# SECTION 26 56 19

# ROADWAY LIGHTING

## PART 1 – GENERAL

### 1.01 WORK INCLUDED

Furnishing and installing of street lighting system on residential streets. See applicable City Standard Drawings, Project Plans and Special Provisions.

### 1.02 RELATED REQUIREMENTS

Not used.

### 1.03 FERENCE STANDARDS

A. State Specifications
B. State of California, Electrical Safety Orders (ESO), Title No. 8
C. State California, Public Utilities Commission, Code Rule #128
D. National Electric Code (NEC)

### 1.04 QUALITY ASSURANCE

A. All materials furnished under this section shall conform to the current standards of the National Electrical Manufacturers Association (NEMA), the Underwriters Laboratories, Inc. (UL), the Electrical Testing Laboratories (ETL), and the National Electrical Testing Association (NETA).
B. A certificate of compliance conforming to the provisions in Section 6-1.07, "Certificate of Compliance," of the State Specifications shall be submitted prior to the use of any material in this project.

### 1.05 MEASUREMENT AND PAYMENT

A. Measurement on Unit Basis
    a. Conduit: Conduit will be measured by the Linear Foot between centers of electroliers and/or boxes, along the conduit routes as shown on the plans.
    b. Conductors: Each individual run of conductor wire will be measured in horizontal distances by the Linear Foot between centers of electroliers and/or boxes, along the conduit routes as shown on the plans.
    c. Combined conduit with conductors (wiring) also will be measured by the linear foot, as specified for items 1 and 2 above.
    d. Boxes: Splice boxes, pull boxes, and other electrical boxes will be measured for payment on the basis of the actual number of units installed of the respective types and sizes.
    e. Electroliers: Electroliers will be measured for payment based on the actual number of units installed of the respective type.
    f. Service Connection: Service connections will be measured for payment based on the actual number of service connections provided. When specified in the Special Provisions, no separate payment will be made for service connection(s) and all costs therefore shall be included in work items requiring service.

B. Payment on Unit Price Basis
The quantities of the respective items, measured as stated above, and accepted, shall be paid for at the respective unit prices as per Schedule of Bid, which prices and payments shall constitute compensation in full for furnishing all labor, materials, tools, and equipment necessary to complete the work in place:
   a. Conduit: The price paid per Linear Foot shall include the conduit, trenching, backfill, restoration of paved surfaces, and disposal of surplus materials, broken pavement, and broken concrete.
   b. Conductors: The price paid per Linear Foot shall include conductors and all testing required for insulation resistance.
   c. Boxes: The price paid per Each shall include the boxes, covers, earthwork, excavation, backfill, and restoration of paved surfaces.
   d. Electroliers: The price paid per Each shall include the light standards, bases, arms, luminaries, photo-electric controls (when specified), wiring from base to luminaire, and excavation, backfill, and concreting of foundations.
   e. Service Connections: The price paid per Each shall include the service charge and all necessary incidentals. The required wire shall be included in the previously listed pay item for conductors. The Contractor shall apply for and pay all required service connection fees, unless specified otherwise in the Special Provisions. On City-funded projects, the Contractor is responsible for notifying the City and PG&E when the service connection is required, and the City shall pay the fees.
   f. Included in the above unit price payments: The Contractor shall furnish and install all accessory work and materials required for a functional street lighting system, complete in place.

C. Grouping: When grouping of the above items occurs, payment will only be made once.

D. Inclusive payment for Electroliers
When so specified in the Special Provisions, unit price payment for electroliers will include costs for associated conduit, wiring, boxes and service connection(s) and all other accessory work and materials required for a complete and functional street lighting system as shown on the plans and specified.

E. Inclusive Lump Sum Project for Street Lighting System
When so specified, in the Special Provisions, a lump sum payment will be made for the street lighting system, complete. This lump sum payment will include costs for all work and materials required to provide a complete and functional system.

## PART 2 – PRODUCTS

### 2.01 COMPATIBILITY WITH EXISTING SYSTEM

All products must be provided and installed to allow interchangeability with other products in the City's street lighting system, unless specifically approved otherwise.

## 2.02 POLES/STANDARDS

A. Unless otherwise specified or shown, provide State Type 15 Lighting Standard with six foot (6') elliptical arms, thirty foot (30') high pole and thirty five foot (35') mounting height, and 0.1196 inch thick aluminum pole.
B. See applicable City Standard Drawings for installation details.

## 2.03 LUMINAIRES

A. For the items listed in Paragraphs 2.03 B, C and D, and indicated by an asterisk, ("*"), catalog numbers may be changed by manufacturer. Contractor shall submit samples for approval by the Engineer prior to purchase and installation of any equipment.
B. * 100 Watts: GE Style M-250 A2 Power/Door, glass refractor, 240-volt, HPF Reactor or LAG ballast, with P.E. receptacle. Use Catalog #M2AR10S0H2GMN32U for multiple circuitry. Use Catalog #M2AR10SXS1GMN32035 for series circuitry.
C. * 150 Watts: GE Style M-250 A2 Power/Door glass refractor, 240 volt, auto regulator ballast, with P.E. receptacle. Use Catalog #M2AR15S0H2GMS32U for multiple circuitry. Use Catalog #M2AR15SXS1GMN32035 for series circuitry.
D. * 250 Watts: GE Style M-250A2 Power/Door glass refractor, 240 volt, auto regulator ballast with P.E. receptacle. Use Catalog #M2AR25S0A2GMS32U for multiple circuitry.
E. Photoelectric Unit:
F. Dark to Light Catalog #D124-1.0-SM, 105-300 VAC, 60Hz, 1800 VA, 1000 watt load.
G. Fuseholder and Fuses by Buss or equal:
H. Waterproof 600 V renewable, 2-pole fuse holder, complete with boots and 30 amp fuses (locate in base of pole).

## 2.04 CONDUIT

A. Conduit shall be as follows:
    a. Metallic Conduit: Rigid steel conduit shall be sized according to NEC Requirements and shall be hot dipped galvanized both inside and outside, and shall be as tested and approved by Underwriter Laboratories or other approved laboratory.
    b. Non-Metallic Conduit (for Multiple System): Rigid non-metallic conduit shall be sized according to NEC Requirements and shall be Schedule 40, conforming to the requirements of the UL Standard for Rigid-Non-Metallic Conduit (Publication UL 651).

## 2.05 CONDUCTORS

A. Conductors for multiple circuits shall be UL listed and rated for 600 volt operation, conforming to the requirements of Section 86-2.08B, "Multiple Circuit Conductors", of the State Specifications, and of the size and type indicated on the Plans.
B. Conductor from luminaire to pull box shall be #10 AWG stranded with THHN insulation. Wire size for main feeder shall be designed for the circuit and of the size indicated on the Plans.
C. All below ground conductors shall have a “WET Rating” insulation as specified by the NEC.

**2.06 PULL BOXES**

Pull boxes shall be Christy #N16 (State #5) or approved equal. Covers for pull boxes shall be precast reinforced concrete lid with "STREET LIGHT" marked on them.

**2.07 GROUND WIRE**

Ground wire shall be #4 standard stranded bare copper.

**2.08 CONCRETE**

Concrete shall be in accordance with Section 21, "Minor Concrete," of these specifications.

**2.09 ANCHOR BOLTS**

Anchor bolts shall be steel-hot galvanized dipped.

**2.10 SPLICE CONNECTORS**

Splice connectors and splicing shall be approved UL listed type compression sleeve, using Method “B” or high voltage method as required all as shown on State Plan ES-13.

**2.11 PULL ROPE**

Pull rope, when specified or called for in the Plans, shall be nylon or polypropylene, with a medium tensile strength of five hundred pounds (500#).

## PART 3 – EXECUTION

**3.01 EXCAVATION**

Trench excavation and backfill shall conform to Section 14, "Trench Excavation and Backfill," of these specifications.

**3.02 CONDUIT**

A. All bends in rigid steel conduit shall have a minimum radius of eighteen inches (18") and any bend showing appreciable flattening shall not be used. Joints shall have clean cut threads and reamed ends, and shall be made up with red lead and linseed oil applied to the male thread only, to provide a watertight joint. All conduit ends in electrolier bases shall extend three inches (3") above the top of the concrete base, and shall slope toward the pole handhole. Ends shall be capped until cables are installed. Bonding bushings shall be installed on conduit ends immediately before pulling in cables. Bond wire to be minimum #6 AWG.

B. Bending of non-metallic conduit shall be by methods recommended by the conduit manufacturer and with equipment approved for the purpose. Equipment shall not expose conduit to direct flame. Conduits shall be laid in accordance with Section 86-2.05C, "Installation", of the State Specifications.

C. For all conduits entering pull boxes, the edge of conduits terminating in pull boxes shall be sealed with approved duct sealing compound after conductors have been installed.

## 3.03 CONDUCTORS

A. Conductors shall be drawn in conduit after the installation of the conduit run has been completed, and the conduit has been cleaned or swabbed out, and if the conduit is installed in a concrete foundation, after the concrete has attained a compressive strength of at least one thousand pounds per square inch (1,000 psi).
B. Conductors shall be installed without injury to the insulation. Where two cables are to be installed in the same conduit, both cables shall be drawn into the conduit at the same time.
C. Conductors shall be continuous from luminaire to luminaire or to junction box without a splice, except those splices, if necessary, may be made in any pole base or junction box.

## 3.04 GROUNDING

A. Each electrolier pole shall be adequately grounded as shown on the applicable City Standard Drawings.
B. In making grounding connections, the surfaces to which connections are to be applied shall be thoroughly cleaned in order to form a good electrical contact. Copper ground clamps shall be used as required. A bolted connection shall be used when connecting the ground wire to the metal poles.

## 3.05 PULL ROPE

Pull rope shall be terminated by doubling back at least two feet (2') back into the conduit.

## 3.06 FOOTINGS

Footings for poles and standards shall be Class A concrete conforming to Section 14, "Minor Concrete," of these specifications.

## 3.07 PULL BOXES

A. Pull boxes shall be installed as indicated in Section 86-2.06, "Pull Boxes", of the State Specifications.
B. All pull boxes shall be located in non-roadway areas.
C. Spacing between pull boxes shall not exceed one hundred feet (100').

## 3.08 CHANGES FOR LINES AND GRADES

Any changes in the line or grade of the new conduit runs, or the location of electroliers or boxes due to interference with existing utilities or other obstructions shall be performed by the Contractor without additional compensation, except where significant changes in bid item quantities are required, and said changes are approved by the Engineer.

## 3.09 PAVEMENT REPLACEMENT

A. Where the trench for the conduit or cable is in an improved street, the area shall be restored in accordance with the plans and the Standard Drawings and Section 16, "Paving and Surfacing," of these specifications.
B. Base of pole shall be grouted to meet existing grade.

## 3.10 TESTS

A. The street lighting system shall be tested for insulation resistance and for operational functioning in accordance with the standard requirements of the City and of the utility company. All the conductors shall be tested for insulation resistance between conductors and from each conductor to ground. For Multiple System, insulation resistance shall be measured with a Megger type instrument having a D.C. test potential of not less than two hundred fifty volts A.C. (250 VAC). Insulation resistance to ground shall be not less than one (1) megohm per one thousand (1,000) linear feet, and from line to line, not less than one and five tenths (1.5) megohms per one thousand (1,000) linear feet.
B. Tests shall be conducted in the presence of the Engineer. The system shall be further tested by being operated for three (3) consecutive nights.

-END OF SECTION-