SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

# GENERAL

## DESCRIPTION

### This section includes materials, installation, and testing of the electrical system.

## RELATED WORK SPECIFIED ELSEWHERE

### One-Year Guarantee: General Conditions.

### Permits and Licenses: General Conditions.

### Section 01000: General Requirements

### Section 01300: Submittals.

### Section 01783: Operation and Maintenance Data.

## REGULATORY AGENCIES AND STANDARDS

### See General Conditions.

### Elsinore Valley Municipal Water DISTRICT Safety Manual, Section 12, Control of Hazardous Energy (Lockout/Tagout).

### Electrical work shall comply with the NEC as amended by the CE and local city code where applicable.

## QUALITY CONTROL

### Materials, appliances, equipment, and devices shall conform to the applicable Underwriters’ Laboratories, Inc. (UL) standards. The label of, or listing by, UL is required for all electrical equipment.

## UTILITY COMPANY REQUIREMENTS AND FEES

### The Contractor shall make application for electric and telephone service in the name of the DISTRICT, and pay utility company fees, cable charges, and added facilities charges. The Contractor may assume that initial service application was filed by the Designer of Records. All utility company coordination activities shall be the responsibility of the Contractor.

### The Contractor shall obtain service requirements from utility companies and make any service and installation agreements that the utility company may require.

### Install electric service entrance equipment in accordance with the serving utility’s requirements. Coordinate with the serving utility to ensure timely connection by the utility. Obtain utility company approval of service entrance and metering equipment shop drawings prior to starting fabrication.

### Install telephone service entrance conduit, backboard, receptacles, grounding, and other telephone equipment shown in the drawings in accordance with the serving utility’s requirements.

### Contractor shall be responsible for obtaining electrical data as required for the development of a Power System and Arc Flash Study, such as available short circuit and protection devices and transformer information from the utility company.

## POWER FOR CONSTRUCTION

### Provide for or purchase power for construction in accordance with Section 01500.

## SUBMITTALS

### Submit shop drawings in accordance with the General Conditions.

### Submit a written plan for demonstrating that each item of equipment provided under Division 16 meets the specified operational requirements. Submit a written plan for procedures to be used in final operation testing of entire systems including a description of each system, test methods and materials, testing instruments and recorders, and a list of the equipment involved with the functional parameters to be recorded on each item. Submit test results and records for all final operation tests. Test plan shall include sign-off boxes for each component or device. SIt is the contractor’s responsibility to pre-test all components prior to notifying the DISTRICT that they are ready for ‘Witnessed’ testing. Failure to perform un-witnessed testing and correction of issues found, may result in back-charges.

### In submitted catalog cuts, cross out items shown that are not pertinent to this project. Where catalog cuts list manufacturer’s standard options, cross out those options not intended to be provided and clearly highlight those options that are to be provided.

### Submittals shall include a copy of the pertinent contract specification section or a tabulation of each paragraph thereof with each paragraph marked either “COMPLY” or “SEE COMMENT” with explanation/justification of the comments.

### Interconnection / Loop diagrams – The Contractor shall prepare Interconnection / Loop diagrams depicting all cable requirements together with their actual terminations as specified below:

### Interconnection / Loop diagrams shall be incorporated on the same drawing where feasible and shall be drawn to reflect actual, physical relationship between equipment and or components as shown on the drawings. The Interconnection / Loop diagram shall indicate wiring between panels, terminal boxes, remotely mounted devices, and motor starters. The diagrams shall interface with the manufacturer’s internal connection diagrams for panels. The diagrams shall indicate the terminations to terminal blocks of field devices at each end of the cable, the number of conductors in the cable, the size of wire, and the number of spare conductors. For each termination, the diagrams shall indicate the terminal number, wire color, and wire numbers as it appears on the wire marker. All terminal blocks, including spares, shall be indicated on the diagrams. Interconnection / Loop diagrams shall be provided for review and approval prior to installation of equipment. Each Interconnection / Loop drawing shall be limited to one per sheet.

## OPERATION AND MAINTENANCE MANUALS

### Submit operation and maintenance manuals in accordance with Section 01730.

### Provide electronic copy in searchable .pdf format on CD.

### **Locations General:** Use equipment, materials, and wiring methods suitable for the types of locations in which they are located as defined below.

### Definitions of Types of Locations:

#### **Dry Locations:** Indoor areas which do not fall within the definitions below for wet, damp, hazardous, or corrosive locations and which are not otherwise designated in the drawings.

#### **Wet Locations:** exposed to the weather, whether under a roof or not, unless otherwise designated in the drawings.

#### **Damp Locations:** Spaces wholly or partially underground unless otherwise designated in the drawings.

#### **Hazardous Locations:** Areas identified in drawings.

#### **Corrosive Locations:** Areas identified in drawings.

## CODES AND REGULATIONS

### Provide electrical equipment and materials, including installation, conforming to the following codes and standards, as applicable. The equipment and materials shall bear labels to indicate manufacturing conformance to the specified standards or equal. Where two codes or standards are at variance, conform to the more restrictive requirement:

#### Basic Electrical Regulations, Title 24, State Building Standards, California Administrative Code.

#### Low Voltage Electrical Safety Orders, Title 8, Division of Industrial Safety, State of California.

#### National Electrical Code.

#### County and City Electrical Codes.

#### American National Standards Institute.

#### American Society for Testing Materials.

#### Certified Ballast Manufacturers.

#### Illuminating Engineering Society.

#### Institute of Electrical and Electronic Engineers.

#### Insulated Cable Engineers Association.

#### National Electrical Manufacturers Association.

#### National Fire Protection Association.

#### Occupational Safety and Health Act.

#### Public Utilities Service Requirements.

#### Underwriters’ Laboratories, Inc.

#### California Building Codes

#### International Society for Automation

#### National Electrical Safety Code

#### NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities

## MEASUREMENT AND PAYMENT

### Payment for the work in this section shall be included as part of the lump-sum bid amount stated in the Proposal.

# MATERIALS

## GENERAL

### Similar materials and equipment shall be the product of a single manufacturer.

### Provide only products which are new, undamaged, and in the original cartons or containers.

### Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer’s current design.

### Materials and equipment shall be suitable for storage, installation, and operation at an ambient temperature of 0°C to 40°C except where more stringent conditions are stated in individual equipment specifications.

### Electrical equipment and panels shall be factory finished with manufacturer’s standard primer and enamel topcoats, unless stated otherwise in the individual equipment specifications. Provide 1 pint of the switchboard and motor control center manufacturer’s touchup paint for repair of damaged enamel topcoats.

# EXECUTION

## PRODUCT DELIVERY, STORAGE, AND HANDLING

### **Delivery:** Deliver electrical materials and equipment in manufacturer’s original cartons or containers with seals intact, as applicable. Unless otherwise specified, deliver conductors in sealed cartons or on sealed reels, ends of reeled conductors factory sealed. Deliver large multicomponent assemblies in sections that facilitate field handling and installation.

### **Storage:** Unless designed for outdoor exposure, store electrical materials off the ground and under cover. Prevent corrosion, contamination, or deterioration.

### **Handling:** Handle materials and equipment in accordance with manufacturer’s recommendations. Lift large or heavy items only at the points designated by the manufacturer. Use padded slings and hooks for lifting as necessary to prevent damage.

## INSTALLATION

### The drawings indicate connections for typical equipment only. If the equipment furnished is different from what is shown, provide the modifications necessary for a safe and properly operating installation in accordance with the equipment manufacturer’s recommendations.

### The drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Field determine exact location based on physical size and arrangement of equipment, finished elevations, and obstructions.

### Work or equipment not indicated or specified which is necessary for the complete and proper operation of the electrical systems shall be accomplished without additional cost to the DISTRICT.

### Accomplish work required to pierce any waterproofing after the part piercing the waterproofing has been set in place. Seal and make watertight the openings made for this purpose.

### Seal weathertight equipment or components exposed to the weather.

### Protect equipment outlets and conduit openings with factory-made plugs or caps whenever work is not in progress at that point.

### **Protection:** Protect electrical materials and equipment until final acceptance. Protect factory painted surfaces from impact, abrasion, discoloration, and other damage. Keep electrical equipment, materials, and insulation dry at all times. Maintain heaters in equipment connected and operating until equipment is placed in operation. If partial dismantling of equipment is required for installation, box or wrap the removed parts until reinstalled. Repair or replace damaged work as directed, at no additional cost to DISTRICT. Protect all equipment against intrusion from dust and rodents.

### Conform to the DISTRICT’s lockout/tagout requirements in accordance with the DISTRICT Safety Manual, Section 12, Control of Hazardous Energy.

## NAMEPLATES

### Mark each individual panelboard, motor controller, disconnect switch, timer, relay, and contactor to identify each item with its respective service or function.

### Provide nameplates with engraved lettering not less than 1/4 inch high. Use white-on-black laminated plastic (so letters will be black with white background), attached with rivets or sheet metal screws. Do not use embossed plastic adhesive tape.

### Provide a nameplate inside the door of each panelboard listing its designation, voltage, feeder number, and load served.

### Provide a nameplate on each transformer listing its designation, voltage, feeder number and load served.

### Provide Arc Flash Warning labels on switchboards, panelboards, control panels, and motor control centers in accordance with the NEC. For 480-volt equipment, provide the following additional information on the label: flash hazard boundary, incident energy, personal protective equipment requirements, equipment voltage, and approach boundaries (limited, restricted, and prohibited). Perform required calculations for specific equipment and site for input to this label.

## WARNING SIGNS

### Install markings, identifications, warning, caution, or instruction signs where required by NEC, NFPA 70E, and NFPA 79 paragraph 4.5.1, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect.

### The design of safety signs and labels shall conform to ANSI Z535.4. Switchgear, panelboards, industrial control panels, motor control center, and VFD shall be field marked to warn qualified persons of potential electric arc hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment, in conformance with NEC 2005 Article 110.16.

### Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.

## EMERGENCY OPERATION SIGNS

### Install engraved laminate signs with white legend on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

**END OF SECTION**