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# **ELECTRICAL SPECIFICATIONS**

**FOR**

## **DIESEL GENERATOR TANK REPLACEMENT**

**at**

### **ORIENT ROAD JAIL**

1201 Orient Rd, Tampa, FL 33619

**September 30, 2020**

**Owners:**



**Prepared by:**



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**For**

**Consulting Engineering Associates**

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**SPECIFICATIONS**

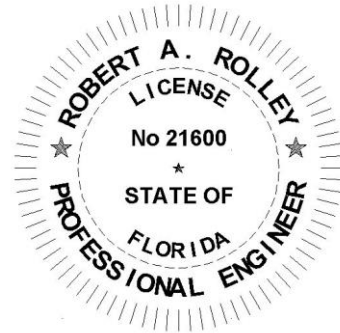
DIVISION 26 – ELECTRICAL

Section	260500	Common Work Results for Electrical	5 pages
Section	260503	Basic Materials and Methods	6 pages
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Section	264100	Facility Lightning Protection	4 pages

END OF SECTION

**Electrical Engineer of Record:**

This item has been electronically signed and sealed by Robert A. Rolley, P.E. on the date included in the Certificate using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copy.



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SECTION 260500 - GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Refer to other sections of these specifications for related work, which is not work of this section.
  - 1. Section 260503 - Basic Materials and Methods
  - 2. Section 263213 - Generator Fuel Storage System
  - 3. Section 264100 - Lightning Protection System

1.2 CODES

- A. Work herein shall conform to all applicable laws, ordinances, and to regulations of the local utility companies. Work shall be in accordance with the latest applicable requirements of:
  - 1. National Fire Protection Association (Fire Code)
  - 2. National Electrical Code - 2014
  - 3. Underwriter's Laboratories, Inc.
  - 4. Florida Building Code - 2017 (6<sup>th</sup> Edition)
  - 5. Local City of Tampa ordinances or codes
  - 6. Florida Fire Prevention Code - 2017 (6<sup>th</sup> Edition)

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Provide only materials that are new, and of the type and quality specified. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.

1.4 SUBSTITUTIONS AND SUBMITTALS

- A. One manufacturer shall be selected for any specific classification of material, equipment or systems (i.e. switchgear, panelboards, transformers, etc.) shall be manufactured by one manufacturer. If more than one manufacturer is submitted, the Engineer shall select one at his discretion.
- B. Submittals for substitutions of electrical equipment or materials shall be made at least ten (10) days prior to the bid date. Prebid substitutions to be made in writing and properly identified. Such substitutions will be identified in an addendum, if acceptable.
- C. Shop drawings shall be reviewed and stamped by contractor, with all items identified and all technical data included. All shop drawings shall be submitted at one time.
- D. The review of shop drawings is a general review subject to the contract documents, and verification of all measurements at the job. Review does not relieve the contractor from the responsibility of shop drawing errors. The contractor shall carefully check and correct all shop drawings prior to

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submission for review. Each shop drawing submittal shall bear the stamp and signature of the contractor, indicating he has reviewed and corrected all shop drawings.

- E. Product data: Within 35 calendar days after the Contractor has received the Owner's notice to proceed, submit:
  - 1. Materials list of items proposed to be provided under this Section.
  - 2. Manufacturer's specifications and other data needed to provide compliance with the specified requirements;
  - 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.

#### 1.5 SHOP DRAWINGS

- A. Shop drawings are required for the following:
  - 1. Fuel Storage Tanks and Accessories
  - 2. Fuel Polishing System
  - 3. Liquid Level Management and Leak Detection System
  - 4. Lightning Protection System

#### 1.6 HANDLING OF MATERIALS

- A. Properly handle, house and protect, from damage and the weather, all materials, equipment and apparatus furnished under this section of the specifications.
- B. Equipment damaged in the course of handling, installation or test shall be replaced or repaired to the satisfaction of the Engineer, without any additional charge.

#### 1.7 EXAMINATION OF SITE

- A. Each bidder shall visit the site of the project to acquaint himself with the difficulties which may attend the execution of work as shown on the drawings and as specified herein. The submission of the Bid proposal shall be constructed as evidence that such a visit and investigation has been made. Claims for labor, equipment or materials required for difficulties encountered shall not be considered.
- B. Where exact locations are required for conduit entries, request shop drawings, equipment location drawings, foundation drawings, and any other data required to locate the concealed conduit before the floor slab is poured.

#### 1.8 COORDINATION OF THE WORK

- A. Examine civil and plumbing drawings for location of equipment to be installed under this section. The contractor shall be responsible for having suitable openings, blockouts and chases left open until equipment has been properly installed.

#### 1.9 RECORD DRAWINGS

- A. Provide a set of prints on which actual installation is shown. Any variations from the contract drawings shall be clearly and completely indicated as the work progresses.
- B. At the completion of the work, prepare a new set of record drawings in hard copy and electronic format (AutoCAD), of the work as actually noted on the marked-up prints, including the DIMENSIONED location of all underground conduit.

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1.10 ELECTRICAL COORDINATION

- A. Coordinate with all other trades to avoid interferences and conditions which will not allow the installation of equipment, piping, etc., as indicated. It shall be the total responsibility of the various contractors to accomplish these installations without extra charges. If, in the opinion of the combined trades, an installation cannot be made as shown, the Engineer shall be notified before installation. If interferences are allowed to develop, the Engineer shall decide which equipment must be moved, regardless of which was installed first.
- B. Provide power wiring, conduit and connections to all electrically operated equipment and provide disconnecting means, unless specifically indicated otherwise, or furnished as part of factory packaged equipment.
- C. Contractor shall check that motors and equipment have proper voltage to operate on this system and that each motor has thermal overload protection, properly sized to nameplate data.
- D. Contractor shall verify exact equipment locations with final civil and plumbing drawings. No extra compensation will be granted for reasonable adjustments.

1.11 ELECTRICAL TEMPORARY FACILITIES

- A. Provide 3-wire grounded power system for construction power.
- B. Provide lighting for all work areas to levels required by OSHA.
- C. Provide double duplex receptacles and 220V outlets in all work areas to allow maximum 50' extension cord to reach any location in building. Extension cords and supplementary lighting for finishing shall be provided by each trade.
- D. Power wiring, disconnect switches, and connections for major construction equipment and machines, such as hoists, crane, belt loader, etc., shall be the responsibility of the contractor, including moving of these services during course of construction.

1.12 SYMBOLS

- A. Symbols for outlets and equipment are scheduled on the plans. Some symbols may not be used, others may not be scheduled.
- B. The contractor shall be responsible for request for clarification of unclear or unscheduled symbols prior to bid.

1.13 ELECTRICAL IDENTIFICATION

- A. Provide typewritten directory in each branch circuit panel and laminated engraved nameplate on exterior trim. Directory shall be in two columns with odd on left and even on right, to match numbers on breakers. Directories shall indicate the specific room and load served.
- B. Nameplates:
  - 1. Engraved three-layer laminated phenolic plastic, white letters on black background.
  - 2. Locations:
    - a. Each control equipment enclosure.
    - b. Panelboards

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3. Letter Size:
    - a. Use 1/8 inch letters for identifying individual equipment and loads.
    - b. Use 1/4 inch letters for identifying grouped equipment and loads.
  - C. Wire and Cable Markers:
    1. Description: Cloth tape or tubing type wire markers.
    2. Locations: Each conductor at panelboard gutters, pull boxes and junction boxes, and each load connection.
    3. Identification:
      - a. Power Circuits: Branch circuit or feeder number indicated on Drawings.
      - b. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on Drawings.
  - D. Conduit Markers:
    1. Underground conduit routings shall be marked utilizing magnetic marker tape set atop of the entire conduit run.
      - a. Underground-Type Plastic Line Marker: Manufacturer's standard detectable permanent, bright colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide by 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried cable. Locate tape 12 inches above top of conduit.
- 1.14 EXCAVATION
- A. Provide excavation, backfill and compaction in conformance with other divisions of the specification.
- 1.15 BASIS FOR WIRING DESIGN
- A. The drawings and specifications describe specific sizes of breakers, conduits, conductors, motor starters, and other electrical equipment. These sizes are based on specific items of power-consuming equipment, i.e., heaters, motors, compressors, pumps, etc. Wherever the contractor provides power-consuming equipment which differs from drawings and specifications, electrical equipment for such installation shall be changed to proper sizes to match at no additional expense to the owner.
- 1.16 MAINTENANCE MANUAL
- A. Complete operating and maintenance manuals covering all electrical equipment and systems shall be provided. Manufacturer's maintenance instructions and shop drawing shall be assembled and bound for use by operating personnel. Maintenance manuals shall include the following:
    1. Copy of the approved Record Documents for this portion of the work
    2. Copy of all circuit directories
    3. Copies of all warranties and guarantees
    4. Copies of all operating and maintenance manuals for equipment supplied
    5. Approved set of shop drawings
    6. Final commissioning reports

PART 2 - PRODUCTS (NOT USED)



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PART 3 - EXECUTION

3.1 LOCKOUT/TAGOUT

- A. Lockout/Tagout procedures shall be performed in conformance with the latest applicable edition of OSHA Standard 1-7.3-29CFR 1910.47 and NFPA 70E.

3.2 CONSTRUCTION CLOSEOUT

- A. As-Built Riser Diagrams
  - 1. An as-built copy of the power and control riser diagrams.
  - 2. Operation and Maintenance Manuals
  - 3. Complete operating and maintenance manuals covering all electrical equipment and systems shall be provided. Manufacturer's maintenance instructions and shop drawings shall be assembled and bound for use by operating personnel.
- B. Operation and Maintenance Training
  - 1. Time shall be devoted to train Owner employees in the proper operation and maintenance of each category of major electrical equipment. Training shall be performed by qualified instructors and shall be included in the contract.
- C. Testing
  - 1. All operating equipment furnished under this contract shall be demonstrated to confirm compliance with contract documents.
  - 2. Contractor shall submit documentation of testing results to the Engineer.

END OF SECTION 260500

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SECTION 260503 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Refer to other divisions and sections of these specifications for related work, which is not work of this section.
- C. Related sections:
  - 1. Section 260500 - General Provisions for Electrical Work

1.2 CATALOG NUMBERS

- A. Catalog numbers indicated with equipment, devices and components are for convenience only. Errors or obsolescence shall not relieve the furnishing of items, which meet the technical description given in specifications noted or required by function designated.

1.3 STANDARDS AND SYMBOLS

- A. Equipment and devices to be manufactured to the General Requirements and Specific Requirements where indicated, of NEMA, ANSI and UL.

PART 2 - MATERIALS

2.1 RACEWAYS

- A. Steel raceway shall be heavy-wall, threaded, rigid steel, or EMT, either hot-spray, hot-dipped, or electro-galvanized, as required, and bear the UL label.
- B. Flexible conduit to be galvanized steel or galvanized steel with watertight jacket. Fittings used with jacketed conduit to be made specifically for that use with grounding sleeve and jacket seal. Aluminum flexible conduit shall not be used.
- C. EMT electrical metallic tubing shall be steel, zinc coated inside and out. EMT fittings, set-screw type, shall be all steel type. Sizes 1-1/2" and larger shall have insulating throat.
- D. PVC conduit to be Schedule 40 for direct burial and UL labeled as electrical raceway. Manufactured couplings and fittings to have UL label.
- E. Bushings shall have metal threads and body with locked-in insulating ring in sizes above 1". 1" and smaller may be all steel or all plastic.

2.2 BOXES

- A. Surface mounted boxes in exterior and interior locations or where otherwise shown shall be of cast ferrous or aluminum alloys and shall have threaded hubs with minimum thread depth of 1/2". Box

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covers shall be galvanized steel, chrome plated steel and cast aluminum. Provide gaskets for outdoor locations. No-hub boxes are not acceptable.

- B. General outlet boxes shall be galvanized steel of unit construction, sized for NEC wire count and conduit entrances. Field sectional or gangable boxes shall not be used.
- C. Junction boxes shall be mounted no more than 6 feet above the finished ceiling.

## 2.3 WIRE AND CABLE

- A. Conductors for building wire and cable and secondary service cable shall have 600 volt insulation, unless specifically indicated or approved otherwise.
- B. Control and systems wire operating at nominal 120 volts to ground or less shall use 300 volt insulation or as otherwise approved for the system.
- C. Branch circuit wire shall be type THHN/THWN insulation. Service and panel feeders shall have type THHN/THWN insulation, unless noted otherwise.
- D. Wire sizes are AWG copper. Aluminum conductors shall not be acceptable.

## 2.4 BRANCH CIRCUIT PANELS

- A. Panelboards shall be bolt-on connection type with the following features:
  - 1. Rating for the voltage and current imposed.
  - 2. 4" wiring gutters and minimum width of 20".
  - 3. Consequent phasing of bus and breaker connection with odd numbers on left, even on right.
  - 4. Separate neutral and equipment ground buses.
  - 5. Hinged and lockable door.
  - 6. Code gauge galvanized steel enclosure with baked enamel finish.
  - 7. Short circuit rating for current imposed.
  - 8. Where space is indicated, space shall be bussed for future breakers.
  - 9. Branch connectors, mounting brackets and other hardware shall be provided for future breakers.
  - 10. 98% copper bus bars (phases, neutral & ground busses).
  - 11. Individually mounted main breakers.
- B. Circuit breakers shall be quick make and break, thermal-magnetic trip-free with temperature compensation; 2 and 3 pole breakers shall have internal common trip. Minimum 1" wide with separate bus connection for each pole.
- C. Main breakers, where applicable, shall be individually mounted within panelboards.

## 2.5 GROUND RODS

- A. Ground rods shall be 3/4 inch diam., 10 feet long sectional copperweld steel. Obtain 5-OHMS max. resistance as read with a ground reading megger using two reference rods. If 5-OHMS cannot be attained, drive additional sections until 5-OHMS has been obtained.

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2.6 ACCEPTABLE MANUFACTURERS

- A. The following manufacturers are acceptable for materials. Catalog numbers set the quality range for all manufacturers indicated:
  - 1. Heavy wall steel conduit and EMT - U.S. Manufacturers.
  - 2. Plastic PVC - Carlon.
  - 3. Fittings - Appleton, Adalet, Killark.
  - 4. Connectors, couplings, locknuts - Steel City, T&B, Appleton, Crouse-Hinds, Gedney, Racor.
  - 5. Bushings - O.Z. Co. Type "B" or "BBT", Gedney.
  - 6. Expansion fittings - O.Z. Co., Appleton.
  - 7. Wire - U.S. Manufacturers
  - 8. Panels - Square D, Siemens, General Electric.
  - 9. Outlet Boxes - Steel City GW135/235 and 54151, Racor 695-696 and 191.
  - 10. Cabinets - Keystone, Columbia, Boss, Square D, Hoffman.

PART 3 - EXECUTION OF WORK

3.1 DIRECTORIES AND NAMEPLATES

- A. Provide typewritten directory in each branch circuit panel and nameplate on exterior trim. Directory shall be in 2 columns with odd on left and even on right to match on breakers.
- B. Distribution panels and individual switches on this panel, safety switches, starters, transformers, control devices and wall switches used to control motors shall have legend plate on laminated rigid engraved plastic. A list of legends shall be provided by mechanical contractor for devices furnished to the electrical contractor.

3.2 MOUNTING HARDWARE

- A. Fasteners shall be designed for specific surface on which they are used. Mounting hardware for exterior use shall be galvanized, plated or brass. Nails shall not be used for mounting electrical outlet boxes or devices. Power drive, or "shot" anchors, shall be threaded type to allow removal of equipment.

3.3 AS-BUILT DRAWINGS

- A. Contractor shall install and circuit all electrical work as indicated on drawings unless specific building construction requires the change or rerouting of his work. Contractor shall keep a record of the location of all concealed work, including the underground utility lines, and upon completion of the job, shall supply as-built drawings in hard copy and electronic format (AutoCAD).

3.4 RACEWAYS

- A. Raceway below slab-on-grade shall be same as underground. Minimum size of conduit shall be 3/4". Provide heavy wall rigid galvanized steel conduit for all exposed exterior locations.
- B. Concealed raceway in walls or ceiling spaces shall be galvanized steel, EMT or aluminum. Exposed and concealed raceways shall be square or parallel with architectural elements. Groups of conduit shall be mounted on common supports at maximum 8' centers. Raceway shall be secured with manufactured clamps, straps or spring steel fasteners. Steel tie wires shall not be used.

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- C. Underground conduit used for building power and systems wiring shall be heavy-wall, hot-spray or hot-dipped galvanized rigid steel, or Schedule 40 PVC with manufactured couplings and fittings, all with UL label. All 90° bends shall be heavy-wall, hot-dipped galvanized steel.
- D. Underground conduit, which extends outside the structure shall be minimum 24" below finished grade. Conduit within the perimeter of the structure shall be minimum 6" below bottom of slab, unless otherwise indicated.
- E. Schedule 40 PVC, non-metallic conduit shall rise above grade, through slab or into wall cavity with a heavy-wall, hot dipped galvanized steel elbow and riser. Schedule 40 PVC, non-metallic conduit shall not be utilized in above grade locations.
- F. Connections to motors and vibrating equipment shall be made with flexible conduit and connectors. Where liquids are present, (i.e., equipment rooms, kitchens, outdoors, etc.) a watertight jacketed flexible conduit shall be used.
- G. EMT fittings for overhead and other concealed work shall be all-steel set-screw type, with insulated throat in fitting 1-1/2 inch and larger.
- H. Bushings shall have metal threads with locked-in insulating ring, in sizes above 1". Plastic bushings will not be accepted.
- I. Conduit stubs and panel terminations shall be closed during construction with bushings and pennies, or manufactured devices. Tape will not be accepted.
- J. Raceways for homeruns shall be minimum 3/4 inch between panel and first outlet. All systems raceway shall be 3/4 inch minimum.
- K. Provide sleeves where conduit passes through concrete structural elements or slabs above grade. Provide O.Z. Gedney fire seals on all required fire rated conduit penetrations.
- L. Provide galvanized pull wire or nylon cord in empty conduit. String will not be accepted. Use maximum of 4-#12 THHN/THWN in 1/2" raceway.
- M. Where galvanized steel conduit is installed in direct contact with earth it shall be coated with two coatings of approved Bitumastic paint prior to installation.

### 3.5 OUTLETS

- A. Outlets, stubs, and junction boxes required to match components or equipment shall be installed with close correlation with supplier layout and connection diagrams. Drawing locations and indications are approximate only and shall not be used for dimension purposes unless dimensions are shown. Extra charges for relocation of outlets due to lack of coordination will not be accepted.
- B. Provide cast ferrous or aluminum alloy type boxes, with deep threaded internal or external hubs for surface mounted switch, receptacle, or device outlets. No-hub boxes are not acceptable.
- C. General outlet boxes shall be galvanized steel of unit construction sized for NEC wire count and conduit entrances. Field sectional or gangable boxes shall not be used.
- D. Boxes other than wall or surface mount shall be supported and secured as required in NEC 314-23.

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3.6 WIRE

- A. Circuit and feeder sizes indicated or specified shall not be decreased. Outlets shall be connected to circuits as shown. Unavoidable changes to be made only after Engineer approval.
- B. Color code branch circuit wiring as indicated:

	<u>120/208V</u>
Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
- C. Use same color for same phase throughout. Phase rotation shall be same in all panels. Identify large cables with colored tape. Where two conductors from same phase occur in same conduit, provide additional neutral. Second neutral shall have tracer or gray jacket. Minimum branch circuit wire shall be #12 AWG.
- D. Conductor sizes shown are AWG copper. All conductors shall be "stranded".
- E. Wire counts indicated in system conduit shows general scheme only. Actual count and raceway size shall be provided to accommodate shop drawings for the system to be installed.

3.7 CONNECTIONS

- A. Splices in branch circuit conductors shall be made with pressure connectors using manufacturer recommended tools, or twist type spring steel pressure type connectors. Splices shall be adequately insulated with connectors, insulators, or plastic electrical tape. Standard wire nuts shall be used only for stranded fixture wire.
- B. Copper cables shall be terminated with copper or bronze pressure connectors or lugs, except where connectors are furnished as integral parts or panels, switches, or circuit breakers and have copper ratings. Cable to bus connections shall be made with bronze bolts and washers.
- C. Junction box and duct splices and joints shall be made with bronze pressure lugs. Joints shall be worked smooth and insulated with plastic electrical tape.
- D. Splices within feeder conductors are not acceptable. Splices below grade are not acceptable.

3.8 GROUNDING

- A. Electrical system shall comply with NEC requirements, and power system shall be completely and effectively grounded.
- B. Provide continuous green grounding conductor from panel grounding bus in all raceways.

3.9 BRANCH CIRCUIT PANELS

- A. Mount panels in or on walls with top of panel 6'-0" above finished floor, unless dimensioned or indicated otherwise.

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- B. Risers shall be provided for future wiring. One 3/4" riser for each six, 1-pole spare breaker or spaces. Risers shall stub into accessible ceiling space above, and on upper floors, at least one stub into ceiling space below.

3.10 EQUIPMENT AND APPLIANCES

- A. Contractor shall verify exact equipment locations with associated shop drawings. No extra compensation will be granted for reasonable adjustments to entry locations as required.
- B. Provide power wiring, conduit and connections to all electrically operated equipment and provide disconnecting means, unless specifically indicated otherwise or furnished as part of factory packaged equipment.
- C. Contractor shall check all equipment to insure they are of the proper voltage to operate on this system and that each motor has a thermal overload protection, properly sized to nameplate data.

3.11 TESTING AND INSPECTION

- A. Provide personnel and equipment, make required tests and secure required approvals, from the Engineer, and governmental agencies having jurisdiction.
- B. Make written notice to the Engineer, 48 hours in advance of each of the following stages of construction:
  - 1. In the underground condition prior to backfill;
  - 2. When all rough-in is complete, but not covered;
  - 3. At completion of the work of this section.
- C. In the Engineer's presence:
  - 1. Test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner.

3.12 PROJECT COMPLETION

- A. Upon completion of the work, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil, and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.
- B. Thoroughly indoctrinate the Owner's operation and maintenance personnel with the operations and maintenance manual required to be submitted.

END OF SECTION 260503



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SECTION 263213 – GENERATOR FUEL STORAGE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to work of this section.
- B. Refer to other sections of these specifications for related work, which is not work of this section.
- C. Related Section:
  - 1. Section 260500 – General Provisions for Electrical Work.
  - 2. Section 260503 – Basic Materials and Methods.

1.2 SCOPE OF THE WORK

- A. The contractor shall provide a generator fuel storage system consisting of the following:
  - 1. Two (2) 10,000 gallon, double steel walled, above ground, diesel fuel storage tanks. The (2) storage tanks shall be equipped with a dual tank, fuel polishing system.
  - 2. To ensure the proper installation and operation, the fuel system supplier shall provide on-site, factory commissioning of the fuel system. Refer to paragraph 3.1.

1.3 INTENT OF SPECIFICATIONS

- A. All materials, equipment, and parts comprising the unit specified herein shall be new and unused, of current manufacture and of highest grade.
- B. The fuel tanks and all major items of auxiliary equipment shall be manufactured in the U.S. by manufacturers currently engaged in the production of such equipment. The unit shall be shipped to the jobsite by an authorized dealer having a parts and service facility within a 100 mile radius of the job site.
- C. The generator fuel system shall be furnished complete with all materials, apparatus, equipment, components and accessories to provide a complete and operable fuel storage system.

1.4 SPECIFICATIONS AND DRAWINGS

- A. The bidders shall furnish information showing manufacturers' model numbers, dimensions and weights for the fuel tanks and polishing system, and major auxiliary equipment. Proposed deviations from the specifications shall be stated in the bid. The successful bidder shall submit copies of pertinent drawings and schematic diagrams for approval and shall include the following:
  - 1. Fuel tanks and polishing system including plans and elevations.
  - 2. Fuel connection points.
  - 3. Actual electrical diagrams including schematic diagrams, and interconnection wiring diagrams for all equipment to be approved.
  - 4. Legends for all devices on all diagrams.

1.5 FACTORY TESTS

- A. A certified prototype test certificate shall be furnished at the time of bid, and a certified prototype test supported seal shall be furnished on the fuel tanks shipped to the job site.

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PART 2 - MATERIALS

2.1 PROTECTED/SECONDARILY CONTAINED ABOVEGROUND FUEL STORAGE TANK

- A. Provide (2) 10,000-gallon aboveground, fuel tank systems approved for listing under U.L. Standard 2085, Aboveground Tanks, Protected Type, Secondary Containment with Vehicle Impact and Projectile Resistance. Unit must comply with all provisions of U.F.C. 79-7, Appendix A-II-F. The tanks and enclosures shall be a completed unit at the factory (shop fabricated). The tank system shall be approved for Phase I and Phase II Vapor Recovery by the California Air Resource Board for gasoline and methanol.
  - 1. Basis of Design: "Fireguard", 126 inch diameter, cylindrical. Contact: Modern Welding Company of Florida, Attn: Kurt Almansberger at (407) 843-1270.
    - a. Acceptable alternates:
      - 1) Convault Florida, Style "SF" cylindrical. (Prior approval required.)
      - 2) Phoenix Products #EV-10,000. (Prior approval required.)
      - 3) Alternate Manufacturers. (Prior approved required.)
- B. Both inner and outer tanks shall be built per U.L. Standard 142, and meet the requirements of N.F.P.A. 30. Welds shall be continuous on all sides, conforming with the American Welding Society Standard for continuous weld. The tank shall be warranted for a minimum of 30 years by the manufacturer.
- C. Fuel tanks shall have double, steel walled construction and concrete filled interstitial spaces, as manufactured by "Fireguard", are acceptable. All other manufacturers shall submit for prior approval.
- D. The tank system shall be designed and tested to provide 2-hour fire protection as per U.L. 2085 2-hour furnace fire test and 2-hour simulated pool fire test.
- E. The tank system shall include a U.L. listed, 6 inch diameter, 7 gallon spill/overflow container manufactured as an integral part of the tank, surrounding the fill pipe, and protected by 2 hour fire rating of the enclosure. The spill/overflow container shall include a stick port and normally closed valve to release spilled product into the main tank. Exterior steel shall be anti-oxidant powder coated to inhibit rust.
- F. Overfill protection shall be provided by the following methods: a) direct reading level gauge visible from fill pipe access; b) valve rated for pressurized delivery located within fill pipe to close automatically at 95 percent full level; c) electronic high fuel and low level probes for interconnection with liquid level management and leak detection control panel.
- G. The (2) tanks shall be interconnected by an overhead, 2 inch diameter siphon bar to ensure equal fuel levels in both tanks.
- H. Provide No. 2 diesel fuel sufficient to meet permitting agency testing requirements only. Initial tank fill after permitting agency acceptance is to be provided by the County.
- I. Each tank shall be equipped for ground level (remote) fill with a spill container:
  - 1. The piping shall be 3 inches and will include a 3 inch vertical check valve (Morrison 158a or equal) and a 3 inch ball valve (Morrison 691 or equal). The end connector shall be an OPW 334b camlock adapter with cap, or approved equal.
  - 2. The spill container box shall include an integral hinged lid. The box shall be made of aluminum and shall contain a minimum of 10 gallons of product. The box shall be mounted directly under the connection for the fill hose, and attached to the fuel tank in a manner able to withstand a load of 200 pounds. A hand pump (Fillrite Model 150 or equal) shall be

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attached to the spill box and piped to pump any product from the spill box to the tank. A 3/4 inch vertical check valve (Morrison 158a or equal) shall be installed in the hand pump piping to prevent back flow.

- J. The system installation shall be inspected and approved by the system supplier or its certified contractor. The system supplier shall submit a comprehensive checklist of quality and safety items critical to the system and verify that the installation has been in accordance with these standards and applicable fire and environmental codes.
- K. Provide "hurricane hold downs" supported from anchors imbedded within the concrete pad.
- L. Signage: Tanks shall be marked on all sides as per state and local codes. Signs will be recessed in concrete exterior to insure against damage during off-loading, refilling or general functions.
- M. Venting: Tank system shall include a two inch atmospheric vent and emergency venting in accordance with NFPA 30.
- N. The tank system including accessories shall be installed in strict accordance with the manufacturer's recommendations and applicable fire and environmental codes. All federal, state and local permits shall be obtained by the contractor prior to installation.

2.2 DUAL TANK FUEL CLEANING AND RECIRCULATION CABINET

- A. Provide complete factory package fuel cleaning and circulation systems to process the fuel oil to remove accumulated water and debris from (2) 10,000 gallon fuel storage tanks.
- B. The system shall incorporate the following features.
  - 1. NEMA 4 bottom base cabinet with pump and motor.
  - 2. NEMA 4 controller.
  - 3. 11 gallons per minute circulation pump.
  - 4. 1 Phase pump motor starter.
  - 5. 1 HP, 120 Volt, 1 PH, 60 Hz motor.
  - 6. Pressure sensor-control.
  - 7. Control power to be 120/1/60.
  - 8. Electronic valve controls.
    - a. Terminal strips for each motorized ball valve.
    - b. (2) ball valves per tank.
      - 1) Supply
      - 2) Return
  - 9. Automatic programmable interval timer via touch screen control.
  - 10. Leak detection shutdown sensor within cabinet.
  - 11. Fuel purifier (separator); FP1000-F).
    - a. 100 Mesh WYE strainer.
    - b. 40 gpm.
    - c. 10 Micron heavy particle filter.
    - d. 3 Micron Beta 1000 particle filter.
  - 12. Inlet / Outlet shut off valves.
  - 13. Lockable controller door.
  - 14. Touch-screen tank selectors.
  - 15. Debris / water manual purge valve.
  - 16. Pump running lamp.
  - 17. Purge alarm lamp.
  - 18. Motorized brass, actuator ball valves with integral anti-condensate heaters, 120/1/60 for supply and return on each tank.

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- 19. Dual tank ball valve manifold.
- 20. Alarm outputs:
  - a. Pump failure
  - b. Purifier high water level
  - c. System high pressure
  - d. Fuel catch basin leak

C. Technical Support

- 1. Manufacturer shall provide technical support via toll free field support telephone number.
- 2. The entire fuel polishing system shall be commissioned and certified by the manufacturer.
- 3. The manufacturer shall supply third-party documentation for all products certifying that performance meets or exceeds EPA requirements.

D. Warranty

- 1. The manufacturer shall warranty parts and labor for five (5) years: That all systems meet specifications herein. All systems are free of defects when properly installed, and maintained by user.

E. Basis of Design:

- 1. RCI Technologies Model FRS-11-MTU-2. Contact: Liquid Automation, Attn: Jeff Smith at (770) 442-8855.

2.3 LIQUID LEVEL MANAGEMENT AND LEAK DETECTION SYSTEM

A. Provide in-tank level monitoring

- 1. The system shall utilize probes based on magnetostrictive technology to monitor the liquid level in the tank and employ a reservoir style in-tank and interstitial space leak detection sensors.

B. Remote Annunciator

- 1. The system shall be provided with a remote NEMA 4x rated annunciator, complete with strobe and high decibel audible horn. Horn can be silenced, but strobe will remain until alarm condition is cleared.

C. I/O Interface

- 1. Alarms
  - a. The tank monitoring system will be capable of audible and visual indication on all alarms.
    - 1) High liquid
    - 2) High – High liquid
    - 3) Leak alarm
  - b. The system will be capable of remotely annunciating all alarm conditions.
    - 1) The system will be capable of silencing all audible alarms.
    - 2) All visual alarm conditions must remain until alarm condition is removed.

D. Installation

- 1. The system shall be site programmable for specific tank specifications.
- 2. The system shall be capable of monitoring (2) main fuel tanks.
- 3. The system will offer numeric security code.

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E. Test Feature

1. The system will have a test button capable of testing:
  - a. RAM
  - b. PROM
  - c. Leak sensors
  - d. Gauging probes
  - e. Audible / visual
  - f. L.C.D. display
  - g. Internal electronic diagnostics
2. Test feature allows for sensor remote testing as per Third Party Certification.

F. System Capabilities

1. Controller shall have the following capabilities:
  - a. 20 oil tight tactile switches for alphanumeric programming
  - b. 4x40 L.C.D. LED backlit display
  - c. (3) L.E.D. indicators for alarm, fault and OK status
  - d. Battery back-up for programming memory
  - e. UL listed and installed per UL and NEC code for intrinsic safety
  - f. Intrinsically safe inputs
  - g. The controller will be equipped with a locking mechanism
  - h. The controller will have conduit knockouts
  - i. The controller will be wall mountable
  - j. All internal power will be supplied by off board switching regulated power supply
2. Gauging probes shall have the following features:
  - a. Wired utilizing Belden 8761 (OMNTEC EC-2)
  - b. Third Party Certified and acceptable for both AST and UST installations
  - c. Capable of being installed in 2 inch, 3 inch or 4 inch openings and must be field adjustable
  - d. Constructed of 316 grade stainless steel all welded construction
  - e. Supplied with cathodic boot, minimum of six inches in length
  - f. Striker plate protective end cap

G. Technical Support

1. Manufacturer shall provide technical support via toll free field support telephone number.
2. The entire liquid level management and leak detection system shall be commissioned and certified by the manufacturer.
3. The manufacturer shall supply third-party documentation for all products certifying that performance meets or exceeds EPA requirements.

H. Documentation

1. The manufacturer shall supply product documentation that addresses the following categories as additional support:
  - a. Installation instructions
  - b. System setup instructions
  - c. System operating instructions
  - d. Probe installation instructions
  - e. Product data sheet
  - f. Wiring diagrams which include the following:
    - 1) Identification of all devices and equipment terminals and all external connection terminal blocks
    - 2) All external wiring connections with approved wire colors and circuit designations

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- I. Warranty
  - 1. The manufacturer shall warranty parts and labor for five (5) years: The system meets specifications herein. The system is free of defects when properly installed, and maintained by user.
- J. System shall be OMNTEC Model OEL8000ii Series with MTG level probe, BX series leak sensors and remote annunciator.

PART 3 - EXECUTION

3.1 COMMISSIONING

- A. To ensure the proper installation and operation of the fuel storage system, the fuel storage system installer shall provide on-site commissioning documentation and training for the following:
  - 1. Fuel tanks and associated controls.
  - 2. Fuel polishing system and associated controls.
  - 3. Fuel and vent piping.
  - 4. Liquid level management and leak detection system.

3.2 START-UP AND INSTRUCTIONS

- A. On completion of the installation, the initial start-up shall be performed by a factory trained service representative of the fuel storage system supplier. At the time of start-up, operating instructions and maintenance procedures shall be thoroughly explained to building operating personnel. Two copies of operating and maintenance instruction books shall be supplied.
- B. A factory trained service representative shall perform all start-up tests.

3.3 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations.
- B. The contractor shall provide copies of the manufacturer's representative's certification in Operations and Maintenance Manuals.

3.4 WARRANTY AND TESTS

- A. Equipment furnished shall be guaranteed against defective parts of workmanship under terms of the manufacturer's and dealer's standard warranties. In no event shall it be for a period of less than five years from date of acceptance. Warranty to include full parts and labor during this period without cost to initial user.

END OF SECTION 263213

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SECTION 264100 - LIGHTNING PROTECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the General Requirements, apply to work of this section.
- B. Refer to other sections of these specifications for related work, which is not work of this section.
  - 1. Section 260500 - General Provisions for Electrical Work.
  - 2. Section 260503 - Basic Materials and Methods

1.2 SCOPE

- A. The work covered by this section of the specifications consists of furnishing all labor, materials and items of service required for the completion of a functional and unobtrusive lightning protection and grounding system as approved by the Engineer and in strict accordance with this section of the specifications.
- B. If any departure from these specifications or submittal drawings covered below are deemed necessary by the contractor, details of such departures and reasons therefore shall be submitted as soon as practicable to the Engineer for approval. No such departures shall be made without the prior written approval of the Engineer.
- C. The following specifications and standards of the latest issue form a part of this specification
  - 1. Underwriters' Laboratories Master Label Code 96A
  - 2. NFPA Code 780.

1.3 CATALOG NUMBERS

- A. Catalog numbers indicated with equipment, devices and lighting fixtures are for convenience only. Errors or obsolescence shall not relieve the furnishing of items, which meet the technical description given in specifications noted or required by function designated.

1.4 STANDARDS AND SYMBOLS

- A. Equipment and devices to be manufactured to the General Requirements and Specific Requirements where indicated, of NEMA, ANSI and UL.

1.5 QUALITY ASSURANCE

- A. The lightning protection system shall conform to the requirements of the Lightning Protection Institute and Underwriters' Laboratories, Inc. standards for lightning protection systems.
- B. The system to be furnished under this specification shall be the standard product of a manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest approved design. The equipment manufacturer shall also be a UL listed manufacturer. All materials specified for this work are manufactured by Harger Lightning Protection, Inc., Thompson Lightning Protection, Inc., Heary Brothers Lightning Protection, or approved equal. For approval of

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manufacturer other than specified, proposed material data, samples and installation drawings must be submitted for review not less than 10 days prior to bid.

1.6 SUBMITTALS

- A. Prebid substitutions for approval shall be made in writing and shall also contain samples of pertinent items involved. Samples are for comparison only and shall not become property of the Engineer.
- B. Complete shop drawings showing the type, size and locations of all equipment, grounds and cable routings, etc., shall be submitted to the Engineer for approval prior to start of work. Samples and pertinent catalog data shall be submitted to the Engineer for approval of shop drawings on request.

PART 2 - PRODUCTS

2.1 STANDARD

- A. All equipment used in this installation shall be UL approved and labeled in accordance with UL procedures, with each air terminal bearing an "A" label and all main conductors bearing a "B" label at 10'-0" intervals.
- B. All equipment shall be new, the product of a single manufacturer as outlined above, and of a design and construction to suit the application where it is used in accordance with accepted industry standards, NFPA 780 and UL code requirements.

2.2 EQUIPMENT

- A. All materials shall be copper, aluminum or bronze as indicated on the drawings. All materials shall be UL approved and labeled and of the size, weight, and construction for use on building in accordance with UL Code requirements for Class I structures and as per manufacturer's recommendations.
- B. Air terminal bases shall be of cast construction with bolted pressure cable connections and shall be securely mounted with stainless steel screws or bolts. Crimp type connectors are not acceptable. Bases shall have a minimum surface contact area of 8.5 square inches.
- C. Cable fasteners shall be of cast construction with pressure cable connectors, electrolytically compatible with the conductor and mounting surface and shall be spaced according to UL and NFPA Code requirements.
- D. Bonding devices, cable splicers and miscellaneous connectors shall be of cast bronze with bolt pressure connections to cable. Cast or stamped crimp fittings are not acceptable.
- E. All miscellaneous bolts, nuts and screws shall be brass, bronze or stainless steel. Crimp fittings are not acceptable. Stamped bronze materials are not acceptable.
- F. Equipment enclosures less than 3/16" thick shall be provided with individual air terminals bonded to the main coursing conductors.
- G. Equipment on ventilators, etc. shall be protected from corrosion in accordance with UL requirements.



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- H. All miscellaneous bolts, nuts and screws shall be stainless steel.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. The installation shall be accomplished by an experienced installer listed with Underwriters' Laboratories as qualified.
- B. All equipment shall be installed in a neat and workmanlike manner in the most inconspicuous place possible. Coursing and down conductors shall be routed as indicated on the drawings. Conductors shall be routed parallel and perpendicular to structural elements.
- C. Locate air terminals as required. Take care to insure that all points are within 2'-0" of outside building edge, outside corners and ridge ends, and that maximum spacing does not exceed 20'-0", and that minimum projection above object protected is 10".
- D. Maintain horizontal or downward coursing of main conductor and insure that all bends have at least an 8" radius and do not exceed 90'.
- E. Support all roof coursing conductors, down leads and bonding cables at 3'-0" on center maximum.
- F. Ground electrodes shall be installed within concrete handholes, in unpaved, accessible areas, but in no instance shall they be less than 1'-0" below grade and 2'-0" from foundation wall. Driven rods shall penetrate earth at least 10'-0". All down conductors shall be bonded to the electrodes utilizing exothermic welds.
- G. The electrical system, building steel, overhead metallic piping and floor slab rebars shall be bonded together. Maximum resistance not to exceed 1 ohms.
- H. Bond to all metal bodies of conductance on roof with main size conductors as shown and as required by UL codes. These bonds include, but are not limited to, exhaust fans, vents, handrails, metal screens and panels, HVAC units, hatches, skylights, cooling towers, flag poles, antennas, etc., or any large metal body subject to direct stroke or exceeds the height of adjacent air terminals.
- I. Bond to metal bodies of conductance located within 6'-0" of main conductor or other bonded object with approved secondary bonding conductor as shown and as required by UL codes. Such objects include, but are not limited to, flashings, metal coping caps, gravel guards, fascias, roof drains, down-spouts, interior ducts, machinery or piping, etc., or, in general, any isolated body at or below the roof subject to inductance and within 6'-0" of system.
- J. System shall be installed to insure proper code compliance and system certification. Any major variance shall entail resubmittal and new approval.

#### 3.2 COORDINATION

- A. The lightning protection installer shall work with other trades to insure a correct, neat and unobtrusive installation.
- B. It shall be the responsibility of the lightning protection installer to assure a sound grounding system.

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- C. The lightning protection installer shall coordinate all work with the fuel tank installer. All materials and installation shall be approved by the fuel tank installer.

END OF SECTION 264100