



CITY OF OCEANSIDE

PUBLIC WORKS DEPARTMENT

TRANSPORTATION DIVISION

STREET LIGHT DESIGN

POLICY MANUAL

FOR NEW STREET LIGHT INSTALLATIONS

MARCH 2001

FORWARD

This manual establishes uniform policies and procedures for the preparation of street lighting plans in the City of Oceanside.

It is not intended as a textbook, or a substitute for engineering knowledge, experience, or judgement, but rather as a guideline to uniformity and to provide the designer with sufficient information to prepare the desired plans with a minimum of uncertainty.

Street lights installed in the City's redevelopment area and in the Rancho Del Oro area may have special design specifications. Engineer should check with the Public Works Department, Transportation Division before starting project.

I. GENERAL REQUIREMENTS

The Engineer preparing street lighting design shall:

- A. Utilize latest National Electrical Codes, The City of Oceanside Guidelines, The State of California Department of Transportation Standard Specs, and The San Diego Regional Standard Drawings.
- B. Include the City's special design requirements as defined in Section III of this manual.
- C. Pothole locations of the proposed poles prior to completion of the plans (if conflicts are foreseen).
- D. Utilize City of Oceanside standard plan sheets and title sheets. Plans shall be signed by a registered civil engineer or an electrical engineer.
- E. Meet with City Traffic Division to review design concepts drawing for discussion.
- F. Coordinate with the serving utility company for service points and conflicts.
- G. Send plans to all utility companies for their information.
- H. Provide three sets of check prints at each submittal.
- I. For street lighting standard, refer to San Diego Regional Standard Drawing No. E-1 (Anchor Base Foundation).
- J. Street lights shall be high pressure sodium vapor.
- K. Street lights shall be anchor base foundation (no direct burial foundation).
- L. For street light location refer to the City of Oceanside Engineers Manual, Drawing Number M-4.
- M. Street light spacing and luminaire shall be in conformance with Table A (Street Design Criteria) of the City of Oceanside Engineers Manual.
- N. Street lights shall normally be located on the outside of curves. Lights shall be located behind sidewalk (approximately six feet) when curb and sidewalk are contiguous, or thirty-six inches on center from the face of the curb when sidewalk is not contiguous.
- O. The street lighting plan shall include two inch PVC conduit with twelve pair #19 PE-89 signal interconnect cable. On the frontage of the project on all arterials and above, for signal interconnect cable (Sic). No. 5 Pull boxes shall be installed every four-hundred feet. (See detail)

II. PLAN FORMAT AND DRAFTING REQUIREMENTS

A. The City requires that all street lighting plans be prepared on City of Oceanside mylars or an autocad disk which can be purchased from the City's Public Works Department in the Engineering Division. Plans should include street light location and detail, conduit runs, pull box locations, service point locations, and transformer locations.

B. The quality of drafting and lettering size shall conform to the highest standards, in order to insure legible reduced prints. Computer-aided drafting or electronic files are required and should be in a .dwg format.

C. Plan preparation shall conform to and/or include the following requirements:

1. North shall always be oriented up or to the right on all plans. The major arterial shall always be horizontal on the plan.
2. Street lighting plans shall be drawn from 1" = 40' to 1" = 100' scale on 24" X 36" City of Oceanside mylar sheets.

D. Any deviation from the various formats shown on the typical plan shall be approved by the City prior to implementation.

III. SPECIAL DESIGN REQUIREMENTS

The following items provide further information about special requirements of the City of Oceanside:

A. Street lights installed in the City's redevelopment area and in the Rancho Del Oro area may have special design specifications. Rancho Del Oro street lights shall have a fiberglass pole and bolt cover. Engineer should check with the Public Works Department, Engineering Division before starting project.

1. MATERIALS - GENERAL

Street lighting luminaire descriptions shall be as follows:

1. Lamp size = 250 Watt high pressure sodium and 100 Watt high pressure sodium w/PER
2. Output = 30,000 lumens (250 Watts) and 9,500 lumens (100 Watts)
3. Luminaire Type = 250 Watts: American Electric Lighting 250 Cut Off 125-OH133-DJ (Charcoal Filter) or equivalent

4. Luminaire Type = 150 Watts: American Electric Lighting 150 Cut Off 20-5H163-F1
5. Luminaire Type = 100 Watts: American Electric Lighting 100 Cut Off 20-5H113-F1 (Fiber Filter) or equivalent
6. Ballast = Regulator (MAG-REG) for 250 Watts, Reactor HPF for 100 Watts
7. Shield = Not allowed
8. Luminaire mounting height = 30' feet for 250 Watts and 27' feet for 100 Watts
9. Mast arm = 8' feet with a 1' foot minimum overhang past face of curb
10. Pole = Round tapered concrete anchored base, with straight base; 250 Watt Centrecon MBR-8.5 or equivalent and 100 Watt - Centrecon MBR-7.5 or equivalent, or Ameron 2C2 Round Pole.

2. LUMINAIRES

Street lighting luminaires shall be completely assembled and furnished with a lamp and a photoelectric control unit. Luminaires shall be designed for horizontal mounting with a horizontal burning lamp. It shall be cutoff type of standard make and manufactured by a manufacturer of recognized experience and ability, who is now regularly engaged in the manufacturing of street lighting luminaries. The luminaire shall be die cast aluminum and furnished with an optical assembly removable without the use of special tools.

The luminaire shall have a slipfitted capable of attaching to a two inch pipe and end mounting bracket without the need for special mounting parts. Leveling and clamping of the luminaire to the mast arm pipe shall be accomplished by tightening mounting bolts which are externally or internally accessible. Provision shall be made to check leveling of the unit. Luminaires shall include an integral twistlock type receptacle for photoelectric cell control in accordance with the latest EEI-NEM standards, and photoelectric control unit. The receptacle shall be prewired to the terminal board. The luminaire power unit assembly shall consist of an integral ballast, starter board, capacitors, and a heavy duty terminal block, and for the two hundred fifty watt unit the power unit assembly shall be mounted on a separate component of the luminaire to facilitate replacement.

The luminaire optical assembly shall provide true ninety degree cutoff that does not allow any light to escape above the horizontal and shall consist of a die cast aluminum lens holder, an Alzak processed aluminum reflector, a heat and impact resistant clear flat glass lens, and a porcelain

enclosed mogul multiple screw socket with lamp grips. The socket support assembly for the two hundred fifty watt installations shall be adjustable to provide variations in the light distribution and shall be factory preset to produce a medium or long cutoff Type III distribution. The socket support assembly for the one hundred watt installations shall be factory preset to produce a medium or long cutoff Type II distribution. The optical assembly shall be sealed with a heat resisting gasket, and also filtered to prevent light loss from gaseous and particulate material infiltration for the two hundred fifty watt installation. The optical assembly door hinge shall be designed so that when the door is opened, the hinge pins shall prevent the door from swinging free of the pins. The luminaire shall be constructed and installed in such a manner to provide the required lighting distribution with the lower edge of the luminaire's housing below the entire light source and all glassware. External shielding added to the luminaire to accomplish the function shall not be acceptable.

The net weight of the luminaire, including ballast, and its projected area shall be no greater than the following:

Lamp Size	Weight	Projected Area
<u>(Watts)</u>	<u>(lbs)</u>	<u>(sq. ft.)</u>
100 & 250	50	2.0

3. HIGH PRESSURE SODIUM VAPOR LAMPS

High pressure sodium vapor lamps shall have clear glass bulb and be suitable for use in street lighting applications. The lamp shall be designed to operate in any position. High pressure sodium vapor lamps shall comply with the following minimum performance requirements:

Lamp Size (Watts)	ANSI Code	Rated Ave. Life At 10 hrs. <u>Per Start</u>	Initial Lumes (A) Burning any <u>Position</u>	Light Output <u>Mean (B)</u>	Factor <u>Per. (C)</u>
100	S54	20,000	9,500	.90	.70
250	S50	24,000	30,000	.90	.70

- (A) Initial lumen ratings based on 100 hour photometry readings.
- (B) Mean light output factor is taken at 1/2 rated lamp life.
- (C) Lumen output at end of rated life.

High pressure sodium vapor lamps shall be able to reach eighty percent of light output within four minutes and to restrike within one minute after an outage due to power interruption or voltage drop at the lamp socket. The base of the lamp shall have a device that will allow the installer to indicate

the month and year of installation.

4. BALLAST

High pressure sodium ballasts for two hundred fifty watt shall be of the regulating type, (MAG-REG) with all windings electrically isolated and provide reliable lamp starting to 20° F. High pressure sodium ballasts for one hundred watt shall be one hundred twenty volt reactor hpf. The starting current shall be less than the running current. The power factor shall exceed ninety-five percent. They shall be suitable for use on multiple distribution circuits with 60 Hz, 120 voltage rating. Ballasts shall be of the component type consisting of precision wound coils and welded magnetic steel laminations assembled together and impregnated with a baked-on insulating and weather-proof varnish and metal cased hermetically sealed capacitor. Each ballast system shall have an auxiliary starting circuit capable of supplying the pulse characteristics listed below. The starting aid shall be readily accessible and easily replaced in the field. Starting aids must be compatible with core and coil of the same rating without need for adjustment. Starting aids must be suitable for continuous operation for a minimum of three months in the event of lamp failure without loss of life or ballast damage.

HIGH PRESSURE SODIUM VAPOR BALLASTS

<u>Lamp Size</u> <u>(Watts)</u>	<u>ANSI</u> <u>Code</u>	<u>Lined</u> <u>Volts</u>	<u>+ % Allow.</u> <u>Line Volt</u>	<u>Line Var.</u> <u>Oper. Amps</u>	<u>Line</u> <u>Start Amp</u>	<u>Power</u> <u>Factor</u>	<u>% Allow.</u> <u>Volt D</u>
100	S54	120	10	1.2	.8	98	40-50
250	S50	120	10	2.8	1.2	98	40-50

The operating sound pressure noise level shall not exceed the ambient noise level by more than five decibels at a distance of thirty feet when measured by a sound level meter conforming to the American Standard for Sound Level Meters. Where the ambient noise level is below forty decibels, a minimum of forty decibels shall be assumed as ambient.

5. PHOTOELECTRIC CONTROL UNIT

The photoelectric unit shall consist of photoelectric unit in a weatherproof housing which plugs into an EEI-NMA twist lock receptacle integral with the luminaire (Type IV). Clear plastic P.E.C. unit shall not be used. The photoelectric unit shall provide an output in response to changing light

levels. The response level shall remain stable throughout the life of the control unit. The control unit shall contain a cadmium-sulfide photoelectric cell suitable for operation with one hundred twenty volt line supply as noted on the plans. The unit shall have a rated load capacity of 1,000 volt - amperes minimum, with a normal power consumption of not more than ten watts. The control unit shall also have surge protection to prevent damage from sudden voltage surges. The control unit shall have a "Turn-On" level between one and five foot candles. The "Turn-Off" level shall be between one & one-half and five times "Turn-On".

6. FUSES

Fuses shall be 13/32 x 1½ in line twenty amps at service point and five amps at pole. The fuse shall be installed in the hot leg of the lighting conductor. The circuit shall be fused in the base of the pole and not in a pull box.

7. FUSEHOLDERS

Fuseholders shall be completely waterproof, shall grip the fuse in load side section when fuseholder is opened, be able to take a 13/32" x 1½" fuse, rated at thirty amperes at 600 volts or less, with crimp type tubular terminals of a size able to take the size cable in the particular street light. The fuseholder shall be located in the access hole of the street light pole. Conductors larger than #8 shall have the same size fuseholder.

8. WIRING

Wiring circuits, including poles, shall be a three wire system and contain the following:

1. White-neutral
2. Black only-ungrounded conductor
3. Green-ground

All wire shall be stranded copper wire No. 10 AWG (THWN/THHN) minimum. Copper wire shall conform to the applicable portion of ASTM B3 and B8. Size of wire used shall be indicated on the plans. Wire connectors shall be of type approved by the Engineer and shall be UL listed. The installation procedure, including connector size and crimping tools shall conform to the manufacturer's recommendations. Aluminum conductors shall not be substituted for copper. All plans will be checked for voltage drop at plan check and calcs shall be submitted. If voltage drop is excessive, plans will be rejected with suggested modifications. Voltage drop not to exceed three

percent without approval of the City Engineer. (Maximum seven lights per circuit).

9. GROUNDING

A 5/8" x 8' ground rod shall be installed in city pull box next to S.D.G. & E. service point. All ground wires will be connected to the ground rod. Fifteen feet of #4 stranded copper wire will be coiled and lay firmly at bottom of street light base with one inch coverage of dirt. Bond #4 copper ground wire to one anchor bolt with ground clamp. All green grounds, neutrals and Uffer grounds shall be bonded together and to street light pole.

10. SPLICING

Splices shall be permitted in pull boxes and lighting standard bases only. All splices shall be waterproof, by using splice kits (3M bags or equal, #4 conductors or larger heat shrinking is allowed) listed for the purpose.

11. CONDUIT

All conduits shall be minimum one inch UL approved heavy wall polyvinyl chloride (PVC Sch-40). Conduit shall be sand encased (three inches minimum over conduit and all sided). The Contractor may, at his expense, use conduit of a larger size, provided the larger size is used for the entire length of the run. Reducing couplings shall not be used. Conduit shall be laid to a depth of not less than thirty inches below the curb grade in sidewalk areas and curbed paved median areas, thirty inches below highway pavement grade in road areas and finished grade in all other areas. Conduit laid in open trench shall not be covered nor shall any trench or inspection hole be backfilled until installation has been accepted by the Engineer.

12. PULL BOXES

State No. 3-1/2 Pull Box or equivalent shall be installed with five feet of each street lighting standard and within five feet of each service point unless standard is within five feet of service point. Pull boxes shall be spaced at not over two hundred feet. The bottom of the pull box shall rest firmly on a twelve inch thick bed of one inch crushed rock extending six inches beyond the outside edges of the pull box. Pull boxes shown in the vicinity of curbs shall be placed adjacent to the back of the curb with non-contiguous sidewalk and shall be adjacent to back of sidewalk with contiguous sidewalk. Where practical, pull boxes shall not be installed with the long side parallel to the curb.

Pull boxes shall not be installed in any part of a driveway or other traveled way unless approved by Engineer. Concrete pull box covers shall be inscribed "STREET LIGHTING." Covers shall be secured with three-eighths inch bolts, capscrews, or studs, and nuts which shall be of brass, stainless steel or other non-corroding material. Pull boxes at service points shall have a five-eighths inch X eight foot ground rod installed inside the pull box.

13. CONCRETE POLE CONSTRUCTION

Concrete poles shall be tapered, centrifugally cast and prestressed. They shall be round, black and white marble aggregate or natural exposed aggregate. The ultimate strength of a pole shall be calculated in accordance with the latest revision of American Concrete Institute (A.C.I.) Standard 318. Under working loads (including wind loading) the pole must not be stressed beyond the cracking strength. Wind loads shall be as specified in the last edition of the AASHTO Standards. Pole shape and color shall be uniform for any one project.

Aggregates shall conform to current requirements of ASTM C33, except that abrasion requirements therein shall not apply and that no more than seven percent shall pass a #100 mesh sieve. No dye or sealer shall be used, without approval of the City Engineer. Mast arm shall have one foot minimum curb overhang.

The centrifugal casting process shall produce a center duct throughout the length of the pole. The duct shall be free from sharp projections or edges which might injure the wire or cable. It shall have a minimum cover of five-eighths inch diameter. After curing, the surface of the standard shall be treated to remove cement laitance and develop the surface texture.

When finished, poles shall be without cracks or crazing and shall have a uniform surface (without objectionable mold marks) and texture throughout the entire length. Maximum deviation from stringline at any point shall not exceed .03" inch per foot of length.

Poles shall be furnished with a mast arm that provides a minimum of six inches of a horizontal straight section at the end of the bracket arm to mount a two inch I.P.S. slipfitter type luminaire. Handhole cover plate securing bolts shall be stainless steel, not brass, plain steel, cadmium coated or galvanized steel. Corrosion and subsequent freezing of these bolts is a serious problem.

14. ANCHOR BOLTS FOR ANCHOR BASE POLES

Anchor bolts shall be of the type and size as shown on Regional Standard Drawing E-1. Anchor bolts (1" x 36" x 4" minimum) shall conform to the specifications of ASTM A 307, and shall be provided with two nuts and two washers each.

Anchor bolts, nuts, and washers shall be galvanized by the hot-dip process conforming to ASTM A 153, or cadmium plated with Type NS coating conforming to ASTM A 165.

All nuts shall be symmetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that nuts can be run the entire length of the tread by the fingers without undue forcing, and without noticeable play or rocking.

Plumbing of standards shall be accomplished by adjusting the nuts on the anchor bolts before the foundation cap is placed. Shims or other similar devices for plumbing or raking will not be permitted. After plumbing, the standard anchor bolts shall be cut off one quarter inch above the nuts and the exposed surfaces shall be repaired.

The contractor shall submit to the Engineer in conformance with the above requirements and the Standard Specifications a certified list of all materials to be used for approval prior to installation. For Anchor Base Foundation see Regional Standard Drawings E1 and E2.

15. MAST ARMS

Mast arms shall be two inch aluminum, self-supporting, without braces, scrolls or rods. Mast arms shall be eight feet in length. Mounting shall be perpendicular to street centerline unless otherwise shown on plans.

Aluminum arms shall be made of corrosion resistant alloys such as Aluminum Association wrought alloys 6061 or 6062, or cast alloys 319 or 356.

Changes in configuration of mast arms will be permitted, providing the mounting height and stability are maintained.

All exposed hardware shall be cadmium coated, hot dipped galvanized or stainless steel.

All protected hardware not visible after installation shall be cast aluminum and/or stainless steel, hot dipped galvanized or cadmium plated steel.

16. HOOK-UP TO SAN DIEGO GAS & ELECTRIC SERVICE POINT

To get a service point, contact S.D.G. & E. They are the only ones that know what is available and where it is. Sometimes a new light can be connected to an existing light system, but that very seldom happens. The service point should be in the City's right-of-way, or you will need to give the City an easement to the service point. An S.D.G. & E. easement is not sufficient. Easements are expensive and time-consuming to you. Avoid service runs across private property if at all possible!

17. WIRE AND CONDUIT TO SERVICE POINT

The lights shall be one hundred twenty volt in a one hundred twenty volt system, there must be a white neutral wire in addition to the black wire. All ground wires will be green. All service point shall be consistent with S.D.G. & E. Service Guide. If the wire used is #8 or bigger or if it is a 3-wire installation, two inch conduit will be used. Enough PVC conduit to reach the rest of the way to the service point will be strapped to the pole. S.D.G. & E's crew will install it. Enough wire to reach the service point will be coiled up above the rigid conduit. If any of this is not done exactly this way, S.D.G. & E. may turn down the job, which can cause costly delays to your project. No more than two wires (**Black & White Only**) will be allowed from streetlight service point pull box to S.D.G. & E. transformer or 3312 secondary box.

18. AS-BUILTS

Before S.D.G. & E. will hook-up a light, two As-Built drawings on standard 24" X 36" City of Oceanside mylars must be given to your inspector. They must clearly show:

- (1) Wattage and type of each light. (for Example: 250 Watt High Pressure Sodium)
- (2) Location of each light.
- (3) Conduit runs and pull boxes.

(4)Service point. If the service point is a wooden pole, show the pole number.

(5)Size of wire.

(6)Lengths and distances of wire runs.

As-Built drawings should be well-drawn and with as much detail as possible, on Street Light print only. Sloppy and incomplete drawings will be rejected. These drawings become part of the permanent file on this development, and will be referred to in the future. Bonds will not be released until As-builts are approved. As-built drawings shall be on 24" X 36" City of Oceanside mylars.

19. OTHER NOTES

This is not a complete specification. It is a supplement to the Standard Specifications for Public Works Construction, the Standard Special Provision to Standard Specifications and the San Diego County Regional Standard Drawings. The term; Engineer, as used in these provisions, shall mean the representatives from the City charged with the responsibility of enforcing City Standards.

STREET LIGHT INSPECTION CHECK LIST

Anchor Base Foundation
Round Tapered Concrete Pole
Pole Shape and Color Uniform to Project
Mast Arm Overhanging Curb 1' Minimum
Cutoff Luminaire
Photoelectric Cell not Clear Plastic
#3.5 Pull Box every 200' or less
Pull Box within 5' of Pole (Unless Pole within 10' of S.P.)
Pull Box within 5' of Service (Unless Pole within 10' of S.P.)
Pull Box Resting on Crushed Rock
Pull Box Inscribed "Street Lighting"
Non-Corrosive Bolts, Capscrews or Studs Secure Pull Box Covers
20 Amp Fuse in Service Pull Box
5 Amp Fuse in Pole Behind Access Plate
13/32 X 1 1/2 In Line Waterproof Fuse
Stranded #10 AWG (THWN) Minimum
Splices only in Pull Box or Pole
All Splices Waterproof using Splice Kits
Conduit 1" Minimum PVC Schedule 40
Conduit Same Size Throughout Project
Stainless Steel Access Plate Screws
15' - #4 AWG Stranded Bare Ground at Pole Base (Uffer Ground)
Green Ground, Neutral and Uffer Ground Bonded Together and to Pole
1" of dirt on top of Coiled Ground Wire