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PUBLIC WORKS
8401 Laguna Palms Way
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Standards Update Transmittal

Reference Number: 2023-06
Standards: Standard Drawings, SL-13 & SL-14

Update:

1. Modification to Standard Drawings:
   a. SL-13: 2-WIRE STREET LIGHT SYSTEM, WIRE SIZE AND VOLTAGE DROP CALCULATION, updating tables, calculations and references to reflect LED luminaires instead of HPS luminaires.
   b. SL-14: 3-WIRE STREET LIGHT SYSTEM, WIRE SIZE AND VOLTAGE DROP CALCULATION, updating tables, calculations and references to reflect LED luminaires instead of HPS luminaires.

Effect of Update:

1. The Standard Construction Drawings required all luminaires to be LED. However, Standard Drawings SL-13 & SL-14 referenced voltage drop calculations for HPS luminaires. This update will bring consistency between Standard Construction Specifications and Standard Drawings.

Request for Update Initiated By: Shoaib Ahrary, PE, ESD Manager 8/23/2022

Update Reviewed for Conformity and Consistency to Standards: Shoaib Ahrary 6/20/2023 | 2:21 PM PDT
Shoaib Ahrary, PE, ESD Manager Date

Update to Standards Approved: Jeffrey R. Werner 6/21/2023 | 5:17 PM PDT
Jeffrey R. Werner, PE, City Engineer Date

TYPICAL VOLTAGE DROP CALCULATION FOR 2 - WIRE SYSTEM

$$\text{VOLTAGE DROP (COPPER CONDUCTOR)} = \frac{D \times A \times N \times 22}{\text{CIRCULAR MILS}}$$

D = Length of section, in feet.

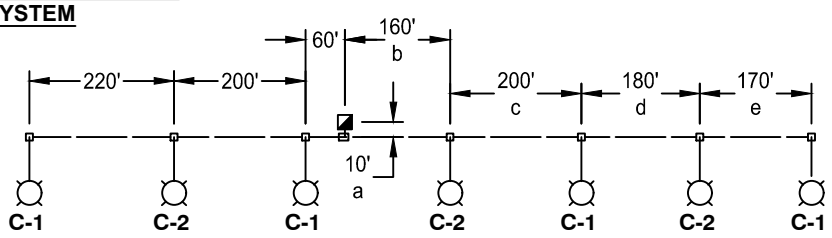
A = Line operating amperes drawn by one light.

N = Number of lights in the circuit beyond the section.

WIRE SIZE (AWG)	AREA (Circular Mils)
14	4,110
12	6,530
10	10,380
8	16,510
6	26,250
4	41,740

Driver Maximum Input Amps for Light Emitting Diode (LED) Luminaires (At 115 Volts)
All Fixtures: 1.25 Amps

TYPICAL MULTIPLE STREET LIGHTING SYSTEM



EXAMPLE CALCULATION:

FIND TOTAL VOLTAGE DROP IN CIRCUIT #1:
(115 volt system)

NOTE:

Dimension "a" is the distance between the service can and the adjacent load pull box. Use "a"=10' for standard installations where the load pull box is immediately adjacent to the service can.

Voltage drop calculations

Section a $= \frac{10\ (1.25 \times 4)\ (22)}{10{,}380} = 0.11$

Section b + c $= \frac{360\ (1.25 \times 2)\ (22)}{10{,}380} = 1.91$

Section d + e $= \frac{350\ (1.25 \times 1)\ (22)}{10{,}380} = 0.93$

TOTAL VOLTAGE DROP = 2.95

LEGEND

115W Light Emitting Diode Luminaire

Circuit #1

Service Can

Conduit with #10 AWG Conductors

NOTES:

1. **Design must be based on a two (2) wire system, even though three (3) wires (with a single common wire) are actually used.**
2. **Maximum voltage drop allowed in 115 volt system = 8.05 volts.**

DATE 09-22-2017	NOT TO SCALE

REVISION	BY	APPROVED	DATE
01	STN	SA	06-20-2023

CITY OF ELK GROVE - PUBLIC WORKS

2 - WIRE STREET LIGHT SYSTEM WIRE SIZE AND VOLTAGE DROP CALCULATION

APPROVED BY:

CITY ENGINEER — DATE: 06-21-2023

DRAWING NUMBER

SL - 13

TYPICAL VOLTAGE DROP CALCULATION FOR 3 - WIRE SYSTEM

$$\text{VOLTAGE DROP (COPPER CONDUCTOR)} = \frac{D \times A \times N \times 11}{\text{CIRCULAR MILS}}$$

D = Length of section, in feet.

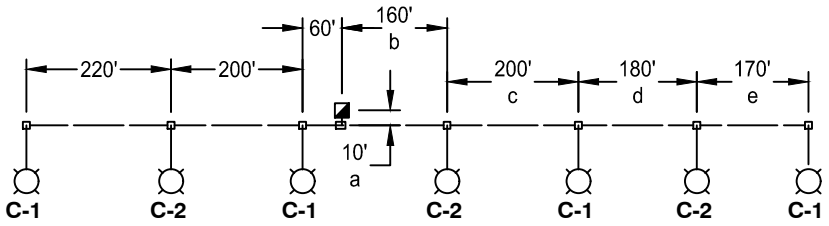
A = Line operating amperes drawn by one light.

N = Number of lights in the circuit beyond the section.

WIRE SIZE (AWG)	AREA (Circular Mils)
14	4,110
12	6,530
10	10,380
8	16,510
6	26,250
4	41,740

Driver Maximum Input Amps for Light Emitting Diode (LED) Luminaires (At 115 Volts)
All Fixtures: 1.25 Amps

TYPICAL MULTIPLE STREET LIGHTING SYSTEM



EXAMPLE CALCULATION:

FIND TOTAL VOLTAGE DROP IN CIRCUIT #1:
(115 volt system)

NOTE:

Dimension "a" is the distance between the service can and the adjacent load pull box. Use "a"=10' for standard installations where the load pull box is immediately adjacent to the service can.

Voltage drop calculations

Section a $= \frac{10\ (1.25 \times 4)\ (11)}{6{,}530} = 0.08$

Section b + c $= \frac{360\ (1.25 \times 2)\ (11)}{6{,}530} = 1.52$

Section d + e $= \frac{350\ (1.25 \times 1)\ (11)}{6{,}530} = 0.74$

TOTAL VOLTAGE DROP = 2.34

LEGEND

- **115W Light Emitting Diode Luminaire**
- C-1 **Circuit #1**
- **Service Can**
- **Conduit with #12 AWG Conductors**

NOTE:

Maximum voltage drop allowed in 115 volt system = 6.90 volts.

DATE 09-22-2017	NOT TO SCALE

REVISION	BY	APPROVED	DATE
01	STN	SA	06-20-2023

CITY OF ELK GROVE - PUBLIC WORKS

3 - WIRE STREET LIGHT SYSTEM WIRE SIZE AND VOLTAGE DROP CALCULATION

APPROVED BY:

CITY ENGINEER — DATE: 06-21-2023

DRAWING NUMBER

SL - 14