

## SECTION 16510 - LIGHTING FIXTURES

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Types of lighting fixtures, including:
  - 1. LED
  
- B. Applications of lighting fixtures required for this Project include:
  - 1. Interior lighting.
  - 2. Exterior lighting.
  - 3. Emergency lighting.
  - 4. Hazardous, corrosive and/or wet environments

#### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01300, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product Data: Submit manufacturer's product data and installation instructions on each type lighting fixture and component. Assemble in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet. Indicate voltage, bulb type, and wattage.
  - 2. Illumination Data: Provide isofotcandle (isolux) plot diagram of footcandles on horizontal pavement surface which shows values of illuminance projected from indicated fixture heights for roadway and parking area lighting.
  
- B. Operation and Maintenance Manuals: submit in accordance with Section 01782, operation and maintenance manuals for items included under this Section. Include maintenance data and parts list for each lighting fixture and accessory, and troubleshooting maintenance guide

#### 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment, of types and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.
  
- B. Codes and Standards:
  - 1. NEMA Compliance: Comply with applicable requirements of NEMA Standards Pub/No. LE 2 pertaining lighting equipment.
  - 2. IES Compliance: Comply with IES RP-8, 19, 20, and PB-15 pertaining to exterior, parking, and roadway lighting practices and fixtures.
  - 3. UL Compliance: Comply with requirements of UL standards, including Standards 486A and B, pertaining to lighting fixtures. Provide lighting fixtures and components which are UL listed and labeled.
  - 4. NFPA Compliance: Comply with applicable requirements of NFPA 78, "Lightning Protection Code," pertaining to installation of exterior lighting fixtures.
  - 5. State of Michigan Act 15 Electrical Law – State and Local requirements.

6. CBM Labels: Provide fluorescent lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  1. Lighting Fixtures:
    - a. Cree, Inc.
  2. Emergency Lighting:
    - a. Cree, Inc. (Preferred)
    - b. Chloride Systems.
    - c. Dual-Lite, Inc.
    - d. Emergi-Lite, Inc.
    - e. Exide, Inc.
    - f. Holophane Lighting.
    - g. Hubbell, Inc.
    - h. Lightalarms Electronics Corp.
    - i. Lithonia Lighting.
    - j. Thomas Industries, Inc.

### 2.02 EXTERIOR LIGHTING FIXTURES

- A. Provide lighting fixtures of sizes, types, and ratings indicated on Luminaire Schedule on Drawings, complete with, but not limited to, housings, energy efficient ballasts, starters, and wiring.
  1. LED:
    - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
    - b. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
    - c. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
    - d. Recessed Fixtures: Comply with NEMA LE 4.
    - e. CRI of 70. CCT of 3000 K or as indicated on the drawings.
    - f. Rated lamp life of 50,000 hours.
    - g. Lamps dimmable from 100 percent to 0 percent of maximum light output.
    - h. Internal driver.
    - i. Nominal Operating Voltage: 120 V ac, 240 V ac, 277 V ac (multi-volt).
      - 1) Lens Thickness: At least 0.125-inch (3.175 mm) minimum unless otherwise indicated.
    - j. Housings:
      - 1) Extruded-aluminum housing and heat sink.
  2. Lamps:
    - a. Provide LED lamps of types indicated.
- B. Provide integral photocell or photocell controlled contactor circuits in accordance with drawings.

## 2.03 INTERIOR LIGHTING FIXTURES

- A. Provide lighting fixtures of sizes, types, and ratings indicated on Luminaire Schedule on Drawings, complete with, but not limited to, housings, LED lamps, lamp holders, reflectors, energy-efficient ballasts, starters, and wiring. Ship fixtures factory assembled with components required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast-generated noise.
1. LED:
    - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
    - b. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
    - c. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
    - d. Recessed Fixtures: Comply with NEMA LE 4.
    - e. CRI of 70. CCT of 3000 K or as indicated on the drawings.
    - f. Rated lamp life of 50,000 hours.
    - g. Lamps dimmable from 100 percent to 0 percent of maximum light output.
    - h. Internal driver.
    - i. Nominal Operating Voltage: 120 V ac, 240 V ac, 277 V ac (multi-volt).
      - 1) Lens Thickness: At least 0.125-inch (3.175 mm) minimum unless otherwise indicated.
    - j. Housings:
      - 1) Extruded-aluminum housing and heat sink.
  2. Lamps:
    - a. Provide LED lamps of types indicated.

## 2.04 EMERGENCY LIGHT SETS, DECORATIVE

- A. Following features apply to decorative emergency light sets:
1. Self-contained emergency lighting units with style, shape, and trim as indicated.
  2. Battery: Sealed, maintenance-free, lead-acid or calcium type with 10-year pro rata adjustment warranty or 5-year, no charge replacement warranty.
  3. Charger: Minimum 2-rate, fully automatic, solid-state type with sealed transfer relay.
  4. Operation: Relay turns lamp on automatically when supply circuit voltage drops to 80 percent of nominal or below. Lamp operates for duration of outage, up to 1.5 hours. Lamp automatically disconnected from battery if voltage approaches deep-discharge level. When normal voltage is restored, battery is automatically recharged within 16 hours and then floated on trickle charge.
  5. Control panel contains low-voltage disconnect switch, high charge indicator light, test switch, and concealed terminals for remote lamp head connection.
  6. Lamps: LED sealed beam, 12 watt equivalent with case or remote mounting as indicated.

## 2.05 EMERGENCY LIGHT SET, GENERAL PURPOSE

- A. Self-contained, surface wall-mounted with 2 lamp heads, and having the following features unless otherwise indicated:
  - 1. Housing: 14-gauge steel or high-impact, injection-molded structural foam or fiberglass reinforced thermoplastic. Provide NEMA enclosure rating suitable for location in which unit is installed.
  - 2. Indicator Light for High Charge Rate and Test Switch: On front panel, with concealed terminals for remote lamp heads.
  - 3. Integral Lamp Heads: Mounted on housing with 180-degree 2-way, locking swivel joints for aiming. Lamps shall be 12-watt equivalent LED sealed beam type, as indicated.
  - 4. Battery: Sealed, maintenance-free, lead-acid or calcium type, with 10-year pro rata adjustment warranty or 5-year, no charge replacement warranty.
  - 5. Charger: Minimum 2-rate, fully automatic, solid-state type with sealed transfer relay and fused output circuits.
  - 6. Finish: Manufacturer's standard for exposed parts, baked enamel on steel.
  - 7. Operation: Relay turns lamps on automatically when supply circuit voltage drops to 80 percent of nominal or below. Lamps operate for duration of outage, up to 1.5 hours. Lamps automatically disconnect from battery when voltage approaches deep-discharge value. When normal voltage is restored, battery is automatically recharged within 16 hours and maintained on trickle charge.

## 2.06 EMERGENCY LIGHT SET, EXIT SIGN

- A. Self-contained, AC battery-illuminated exit sign unit, universal mounting with downlight. Provide NEMA enclosure rating suitable for the location in which unit is installed.
  - 1. Lamps: Manufacturer's standard LED, furnished with unit.
  - 2. Style, shape, trim, material, finish, and arrangement of housing as indicated.
  - 3. Faceplate: High-impact, UL 94 V-O rated, plastic with snap-out arrows and color of letters as indicated.
  - 4. Mounting provisions shall suit individual installation conditions.
  - 5. Battery: Sealed, maintenance-free, lead-acid type, with 10-year pro rata adjustment warranty or 5-year no charge replacement warranty.
  - 6. Charger: Minimum 2-rate, fully automatic, solid-state type with sealed transfer relay.
  - 7. Finish: Matte white for exposed parts, or as indicated.
  - 8. Operation: Sign is illuminated by AC-powered LED lamps under normal conditions. Relay turns emergency lamps on automatically when supply circuit voltage drops to 80 percent of nominal or below. Lamps operate for duration of outage, up to 1.5 hours. Lamps automatically disconnect from battery when voltage approaches deep-discharge value. When normal voltage is restored, AC-powered lamps are relighted and DC lamps are switched off. Battery is automatically recharged within 16 hours and maintained on trickle charge.

## 2.07 EXTRA MATERIALS

- A. Extra Stock: Furnish stock of replacement fixtures and photocells (if used) amounting to 15 percent (but not less than 1 fixture in each case) of each type and size used. Deliver replacement stock as directed to OWNER's storage space and obtain receipt.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF INTERIOR LIGHTING FIXTURES

- A. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements. Field locate fixtures to avoid conflicts with equipment, pipework, etc.

END OF SECTION