

S-106

**STANDARD SPECIFICATIONS FOR MATERIALS
AND THE INSTALLATION OF
STREETLIGHTS AND ALLEY LIGHTS
IN THE CITY OF SANTA MARIA, CA**

SECTION 1. GENERAL REQUIREMENTS

These specifications shall apply to all materials and work of construction of streetlights for the street lighting system of the City of Santa Maria constructed pursuant to the requirements of a contract, local ordinances, subdivision or other agreements, and to other work as may be required as a condition of any permit.

The work herein provided for is to be done in accordance with the Plans and the General and Special Provisions on file with the Department of Public Works of the City of Santa Maria and with these Specifications, which are intended to cover all items necessary for the complete construction and placing in operation of a street lighting system, together with all necessary miscellaneous appurtenances. No plans may be used unless signed by the City Engineer. All proposed equipment schedules and material lists must be submitted in quadruplicate and approved by the City Engineer prior to installation.

SECTION 2. MATERIAL REQUIREMENTS - COBRA HEAD TYPE

A. POLE AND MAST ARM - STREETLIGHTS

A pole with mast arm, fitted top cap and handhole covers shall be constructed as shown on City Standard Drawings for streetlights and shall conform to the provisions of Section 86-2.04 of the Standard Specifications of the Department of Transportation, State of California, as last revised.

1. Poles

The standard light pole shall be 11 gauge round galvanized steel, twenty-eight feet six inches (28' 6") tall, tapering from eight inches (8") to four inches (4") in diameter with base, cap, handhole, handhole covers, attachments and appurtenances as shown in detail on the Standard Drawings for streetlights. Any variation from this standard will be shown on the Contract Plans or in Special Provisions of the Specifications.

2. Mast Arms

The standard mast arm shall be 11 gauge galvanized steel, tapering from three and one-half inches (3-1/2") to two and five-eighths inches (2-5/8") in diameter, with an eight-foot (8'0") span rising to a thirty-foot six-inch (30'6") mounting height, with an attachment bracket on the three and one-half inch (3-1/2") end for assembling to the pole standard. Tenon assembly shall be as shown in detail on the Standard Drawings for streetlights and Caltrans Standard Plans. Any variation from this standard will be shown on the Contract Plans or Special Provisions of the Specifications.

B. POLE AND MAST ARM - ALLEY LIGHTS

A pole with mast arm, fitted top cap and handhole covers shall be constructed as shown on City Standard Drawings for streetlights and shall conform to the provisions of Sections 86-2.04 of the Standard Specifications of the Department of Transportation, State of California, as last revised.

1. Poles

The standard light pole shall be eleven (11) gauge round galvanized steel, twenty-five feet - zero inches tall (25'0") span and a rise of seven inches (7"), with an attachment bracket for assembling to the pole standard as shown in detail on the Standard Drawings for streetlights. Any variation from this standard will be shown on the contract plans or in Special Provisions of the Specifications.

2. Mast Arms

The standard mast arm shall be 2.375" O.D. x 0.154 tube with a two-foot-zero inch (2'0") span and a rise of seven inches (7"), with an attachment bracket for assembling to the pole standard as shown in detail on the Standard Drawings for streetlights. Any variation from this standard will be shown on the contract plans or in Special Provisions of the Specifications.

C. LUMINAIRES

Luminaire units shall be of the same design and finish throughout the project. Each bidder shall list, in his bid, the manufacturer's name and catalog numbers of the luminaires he proposes to furnish. Certification Test Data, detailed catalog information and a written guarantee by the manufacturer shall be furnished with the bid.

Luminaires shall be of the enclosed type with horizontal burning lamp and horizontal-type slip fitter for standard two-inch (2") pipe mast arm, (2-3/8" O.D.), with adapter if necessary.

Each luminaire shall consist of: housing, tear drop reflector, refractor, terminal barrier strip, generator, and lens shall be glass or as approved by the engineer.

1. Photo Cell

Fixtures to have 240 volt photo cell receptacles and shall be equipped with photo cell similar to Tork Catalog Number 2007 or approved equal.

All luminaires shall be factory wired and labeled for voltage specified.

The luminaires shall carry a one-year manufacturer's guarantee for any defects of material or workmanship.

1. Light Distribution

Light distribution shall be Type III, semi-cutoff, unless otherwise indicated.

2. Luminaire Housing

The luminaire housing shall be grey and of a high-quality corrosion-resistant die-cast aluminum providing mounting for all components.

Finish: The luminaire housing shall be high-quality die-cast aluminum with a uniform surface finish, with no blemishes.

Slip Fitter: The slip fitter shall allow leveling adjustment of the fixture on the mast arm. The mast arm or tenon is constructed on two-inch (2") standard pipe, (2-3/8" O.D.). The slip fitter shall be secured with four bolts. Use oxidation inhibitor on luminaire set screw connectors. Some mast arms are tapered to three and one-half inches (3-1/2") with a two-inch (2") Schedule 40 pipe insert, seven inches (7") long.

Hardware: All exposed bolts, washers or screws shall be stainless steel, cadmium plated or other equivalent corrosion-resistant material.

Reflector: The internal reflective surface shall have a minimum reflection factor of eighty-five percent (85%) or better.

Gasket: All fixtures shall be sealed with a gasket to prevent water intrusion. The gasket shall be of high-temperature neoprene rubber providing continuous interface between the housing and mast arm or as approved by the engineer.

3. Lamps

Lamps shall be Phillips QL 85 watt induction (4000k rated) with an average rated life of 100,000 hours. Lamps shall have a ninety percent (90%) survival rate at 75,000 hours.

4. Generator

High frequency generator for induction lamp, supplies current to the power coupler, nominal 240 volt. Operating range 60 Hz or 85W. Accept voltage between 200 and 277 volt. Lamp starting capacity -40F(-40C) degrees; power factor corrected to 90% minimum.

The generator shall be permanently marked with the following information: manufacturer's name, catalog number, input voltage rating and lamp wattage rating.

The generator shall be suitable for high ambient temperature operation and shall be designed for 240 volt operations. The power factor shall be corrected to ninety percent (90%).

D. CONDUIT

All conduit shall be polyvinylchloride Schedule 40 and conform to the provisions of Section 86-2.05 of the Standard Specifications. Minimum size to be one inch (1") and larger if required by the N.E.C. for the size of conductors being used. All conduit to be U.L. approved. Conduit fittings to be high impact, same as conduit, molded, with tapered sockets for solvent weldings.

E. WIRE

All service wire to consist of two (2) each soft copper, stranded conductors, insulation type, **THHN/THWN**, minimum size #6 AWG, for 600 volt service. Larger size shall be installed if required by the N.E.C. for the connected load. Each pull box and light standard shall have twenty-four inches (24") of slack in each conductor.

Fixture wire, from the standard base to the luminaires, shall be #10 AWG copper in strands, 600 volt service, Type **THHN/THWN**. No solid wire shall be allowed.

Wire and wiring to conform to the provisions of Section 86-2.06, 86-2.08 and 86-2.09 of the Standard Specifications. Specifically, one red wire and one black wire.

F. SERVICE EQUIPMENT

Service equipment shall consist of a State Standard #3-1/2 concrete pull box, with thirty (30) amp in-line fuse disconnects. Cover shall be marked "Service."

A white dot shall be placed on the curb face at each service/point/box location.

The service shall conform to the provisions of Section 86-2.11 of the Standard Specifications.

G. BASE

A Portland Cement Concrete base shall be constructed, of the size and to the dimensions shown by Standard Drawings for streetlights and in the location and to the grade shown on the plan. The Portland Cement Concrete shall be Class "A" and shall comply with City Standard Specification S-109 and Section 90 of the Standard Specifications. This base shall include the specified reinforcing bars, anchor bolts, Schedule 40 PVC sweeps and ground rod, and other required fittings and appurtenances as necessary to comply with the applicable rules and regulations and to fulfill the intent of the specifications. Each base which is at the termination of an underground run shall have a spare one-inch (1") elbow stubbed out and capped on the street side.

H. FUSED SPLICE CONNECTORS

In each handhole of each standard, there shall be installed a fused disconnect splice connector on each fixture wire.

Fuses shall be included and sized for the designed load per manufacturer's recommendations.

The splice connector shall completely enclose the fuse and shall protect the fuse against damage from water and weather. The contact between the fuse and fuseholder shall be by spring pressure. Springs shall not be a part of the current carrying circuit.

The terminals of the splice connector shall be rigidly crimped on to the line conductors and the conductors to the ballasts and shall be insulated and made waterproof in accordance with the splice connector manufacturer's recommendation.

I. PULL BOXES

Pull boxes shall be in accordance with the provisions of Section 86-20.6A of the Standard Specifications.

SECTION 3. CONSTRUCTION METHODS

A. CONSTRUCTION AND WORKMANSHIP

Methods of construction and workmanship shall be in accordance with the highest standards of the industry and in compliance with these Specifications, City Standard Drawings, and the rules and recommendations of the following organizations:

- National Electric Code of N.F.P.A. (NEC)
- National Electric Manufacturers Association (NEMA)
- Underwriters Laboratories, Inc. (UL)
- American Society of Testing & Materials (ASTM)
- American Standards Association (ASA)
- Electrical Safety Orders of the State of California, Division of Industrial Security (ESO)
- Standard Specifications, State of California, Department of Transportation, as last revised (Standard Specifications)

B. TRENCHING

Trenching shall be thirty-six inches (36") into the street from the face of curb for streetlights. Minimum cover to be twenty-four inches (24") and if in an existing or future roadway must be completely backfilled in a manner which will assure a minimum relative compaction of ninety-five percent (95%). All other trenches must be backfilled and compacted to a minimum relative density of ninety percent (90%).

Trenching shall be twelve inches (12") into the alley from the property line or the building line for alley lights. Minimum cover to be twenty-four inches (24") and must be completely backfilled in a manner which will assure a minimum relative compaction of ninety-five percent (95%).

C. SERVICES

Services shall be underground from point of service designed by PG&E. All services shall be two-wire, 240 volt unless otherwise indicated. Contractor shall apply to PG&E for service, pay all service connection fees, and provide the City with a copy of the service application. Service point boxes shall contain only one circuit, unless otherwise approved by the City Engineer. Service point locations shall be identified by a Caltrans standard Type A non-reflective pavement marker affixed to the curb face at the service point location.

D. CONDUIT AND CIRCUITRY

All conduit shall be located thirty-six inches (36") into the street from the face of curb, and with a minimum cover of twenty-four inches (24"). Conduit bends must be factory ells.

Conduit installation shall conform to the provisions of Section 86-2.05 of the Standard Specifications.

Circuitry for street lighting shall follow either an east/west or north/south direction wherever practicable. Circuits shall consist of 30 maximum light standards, unless otherwise approved by the City Engineer. Two copies of "as built," including service point location and conduit routing shall be submitted and approved prior to project being accepted as complete.

E. WIRE

Splices may be made only in the pole handhole or in an approved pull box. All conductors shall have a minimum of twenty-four inches (24") of slack in each light base or pull box, and the type of connector used for splicing must be approved by the City Engineer. The incoming #6 conductor shall be spliced to the outgoing #6 conductor and to the #10 conductor, 24-inch minimum from the fuseholder. Use a Type "T" splice in accordance with Caltrans Standard Drawing ES-13. Split bolt connector may be used in lieu of the "C"-shaped compression connector. Wire and wiring shall conform with the provisions of Section 86-2.06, 86-2.08 and 86-2.09 of the Standard Specifications.

1. Grounding

Each standard shall be grounded with a minimum ground wire size of #6 AWG bare solid copper from the ground rod to the pole. All grounding connections shall be clearly visible. Bonding and grounding shall conform to the provisions of Section 86-2.10 of the Standard Specifications. Use ground rod specified on Standard Drawings for streetlights. The ground rod shall protrude a minimum of eight inches (8") above the base.

F. PULL BOXES

Pull boxes shall be installed in accordance with Section 86-2.06B and 86-2.06C of the Standard Specifications.

More specifically, the boxes shall be placed such that no conduit run exceeds 200 feet in length between adjacent pull boxes or standards.

All pull boxes, including service points, shall be located in the sidewalk or in the case where there is no sidewalk, at the back of the curb. Top of pull boxes shall be flush

flush with surrounding grade or top of adjacent curb. Pull boxes shall not be situated within the boundaries of new or existing handicapped ramps and driveways.

When a pull box is located behind a curb and in a parkway, it shall have a 4" thick concrete pad with a 12" minimum edge distance around the pull box.

G. LUMINAIRES AND POLES

Use oxidation inhibitor on all luminaire bolts.

Use oxidation inhibitor on all handhole cover bolts.

H. TESTS

Plumb: The completed and secured light standard shall have its center line true and vertically plumb in all directions within three inches (3") from top to bottom as measured with a surveyor's transit. These tests shall be performed under the supervision of the City Engineer and the survey notes recorded.

Any scratches or tool marks caused to the galvanized surfaces or bolt nuts and threads shall be cleaned and painted with an approved aluminum paint.

Electrical Tests shall comply with all the electrical codes specified in Section 86-2.14 of the Standard Specifications.

Luminaires shall be leveled after erection with a hand level to assure correct positioning.

SECTION 3. MATERIAL REQUIREMENTS - DECORATIVE TYPE

A. DESIGN CRITERIA

1. Lighting Levels

Lighting levels to be per latest IES guidelines (Ref. Table 2 on page 8 of RP-8-00; paragraph "F" below). For a typical residential subdivision on a local street with low ped conflict and R2 & R3 pavement:

Average FC \geq 0.4
Minimum FC \geq 0.07 (1/6 of 0.4)
Avg./Min. FC ratio \leq 6.0

B. FIXTURE

- 240 volt generator
- Cyclone induction
- Philips Lumec Z47 Induction
- Lamp – 85 Watt Induction Phillips QL
- Color – black
- Tork 2007 A photo control (oriented facing North)

Shall have a seal placed in lower section to prevent moisture entering fixture from top of pole.

C. POLE

- Ameron International, Traditional Series Victorian Style II concrete pole (VBF-4.1)
- Color – 113 (Gray Natural)
- Finish - exposed
- Coating – anti-graffiti & sealer
- Handhole to be oriented facing the street

D. POLE PLACEMENT

- Lateral placement of poles shall be 42” from face of curb to center of pole (for subdivisions with parkways between street and sidewalk).
- Maximum spacing for 85 watt induction fixture, 15’ mounting height and 40’ wide roadbed:

200’ staggered	(try to place at property lines)
188’ same side	(try to place at property lines)

- See City of Santa Maria Street Lighting General Plan for placement of lights at intersections, cul-de-sacs (end), and outside of knuckles.

E. FOUNDATION DETAILS

- Same as City Standard Drawings for streetlights with the following modifications:
 1. Foundation depth to be 30” minimum.
 2. Anchor bolt dimensions to be ¾” x 20” x 4”.
 3. Foundation to be recessed below grade and a capping detail installed per “Capping Detail” (Standard Drawing for streetlights).
 4. A No. 3 ½ pull box (Per Std.Dwg. ES-8) shall be placed at each pole location. Fuse holder shall be placed in pull box and not in pole.

F. TABLE 2-ILLUMINANCE METHOD-RECOMMENDED VALUES [SOURCE: ANSI/IESNA RP-8-00 PAGE 8]

Road and Pedestrian Conflict Area		Pavement Classification (minimum Maintained Average Values)			Uniformity Ratio Eavg/Emin	Veiling Luminance Ratio Lvmax/Lavg
Road	Pedestrian Conflict Area	R1 lux/fc	R2 & R3 lux/fc	R4 lux/fc		
Freeway Class A		6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Freeway Class B		4.0/0.4	6.0/0.6	5.0/0.5	3.0	0.3
Expressway	High	10.0/1.0	14.0/1.4	13.0/1.3	3.0	0.3
	Medium	8.0/0.8	12.0/1.2	10.0/1.0	3.0	0.3
	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Major	High	12.0/1.2	17.0/1.7	15.0/1.5	3.0	0.3
	Medium	9.0/0.9	13.0/1.3	11.0/1.1	3.0	0.3
	Low	6.0/0.6	9.0/0.9	8.0/0.8	3.0	0.3
Collector	High	8.0/0.8	12.0/1.2	10.0/1.0	4.0	0.4
	Medium	6.0/0.6	9.0/0.9	8.0/0.8	4.0	0.4
	Low	4.0/0.4	6.0/0.6	5.0/0.5	4.0	0.4
Local	High	6.0/0.6	9.0/0.9	8.0/0.8	6.0	0.4
	Medium	5.0/0.5	7.0/0.7	6.0/0.6	6.0	0.4
	Low	3.0/0.3	4.0/0.4	4.0/0.4	6.0	0.4