

DIVISION 16 - ELECTRICAL

SECTION 16010 - GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.01 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. Specifications and Drawings are prepared in abbreviated form and includes incomplete sentences. Omission of words or phrases such as "the Contractor shall", "as shown on the drawings", "a" and "the" are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.
- B. Specifications and Drawings complement each other and what is specified, scheduled or mentioned by one shall be binding as if called for by both.

1.02 DEFINITIONS

- A. Provide: "furnish and install, test and deliver to the Government in operating and ready to use condition".
- B. Wiring: "Provide all raceways, junction boxes, conductors, devices, protection equipment, installation of motor controller furnished (by others) when required, etc., including testing for a complete, operative and ready to use electrical system".
- C. Equal: "Material, equipment or system, including all necessary labor, modifications and accessories satisfying the requirements of the contract documents to provide features or have operating characteristics equal or better than that specified".
- D. Complete: "Furnish installation that is operative, tested, ready to use and which satisfies the intent of the contract documents, including all necessary accessories and modifications".
- E. Contractor: "General Contractor responsible for all work shall assign work to Subcontractors. Except where noted, work of this section shall be assigned to the Electrical Subcontractor".

1.03 SUMMARY

- A. Electrical Work: Provide all articles, materials, equipment operators, systems and services specified herein or on the Drawings or as normally required by accepted industry standard practices, including all labor taxes, fees, insurance, warranties and incidentals required to complete all electrical work.
- B. In general, the following work is included:
 - 1. Provide power systems, including branch circuits, outlets, electrical apparatus and wiring to support the lighting system.
 - 2. Provide wiring and connection for all equipment including fixtures, etc., complete. Furnish disconnects for all equipment as required by the NEC, NAVAC-HI and Hawaiian Electric Company.
- C. Wiring and connecting of all electrical equipment supplied for installation and use in this contract and not specifically listed as work by others.
- D. Furnishing of "Contractor Submittals" and "Field Posted As-Built Drawings".

- F. Coordinate work with other trades to avoid omissions and overlapping of responsibilities.
- G. Obtain and pay for all fees, permits, licenses, assessments and inspections required for this work.

1.04 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Materials and methods specified under BASIC MATERIALS AND METHODS Section.
- B. Electric service and utility company metering by NAVFAC-HI.
- C. Connect all electrical equipment furnished or provided under other sections of the specifications.

1.05 QUALITY ASSURANCE:

- A. Government and Utility Requirements: Comply with all requirements of the State of Hawaii, County of Maui and utility company rules and regulations.
- B. Specifications are accompanied by architectural, structural and mechanical plans of the building, site plans and diagrammatic electrical plans showing locations on luminaires, outlets, feeder runs, devices and other electrical equipment. Locations are approximate and before installation, Contractor shall study with and coordinate with adjacent construction work and make installation in the most logical manner that meets the intent of the design.
- C. Prior to the start of rough-in work, verify all dimensions and sizes of equipment at the job site. Circuits and raceway routes are diagrammatic and may be altered in any logical manner. However, all changes from the contract documents shall be subject to review and acceptance of the Project Manager and indicated on the "Field Posted As Built" Drawings.
- D. Materials and Equipment: Materials and equipment shall conform to requirements of applicable technical sections, publications specified therein and shall be as shown on the drawings. Materials and equipment shall be new and shall be the product of the manufacturers regularly engaged in the manufacturer of such products. All items shall essentially duplicate materials and equipment that have been in satisfactory use at least two years prior to bid opening and shall be supported by service organization that is reasonably convenient to the site of installation.
- E. Substitutions of another manufacturer's product for equipment specified hereinafter requires written permission by the Project Manager prior to bidding. Brand names, manufacturer's names and catalog numbers indicate standards of design and quality required. List of substitute materials together with qualifying data shall be submitted for review. Failure to submit for review substitute materials prior to bidding shall mean that materials, as specified, will be provided.

EXAMPLE

Item	Manufacturer and Catalog No. Specified	Substitute Manufacturer and Catalog No.
Conduit	Blue - No. 2828	Green - No. 3080

Qualifying data shall include catalog cut sheets, shop drawings and specifications to indicate equality with material specified herein and in the drawings.

Burden of proof of equality of proposed substitutions will be the responsibility of the

Contractor. Submittals shall be sufficiently detailed to permit evaluation of the proposed items. Insufficient information on the submittal will be sufficient cause to reject a proposed substitution.

1. Approval shall not in any circumstance be construed as an approval for deviations from the contract documents unless the entity seeking such approval has, in writing, specifically called the Project Manager's or the approval agency's attention to each such deviation at the time of submission. Said entity and/or Contractor shall be responsible for coordination of the work with adjacent and pertinent work, affected materials, equipment and labor to insure proper execution of the work as per the intent of the contract documents.
 2. Installation shall be complete in every detail and ready for use. Any item supplied by Contractor developing defects within one (1) year after final acceptance by the Project Manager shall be replaced by materials, apparatus or parts including installation labor to make such defective portion of complete system conform to the true intent and meaning of the drawings and specifications, without additional cost to the Government.
- F. Design (intent) changes, if required, resulting from substitution of materials or system shall be accompanied by appropriate changes in all affected work of every trade. Such changes shall be at no increase in the contract amount and shall be the responsibility of the Subcontractor or supplier responsible for the departures. Changes proposed by the Contractor shall be based on a system approach and shall be allowed if implemented without decrease in quality in performance or operations, increase in utility costs, or adverse affect on the available physical space to install the equipment. Such departures shall be submitted and noted in shop drawings for review and acceptance by the Project Manager. Design changes required by other trades, requiring changes in the electrical system as well as other systems, shall be accompanied by appropriate changes to all affected work of every trade, at no increase in contract amount.
- G. The General Contractor shall be responsible to coordinate, approve, and select systems that do not impose unaccounted for impact on the electrical work. It shall be understood that after the award of the contract, all departures having electrical impact, unless otherwise noted, have been reviewed and approved by the General Contractor. Therefore all appropriate changes to the electrical system required to accommodate the design changes shall be at no additional cost to the Government.

1.06 SUBMITTALS

- A. Manufacturer's Data Sheets: Submit manufacturer's data sheets in accordance with the General Provisions. Shop drawings shall be submitted for equipment not completely identifiable by information contained in the list of materials and equipment, especially for the following equipment:
1. Circuit breakers and safety switches.
 2. Cabinets and junction boxes.
 3. Wiring devices.
 4. Panelboards.
 5. Any Built-to-Order equipment.
- B. Shop Drawings: Shall be submitted when required by section specifying the equipment and shall be sufficiently comprehensive and detailed to permit evaluations, otherwise it may be rejected, and shall include as applicable the following:
1. Identification of each equipment and component.

2. Dimension outlines of all enclosures.
 3. Dimension drawings of components such as switchboard and panelboards.
 4. Layouts and general arrangement of equipment.
 5. Operating and electrical characteristics including interrupting ratings and impedances.
 6. Related and adjacent work of other trades shall be shown to ensure constructability and functionality.
- C. Certificate of Compliance: Where required by section specifying the equipment, the Contractor shall submit six copies of certificates of compliance in accordance with the requirements of the General Provisions. The certificates shall include but not be limited to factory test reports.
- D. Installation, Operation and Maintenance Data: Three copies of installation, operation and maintenance data shall be submitted for equipment specified to require such data. The data shall be in the form of manuals and shall present instruction for operating, maintenance, repair, recommended inspection points and periods for inspection in a practical, complete and comprehensive manner. The information shall be arranged in a logical, orderly sequence, including a general description of the equipment and significant technical characteristics. Test, adjustment and calibration information shall be furnished and identified to specific equipment. The installation, operation and maintenance data shall be as required by General Requirements.
- E. Acceptance Requirements: Acceptance for material and equipment will be based on manufacturer's published data. Where materials or equipment are specified to be constructed and tested, or both, in accordance with the standards of the National Electrical Manufacturers Association (NEMA) or the American National Standard Institute (ANSI) the Contractor shall submit proof that the items furnished under this section of the specifications conform to such requirements. A certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard by a company listed as a member company of NEMA for the section whose standards cover the item under construction, will be acceptable as sufficient evidence that the item conforms to the requirements of the National Electrical Manufacturers Association. A manufacturer's statement indicating complete compliance of each item with the applicable NEMA, ANSI or other commercial standard specified shall be submitted and will be acceptable proof of compliance. Conformance with the agency requirements does not relieve the item from complying with any other requirements of the specifications.
- F. Nameplates:
1. General: In addition to standard manufacturer's nameplate, corrosion resistant nameplates shall be provided for each circuit breaker, safety switch, junction box, cabinet, panelboard, and each major piece of equipment. Nameplates shall designate the function of the equipment for which they are used. The designation shall be submitted for review and acceptance with the shop drawings.
 2. Material and Lettering: 1/16" thick, laminated plastic, black-white-black. Nameplate lettering shall be 1/4" high upper case.
 3. Fastening: Nameplates shall be fastened by means of non-ferrous metal screws.
 4. Hand lettering or stick on embossed marking tape is not acceptable.

- G. **Factory Tests and Inspection:**
1. The equipment furnished shall be inspected mechanically and electrically, and all manufacturer's routine factory tests shall be performed to verify conformance with the specified requirements. The test equipment and test methods shall conform to the requirements of standards specified. The contract price shall include cost of performing all tests, and no additional compensation will be allowed therefor.
 2. The Contractor shall furnish at time of equipment delivery, six certified copies of all test results.
- H. **Equipment Guarantees:** Installation shall be complete in every detail and ready for use. Any item supplied by the Contractor developing defects within two (2) years after final acceptance by the Project Manager shall be replaced by materials, apparatus or parts including installation labor to make such defective portion of complete system conform to the true intent and meaning of the drawings and specifications, without additional cost to the Government. The Contractor shall guarantee all equipment specified from the date such equipment is accepted by the Project Manager, against defects in materials, design, performance and workmanship. Guarantees shall be supported by manufacturer's written warranties and shall be signed by an official of the manufacturer's organization. Replacement parts shall be delivered or repairs shall be made promptly upon receipt of notice of failure under normal and proper use and maintenance. All costs of replacement and repair shall be borne by the Contractor provided that a report substantiating such defect or failure to conform to specifications is promptly given to the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials shall be new, except as specifically noted, and shall bear the label of Underwriters' Laboratories, Inc., wherever standards have been established and label service is normally and regularly furnished by the agency.

PART 3 - EXECUTION

3.01 MATERIALS AND EQUIPMENT FURNISHED BY THE CONTRACTOR

- A. The electrical installation shall be complete and operable and shall conform to the requirements of contract drawings. The Contractor shall provide all electrical equipment and materials, wiring, supports, and such additional parts as are necessary to make the installation complete. All Contractor furnished materials and equipment are subject to review and acceptance by the Project Manager.

3.02 PROTECTION DURING STORAGE

- A. All materials and equipment shall be stored in a safe manner; weather and fire protection shall be maintained and all materials shall be stored above the ground of floor level to avoid damage by moisture.

3.03 PROTECTION OF WORK IN PROGRESS

- A. All electrical materials and equipment shall be completely protected during installation. Equipment shall be securely protected against physical or chemical damage. In areas exposed to weather, materials unused at the end of each day's work shall be stored in weather-protected locations. Damage to materials or equipment due to Contractor's neglect shall be repaired or replaced by and at the expense of the Contractor.

3.04 PROGRESS OF WORK AND COORDINATION

- A. The Contractor shall prepare a schedule giving sequence of electrical work. The electrical work shall be coordinated with the work of other Contractors and other trades.

The schedule shall be submitted prior to beginning installation and shall be subject to review and acceptance by the Project Manager.

3.05 RULES

- A. The entire electrical installation shall conform to the applicable rules and regulations of the state Model fire Code of the State of Hawaii, Hawaiian Telcom, Hawaiian Electric Company, requirements of the National Electrical Code and other County of Honolulu standards and publications specified in the technical sections.

3.06 COORDINATION

- A. The contract drawings indicate the extent and general location and arrangement of equipment, conduit and wiring. Luminaires, outlets and electrical equipment shall be located so as to avoid interference with architectural, mechanical or structural work. Any device or equipment may be relocated within 10'-0" of the location shown on the drawings before installation is initiated and without increase in contract amount.

3.08 WORKMANSHIP

- A. All materials and equipment shall be installed in accordance with printed recommendations of the manufacturer, and shall conform to the requirements of the contract drawings. The installation shall be accomplished by workers skilled in this type of work.

3.09 FIELD TESTS

- A. After the installation is completed, and at such time the Project Manager may direct, the Contractor shall conduct field tests for acceptance by the Project Manager. When the tests are specified to be performed under supervision of the equipment manufacturer, the Contractor shall cooperate with the Project Manager during tests and shall place at his disposal all assistance, materials and services required to perform such tests. The tests shall be performed in the presence of the Project Manager. The Contractor shall furnish all necessary electric power instruments and personnel required for the tests.
- B. Operating Tests: The equipment and systems shall be demonstrated to operate in accordance with the requirements of the technical sections in which the equipment or systems are specified.

END OF SECTION