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16500-LIGHTING FIXTURES AND ACCESSORIES

PART 1: GENERAL

1.1 SCOPE:

- a. The Contractor shall furnish and completely install Lighting Fixtures and Accessories as indicated on the drawings and as herein specified.
- b. All fixtures shall be equipped with lamps.
- c. A lighting fixture shall be provided for each lighting outlet indicated. Outlets lacking fixture designations shall be brought to the attention of the Architect/Engineer before submitting proposal, otherwise units selected by the Architect/Engineer shall be furnished and installed at no additional charge.

1.2 SUBMITTALS:

- a. Submit for approval complete manufacturer's data sheets for all fixtures. Indicate all components, characteristics, and options.
- b. Submit for approval manufacturer's data sheets for all lamps to be furnished.
- c. Submit for approval Lighting Fixture samples as requested by the Architect/Engineer. Samples shall be equipped with lamps, cords, plugs, and ballasts for 120 volt operation.

PART 2: PRODUCTS

2.1 LIGHTING FIXTURES:

- a. All fixtures shall be labeled by Underwriters Laboratories, Inc.
- b. Fixture designations on the drawings generally consist of a letter indicating the fixture type. Fixture types are identified in the Lighting Fixture Schedule or Symbol Schedule, however, the Schedule does not necessarily list all accessories and hardware necessary for the complete installation, nor does it detail the construction to be encountered at the fixture locations. It is the Contractor's responsibility to properly determine and provide correct components, accessories, and hardware required for the installation.
- c. Pendant Fixtures shall be equipped with swivel hangers; twin stem for individual fluorescent fixtures and single stem for continuous row fluorescent fixtures, spaced according to the manufacturer's recommendations but not less than one per fixture unit plus one per row.
- d. Recessed fixtures in plaster and gypsum board ceilings shall be equipped with plaster frames. In other ceilings they shall be equipped with plaster frames and/or other devices as approved by the Architect/Engineer, to facilitate removal of fixture and access to the concealed junction box.
- e. Plastic materials indicated to be "acrylic" shall be of 100% virgin methyl methacrylate produced by Rohm and Haas, Dupont, or Cyanamid.
- f. Eight-foot chassis with lamps in tandem may be used in lieu of four-foot fluorescent units in continuous rows, except where recessed into ceiling construction which incorporates exposed support members at four-foot intervals.

2.2 LED DRIVES

- a. General.
 1. Ten-year operational life while operating at maximum case temperature and 50 percent non-condensing relative humidity.
 2. Designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC601-2.
 3. Electrolytic capacitors to operate at least 20 degrees C below the capacitor's maximum temperature rating when the driver is under fully-loaded conditions and under maximum case temperature.
 4. Maximum inrush current of 2 amperes for 120V and 277V drives.
 5. Withstand up to a 4,000 volt surge without impairment of performance as defined by ANSI C82.41 Category A.
 6. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD 520.20.
 7. Class A Sound Rating - Inaudible in a 27 dBA ambient.
 8. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
 9. Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements.
 10. Drives to track evenly across:
 - (a) Multiple fixtures.
 - (b) All light levels.
 11. Constant current drives must provide models to:
 - (a) Support from 200mA to 2.1 Amps (in 10mA steps) to ensure a compatible driver exists.
 - (b) Support LED arrays up to 40W or 50W (7.10mA to 1.05A in 10mA steps).
 12. Constant voltage drives must provide models to:
 - (a) Support from 10V to 40V (in 0.5V steps) to ensure a compatible driver exists.
 - (b) Support LED arrays up to 40W.
 13. Configuration tool must be available to optimize the following for LED fixtures:
 - (a) Light level.
 - (b) Efficacy.
 - (c) Thermal performance.
 14. Driver must be capable of operating from a supply voltage of 120 through 277VAC at 60Hz.

2.3 EMERGENCY EXIT LUMINAIRE:

- a. It shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, N.C. Building Code, Volume X Energy Code, NFPA-101, and NEMA Standards.
- b. Battery shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Battery shall have a normal life expectancy of 10 years. Batteries shall be high temperature type with an operating range of 0 degree C to 60 degrees C and contain a re-sealable pressure vent, a sintered + positive terminal and - negative terminal.
- c. Charger shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80 percent. A low voltage disconnect switch shall be included if LEAD battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.
- d. Pilot light shall indicate the unit is connected to AC power. The battery shall have high rate charge pilot light, unless self-diagnostic type. Tests switch shall simulate the operation of the unit upon loss of A.C. power by energizing the lamps from the battery. This simulation must also exercise the transfer relay. If fluorescent emergency unit is used, an LED charging indicator light shall be easily visible for installation and a remote test switch shall be installed adjacent to the fixture.
- e. The entire unit shall be warranted for three years. The battery must have an additional two more years' pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.
- f. The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Minimum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit and recharge to the owner.
- g. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection. Any unit which fails the test must be repaired or replaced, and tested again. The test shall demonstrate that the batteries conform to the requirements of NEC 700.12 (F).

2.4 EMERGENCY EGRESS LUMINAIRE:

- a. Shall be completely self-contained, provided with maintenance-free 12 volt battery, automatic charger, two lamps, and other features. Luminaire shall be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, N.C. Building Code, Volume X Energy Code, NFPA-101, and NEMA Standards.
- b. Pilot light shall indicate the unit is connected to A.C. power. The battery shall have high rate charge pilot light, unless self-diagnostic type. A test switch shall simulate the operation of the unit upon loss of A.C. power by energizing the lamps from the battery. This simulation must also exercise the transfer relay. If fluorescent emergency unit is used, an LED charging indicator light shall be easily visible for installation and a remote test switch shall be installed adjacent to the fixture.
- c. Battery shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Battery shall have a normal life expectancy of 10 years. Batteries shall be high temperature type with an operating range of 0 degree C to 60 degrees C and contain a re-sealable pressure vent, a sintered + positive terminal and - negative terminal.
- d. Charger shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.
- e. The entire unit shall be warranted for three years. The battery must have an additional two more years' pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.
- f. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection. Any unit which fails the test must be repaired or replaced, and tested again. The test shall demonstrate that the batteries conform to the requirements of NEC 700.12 (F).

PART 3: EXECUTION

3.1 COORDINATION:

- a. Contractor shall verify ceiling or wall type in or on which each fixture is to be mounted, and shall furnish unit with appropriate trim type, mounting hardware, and accessories to fit the construction; and feed through junction boxes as required to maintain proper access to system wiring.

3.2 INSTALLATION:

- a. Lighting fixtures shall be installed in accordance with the manufacturer's instructions.
- b. Lighting fixtures shall be supported from the building structure using corrosion resistant steel hardware in compliance with Section 26 10 00, Basic Materials and Methods.
- c. A minimum of two No. 12 gauge wire supports attached to the structure shall be provided for each lighting fixture unless otherwise indicated or approved by the Architect/Engineer. The supports shall be located at diagonal corners of rectangular fixtures and angled away from fixture. A minimum of three full twists shall be made at each end to secure wire.
- d. In addition to the supports from the structure, fixtures shall also be secured to suspended ceilings on which they are mounted, or in which they are recessed. Where fixtures are secured to suspended ceilings, the primary supports from the building structure shall be slack.
- e. Where installed recessed in grid type ceilings, the fixtures shall be attached to the main run-ins of the suspended ceiling at all four corners using sheet metal screws.
- f. Mount fixtures plumb and square. Keep rows in perfect line.
- g. At time of project completion, fixtures and lamps shall be clean and fully operational.

16730-1 EXTENSION OF EXISTING FIRE ALARM SYSTEM, ADDRESSABLE

1.1 SCOPE:

- a. Contractor shall extend the building's existing Fire Detection and Alarm System as indicated on the drawings and as specified herein.
- b. Extension shall include all devices, wiring, equipment, raceways, and connections required for a complete and satisfactorily operating system, whether or not every such item is specifically shown or mentioned.
- c. All initiation devices shall be analog addressable devices. The notification devices shall be installed where required to meet ADA, NFPA 72 and the NORTH CAROLINA Building Code.
- d. All devices and installation methods used shall match that of the existing system.

1.2 CONTRACTOR QUALIFICATIONS:

- a. Equipment and materials shall be provided by a factory-authorized distributor to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service. The factory-authorized distributor is required to have been in the fire alarm industry (service and installation) for a minimum of 5 years.

1.3 SUBMITTALS:

- a. Shop drawings shall be submitted for each item of equipment to be furnished.
- b. Submittal shall include a complete wiring and conduit diagram overlaid on a building floor plan system battery calculations, notification device response drop calculations, prepared by an authorized representative of the system manufacturer. Diagram shall indicate conduit sizes, quantities, and notations for each conduit run, as well as required conduit sizes.

1.4 CLOSEOUT DOCUMENTS:

- a. Complete set of record wiring schematics, drawn to scale, showing all device locations, wire routing, and connections, etc. shall be provided prior to final inspection.
- b. Warranty Statement from the manufacturer. Warranty statement will state the period of warranty of the product proposed for the project, and shall include the name and address of the authorized manufacturer's agent who will honor any and all warranties.
- c. A scaled plan of the building showing the placement of each individual item of fire alarm equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

1.5 SYSTEM FUNCTION:

- a. In general, system function shall be as evidently intended by self-labeled equipment, indicated herein.
- b. Activation of any manual station, smoke detector, sprinkler system flow switch, or other alarm initiating device shall cause:
 1. The sounding of audible alarm throughout the facility.
 2. The flashing of alarm indicating lights.
 3. Indication of the alarm condition at the control panel indicating type of alarm (e.g. whether manual station, smoke detector, etc.) as well as location of initiating device.
 4. Release of magnetic door holders, shut-down of air handling systems, closing of smoke dampers and other control functions as indicated or required.
 5. Manual sounding device in the panel shall be activated.
- 6. Activation (Alarm, Trouble, Supervisory) of the existing Fire Alarm System remaining for the existing building.
 - a. All automatic programs assigned to the alarm point shall be executed and the associated notification appliance circuits and control relays addressed and tested.
 - b. Other functions as noted on the drawings or as evidently intended or required.
- c. All strobes shall be synchronized in common spaces.
- d. Provide a horn silence function with an adjustable delay of 2 minutes to 15 minutes. Delay shall prevent silence function from engaging. Silence function shall be manually activated only and shall not prevent visual alarm from flashing.

3.1 INSTALLATION:

- a. Wiring shall be in accordance with manufacturer's recommendations for proper system operation.
- b. Cable for monitoring and control of addressable devices shall be not less than a #18 AWG twisted shielded pair. Unless specifically noted or approved otherwise, other conductors shall be of stranded copper not smaller than #14 AWG, with THW/THHN insulation.
- c. All wiring shall be in metal raceway, unless specifically shown otherwise. Raceways shall be sized for the wiring requirements of the system proposed, with maximum conduit fill of 40%.
- d. Wall-mounted system devices shall be flush mounted where construction permits. Where necessary and approved by the Architect/Engineer, surface mounting enclosures may be utilized. Contractor shall coordinate trim types.
- e. Automatic detectors shall be located at least three feet from any HVAC diffuser.
- f. All junction and connection boxes shall be painted red for easy identification.
- g. Field connected devices must be installed and wired by a factory-trained and authorized fire alarm system Sub-Contractor or a licensed Electrical Contractor under direct supervision of a factory-trained and authorized fire alarm system Sub-Contractor.
- h. All auxiliary Power Supplies or other Fire Panels shall be located in electrical or mechanical rooms. They shall be mounted at a height between 48 to 60 inches from floor level. All such panels shall be "supervised" by the main Fire Alarm Panel.
 1. All communications with remote fire alarm system monitoring shall continue to be performed by the existing fire alarm system. The new fire alarm system shall notify the existing system with all alarm, trouble and supervisory signals. In addition, the existing fire alarm system shall notify the new fire alarm system with all alarm trouble and supervisory signals.

3.2 MANUFACTURER'S RESPONSIBILITIES:

- a. Final system connections shall be made by or under the direct supervision of an authorized representative of the manufacturer, who shall verify to the Architect/Engineer that the system has been left in full and proper operating condition.

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Project Number 106

Specifications

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