SECTION 7
STREET LIGHTING

7.01 GENERAL

A. GENERAL REQUIREMENTS - These specifications shall cover the design and installation of streetlights and park trail lighting. The design and installation shall conform to these Design Standards; the City Standard Construction Specifications, Division IV; the City Standard Details, Division V; City Authorized Material List; California Electrical Code; Sections 86 and 87 of the State Standard Specifications; State Standard Plans; and Caltrans Electrical Systems Design Manual. Streetlight improvements shall be designed to serve the ultimate level of development as defined in the City General Plan and City Specific Plans (when appropriate). This section describes typical design practices for new and modified street lighting systems within the City of West Sacramento.

   Existing streetlights, which must be relocated to or repositioned as a result of construction of new streets or driveways in a development, shall be the responsibility of the Developer. Streetlights that are relocated shall be upgraded to current LED light heads, as part of the relocation process if existing light heads are high pressure sodium or other type light heads not matching current City Standards.

B. SUBMITTAL REQUIREMENTS
   1. The Consulting Design Engineer shall meet the submittal requirements described in Section 2 of this Design Standards. The submittal plans shall include the existing and proposed street lighting system and park trail lighting system improvements, if applicable, on separate streetlight plan sheets of the Development Improvement Plans. Plans shall be drafted to provide plan and profile views as appropriate in accordance with Section 2 of these Design Standards. If the project includes traffic signals, street and park trail lighting improvements, these improvements may be included with the traffic signal plans. The plans shall include the following items:
      a. Proposed location of electroliers, traffic signal poles (if appropriate), and related physical improvements to be installed, as appropriate.
      b. Location of service points.
      c. Location of pull boxes.
      d. Luminaire Schedules - Luminaire schedules shall be shown in a tabular format and shall indicate, but not be limited to, the amount and type of luminaires on each new or existing service, the service location, voltage, and voltage drop between luminaires, the number of streetlights removed or added to an existing service, and any other pertinent information affecting the service load.
      e. Conduit size, location, lengths, depth and runs.
      f. Wire size, lengths, and runs.

g. Mounting height and mast arm length (See Std Details #602 & #603).
h. Service Voltage and wiring diagram.
i. Scale (scale requirements listed in Section 2.02 G. of these Design Standards).
j. Right-of-way, adjacent subdivision and lot details.
k. Existing facilities and topography including existing service points, existing electrical facilities including traffic signals, streetlights, irrigation controllers, underground utilities, and conduit runs in the immediate vicinity of the project.

2. The Consulting Engineer shall submit PDF plans of the streetlight and/or park trail lighting plans as part of the Developer Improvement Plan submittal to the City for review in accordance with the requirements of Section 2 of this document. The Developer/Consulting Engineer shall obtain service locations, service voltages, and identification numbers from the Pacific Gas and Electric Company (PG&E) and include the information on the improvement plans.

   After the Consulting Engineer receives the service locations, the Consulting Engineer shall determine the wire size and length of each conduit run. These items may be shown in tabular form or denoted next to each conduit run on the plans.

   The cost for all PG&E services shall be paid for by the developer or contractor. This shall include the PG&E connection charge for energizing streetlights and traffic signals, as appropriate.

7.02 STREETLIGHT DESIGN

A. SPACING, INTENSITY, AND POLE HEIGHTS - Streetlights shall have the maximum spacing, location, distribution, mast arm length, intensity, and pole heights according to the type of street on which they are to be installed as shown in Standard Details # 602, # 603, #604, #605, and #613 or as otherwise required and detailed in City Specific Plans, the City Zoning Code (17.22.080), and approved Authorized Material List.

   Note that on Standard Details #604 & #613 light spacing for streets with a width of sixty (60) feet or more is based on a one-sided arrangement and that spacing for narrower streets is based on a two-sided arrangement. The one-sided spacing arrangement is a system whereby the streetlight spacing relates to the distance between streetlights all on the same side of the street. The two-sided arrangement relates to the distance between streetlights taking into consideration the streetlights on both sides of the street. The actual constructed street width shall be the controlling factor for determination of streetlight spacing rather than the street classifications (arterial, collector, etc.).

   1. The following steps shall be taken to determine the appropriate spacing and location for streetlights.

a. Identify the nearest intersections each way from the streetlight location being planned. Determine the location of the streetlights at the intersections in conformance with these Design Standards and City Standard Details.
b. Determine the distance between the adjacent intersection requiring lights and then divide the distance into equal spaces. The spacing is not to exceed the maximum allowable spacing on Standard Detail #613.
c. Compare the light locations to intersecting property line, driveways, and other obstructions as follows:
    i. If the location falls close to a property line and it can be adjusted to the property line while staying within the maximum spacing allowed, then the adjustment should be made.
    ii. Generally, streetlights should be situated at intersecting property lines for residential lots and parcels with minimal frontage (seventy-five (75) feet or less). The light spacing may have to be unbalanced, with additional lights being added to attain this and still comply with the maximum spacing allowed.
    iii. Variations to these requirements may be approved on an individual basis by the City Engineer.

B. LOCATION OF STREET LIGHTS
1. On streets with separated sidewalks, streetlights shall be located at the front of sidewalk, as long as the front of the streetlight foundation would not be more than five (5) feet behind the back of curb. For streetlights with the front of the streetlight foundation located greater than five (5) feet behind back of curb, the luminaire arm length shall be increased as directed by the City Engineer.
2. On streets with monolithic curb, gutter, and sidewalk, streetlights shall be located at the back of sidewalk. The edge of the pole foundation shall meet the back of sidewalk.
3. Where there is only curb and gutter, the front edge of the streetlight foundation shall be located five (5) feet from the back of curb or six (6) feet if future sidewalk attached to the curb is planned.
4. In cul-de-sacs, a streetlight shall be located within the bulb area as close to the end of the bulb as possible.
5. For intersection lighting refer to Standard Details #604 and #605.
6. Streetlights shall be placed on the outer edge of roadway curves.
7. Streetlights shall be placed adjacent to bus stop shelters.
8. Streetlights shall be located just inside adjacent property lines whenever possible, at least five (5) feet from driveways or any above ground facility, and to maximize separation from trees.

C. LIGHTING DISTRIBUTION PATTERN
1. All street lighting shall be as detailed in the City Standard Details. Street lighting shall be Type III unless otherwise shown on the plans, Standard Details, or as directed by the City Engineer.

2. All park trail lighting shall be Type IV - Symmetric Distribution Lighting.
3. Streetlight and park trail illumination and foot-candle distribution shall be optimized to meet minimum standards and avoid unnecessary glare.

D. MAST ARM LENGTH - Streetlight poles that are located six (6) feet or less from the back of curb (as measured from the centerline of the streetlight pole), a six (6) foot mast arm shall be specified. When these poles are greater than six (6) feet from the back of curb, an eight (8) foot mast arm shall be specified. The requirements may be modified by the City Engineer in certain locations or unique design requirements.

E. PULL BOXES
1. Pull boxes shall be spaced at a maximum of two hundred (200) feet unless otherwise approved by the City Engineer.
2. One pull box shall be located next to each electrolier unless there is a secondary electric service whose pull box is located within eight (8) feet of the electrolier and such electrolier is singularly serviced.
3. One pull box shall be located at each side of all street crossings.
4. Pull boxes shall be placed immediately behind the sidewalk in sidewalk areas, five feet behind the back of curb in non-sidewalk areas or within landscape areas. All pull boxes installed outside sidewalk areas shall include a six (6) inch by six (6) inch concrete collar all the way around the pull box. Final location of all pull box placement shall be subject to approval by City Inspectors.
5. Pull boxes shall be located where two (2) or more conduits connect or at any angle point in the conduit run greater than ninety (90) degrees. Conduits between pull boxes shall not have more than two hundred seventy (270) degrees of bends in the conduit.
6. Pull box size and type shall meet the requirements of the Division IV Standard Construction Specifications, Section 18 and Division V Standard Details #601 and #606.
7. Unless otherwise shown on the improvement plans, all pull boxes containing three or less street lighting conduits shall be State Standard No. 3- 1/2 size. Pull boxes containing four (4) or more street lighting conduits shall be State Standard No. 5 size. If pull boxes are set in an area subject to vehicle traffic loading, the boxes must be traffic load bearing (H-20 minimum) and have a steel cover. In addition, all pull boxes shall have a vandal proof locking cover acceptable to the City Engineer or approved Authorized Material List.
8. All pull box covers shall be labeled “Street lighting.”

F. VOLTAGE DROP CALCULATIONS - The minimum conductor size from the service point to the service panel shall be No. 4 A.W.G. copper when a service panel is required. The size of each conductor from the service panel or PG&E utility splice box to the luminaire shall be such that the voltage drop along the circuit will not exceed five percent of the nominal service voltage to be used which is one-hundred-twenty volts, in accordance with Standard Detail #611. Calculations shall be provided in the design

submittal substantiating the design criteria for every circuit. Calculations shall also be made showing the total load in amperes of each circuit at the service panel.

G. PHOTOCELLS - No external photocells are allowed unless the streetlight is directly fed from the service provider (i.e., there is no service pedestal). Photocells shall be installed as shown on the Improvement Plans or as detailed on the approved submittal documents or calculations sheet.
   1. Type 1 Photocell: Installed on each separate luminaire.
   2. Type 2 Photocell: Installed at the service cabinet.
   3. Type 3 Photocell: Installed on a single luminaire that controls the circuit.

H. SERVICE - All streetlight systems shall have underground service provided. Service points shall be provided within a utility easement immediately adjacent to or within the right-of-way and shall be open and easily accessible to the street frontage. Streetlights shall be powered from the un-metered side LS-2 rate. All electrical system control, switching equipment, and fusing of all circuits shall meet the requirements of the State Standard Specifications, State Standard Plans and California Electrical Code. Types of service are as follows:
   1. A direct underground service consists of one (1) or two (2) streetlights being served from a single service point. The service point may be in the form of a service pull box installed by the Developer, which is connected to a secondary splice box provided by PG&E. See City Standard Detail #601.
   2. An above ground service for single streetlight constructed directly by the electric utility provider shall be approved by the City Engineer prior to installation.
   3. A multiple service is three (3) or more lights being served from a single service point. The service point shall be in the form of a service installed by the Developer. Multiple systems shall have a State Standard Type III-AF service equipment enclosure (Anodized Aluminum Cabinet) located adjacent to the service point.

I. CONDUIT FILL
   1. The National Electric Code limits the portion of the conduits cross section that can be occupied by conductors to the following:
      a. One (1) Conductor - 53%
      b. Two (2) Conductors - 31%
      c. Three (3) or more conductors - 40%
   2. As a practical limit, projects for new construction/installation should be designed with twenty-six percent of the conduit x-section occupied by conductors. Standard Detail #612 lists conductor sizes and available conduit area. Conduit size shall be no smaller than one (1) inch diameter.

J. CONDUIT LOCATIONS - All underground street lighting conduit shall have a minimum twenty-four (24) inch cover. Warning tape indicating buried electrical lines shall be installed twelve (12) inches above the conduit and shall be installed during backfilling operations unless otherwise directed by the City Engineer. Location of electrical conduit shall be as follows:

1. In separated sidewalk locations, conduit shall be placed under the front edge of the sidewalk closest to the street.
2. In monolithic curb, gutter, and sidewalk locations, conduit shall be located under the back edge of sidewalk farthest from the street.

K. CONDUCTORS - All conductors, including quantity and size, shall be identified on the plans. Unless otherwise specified, conductors shall be single conductor wire with THW insulation, solid or stranded copper, sized and color coded in accordance with these standards and the National Electric Code. The same color of wire must be used for the entire length of the circuit. Tape shall not be used for identification of the wire.

The minimum conductor shall be No. 4 A.W.G. copper on a direct underground service or from the service point to a service panel.

The minimum conductor size for street lighting conductors shall be No. 10 A.W.G. copper except No. 12 A.W.G. copper may be used from the luminaire to the adjacent pull box.

A photocell is required in each service system. It shall be enclosed within the service panel with three (3) No. 14 A.W.G. copper conductors unless otherwise shown on the improvement plans.

L. LUMINAIRES - Luminaires shall be designed in accordance with the State Standard Specifications, City's Authorized Material List, or as approved by the City Engineer.

M. POLES - Poles shall be designed in accordance with the State Standard Specifications, City's Authorized Material List, or as approved by the City Engineer.