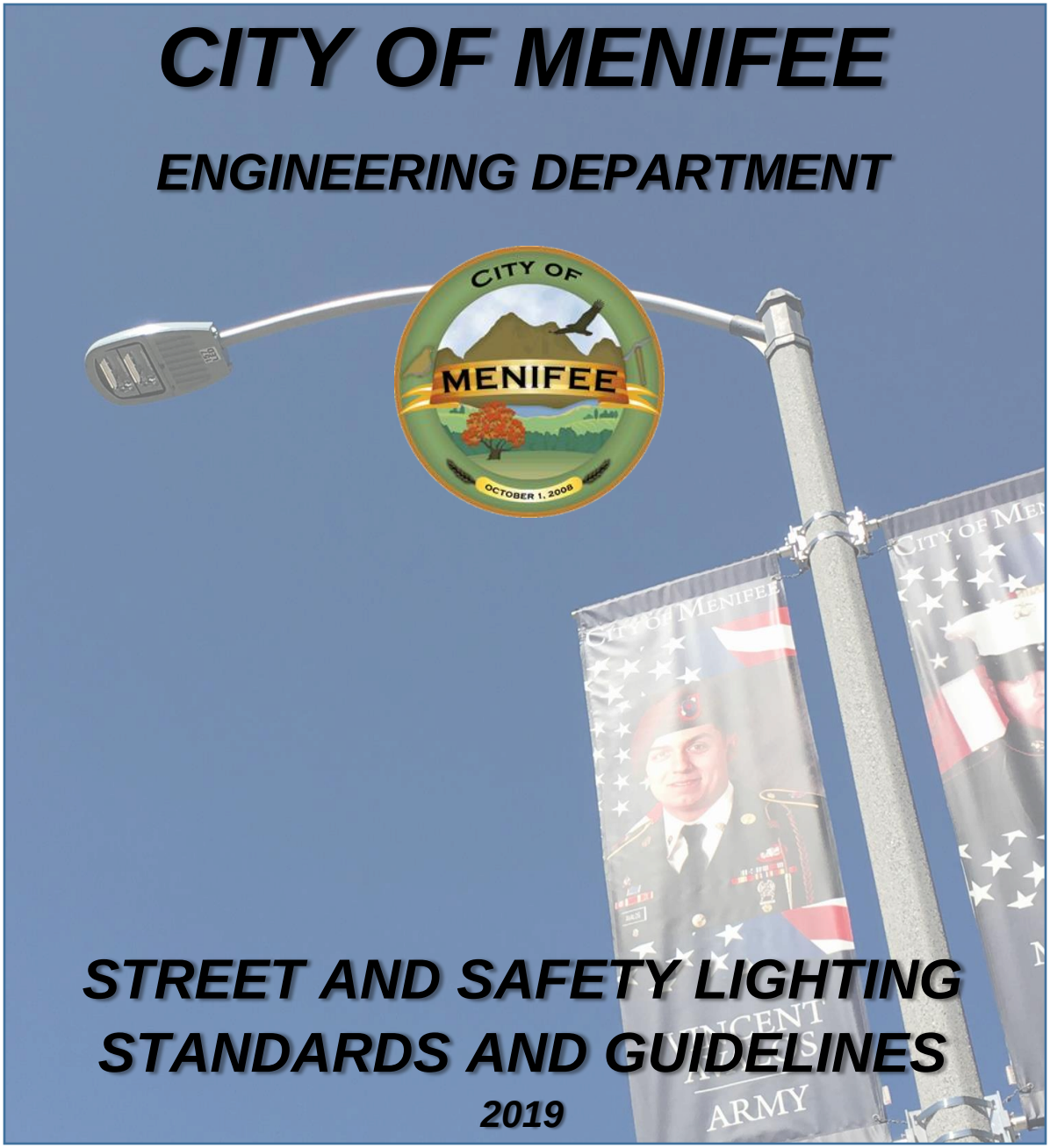
CITY OF MENIFEE

ENGINEERING DEPARTMENT



STREET AND SAFETY LIGHTING STANDARDS AND GUIDELINES

2019

MENIFEE
PUBLIC WORKS
& ENGINEERING

FORWARD

Deviations from these specifications shall be requested from the City Engineer for approval prior to commencement of work.

REVISIONS

1. Original: 9/1/2015
2. Revision: 3/2/2016
3. Revision: 4/13/2017
4. Revision: 7/12/2017
5. Revision: 01/02/2019
6. Revision: 04/11/2019

INTRODUCTION

These specifications are a supplement to the latest edition of the Standard Specifications for Public Works Construction "Green Book" and the City of Menifee Standard Special Provision. In case of conflict with the Green Book or Menifee Standard Special Provisions, these specifications shall take precedence.

GENERAL

New or relocated streetlights located within City R/W or City easements are required to include light emitting diode (LED) luminaries and shall be constructed per City Standards, Per Plan, and field inspected and approved prior to requesting energizing or acceptance.

INDUSTRY STANDARDS:

LED streetlight luminaries shall meet the applicable requirements of the following industry standards:

1. ANSI/NEMA/ANSLG C78.377-2011-Specifcations for the Chromaticity of Solid-State Lighting (SSL) Products
2. IES LM-79-08 – Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products
3. IESNA LM-80-08 – Approved Method measuring Lumen Maintenance of LED chips / Fixture Manufacturer must provide extrapolation explanation for Lumen Maintenance derived from In-Situ testing upon request.
4. IEEE C62.41.2-2002-IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits
5. IESNA TM-15-11 & Addendum A (replaces TM-15-07 and TM-15-07 Addendum A) – Luminaire Classification System for Outdoor Luminaires; Backlight, Uplight, and Glare (BUG) Ratings
6. ANSI/UL 1598 – Poles & luminaires; UL
7. ANSI/UL 8750: Additional requirements for LED luminaires as well as drivers and LED arrays

Test data that establishes compliance with the requirements of ANSI/UL 1598 and the other industry standards listed above shall be provided upon request.

REFERENCE:

1. Project Plans and Specifications – Location and project –specific details
2. California Electric Code – As applicable by the Building Department
3. SCE Standards – As applicable
4. City Standard Drawings
5. Standard Specifications for Public Works Construction (Greenbook) (latest edition) – Subsections 700 and 701 and all included cross references.

STREET LIGHT LOCATIONS:

See Menifee Std. Plan #1000 for approximate locations.

LUMINAIRES:

Fixtures shall be LED, dimmable, and one of the following or as approved by City Engineer:
GE Evolve Catalog #: ERL1-0-05-B3-30-D-GRAY-L (39 watts / residential streets)
GE Evolve Catalog #: ERLH-0-11-C3-30-D-GRAY-L (96 watts / collector-major streets)
GE Evolve Catalog #: ERLH -0-13-C3-40-D-GRAY-L (111 watts / standard intersection safety lighting)

General description of LED Streetlight – Standard fixture utilizes terminal block for power input suitable for #6 - #14 AWG wire operates at 700mA. Drive current is not field switchable. A three-pole terminal block capable of accepting #14 to #10 AWG shall be mounted to the housing inside the electrical compartment. Luminaire shall be provided with capability for optional backlight control. Complete assembly weight shall not exceed 45 lbs. Fixture is designed to mount on a schedule 40, 2" nominal pipe size (NPS) horizontal tenon (minimum 8" in length) and is adjustable +/- 5 degrees to allow for fixture leveling (includes two axis T-level to aid in this process). Fixture, including the LEDs, drivers and electrical components, shall carry a limited ten-year warranty and housing paint and finish shall carry a ten-year warranty.

Color temperature and CRI: 4000K color temperature for Safety Lighting, minimum 70 CRI
3000K color temperature for Street Lighting, minimum 70 CRI

OPTICAL DISTRIBUTION METHOD & CONFIGURATIONS:
Optical configurations shall meet the following criteria:

1. No reflectors or single lensed fixture accepted. Close contact refractors to be employed for optical distribution.
2. Refractors are to be polymeric material rated 5VA, f1 rating
3. Lumen maintenance at 50,000 hours of life to be no less than 88% of initial lumen output
4. Shall have 95% survival rate at 50,000 hours
5. Integral 10K surge suppressor for diode and entire system protection

Fixture Application (@100 hours)	LED Fixture Wattage	Color Temp	Minimum Lumens	Distribution Type
Residential Streets	39 Watts	3000 K	4,900 Lumens	IESNA Type II distribution
Collector-Major Streets	96 Watts	3000 K	11,000 Lumens	IESNA Type III distribution
Signalized Intersections	111 Watts	4000 K	13,000 Lumens	IESNA Type III distribution

Note: The items in the table are recommended values and may be changed per direction of City.

LUMINAIRE HOUSING:
Luminaire housing shall be furnished with an optical assembly, be powder-coated silver, include a level bubble to facilitate installation, allow for tool-less entry and shall include an integral twist-lock type receptacle for photoelectric cell control in accordance with the latest EEI-NEMA standards which is adjustable with respect to north and prewired to the terminal board. Photocell control shall be for a 7-pin receptacle per ANSI C136.41.

Luminaire external housing shall have a minimum rating of IP66 as specified in IEC 60529, with the ability to shed water from inside the housing (i.e. weep holes).

The LED luminaire shall be designed for horizontal mounting. The LED assembly shall have a slip-fitted mounting bracket capable of attaching to a two-inch (2") pipe without the need for special mounting parts. They shall be installed in a horizontal position with leveling and clamping to the mast arm pipe accomplished by tightening mounting bolts, which are externally or internally accessible. Bolts shall be minimum 5/8" x2" size and stainless steel.

Luminaire circuitry shall include quick connect / disconnects to allow easy separation and removal of driver and power door. Grounding requirements: ANSI/UL Standards and NFPA 70.

The luminaire power unit assembly shall consist of an integral driver, capacitor, 10K surge suppressor, and heavy-duty terminal block. The power unit assembly shall be mounted on a separate component of the luminaire to facilitate replacement.

The luminaire optical chamber shall have a minimum rating of IP66 as specified in IEC 60529.

The luminaire housing cooling system shall consist of a passive heat sink with no fans, pumps, or liquids and shall be designed and constructed to accept a standard plug type, locking, three-pole, three-wire, streetlight photocontrol. The fixture and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

All fasteners shall be stainless steel and all polycarbonate components shall be UV stabilized.

An easily-viewable nameplate shall be permanently affixed to the inside of each luminaire housing. The nameplate shall contain the following information: manufacturer's name, manufacturer's catalog number, date of manufacture (month and year), plant location, input power consumption, driver output current, IEC IP Rating, correlated color temperature (CCT), IES light distribution type, IESNA TM-15 BUG ratings, and serial number. Utility approved luminescent name plate with light source and wattage shall be permanently affixed on the exterior of the Luminaire to be visible from the ground.

The driver assembly shall be enclosed in a separate compartment from the optical assembly. The entire fixture shall be "wet listed" with the optical assembly compartment being rated at IP66. The LED Luminaire shall be constructed to provide the required light distribution with the lower edge of the Luminaire housing below the entire light source close contact refractors. **The Luminaire must be Dark Sky Compliant with U0 bug rating**. The light distribution pattern shall be per the FIXTURE table shown above.

Luminaire head shall be equipped with a shorting cap.

DRIVERS:

Light Emitting Diode (LED) drivers shall be component-type consisting of precision wound coils and welded magnetic steel laminations assembled together and impregnated with baked-on, insulating, weatherproof varnish; and metal-cased, hermetically-sealed capacitor, suitable for use on multiple distribution circuits with 60Hz, 120 or 240 Volt rating. The operating sound pressure noise level shall not exceed the ambient noise level by more than five (5) decibels at 30-feet when measured by a sound level meter conforming to the American Standards for Sound Level Meters. Where the ambient noise level is less, a minimum of 40 decibels shall be assumed.

Power supply / driver shall be field replaceable by means quick-disconnect connectors and easy access mounting hardware. Power supply / driver shall be wet-listed in the US and Canada, UL, ROHS compliant, meet Caltrans 611 vibration testing and GR-63-CORE section 4.4.1/5.4.2 earthquake zone 4.

DRIVER SPECIFICATIONS:

Electronic; voltage range = universal 120 – 277 v +/- 10%; frequency = 50/60 Hz; power factor > 90% @ full load; THD < 20% @ full load; output ripple < 10%; output shall be isolated; case temperature rated for

-40 to 60C; fully encased and potted; overheat protection, self-limited short circuit protection, and overload protected – minimum integral 10k surge protection tested in accordance with IEEE C62.41 and ANSI standard 62.41.2; Driver Life Rating not less than 100,000 hours.

PHOTOELECTRIC CONTROL UNIT FOR SERVICE CABINET:
Fisher-Pierce # TRS-2 105-305 VAC LED control or approved equal.

The photoelectric unit shall consist of a photoelectric cell in a weatherproof housing which plugs into an EEI-NEMA twist-lock receptacle integral with the luminaire and shall be installed with the clear UV-stabilized photocell window facing north, with an external light shield, or remotely mounted facing north. The control unit shall contain a uniformly coated cadmium-sulfide photoelectric cell suitable for operation with 120 or 240 volt line supply with surge protection to prevent damage and made to fail in the "ON" position. The unit shall have a HID load rating of 1,800 VA with a Tungsten load rating of 1,000 watts. The unit shall have time-delay capabilities.

The response level of the unit to changing light levels shall remain stable throughout the life of the unit (5,000 operations). The "turn-on" level shall be nominal 1 foot-candle and the "turn-on: turn-off" ratio shall be 1.5.

FUSES:
Fuses shall be slow blow 13/32" x 1 ½" in-line type in 5 amp size (unless specified otherwise by the City). The fuse shall be installed in the hot leg of the lighting conductor. The circuit shall be fused in the base of the pole – not in the pull box. 240-volt installations require each leg to be fused using a double fuse holder and two fuses of appropriate size. Fuses shall be Bussmann Series type FNQ or approved equal.

FUSEHOLDERS:
Fuse holders shall be completely waterproof, shall grip the fuse in the load side section when opened, and be able to take a 13/32" x 1 ½" fuse, with crimp-type tubular terminals of a proper size for the cable in the particular light. Heat shrink both crimp ends. Fuse holders shall be Bussmann Series type HEB or HEX with insulating boots or approved equal.

MAST ARMS:
Mast arms shall be minimum two-inch (2") I.P.S. galvanized steel or aluminum and shall be self-supporting without braces, scrolls or rods. Mounting shall be perpendicular to the street centerline unless otherwise directed by the City Engineer. They shall have a minimum of six inches (6") of horizontal straight section at the end of the arm to mount to a I.P.S. slipfitter type luminaire mount.

Mast arms shall be eight feet (8') long for all luminaires unless otherwise specified in the plans and shall be capable of handling the EPA and weight of the luminaire. Steel arms shall conform to ASTM A 120. Aluminum arms shall be corrosion resistant alloys such as Aluminum Association wrought alloys 6061 or 6062 or cast alloys 319 or 356.

All exposed hardware shall be stainless steel. All protected hardware not visible after installation shall be cast aluminum and / or stainless steel, hot-dipped galvanized. Anti-seize shall be used.

FOUNDATIONS:
Per City of Menifee Std. Plan #1003.

CONCRETE POLES:
RESIDENTIAL STREETS: Ameron 1C123 Pole
COLLECTOR AND ARTERIAL STREETS: Ameron 1C128 Pole
(Note: Use 8' arms on poles located adjacent to the sidewalk on residential, collector and arterial streets)

Concrete poles shall be tapered, centrifugally cast and pre-stressed. Poles shall be black and white marble aggregate or natural exposed aggregate. Pole shape and color shall be uniform for any one project. Replacement poles shall match existing.

Hand hole cover plates shall be aluminum and securing bolts shall be stainless steel tamper-proof bolts of the type installed with a pent-head wrench. Anti-seize shall be used.

All concrete poles shall be provided with a clear, factory applied Amershield Anti-Graffiti coating.

PULL BOXES:
Pull boxes shall be #3 1/2 Pull Boxes or approved equal. Pull boxes shall be installed per CALTRANS Standard Plan ES-8 as follows:

1. The pull box that feeds into SCE service point shall be a #5 pull box and be within 5' of the service pedestal.
2. Located within five feet (5') of each street light.
3. Located at conduit interval runs of not more than 200 LF. Additional #3 1/2 pull boxes will be required for conduit runs over 200 LF long.

Pull boxes shall be installed within the sidewalk near the street light pole with the short side parallel to the curb. They shall not be installed in any part of a driveway or other traveled way, unless approved by the City Engineer and provided with a metal traffic cover. Pull box covers shall be inscribed "STREET LIGHTING" and shall be secured with bolts, cap screws or studs and nuts made of stainless steel. Pull boxes shall be tamper resistant and utilize a special key tool for opening. Anti-seize shall be used.

For more information on City standard pull boxes, see Traffic Signal Specifications and Installation Guidelines and City Standard Plan #1004.

CONDUIT AND TRENCH:
All conduit shall be two-inch (2") UL approved heavy wall polyvinyl chloride (PVC) Schedule 80. Conduit shall be encased in a minimum of three inches (3") of sand on all sides. Location tape shall be installed above the sand layer along the length of the conduit trench. The minimum sweep radio shall be twenty-four inches (24"). The maximum length of a conduit run shall be two hundred feet (200'). The Contractor may, at his expense, use conduit or a larger size, provided the larger size is used for the entire length of the conduit runs between pull boxes (reducing couplings shall not be allowed).

Conduit shall be laid to a depth of not less than thirty inches (30") unless placed under sidewalk in which case only eighteen inches (18") shall be required. Conduit laid in open trench shall not be covered nor shall trench or inspection hole be backfilled until accepted by the City Engineer or his designated representative.

SPLICING:
Splices shall be permitted in pull boxes and lighting standard bases ONLY. All splices shall be waterproofed with Penetrox (or approved equal) with butt splice and heat shrink tubing.

CONDUCTORS AND SERVICE RUNS:
All conductors shall be stranded copper, XHHW-2, #8 AWG minimum. Maximum wire size shall be #6 AWG. Neither aluminum nor direct-burial cable shall be accepted. All street light system shall be provided with 240V metered service.

Wire shall conform to the applicable portion of ASTM B3 and B8. Wire connectors shall be approved by the City Engineer or his designated representative and shall bear the UL seal of approval. The installation procedure, connector size and crimping tools shall conform to the manufacturer's recommendations.

Wire from the base of the pole to the luminaire shall be #10. For 120-volt installations (if approved by city engineer), the wires shall be black and white, with black being the hot wire and fused. For 240-volt installations, one hot wire shall be black and the other shall be red. Both hot wires shall be fused. Any ground wires shall be green and connected to a clamp attached to an anchor bolt.

Service runs parallel to the street shall be installed under the sidewalk where new sidewalk is being constructed or directly behind the existing sidewalk. Street light circuits shall alternate from light to light. Voltage drop shall not exceed five percent (5%).

SERVICE CABINETS:
See Menifee Std. Plan #1001 for service cabinet information. All service cabinets shall be single meter service cabinets. City may require dual meter service with unmetered section at discretion of city engineer.

Service cabinets shall also meet the following specifications:

1. All cabinets shall be stainless steel Myers or approved equal.
2. Single meter service (Meyers Model USP16-M2200-112CTB or most applicable model number).
3. Shall include a photoelectric socket and control unit with time delay capabilities.
4. Shall include factory installed photocell shield.
5. Shall include test block switches.
6. Shall be anodized aluminum or stainless steel.
7. Shall include branch circuits per project design plans.

CONNECTION TO SCE SERVICE POINT:
Contractor shall contact SCE for a service point. SCE will identify what service is available and where it is located. In rare cases, a new streetlight can be connected to an existing streetlight circuit, but not without written permission from the City Engineer. New voltage drop calculations shall be required to verify that existing circuit can handle additional load.

The service point shall be in the City's right-of-way; otherwise, the City will require an easement to the service point.

PRE-INSTALLATION:

1. Contractor shall set up a pre-construction meeting prior to ordering of any materials or any work taking place.

2. Contactor shall provide material submittal drawings for city review and approval prior to ordering of any material.

3. Obtain a City R/W permit for any work performed within a City R/W or City easement. Attached to the R/W permit are the construction requirements applicable to all work performed within the City R/W.

4. Call underground Service Alert at 800-422-4133 at least 72 hours before excavating.

INSTALLATION AND INSPECTION:

1. Concrete and/or asphalt removal & replacement shall be per City of Menifee Standards or as directed by the City Engineer. A sidewalk extension may be required to meet ADA access requirements.

2. Conduit depth shall be as described in the CONDUIT AND TRENCH section. All trenches shall be compacted per the City of Menifee Standards or as directed by the City Engineer.

3. Street Lights shall be located per City approved plan and shall not be relocated without prior City approval.

4. Minimum Engineering Department Inspections Required:
    a. Schedule an Engineering Department Inspection 72 hours in advance by calling 951 672-6777 ext: 155
    b. All work performed within a Public Right-Of-Way
    c. All conduit placement
    d. Prior to and during any concrete foundation placement
    e. Pole installation
    f. Construction “As-Built” drawings shall be submitted prior to final inspection

5. Public Works inspection is required for final wiring and splicing prior to energizing. Contact the Public Works Department for inspection 72 hours in advance at 951 672-6777 ext: 155.

6. Pedestrian and vehicle traffic control and access shall be maintained per the Plans, Specifications, City Traffic Control Standards, CA MUTCD, and as otherwise required or directed by the City.

ACCEPTANCE AND ENERGIZING:

1. Upon completion of all street light construction, the Engineer of Record shall submit two (2) sets of professionally drafted streetlight “As-Built” plans on 11” x 17” size sheets to the Engineering Department.

2. After “As-Built” plans have been accepted by the City, the Contractor or Developer shall anticipate a minimum of five (5) working days for the City to contact SCE for streetlight energizing. Release of a Building Occupancy requires that streetlights be energized.

STREET LIGHT DESIGN PLANS

(APPLIES TO CITY STANDARD STREET LIGHTS ONLY, NON-STANDARD STREET LIGHTS WILL BE REVIEWED ON A PROJECT-BY-PROJECT BASIS):

1. The Design Engineer preparing plans and specifications for street lights shall adhere to the following design and plan preparation criteria:
    1. Include a title sheet with street light general notes, general construction notes, engineer declaration of responsible charge, quantity table, legends and abbreviations, vicinity map, sheet index. Cover sheet or the second sheet shall contain a large view of the street light locations with service pedestal locations. Max size of this street light location shall be 1:100' scale unless size of project necessitates larger scale.

    2. Design plan sheets shall:
        a. Be drawn at a scale of 1"=40'.
        b. Include north arrow and scale.
        c. Include R/W and centerline stationing.
        d. Conform to the latest edition of Menifee Street and Safety Light Standards and Guidelines.
        e. Reference appropriate Menifee standard drawing details or include detail sheet with Menifee standard drawings. See Menifee Standard Drawings #1000 through #1005.
        f. Include appropriate construction notes.
        g. Show existing/proposed utilities and driveways.

    3. Design plans shall include the following information:
        a. Street light pole type and fixture information.
        b. Street light call out indicating street station and circuit information.
        c. Street light size (watts).
        d. Street light circuits shall alternate from street light to street light.
        e. SCE service point and stationing. Indicate serving voltage (240v).
        f. Street light service pull box.
        g. Size of conduit (2" minimum) Schedule 80 PVC.
        h. Indicate trench depth.
        i. Size and numbers of wires.
        j. When laying conduits across a street, they shall be at right angles to the curb line.
        k. Include voltage drop calculations.
        l. Include service meter panel information.

2. Voltage Drop calculations for wire sizing are required for every circuit run which has more than (2) street lights and whenever the service from the service point is more to the last (furthest) street light exceeds 500'.

3. The Engineer of record shall be responsible for providing final "As-Built" drawings once the lighting system is installed and approved by the inspector. The construction "As-Built" drawings will be the basis for providing the final drawings. The final drawings are to be CAD drafted and shall be signed off by the engineer of record.

4. All non-standard City street lights shall be approved by Engineering Department. Non-standard street lights will be required to provide photometric analysis along roadways.

5. Structural pole base calculations are required to be submitted as a supporting document when nonstandard streetlights are approved for installation. Calculations shall be prepared by licensed California registered engineer and shall be wet-stamped.

6. Design submittals not containing full electrical designs during first submittal will be rejected.

STREET LIGHT PLAN GENERAL NOTES

For City of Menifee Street Light General Notes, see Improvement General Notes section of the City website.