

## **SECTION 16800**

### **SITE LIGHTING**

#### **PART 1 – GENERAL**

##### **1.01 DESCRIPTION**

- A. Section includes requirements for site lighting system, including lighting control and protection components.

##### **1.02 REFERENCE STANDARDS**

- A. American National Standards Institute (ANSI):
  - 1. ANSI C82.4 Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)
- B. Institute of Electrical and Electronics Engineers (IEEE):
  - 1. IEEE C2 National Electrical Safety Code (NEC)
- C. National Fire Protection Association (NFPA):
  - 1. NFPA 70 National Electrical Code (NEC)
- D. Underwriters Laboratories (UL):
  - 1. UL 1029 High-Intensity-Discharge Lamp Ballasts
  - 2. UL 1598 Luminaires

##### **1.03 SUBMITTALS**

- A. Refer to Section 16000, Basic Electrical Requirements, for additional submittals and submittal requirements.
- B. Submit shop drawings including dimensions and components for each luminaire which is not a standard product of the manufacturer. Submit shop drawings of the lighting control cabinet, including layout drawing, control schematic, and wiring diagram.
- C. Submit product data including dimensions, ratings, and performance data.
- D. Submit test reports indicating measured illumination levels.
- E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.
- F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

- G. Maintenance Data: Submit maintenance data including instructions for maintaining luminaires.

**1.04 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NEC.
- B. Furnish products listed and classified by a nationally recognized testing laboratory.

**PART 2 – PRODUCTS**

**2.01 LIGHTING FIXTURES - GENERAL**

- A. Refer to Contract Drawings for Lighting Fixture Schedule. Provide lamp type as indicated on the Contract Drawings and as specified herein.
- B. All lighting fixtures shall have a polycarbonate shield for vandalism. All fixtures shall be waterproof and vandal-proof.
- C. The exterior lighting fixtures for the temporary station platforms shall be high pressure sodium vapor as indicated on the Contract Drawings. Fixtures shall have fully adjustable bilateral reflectors. The housing shall be constructed of extruded aluminum with an extruded aluminum hinged door for access to the lamp. The lamp holder shall be of the grip-tight mogul socket. Fixture voltage shall be selected to coordinate with the existing source available.
- D. Luminaires shall comply with UL 1598. High intensity discharge ballast shall comply with UL 1029 and ANSI C82.4.
- E. The finish of exterior luminaires shall be corrosion resistant, electrostatically applied on painted components.
- F. Fixtures shall have ballasts pre-wired with high power factor and designed for minus 20 degree F, or below, starting. The capacitor shall be separate and replaceable. The starting current of the ballast shall be less than the normal running current. The ballasts shall be of the high endurance type with a 3 year written manufacturer's guarantee covering damage to the ballasts due to lamp failures in open or short circuit conditions. Ballast shall have a protect feature which will prevent pulses to burn out lamps.
- G. Fixtures shall be listed by a nationally recognized testing laboratory for wet locations.
- H. Gaskets shall be high quality, high temperature gaskets providing positive weatherproof seals.
- I. Furnish mounting hardware and appurtenances with each fixture.

## 2.02 FIXTURE MOUNTING HARDWARE

- A. Lighting fixtures shall be designed with mounting brackets to provide the nominal mounting heights of luminaires as indicated on the Contract Drawings.
- B. Arms, mounting brackets, lighting poles, bases, and all hardware shall be from the same manufacturer as lighting fixtures. All shall be compatible in appearance, finish, and assembly.
- C. Where applicable, lighting poles shall be provided with grounding lugs capable of accepting a #2 AWG tap from the OCS (Overhead Catenary System) system counterpoise ground. This shall be in addition to the ground lug provided for connection to the equipment grounding conductor and supplementary ground.
- D. Mounting brackets for temporary station platform lights shall be suitable for wood pole mounting, fabricated from standard pipes, with an insulated wire inlet and rod to secure arm to wood pole. Wood pole shall be ANSI Class 5, of the length indicated on the Contract Drawings.

## 2.03 LIGHTING CONTROL EQUIPMENT

- A. Lighting control cabinet shall be NEMA Type 12 for indoor installation and NEMA Type 4 for outdoor installation. Cabinets shall be designed for wall mounting or shall be self standing, with dimensions as indicated on the Contract Drawings. Outdoor cabinets shall have outer and inner doors, backpanel, and hasp for padlocking.
  - 1. Time Switches: Digital type, two channels, with 365 days advance single holiday and seasonal schedule. Time switch clock input shall be 120 volts, 60 hertz, and shall be provided with two DPDT contacts rated a minimum of 10 amperes continuous duty. Time switch shall be able to retain the schedule for 40 years without power.
  - 2. Photoelectric Unit: Furnish photoelectric unit and necessary hardware suitable for mounting where required on the Drawings.
  - 3. Control Relays: Control relays shall be general purpose, blade type, 3PDT contact configuration with neon indicating light, rated minimum of 10 amperes at 240VAC. Provide matching socket base with hold down clips.
  - 4. Selector switch: Selector switch shall be NEMA 4X, oiltight/watertight, with contact block arrangement as required on the Contract Drawings.
  - 5. Lighting contactors: Lighting contactors shall be magnetically held, multi-pole, with coil rated at 120VAC, 60 hertz. Contact rating shall be a minimum of 30 amperes continuous. Number of contacts shall be as indicated on the Contract Drawings.
  - 6. Lightning arrester: Lightning arrester shall be a secondary surge arrester for electrical wiring.

7. Terminal blocks: Terminal blocks shall be provided for all incoming and outgoing circuits. Terminal blocks shall be rated 600 volts, and shall be UL listed. Terminal blocks for incoming circuits shall be suitable for wire sizes ranging from #20 AWG to #6 AWG. Terminal blocks for outgoing circuits shall be suitable for wiring ranging from #8 AWG to #4 AWG.
  8. Wire management: Plastic wire duct with slotted sidewall and with cover, sized as indicated on the Contract Drawings or as required.
- B. Control equipment shall provide components and connections which will allow automatic control of the lighting system. The controls shall provide on-off control of the lighting in response to two modes of operation:
1. Manual
  2. Automatic: In the automatic mode, the primary control device shall be the photocell unit. The time clock shall be wired into the control circuit such that certain lights may be turned off for a preset period of time during the normal photocell on period. The time clock controlled off operation shall be completely programmable for periods of time as short as 15 minutes and the setting shall be visible on the face of the time clock.

### **PART 3 – EXECUTION**

#### **3.01 GENERAL**

- A. Provide grounding to fixtures in accordance with Section 16060, Grounding and Bonding. Wiring methods and devices shall be in accordance with Sections 16100, Wiring Methods, and 16250, Wiring Devices. Handholes and pull boxes for running wiring to the luminaires and posts shall be in accordance with Section 16138, Concrete Handholes and Pull Boxes.

#### **3.02 LIGHTING FIXTURES**

- A. Install in accordance with manufacturers' instructions.
- B. Install lighting poles at locations indicated on the Contract Drawings. Locations on Contract Drawings are diagrammatic. Obtain Engineer's approval of exact locations in field.
- C. Install lamps in each luminaire.
- D. Bond luminaire, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode in the adjacent handhole or at the pole base where indicated on the Contract Drawings. Provide additional bonding to the OCS system counterpoise ground where indicated on the Contract Drawings. Refer to Section 016060, Grounding and Bonding.
- E. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for

equipment, change the locations for the lighting fixtures by a minimum distance necessary as approved by the Engineer. For purposes of this Section, clearances and interferences will be as defined in the NESC.

- F. Photoelectric controls shall provide control to the lighting contactors for the lighting systems and shall be powered independent of the wiring to the luminaire ballast system.

### **3.03 LIGHTING CONTROL DEVICES**

- A. Apply labels or stencil to control components to identify components and their purpose.
- B. Lightning Arrestor: Install lightning arrestor within the control cabinet.

### **3.04 FIELD QUALITY CONTROL**

- A. Take light meter readings in the presence of the Engineer at night to ensure proper lighting levels of all lighting systems. Provide the labor and equipment to make any required adjustments at this time. Notify the Engineer at least 48 hours prior to performing this test. This test shall be accomplished in the presence of the Engineer. Submit the test results to the Engineer in writing prior to Final Inspection. Record results on the Project Record Drawings.
- B. After completion of the work, place illumination system in operation. Final acceptance will not be made until the system has operated satisfactorily for a period of not less than 30 days from the date designated by the Engineer. This test period shall be included with the specified Contract time. Operation of the system shall not in any way be construed as an acceptance of the system or any part of it or as a waiver of any of the provisions of the Contract. The Contractor shall be responsible for the system during this period of operation and shall make any adjustments or repairs which may be required and remedy defects or damage which may occur.

**END OF SECTION**