

DIVISION 16 - ELECTRICAL

SECTION 16010: GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE:

The scope of the electrical phase of this project shall include all labor, materials, equipment, etc., required to fulfill the intent of the Contract Documents and shall include the work specified under the following sections:

SECTION 16050 - BASIC MATERIALS AND METHODS

SECTION 16400 - SERVICE AND DISTRIBUTION

SECTION 16500 - LIGHTING

SECTION 16600 - ALTERNATE POWER SYSTEMS

SECTION 16700 - SPECIAL SYSTEMS

1.2 RELATED DOCUMENTS:

All applicable provisions of Division 0 and 1 govern work under this division. Refer to these articles in the specifications for additional information.

1.3 REFERENCED STANDARDS:

1.3.1 All work shall be performed in accordance with the latest editions of the applicable state, national and local ordinances, building codes and the National Electric Code.

1.3.2 Refer to each section for applicable codes and reference standards.

1.4 FEES, PERMITS AND TAXES:

This Contractor shall make arrangements for and pay for all inspection fees and permits required by the local authorities. The Contractor shall also pay all taxes levied for labor and materials associated with work under this Division.

1.5 SUBMITTALS:

1.5.1 The symbol "<S>" indicates a requirement for submittals.

1.5.2 Shop drawings, manufacturer's data materials lists, etc., are required for all equipment and material where submittals are required.

1.5.3 Refer to "General Conditions" and/or "Instructions to Bidders" for additional information on submittals.

1.5.4 Submittals shall be presented from published manufacturer's data and in such a form that the Architect can readily verify compliance with codes, standards, and the Contract Documents including

construction features, rough-in requirements, etc. Each submittal shall contain data relevant to the particular equipment (including options). The data shall be identified by "hy-liteing", arrows, underlining, etc. Do not submit pages of non-relevant information. Broad general data is not acceptable. If equipment submitted is not as specified in the Contract Documents, then the submittal shall contain specific details prominently identifying any differences in form, fit or function. If the equipment submitted is not as specified, then the Contractor shall be responsible for any additional costs necessary to install and connect the equipment. This includes, but is not limited to, increased panelboard size, circuit breaker size, disconnect size or circuit size. Submit dimensional layout of all electrical equipment locations, drawn to scale, with equipment locations shown. Clearances shall be in accordance with NEC and local codes. Panelboard and switchgear submittals will be rejected without dimensioned room or equipment location layouts.

1.6 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS:

1.6.1 The symbol "<OM>" indicates that operating and maintenance manuals are to be furnished.

1.6.2 Each operating and maintenance manual shall apply specifically to the equipment installed. In those cases where one manual covers a general class of equipment, the contractor shall be required to identify (hy-liteing, underlining, etc.) those portions which apply to the installed equipment. All operating and maintenance manuals shall be available for inspection by the Architect/Engineer at the final review. Do not submit operating and maintenance manuals unless specifically requested.

1.6.3 Provide (2) two copies of operating and maintenance manuals. Manuals shall be bound in large ring loose-leaf binders and contain the following:

- A. Manufacturer's instructions and/or installation manual.
- B. Additional items that may be required in Division 1.

1.7 PRIOR APPROVAL:

Where the contractor wishes to substitute equipment or materials under an "or equal" clause, he shall submit to the Architect in writing seven (7) work days prior to bid opening lists of proposed substitutions which, from published manufacturer's data, cover the salient features of the proposed substitution. This requirement does not apply to light fixtures. Approvals will be issued in writing.

1.8 WARRANTY:

This Contractor shall guaranty fully all workmanship, material, equipment, systems, etc., provided by him for a period of one year after substantial completion of the project. The use of building equipment for temporary service and testing does not constitute the beginning of the warranty. This guaranty means that this Contractor shall make good to the owner, at no cost, any defects that become apparent during the year following substantial completion. This guaranty is in addition to any other guaranties or warranties and is not intended to limit such other guaranties or warranties.

1.9 DEFINITIONS: The following words and phrases are hereby defined:

1.9.1 "provide": Furnish and install all material and labor required for a complete installation ready for operation in accordance with the intent of the Contract Documents.

1.9.2 "as required": Indicates that the contractor shall perform the work or provide the material as indicated in accordance with manufacturer's installation instructions and in accordance with applicable codes or regulations.

1.9.3 "or equal": Indicates that the contractor may substitute equipment by another manufacturer if the salient features of the equipment indicated by manufacturer's name and/or described are, in the judgment of the Architect, adequate. See article PRIOR APPROVAL.

1.9.4 "contractor": Where the word(s) "contractor" or "this contractor" is used herein it refers to the contractor engaged to execute the work under this division of the specifications only, even though he may be technically described as a sub-contractor.

1.9.5 "intent of the Contract Documents": The specific intent of these documents is to provide to the owner, in a thoroughly functional condition, all the various systems, equipment, etc., indicated herein. Final interpretation of the "intent" shall rest with the Architect.

1.9.6 "shall": Indicates a mandatory requirements.

1.10 INSPECTION OF THE SITE:

1.10.1 The drawings are prepared from the best information available and reflect all conditions commensurate with this information. However, the contractor should visit the site prior to submitting a proposal and should verify the locations, sizes, depths, pressures, etc., of all existing utilities and familiarize himself with working conditions, hazards, existing grades, soil conditions, obstructions, etc. If it becomes evident that existing site conditions will impair the proper operation of the utilities, the Architect shall be notified in writing.

1.10.2 All proposals shall take these existing conditions and any revisions required into consideration, and the lack of specific site information on the drawings shall not relieve the contractor of any responsibility.

1.11 CONSTRUCTION SAFETY:

This Contractor assumes all responsibility for the safety of his personnel on the project during construction. The Contract Documents do not include materials, procedures, components, etc., required to insure construction safety. Refer to General Conditions for additional information.

1.12 DAMAGE:

1.12.1 This Contractor shall be responsible for damage to the project caused by this Contractor's failure to recognize hazards associated with items such as lack of power, scheduling of work (tardiness), inexperienced workmen, excessive cutting, etc. This Contractor shall repair at no expense to the owner any such damage.

1.12.2 This Contractor shall familiarize himself with working conditions to the extent that he shall be responsible for damage to concealed piping, wiring and other equipment meant to remain, and shall repair any damage caused by his negligence at no cost to the owner.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 WORKMANSHIP:

3.1.1 All work shall be done by experienced craftsmen skilled in the applicable trade.

3.1.2 Unprofessional and incomplete work shall be rejected and corrected at no additional expense. The judgement of professionalism and completeness of work shall be made by the architect/engineer and shall be final.

3.2 MANUFACTURER'S INSTALLATION INSTRUCTIONS:

All equipment shall be installed in strict compliance with manufacturer's installation instructions.

3.3 PROTECTION OF EQUIPMENT:

The Contractor shall continuously maintain adequate protection of stored materials and installed equipment. Fixtures and equipment, whether located inside or outside, shall be tightly covered with sheet polyethylene or waterproof tarpaulin as protection against dirt, rust, moisture and abuse from other trades. Adequate air circulation shall be provided under any protective sheet to prevent condensate build up. Materials and equipment shall not be stored where it can come into direct contact with the ground. Conduit, conduit hangars, cable tray and equipment shall not be used by other trades as supports for their equipment, scaffolds or personnel. At the completion of the work, equipment, fixtures, exposed supports and piping shall be cleaned of loose dirt, construction debris, overspray, etc., to the satisfaction of the Architect. Repairs made necessary by damage shall be paid for by the Contractor.

3.4 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES:

3.4.1 The drawings are not to be construed as shop drawings but indicate the extent, general locations, arrangement, etc., of conduit systems and equipment. Electrical drawings are diagrammatic and shall not be scaled for exact size. If the contractor has any questions regarding the layout of a particular device or equipment item he shall contact the architect for clarification. This Contractor shall, in laying out his work, refer to other sections of the specifications and other drawings such as air conditioning, structural, plumbing, architectural, etc., in order to eliminate conflicts and undue delays in the progress of the work. See article CUTTING AND PATCHING for additional coordination required. Where items are furnished by other trades require connections by this Contractor, they shall be held responsible for providing rough-in drawings and assistance upon request.

3.4.2 In the event of interferences, piping or equipment requiring set grades or elevations shall have precedence over conduit, lighting, outlet boxes, air conditioning, ductwork, etc.

3.4.3 Plans, specifications and other documents have been prepared and developed with reasonable professional care and coordination. It is the intent that all documents are supportive and complimentary, one to the other; and as such what is required by one shall be considered as required and binding as if indicated by all. Work indicated shall include, regardless of whether or not specifically stated, such supportive or required items or work as consistent with what is indicated, is reasonably inferable from what is indicated, and/or is common construction procedure or knowledge with regard to what is indicated.

3.4.4 In the event of conflict between codes as interpreted by the authority having jurisdiction, and the contract documents, the codes shall govern.

3.4.5 In the event of a conflict between manufacturer's installation instructions and the drawings, the manufacturer's installation instructions shall govern.

3.4.6 Should discrepancies be found between the documents and/or an interpretation is required, and a decision or interpretation to the contractor is not rendered by the Architect, it shall be assumed the contractor has reviewed all the documents to find the most costly method or items in question which then shall be required. One document does not take precedence over another when interpreting a discrepancy.

3.5 CUTTING AND PATCHING:

3.5.1 All cutting required by the installation of sleeves, conduit, equipment, etc., shall be coordinated with the General Contractor, but performed by this Contractor. Patching shall be by General Contractor. This Contractor shall not cut any structural element or any finished work without written permission from the Architect.

3.5.2 This Contractor shall cut and patch all paving as required by the installation of buried conduit or wire.

3.6 CONCRETE WORK:

This Contractor shall provide all forming, reinforcing and concrete as indicated such as equipment bases, transformer pads, etc. Work shall conform to the applicable portion of Division 3 CONCRETE.

3.7 PAINTING:

3.7.1 All painting except "touch-up" shall be provided under the painting section (Division 9) unless noted otherwise. All exposed conduit, equipment, etc., shall be left clean and free from rust or grease and ready for the painter.

3.7.2 Where equipment finishes are damaged, this Contractor shall obtain touch-up paint in matching colors from the equipment manufacturer and paint as required.

3.8 TRENCHING AND BACKFILL:

3.8.1 This Contractor shall perform all trenching, excavation, shoring, pumping and backfill required in the installation of his work. All trenches shall be maintained dry until all circuits have been satisfactorily tested (see paragraph TEST) and then filled in tamped 6" layers immediately after approval of tests by the Architect. All backfill shall be free of construction debris and any other foreign material which might damage any circuit runs. Stability of backfilled soil shall match adjacent undisturbed soil.

3.8.2 All exterior raceway or cable shall be laid with at least a minimum cover as indicated in the National Electrical Code.

3.8.3 The contractor shall exercise all possible care to avoid damage to trees and roots in excavation. Where possible, the contractor shall excavate beyond the drip line of trees. If it is necessary to cut roots 1" to 2 1/2" in diameter, the contractor shall excavate around, cut clean and paint severed ends of roots with a tree wound sealer. Do not cut roots 2 1/2" and larger.

3.9 EQUIPMENT CONNECTIONS:

3.9.1 This Contractor shall bring all required electrical service to all equipment items furnished under other sections of these specifications or by the owner, make final connections, and leave equipment ready for operation. This Contractor shall coordinate with any affected trade to assure correct operation of the equipment item, i.e., phase rotation, switching, control location and accessibility.

3.9.2 When the contractor is uncertain about the method of installation, proper location, etc., he shall ask for further instructions or details. Failure to request such information will not excuse non-compliance.

3.9.3 All roof mounted mechanical equipment shall be served through curb if possible.

3.9.4 General Clarification: Contractor shall provide power to all magnetic door locks locations whether boxes are indicated on the plans or not. Final locations are subject to review and approval by the Architect of Section 17400 system submittals. [Add6-14]

3.10 CONTROL AND INTERLOCK WIRING:

3.10.1 Except as otherwise indicated on the drawings, details of control wiring for work under the Mechanical Section are not shown. Control systems, components and control and interlock wiring for mechanical equipment will be furnished under Division 15. Control devices including, but not limited to, thermostats, fan speed and level control switches, relays and electro-pneumatic switches shall be furnished under Division 15. Motor control centers, magnetic starters and normal motor starters shall be provided under Division 16 unless noted to be provided with mechanical equipment in Division 15.

3.10.2 Power wiring to starters, relays and contactors shall be under Division 16. Power wiring to magnetic starters shall consist of wiring to the line side terminals of the magnetic starter or contactor and wiring away from the load side terminals to the equipment, except where such wiring is installed pre-wired by the equipment vendor such as for rooftop air conditioning units.

1. Power wiring to 120 volt-1 phase-60Hz and 277 volt-1 phase-60Hz fans, unit heaters, fan-coil units and pumps shall include all portions of the branch circuit, except wiring inside an

automatic temperature control panel (ATC) or Direct Digital Control Panel (DDC) or magnetic starter. Such internal wiring shall be furnished under Division 15.

Under Division 16:

1. Furnish duct mounted smoke detectors.
2. Provide wiring among detectors, fire alarm system, magnetic starters and relays, ATC panels and DDC panels.
3. Install line voltage components.
4. Circuiting to line voltage safety devices, i.e. vibration sensors on cooling towers.

3.10.3 The Electrical Subcontractor shall install all starters, pilot switches, control devices and miscellaneous items of electrical equipment furnished under other sections of these specifications that are not integrally mounted with their associated equipment.

3.10.4 The definition of control wiring for this specification is wiring that does not supply utilization energy and is generally below 120 volts. This wiring (control wiring) is to be provided under Division 15. Power wiring is typically branch or feeder circuiting that terminates in an electrical outlet that supplies utilization energy for machines or other electrical equipment. This voltage is generally 120 volts or greater and is provided under Division 16. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work associated with the control system.

3.11 FLASHING AND WATERPROOFING:

All building penetrations to the outside shall be flashed and counter-flashed as required to eliminate leaks.

3.12 TESTS:

All circuit and operational tests of the electrical systems shall be made by this Contractor and repeated until approved by the Architect. Conduit systems shall not be covered or otherwise concealed until review has been made and approvals obtained from the Architect. Notify the Architect four days prior to tests to allow for scheduling.

3.13 CLEAN-UP:

Where all work has been finally tested, this Contractor shall clean all work installed by him, including all fixtures, equipment, and all exposed work.

END OF SECTION