption.

G. The unit shall be as manufactured by Kooltronic or approved equal.

H. The Contractor shall appropriately size the unit to remove the heat generated by the VFD.

PART 3 - EXECUTION

3.01 EXAMINATION & INSTALLATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. The Contractor shall provide limit switch to turn light "ON" when dry well hatch is opened.

D. Minimum interrupting capacity of the electrical panel shall be 14,000 AMPS.

E. Sump pump shall be provided with high level alarm wired to the telemetry.

F. Main Disconnect switch shall be sized to match main circuit breaker and in a pad lockable NEMA 4X stainless steel enclosure.

G. Control panel shall incorporate a Tamper/Intrusion Switch (DC) that activates an alarm to the RTU whenever the panel is opened. Control panel shall be located outside of pump station above grade.

H. When field conditions requires that meter to be mounted at a location more than five (5) feet away from the Main Breaker of the Control Panel, a service entrance rated enclosed main circuit breaker shall be provided . It shall be mounted not more than five (5) feet away from the meter location.

I. A sump pump, discharge piping and local switch shall be installed in the valve pit in accordance with Section UC-600, Subsection 3.03-B.

3.02 CERTIFICATIONS

At the time of final acceptance inspection, and in addition to all other submittals required by the specifications, the Contractor shall furnish the following:

A. Submit letter from the electrical panel manufacturer certifying that:

1. The electrical panel has been inspected at the jobsite after complete installation.

2. The electrical panel and its components match approved shop drawings and are in compliance with the project's plans and specifications.

3. The electrical panel and its components have not been modified, changed or altered in any way which will void the Underwriter Laboratory "UL" listing.

4. The electrical panel and its components are safe to energize and operate.

B. Submit letter from the Contractor certifying that:

1. The electrical panel has been installed in accordance with the MD-WASD's standards and these specifications.

2. External wiring has been terminated inside the panel at the designated "Terminal Boxes", in accordance with the approved electrical schematic and/or shop drawings.

3. The electrical panel and its components have not been modified, changed or altered in any way which will void the Underwriter Laboratory "UL" listing.

4. The electrical panel and its components match approved shop drawings and are in compliance with the MD-WASD's specifications.

5. The electrical wiring schematic and control schematic are current and reflect all field modifications made, if any.

6. The electrical panel and associated electrical equipment are safe to energize and operate.

END OF SECTION