

## SECTION 16500 - LIGHTING

### City of San Diego, CWP Guidelines

#### PART 1 -- GENERAL

##### 1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing lighting fixtures, accessories, and controls required for a complete and operable lighting system.

##### 1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

- 1. Section 16050 Basic Electrical Materials and Methods

##### 1.3 STANDARD SPECIFICATIONS

- A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

##### 1.4 CODES

- A. The WORK of this Section shall comply with the current editions of the following codes as adopted by the City of San Diego Municipal Code:

- 1. National Electrical Code (NEC), NFPA 70
- 2. Uniform Building Code (UBC)

##### 1.5 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

- 1. UL Underwriters Laboratories
- 2. CBM Certified Ballast Manufacturer's Association

##### 1.6 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted in compliance with Section 01300:

- 1. List of all fixture types with manufacturer's name and full catalog number.
- 2. Catalog information for each fixture, accessory, and control device. Each equipment submittal shall clearly describe make, materials, and dimensions. Catalog information shall clearly show manufacturer's name and full catalog number. Additional information is required for the following items:

- a. Fixtures. Material description shall include diffuser, hardware, gasketing, reflector and chassis, and finish.
  - b. Ballasts. Type of ballast, power factor, starting characteristics, temperature and sound rating, input watts and lamp watts.
  - c. Lighting Poles. Anchoring details, fixture attachment hardware, handholes, and pole mounted accessories or controls.
  - d. Photo-electric cell units. Switching capacity, lighting level adjustment method, and enclosure.
3. Polar plots on 8-1/2 x 11 inch paper providing candlepower vs. angle and foot-lamberts of brightness vs. angle for longitudinal and traverse axis.
  4. Table of utilization factors for calculation of illumination levels by the zonal cavity method.

## 1.7 OWNER'S MANUAL

- A. The following shall be included in the OWNER'S MANUAL in compliance with Section 01300:
  1. Manufacturer's installation instructions.
  2. Manufacturer's maintenance procedures, including dismantling procedures and parts list.

## PART 2 -- PRODUCTS

### 2.1 GENERAL

- A. Lighting materials including lighting fixtures, accessories, hardware, and controls shall conform with the detailed requirements indicated on the lighting fixture schedule. Lighting fixtures shall be provided where indicated. Raceway and wire, for other than street lighting, shall be in accordance with Section 16050. Materials for street lighting applications shall be in accordance with SSPWC section 209.

### 2.2 FIXTURES

- A. **General:** Fixtures shall be pre-wired with leads 18 AWG minimum, for connection to external lighting circuit.
- B. **Exterior Fixtures:** Pole-mounted fixtures, in combination with their mounting pole and bracket, shall be designed to withstand 100 MPH winds without damage. Exterior fixtures shall have corrosion-resistant hardware and either hinged door or lens retainer. Fixtures specified with integral photo-electric control shall be of the fixture manufacturer's standard design.
- C. **Interior Fixtures:** Interior fluorescent fixtures without diffusers shall be furnished with end plates. Where required, diffusers shall be of high molecular strength acrylic. Minimum

thickness of acrylic shall be 0.125 inches, except for those on 4 foot square fixtures which shall be a minimum of 0.187 inches thick.

## 2.3 BALLASTS

- A. **Fluorescent - Magnetic:** Ballasts for fluorescent lamps shall be non-leaking, filled with thermosetting compound, rated for 120 volt service, unless otherwise indicated. Two lamp ballasts shall be used where applicable. Ballasts for fixtures located in covered unheated areas and open areas shall be low temperature type. Ballasts shall be Class P, protected type, high power factor and shall carry the CBM and UL label. Ballasts shall be designed for case temperature lower than the nominal UL 90 degree C requirement.

Rapid start and slim-line fixtures shall be provided with ultra-premium grade, energy-saver ballasts with full light output. Ballasts in office areas shall have a Class "A" sound rating.

- B. **Fluorescent - Electronic:** Ballasts for fluorescent lamps shall be high frequency (20 kHz or greater) electronic type filled with non-leaking, thermosetting compound, rated for 120 volt service, unless otherwise indicated. Two lamp ballasts shall be used where applicable with input watts limited to 68 watts maximum. A three lamp ballast shall be used in three lamp fixtures with dual switching (one lamp on, two lamps on, three lamps on) and input watts limited to 101 watts maximum. Ballasts for fixtures located in covered unheated areas and open areas shall be low temperature type. Ballasts shall be Class P, protected type, sound rated A, high power factor and shall carry the CBM and UL label. Ballasts shall be designed for case temperature lower than the nominal UL 90 degrees C requirement.
- C. **High Pressure Sodium:** Ballasts for high pressure sodium lamps shall be autotransformer or isolation transformer high power factor type. Starting current shall not exceed normal running current.

## 2.4 LAMPS

- A. **Color:** Unless otherwise indicated, fluorescent lamps shall be warm white. Incandescent lamps shall be frosted inside. High-pressure sodium lamps shall be "color corrected."
- B. **Other:** Incandescent lamps shall be rated 130V AC. Unless otherwise indicated, lamp shape shall be standard A or PS. Unless otherwise indicated, high-pressure discharge lamps shall be suitable for operation in any burning position.

## 2.5 PHOTO-ELECTRIC CELL UNITS

- A. Photo-electric cell units shall consist of a cadmium sulfide cell housed in a plug receptacle assembly. The plug receptacle assembly shall be three-prong polarized locking type. Assembly shall be weatherproof, suitable for outdoor mounting and shall be rated for 1800 VA capacity at 120V. Unless otherwise indicated, photo-electric cells shall be provided with time-delay features.

## 2.6 LIGHTING POLES

- A. **General:** Lighting poles shall be provided with pole cap and all necessary fixture mounting hardware.

- B. **Fiberglass:** Fiberglass pole finish shall be impregnated in the resin. Color shall be factory standard brown, most nearly matching tree color in the area. Submit available colors for selection.
- C. **Concrete:** Concrete pole finish shall be natural mold concrete grey.

## 2.7 LIGHTING JUNCTION BOXES

- A. Junction boxes for the distribution of outdoor lighting circuits shall be precast concrete, set flush with the ground. Size shall be approximately 10.5 x 17.25 x 12 inches deep. Junction boxes for street lighting shall be in accordance with SSPWC section 307. Junction box cover, for other than street lighting, shall be cast iron with cast inscription: "LIGHTING".

## 2.8 LIGHTING CONTROL RELAYS

- A. Unless otherwise indicated, relays for lighting control shall be mechanically held, based-mounted, and single-purpose units.
- B. Unless otherwise indicated, coil voltage rating shall be 120 volts AC with double break contacts rated 20 amps continuous to 600 volts AC. Contacts shall be marked for ballast lighting (HID), tungsten, and general purpose loads.

## 2.9 EMERGENCY LIGHTING POWER SUPPLY

- A. Sealed battery, inverter and automatic transfer switch shall be rated to start one lamp immediately and maintain a lamp output of at least 600 lumens for 90 minutes following power failure. The emergency power supply shall be installed at the factory and shall be internally mounted inside the fixture ballast compartment. External status pilot light and manual test button shall be provided.

## 2.10 SPARE LAMPS

- A. Spares shall be provided for all lamp types except medium base incandescent lamps rated less than 300 watts. The number of spares shall be equal to 5 percent of each rating type, with a minimum of one standard manufacturer's package.

## 2.11 MANUFACTURERS

- A. Products of the type indicated shall be of the following manufacturer (or equal):

- 1. Fluorescent Magnetic Ballasts:

- Approved "series" for 2-F40 rapid-start lamps rated 120V (277V)
  - Advance "Mark III Kool-Koil," #R-2S40-TP (#V-2S40-TP).
  - GE "Super Premium Maxi-Miser I," #8G1024 (#8G1039).
  - Universal "Watt Reducer," #446-L-SLH-XXTC-P, (#443-L-SLH-TC-P).

- 2. Lamps:

- General Electric
  - North American Philips (Norelco)
  - Sylvania
  - Venture Lighting International

3. Fiberglass Lighting Poles:  
W.J Whatley
4. Concrete Lighting Poles:  
Centrecon  
Union Metal "Marbelite"
5. Lighting Junction Boxes:  
Brooks Products  
Christy Concrete Products  
Forni Corporation  
Utility Vault Company
6. Lighting Control Relays:  
ASCO 917 Series
7. Emergency Lighting Power Supply:  
Bodine  
Datbrite  
Guth  
Lithonia  
Siltron

## **PART 3 -- EXECUTION**

### **3.1 INSTALLATION**

- A. **General:** Raceways and lighting circuits shall be provided from the fixtures, switches, and fixture outlets to the power panelboard in accordance with the NEC. Raceways and wire, other than for street lighting, shall be provided in accordance with Section 16050. Installation requirements for street lighting shall be in accordance with SSPWC section 307. Fixtures shall be aligned and directed to illuminate an area as indicated. A concealed latch and hinge mechanism shall be provided to permit access to the lamps and ballasts and for removal and replacement of the diffuser without removing the fixture from ceiling panels. Fixtures recessed in concrete shall have protective coating of bituminous paint.
- B. **Fixtures:** Internally wired conductors of fixtures having a temperature rating exceeding 75 degrees C shall be spliced to circuit conductors in a separately mounted junction box. Fixture shall be connected to junction box using flexible conduit with a temperature rating equal to that of the fixture.
- C. **Supports:** Fixture supports shall be braced for seismic loads in accordance with UBC for Seismic Zone 4. Fixtures shall be directly and rigidly mounted on their supporting structures. Unless otherwise indicated, conduit system shall not be used to support fixtures. Where brackets or supports for lighting fixtures are welded to steel members, the welded area shall be treated with rust-resistant primer and finish paint. Where recessed fixtures are required, the fixture shall be provided with mounting hardware for the ceiling

system indicated. Recessed fixtures shall be installed light-tight to the ceiling and shall be provided with auxiliary safety supports attached directly to the building structure. Such safety supports shall consist of #12 AWG soft-drawn galvanized wire or #10 AWG aluminum wire. Pendant-mounted fixtures installed from sloping ceilings shall be suspended by ball-joint hangers. Fixtures weighing more than 25 pounds shall be supported independently of the fixture outlet box.

- D. **Photo-Electric Cell Units:** Photoelectric cells shall be oriented toward the north.

### 3.2 CLEANUP

- A. Labels and marks, except the UL label, shall be removed from exposed parts of the fixtures. Fixtures shall be cleaned when the project is ready for acceptance.
- B. All burned-out, broken, and otherwise disabled lamps shall be replaced when the project is ready for acceptance.

**\*\* END OF SECTION \*\***