

SECTION 16010

GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 REFERENCES

- A. Conditions of the Contract, Specifications, Change Orders, Addenda, Drawings and Division 1 General Requirements, apply to work of this section. Where paragraphs of this section conflict with similar paragraphs of Division 1, requirements of this section shall prevail.
- B. As used in this section, "provide" means "furnish and install", "furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturers instructions", and "install" means "to unload at the delivery point at the site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project".

1.2 EXAMINATION OF SITE

- A. Before submitting a bid, the Electrical Contractor shall visit and carefully examine site to identify existing conditions and difficulties that may affect the work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions.
- B. Before starting work in a particular area of the project, the Electrical Contractor shall examine the conditions under which work must be performed including preparatory work performed under other Sections of the Contract, or by the Owner and report conditions, which might adversely affect the work in writing to the Architect. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.

1.3 SCOPE

- A. The work to be accomplished under these specifications includes providing all labor, materials, equipment, consumable items, supervision, administrative tasks, tests and documentation required to install complete and fully operational electrical systems as described herein and shown on the Drawings. The Electrical Contractor shall completely coordinate the work of this section with the work of other trades.
- B. The Electrical Contractor shall file plans, obtain permits and licenses, pay fees and obtain necessary inspections and approvals from authorities that have jurisdiction, as required to perform work in accordance with all legal requirements.

- C. The Work shall be complete from point of service to each outlet or device with all accessory construction and materials required to make each item of equipment or system complete and ready for operation. The work shall include but not be limited to the following. The Electrical Contractor shall provide:
1. Grounding of utility transformer in accordance with utility standards and all other equipment required by utility for new electrical service. Coordinate with CMP and site contractor for line extension into the facility.
 2. Service lateral and service entrance conductors and raceway.
 3. Meter enclosure for utility company revenue metering.
 4. Complete power and lighting distribution systems including service disconnect, switchgear, switchboards, distribution panels, panelboards, transformers, overcurrent devices raceway, cable and wire.
 5. Branch circuits and devices for power and convenience receptacles.
 6. All motor wiring, safety disconnects, and motor starters unless integral with equipment.
 7. Complete interior lighting system including normal and emergency fixtures, exit signs, lamps, controls, trim and accessories.
 8. Exterior lighting time clock, photocell, lighting contactors and termination of site lighting branch circuits. Site pole lighting and all associated wiring to be completed by site contractor.
 9. Complete addressable fire alarm and detection system including fire alarm control panel, pull stations, heat detectors, area smoke detectors, duct smoke detectors, indicating appliances, remote annunciator, water flow, pressure, and tamper switch wiring, auxiliary contacts for equipment interlocking, magnetic door holders and other devices shown on the Drawings.
 10. Empty boxes and conduits with pull strings to above accessible ceilings for voice/data, cable TV and other telecommunications system wiring by owner.
 11. Control wiring not provided by Division 15000.
 12. Complete grounding system as indicated on grounding plans.
 13. All support material and hardware for raceway, cable tray and electrical equipment.
 14. Branch circuits to control panels and devices furnished under other sections.
 15. Termination of all cable and wire unless otherwise noted.

D. Install the following items furnished by others:

1. Motors
2. Control Panels

1.4 RELATED WORK IN OTHER SECTIONS

A. The following work is not included in this Section and shall be performed under other sections:

1. Excavation and backfill.
2. Concrete work, including concrete housekeeping pads and other pads and blocks for vibrating and rotating equipment.
3. Cutting and patching of masonry, concrete, tile, and other parts of structure, with the exception of drilling for hangers and providing holes and openings in metal decks.
4. Installation of access panels in ceilings and wall construction.
5. Painting, except as specified herein.
6. Temporary water, heat, gas and sanitary facilities for use during construction and testing.
7. Control wiring specifically indicated as part of Division 15.

B. The Electrical Contractor shall identify locations of penetrations, excavations, structural supports, etc. required for the completion of the Work of this Section to the General Contractor in a timely manner.

1.5 CODES, STANDARDS, AND AUTHORITIES

A. All work shall be performed strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have lawful jurisdiction. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of publications, standards, rulings, and determinations of:

1. Local and state building, plumbing, mechanical, electrical, fire and health department and public safety codes agencies.
2. National Fire Protection Association (NFPA)
3. Occupational Safety and Health Act (OSHA)
4. Factory Mutual Association (FM)

5. National Electrical Code (NEC)
 6. National Electrical Safety Code (NESC).
 7. The BOCA National Building Code.
- B. All materials and equipment shall be listed by Underwriters Laboratories (UL), and approved for intended service.
- C. When requirements cited in this Paragraph conflict with each other or with Contract Documents, the most stringent requirements shall govern conduct of work. The Architect may relax this requirement when such relaxation does not violate the ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.

1.6 WARRANTY

- A. Refer to Division 1 General Requirements for Warranty Requirements.

1.7 CONTRACT DRAWINGS

- A. Work to be performed under this section is shown on the electrical drawings listed in Division 1 General Requirements.
- B. The listing of electrical drawings does not limit responsibility of determining full extent of work required by contract documents. The Electrical Contractor shall refer to architectural, plumbing, HVAC, structural, and other drawings and other sections that indicate types of construction with which work of this section must be coordinated. The Electrical Contractor shall check with the General Contractor and other subcontractors to determine whether there will be any interference by such trades with the electrical work. If the Electrical Contractor fails to check with the General Contractor and subcontractors and the electrical work is later found to interfere with their work, then he shall make necessary changes, without additional cost to the Owner, to eliminate such interference.
- C. Drawings are diagrammatic and indicate general arrangement of systems and work included in contract. Information and components shown on riser diagrams or called for in the specifications but not shown on plans, and vice versa, shall apply and shall be provided as though required expressly by both. It is not intended to specify or to show every offset, fitting, or component; however, contract documents require components and materials whether or not indicated or specified as necessary to make electrical installation complete and operational.

1.8 DISCREPANCIES IN DOCUMENTS

- A. It shall be the responsibility of each bidder to examine the drawings and specifications carefully before submitting his bid, with particular attention to errors, omissions, conflicts with provisions of laws and codes imposed by authorities having jurisdiction, conflicts between portions of drawings, or between drawings and specifications, and ambiguous definition of the extent of coverage in the contract. Any such discrepancy discovered shall be brought to the immediate attention of the Architect for correction. Should any of the

aforementioned errors, omissions, conflicts or ambiguities exist in either or both the drawings and specifications, the Electrical Contractor shall have the same explained and adjusted in writing before signing the contract or proceeding with work. Failure to notify the Architect in writing of such irregularities will cause the Architect's interpretation of the Contract Documents to be final. No additional compensation will be approved because of discrepancies thus resolved.

- B. The drawings and these specifications are intended to comply with all the above mentioned rules and regulations. If discrepancies occur, the Electrical Contractor shall immediately notify the Architect in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the Architect prior to the execution of the contract, the applicable rules and regulations shall be complied with as a part of the contract.
- C. In case of difference between building codes, specifications, state laws, industry standards and the contract documents, the most stringent shall govern. Should the Electrical Contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, and industry standards, he shall bear all costs arising in correcting these deficiencies.

1.9 EQUIPMENT AND MATERIALS

- A. All equipment and materials shall be new and of the quality specified. All materials shall be free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged during construction shall not be repaired at the jobsite, but shall be replaced with new materials.
- B. All equipment installed on this project shall have local representation, local factory authorized service and a local stock of repair parts.
- C. No equipment or material shall be installed in such a manner as to void a manufacturer's warranty. The Electrical Contractor shall notify the Architect of any discrepancies between the Contract Documents and manufacturer's recommendations prior to execution of the work.

1.10 RECORD DRAWINGS

- A. As work progresses, and for duration of the Contract, the Electrical Contractor shall maintain a complete and separate set of prints of Contract Drawings at job site at all times and record work completed and all changes from original Contract. Drawings shall clearly and accurately include work installed as a modification or added to the original design.
- B. At completion of work and prior to final request for payment, the Electrical Contractor shall submit a complete set of reproducible record drawings showing all systems as actually installed.

1.11 SHOP DRAWINGS

- A. After the Contract is awarded, but prior to proceeding with the Work, the Electrical Contractor shall obtain complete shop drawings, product data and samples from manufacturers, suppliers, vendors, and Subcontractors for all materials and equipment specified herein, and submit data and details of such materials and equipment for review by the Architect and Engineer. Prior to submission of the shop drawings, product data and samples to the Architect, the Electrical Contractor shall review and certify that the shop drawings, product data and samples are in compliance with the Contract Documents. Further, the Electrical Contractor shall check all materials and equipment after their arrival on the jobsite and verify their compliance with the Contract Documents. A minimum period of ten working days, exclusive of transmittal time will be required in the Engineer's office each time shop drawings, product data and/or samples are submitted or resubmitted for review. This time period shall be considered by the Electrical Contractor when scheduling his Work.
- B. The Electrical Contractor shall submit to the Engineer four (4) copies of shop drawings. All copies shall be neatly bound in folders. Additional copies required for distribution shall be the responsibility of the Electrical Contractor after reviewed copies are returned to him with the Architect's review comments and notes.
- C. Each shop drawing shall indicate in the lower right hand corner, and each product data brochure shall indicate on the front cover the following: Title of the sheet or brochure; name and location of the building; names of the Architect and Engineer, Contractor, Subcontractor, manufacturer, supplier, vendor; the date of submittal; and the date of each correction and revision. So far as is practical, each shop drawing, product data and/or samples shall bear a cross-reference note to the page or sheet number of the Drawings and/or Specifications showing the Work. Unless the above information is included, the submittal will be returned for resubmittal without review.
- D. The shop drawing submittal shall include all data necessary for interpretation as well as manufacturer's name and catalog number. Sizes, capacities, colors, etc., specified on the drawings shall be specifically noted or marked on the shop drawings.
- E. Submittals shall contain only information specific to systems, equipment and materials required by Contract Documents for this Project. Do not submit catalogs that describe products, models, options or accessories, other than those required, unless irrelevant information is marked out or unless relevant information is highlighted clearly. Marks on submittals, whether by Contractor, Subcontractor, manufacturer, etc., shall not be made in red ink. Red is reserved for review process.
- F. All specification sheets, drawings and diagrams shall be submitted within 30 days from the date of Electrical Contractor signs the Contract. The Engineer's and Architect's review of such drawings shall not relieve the Subcontractor of responsibility for deviations from the Contract Drawings or Specifications, unless he has in writing called the attention of the Architect to such deviations at the time of the submission. The Architect's review shall not relieve the Electrical Contractor from responsibility for errors or omissions in such drawings.
- G. If the Electrical Contractor proposes an item of equipment other than that specified or detailed on the drawings which requires any redesign of the wiring or any other part of the

mechanical, electrical or architectural layout, the required changes shall be made at the expense of the trade furnishing the changed equipment at no cost to the Owner.

- H. Manufacturer's names are listed herein and on the drawings to establish a standard for quality and design. Where one manufacturer's name is mentioned, products of other manufacturers will be acceptable if, in the opinion of the Engineer the substitute material is of quality equal to or better than that of the material specified. Where two or more manufacturer's names are specified, material shall be by one of the named manufacturers only.

1.12 BULLETINS, MANUALS, AND INSTRUCTIONS

- A. The Electrical Contractor shall obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items and assemble literature in coordinated manuals with additional information describing combined operation of field assembled units, including as-built wiring diagrams. Manuals shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into two sections or books as follows:
1. Directions for and sequence of operation of each item of electrical systems, e.g. emergency generator, sound system, fire alarm system, etc.
 2. Detailed maintenance and trouble shooting manuals containing data furnished by manufacturer for complete maintenance.
- B. Furnish three copies of manuals to the Architect for review and distribution to Owner. Deliver manuals no less than 30 days prior to acceptance of equipment to permit Owner's personnel to become familiar with equipment and operation prior to acceptance.
- C. Upon completion of installation or when Owner accepts portions of building and equipment for operational use, instruct the Owner's operating personnel in any and all parts of various systems. Such instructions shall cover period of control such as will take mechanical equipment through complete cycle. Make adjustments under actual operating conditions.

1.13 TEMPORARY LIGHT AND POWER

- A. The Electrical Contractor shall furnish, install and remove the temporary electrical power and lighting systems and pay for all labor, materials, and equipment required therefore. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.
- B. The Electrical Contractor shall provide a temporary service to the space as required to provide electric light and power while the area is being renovated and until the permanent feeders have been installed, tested and accepted by the Owner. Install and maintain a feeder of sufficient capacity for the requirements of the space.
- C. The temporary electric service shall be based on the following:
1. Rooms or spaces under 250 sq. ft. - one (1) 100 watt lamp.

2. Rooms or spaces over 250 sq. ft. and under 500 sq. ft. - two (2) 100 watt lamps.
 3. Rooms or spaces over 500 sq. ft. - one (1) 200 watt lamp per every 1,000 sq. ft. or fraction thereof.
 4. Sufficient wiring outlets and lamps shall be installed to insure proper lighting in stairwells, corridors, and passage areas.
 5. Temporary power, in addition to the lighting requirements, shall be provided throughout the building for electrically operated tools on a minimum of 0.5 watts per sq. ft. Motors up to and including one hp only shall be provided for.
 6. Outlets shall be located at convenient points so that extension cords of not over 50 ft. in length will reach all work requiring light or power.
- D. All necessary cables, panelboards, switches, and accessories required by the temporary light and power installation shall be provided by the Electrical Contractor.
- E. The Electrical Contractor shall furnish all lamps, both initial and replacement, used for the temporary lighting system.
- F. The General Contractor and all subcontractors, individually, shall furnish all extension cords, portable lights and lamps therefore, sockets, motors, and accessories as required for their work.
- G. The General Contractor and all subcontractors shall reimburse the Electrical Contractor for the following:
1. Any temporary wiring of a special nature, other than that specified above, required for their work.
- H. All temporary wiring, service equipment, and accessories thereto shall be removed by the Electrical Contractor when directed by the General Contractor.
- I. All lamps installed in permanent lighting fixtures and used as temporary lights during the construction period, shall be removed and replaced with new lamps.

1.14 SPACE, EQUIPMENT ARRANGEMENT AND ACCESS

- A. The size of equipment shown on the drawings is based on the dimensions of a particular manufacturer. Where other manufacturers are acceptable, it is the responsibility of the Electrical Contractor to determine if the equipment he proposed to furnish will fit the space available. Shop drawings shall be prepared by the contractor when required by the Architect or Owner to indicate a suitable arrangement.
- B. Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Minor deviations from the drawings may be made to allow for better accessibility at no additional cost to the Owner, but changes shall not be made without review by the Engineer.

- C. Minimum clearances in front of or around equipment shall conform to the latest applicable code requirements.

1.15 MARKING AND LABELING

- A. All panelboards, indoor transformers, cabinets and other specified equipment shall be labeled with engraved laminated plastic plates, minimum 3/4" high with 3/8" engraved letters. Punch tapes with mastic backings are not acceptable.
- B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates, minimum 1/2" high with 1/4" engraved letters. Where individual switches or circuit breakers in power or distribution panelboards do not have cardholders, they shall be marked with 1/2" high labels.
- C. All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.
- D. All receptacles, switches, junction boxes, hard wired devices and other electrical equipment to be labeled with a Brother Ptouch labeling device that identifies panelboard and branch circuit the device is fed from.
- E. Cardholders for panelboard shall be filled out with typewritten identification of each circuit, except that the word "spare" shall be written in soft pencil to identify all circuit breakers installed that are not used.

1.16 WIRING METHODS

- A. Unless otherwise noted all wiring shall be installed in raceway.
 - 1. Unless otherwise noted, power distribution wiring including feeders and branch circuits shall be installed in electrical metallic tubing (EMT). Wiring concealed within wall cavities and above ceilings shall be permitted to be hospital grade MC cable.
 - 2. All fire alarm system wiring shall be installed in EMT. Wiring above ceilings and in wall cavities shall be U.L. listed fire alarm MC cable.
 - 3. All control wiring including automatic temperature control wiring provided by Division 15000 shall be installed in EMT when exposed to physical damage. Wiring above ceiling and in wall cavities shall be plenum rated cable.
 - 4. All phone, data, cable TV, security system and other telecommunications wiring shall be run in EMT for stub-ups.

END OF SECTION 16010