

## **Section 16010**

### **Basic Electrical Requirements**

#### **PART 1: General**

- 1.1 *Scope* – This scope covers the furnishing, installation, testing, adjusting and placing in operation all electrical equipment, devices, facilities, materials, and auxiliary items necessary for the complete and successful operation of all electrical equipment as herein described, shown on the plans, or deemed necessary for the completion of the electrical portion of the project. It is the intent of Sections 16010 -16950 to outline the electrical requirements of the Contract in order to provide the information necessary for the construction of a fully operational system as shown on the plans and as herein described. A comprehensive electrical scope of work is as follows:
  - 1.1.1 Power/Electrical System
  - 1.1.2 Lighting System
  - 1.1.3 Control System
  - 1.1.4 Instrumentation System
  - 1.1.5 Utility Work
  - 1.1.6 Connection of Electrically Powered Mechanical Equipment
  - 1.1.7 Temporary Construction Power
  - 1.1.8 All Incidentals Necessary for a Complete and Fully Operational Electrical System.
- 1.2 *Definitions* –
  - 1.2.1 *LED* – Light Emitting Diode
- 1.3 *Working Clearances* –
  - 1.3.1 Working clearances around equipment requiring electrical services shall be verified by Contractor to comply with Code requirements. Should there be apparent violations of clearances; the Contractor shall notify the Owner before proceeding with connection or placing of equipment.
  - 1.3.2 In the case of circuit breakers, safety switches and other equipment requiring wire and cable terminations, the Contractor shall ascertain that lug sizes and wiring gutters or space allowed for proper accommodation and termination of the wires and cables are adequate.
- 1.4 *Workmanship* – Workmanship under this Division shall be accomplished by persons skilled in the performance of the required task. All work shall be done in keeping with conventions of the trade. Work of this Division shall be closely coordinated with work of other trades to avoid conflict and interference. Equipment and conduits shall be installed in a neat and professional manner as determined by ECUA based on certifications of the trade and NFPA. Failure to do so shall result

in work being removed and reinstalled at no cost to ECUA. Conduits shall be square, level, parallel and perpendicular to each other and surrounding surfaces.

- 1.5 *Protection of Electrical Equipment* – Electrical equipment shall be protected from the weather, especially from water dripping or splashing upon it, at all times during shipment, storage and after installation. Follow Manufacturer’s written instructions for shipment and storage.
- 1.6 *Utilities* – The Contractor shall provide a fully operational electrical service as described in the plans. Coordinate with the utility company for the services and install the service in accordance with their requirements, regulations and recommendations. All utilities company fees to be paid by Contractor.
- 1.7 *Guarantee* –
  - 1.7.1 Contractor shall guarantee all lighting fixture drivers and LEDs for a period of five (5) years after the lift station is in service. Guarantee shall include material and labor for replacing drivers and LEDs or associated LED bar.
  - 1.7.2 The Contractor shall guarantee all other electrical systems, materials and workmanship to be free from defects for a period of at a minimum two (2) years from the date of final acceptance. The Contractor shall correct all defects arising within this period upon notification by the Owner, without additional compensation.
  - 1.7.3 It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the special and general provisions of the Contract.
- 1.8 *Temporary During Construction* – It shall be the responsibility of the Contractor to provide and maintain adequate temporary lighting at all times during construction, so that the various other trades can accomplish their work in a flawless manner. All utility installation costs and monthly bills shall be included as part of the responsibility.
- 1.9 *Material Standards* – Material shall be new and comply with standards of Underwriters' Laboratories, Inc., where standards have been established for the particular product and the various NEMA, ANSI, ASTM, IEEE, AEIC, IPCEA or other publications referenced.
- 1.10 *Test Equipment* – The Contractor shall provide all test equipment and supplies deemed necessary by the Owner or Engineer at no extra cost to the Owner. These supplies shall include but not be limited to the following: volt meters, amp meters, light meters, fuel, generator load banks, watt meters, harmonic distortion test equipment, thermal image camera, high pot test equipment, power quality analyzers, and oscilloscopes. Where conflict exists between specifications and plans, the most stringent requirement shall prevail unless directed otherwise in writing.

1.11 *References –*

1.11.1 See the following table for a list of related Codes and Standards:

ANSI/NFPA 70	National Electrical Code
ANSIC2	National Electrical Safety Code
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
NFPA 820	Standard for Fire Protection in Wastewater Treatment and Collection Facilities
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
IEEE	The Institute of Electrical and Electronics Engineers
IESNA	The Illuminating Engineering Society of North America
NETA	International Electrical Testing Association
UL	Underwriters' Laboratories

1.11.2 Recommended Standards for Water Works and Wastewater Facilities as published by Great Lakes – Upper Mississippi River Board of State Public Health and Environmental Managers.

1.12 *Submittal –*

1.12.1 Submit under provisions of the General Provisions.

1.12.1.1 The Contractor installing all Electrical work shall review and approve all electrical shop drawings prior to submittal to the Engineer for review. As part of the review, the installer shall certify the following:

1.12.1.1.1 I hereby certify that the equipment and devices shown and marked in this submittal are in compliance with the Contract drawing and specifications, can be installed in the allocated space, will be stored in accordance with the Manufacturer's recommendation, will be installed per NEC and ECUA standards, and is submitted for approval.

Certified by: \_\_\_\_\_ Date: \_\_\_\_\_

1.12.2 Submit shop drawings and product data grouped to include complete submittal of related systems, products, and accessories in a single submittal. All material not submitted for approval may or may not be accepted after installation. If not accepted, such material shall be replaced with material acceptable to ECUA at no additional cost. No electrical work may be performed until shop drawings are approved. Submit Shop Drawings on the Following Systems as Grouped Below:

1.12.2.1 *Power/Electrical System –*

1.12.2.1.1 Conduit and Conduit Fittings

1.12.2.1.2 Wire/Conductors

1.12.2.1.3 Pull Boxes

- 1.12.2.1.4 Control Panel Layouts
- 1.12.2.1.5 Support Racks Materials
- 1.12.2.1.6 Conduit Support Systems
- 1.12.2.1.7 Transformers
- 1.12.2.1.8 Surge Protection Devices
- 1.12.2.2 *Generator Equipment –*
  - 1.12.2.2.1 Generator
  - 1.12.2.2.2 Generator Enclosure
  - 1.12.2.2.3 Fuel System Tank & Piping
  - 1.12.2.2.4 Transfer Switches
- 1.12.2.3 *Lighting System –*
  - 1.12.2.3.1 All Light Fixtures
  - 1.12.2.3.2 Site Poles & Foundations
- 1.12.2.4 *Control System –*
  - 1.12.2.4.1 Control Panels
  - 1.12.2.4.2 Generator Receptacle
  - 1.12.2.4.3 Circuit Breakers
  - 1.12.2.4.4 Across-The-Line Starters
  - 1.12.2.4.5 Fuses
  - 1.12.2.4.6 Power Distribution Blocks
  - 1.12.2.4.7 Surge Protection Devices
  - 1.12.2.4.8 24VDC Power Supplies
  - 1.12.2.4.9 Batteries
  - 1.12.2.4.10 Converters
  - 1.12.2.4.11 PLC
  - 1.12.2.4.12 Software
  - 1.12.2.4.13 HMI

- 1.12.2.4.14 I/O Racks
- 1.12.2.4.15 Relays
- 1.12.2.4.16 Intrinsically Safe Barrier Relays
- 1.12.2.4.17 Seal Fail Relays
- 1.12.2.4.18 Pressure Transducers
- 1.12.2.4.19 Float Switches
- 1.12.2.4.20 Momentary Push Buttons
- 1.12.2.4.21 Hand-Off-Automatic Selectors
- 1.12.2.4.22 On-Off Selectors
- 1.12.2.4.23 Limit Switches
- 1.12.2.4.24 Alarm Lights
- 1.12.2.4.25 Wiring Devices
- 1.12.2.4.26 Control Point-to-Point Drawings
- 1.12.2.4.27 Conductors with Color Indications
- 1.12.2.4.28 Radio
- 1.12.2.4.29 Conduit Penetration Areas
- 1.12.2.4.30 Air Break Seal System

1.12.2.5 *Miscellaneous Electrical Equipment –*

- 1.12.2.5.1 Miscellaneous Electrical Parts

1.12.2.6 *Drawings –*

- 1.12.2.6.1 Coordination drawing of All Electrical Items in relation to Site
- 1.12.2.6.2 Conduit layout drawings
- 1.12.2.6.3 Conduit penetration locations into wet well

1.12.3 Mark dimensions and values in units to match those specified.

1.13 *Regulatory Requirements –*

1.13.1 Obtain permits, and request inspections from authority having jurisdiction.

1.13.2 References listed in section 1.11

1.14 *Final Inspection And Testing –*

- 1.14.1 After the electrical installation is complete, the Contractor shall deliver to the Engineer and Owner the following information with his request for final inspection. As-built drawings shall be maintained and available on site throughout construction.
  - 1.14.1.1 One set of Contract Drawings marked to show all significant changes in equipment ratings and locations, alterations in locations of conduit runs, or of any data differing from the Contract Drawings.
  - 1.14.1.2 Certificates of final inspection from local authority having jurisdiction.
  - 1.14.1.3 A tabulation of all motors listing their respective Manufacturer, horsepower, nameplate voltage and current, actual running current after installation and overload heater rating.
- 1.14.2 The electrical work shall be thoroughly tested to demonstrate that the entire system is in proper working order and in accordance with the plans and specifications. Each motor with its control shall be run as nearly as possible under operating conditions for a sufficient length of time to demonstrate correct alignment, wiring capacity, speed and satisfactory operation. All main switches and circuit breakers shall be operated, but not necessarily at full load. Contractor may be required during final inspection, at the request of the Engineer or Owner to furnish test instruments for use during the testing.

1.15 *Staffing –*

- 1.15.1 The Electrical Contractor shall provide a “Master Electrician” who has been deemed a “Master Electrician” by exam through the State of Florida, or any other Florida County Permitting Authority as the Electrical Superintendent for the project. The Electrical Superintendent shall be on the project site any time any electrical work is performed by the Contractor.
- 1.15.2 In addition, the Contractor shall provide one Journeyman electrician for every four electrical helpers used on the project site.
- 1.15.3 The Electrical Contractor is required and expected to read all other equipment specifications contained in these documents and provide all required power and control conductors required by said equipment to allow them to function as described.

1.16 *As-Built Drawings –*

- 1.16.1 The Contractor shall provide detailed as-built drawings for the project indicating all power wiring. (All Drawings shall be delivered to the Owner in an AutoCAD 2013 Format.)
- 1.16.2 The As-Built drawings shall include detailed drawings of all underground conduit, above ground conduit, control panels, and control drawings.
- 1.16.3 The Engineer will provide electronic copies of all drawings in the plans set on a CD for use by the Contractor. Contractor shall coordinate with ECUA staff before and during conduit installation to verify sufficient size and quantities of conduits are installed.