

## **SECTION 16000**

### **ELECTRICAL WORK – GENERAL**

#### **1. SCOPE**

The work described in this section shall include the furnishing all labor, materials, equipment and services to be rendered, and the installation of the complete electrical distribution system as shown in the accompanying drawings and specified herein. Although the work might not be restricted to these, it shall include the following:

- a. High and low-voltage feeders, distribution system for power and lighting, panel-boards, branch circuits, control switches, receptacles outlets, lighting fixtures, and any other system or equipment shown in the drawings necessary for a complete and ready-to-use installation.
- b. Grounding system.
- c. Exterior underground conduits for power and telephone/CATV systems.
- d. All concrete work for the protection of underground conduits.
- e. Any other system or part of a system shown in the drawings.

#### **2. GENERAL REQUIREMENTS**

- a. It shall be the direct responsibility of the Contractor to orient himself and become acquainted with all the requirements of the Puerto Rico Electric Power Authority (PREPA) and the Puerto Rico Telecommunication Regulations Board (JRT-PR) as they may pertain to this project. Such requirements will be as much as part of this contracting as so stated herein.
- b. The Contractor shall maintain a complete and accurate record of any variations or changes to the contract drawings that may be necessary during the installation due to field or structural conditions. At termination of the work, and prior to the final payment, the contractor shall deliver these drawings for the architect's approval before liquidation of the contract. The architect shall then incorporate the variations or changes into a set of sepia prints, as originally issued, in such a manner that they will reproduce legibly, and any competent person may readily comprehend them, as well as all the changes and revisions made during the installation of the work. The work to be done in the sepia prints shall be performed by an experienced draftsman. This revised set of sepia prints must be delivered to the owner prior to the receipt of the final payment.

#### **3. DRAWINGS**

- a. The drawings, which constitute an integral part of this contract, shall serve as the working drawings. They will indicate the general layout of the complete electrical system, i.e. the arrangements of the feeders, circuits, outlets, switches, controls, panel-boards, lighting fixtures and any other work.

- b. A field verification of the scale dimensions in the plans will be carried out in the actual locations, and all distances and levels will be governed by the actual field conditions.
- c. The Contractor shall review the architectural, structural, and plumbing plans, etc., and shall adjust the electrical work to conform to all conditions indicated thereon.
- d. The discrepancies shown between different plans, between plans and actual field conditions or between plans and specifications shall be promptly brought to the attention of the architect or engineer for a decision.
- e. All items not specifically mentioned in the specifications or noted in the drawings but that are obviously necessary to make a complete working installation shall be included with no additional cost to the Owner.
- f. The Contractor shall submit to the architect or engineer detailed, dimensioned shop drawings covering all items or equipment and brochures of the lighting fixtures. No equipment should be put into manufacture (or ordered) until these shop drawings or brochures have been approved by the architect or engineer.

#### **4. MATERIALS**

- a. If the materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog numbers, such designation will establish the standards of desired quality and style, and shall be the basis for the bid.
- b. If the Contractor desires, he (she) may submit a request to use any materials or products other than those specified. The contractor shall provide a list of the proposed substitutions to the owner's representative to determine if such substitutions are equivalent in quality and style to the ones initially specified.
- c. The acceptance or rejection of the proposed substitutions shall be subject to the approval by the architect or engineer.
- d. The approvals of any submittal shall not relieve the Contractor from the responsibility of furnishing materials and systems of the proper dimensions, capacities, sizes, quantities, quality, and installation details to effectively comply with the requirements and intent of the Contract Documents. Such approval shall not relieve this trade from the responsibility of errors in submittals.
- e. All submittals shall be presented sufficiently in advance to the field requirements to allow ample time for checking. No claim for extension of time will be granted by reason of failure in this respect.

#### **5. SAMPLES**

- a. The Contractor shall submit samples of the following items to the architect or engineer for their approval:

1. Light switches: one of each type.
  2. Receptacles and plugs: one of each type.
  3. Wire and cable: 1-foot length of each type.
  4. Conduit and conduit fittings: one of each type.
  5. Switch plates or covers: one of each type.
  6. Outlet boxes: one of each type.
  7. Cable connectors and bushings: one of each type.
  8. Plates: one of each type.
  9. Lighting fixtures: one of each type.
- b. All materials installed or work performed without the approval of materials will be done at the risk of the contractor, and the cost of removal of such materials of work (if it is judged unsatisfactory for any reason by the owner's representative) shall be done at the expense of the Contractor.

## **6. CODES, PERMITS AND INSPECTION**

- a. The Contractor shall contact and coordinate with the nearest PREPA and JRT-PR local offices and the corresponding telecommunications services provider, all the details of the related electrical and telephone/CATV installations for this project before the beginning of such installations.
- b. The installation work shall comply with all the laws applying to electrical installation in effect in Puerto Rico, and the latest rules and regulations of the National Electrical Code, the PREPA and the JRT-PR. The Contractor shall obtain all permits and certificates of inspection and pay all the fees necessary for the execution of the work. After completion of the work, the Contractor shall provide to the architect or engineer a certificate of final inspection and approval from the PREPA and the JRT-PR local offices.

## **7. STANDARDS OF MATERIALS AND WORKMANSHIP**

- a. All materials and/or equipment described or found necessary for the electrical installation shall be new and free from defects. They shall also be listed by the Underwriters Laboratories (UL), Inc. and the National Electrical manufacturer's Association (NEMA) as conforming to their standards in every case where such standards have been established for the particular type of material in question. The materials shall be in accordance with the PREPA and JRT-PR standards. All materials and/or equipment shall be approved by the architect or engineer.
- b. The Contractor shall provide the services of an experienced licensed electrician, who shall constantly be in charge of the work together with skilled workmen, fitters, helpers, and the labor force required to properly unload, transfer, erect, connect, adjust, start, operate, and test the system. The work shall be performed in a workman-like manner and shall be subject to the approval of the architect or engineer.

**8. PROGRESS OF THE WORK**

The electrical work shall progress in coordination with the progress of the construction work and shall be completed as soon as the conditions of the building will permit.

**9. SLEEVES, INSERTS AND OPENING**

- a. The Contractor shall layout and install all required materials and/or equipment in advance to the pouring of concrete floors, walls, and roofs. He (she) shall furnish and install all the necessary sleeves or openings through floors or walls required for the passage of all conduits, pipes or ducts to be installed by him (her).
- b. The Contractor shall furnish and install the inserts and hangers required to support conduits, pull boxes, etc.
- c. If any material and/or equipment is not properly installed, the contractor shall do all the necessary cutting and patching at his (her) own expense to rectify the errors, subject to the approval of the architect or engineer.

**10. TESTS**

The tests listed below shall be made in the presence of the architect, engineer or owner's representative. All testing instruments and methods shall be subject to the approval of the architect, engineer or owner's representative. All necessary arrangements to obtain all instruments, assistance personnel and materials necessary for the performance of the tests shall be made by the contractor.

- a. The Contractor shall test all the wiring and shall leave the electrical installation free of grounds, shorts, etc.
- b. The Contractor shall also test all lighting fixtures and electrical apparatus or equipment to be furnished under this section of the specifications.
- c. Before and application for final acceptance of the work could be considered, all tests deemed necessary to show proper execution of the work must have been performed and completed in the presence of the architect, engineer or owner's representative. The scheduling for all testing procedures shall be arranged to suit the convenience of the architect, engineer or owner's representative. The scheduling for all testing procedures shall be arranged to suit the convenience of the architect, engineer or owner's representative.
- d. The electrical work shall include the provision of any assistance (such as the removal of panel-board trims and junction, and pull boxes covers) deemed necessary for the architect, engineer or owner's representative to demonstrate compliance with the requirements of the drawings and specifications.
- e. If the electricity-utilizing equipment supplied by other trades is energized, controlled or otherwise made operative by the electric work wiring systems, the testing to demonstrate the proper functional performance of such wiring systems shall be conducted by the trade responsible for the equipment.

- f. Any test required in any section of the electrical specifications that is not listed here shall also be the responsibility of the electrical contractor.
- g. Any defects or deficiencies discovered in any of the electrical works shall be corrected by the contractor.

**11. TEMPORARY SERVICE**

- a. The Contractor shall provide and maintain a temporary electric service to be used during the construction period. This service shall comprise with the required number of outlets and extension cords with lamps and guards located as required, together with a supply of wiring-run conveniently located and a temporary main switch with required fuses or breaker. The arrangements for this supply shall be made with PREPA.
- b. A temporary service of similar characteristics as the final service shall be provided by the Contractor at his (her) own expense to perform all the tests required by the owner and/or the different trades.

**12. GUARANTEE**

- a. The Contractor shall leave the entire electrical installation included under this contract in proper working conditions. He (She) shall also replace, without additional charge, any work, materials and/or equipment or any of its component parts that develop defects different from ordinary use, within one (1) year from the date of substantial acceptance of the project by the Owner's representative.
- b. The Contractor shall also be responsible for any or all damages resulting from defective materials and/or equipment, and shall repair or replace, without additional charge, all damages to the existing work caused by such defects or replacement to the satisfaction of the architect or engineer.
- c. The Contractor shall provide a certificate of guarantee from the manufacturers of specialties to the effect that they will furnish new parts or equipment in which defects occur due to faulty manufacture, for a period of one (1) year from the date of substantial acceptance of the project by the Owner's representative.
- d. If, at request of the architect or engineer, a part of electrical system is placed in service prior to the date of substantial acceptance, that particular part of the system will then commence its one-year period of guarantee. This guarantee will expire one year after such part of the system was placed in service regardless to the date when the final acceptance or approval (covering the entire system) is granted.

**13. RECORD DRAWINGS AND INSTRUCTIONS BOOKLETS**

- a. The Contractor shall complete an exact detailed record of all changes or variations in the electrical installation that take place during the progress of the work. The records shall

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- include detailed plans or diagrams of the changes showing the method of connection, wiring diagrams, etc.
- b. The architect shall then incorporate into a set of sepia prints supplied by the owner all changes and revisions made during the installation of the work. This set of sepia prints with all changes, additions, and omissions listed thereon shall be returned to the owner upon completion of the contract.
  - c. The Contractor shall also provide the architect or engineer with three copies of each instruction booklet supplied by the manufacturer with their respective equipment upon the completion of the work.

**END OF SECTION 16000**