

SECTION 26 00 00
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Do all work in accordance with regulations of serving electrical utility, telephone utility, National Electrical Code, National Electrical Safety Code, National Fire Codes, and other applicable codes.
- B. Whenever the requirements of the Electrical Specifications or Drawings exceed those of the applicable code or standard, the requirements of the Specifications and Drawings shall govern.
- C. This Contractor is bound by the General Conditions, Supplementary Conditions, Special Conditions, and Division 1 bound herewith in addition to this Specification and accompanying Drawings.
- D. Bidders shall view the site and shall include all costs incurred by existing conditions in the bid proposal.

1.2 QUALITY ASSURANCE

- A. All materials shall be new, of manufacturer's latest design and of the best quality. The materials shall be manufactured in accordance with applicable standards of NEMA, ANSI, or UL and shall be UL listed.
- B. Complete each system as shown and place in operation except where only rough-in or partial systems are called for. Each system shall be tested and left in proper operation free of faults, shorts, or unintentional grounds.
- C. Protect electrical work, wire and cable, materials and equipment installed under this Division against damage by other trades, weather conditions, or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.

PART 2 PRODUCTS

2.1 MATERIALS AND METHODS

- A. Electrical metallic conduit may be used in dry locations not subject to mechanical injury. Raceways within six feet of the floor in passages, storage areas or where exposed to passing traffic are deemed subject to mechanical injury.
- B. Non-metallic plastic conduit (PVC) shall be used for power systems underground feeders, including runs under the building slab. Minimum 3/4" trade size. PVC shall not be used inside buildings.
- C. Flexible metal conduit permitted where fixed into the existing concealed spaces and where flexibility is necessary. Exposed flex shall be jacketed, equal to Seal-Tite, with approved fittings, limited to nominally 18 inches maximum length.

- D. With the exception of secondary service conduits, all conduits shall be routed overhead and concealed in walls.
- E. Galvanized Rigid Conduit (GRC) and Intermediate Metal Conduit (IMC) shall be used where exposed to weather, or damp location, where subject to mechanical injury.
- F. GRC and IMC shall be coupled and terminated with threaded fittings. Ends shall be bushed with insulating bushings equal to T&B 1220 or 1230 series.
- G. Connectors and couplings for EMT shall be steel concrete tight compression type with insulated throats on connectors. Connectors shall have a T&B 5030 and 5040 series insulating bushing. Indent type connectors shall not be used.
- H. The Contractor shall provide supplemental ground bus in terminating switch and panelboards, and green ground wire as per code rules, for all PVC runs.
- I. Provide duct-seal at ends of all underground and under slab conduits.
- J. All elbows installed in PVC conduit runs shall be long sweep galvanized rigid steel.
- K. Wire shall be copper, unless otherwise shown on the Drawings, No. 12 minimum size for lighting and power uses. Insulation to be type THHN or THWN except where adverse conditions require other insulation type.
- L. Splices and Terminations: Splices shall utilize wing nut connector installed properly; splices for No. 8 and larger wires shall be made with approved pressure type connectors; all taped joints shall be applied in half-lap layers without stretching to deform.
- M. Outlet boxes shall be galvanized stamped steel with screw ears, knock-out plugs, mounting holes, fixture studs if required.
- N. Safety and disconnect switches shall be NEMA type HD (heavy duty), quick-make, quick-break, dual rated with electrical characteristics as required by system voltage and the load served. Approved manufacturer: Siemens, Square D, Cutler Hammer, G.E..
- O. All wiring devices and plates to be specification grade. Ivory color. Receptacles: Hubbell 5362 series, Switches: Hubbell 1221 series, Coverplates: Impact resistant plastic, Ivory color.
- P. Panels shall be factory pre-assembled using copper bussing and bolt-on circuit breakers. Separate feeder lugs shall be provided for each feeder conductor. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machine drilling or tapping. Panels shall be "service rated" where required. Approved manufacturer: Siemens, Square D, Cutler Hammer/Westinghouse, G.E.
- Q. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.

- R. Circuit breakers shall be fully interchangeable, without disturbing adjacent units, quick-make, quick-break, ambient compensated, and trip indicating. Provide complete, accurate, typewritten resulting circuit schedules in panel.
- S. Provide grounding of the electrical system in accordance with Article 250 of the National Electrical Code. All raceway systems are to contain a grounding conductor sized in accordance with the NEC.
- T. Provide all lighting outlets indicated on the Drawings with a fixture of the type designated for the location. Outlet symbols on the Drawings without a type designation shall have a fixture the same as those used in similar or like locations. Provide lamps for all fixtures.
- U.. LED lighting fixtures shall be in accordance with IED, NFPA, UL, as shown on the Drawings and as in these Specifications.
- V. LED drivers shall include the following features unless otherwise indicated:
 1. Power factor: > 0.9 nominal
 2. Input Voltage: 120V – 277V, 60 Hz
 3. Total Harmonic Distortion: < 20 percent
 4. Temperature Rating: 0 degrees C – 40 degrees C
 5. Integral short circuit, open circuit, and overload protection.
- W. LED modules shall include the following features unless otherwise indicated.
 1. Comply with IES LM-79 and LM-80 requirements.
 2. Minimum 80 CRI and color temperature 4000 degrees K unless otherwise specified in Lighting Fixture Schedule/List.
 3. Minimum Rated Life: 70,000 hours per IES L70, unless otherwise specified in Lighting Fixture Schedule/List.
 4. Light output initial lumens as specified in Lighting Fixture Schedule/List.
 5. LED modules shall be field replaceable and contain quick-disconnects.
- X. LED lighting fixtures shall have available digital IES files from a NVLAP accredited testing laboratory in accordance with IESNA LM-79, which specifies the entire luminaire as the source, resulting in an efficiency of 100 percent. Lighting fixtures that do not have these test results available will not be accepted.
- Y. Type 1 occupancy sensors shall be wallbox-mount passive infrared type, 180 degree field view, 900 square foot range, 30 sec to 30 min adjustable time delay, user-adjustable sensitivity, manual override switch, Watt Stopper WS series or equal.
- Z. Type 2 occupancy sensors shall be ceiling-mount dual-tech infrared and ultrasonic type, 360 degree field view, 5 to 30 min adjustable time delay, Watt Stopper DT-300 series or equal.

2.2 INSTALLATION REQUIREMENTS

- A. Electrical plans are diagrammatic. Verify exact equipment locations for all equipment. Coordinate with architectural drawings and installations to avoid conflicts

- B. All work shall be installed in a neat, inconspicuous, professional manner. Conduit runs shall parallel structural lines where exposed.
- C. Support conduits nominally every 6 feet along runs and within 18 inches of terminations, ells and fittings. Outlet boxes, fixtures and equipment shall be securely mounted and supported.
- D. The site shall be left clean and free of dirt and debris. Panels, fixtures, outlets and equipment shall be left clean and free of foreign materials and dirt.
- E. Panels, switches, distribution centers and all controls shall be clearly and permanently labeled as follows:
 - 1. Panelboards shall be labeled with panel designation, voltage and phase. Labels shall be black on white phenolic plastic with the lettering engraved to expose white lettering. Panel designation shall have 1" high letters and voltage and phase shall be ¼" high. Nameplates shall be secured with screws. Adhesive is not acceptable.
- F. Lamps and lighting fixtures of types and sizes as indicated shall be furnished and installed complete. Provide with all required mounting accessories.
- G. Lamps of the proper type, wattage, and voltage rating shall be delivered to the project in the original cartons and installed in the fixtures just prior to the completion of the project. Provide lamp type as recommended by the fixture manufacturer.
- H. Fixtures shall be left clean at the time of acceptance of the work with every lamp in operation. If fixtures are deemed dirty by the Architect at completion of the project, the Contractor shall clean them.
- I. Fixtures shall be carefully aligned, leveled in straight lines, and located as shown on the Architectural reflected ceiling plan. The final decision as to adequacy of support and alignment shall be made by the Architect. The fixtures shall be supported and fastened to the ceiling system.
- J. It shall be the contractor's responsibility to locate and aim occupancy sensors in the correct location required for a complete and proper volumetric coverage within the range of coverage of controlled areas per the manufacturer's recommendations. The contractor shall provide the quantity of sensors necessary to properly and completely cover each room indicated to have occupancy sensing.
- K. The contractor shall provide power packs as required to accomplish the occupancy sensing indicated.
- L. It is the contractor's responsibility to arrange a pre-installation meeting with the manufacturer's factory authorized representative, at the Owner's facility, to verify placement of sensor and installation criteria.
- M. The contractor shall provide, at the Owner's facility, the training to familiarize the Owner's personnel with the operation, use, adjustment, and problem-solving diagnosis of the lighting control equipment and systems.

PART 3 EXECUTION

3.1 GUARANTEE

- A. Guarantee the electrical installation against all defects in materials, equipment, and workmanship for one year after the date of acceptance of the work. Defects shall be properly remedied to the satisfaction of the Architect at no cost to the Owner.

END OF SECTION 26 00 00