

# Streetlight Guidelines

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# Re: Streetlights Design Guidelines and Requirements

This document is provided as a general guide summarizing what the San Francisco Public Utilities Commission, Power Enterprise, Streetlights Section (“SFPUC”) expects regarding any streetlights located in the franchise area within the Geographical boundaries of the City and County of San Francisco. If this document contradicts any other document, this document will prevail.

1. Under the City Administrative Code, the Director of Public Works (DPW) shall require that underground street lighting facilities, including standards, all associated wires, cables, conduits, junction boxes, services, and all connections therewith satisfactory to the Public Utilities Commission, be included in all plans, maps and specifications, for the opening of new streets, tracts, districts or subdivisions, except when arrangements have been made by the Public Utilities Commission for installation of adequate overhead street lighting facilities on utility poles.
2. The SFPUC shall review the plans for streetlight spacing, illumination levels and uniformity. 60%, and 90% Street Light design plans, including photometric calculations and specifications shall be submitted for review and approval.
3. The street and pedestrian light poles and luminaires shall be selected to comply with SFPUC streetlight catalogue. . All new street and pedestrian light fixtures shall be designed to use Light Emitting Diodes (LEDs). LED color temperature is 3000K Kelvin. The final fixtures selected in the design must be approved by the SFPUC.
4. The streetlight review process will look at the following:
  - a. Photometrics- look to see if the average fc and uniformity meet the needs of the street/sidewalk
  - b. Streetlight plan- general review of plan, it is assumed that the project team/developer should apply for a new unmetered for the streetlights they are installing unless otherwise specified
  - c. The developer is responsible to ensure that all streetlight guidelines are met. If a variance is needed, the developer is responsible to request a variance in writing.
5. SFPUC requires 10% spare of catalogue fixtures (poles, arms, luminaire assemblies) upon completion of a project.
6. Contact SFPUC to apply for Streetlight power at [SLEngineering@sfgwater.org](mailto:SLEngineering@sfgwater.org). There shall be a minimum of one service point per side of a street per block. A request must be made to use existing streetlight services. Please see below commonly asked questions for more information about using existing streetlight power.
7. After project completion, as-built drawings shall be provided to SFPUC. Send an electronic copy of the as-built drawings to [streetlights@sfgwater.org](mailto:streetlights@sfgwater.org) and a hard copy to Power Enterprise, 525 Golden Gate 7<sup>th</sup> Floor, CA 94102.

8. For design purposes, streetlights must be designed to use SFPUC standard poles and be mounted at either 22 feet or 30 feet. Pedestrian scale lights installed on 16ft tall poles can only be used to light the sidewalk and not the Roadway.  
For small alley ways and certain residential areas, pedestrian scale lights may be an option to light the roadway; however, a variance request will need to be reviewed and approved by streetlight engineering. The variance design must include Lighting the roadway.
9. All streetlights need to be adequately protected. If the streetlight is not located on the sidewalk with a 6" curb at least 24" from the center of the streetlight pole to face of the curb, a variance needs to be requested and approved. The proposed protection needs to be equivalent to the standard. There must be at least a 3ft working clearance around the streetlight pole and box.
10. Design and installation must meet NEC and NESC requirements
11. Measurements should be made from the center of the infrastructure for poles and foundations
12. Measurements should be made from the edge of the infrastructure for streetlight boxes and conduits
13. For DPW drawings please see red-lined drawings.

## Streetlight Photometrics:

### Photometric Study:

Streetlight work will be required in the areas where the developer is working on the sidewalk. Please perform the photometric study as follows:

1. Request existing streetlight information from [streetlights@sfgov.org](mailto:streetlights@sfgov.org) and/or in field investigation
2. Perform the streetlight study providing results per block to meet the needs of the street.
  - a. Add streetlights only in the area where the developer is working in the sidewalk
  - b. Sidewalk and street results should be separated unless it is a local residential only road. Local residential roads will be incidentally lit by the streetlights.
  - c. Intersection results should be provided if the development spans multiple blocks
  - d. To aid in the review, highlight the area where sidewalk work is to be done.
  - e. The light schedule, study parameters, and results should be on the drawing in chart form.
  - f. Indicate what lights are existing and which ones are new
  - g. Make sure the light is visible in the drawing
  - h. Include legend on the photometric sheets- lights, SL Box, SL service point, SL conduit, trees, planters, and bio retainers

### Photometric Requirements:

1. The design for street and pedestrian lighting shall comply with the Recommended Practices of Roadway Lighting (RP-8), published by the Illuminating Engineering Society of Northern California ("IESNA"), and roadway functional classifications specified by Caltrans California Road System (CRS) Maps.

To determine recommended illuminance values:

- a) Identify the roadway functional classification by using Caltrans CRS Maps (5M and 5L for San Francisco), which can be located at <http://www.dot.ca.gov>.

Notes:

- i. Caltrans Principal/Minor Arterial roadways are equivalent to IESNA Major roadways
  - i. Caltrans Major/Minor Collector roadways are equivalent to IESNA Collector roadways
  - ii. Caltrans Local roadways are equivalent to IESNA Local roadways
- b) Identify Pedestrian Conflict Areas by using IESNA definitions per Section 3.5 Pedestrian and Bikeway Design Criteria. For example:

- i. High pedestrian conflict areas—commercial areas in urban environments with high night pedestrian activities.
  - ii. Medium pedestrian conflict areas—intermediate areas with moderate night pedestrian activities. These areas are typically near community facilities, such as libraries and recreational centers.
  - iii. Low pedestrian conflict areas—residential areas.
- c) Determine recommended illuminance values for roadways using results from steps a) and b) and Figure 1.
- d) Determine recommended illuminance values for intersections using results from steps a) and b) and Figure 2.
- e) Determine recommended illuminance values for pedestrian walkways and bikeways from step a) and Figure 3.

When in doubt regarding the pedestrian conflict, LED lighting can be designed within the two average values provided in Figures 1 and 2. For example, if pedestrian conflict is between high and medium, roadway average maintained illuminance levels can be between 1.3fc and 1.7fc. Consult with the SFPUC Streetlight division for any additional questions.

Road & Pedestrian Conflict Area		Average Value	Uniformity Ratio
IESNA Road Classification	Pedestrian Conflict Area	R2 & R3 Pavement Classification Type (fc)	Eavg/Emin
Major	High	1.7	3.0
	Medium	1.3	3.0
Collector	High	1.2	4.0
	Medium	0.9	4.0
Local	High	0.9	6.0
	Medium	0.7	6.0
	Low	0.4	6.0

Figure 1: Recommended illuminance values for roadways (IESNA Section 3.0)

IESNA Road Classification	Average Illuminance at Pavement by Pedestrian Conflict Classification (fc)			Uniformity Ratio
	High	Medium	Low	Eavg/Emin
Major/Major	3.4	2.6	-	3.0
Major/Collector	2.9	2.2	-	3.0
Major/Local	2.6	2.0	1.3	3.0
Collector/Collector	2.4	1.8	-	4.0
Collector/Local	2.1	1.6	1.0	4.0
Local/Local	1.8	1.4	0.8	6.0

Figure 2: Recommended Illuminance values for intersections (IESNA Section 4.0)

Pedestrian Conflict Area	Average Illuminance (fc)	Uniformity Ratio, Eavg/Emin
Medium*	0.5-1.0	4.0

Figure 3: Recommended illuminance values for pedestrian walkways and bikeways (IESNA Section 3.0)

\*Recommended values for civic, downtown and commercial areas, and do not apply to residential areas. For Local roadways, with low vehicular traffic, pedestrian walkways may be illuminated incidentally by roadway lighting. For photometric calculations use LLF=0.81

## Streetlight Plan:

### Plan Drawing requirements:

1. Streetlight plan should be scaled, and scale noted on the plan
2. Streetlight plan should include part numbers
3. Streetlight plan should show service point box and conduit path
4. Include all trees in the area and label them small, medium, and large. Include all planters and bio retainers. Indicate where the curb is.
5. Include legend on the streetlight plan sheets- lights, SL Box, SL service point, SL conduit, trees, planters, and bio retainers
6. Indicate what lights are existing and which ones are new

### Streetlight requirements:

1. Streetlight design should follow red-lined DPW standard drawings unless otherwise noted by SFPUC.
2. All lighting at major intersections and /or same block of street, shall be consistent and shall use the same fixture technology (i.e., all LEDs). Design the lighting such that the number of fixtures is no more than the number of crossing at that intersection (typically four fixtures at a crossing of two roads).
3. Each streetlight pole shall have an individual pull box installed within 5 feet at the base of all streetlight poles. A separate main service pull box in the sidewalk with appropriate fuse shall be provided to serve a single light or multiple streetlights.
4. Changes to an area surrounding existing streetlight infrastructure may require modifications to the streetlight infrastructure for it to remain in compliance with DPW's standard plans. For example:
  - a. If the grade is lowered by two feet; instead of lowering the streetlight pullbox cover by two feet, the pullbox may have to be dug and reset so the wires can continue to meet DPW's minimum separation requirements between the wires and the bottom of the pullbox lid.
  - b. Similarly, if the grade is raised, the streetlight pole and foundation may have to be raised such that the handhole located on the streetlight base remains accessible. This may require excavating the site and raising the streetlight foundation.
  - c. If there is a grade change of more than 0.25" than a new foundation and pole will need to be installed.
5. Typical streetlight spacing of pole is approximately 80 feet from one another. This is approximately 3 the mounting heights for Type II and Type III LED lights

### Streetlight Service:

1. Streetlight should have an input voltage of 120V and use wattages of less than 150W.
2. Service connection and wiring should follow redlined drawing 87,203 and 87,206

### Grounding:

1. Should follow redlined drawings 87,203 for grounding conduit and SL box.

### Streetlight Clearances and Separation:

1. Follow DPW ordinance 169946 regarding the to the minimum separation requirements between trees and streetlights. Contact DPW Bureau of Urban Forestry (BUF) for the classifications of trees. Trees such as the Chinese Elm or Brisbane box are considered large trees, thereby necessitating a 21-foot clearance between those trees and streetlights.
  - a. Small (less than 20' crown diameter at maturity)-9 Ft
  - b. Medium (20' to 35' crown diameter at maturity)-15 Ft
  - c. Large (more than 35' crown diameter at maturity)-21 Ft
2. Poles should be 24" from face of the curb.
3. Poles should be at least 3' from low pressure hydrant. 5' from high pressure.
4. For dry utilities keep a distance of at least 12 inches streetlight infrastructure.
5. For wet utilities keep a distance of at least 3.5 feet from streetlight infrastructure.
6. Please make sure that there is a working clearance of at least 3 ft
7. Streetlight poles shall be a minimum of 3 feet from a permanent private structure (ie, buildings)
8. Conduits need to be a minimum of 6" from the edge of the curb. The closest conduits can be located within the first flag away from the road

### Infrastructure Requirements:

1. All streetlight infrastructure must be in the sidewalk
2. The streetlight pole foundations and boxes shall not be located within a curb ramp, or wing of a curb ramp.
3. The streetlight pole and pullboxes shall not be surrounded by dirt, permeable pavers, or other atypical materials that can settle or cause the streetlight facility to be hidden in the future. Streetlight pole and pullboxes should not be in any planters or bio retention areas. Instead, a typical concrete flag shall surround the streetlight poles and pullboxes.
4. At the Service Point, install a 40A fuse.
5. At the base of pole install a 10A fuse (Busmann FM10-10).
6. A 3ftX3ft flag around each light pole and SL box is required.
7. If there is an MTA Signal on PUC Streetlight pole, the Signal power and the Streetlight power must be separately fused and labeled inside the pullbox near the pole.



8. Ground rod in the Streetlight service box shall be ground by code and the standard streetlight plans. Attachments to this grounding (other than the metal streetlight conduit) shall use stranded copper wires (such as for streetlight pole foundations.)
9. There should be no more than 4 conduits coming in/out of the N16 streetlight box.
10. Follow DPW standards for compaction

#### Lights:

1. Streetlights should be on the streetlight catalog. Please use the wattages and distribution provided on the catalog. If photometrics cannot be met with those wattages and distribution, please state that when submitting for review.
2. Design and installation should follow DPW red lined drawings

#### Boxes:

1. Must be N16 or N36 concrete box
2. Streetlight box must be lockable; for the streetlight box cover use penta-head bolts.
3. Design and installation should follow DPW drawings 87,201 and 87,202
4. Streetlight box should say "STREET LIGHTING" according to DPW drawing 87,201
5. Splicing can be only done inside the box and not in conduits
6. For splicing details see 87204
7. Streetlight box material should be reinforced concrete body with lockable reinforced concrete lid. Boxes must be located inside the sidewalk.
8. Minimum of 3" gravel underneath the boxes is required

#### Poles:

1. Pedestrian light poles should be 16ft tall
2. Streetlight poles should be 22ft or 30ft (28.5ft) tall
3. Round tapered are preferred
4. Design and installation should follow DPW drawings
5. Numbering should be added according to red lined drawing 87,207

#### Conduits:

1. Avoid routing streetlight conduits under a roadway. Street crossing should be rare, and a variance request must be approved by PUC. Design the project such that streetlight conduits are located under the sidewalk when running parallel to the curb.
2. Streetlight conduits are typically located 18" below topping slab in dirt finished grade under the sidewalk and 24" below finished grade under roadway. When part of a dry utility joint trench, design the streetlight conduit such that it is located 18" under the topping slab.
3. Conduits: Use 1.5" RGS conduit between pullboxes. Use #8 AWG wire between pullboxes, use #10 AWG from pullbox to light with a 10A fuse. Use #6 AWG for ground. Max. distance between pullboxes shall be 250 feet. Wires shall be stranded copper with THWN insulation. All streetlight

conduits shall run underneath the sidewalk; with the sole exception of service conduit road crossings when there are no other available options.

4. The conduit bends will be less than 270 degrees from pullbox to pullbox.
5. Splicing can only happen in the streetlight boxes
6. T-connection are not allowed
7. Conduits must enter and leave through the bottom of the SL box (as per the standard plans)
8. As stated previously, upon a granted variance - street crossings can only occur at the end of the block. A spare conduit shall be provided for this type of crossing.
9. Useful drawings 87203, 87206

#### Foundation:

1. Bolt circles and Anchors
  - a. Pole anchors will be minimum of 42-inch-long, 1-inch diameter
  - b. Bolt circle will be 11" for all metal Streetlight Poles
  - c. Must have slotted bolt circle of at least 0.5 inch
2. The attached pole foundation pdf is a guideline, please have the developer's Structural Engineer review to ensure that the foundation is adequate.
3. If the foundation is less than 24 inches from a basement or vault, then the standard streetlight foundation is no longer acceptable. Please have a structural engineer design an equivalent streetlight foundation. Please submit a stamped drawing for Streetlight review and approval.

## Inspection:

1. Email inspection request to [SLinspections@sfgov.org](mailto:SLinspections@sfgov.org)
2. SFPUC will perform an inspection prior to accepting the streetlight assets and associated work. Contact SFPUC at a minimum of 5 business days in advance to schedule an inspection.
3. Payment must be processed before any inspection is scheduled.
4. Inspections are required for all streetlight infrastructure before the concrete is poured.
5. Final inspection will be performed after all streetlights in the project are operational.
6. Streetlights will not be accepted until all punch list items are completed from the final inspection.
7. Red-lined drawings and submittal drawings should be emailed to [streetlights@sfgov.org](mailto:streetlights@sfgov.org).

## Purchasing:

All streetlights purchased should include the following:

1. Hand holes will be designed to be located 180° from the street
2. 7-Pin receptacle- Use top mounted, 7-pin, twist lock photo-eye
3. Slotted bolt circle
4. For cobra head lights, the ANSI wattage label to be installed on the fixture per the 2011 ANSI standard giving the exact wattage of the fixture.
5. Invoice needs to be submitted and reviewed before attic stock is received at the warehouse. The below information should be provided with the invoice
  - a. Manufacturer
  - b. Make
  - c. Part Number
  - d. RAL color
  - e. Job name/number
6. If attic stock is being purchased, identification label on the box , which includes the wattage and distribution type, similar to the ANSI label ( ex. 54W R2M)
7. Contact [streetlights@sfwater.org](mailto:streetlights@sfwater.org) to deliver attic stock. Invoice should be included with delivery.
8. All lights are 3000k
9. Submittals and Request for Information: PUC will provide standards and design guidelines to the design engineers and they will design, review and comment on submittals and RFIs. If the design or material are different from PUC standards, the design engineer should contact PUC Streetlights to discuss possible exceptions.

## Commonly asked questions:

### Is replacing poles and foundation required for grade change?

When work around the streetlight poles, chips or damages the foundation in any way, new foundation will be required. The pole should be flush to the finished grade upon completion of the project. Having the poles foundation exposed above the finished grade (above the base plate) is unacceptable. Unless the project owner provides a report from a CA registered structural engineer asking for exception. This variance will need to be reviewed and approved.

### Can existing poles be reused?

New, similar poles will be installed unless project requests to reuse the pole. Upon PUC inspection of the pole, PUC may grant permission for re-using of the existing pole. Concrete poles may not be reused.

### Can I connect the new streetlights to PUC service points?

Yes, if you are installing less than 3 lights and with written approval from PUC engineer. Follow this process:

Please note that PUC service point is the box which is owned by PUC and connected directly to PG&E infrastructure.

1. Ask for a streetlight map showing the proposed PUC service point and all lights connected to it by emailing [streetlights@sfwater.org](mailto:streetlights@sfwater.org).
2. Mark up provided drawing indicating which service point you are requesting to use and where the new lights will be located. Please also include the additional load information. Please note that the service point needs to be on the same block and side of the block as the lights to be installed. Send information to the Streetlight Engineer reviewing your application.
3. The engineer will respond with a decision.

### How can I request a streetlight foundation variance?

Provide the below information to the streetlight engineer for review:

1. Description of why developer cannot install the standard foundation:
2. Will moving the light <10 feet while still being ~ 24" from the face of the curb allow the developer to install the standard foundation?
3. Provide a stamped drawing of the proposed foundation stating it is equivalent to the standard foundation

## What are some of the emergency temporary light requirements?

When an unexpected outage occurs because of developer construction, developer is responsible to install like-in-kind temporary lighting until the permanent light is repaired by the developer.

- Must be operational from dusk to dawn
- Light must face the road
- If it is a flood light, aim so that the light to the middle of the road
- If it is a cobra head, orient it to the road and tilt should be 0
- Light should be mounted at the same height as the streetlights in the area
- Light must have equivalent lumens of light it is replacing

## What is the process to request relocation of streetlight infrastructure?

If you are already working with a streetlight engineer, provide the filled-out form and the following information to the engineer for review. If you are not already working with a streetlight engineer, provide the following information to [SLEngineering@sfwater.org](mailto:SLEngineering@sfwater.org).

- Scaled plan drawing showing the existing infrastructure and proposed changes
- Explanation of why the infrastructure needs to be relocated

Please note that all infrastructure needs to be in the sidewalk and not in any planters, bio retention areas, or curbs.

Please note that if any light is de-energized from dusk to dawn, temporary lighting will be required.

An engineer will review the information. If acceptable, the engineer will end a Custom Work letter to perform work and/or inspection associated with the request.

Please note that if there is other equipment on the pole, it is the contractor's responsibility to inform streetlight engineer in writing. If there is DAS equipment on the pole, the developer should email [das@sfwater.org](mailto:das@sfwater.org).

## Do I need to perform a photometric study if I need to move an existing streetlight?

If the project needs to move an existing light to accommodate the project's needs, a photometrics study is needed if the streetlight is moving more than 10ft.

## How do we know if the streetlight is approved?

Even when a streetlight is on the catalog, the streetlight engineer must approve it. When the streetlight engineer approves the photometrics, the streetlight is approved. Prior to the photometrics being approved, the developer cannot assume that the streetlight is approved for the project.

## What should I submit for review?

Please submit the Streetlight Review Form and attach all the necessary documents it asks for. Please also provide a project timeline.

## What is the process to request a light removal?

If the streetlight is owned by PG&E:

1. Once the project team is ready to remove the PG&E owned streetlights, please fill out the PG&E Streetlight Removal form to [SLEngineering@sfgwater.org](mailto:SLEngineering@sfgwater.org). If you are already working with a streetlight engineer, you can directly email him/her.
2. The streetlight engineer will review and put in an application to PG&E on your behalf.
3. PG&E will estimate and send an invoice
4. Project team will pay invoice
5. PG&E will remove lights

If the streetlight is owned by SFPUC:

1. Project team can fill out the SFPUC Streetlight Removal Form
2. Project team can include the removal request with the WDT application. Send application with SFPUC Streetlight Removal Form to [SLEngineering@sfgwater.org](mailto:SLEngineering@sfgwater.org)

Please contact [streetlights@sfgwater.org](mailto:streetlights@sfgwater.org) with any additional questions