

SECTION 26 0510 - ELECTRICAL GENERAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The "General Conditions" and "Special Conditions" of Contract as written and referred to herein before are adopted and made part of Division 26.

1.2 DESCRIPTION OF WORK:

- A. Provide equipment, labor, etc., required to install complete working electrical system as shown and specified.
- B. Provide fixed electrical equipment, except where specifically noted otherwise.
- C. Provide portable electrical equipment for complete system.
- D. Provide equipment and/or wiring normally furnished or required for complete electrical systems but not specifically specified on the drawings or in specifications, as though specified by both.
- E. All equipment and wiring shall be new.
- F. Electrical work includes, but is not limited to:
 - 1. Arrange with local utility companies for services as shown or specified.
 - 2. Removal or relocation of electrical services located on or crossing through project property, above or below grade, obstructing construction of project or conflicting with completed project or any applicable code.
 - 3. Provide meters, switchboards, panelboards, circuit breakers, power outlets, convenience outlets, switches, and/or other equipment forming part of system.
 - 4. Complete cabling and raceway systems for voice & data system.
 - 5. Connection of all appliances and equipment.
 - 6. Complete emergency lighting and power system, including engine-generator, transfer switches, fuel system, venting, piping, controls, and fuel storage.
 - 7. Complete addressable fire alarm system.
 - 8. Complete empty raceway system(s) for auxiliary system(s) as shown.
 - 9. Complete system of cabling, outlets and raceways for nurses call system.
 - 10. Complete raceway system(s) and cabling for paging system.
 - 11. Complete system of cabling, outlets and raceways for television systems.
 - 12. Complete system of cabling, outlets and raceways for security system and access control system.
 - 13. Complete interior and exterior lighting.
 - 14. Complete lightning protection system.
 - 15. Provide temporary facilities for construction power.
 - 16. Complete conduit and wiring for medical gas alarms.
 - 17. Coordination of required services for owner furnished equipment.
 - 18. Complete conduit, wiring and connection of smoke dampers.
 - 19. Equipotential grounding of patient care areas.
 - 20. Short circuit and protective device coordination study, including field adjustments, as required by the NEC.
 - 21. Provide arc flash warning labels on all power distribution equipment as required by the NEC.
 - 22. Provide housekeeping pads for all floor mounted electrical equipment.
 - 23. Provide assistance to authorities having jurisdiction, architect, and engineer during scheduled and unscheduled field observations at various stages during the construction.

1.3 WORK NOT INCLUDED:

- A. Furring for conduit and equipment.
- B. Finish painting of conduit and equipment.
- C. Installation of motors except where specifically noted.

- D. Control wiring for mechanical systems, except where indicated to be provided by Electrical Contractor.
- E. Installation of telephone instruments and wiring.
- F. Flashing of conduits into roofs and outside walls. Inform General Contractor of number and size of roof penetrations prior to bidding.

1.4 RELATED WORK SPECIFIED ELSEWHERE:

- A. Classification of excavation: Architectural Division.
- B. Painting: Painting Division.
- C. Concrete Work: Concrete Division.

1.5 REQUIREMENTS OF REGULATORY AGENCIES:

- A. Obtain and pay for all permits required for the work. Comply with all ordinances pertaining to work described herein.
- B. Install work under this Division per drawings, specifications, adopted edition of the National Electrical Code, Local Building Codes, and any special codes having jurisdiction over specific portions within complete installation. In event of conflict, install work per most stringent code requirements determined by Architect.
- C. Arrange, pay fees for and complete work to pass required tests by agencies having authority over work. Deliver to Architect Certificates of Inspection and approval issued by authorities.

1.6 QUALIFICATIONS OF CONTRACTOR:

- A. Has completed minimum two projects same size and scope in past five (5) years.
- B. This qualification applies to Sub-Contractors.
- C. Use workmen experienced in their respective trade. Submit qualifications of Superintendent for review.
- D. Owner reserves right to reject bid of any Contractor failing to meet these qualifications.

1.7 GENERAL JOB REQUIREMENTS:

- A. Drawings and Specifications:
 - 1. Electrical work is shown on "E" series drawings inclusive. Follow any supplementary drawings as though listed above.
 - 2. Drawings and specifications are complementary. Work called for by one is binding as if called for by both.
 - 3. Drawings show general run of circuits and approximate location of equipment. Right is reserved to change location of equipment and devices, and routing of conduits to a reasonable extent, without extra cost to Owner.
 - 4. Refer conflicts between drawings and specifications describing electrical work and work under other Divisions to Architect for remedial action.
 - 5. Use dimensions in figures in preference to scaled dimensions. Do not scale drawings for exact sizes or locations.
 - 6. Execution of Contract is evidence that Contractor has examined all drawings and specifications related to work, and is informed to extent and character of work. Later claims for labor and materials required due to difficulties encountered, which could have been foreseen had examination been made, will not be recognized.
 - 7. Charges for extra work not allowed unless work authorized by written order from Architect approving charge for work.

- B. Visit to Site:
1. Visit site to survey existing conditions affecting work. Include necessary materials and labor to accomplish the electrical work, including relocation of existing services and utilities on building site in bid. No consideration given to future claims due to existing conditions.
- C. Definitions:
1. Provide: Furnish, install and connect complete.
 2. Wire: Furnish all necessary wiring and connect complete.
 3. Install: Set in place and wire complete.
 4. Work: Materials completely installed and connected.
 5. AWG: American Wire Gauge.
 6. NEC: National Electrical Code (latest edition)
 7. NFPA: National Fire Protection Association.
 8. OSHA: Occupation Safety and Health Administration.
 9. UL: Underwriters Laboratories, Inc.
 10. NEMA: National Electrical Manufacturers Association.
 11. IEEE: Institute of Electrical and Electronic Engineers.
 12. Approved equal: Must be approved prior to bid.
- D. Workmanship, Guarantee and Approval:
1. Work under this Division shall be first class with emphasis on neatness and workmanship.
 2. Install work using competent mechanics, under supervision of foreman, all duly certified by local authorities. Installation subject to Architect's constant observation, final approval, and acceptance. Architect may reject unsuitable work.
 3. Furnish Architect written guarantee, stating that if workmanship and/or materials executed under this Division are proven defective within one (1) year after final acceptance, such defects and other work damaged will be repaired and/or replaced.
 4. In event that project is occupied or systems placed in operation in several phases at Owner's request, guarantee will begin on date each system or item of equipment is accepted by Owner.
- E. Observations of Work and Demonstration of Operation:
1. At all observations of work, open panel covers, junction box covers, pull box covers, device covers, and other equipment with removable plates for check. Provide sufficient personnel to expedite cover removal and replacement.
 2. Contractor to assist Architect in demonstration of operation of new systems to satisfaction of Owner. Contractor to have manufacturer available for demonstration of systems where requested by Owner.
- F. Testing of Electrical Systems:
1. Test Completed work as follows:
 - a. Perform test required by Architect to indicate compliance with specifications, drawings and applicable codes. Provide instruments, labor and materials for tests.
 - b. Insulation - use 1000 VDC insulation tester (0-500 megohm full-scale), equal to "Megger" as manufactured by Biddle Company. Test conductors and busses of all systems, including feeders, main service busway, branches, motors, devices, equipment, etc. Test branches for one (1) minute; test feeders, bus ducts, busses, etc., for 15 minutes with readings at one minute intervals.
 - c. Receptacles:
 - 1) Use Woodhead Ground Loop Impedance Tester. Test each receptacle. Record readings.
 2. Ground Testing:
 - a. Testing of Made Ground Electrodes:
 - 1) Test Ground Systems Indicated.
 - 2) Using a measuring device which generates minimum of 500 VDC, calibrated in ohms (maximum 200 ohm scale) J.C. Biddle "Vibrotester" or approved equivalent.
 - 3) Provide test electrode in accordance with Measuring Device Manufacturer's instructions. Use ground rods as specified in Section "Grounding".
 - 4) Follow instructions of measuring device manufacturer for proper results.
 - 5) Test grounds only when earth is dry.
 - 6) Record ambient temperature, date, time, approximate water table level (as obtained from local geologists); type of earth material.

- b. Equip-Potential Grounding:
 - 1) Test as described in 2002 NFPA 99. See 4.3.3.1, "Ground Systems in Patient Care Areas".
 - 3. Test interval - 15 minutes. Graph microampere leakage vs. time with values plotted each 30-60 seconds. Test to be discontinued if erratic results are observed. Test records include date, ambient temperature, relative humidity, and time of day.
 - 4. Record all test results in loose leaf log for Owner. Test information required: Date of test; name of circuit or equipment; ambient temperature; weather conditions; final instrument readings; graph of readings for 15 minutes tests. Provide three copies of log.
 - 5. Some example test forms are included in 16018 including additional references to specific form types.
 - 6. Architect will observe tests. One week prior notice required.
- G. Materials and Substitutions:
 - 1. All material shall be new, with U.L. label where available. If U.L. label is not available, material shall be manufactured in accordance with applicable NEMA; IEEE and Federal Standards.
 - 2. No material substituted for specified, except by prior written approval of Architect. Specified catalog numbers are used for description of equipment and standard of quality only. Equivalent material given consideration only if adequate comparison data including samples are provided. Approval required prior to bid date. Submit substitution data 10 working days prior to bid date. Bid substituted material only if approved in writing by Architect.
 - 3. Submit to Architect within 30 days after award of contract a complete list of proposed material manufacturers. List does not preclude submission of shop drawings. Approval of manufacturer on list does not constitute approval of specific material or equipment.
- H. Shop and Erection Drawings:
 - 1. Submit complete shop drawings for all material and equipment furnished under Division 26 of specifications, to Architect for review within 30 days after award of contract. Shop drawings shall be submitted on timely basis to allow adequate lead time for review, re-submission if necessary, manufacture and delivery to allow access of material to project at correct time based on schedule established by Architect/Contractor. Include complete descriptive data with dimensions, operating data and weight for each item of equipment. Carefully examine shop drawings to assure compliance with drawings and specifications prior to submittal to Architect, General Contractor, and Sub-Contractor. Shop drawings and submittals shall bear the stamp of approval of the Contractor as evidence that the drawings have been checked by him. Drawing submitted without this stamp of approval will not be considered and will be returned for proper resubmission.
 - 2. Drawings larger than 8-1/2" x 11", submit 3 copies and 1 reproducible of each drawing. Architect will retain 2 copies and return 1 reproducible and 1 copy to Contractor. Contractor is responsible for copying reproducible for distribution.
 - 3. 8-1/2" x 11" drawing in brochure: Submit 6 original copies for review Architect will retain 2 copies and return 4 copies to Contractor.
 - 4. Review of shop drawings does not relieve Contractor of responsibility for errors and omissions in shop drawings. Contractor is responsible for dimensions and sizes of equipment. Inform Architect in writing of equipment differing from that shown.
 - 5. Prepare erection drawings when required by Architect. Investigate thoroughly all conditions affecting work and indicate on drawing. Architect will review erection drawings before work commences.
 - 6. Provide for Owner three (3) sets of final shop and erection drawings, except provide 1 set of 1.5 mil mylar sepia of shop drawings larger than 8-1/2" x 11" size.
 - 7. Coordination shop drawings will be required for the following areas, drawn to a scale of not smaller than 1/4" = 1'-0":
 - a. Electrical equipment areas.
 - b. Electrical and mechanical equipment areas.
 - c. Start drawings as HVAC shop drawings indicating all ductwork piping, equipment and locations of mechanical room floor drains, and electrical connections. Indicate elevations of all ductwork and piping. Draw sections as required to clarify congested situations.
 - d. Next, the Plumbing Section shall add all piping and plumbing equipment to the drawings.
 - e. Next, the Fire Protection Section shall add all sprinkler heads and fire protection piping.
 - f. Next, the Electrical Sections shall add all electrical fixtures, conduit and equipment.
 - g. Next, the drawings shall be submitted to the General Contractor for final coordination.
 - h. Finally, after the General Contractor has approved the drawings they shall be submitted to the Architect for approval.

- I. Cooperation:
 - 1. Carefully coordinate work with other contractors. Refer conflicts between trades to Architect.
 - 2. Work to be installed as progress of project will allow. Schedule of work determined by General Contractor and/or Architect.
- J. Maintenance and Operating Instructions for Equipment:
 - 1. Submit to Architect three (3) sets of data prepared by manufacturer for each item of electrical equipment completely describing equipment. Data to include parts lists, description of operation, shop drawings, wiring diagrams, maintenance procedures and other literature required for maintenance of equipment. Bind in booklet form for presentation.
- K. "Record" Blue Line Prints:
 - 1. Provide "Record" blue line prints at the completion of job. Keep set of prints on job and record day to day changes to Contract drawings with red pencil. One complete set of blue line prints will be furnished Contractor for record drawings. Indicate actual location of conduit systems, outlets, and equipment. Turn over prints to Architect at final observation.
 - 2. Frame "Record" print under glass in extruded aluminum frame and mount with screws and inserts on wall. Mount Riser Diagram near Main Switchboard; Mount Floor Plans near panelboard involved. Where more than one panelboard is involved and are separated, provide framed auto-positive near each panelboard.
- L. Items for Owner:
 - 1. Provide following items for Owner at time of substantial completion:
 - a. Certificates of inspection and approval from authorities having jurisdiction.
 - b. Written guarantee.
 - c. "Record" blue line prints.
 - d. Final approved shop drawings (3 sets).
 - e. Spare fuses (furnish receipt).
 - f. Maintenance data (3 sets).
 - g. Affidavit of Owner Instruction (1 copy).
- M. Marking:
 - 1. Identify each starter, (including starters furnished under Mechanical Section), panelboard, cabinet, control device, breaker, disconnect and safety switch with 1/4" high black letters cut in a white laminated phenolic strip. Use red letters for all equipment connected to emergency system. Attach to enclosure with two (2) metal screws.
 - 2. Identify receptacle outlets in critical care areas with nameplates indicating circuit number and panel designation. Critical care areas include: Operating Rooms, Delivery Rooms, Intensive Care Units, Special Procedures Rooms, Emergency Trauma and Treatment Rooms.
 - 3. Nameplates required for other items in this Division similar to those described above.
- N. Protection and Storage:
 - 1. Provide warning lights, bracing, shoring, rails, guards and covers necessary to prevent damage or injury.
 - 2. Do not leave exposed or unprotected, electrical items carrying current. Protect personnel from exposure to contact with electricity.
 - 3. Protect work and materials from damage by weather, entrance of water or dirt. Cap conduit during installation. Do not use "duct tape."
 - 4. Avoid damage to materials and equipment in place. Repair, or remove and replace damaged work and materials.
 - 5. Deliver equipment and materials to job site in original, unopened, labeled container. Store to prevent damage and injury. Store ferrous materials to prevent rusting. Store finished materials and equipment to prevent staining and discoloring. Store materials affected by condensation in warm dry areas. Provide heaters. Storage space on site and in building designated by Owner/Architect.
 - 6. Install equipment per manufacturer's recommendations. Conflicts between contract documents and these recommendations, deferred to Architect.
- O. Excavation and Backfill:
 - 1. Excavate for work in this Division.
 - 2. Avoid existing facilities in excavating. Contractor is responsible for repair and replacement of damaged facilities in executing work.

3. Backfill in twelve inch (12") lifts, wetted down and tamped. Compaction minimum 95% of adjacent earth.
 4. Repairing to be comparable to work cut including new asphalt paving, concrete paving, sod, replanting shrubbery, etc. Architect will observe repair work, and reject unsuitable work.
- P. Cutting and Repairing:
1. Cut and repair walls, floors, roof, etc., required to install work. Where work cut is finished, employ original installer of finish to repair finish. Do not cut structural members.
- Q. Anchors:
1. Provide anchors for all equipment, raceways, hangers, etc. to safely support weight of item involved. Anchors to consist of expansion type devices similar to "Redhead" or lead expansion anchors. Plastic anchors are not acceptable.
- R. Cleaning and Painting:
1. Clean equipment furnished in this Division after completion of work.
 2. Touch-up or re-paint damaged painted finishes.
 3. Remove debris, packing cartons, scrap, etc., from site.
- S. Starters:
1. Separately mounted starters are furnished under another Division, but installed in Division 26 unless specifically noted otherwise.
- T. Control Wiring:
1. Control Wiring including low voltage and line voltage interlock wiring will be furnished and installed under another Division, except where specifically shown otherwise. Carefully coordinate power and control wiring interface.

END OF SECTION