SPECIAL SPECIFICATION

7438

Storm Water Pumping Station Repairs

1. Description. Repair damage to the Texas City Wye pumping station located at the intersection of SH146 and IH45. The building and electrical service address is 150 Texas City Wye. Work will include providing temporary power and controls to operate the station in the automatic mode utilizing all four storm water pumps during replacement of damaged equipment. The primary work will be to repair or replace all damaged equipment and return the station to full operation in the automatic mode. The original plans and specifications for prior TxDOT construction project 0192-04-081 are being made part of this project as the standard to which the pump station is to be restored. Some basic changes and revisions are noted within this specification. Maintenance and operation of the pumping station will be the sole responsibility of the Contractor while the station is under contract. All salvage material shall remain property of the State. The automatic pumping station will be complete, functional and fully automatic consisting of the following:

- Temporary power and controls to operate the pump station while permanent repairs are being made.
- Electrical Systems. Supply new motor control center equivalent to original one and include all equipment as specified in original plans and specifications for TxDOT construction project 0192-04-081. Replace all submerged wire and fittings.
- Generator and Controls Building. Spray wash inside and out and re-paint. Repair or replace damaged louver(s). Replace door awning.
- Water Level Control System. Replace existing float switches with new switches and set at revised on-off elevations to be supplied during construction.
- Standby Engine-Generator Set. Unit to be removed and sent to manufacturer’s shop for evaluation. Fuel tank to be replaced with new tank. Generator to be repaired or replaced as recommended by manufacturer.
- Traversing Trash Rake. Replace traversing unit motor and windscreen for top of rake that was blown away. Repair all damaged wiring and connections.
- Combination Fire/Security Control System Alarm. Verify all functions.
- Electrical Service. Replace cabinet, fused disconnect and all wiring to motor control center. Coordinate re-energizing the service to the station with the power company.
- Repair Fence and Gates.
Replace all light fixtures in wet well.
Check all pumps for functionality and repair if necessary.

2. Submittal.

A. Submittal of Equipment, Materials and Details. Submit the following items to the Engineer for approval prior to their use on this project. Shop drawings shall be submitted electronically per current TxDOT instructions in General Notes.

1. Building. All new replacement items.

2. Electrical. Certified manufacturer’s outline dimensioned drawings, brochures and descriptive bulletins of all equipment to be used. Include scaled layouts of all replacement switchgear.

3. Generator. All new replacement items.

4. Detailed Shop Drawing. All fabricated equipment and fixtures.

5. Pipe, Couplings, Valves, etc. Manufacturers brochures and specifications.


B. Approval – Upon approval of the above items, the Contractor may proceed with repairs to the pumping station or any portion thereof pertaining to approved items.

Where an approved item requires dimensional changes or alterations, the Contractor shall, at his own expense, prepare the necessary drawings and submit to the Engineer for approval. Upon approval, the Contractor may proceed with that portion of the pumping station affected by the change.

No changes will be permitted in the list of equipment or shop drawings once approved, unless authorized in writing by the Engineer. Approved equipment and drawings shall constitute final plans for repair of the pumping station. Approval shall, in no way, relieve the Contractor or equipment suppliers of any responsibilities described elsewhere in these specifications.

C. Operation Manuals – Upon determination of all equipment to be used in this station and prior to final acceptance of this project, furnish the Engineer three (3) books each containing the following:

- All portions of data required for approval of above items “1” through “7”. All drawings will be “as built.” Include complete lubrication, operation manual, service, maintenance instructions and parts lists.
• Complete sequence and description in full of operating instructions, noting all precautions.

• Parts list for each item of mechanical and electrical equipment supplied on this contract.

• Bound copies of warranties and guarantees with dates of expiration, also names and addresses of persons providing warranties and guarantees.

D. Diagram – Furnish 22 in. x 34 in. diagram(s), laminated with clear plastic, showing in detail each circuit of all control devices with each wire individually numbered. Upon approval by the Engineer, the laminated diagram(s) shall be placed at the work bench located in the generator building.

3. Construction.

A. Generator and Control Building – Clean all salt water contaminated areas of the building by spray washing with fresh water and remove all debris. The methods, procedures, and sequences of cleaning process are the responsibility of the Contractor.

1. Roof Deck – Check the roof deck for wind damage and leaks. Use the following materials if repairs are needed.

   The roof deck shall be 3 plys of tar saturated felt and gravel over one inch rigid insulation board screwed to galvanized type F roof deck. Type F deck shall be 22 gage cold formed steel conforming to ASTM A 446, Grade A, coating designation G60. The metal deck shall be 1-1/2 inches deep with a minimum section modulus (SP) of 0.108 in. cubed per foot of width.

   The deck shall be attached to supporting steel and adjoining sheets with no.12 self-drilling and tapping type sheet metal screws (Teks, Star or equal). Screws are to be used at all supporting members and lap joints with a 36/4 spacing. Screws at lap joints between supporting members shall be on a maximum spacing of 18 in. Care shall be taken to assure good contact between connected parts without “over driving.”

2. Work Bench – Replace work bench with a new one as described as follows: Work Bench shall be of heavy steel construction, approximately 36 in. wide by 24 in. deep by 35 in. high with adjustable intermediate shelf and door(s).

3. Louvers, Doors and Burglar Bars – Check all louvers for damage and repair if possible or replace with extruded aluminum louvers equal to existing type as called for on original construction drawings. The backdraft type louver for the generator fan discharge is damaged and will have to be repaired or replaced. Pressure wash interior and exterior doors and repaint with a similar color. Mechanically clean any rusted areas and prime with a metal primer before finish painting. Replace any damaged or rusty hardware.

   Check the steel roll-up door for damage and repair as required to return the door to working condition. Clean and re-paint door to match other exterior trim.
4. **Paint** – Clean and re-paint interior and exterior walls with a compatible paint to match the present colors. Any metal items requiring paint shall be painted in accordance with specification Item 446, “Cleaning, Paint and Painting,” except that all metal shall be given a 3.0 mil dft prime coat of red oxide industrial primer with a two coat, 2.0 mil dft each finish coat of industrial alkyd enamel in a color to match the louvers. Pre-paint the extruded aluminum louvers with a “Duranar” fluoropolymer coating, or equal, (color D=code UC-51515/Medium Bronze). If required, paint the generator set, base, day tank and motor mounts per generator set manufacturer’s standard color.

5. **Concrete Block Finish** – Building interior and exterior walls shall be painted with Sherwin-Williams, Glidden, Devoe or approved equal. The concrete finish shall be as follows:

- **Surface Prep:** As per manufacturer’s recommendations.
- **Primer:** Concrete sealer per manufacturer’s recommendations.
- **Finish: Interior** 2 coats dry fallout eggshell white per manufacturer’s recommendations (10.0 mil dft min.).
- **Finish: Exterior** 2 coats beige semi-gloss elastomeric per manufacturer’s recommendations (10.0 mil dft min.)

**For this project only one 5.0 mil finish coat will be required.**

6. **Building Door Awning** – Supply new awning per the following: Pre-finished aluminum material, 0.024 in. min. thickness. Coating shall be guaranteed a min. of 10 years. Submit brochures and color samples for approval and choice of color. Also refer to original plans for size.

**B. Electrical System** – All electrical work shall be done in accordance with all applicable codes, standards and ordinances. A State of Texas licensed master electrician shall directly supervise the Contractor forces.

All electrical submittals shall be certified correct by the master electrician. All persons performing electrical work shall have appropriate electrical license. Provide the Engineer with documentation that proves the Contractor has a minimum of five years experience and is qualified in this type and scope of work. Provide all necessary equipment, materials and labor to provide a complete electrical system as shown in the original construction plans and described in the original specifications. Electrical service installation shall be as shown in the plans and as required by the electrical utility company. Provide any temporary electrical power necessary for construction of pumping station. This shall include dewatering. Provide electricians to make necessary connections of the portable load banks to the load lugs of the generator or generator main breaker so that the required generator set testing can be performed.

Components shall conform to the following where applicable:
**Wire and Cable.** Shall be UL listed type XHHW with 75°C rating for wet locations and 90°C rating for dry and damp locations unless noted otherwise. Insulation shall be in accordance with the latest edition of ICEA S-68-516, NEMA WC-8, UL44, and IEEE 383. Conductors shall be soft annealed copper per ANSI/ASTM B-8, class D, stranded. Size of wire and cable shall not be smaller than no. 12 AWG, except control wire may be no. 14 AWG. Control conductors can be stranded type MTW. Splices in the wet well not permitted.

1. **Underground Conduit.** Shall be PVC sch 80 heavy wall with 90°C wire rating, UL listed. Provide a minimum 2 in. clearance between conduits, and minimum 24 in. cover or as noted on plan set.

2. **Lighting Panel.** Shall have circuit breakers with capacity as required. Serve all 120 volt receptacle circuits by a GFCI circuit breaker U.L. Class A. Top operating handle shall not exceed 6.5 ft. from finished door. Label all circuits with embossed type labels. The panel shall be an integral part of the Motor Control Center.

3. **Lighting Dry-type Transformer.** Shall have two 5% taps below, 150°C temperature rise and shall be in compliance with NEMA standards ST-20-72, ANSI C 89 (1-74F), and UL 506-76. Size the transformer as shown on plans and mount in the Motor Control Center.

4. **Selector Switches, Pushbutton Control Station and All Pilot Devices.** Shall be heavy-duty oiltight with nameplates.

5. **Controls.** Mount in a separate section of switchgear of same manufacturer as the Motor Control Center. Secure a unique label or number to all wiring by clear heat shrink tubing. Neatly contain wiring by plastic wire troughs. Controls manufacturer shall complete the control logic shown in plans so that the pump station is automatically controlled and coordinated.

   Permanently label each lamp, relay, switch and any other devices with nameplates as to their designation and function.

   The control relays shall be industrial type with minimum contact rating of 10 amps at 250 volts AC, Square D type X or GE class CR122B or equal.

6. **Light Switches.** Shall be specification grade and rated 20 amps at 120 volts AC. Switch shall have industrial cover if flush mounted and shall have Crouse-Hinds DS32 or Appleton FSK-ITS-C cover with FD conduit box if surface mounted. Mount switches 4.5 ft. from finished floor and label.

7. **Receptacles.** Receptacles shall be 120volts AC specification grade, rated for 20 amps and shall be corrosion resistant, straight blade, duplex, grounding type. Receptacle shall have industrial cover and mounted 4.5 ft. above finished floor.

8. **Grounding System.** As shown on plans and required by NEC. Ground rod shall be 3/4 in. copper clad, minimum 10 ft. length. Connect wire using an exothermic welding process. Maximum resistance to ground shall be 5 ohms.
9. **Automatic Transfer Switch (ATS).** Supply new ATS to be mounted in an enclosure integral to the motor control center. Shall be three phase, 480 V., 60 Hz, three pole with full manufacturer warranty. The current rating of the automatic load transfer switch shall be as shown in the plans. Provide the State a copy of the manufacturer’s warranty and any information concerning parts and service support.

Each automatic transfer switch shall be mechanically held on both the emergency and the normal side and rated for continuous duty in an unventilated enclosure. The switches shall be double throw with the main contacts rigidly and mechanically interlocked to ensure only two possible positions: normal or emergency. The switch shall provide for a time adjustable pause in a neutral, disconnected, position in both directions of travel. The operating transfer time in either direction shall not exceed one-sixth (1/6) of a second. A manual operator must be provided to enable one hand manual operation.

The automatic transfer switch shall be motor operated.

Accessories for transfer switch: The automatic load transfer switch specified above shall include the following:

- Extended time delay on transfer to emergency pre-set at factory for 120 sec. (note: Engine start shall take place when float switch is closed and transfer signal is present). Incorporate provisions for testing the circuit in the control circuit design.

- Full phase protection. Three-phase relays shall be field adjustable, close differential type with 92% to 95% pickup and 82% to 85% dropout. Relays are to be connected across live lines.

- Four-position mode selector switch marked “TEST,” “AUTO,” “OFF,” and “ENGINE START.”

- Voltage and frequency monitor on generator output to prevent transfer prior to proper output parameters.

- Adjustable 0.5 to 6 second time delay on engine starting to override momentary outages and nuisance voltage dips, set at 6 seconds.

- Adjustable 2 to 30 minute time delay set at 5 minutes on retransfer of load to normal.

- Provide engine exerciser to start and run the generator set, with or without load, each 168 hours for a 20 minute interval.

- Three pilot lights, to indicate the normal and emergency position of the transfer switch and mode selector switch in “OFF” position.

- The automatic transfer switch shall have a load disconnect circuit, which is operated 20 seconds before load is transferred from normal power to standby generator and from standby generator to normal power.
10. **Conduit.** (when required) R.M.C. Mount all exposed conduit on clamp back type straps. All conduit stub-ups shall have bell ends or bushings. PVC conduit must be supported properly to prevent sagging or breaking.

11. **Motor Control Center.** Furnish and install a Motor Control Center (MCC) in accordance with the latest applicable code requirements of NEMA, ANSI, NEC, OSHA (Occupational Safety and Health Administration) and UL standards. The Motor Control Center shall contain all provisions required for the automatic control of motors in accordance with the listed sequence of operation, and shall contain all items listed in the plan set and listed below. All sections in the Motor Control Center except the autosensory section shall be listed by U.L., and have a U.L. Label permanently attached to the exterior door of the Motor Control Center. This labeling will indicate that it has been U.L. approved and shall be listed for full available fault current or as called for in the plan. Coil voltage shall be 120V from lighting panel.

The Motor Control Center shall include the following items:

a. **Motor Starters.** Combination type magnetic motor starters with thermal magnetic circuit breakers. Starters to have one (1) green “RUN” pilot light, one (1) blue “MOISTURE” pilot light, one (1) yellow “HIGH TEMP” pilot light, elapsed time meter and HAND-OFF-AUTO selector switch. All pilot lights shall be push-to-test type. Starters shall be controlled to prevent motors from starting at same time. Combination units shall be UL listed for available fault current and as called for in the plans. Control voltage shall be 120 volt A.C.

b. **Wiring.** NEMA class II, type B wiring with 120 volt control bus.

c. **Space Heaters.** Space heaters with thermostat. Heaters shall be energized immediately upon delivery and remain on.

d. **Interlocks.** Provide all necessary auxiliary interlocks.

e. **Unit Doors.** Mount unit doors on the stationary structure and hinged on the side away from the vertical wire way. The doors shall be held closed with slotted thumb screws. Pilot lights and selector switches shall be mounted on starter doors. Units shall be constructed to meet NEMA 12 enclosure standards.

Provide unit doors with a handle mechanism for the manual operation of the circuit breaker from the outside with the door closed. When the doors are closed, the handle shall indicate whether the circuit breaker is in the “ON” or “OFF” position. Handle must be lockable in open position.

Interlock the handle mechanism where the door cannot be opened while the circuit disconnect is in the “ON” position (interlock shall be designed so that it can be bypassed by an authorized person). It shall be possible to padlock the circuit breaker in the “OFF” position thereby preventing operation of the circuit breaker and preventing access to the unit interior.
Provide each unit door with a white bakelite nameplate with black lettering. Each switch, light, or any other device shall be clearly labeled as to its function or purpose with bakelite tags. All labels shall be permanently mounted.

f. **Bus Bars.** Unit bus bar tabs shall be silver plated copper, reinforced with strong spring steel to ensure high contact pressure.

g. **Controls.** Completely enclose all controls such as timers, relays, etc., as well as the starter and circuit breaker within the motor control center.

h. **Vertical Stations.** All vertical sections shall be as follows:

   - Sections shall be rigidly formed of 14 gauge or heavier cold-rolled sheet steel, NEMA 12 enclosure.
   - Provide continuous horizontal wiring troughs at both top and bottom of each section. These troughs shall line up to form a continuous wireway for the full length of the control center. A large, continuous, full height vertical wiring trough shall be provided in the side of each section. The door hinge shall be on the opposite side from terminals with an individual door exposing wireway only.
   - Silver plate the entire vertical and horizontal bus. Provide a continuous tin plated ground bus for the entire length of the MCC. Neutral bus is required in incoming main sections only.
   - All bus bar supports shall be of high-impact, high-strength, polyester-glass or non-carbonizing porcelain mounted on steel brackets, and shall provide adequate dielectric strength and creepage distances. The bus structure shall be U.L. listed for short circuit current available or as called for in the plans.
   - Wiring. Every wire shall have a unique label. Permanently attach the cover label with clear heat shrink. Provide a laminated wiring diagram showing terminations of all wires. Label each wire on diagram.
   - Control power for starters shall be from lighting panel. All coils shall be 120V.

12. **Main Disconnect** – The main breakers (generator and normal) shall be solid state, insulated case, 80% rated and have UL interrupting rating of 50,000 amps rms symmetrical. The main breakers shall have the following adjustable trip functions; long time, short time and instantaneous pickup.

   Coordinate and set all breaker variables with switchgear manufacturer. Coordinate main and pump breakers for overcurrent tripping. Coordinate main protective equipment with the governing utility company’s transformer protective equipment. A short circuit study shall be performed by manufacturer and provided to the Engineer along with breaker time current curves.
13. **Service** – Provide new NEMA 4R enclosure and 600A, 600V AC heavy duty fused disconnect with NEMA class H fuses, to be mounted on existing service rack. Replace existing (3) #300MCM XHHW & (1) #2 XHHW & (1) #1 gd in each of 2 conduits between service pole and motor control center. Provide 3 spare fuses to be stored in the generator building. Coordinate all equipment with electrical utility company and provide wire and terminations as needed.

C. **Sludge Pump.** Sludge pump is not to be replaced on this project. Repair if necessary. Refer to original Special Specification 4145 for description of pump.

D. **Storm Water Pumps.** Storm Water pumps are not to be replaced on this project. Repair if necessary. Refer to original Special Specification 4145 for description of pumps.

E. **Water Level Control System** - The water level control system for the sludge pump and stormwater pumps shall consist of sealed float switches (sensors) installed to form a complete level control system. The existing float switches are to be replaced on this project and installed with new on-off elevations. The new elevations will be supplied to the Contractor prior to construction by the Engineer. The float switches shall be supported to permit free movement, unimpeded by pump, piping, or minor sludge accumulations. All components other than sensors are to be located in motor control center. Level control system components shall be as follows:

1. **Sensors.** Sensors shall be sealed float switches with internal weight and shall connect to control panel by means of heavy neoprene jacketed submersible type electrical cable to junction box and XHHW wire from junction box to control panel. Cable splices are not allowed in the wet well. The sensors shall have adequate number of poles to perform functions required and shall be U.L. Listed. Seal at all entries to prevent migration of moisture and gas.

2. **Relays.** Relays shall be industrial type: Square D type X, General Electric class CR122B, or equal.

   The time delay relays shall be pneumatic type manufactured by Square D class 9050 type B, Allen Bradley Bulletin 700 AC-NPT or equal.

3. **Controls.** The control system shall perform the following functions in addition to the functions necessary to make the pumping station fully automatic.

   - Alternate pumps P1 and P4.
   - Alternate pumps P2 and P3.
   - Provide time delay for every pump. (See controls drawings)
   - Stop all motors 20 seconds before transfer switch operation.
   - Provide override switch to turn outside beacon off manually. Label switch “OFF”, “AUTO.”
   - Provide manually reset high water alarm initiated by float switch FS-3, with push to test button and indicator light.
• Provide relay that operates flashing red light when alarm condition is present from engine, high water float switch or when activated by high water. Provide toggle switch labeled “OFF”, “AUTO” simulating float closing.

• Provide relay that monitors engine alarm status and operates indicator light labeled “ENGINE ALARM” in MCC.

• Provide indicator light labeled “ENGINE ALARM” that must be manually reset.

• Provide toggle switch to simulate float closing for every float switch. They shall be permanently mounted in autosensory section of M.C.C. Label “AUTO”, “TEST.”

• A 5 minute cool down timer wherein the generator set runs unloaded for 5 minutes before shut down after any start-up.

• Phase failure relay to shut down all pumps and reset all timers with adjustable delay.

• Be connected to ATS to form complete system.

E. Standby Engine-Generator Set. Check existing 300kw standby Cummins generator for functionality. Contact Cummins-Southern Plains Power Company to provide an assessment of the unit and recommended repairs. The diesel fuel tank is to be replaced with one equal to existing tank. Any fuel drained from the tank at the site shall be disposed of in accordance with all applicable federal and local regulations. While the permanent generator is out of service, provide an equal or larger size of a portable diesel powered generator to power the station until normal power is restored and then utilize the portable unit as the backup power source until the permanent backup generator can be placed back into service. The Contractor shall be responsible for all fuel costs for the duration of the project. Check load bank on radiator end for damage and repair as necessary.

4. Testing. One test will be required after the generator is re-installed and shall be witnessed by the Engineer or the designated representative of the Department. The cost for the test shall be included in the cost of the generator. The test shall be for 4 hours and performed after installation to verify that the generator set is free of any defects and will perform to specifications. The results shall be recorded manually for volts, amps and frequency. The test shall be performed with the use of resistive load banks of the proper number and size to produce the required design load connected to the load lugs of the generator or generator breaker. All consumables necessary for the tests shall be furnished by the supplier. The tests shall be performed between 6 A.M. and 6 P.M., Monday through Friday, unless otherwise agreed upon by the Department.

The tests for the engine-generator shall be performed according to the following loads, with 0:00 considered the beginning of the test period and 4:00 or 8:00 respectively being the end of the test period.
8 Hour Test (N/A)     4 Hour Test
Time (Hour: Minutes) Time (Hour: Minutes)
0:00 – 0:30 75% load 0:00 – 0:30 75% load
0:30 – 2:00 100% load 0:30 – 2:00 100% load
2:00 – 3:00 75% load 2:00 – 2:30 75% load
3:00 – 5:00 100% load 2:30 – 3:00 50% load
5:00 – 6:00 75% load 3:00 – 3:45 100% load
6:00 – 6:30 50% load 3:45 – 4:00 25% load
6:30 – 7:00 25% load
7:00 – 7:45 100% load
7:45 – 8:00 25% load

If any failure occurs during any phase of the above test, a new test will be re-scheduled and performed in its entirety.

The generator set shall meet the following tolerance limits:

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<th>Item</th>
<th>Units</th>
<th>Percent values shown are percent of required nominal specs</th>
<th>Number of places after decimal</th>
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* Nominal voltage droop equals 0%. The droop is set to zero value.
6. **Engine.** Drain and replace all engine fluids and filters. Install new crankcase ventilation system as described below. Repair or replace engine exhaust system and insulation if damaged.

   - Vent crank case fumes to a crankcase ventilation filter system for removal of oil mist from the atmosphere emitted from the engine during operation. The Crankcase Emission Absorber (CEA) shall remove 99% of oil mist and airborne particles so that the clean blowby fumes can be ducted to the air cleaner for a completely closed system, removing 100% of the blowby mists and gases from the atmosphere without endangering the engine. The engine-generator supplier shall install the system and check for proper operation.

7. **Generator.** The generator shall be removed from the engine and the windings cleaned by steam cleaning and then baking to remove all moisture. If the windings have an internal short, the generator must be replaced. If not, then after baking, coat the stator and rotor with an epoxy coating designed to protect the unit for operation in severe environments where sand, salt sea spray and possible chemical corrosion may be present. Replace end bearings with new pre-lubricated maintenance free ball bearings. Replace the silicon diode rectifiers and megger the unit after reassembly to check for Shorts and grounds. Re-install on engine and check for proper alignment and operation.

8. **Automatic Starting System.** Check starter and system and replace all components that are damaged with the following described equipment: A 24 volt electric starting system with positive engagement drive and of sufficient capacity to crank the engine at a speed which will start the engine under operating conditions.

9. **Jacket Water Heater.** Replace all damaged items with new parts per the following described items: An engine-mounted thermal circulation tank-type immersion water heater incorporating an adjustable thermostat switch to maintain the engine jacket water temperature at 90°F (32.2°C) in a still air ambient temperature of 30°F (-1.1°C). The heaters shall be 120 volt or 240 volt, single phase, 60 hz.

10. **Automatic Controls.** Replace all damaged circuit boards in the control panel, as required, to perform the following functions. Fully automatic generator set start-stop controls in the generator control panels. Provide shutdown controls for low oil pressure, high water temperature, overspeed, overcrank, and an auxiliary contact for activating rotating red beacon located on exterior of the building. Mount indicator lights in the panel to indicate failure. Supply a test button to check visual alarms. The controls shall also include 3-15 seconds cranking cycle 2 minutes apart with lockout and manual reset.

11. **Batteries.** Provide new lead/acid storage battery sets of the heavy-duty industrial starting type. Battery voltage shall be compatible with the starting systems. The battery set shall be rated no less than 220 ampere hours. Provide battery racks constructed in conformance with National Electric Code (N.E.C.) requirements and
necessary cables and clamps. Batteries shall be capable of cranking the engines at the rated ambient for a minimum of five minutes.

12. **Battery Chargers.** Furnish new current limiting, float-equalize charger to automatically recharge batteries. The charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. The battery charger shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressors, DC ammeters, and fused DC outputs. AC input voltage shall be 120 volts or 240 volts, single phase. Amperage output shall be no less than 5 amperes. Wall mount chargers in NEMA 1 enclosure.

13. **Main Line Circuit Breaker.** Main line circuit breaker for three phase overload and/or short circuit protection is included in M.C.C. and is not a part of engine generator.

14. **Generator Control Panel.** Replace all damaged portions of the existing generator control panel from the same manufacturer as the generator set and include a factory warranty and the manufacturer’s parts and service support. Existing control panel is a generator-mounted NEMA 12 type, vibration isolated, dead front, 14 gauge steel. The repaired control panel shall contain, but not be limited to, the following equipment:

- Illuminating lights and switch.
- AC voltmeter, 3-1/2 in. (9 cm), 2% accuracy.
- AC ammeter, 3-1/2 in. (9 cm), 2% accuracy.
- Ammeter-voltmeter, phase selector switch.
- Frequency meter, 3-1/2 in. (9 cm), dial type (45-65 hz).
- Automatic start-stop control as specified.
- Voltage level adjustment rheostat.
- Dry contacts for remote alarms wired to terminal strips.
- Fault indicators for low oil pressure, high water temperature, overspeed, and overcrank which must be manually reset.
- Four-position function switch marked “AUTO,” “MANUAL,” “OFF/RESET,” and “STOP.”
- Switch to operate engine at idle or run.
- Emergency stop to kill engine.

15. **Fuel Tank Base (Day Tank).** Replace existing fuel tank with an equal size tank as specified in original construction project specification.
16. **Duct Mounted Load Bank.** Check existing load bank and if damaged repair as necessary or replace if damaged beyond repair. The existing load bank is rated at 135 kw and is internally fused in 20 kw maximum increments.

G. **Wet Well.** Spray wash contaminated portions of the wet well with fresh water and remove any debris not previously removed by others.

H. **Construction Dewatering.** It is not anticipated that construction dewatering will be required on this contract, but if required it shall be the responsibility of the contractor. Provide and install temporary pumps for dewatering. The Contractor shall not use the permanent or existing pumps as called for in this specification for construction dewatering.

I. **Wet Well Roof Access Doors.** No work will be required for this item.

J. **Wireless Remote Monitoring System.** Replace the existing Critical Wireless Remote Monitoring system with an equivalent system. The monitoring unit shall be in the form of a wireless remote terminal unit (RTU) and be capable of monitoring up to 14 discrete signals plus battery voltage and ambient temperature. The unit shall monitor diagnostic and alert signals which will be designated by the State at the time of installation. A partial list is shown below.

The unit shall have capability to communicate with any authorized pager, text capable cell phone or e-mail address. The Web-based Configuration and management system shall permit using the Critical Wireless secure, password-protected Device Management Portal to configure new units, update recipient lists, see a graphical snapshot of all field equipment and analyze archived alert data from any web browser. There shall be no software or installation required by the State.

The RTU transceiver shall be capable of operating at 3 watts of transmission output power with an input voltage of 11-30 VDC. It shall have a standby current draw of 100mA +/-20 mA and a maximum current draw of 1.7 A. The transceiver shall be mounted inside the generator control panel cabinet either with an optional magnet mount or bolted to the housing via PCB stand-offs. The antenna shall be magnet mounted to the best available ground plane and be compatible with the transceiver in all respects.

An existing contract is in place to supply the required cellular communication service necessary for the system to function as prescribed. This contract is with Cummins-Southern Plains Power to supply the required service.

1. **Warranty.** The dialer shall be covered by a two (2) year warranty covering parts and labor after initial start-up.

2. **Monitored Items.** Items to be monitored by the dialer.

   - High Water Alarm
   - Engine Alarm (Any engine malfunction or fuel indication through one input to dialer)
• Moisture Sensor Alarm (One input to dialer through dry contacts at each pump)
• Over-Temp Alarm (One input to dialer through dry contacts at each pump)
• Building Intrusion (One input to dialer from Alarm Console-any intrusion point)
• Fire Alarm (One input to dialer from Alarm Console-heat or smoke detector)

K. Combination Fire/Security Control System Alarm. Replace the existing alarm console and keypad with an updated system to be approved by the State. Also replace all magnetic contacts within 4 ft. proximity of the floor. The main console and keypad shall be U.L. listed for commercial applications. The console shall have a minimum of eight (8) two wire supervised class “B” zones with programming capabilities for intrusion or heat/smoke detection. The console unit shall operate on 120VAC primary to a plug-in or permanently wired transformer with 18 VAC, 35VA min. secondary. The on-board power supply shall be fully regulated and supply a 13.8 volts DC float charging circuit to charge an on-board rechargeable stand-by battery. The stand-by battery shall be a 12VDC, 6AH min. rechargeable lead-acid type (Gel-cell). The power supply shall have reverse polarity protection on the battery inputs and fused outputs for keypad power, auxiliary output and fire output. The console cabinet shall be steel and where possible is to be mounted in the motor control center. The keypad console shall be mounted near the main entry door for convenient arming and disarming. The system shall provide two (2) dry contact outputs to the Remote Dialer System to annunciate an intrusion alarm or heat/smoke detector alarm. The control board shall be of the low current drain design, have a watchdog microprocessor monitoring circuit and a multistage lightning/transient protection system. It shall provide auxiliary power outputs to operate an audible alarm and passive infrared detector. The control board shall have low battery detection monitoring and automatic shutdown if voltage falls below the operating range. Items to be monitored by the system are as follows:

• Entry/exit door – (magnetic contacts)
• Roll-up door – (magnetic contacts)
• Smoke detection – (photoelectronic type)
• Heat detection – (200°F. Rate-of-Rise type heat detector)

All wiring to sensors and contacts shall be run in RMC.

1. Accessories. The above described system shall utilize the following industrial grade accessories:

• Magnetic Contacts. (Replace all magnetic Contacts within 4ft. of the floor.) Industrial wide gap (3") contacts housed in anodized aluminum. Switch contacts to be rhodium plated and hermetically sealed to eliminate corrosion. Complete with 3’ – 0 Stainless Steel armored cable. All contacts shall be surface mount, UL Listed.
• Heat Detector. (Check for operation. Do not replace if working) Shall be a 200° Rate-of-Rise type featuring a pneumatic rate-of-rise element which responds to a rapid rise in temperature by expansion of air within the sealed chamber faster than it can escape through a calibrated vent. This increase in pressure shall cause the electrical contact to close the circuit. The unit shall provide visual confirmation that the temperature element has operated and can be tested for proper operation. The heat detector shall be electronically supervised with battery back-up at the console, DC powered and U.L. Listed.

• Photoelectronic Smoke Detector. (Check for operation. Do not replace if working) Shall be area type, two wire, DC powered, U.L. Listed and operate on the light scattering concept. The unit shall contain an infrared LED light source and a light sensing photodiode positioned such that when smoke particles enter the sensing area, light from the LED reflects onto the photodiode. When the proper amount of reflected light reaches the sensitivity setting, the smoke sampling rate shall increase to twice normal and shall activate the alarm after verification by three (3) successive smoke sensings above the sensitivity setting. The detector shall be capable of latching or non-latching alarm functions and be non-polar. It shall also provide for field sensitivity measurement and easily operated functional field test. The detector shall have a hinged cover and include a concealed tamper-resistant latch and insect cover.

• Audible Alarm. (Check audible alarm for operation and replace if faulty.) Shall be a U.L. Listed, armored, self-contained siren combined in one unit with built-in tamper switch and operate on 12V DC. The unit shall be suitable for exterior use, manufactured from weather resistant materials. The alarm shall be wired for a steady tone delivering a minimum of 105 db/10 feet.

4. Inspection and Tests. Work under this item shall be done in such a manner that when complete it shall constitute a complete operational automatic pumping station. Make the pertinent installations as shown on the original plans. Prior to testing the pumps and motors, pump out the sump and clean the sump of all debris and sediment.

After completion of the installation in every detail, the automatic pumping station shall be subjected to functional tests. The tests shall be initiated within 15 days after completion of the installation. The tests may be made during a rainfall of sufficient magnitude, if possible, to allow the unit to function as designed. The test shall be repeated as many times as necessary to secure a properly tested working unit. The Contractor shall be responsible for making any changes and assume all costs for new equipment that does not meet specifications or operational requirements.

After the above described tests have been completed and prior to final acceptance, provide to the Engineer certificates from the respective manufacturers, guaranteeing all new equipment against defects in material and workmanship for a period of one year dating from the date of the acceptance. Where applicable, furnish to the Engineer certified statements from the manufacturers or their authorized representatives that the installation has been thoroughly inspected by them and that it is in accordance with manufacturer’s design.
Final inspection and acceptance will occur upon completion of all work required under this contract. The final inspection will be conducted on a walk-through basis. The final inspection will be conducted by State District personnel and/or State authorized representatives in the presence of the Contractor or appointed representative of the Contractor. Any and all defects due to quality of workmanship or materials, and/or not in accordance with the plans and submittal will be corrected at the expense of the Contractor. Provide a minimum 7-day notice to the Engineer to arrange the inspection, which will take place during working hours Monday through Friday.

5. **Measurement.** The operational storm water pump station repairs of the building, electrical system, motor control center, pumps, trash rake, and generator, satisfactorily completed and tested in accordance with this specification and the original plans and specifications to repair the existing automatic pumping station will be measured as a complete unit by the lump sum.

6. **Payment.** The work performed and materials furnished as prescribed by this item, measured as provided under “Measurement” will be paid for at the lump sum price bid for the item, “Storm Water Pumping Station Repairs”, at the location specified. Lump sum bid price is full compensation for furnishing and installing all necessary items to form a fully operational automatic pumping station and all equipment required by this item including building, generator, pumps, trash rake, sensors, controls, switchgear, electrical systems, and for all other materials, labor, tools, equipment, accessories and incidentals necessary to complete the work. All costs associated with dewatering, electrical service and testing will be subsidiary to this item.