



**Municipal Street Lighting
Best Management Practice
April 30, 2014**

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APPENDICES

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1. Abbreviations

CEC	Canadian Electrical Code (Part 1)
CSA	Canadian Standards Association
City	The City of Saint John
IDA	International Dark Sky Association
IES	Illuminating Engineering Society
IESNA	Illuminating Engineering Society of North America
IMSA	International Municipal Signals Association
NEMA	National Electrical Manufacturer's Association
SJE	Saint John Energy
TAC	Transportation Association of Canada

2. References

- ANSI/IESNA RP-8-00 Roadway Lighting (Reaffirmed 2005)
- IES The Lighting Handbook 10th Edition
- TAC Guide for the Design of Roadway Lighting, latest revision
- City of Saint John Subdivision By-Law, latest revision
- City of Saint John General Specifications, latest revision
- City of Saint John Trails and Bikeway Strategic Plan (May 2010)

3. Glossary of Terms

Average Illuminance – The average maintained level of horizontal illuminance on the roadway pavement when the output of the lamp and luminaire is diminished by maintenance factors. It is expressed in average lux (or foot-candles) for the pavement area.

Chief City Engineer – As appointed by Council, or any person authorized by him to act on his behalf.

City – The City of Saint John.

Colour Rendition – A measure of a lamp's ability to accurately show colour, using the sun's light as the standard. Colour rendition is measured on the Colour Rendering Index (CRI) scale from 1 to 100. The sun has a CRI of 100.

Curvilinear Road – A curvilinear roadway, for the purposes of this document, shall refer to roadways in which the decision sight distance for on-coming traffic or pedestrians is not achieved.

Effective Life – Typically measured in hours, it is the amount of time a lamp can operate before needing to be replaced i.e.; burn out. For LEDs, it the length of time before the emitted light is reduced to 70% of its original output (also called the L70 point).

Foot-candle (fc) – A unit of measuring illuminance.

Full Lighting – Lighting of the entire roadway within a defined area in a uniform manner shall meet the full level requirements as set forth in this document.

Glare – An excessive level of light that results in visual discomfort; there are three (3) classifications of glare: disability glare, discomfort glare, and nuisance glare.

Illuminance – The density of the luminous flux incident on a surface. It is the quotient of the flux by the area of the surface when the latter is uniformly illuminated.

Intersection – Where two or more public streets come together.

Lamp – General term for a non-natural source of light.

Lamp Wattage – The rate at which a light source will consume electric energy measured in watts (W).

LED – is a solid-state lamp that uses light-emitting diodes (LEDs) as the source of light. LED lamps offer long service life and high energy efficiency.

Lighting Designer - A qualified designer / consultant performing street lighting calculations and designs for municipal street lighting based. The designer / consultant must be a professional engineer registered in New Brunswick, have significant experience in municipal street lighting design and be approved by the Chief City Engineer.

Lighting Upgrade – The addition of street lighting or change of existing street lighting based on the results of a completed street light warrant. Lighting upgrades shall be performed on new roadways, reconstruction of existing roadways or due to warrant results.

Luminaire – A complete lighting unit consisting of a lamp(s) together with the parts designed to distribute the light, to position and protect the lamps, and to connect the lamps to the power supply.

Luminance – The luminous intensity of any surface in a given direction per unit of projected area of the surface as viewed from that direction.

Lux – Unit of illuminance and luminous emittance, measuring luminous flux per unit area.

Partial Lighting – Lighting at a decision point or points, typically at curvilinear roadway safety points and intersections. Typically this type of lighting would be a single fixture installation.

Pavement Classification – Classification that relates to the type of road surface (Portland cement concrete and different aggregate compositions of asphalt) and the associated reflectance characteristics.

Pedestrian Conflict – Classification that relates to the interaction of pedestrians and vehicles in a certain area, typically related to land use.

High Pedestrian Conflict – An area with a significant number of pedestrians expected to be on the areas during the hours from dusk to dawn, 100 or more pedestrians in a one hour time period. An example of a high pedestrian area includes Uptown Saint John.

Medium Pedestrian Conflict – An area where fewer pedestrians are expected to be on the areas during the hours from dusk to dawn, approximately 11 – 99 pedestrians in a one hour time period. Examples of medium pedestrian areas include: urban commercial or industrial areas, areas with multifamily residential, community buildings, neighbourhood shopping and/or transit lines.

Low Pedestrian Conflict – An area where little to no pedestrians are expected to be on the areas during the hours from dusk to dawn, 10 or less pedestrians in a one (1) hour time period. Examples of low pedestrian areas include: short urban streets with single-family homes.

Roadway Classification

Arterial Street – An arterial street is considered a street designed for through traffic usually on a continuous route, with or without intersections at grade, giving direct access to abutting property, and on which geometric design and traffic control measures may be used to expedite the safe movement of through traffic.

Collector Street – A collector street is considered a street designed to provide access to abutting properties which also serves to collect and distribute traffic between arterial and local streets.

Local Street – A local street is considered a street designed primarily for access to a residence, business or other abutting property.

Rural Road – A rural road is considered to be similar to a local street, serving larger un-serviced lots with on-site facilities. These roadways are outside the City's Primary Development Area as shown on the Municipal Development Plan (Schedule B – Future Land Use, latest revision). Rural roads shall

not have street lighting unless deemed necessary due to dead ends, lighting warrants, intersections and/or vertical/horizontal curvature. If lighting is warranted, rural roads shall meet the requirements of local roadways with low pedestrian conflict.

Street Light Pole – A metal or wooden pole that has a street light mounted on it as an attachment.

Uniformity – A measure of the change in intensity of light over a certain area. The smaller the difference between the brightest point and the darkest point (or the brightest and the average) in a given area, the better the uniformity.

Veiling Ratio – A measure of glare from the roadway.

Visibility – The quality or state of being perceived by the eye. Typically in street lighting it is defined as the distance at which an object can be seen.

4. Introduction

The City has developed this Municipal Street Lighting Best Management Practice (Document) in order to standardize the process for design, review and assessment of municipal street lighting in the City of Saint John. This Document is intended to provide adequate street lighting uniformity (location, spacing, type, and/or amount) for full street reconstructions, new developments, and where applicable, to assess requests on existing street lighting conditions across the City. All street lighting evaluations and requests shall consider user roadway, user safety, cost benefit analysis and capital cost. With the exception of emergency requirements, any warranted street lighting will be prioritized and considered during budget deliberations. Consideration for street lighting will only be within the municipal right-of-way and not for private lighting purposes.

Municipal street lighting designs in Saint John shall be in accordance with the Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting. These Practices are to be read in conjunction with the TAC Guide for Roadway Lighting. Those performing designs in Saint John must be knowledgeable in all parts of the TAC Guide for Roadway Lighting. All design must be in conformance with Canadian Electrical Code.

This Document shall apply to streets that are under the jurisdiction of the City, it does not apply to private roads and/or properties, open spaces, parks, provincial and regional designated highways. Although the Document addresses several lighting design situations, there may be instances where a lighting design is not covered. Where special circumstances arise, the City may vary from the requirements of this Best Management Practice and use recognized municipal lighting standards.

4.1 Purpose

The purpose of the City of Saint John Municipal Street Lighting Best Management Practice is to develop principles that will:

- contribute to roadway user safety;
- assist in the conservation of energy;
- assist in preserving the experience of the night sky (minimize light pollution);
- provide respect for the privacy of residential space (minimize light trespass);
- provide a consistent and standard approach to design; and
- ensure financial sustainability with respect to construction, maintenance and operating costs.

5. General Information

5.1 Lighting Levels

The street lighting levels shall be based on the TAC and ANSI/IESNA. The recommended levels for each type of roadway are described below:

Horizontal Luminance - the recommended measurement for standard roadways. The calculations to be performed for a roadway are average, uniformity and veiling ratio; Table 1 illustrates the acceptable levels for horizontal luminance.

Horizontal Illuminance - the recommended measurement for intersections, including curvilinear road sections, cul-de-sacs and roundabouts; Table 2 illustrates the acceptable levels for horizontal illuminance.

Vertical illuminance - the recommended to measure lighting at pedestrian areas to ensure the safety of pedestrians; Table 3 illustrates the acceptable levels for vertical illuminance.

Table 1 – Horizontal Luminance Criteria for Roadways*

Roadway Classification	Pedestrian Conflict	Minimum Average (cd/m ²)	Maximum Uniformity (L _{avg} /L _{min})	Maximum Veiling Ratio (L _{vmax} /L _{avg})
Arterial	High	≥ 1.2	≤ 3.0	≤ 0.3
	Medium	≥ 0.9	≤ 3.0	≤ 0.3
	Low	≥ 0.6	≤ 3.5	≤ 0.3
Collector	High	≥ 0.8	≤ 3.0	≤ 0.4
	Medium	≥ 0.6	≤ 3.5	≤ 0.4
	Low	≥ 0.4	≤ 4.0	≤ 0.4
Local	High	≥ 0.6	≤ 6.0	≤ 0.4
	Medium	≥ 0.5	≤ 6.0	≤ 0.4
	Low	≥ 0.3	≤ 6.0	≤ 0.4
Rural [‡]	N/A			

* Values in Table 1 are derived from TAC, Guide for the Design of Roadway Lighting (2006).

[‡] Rural roads shall not have street lighting unless deemed necessary due to dead ends, lighting warrants, intersections and/or curved road sections. Where warranted rural roads shall meet the requirements of local roadways with low pedestrian conflict.

Table 2 – Horizontal Illuminance Criteria for Curvilinear Road Sections, Cul-de-sacs and Roundabouts*

Roadway Classification	Pedestrian Conflict	Minimum Average (lux)			Maximum Uniformity (E_{avg}/E_{min})	Maximum Veiling Ratio (L_{Vmax}/L_{avg})
		R1 [†]	R2 & R3 [†]	R4 [†]		
Arterial	High	≥ 12.0	≥ 17.0	≥ 15.0	≤ 3.0	≤ 0.3
	Medium	≥ 9.0	≥ 13.0	≥ 11.0	≤ 3.0	≤ 0.3
	Low	≥ 6.0	≥ 9.0	≥ 8.0	≤ 3.5	≤ 0.3
Collector	High	≥ 8.0	≥ 12.0	≥ 10.0	≤ 3.0	≤ 0.4
	Medium	≥ 6.0	≥ 9.0	≥ 8.0	≤ 3.5	≤ 0.4
	Low	≥ 4.0	≥ 6.0	≥ 5.0	≤ 4.0	≤ 0.4
Local	High	≥ 6.0	≥ 9.0	≥ 8.0	≤ 6.0	≤ 0.4
	Medium	≥ 5.0	≥ 7.0	≥ 6.0	≤ 6.0	≤ 0.4
	Low	≥ 3.0	≥ 4.0	≥ 4.0	≤ 6.0	≤ 0.4
Rural [‡]	N/A					

[†] R1, R2, R3 and R4 are defined in the ANSI/IESNA RP-8-00 Roadway Lighting (Reaffirmed 2005), Table 1: Road Surface Classifications

* Values in Table 2 are derived from TAC, Guide for the Design of Roadway Lighting (2006).

[‡] Rural roads shall not have street lighting unless deemed necessary due to dead ends, lighting warrants, intersections and/or curved road sections. Where warranted rural roads shall meet the requirements of local roadways with low pedestrian conflict.

Table 3 – Vertical Illuminance Criteria for Pedestrian Areas*

Pedestrian Conflict	Maintained Average Vertical Illuminance (lux)	Uniformity Ratio (E_{avg}/E_{min})	Minimum Maintained Vertical Illuminance (lux)
High	20.0	4.0	10.0
Medium	5.0	4.0	2.0
Low	3.0	6.0	0.8

* Values in Table 3 are derived from TAC, Guide for the Design of Roadway Lighting (2006). Pedestrian areas in this table are considered walkways adjacent (within 5 metres) of the roadway.

Table 4 – Illuminance Criteria for Intersections*

Intersection Classification	Average Illumination at Intersections by Pedestrian Conflict Classifications (lux)			E_{avg}/E_{min}
	High	Medium	Low	
Arterial/Arterial	34.0	26.0	18.0	3.0
Arterial/Collector	29.0	22.0	15.0	3.0
Arterial/Local	26.0	20.0	13.0	3.0
Collector/Collector	24.0	18.0	12.0	4.0
Collector/Local	21.0	16.0	10.0	4.0

Local/Local	18.0	14.0	8.0	6.0
Rural Intersections [‡]	9.0	7.0	1.0	6.0

* Values in Table 4 are derived from TAC, Guide for the Design of Roadway Lighting (2006).

[‡] Rural roads shall not have street lighting unless deemed necessary due to dead ends, lighting warrants, intersections and/or curved road sections. Where required illumination levels for rural intersections shall meet partial intersection lighting level requirements.

5.2 Design Criteria

Designs shall endeavour to provide consistent illumination for street lighting throughout the City while meeting the requirements in this document.

Street lighting shall be designed by the City, or their approved lighting designer / consultant, taking into consideration, the requirements to promote safety and security for drivers and pedestrians, control glare, minimize lighting trespass onto adjacent properties, minimize direct upward light emissions, energy conservation and minimize over lighting.

Street lighting within the City shall be standard 'cobra head' style except in specified areas such as Uptown Saint John, locations designated as Heritage Areas, and any other areas where special approvals have been granted. In areas illuminated with decorative lighting, all efforts shall be made to meet the requirements of this document; however, it is acceptable for average illumination levels to be lower than prescribed as long as the uniformity ratio is met.

5.2.1 Pole Offsets for Roadway Surfaces

Pole offsets for roadway surfaces shall be in accordance with the typical cross sections of the City's General Specifications and as outlined below:

- For roadways that include curb and sidewalk, street light poles shall be located between the curb and sidewalk (sod median).
- For rural roadway classifications, street light poles shall be located a minimum of 1.85 m outside the edge of asphalt.
- For roadways with shared use trails adjacent to the roadway street light poles shall be located a minimum of 1.5 m outside the edge of asphalt.

Where pole offsets and proposed locations are not possible, lighting calculations and proposed shall be reviewed to determine the best possible location for poles and the design shall be reviewed by the Chief City Engineer or designate.

5.2.2 Pole Heights and Spacing

Street light pole heights and spacing shall vary based on the luminaire wattage and the type of luminaire and the roadway classification. Table 5 provides the required pole heights and spacing.

Table 5 – Pole Heights and Spacing

Luminaire Wattage	Pole Height (Above Ground)	Single Side Spacing	Double Side Spacing (Staggered or Opposite)
100W HPS (44W LED) Standard Flat Glass Fixture	≥ 7.6 m	35 - 45 m	40 - 50 m Staggered

150W HPS (88W LED) Standard Flat Glass Fixture	≥ 7.6 m	40 - 45 m	45 - 50 m Staggered 45 - 50 m Opposite (4 lane Collector only)
*250W HPS (131W LED) Standard Flat Glass Fixture	9.144 m	Not Recommended	45-55 m (4 lane Collector / Arterial) Opposite
150W HPS (75W LED) Post Top Decorative	4.5 m	28-35 m	45 – 50 m Staggered

* 250W luminaires are only to be used on arterial roads where 150W luminaires are not able to reach the proper lighting levels.

Mounting heights for standard flat glass fixtures are based on using standard mast arms, length of either 1.2 m or 3.1 m based on the location of the pole and results of the calculations. For installation of standard flat glass fixtures on street light poles, the developer is to coordinate mounting heights and spacing with the Chief City Engineer or designate, selecting the most appropriate wattage to meet the required levels.

For new residential areas, the recommended street light pole location shall be on lot lines between properties to assist in the elimination of light trespass into houses.

All street lighting designs shall be done based on the specific roadway. Pole heights and spacing are to be designed based on the lighting level calculations to best meet the lighting levels required.

5.2.3 Luminaire Wattages for Different Roadway Classifications

Luminaire wattages shall vary based on the type of luminaire and the roadway classification. Table 6 provides the required luminaire wattages as follows:

Table 6 – Luminaire Wattage

Luminaire Wattage	Roadway Classification
100W HPS (44W LED) Standard Flat Glass Fixture	Rural or Local
150W HPS (88W LED) Standard Flat Glass Fixture	Rural, Local or Collector
*250W HPS (131W LED) Standard Flat Glass Fixture	Arterial
150W HPS (75W LED) Post Top Decorative	Local or Collector

* 250W luminaires are only to be used on arterial roads where 150W luminaires are not able to reach the proper lighting levels.

All street lighting designs shall be done based on the specific roadway. Luminaire wattages are to be designed based on the lighting level calculations to best meet the lighting levels required.

5.2.4 Light Level Calculations

Luminance is the preferred measure for roadway surfaces as it measures the light that is reflected from the roadway surface to the observer looking down at the roadway, and is used as a measurement to ensure minimal over lighting.

For standard roadway surfaces, the City or their approved lighting designer / consultant, is required to calculate the horizontal luminance.

For roadway surfaces that are curvilinear, illuminance is the preferred measure as the levels are not dependent on an observer and only consider the light that strikes off the surface regardless of the location of the observer.

- The City or their approved lighting designer / consultant shall, as a minimum, perform the following street lighting calculations:
 - - Horizontal Luminance Criteria for Roadways (Table 1)
 - Horizontal Illuminance Criteria for Curvilinear Road Sections, Cul-de-sacs and Roundabouts (Table 2)
 - Vertical Illuminance Criteria for Pedestrian Areas (Table 3)
 - Illuminance Criteria for Intersections (Table 4)
- The City or their approved lighting designer / consultant shall perform street lighting calculations such that the lighting levels are as close to the acceptable averages as possible without significant over lighting. Pole spacing, wattages and pole heights shall be adjusted to ensure over lighting, trespass light and glare are minimized.
- The City or their approved lighting designer / consultant shall perform all calculations using a 0.8 light loss factor for new luminaires.
- The City or their approved lighting designer / consultant shall prepare drawing submissions for the lighting level calculations that shall include the following:
 - - Layout of the roadway with grid points within the edge of pavement;
 - Horizontal luminance calculation for the entire standard roadway showing Average, Uniformity (Avg/Min);
 - A separate horizontal illuminance calculation for each intersection, curvilinear road section, roundabout or cul-de-sac, including the intersection to the existing street, including Average, Uniformity (Avg/Min);
 - A separate vertical illuminance calculation for each cross walk or sidewalk if it is immediately adjacent to the edge of pavement, including Average, Uniformity (Avg/Min); and
 - A legend indicating the type of luminaires, pole/mounting heights, quantities of each luminaire, light loss factor used and wattages used.

Acceptable lighting software(s) shall be the latest version of any of the following:

- AutoLUX;
- AGi32;
- Cooper Luxicon;
- GE Aladdin; or
- Visual

5.2.5 Other System Components

Other lighting system components that must be considered are: wiring, underground conduit, power connection points, and fusing. These system components shall be designed to meet CEC requirements, the local electrical utility Construction Practices and the following:

- Street light wiring shall be a minimum of # 6 copper wiring for underground installations and have 2 wires plus ground for each circuit. Ground wires are to be # 6 bare copper. Wiring shall be RWU-90. Wiring shall be sized such that the voltage drop on any given run is no more than 3%.
- Overhead wiring shall be either #4 duplex with messenger or # 2 tri-plex with messenger. Wiring shall be aluminum for overhead installations. Overhead connections shall be coordinated with SJE.

- Street light wiring shall be installed in DB-II conduit. Conduit is to be installed at a minimum depth to meet CEC requirements or 600 mm where not located under road surfaces. Under road surface conduits shall be installed in concrete encasement and shall be a minimum depth of 760 mm.
- Splicing of wiring shall only be done in pole handholes or manholes. No splicing shall be performed underground unless approved by SJE.
- Luminaires shall be individually fused with 3A fuses at the splice in the pole handhole.
- Street lighting shall not be required to be metered.
- Street lights shall all have individual photo button control appropriate for the voltage of the luminaire.
- If street light poles are installed with receptacles, the receptacles may only be used for decorative lighting purposes and shall be designed accordingly. Appropriate labeling shall be installed at each pole. Receptacles shall include 'cover while in use' covers as per CEC code requirements. Receptacle shall only be allowed on poles in which supply voltage for the luminaire and the receptacle are 120V.
- Ground rods or ground plates shall be placed at the end of each circuit and at the power connection point. Rods shall be copper clad 19 mm in diameter and 1.8 m in length.

5.3 Materials and Installation

Light pollution contributes to sky glow, glare, light trespass, light clutter, decreased visibility at night and energy waste. The City recognizes the effects that light pollution has on the environment and therefore has an interest in reducing the amount of light pollution generated by street lighting. As such, the City has selected full cut-off fixtures for all applications.

Developers may request an equivalent manufacturer's decorative or standard lighting; however, the Chief City Engineer or designate shall review all requests and advise if it is acceptable. All new street lighting shall be LED. High Pressure Sodium (HPS) street lighting may be considered for decorative or ornamental purposes.

Although the City's General Specifications, Division 16 details material and installation standards for street lighting, this Document shall take precedence for street lighting and related equipment.

A list of acceptable manufacturers and materials is included in Tables 7 and 8. Should there be a request for a substitute or an equivalent product, all requests shall be provided in writing to the Chief City Engineer or designate, for review prior to any ordering or installing. The Chief City Engineer will review all requests and advise in writing if the request product is acceptable.

Cut sheets must be supplied to the City by the developer and must include the minimum following requirements:

- Full part number must be shown for review;
- Cut off classification or BUG rating of fixture and distribution type;
- Wattage and pre-wired voltage of fixtures; and
- Light source and ballast type.

All City approved fixtures must meet the following minimum requirements:

- All street lights must be CSA approved;
- All street lights must have universal starters;
- All street lights must have common ballasts;
- All street lights shall be tri-tap, and pre-wired for 120V connection; and
- All street lights shall be type III distribution.

Table 7 – Standard Type Luminaire

	Manufacturer	Description	Part Number
LED	LED Roadway Lighting	SAT-48S Type III SAT 24S Type III SAT-72M Type III	S48S-0-R-GS-3-NN-G#-GCQ-K2F-LF S24S-0-R-GS-3-NN-G#-GCQ-K2F-LF S72MS-0-R-GS-3-NN-G#-GCQ-K2F-LF

Table 8 – Decorative Type Luminaire

	Manufacturer	Description	Part Number
HPS	Holophane	Post Top	PTU-15AHP-12-A-C5-B
	Lumec	Lantern Post Top	L21A(N)-150HPS-PC-C-RR3-120-BKTX
LED	Holophane	Post Top	PUL-07LED-6K-AS-A-L5-B
	Lumec	Lantern Post Top	S26A(N)-003-65W49LED4K-ES-ACDR-C-LE5-120-RC-TN3.5-BKTX

Table 9 – Street Light Poles*

	Manufacturer	Description	Part Number
Direct Buried	Hapco	Aluminum	RTA25C7BE
	Thomas & Betts (All-struct)	Aluminum	PF25-745C-DB
Base Mounted Steel / Aluminum	Dynapole	Spun Aluminum	SRA6-25-B1 SRA6-30-B1
	T&B (All-struct)	Spun Aluminum	PF25-745C-AB PF30-845C-AB

*Street light poles will be based on site conditions and street light applications. Bolt patterns must match existing bases.

6. Roadway Street Lighting Assessments

6.1 Warrant Process

As municipal street lighting may not be required (warranted) on all roadways nor be beneficial to drivers in all situations, the City shall use a point-score lighting warrant system based on the standards described in the TAC Manual - Guide for the Design of Roadway Lighting (Chapter 9). The Warrant Analysis system, Table 10, shall be used to evaluate, calculate and determine the need for full, partial or no lighting.

New developments shall be reviewed by the City after the preliminary roadway layout has been designed and constructed by the developer. The City shall use the Warrant System to determine the level of lighting required and shall inform the developer of these requirements.

For existing roadways, should a citizen request a street light (process flowchart on next page), a lighting warrant shall be performed by the City. The City shall not review requests for lighting on private property; the warrant system shall only be valid for municipal street lighting applications. The City shall review the section of roadway in question and based on the result of the warrant lighting system, determine if lighting is required. The roadway shall be reviewed from the closest two intersecting streets or for a distance of 1 kilometre, whichever is smaller.

Table 10 – Lighting Warrant for Roadways has been included below:

		Road Name								
		From _____		To _____						
		City _____								
		Warrant Undertaken By _____								
		Date _____								
Warrants for Lighting of Arterial, Collector and Local Roads										
No.	Classification Factor	1	2	3	4	5	Weight	R Factor	Score	
Geometric Factors										
1	Number of Lanes	≤4	5	6	7	≥8	0.15			
2	Lane Width (m)	>3.6	3.4 to 3.6	3.2 to 3.4	3.0 to 3.2	<3.0	0.35			
3	Median Openings / km	<2.5 or 1-Way	2.5 to 5.0	5.0 to 7.2	7.2 to 9.0	>9.0 or No Median	1.4			
4	Driveways and Entrances / km	<20	20 to 40	40 to 60	60 to 80	>80	1.4			
5	Horizontal Curve Radius (m)	>600	450 to 600	225 to 450	175 to 225	<175	5.9			
6	Vertical Grades	<3	3 to 4	4 to 5	5 to 7	>7	0.35			
7	Sight Distance	>210	150 to 210	90 to 150	60 to 90	<60	0.15			
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.1			
Subtotal Geometric Factors									0	
Operational Factors										
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15			
10	Left Turn Lane	All Major Intersections or 1-Way	Substantial Number of Major Intersections	Most Major Intersections	Half of Major Intersections	Infrequent Number or TWTL	0.7			
11	Median Width (m)	>10	6 to 10	3 to 6	1.2 to 3	0 to 1.2	0.35			
12	Operating or Posted Speed	≤40	50	60	70	≥80	0.6			
13	Pedestrian Activity			Low	Medium	High	3.15			
Subtotal Operational Factors									0	
Environmental Factors										
14	Percentage of Development Adjacent to Road (%)	none	none to 30	30 to 60	60 to 90	>90	0.15			
15	Area Classification	Rural	Industrial	Residential	Commercial	Downtown	0.15			
16	Distance from Development to Roadway (m)	>60	45 to 60	30 to 45	15 to 30	<15	0.15			
17	Ambient (off Roadway) Lighting	none	Sparse	Moderate	Distracting	Intense	1.38			
18	Raised Curb Median	none	Continuous	At all Intersections (100%)	At Most Intersections (51% to 99%)	At Few Intersections (≤50%)	0.35			
Subtotal Environmental Factors									0	
Collision Factors										
19	Night-to-Day Collision Ratio	<1.0	1.0 to 1.2	1.2 to 1.5	1.5 to 2.0	>2.0	5.55			
Subtotal Collision Factors									0	
Total Warranting Points									0	
Recommended Lighting									No Lighting	

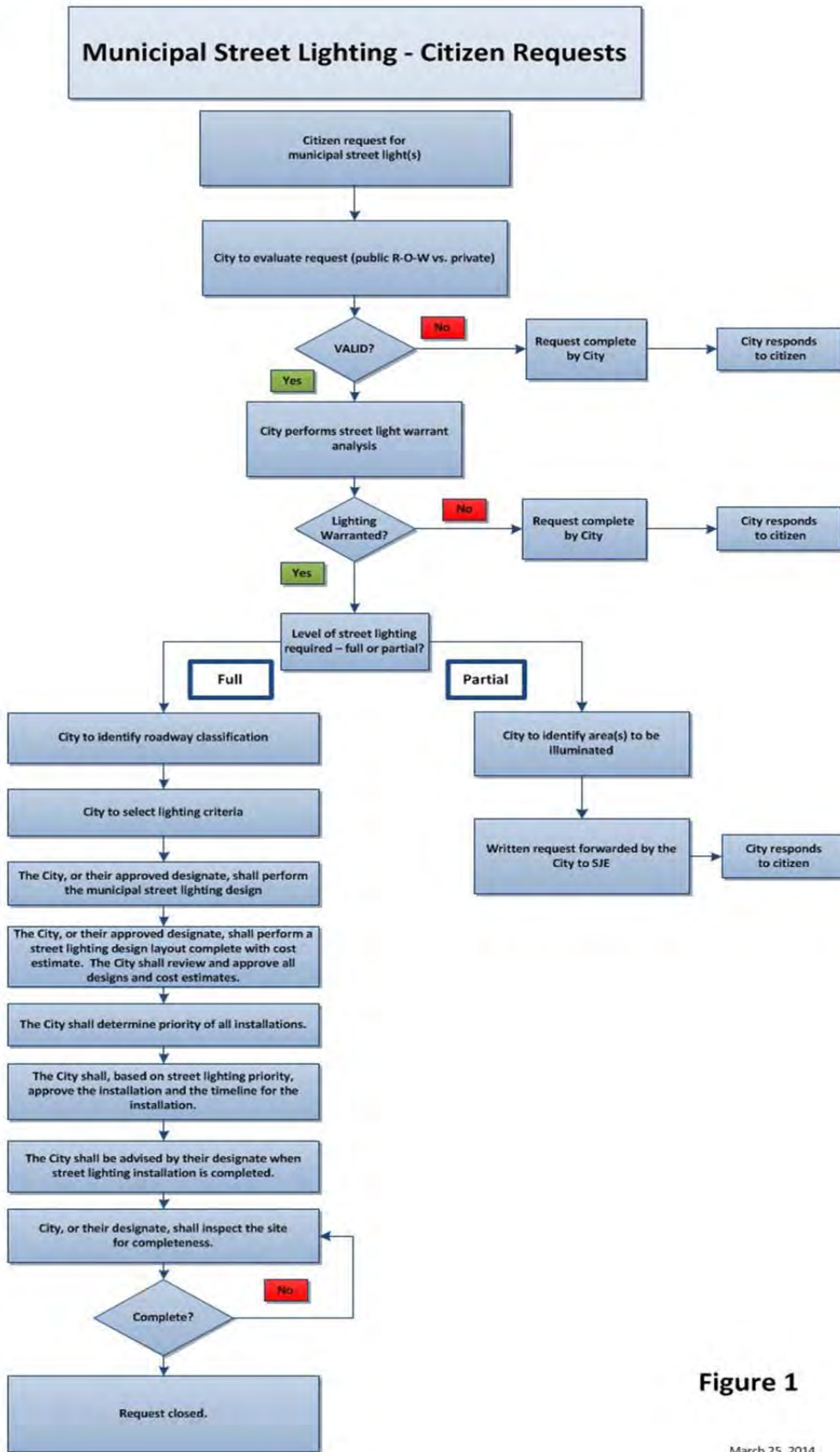


Figure 1

March 25, 2014

Table 11 below clarifies the subsequent results and defines the Lighting Warrant from Table 10.

Table 11 – Evaluation of Results

Result	Recommendation
> 65	Full lighting is warranted
60 – 65	Partial lighting is warranted
< 60	No lighting is warranted

7. New Developments

New development may include residential subdivisions, commercial, industrial or institutional development that will create a new intersection onto an existing roadway or that will create a new road or an extension to an existing roadway.

7.1 Submission Requirements and Approval Process

The following flowchart outlines the municipal street lighting submission review / approval process for new developments:

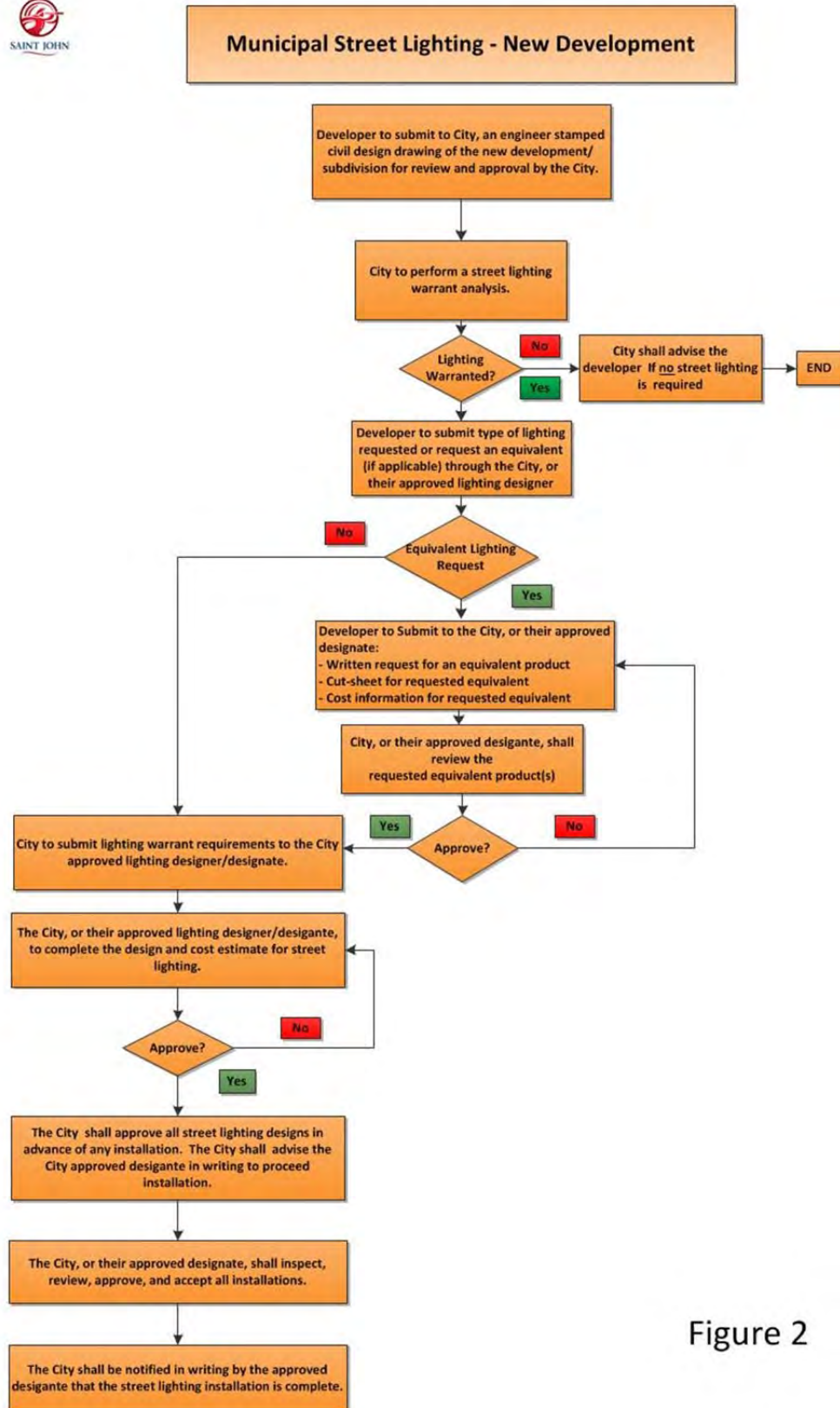


Figure 2

March 25, 2014

APPENDIX “A”

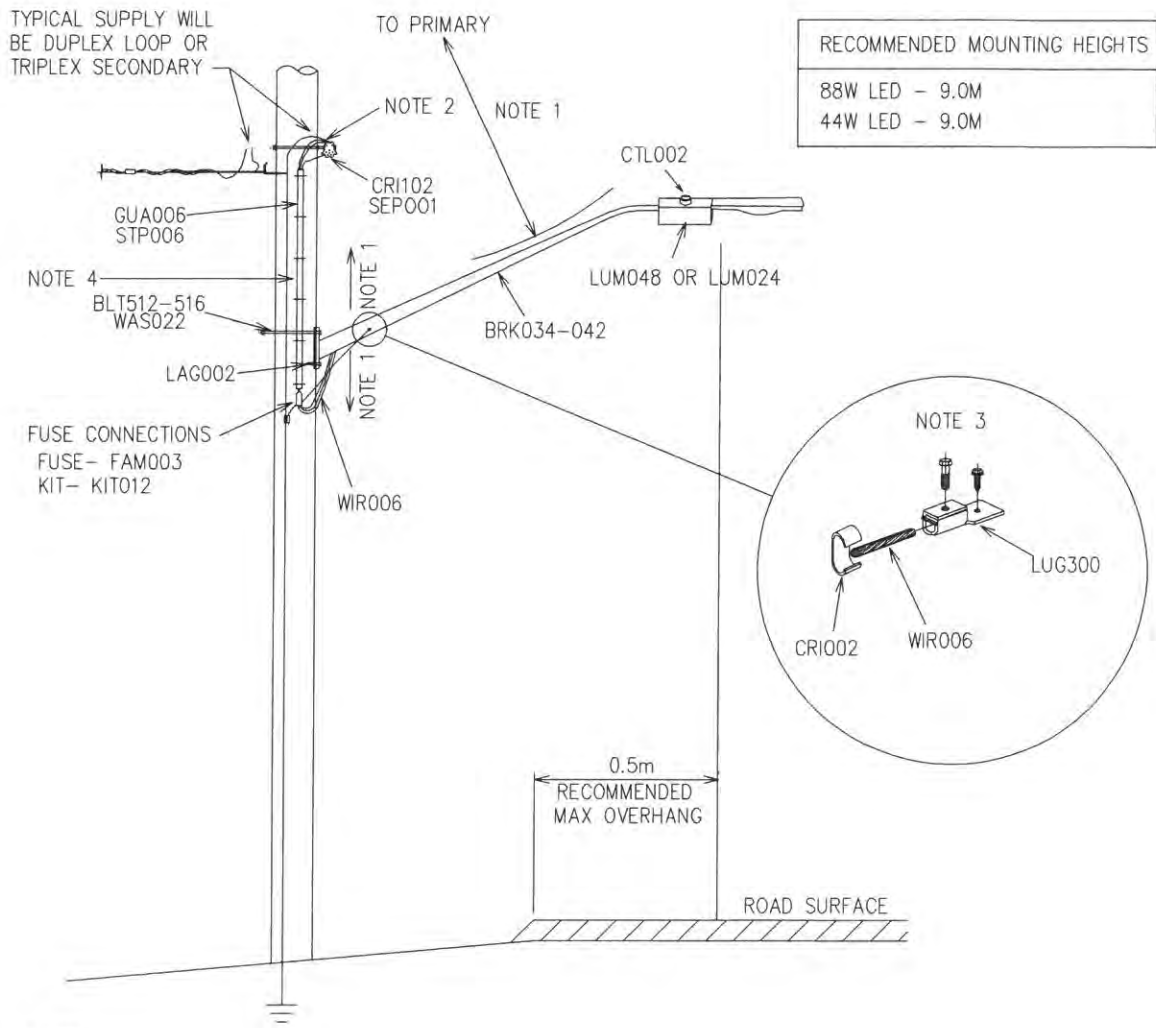
Standard Construction Practices

STANDARD CONSTRUCTION PRACTICES

	DRG. NO.:
	REVISION:
	EFF. DATE:
	AUTHOR:
	REV. BY:
	APPROVED BY:

SUBJECT:

LED STREET LIGHT INSTALLATION



NOTES:

- 1) THE MINIMUM RADIAL CLEARANCES BETWEEN CONDUCTOR OR APPARATUS AND LUMINAIRES AND BRACKETS SHALL BE:
 -900MM FROM VOLTAGE ABOVE 600V
 -150MM FROM 0-600V (INCLUDING NEUTRALS & COMMUNICATIONS)
- 2) WHEN A BUTT GROUND EXISTS CONNECT LUMINAIRE GROUND TO BUTT GROUND. OTHERWISE CONNECT IT TO SUPPLY CONDUCTOR NEUTRAL.
- 3) ON STREET LIGHT WITHOUT A GROUND WIRE, DETAIL MATERIAL FOR GROUND WIRE INSTALLATION.
- 4) INSTALL MOLDING IF WIRES ARE LONGER THAN 300MM.

STANDARD CONSTRUCTION
PRACTICES

DRG. NO.:

REVISION:

EFF. DATE:

SUBJECT:

LED STREET LIGHT INSTALLATION

MATERIALS LIST

ITEM NO.	QUANTITY	DESCRIPTION
GUA006	1.00	GUARD-WOOD, GROUND WIRE COVERING
STP006	1.00	STAPLE-FOR WODD GRD. WIRE GUARDS
BLT512-BLT516	1.00	BOLT-THRU, GALVANIZED 5/8"X12"-18"
WAS022	1.00	WASHER-2 1/4"X2 1/4"X3/16"-11/16" HOLE
LAG002	1.00	LAG-GALVANIZED, 1/2"X4"
CRI102	1.00	CRIMPET-#2 TO #8 ALUMINUM
SEPO01	1.00	PAD-SEALING PADS, 4"X4"
WIR006	2.00	WIRE-STREETLIGHT, NMWU 14/2
BRK034-BRK024- BRK092-BRK040	1.00	BRACKET-ALUMINUM STREETLIGHT, 8"X2"/STEEL
LUM048	1.00	LUMINAIRE-88 WATTS LED-ROADWAY/CUTOFF OPTICS
OR		
LUM024	1.00	LUMINAIRE-48 WATTS LED, ROADWAY
CRI002	1.00	CRIMPIT-#2/0 TO #2 COPPER
LUG300	1.00	LUG-STEEL LIGHT TAP, #6 (120 STR)
CTL002	1.00	CONTROL-PHOTO, ELECTRONIC TYPE
FAM003	1.00	FUSE - 3 AMP
KIT012	1.00	FUSE KIT

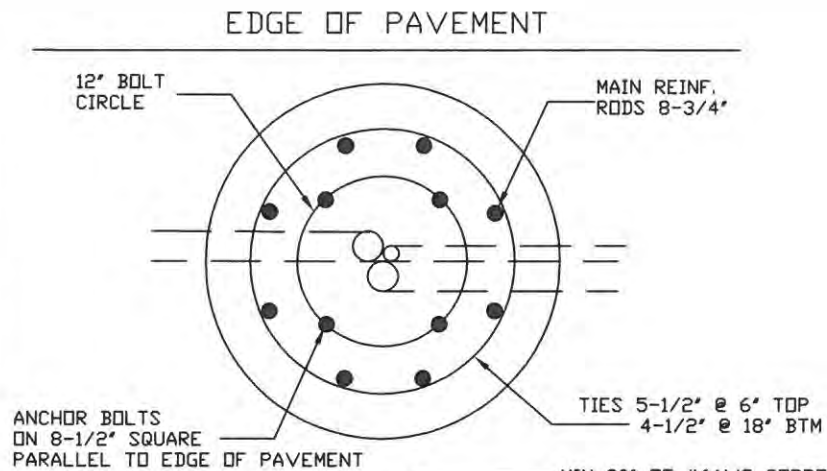
STANDARD CONSTRUCTION PRACTICES

DRG. NO.:	
REVISION:	
EFF. DATE:	
AUTHOR:	
REV. BY:	
APPROVED BY:	

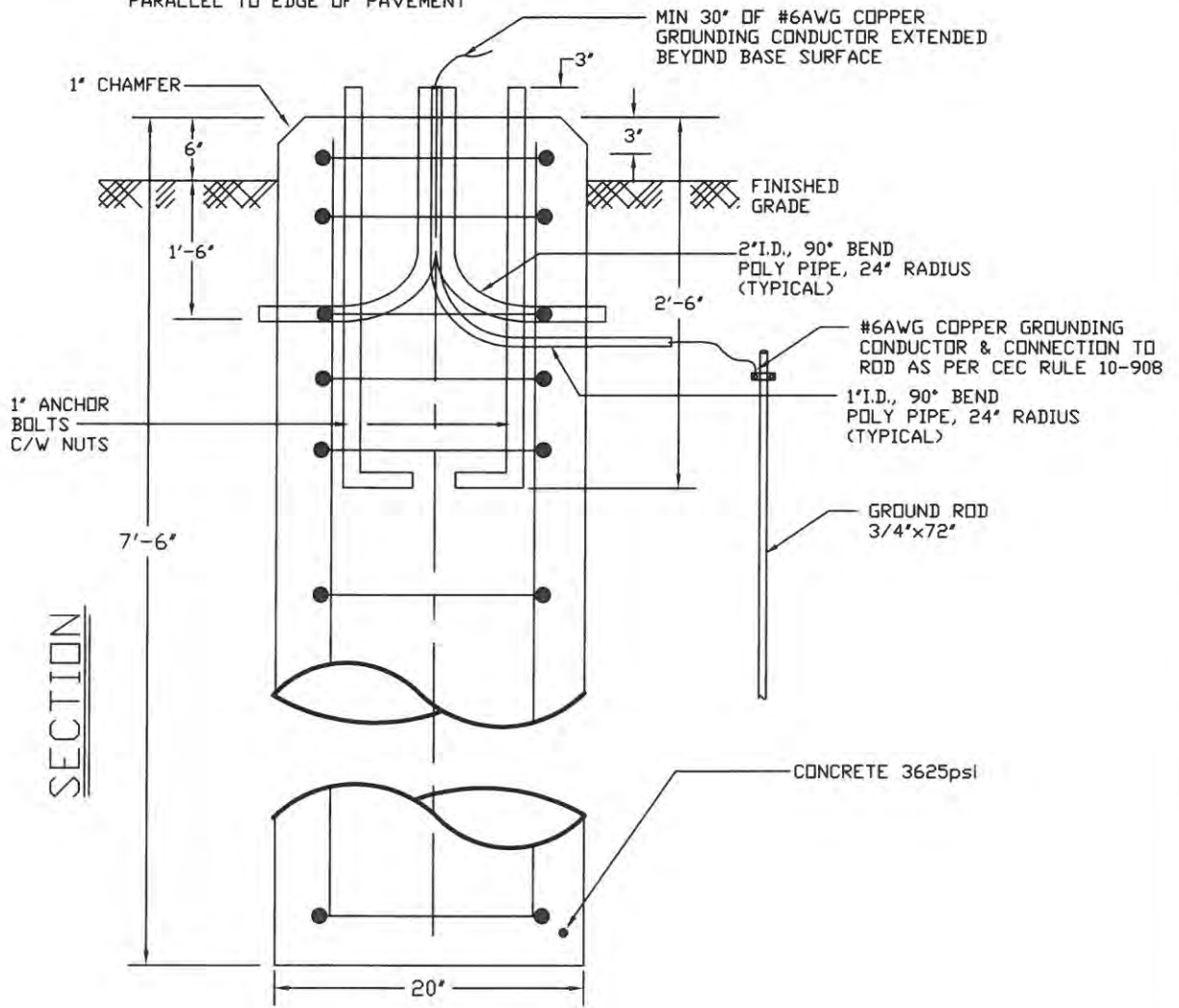
SUBJECT:

STREET LIGHT POLE BASE (TYPICAL)

PLAN VIEW



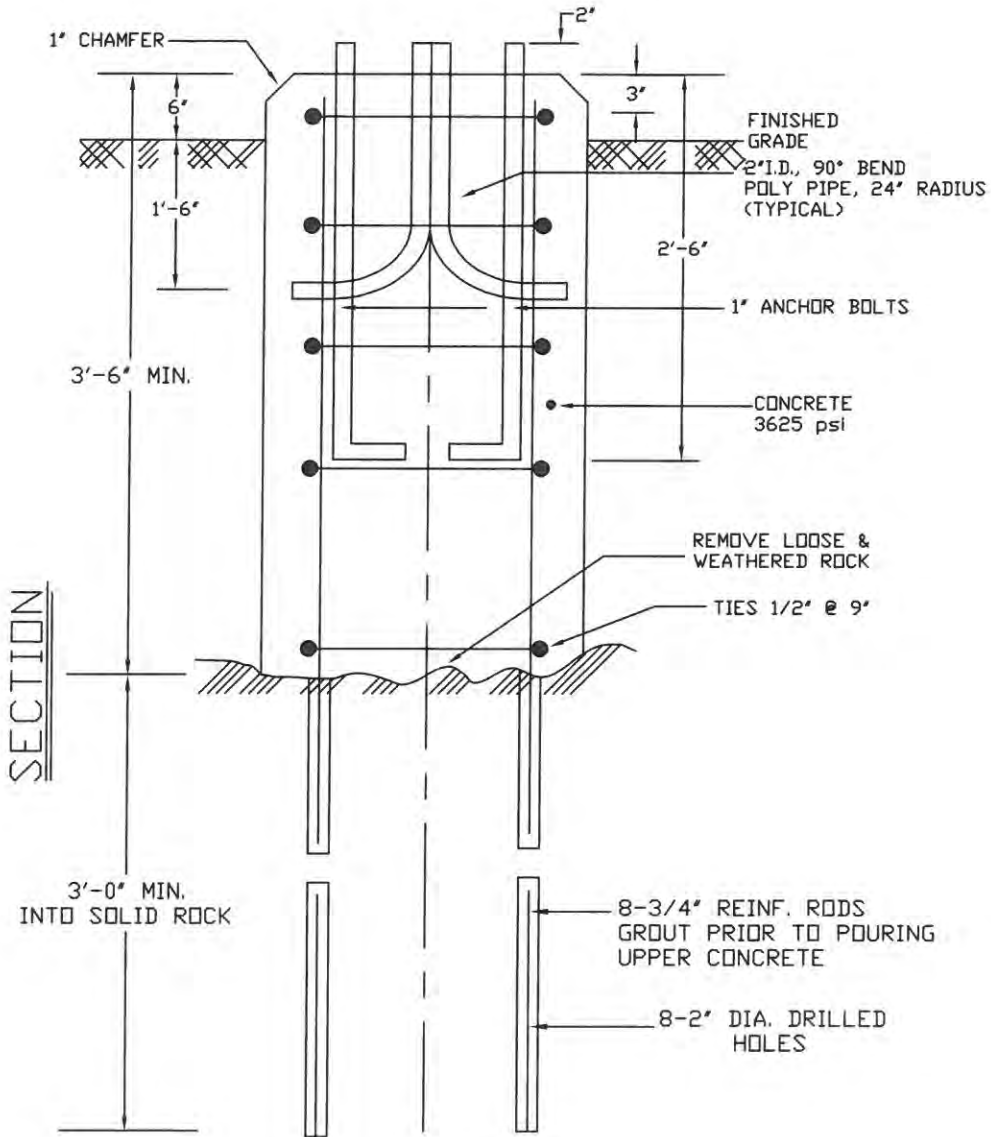
SECTION



STANDARD CONSTRUCTION PRACTICES

DRG. NO.:
REVISION:
EFF. DATE:
AUTHOR:
REV. BY:
APPROVED BY:

SUBJECT:
STREET LIGHT POLE BASE (IN ROCKY AREAS)



NOTE: SEE SCP-8011 FOR PLAN VIEW

STANDARD CONSTRUCTION PRACTICES

SUBJECT:

CAST IRON LIGHT BASE

DRG. NO.:

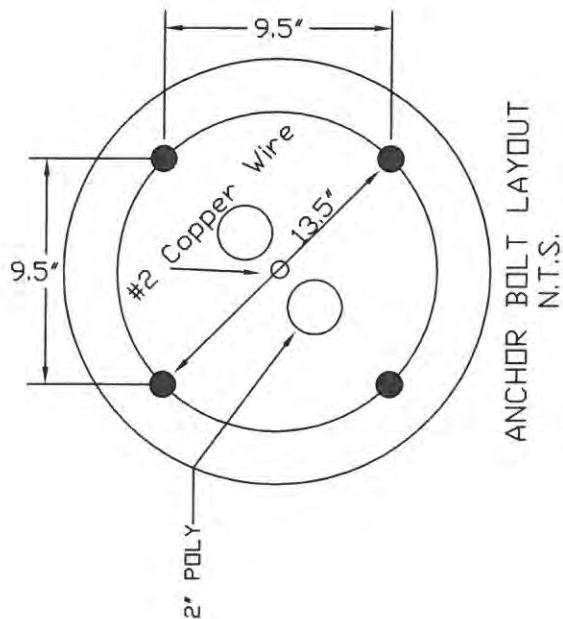
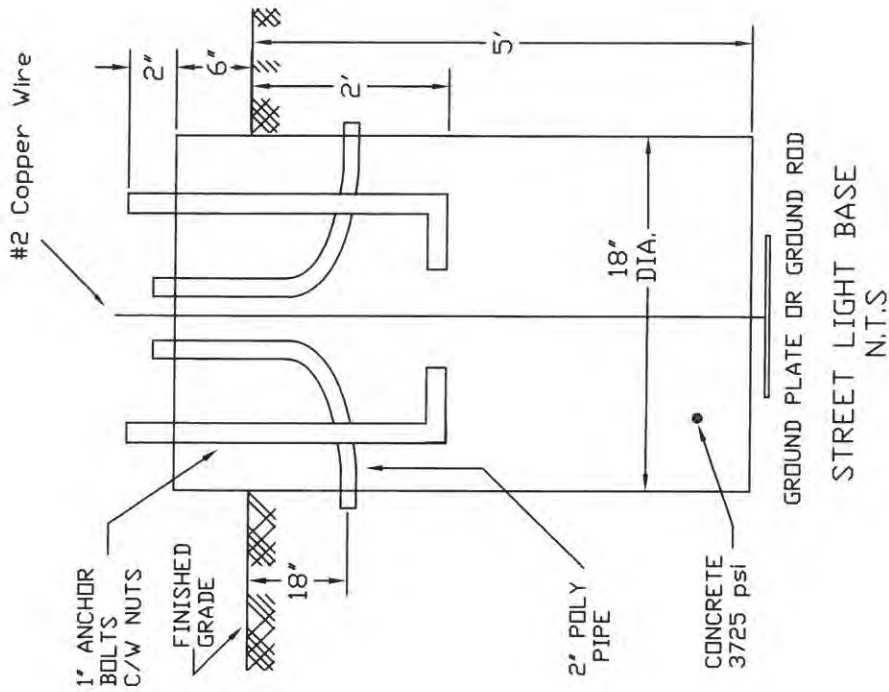
REVISION:

EFF. DATE:

AUTHOR:

REV. BY:

APPROVED BY:



NOTE: FOUNDATION CONSTRUCTED BY USE OF PERFORMED TUBE (SONATUBE).

APPENDIX “B”

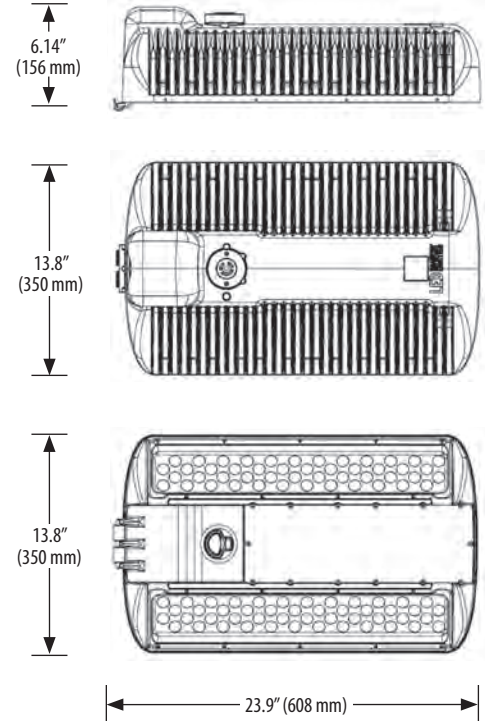
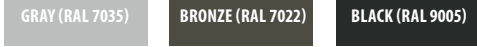
Material Cut Sheets

SATELLITE™ SERIES LUMINAIRE: SPECIFICATIONS

SAT-M



Housing: Single piece, die-cast A360 aluminum
 Operating Temperature: -40°C to +60°C (-40°F to +140°F)
 Mounting: 1.625" - 2.375" (42 - 60 mm) O.D. Tenons
 Weight: 25 lb (11.4 kg)
 EPA Rating: <0.699 ft² (< 0.065 m²)
 Lens Material: Acrylic
 Finish: Durable polyester powdercoat topcoat
 Available Colors:



ELECTRICAL	SAT-72M (72 LEDs)					SAT-96M (96 LEDs)				
	Currents (mA)	280 mA	350 mA	450 mA	525 mA	600 mA	280 mA	350 mA	450 mA	525 mA
Power Consumption* (W)	65 W	83 W	107 W	131 W	150 W	86 W	110 W	143 W	175 W	200 W
Input Voltage (V)	Universal Driver 120 - 240V AC, 50 Hz or 60 Hz; 277V, 347V, 480V, and 12 - 24V DC drivers available upon request.									
Surge Protection	20kV/10kA per ANSI C62.41.2-2002									
Power Factor	>0.90									
OPTICS & PERFORMANCE	SAT-72M (72 LEDs)					SAT-96M (96 LEDs)				
	Photometry (Distribution Types)	Type II, Type II Medium, Type II Wide, Type II U, Type III, European Wide, European Narrow, European Long, European Medium								
Color Temperature (CCT)	5000K (Standard), 4000K & 4500K (Optional)									
Color Rendering Index (CRI)	~70 (±5%)									
Drive Currents (mA)	280 mA	350 mA	450 mA	525 mA	600 mA	280 mA	350 mA	450 mA	525 mA	600 mA
Fixture Efficacy (Lm/W)*	97 Lm/W	93 Lm/W	87 Lm/W	84 Lm/W	80 Lm/W	96 Lm/W	92 Lm/W	86 Lm/W	81 Lm/W	78 Lm/W
Fixture Output (Lm)*	6,200 Lm	7,500 Lm	9,300 Lm	10,800 Lm	11,800 Lm	8,250 Lm	10,000 Lm	12,250 Lm	14,100 Lm	15,500 Lm
LED L70 (Hours)	> 100,000 hours (@ 350mA)									
PHOTOCELL & CONTROLS	SAT-72M (72 LEDs)					SAT-96M (96 LEDs)				
	Photocell Options	20-Year Life Photocell with NEMA Twist-Lock (Standard)								
Control & Monitoring	Available with integrated Streetlight Intelligence™ System.									

NOTES: * VALUES SHOWN ARE BASED ON "TYPE II" LM-79 TESTING AND ARE SUBJECT TO ±5% TOLERANCE. ILLUSTRATED ABOVE: SAT-96M IN GRAY (RAL 7035). ALL INFORMATION PROVIDED IS SUBJECT TO CHANGE WITHOUT NOTICE.



115 Chain Lake Drive, Halifax, Nova Scotia, B3S 1B3 Canada
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SATELLITE™ SERIES LUMINAIRE: ORDERING GUIDE **SAT-M**

SERIES	LED'S/BODY SIZE	VOLTAGE	PHOTOCELL CONTROL	OPTICS	DRIVE CURRENT
SAT Satellite	72M Medium 96M Medium	0 120V-240V Universal 6 277V-347V Universal 7 480V 8 12V-24V DC (Solar Applications)	R c/w NEMA Photocell Receptacle S Solid Casting (No Photocell Receptacle) Photocells and shorting caps ordered separately.	T2 Type II TW Type II Wide TM Type II Medium TU Type II U T3 Type III EW Euro Wide EN Euro Narrow EL Euro Long EM Euro Medium	280 280 mA 350 350 mA 450 450 mA 525 525 mA 600 600 mA
(A)	(B)	(C)	(D)	(E)	(F)

FINISH	COLOR/TEMPERATURE (CCT)	LENS TYPE	CERTIFICATION	CONTROL OPTIONS
GY Gray (RAL 7035) BK Black (RAL 9005) BZ Bronze (RAL 7022) ----- 4 Digit RAL# (Custom Finish)	1 5000K (Standard/Default) 2 4500K (Optional) 3 4000K (Optional) Other color temperatures available. Please contact factory for details.	A Acrylic	NS USA/Canada (QPS) (Standard/Default) CE European NM NOM-Mexico CT C-TICK (Australia) UL USA (120-240V only)	XX TBA
(G)	(H)	(I)	(J)	(K)

SAMPLE CATALOG NUMBER: | SAT | 96M | 0 | R | T2 | 450 | GY | 1 | A | NS | XX |
(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K)

A= Satellite™ Series B= 96 LEDs (Medium Body Fixture) C= 120V - 240V D= NEMA Photocell Receptacle E= Type II Distribution F= 450mA Drive Current G= Gray Finish
H= 5000K CCT I= Acrylic Lens J= CDN/US QPS Certification K= No Control Option Specified

ORDER CONFIRMATION	COMMENTS
PROJECT NAME:	
QUANTITY:	
APPROVED BY:	
DATE:	
(For standard finishes insert 2 digit code. For custom finishes, insert 4 digit RAL number)	
CATALOG NUMBER: SAT _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ A _ _ XX	
(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K)	

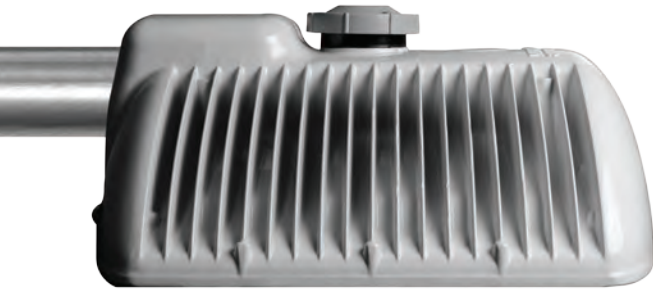
By completing the Order Confirmation above, I certify that I am authorized to sign the confirmation on behalf of the company. Information provided is subject to change without notice.



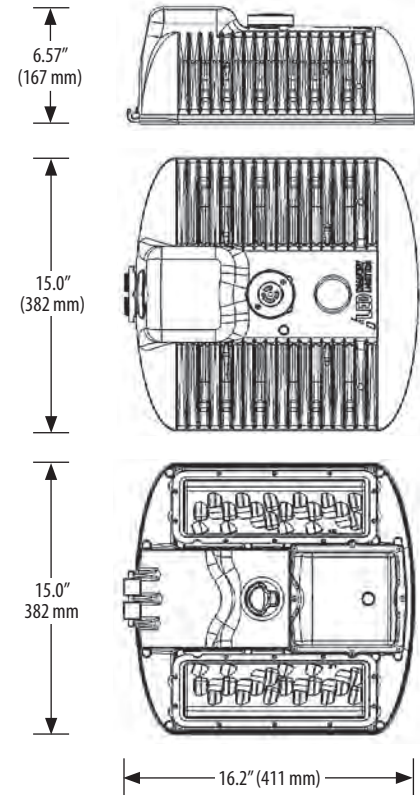
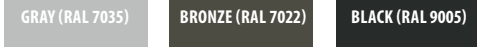
115 Chain Lake Drive, Halifax, Nova Scotia, B3S 1B3 Canada
Toll-Free Phone: +1 (877) 533.5755 Toll-Free Fax: +1 (888) 533.5755 info@ledroadwaylighting.com www.ledroadwaylighting.com

SATELLITE™ SERIES LUMINAIRE: SPECIFICATIONS

SAT-S



Housing: Single piece, die-cast A360 aluminum
 Operating Temperature: -40°C to +60°C (-40°F to +140°F)
 Mounting: 1.625" - 2.375" (42 - 60 mm) O.D. Tenons
 Weight: 18 lb (8.2 kg)
 EPA Rating: <0.509 ft² (< 0.047 m²)
 Lens Material: Acrylic
 Finish: Durable polyester powdercoat topcoat
 Available Colors:



ELECTRICAL	SAT-24S (24 LEDs)					SAT-48S (48 LEDs)				
	Currents (mA)	280 mA	350 mA	450 mA	525 mA	600 mA	280 mA	350 mA	450 mA	525 mA
Power Consumption* (W)	22 W	28 W	36 W	44 W	50 W	43 W	55 W	72 W	88 W	100 W
Input Voltage (V)	Universal Driver 120 - 240V AC, 50 Hz or 60 Hz; 277V, 347V, and 12 - 24V DC drivers available upon request.									
Surge Protection	20kV/10kA per ANSI 62.41.2-2002									
Power Factor	>0.90									
OPTICS & PERFORMANCE	SAT-24S (24 LEDs)					SAT-48S (48 LEDs)				
	Photometry (Distribution Types)	Type II, Type II Medium, Type II Wide, Type II U, Type III, ANZ, European Wide, European Narrow								
Color Temperature (CCT)	5000K Standard, 4000K & 4500K (Optional)									
Color Rendering Index (CRI)	~70 (±5%)									
Drive Currents (mA)	280 mA	350 mA	450 mA	525 mA	600 mA	280 mA	350 mA	450 mA	525 mA	600 mA
Fixture Efficacy (Lm/W)*	102 Lm/W	96 Lm/W	93 Lm/W	90 Lm/W	86 Lm/W	99 Lm/W	95 Lm/W	93 Lm/W	88 Lm/W	84 Lm/W
Fixture Output (Lm)*	2,150 Lm	2,550 Lm	3,200 Lm	3,750 Lm	4,150 Lm	4,200 Lm	5,100 Lm	6,550 Lm	7,600 Lm	8,400 Lm
LED L70 (Hours)	> 100,000 hours (@ 350mA)									
PHOTOCELL & CONTROLS	SAT-24S (24 LEDs)					SAT-48S (48 LEDs)				
	Photocell Options	20-Year Life Photocell with NEMA Twist-Lock (Standard)								
Control & Monitoring	Available with integrated Streetlight Intelligence™ System.									

NOTES: * VALUES SHOWN ARE BASED ON "TYPE II" LM-79 TESTING AND ARE SUBJECT TO ±5% TOLERANCE. ILLUSTRATED ABOVE: SAT-48S IN GRAY (RAL 7035). ALL INFORMATION PROVIDED IS SUBJECT TO CHANGE WITHOUT NOTICE.



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 Toll-Free Phone: +1 (877) 533.5755 Toll-Free Fax: +1 (888) 533.5755 info@ledroadwaylighting.com www.ledroadwaylighting.com

LRL_SATELLITE_SAT-S_SPEC_ORDER_2013_08_19

SERIES	LED'S/BODY SIZE	VOLTAGE	PHOTOCELL CONTROL	OPTICS	DRIVE CURRENT
SAT Satellite	24S Small 48S Small	0 120V-240V Universal 6 277V-347V Universal 8 12V-24V DC (Solar Applications)	R c/w NEMA Photocell Receptacle S Solid Casting (No Photocell Receptacle) Photocells and shorting caps ordered separately.	T2 Type II TW Type II Wide TM Type II Medium TU Type II U T3 Type III EW Euro Wide EN Euro Narrow AN ANZ	280 280 mA 350 350 mA 450 450 mA 525 525 mA 600 600 mA
(A)	(B)	(C)	(D)	(E)	(F)

FINISH	COLOR/TEMPERATURE (CCT)	LENS TYPE	CERTIFICATION	CONTROL OPTIONS
GY Gray (RAL 7035) BK Black (RAL 9005) BZ Bronze (RAL 7022) ---- 4 Digit RAL# (Custom Finish)	1 5000K (Standard/Default) 2 4500K (Optional) 3 4000K (Optional) Other color temperatures available. Please contact factory for details.	A Acrylic	NS USA/Canada (QPS) (Standard/Default) CE European NM NOM-Mexico CT C-TICK (Australia) UL USA (120-240V only)	XX TBA
(G)	(H)	(I)	(J)	(K)

SAMPLE CATALOG NUMBER: | SAT | 48S | 0 | R | T2 | 450 | GY | 1 | A | NS | XX |
(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K)

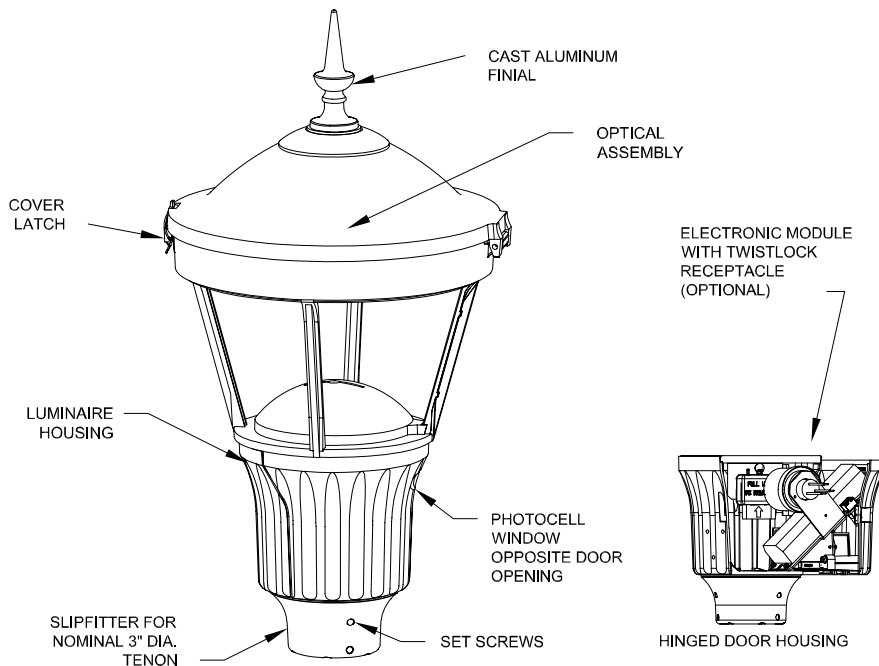
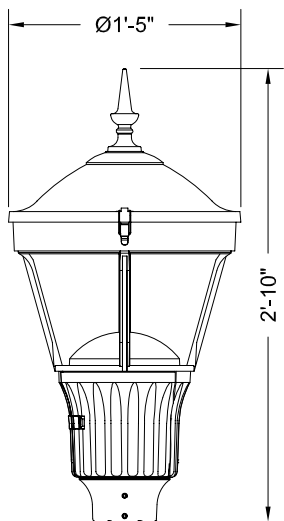
A= Satellite™ Series B= 48 LEDs (Small Body Fixture) C= 120V - 240V D= NEMA Photocell Receptacle E= Type II Distribution F= 450mA Drive Current G= Gray Finish
H= 5000K CCT I= Acrylic Lens J= CDN/US QPS Certification K= No Control Option Specified

ORDER CONFIRMATION	COMMENTS
PROJECT NAME:	
QUANTITY:	
APPROVED BY:	
DATE:	
(For standard finishes insert 2 digit code. For custom finishes, insert 4 digit RAL number)	
CATALOG NUMBER: SAT _ _ _ _ _ _ _ _ _ _ _ _ A _ _ XX	
(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K)	

By completing the Order Confirmation above, I certify that I am authorized to sign the confirmation on behalf of the company. Information provided is subject to change without notice.



Maximum weight - 39 lbs
Maximum effective projected area - 1.24 sq. ft.



Utility Poststop
Series Luminaire
Full Cutoff LED

DECORATIVE
OUTDOOR



THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE SHALL BE SUPPLIED. THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

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EXAMPLE:

PUL 070 6K AS B L3 S

ORDERING INFORMATION:

PUL

WATTAGE / DRIVER
070 = 70 W (350mA)
105 = 105 W (525mA)

VOLTAGE
AS = AUTO-SENSING VOLTAGE (120 THRU 277 V)
AH = AUTO-SENSING VOLTAGE (347 THRU 480 V)

COLOR TEMPERATURE
4K = 4000K
5K = 5000K
6K = 6000K

COLOR
A = AS SPECIFIED
B = BLACK
D = DARK GREEN RAL6005
E = BROWN GREEN RAL6008
F = DARK GREEN RAL6009
H = DARK GREEN RAL6012
N = GREEN
W = WHITE
Z = BRONZE

OPTICS
L3 = ASYMMETRIC FULL CUTOFF, FLAT GLASS
L5 = SYMMETRIC FULL CUTOFF, FLAT GLASS

FINIAL (FACTORY INSTALLED)
B = BALL
S = SPIKE

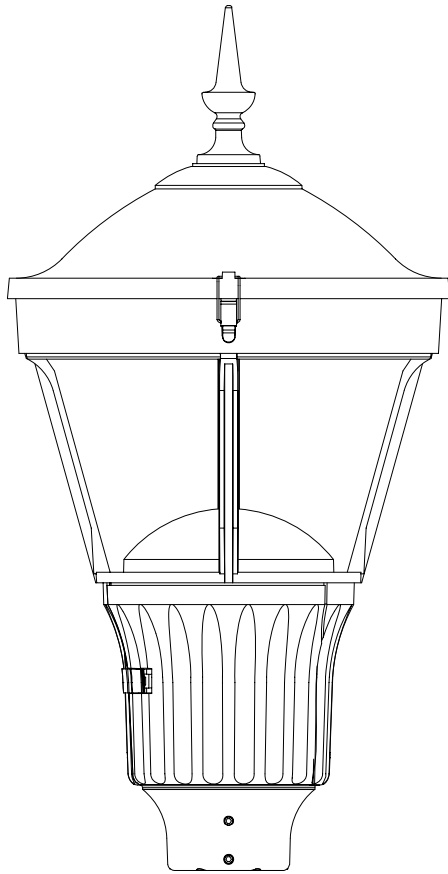
OPTIONS

OPTIONS

- DM = 0-10V DIMMING
- H = NEMA TWISTLOCK PHOTOCONTROL RECEPTACLE ONLY
- L03 = 3 FEET OF PREWIRED LEADS*
- L10 = 10 FEET OF PREWIRED LEADS*
- L20 = 20 FEET OF PREWIRED LEADS*
- L25 = 25 FEET OF PREWIRED LEADS*
- L30 = 30 FEET OF PREWIRED LEADS*
- PCS = DTL SOLID-STATE LIGHTING PHOTOCONTROL 120-277 VOLT (MUST BE USED WITH OPTION "H")
- P34 = DTL TWISTLOCK PHOTOCONTROL 347 VOLT (MUST BE USED WITH OPTION "H")
- P48 = DTL TWISTLOCK PHOTOCONTROL 480 VOLT (MUST BE USED WITH OPTION "H")
- PSC = SHORTING CAP (MUST BE USED WITH OPTION "H")

*UNIT IS PROVIDED WITH 2 FEET OF PREWIRED LEADS UNLESS OTHERWISE SPECIFIED

ORDER #:
TYPE:
DRAWN: SGK
DATE: 05/04/11
DWG #: LUM_PUL



FINIALS

BALL



SPIKE



Specifications

GENERAL DESCRIPTION

The Utility Postop LED is designed for ease of maintenance with the plug-in driver module common to each of the luminaires in Holophane's Utility Luminaire Series. A precision optical system maximizes post spacings while maintaining uniform illumination.

OPTICAL SYSTEM

The optical system consists of a precisely engineered LED circuit board located in the top cover. A gasket between the cover and ring along with a flat glass plate and gasket beneath the reflector create a sealed optical compartment that meets an IP rating. Optics designed to provide an I.E.S. Asymmetric or Symmetric full cutoff distribution are available.

LUMINAIRE HOUSING

The luminaire housing, cast of aluminum, anchors the optical system and provides an enclosure for the plug in electrical module. The electrical enclosure conforms to an IP55 rating. For use with units with an E.E.I.-N.E.M.A. twist lock photocell receptacle, the housing contains a glass "window" to allow light to reach the cell. The nickel plated lamp grip socket and the three station incoming line terminal block are pre-wired to a five conductor receptacle for ease in connecting the electrical module. A slipfitter will accept a 3" high by 2 7/8" to 3 1/8" O.D. pole tenon.

LUMINAIRE HOUSING DOOR

Cast of aluminum, the housing door is hinged and latched to the housing. The door forms the mount for the electrical module, and allows easy access during maintenance.

ELECTRICAL MODULE

The electrical components are mounted to an aluminum plate that is removable with standard tools. A matching five plug connector connects the electrical components to the surge protector for quick replacement. For Photoelectric operation, the electrical module is provided with an E.E.I.-N.E.M.A. twist lock Photocell receptacle.

TOP COVER

The top cover, cast of aluminum, is attached to the top ring of the luminaire housing by a stainless steel hinge pin. The cover is latched by an overcenter, positive action, stainless steel latch which allows tool-less entry to the lamp chamber for relamping.

DRIVER

Voltage sensing 120-277V or 347-480V, 50/60 Hz electronic drivers are >90% efficient. Potted for increased thermal management. Removable through hinged door housing. Available with 0-10V dimming control signal input. Refer to Driver Data Sheet for specific operating characteristics.

FINISH

The luminaire is finished with polyester powder paint applied to ensure maximum durability.

UL

The luminaire is UL listed as suitable for wet locations at a maximum of 40 degrees C ambient temperature.

Utility Postop[®]
Series Luminaire
Full Cutoff LED

DECORATIVE
OUTDOOR

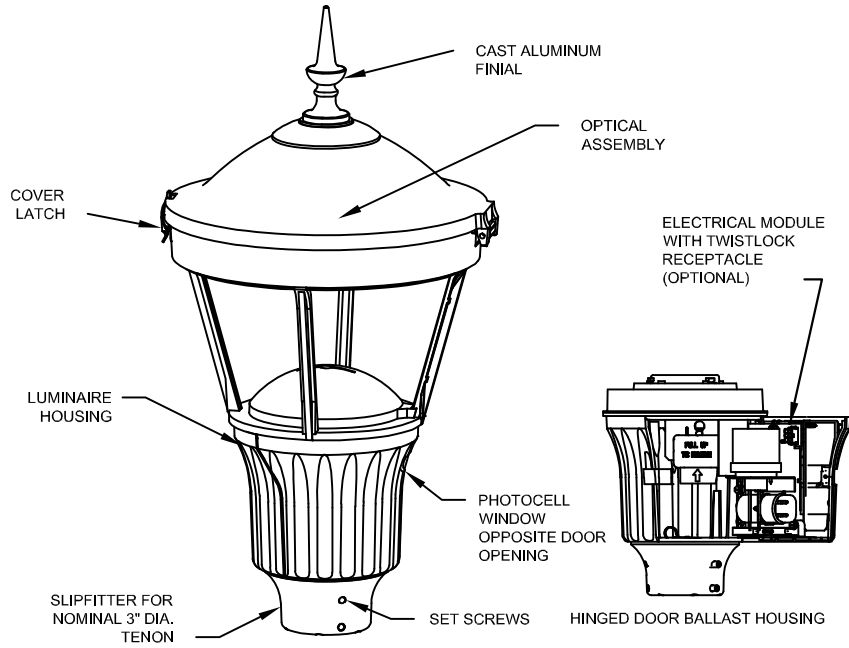
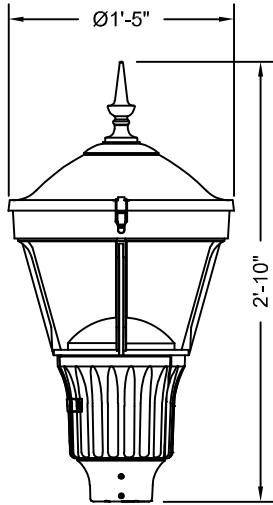
HOLOPHANE[®]
LEADER IN LIGHTING SOLUTIONS
An Acuity Brands Company

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ORDER #:
TYPE:
DRAWN: SGK
DATE: 05/04/11
DWG #: LUM_PUL

2 OF 2

Maximum weight - 38.5 lbs
 Maximum effective projected area - 1.24 sq. ft.



Utility Postop[®]
 Series Luminaire
 Full Cutoff

DECORATIVE
 OUTDOOR



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ORDERING INFORMATION:

PTU

PTU

050HP

12

B

C3

B

BALLAST TYPE (MOGUL BASE)

050HP = 50W HPS
 070HP = 70W HPS
 100HP = 100W HPS
 15AHP = 150W 55V HPS
 175MH = 175W MH *
 175PM = 175W PMH (E)

BALLAST TYPE (MEDIUM BASE)

50DHP = 50W HPS
 70DHP = 70W HPS
 10DHP = 100W HPS
 15DHP = 150W 55V HPS
 70DMH = 70W MH (NOT AVAIL. W/ 480V)
 10DMH = 100W MH (NOT AVAIL. W/ 480V)
 15DMH = 150W MH (NOT AVAIL W/ 480V)
 17DMH = 175W MH *

(COMPACT FLUORESCENT) **

42CFL = 42W COMPACT FLUORESCENT
 57CFL = 57W COMPACT FLUORESCENT
 70CFL = 70W COMPACT FLUORESCENT

* NOT AVAILABLE FOR SHIPMENT IN US AFTER 12/31/08 DUE TO EISA 2007 LEGISLATION.

** 120-277 VOLT ONLY, NOT AVAILABLE WITH OPTION NEMA LABEL.

VOLTAGE

12 = 120 VOLT
 20 = 208 VOLT
 24 = 240 VOLT
 27 = 277 VOLT
 34 = 347 VOLT (C.U.L.)
 48 = 480 VOLT
 MT = MULTITAP (120, 208, 240, 277 VOLT)

COLOR

A = AS SPECIFIED
 B = BLACK
 D = DARK GREEN RAL6005
 E = BROWN GREEN RAL6008
 F = DARK GREEN RAL6009
 H = DARK GREEN RAL6012
 N = GREEN
 W = WHITE
 Z = BRONZE

OPTICS

C3 = ASYMMETRIC FULL CUTOFF, FLAT GLASS
 C5 = SYMMETRIC FULL CUTOFF, FLAT GLASS

FINIAL (FACTORY INSTALLED)

B = BALL
 S = SPIKE

OPTIONS

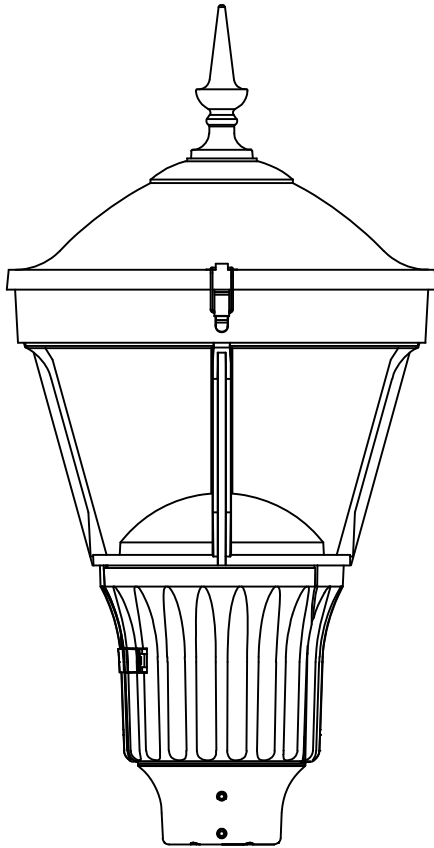
H = NEMA TWISTLOCK PHOTOCONTROL RECEPTACLE ONLY
 L1H = 1.5 FEET OF PREWIRED LEADS
 L03 = 3 FEET OF PREWIRED LEADS
 L10 = 10 FEET OF PREWIRED LEADS
 L20 = 20 FEET OF PREWIRED LEADS
 L25 = 25 FEET OF PREWIRED LEADS
 L30 = 30 FEET OF PREWIRED LEADS
 NE = NEMA LABEL
 P = PROTECTED STARTER FOR HPS UNITS ONLY (NOT AVAILABLE W/ VOLTAGE CODES 08 OR 40)
 P27 = DTL TWISTLOCK PHOTOCONTROL 120-277 VOLT (MUST BE USED WITH OPTION "H")
 P48 = DTL TWISTLOCK PHOTOCONTROL 480 VOLT (MUST BE USED WITH OPTION "H")
 PSC = SHORTING CAP (MUST BE USED WITH OPTION "H")

ACCESSORIES

LAMP = SHIP APPROPRIATE LAMP AS LINE ITEM. SEE LAMP SHEET
 IG-5 = PLUG-IN REPLACEMENT STARTER FOR HPS UNITS
 IG-6 = PLUG-IN REPLACEMENT PROTECTED STARTER FOR HPS UNITS
 IG-7 = PLUG-IN REPLACEMENT STARTER FOR 70/10/15DMH UNITS
 IG-30PLUGIN = PLUG-IN REPLACEMENT STARTER FOR 175PM UNITS

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE USED IN PLACE OF THAT SPECIFIED HEREON PROVIDED THAT THE VENDOR SHALL FURNISH AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED. THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS WRITTEN REQUEST. NO PARTS OR MATERIALS SHALL BE USED IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

ORDER #:	
TYPE:	
DRAWN:	ACH
DATE:	12/14/09
DWG #:	LUM_PTU_FC



FINIALS

BALL



SPIKE



Specifications

GENERAL DESCRIPTION

The Utility Postop is designed for ease of maintenance with the plug-in electrical module common to each of the luminaires in Holophane's Utility Luminaire Series. A precision optical system maximizes post spacings while maintaining uniform illumination.

OPTICAL SYSTEM

The optical system consists of a precisely engineered segmented aluminum reflector located in the top cover. A gasket between the cover and ring along with a flat glass plate and gasket beneath the reflector create a sealed optical compartment that meets an IP rating. Optics designed to provide an I.E.S. Asymmetric or Symmetric full cutoff distribution are available.

LUMINAIRE HOUSING

The luminaire housing, cast of aluminum, anchors the optical system and provides an enclosure for the plug in electrical module. The electrical enclosure conforms to an IP55 rating. For use with units with an E.E.I.-N.E.M.A. twist lock photocell receptacle, the housing contains a glass "window" to allow light to reach the cell. The nickel plated lamp grip socket and the three station incoming line terminal block are pre-wired to a five conductor receptacle for ease in connecting the electrical module. A slipfitter will accept a 3" high by 2 7/8" to 3 1/8" O.D. pole tenon.

LUMINAIRE HOUSING DOOR

Cast of aluminum, the housing door is hinged and latched to the housing. The door forms the mount for the electrical module, and allows easy access during maintenance.

ELECTRICAL MODULE

The ballast components are mounted on a steel plate that is removable without the use of tools. A matching five conductor plug connects to the receptacle in the luminaire housing to complete the wiring. Where a starting aid is required, it is provided with a separate plug-in connector and can be replaced without the use of tools. For photoelectric operation, the electrical module is provided with an E.E.I.-N.E.M.A. twist lock photocell receptacle.

TOP COVER

The top cover, cast of aluminum, is attached to the top ring of the luminaire housing by a stainless steel hinge pin. The cover is latched by an overcenter, positive action, stainless steel latch which allows tool-less entry to the lamp chamber for relamping.

BALLASTS

(Refer to the Ballast Handbook for specific operating characteristics)

50 watt 120 volt High Pressure Sodium (HPS) ballasts are High Power Factor Reactor type. All other HPS ballasts are High Power Factor Autotransformer type.

175 watt Metal Halide (MH) ballasts are Peak Lead Autotransformer type. 70 and 100 watt MH units are available only with High Power Factor High Reactance type ballasts.

FINISH

The luminaire is finished with polyester powder paint applied to ensure maximum durability.

UL

The luminaire is UL listed as suitable for wet locations at a maximum of 40 degrees C ambient temperature.

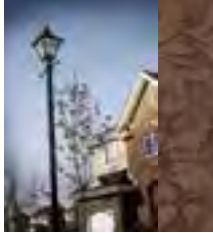
**Utility Postop[®]
Series Luminaire
Full Cutoff**

**DECORATIVE
OUTDOOR**



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DATE: 12/14/09	
DWG #: LUM_PTU_FC	



SQUARE LANTERN SERIES

Product Overview and Technical information >>



>>
LUMINAIRE > L21A-RR
POLE > RA61



S26A-HX

S40-RACE-CRC

S41-HX-CRA

L20-RR-CRC

L21A-SE

SQUARE LANTERN SERIES

Evoke Harmony / Philips Lumec's Square Lantern Series draws on the designs of yesteryear in order to evoke a feeling of harmony and warmth in any project. This series is another example of how Philips Lumec melds feelings of old-time luminaires with modern lighting techniques and technology. This blend of form and function makes the Square Lantern Series an excellent choice for any environment. >>



>>
LUMINAIRE > L21A-RR
POLE > AM6



PAST BEAUTY

Evoking a distinguished touch of yesteryear, the luminaires of the Square Lantern Series deliver an encompassing light that is warm and safe. With this series, Philips Lumec shows once again that the past and the present can, together, create an exquisite light that is decidedly current. For older neighborhoods or contemporary environments, the Square Lantern Series has it all.

PRESENT KNOW-HOW

Creating a warm and friendly ambiance with its design while at the same time offering high-end technology and photometric performance is the strength of this series of beautiful luminaires. It can compliment many settings thanks to its two sizes and its internal components assure long life, reliability, and durability.

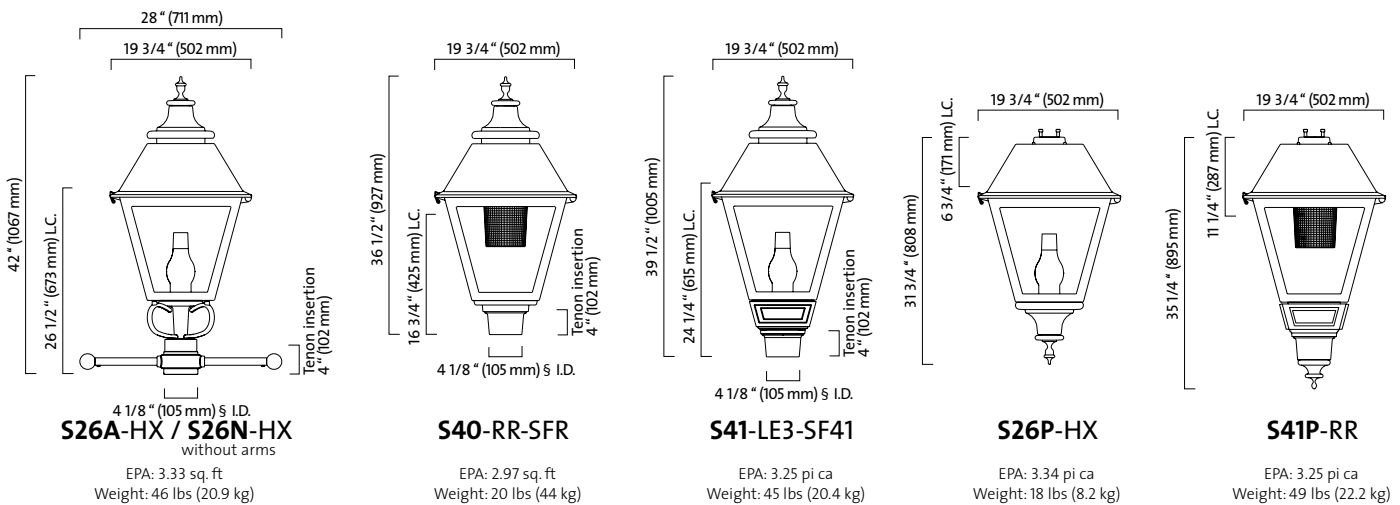


BENEFITS

- Constructed from top-quality materials, the Square Lantern Series maintains excellent performance in even the most demanding environments.
- The family is available in two sizes, offering solutions for a wide range of applications.
- Prismatic RR optics, SE cut-off reflectors, SG arc-image duplicating segmented reflectors, and the RACE optical system, are available to meet any range of lighting applications.
- The luminaire is sealed with a gasketed closure to maintain optical performance.
- A complete selection of materials and finishes are available to complement your project.

LUMINAIRES

Conform to the **UL 1598** and **CSA C22.2 No. 250.0-08** standards



➤ Smartseal lanterns **are only available with PC-C and ACDR-C:**

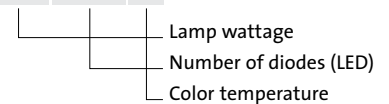
*PC-C : Clear polycarbonate ACDR-C : Acrylic DR

*GL-C : Clear tempered glass * not available with LED

LAMPS / LED

LED = Philips Lumileds Rebel ES, CRI = 70, CCT = 4000K (+/- 350K)
 LED rated life = 100,000 hrs¹ - Driver rated life = 50,000 hrs

LAMP CODE DEFINITION / 40W 49LED 4K



LAMP	TYPICAL DELIVERED LUMENS ²	TYPICAL LAMP WATTAGE (W)	TYPICAL SYSTEM WATTAGE ³ (W)	TYPICAL CURRENT @ 120 V (A)	TYPICAL CURRENT @ 240 V (A)	TYPICAL CURRENT @ 277 V (A)	LED CURRENT (MA)	HPS EQUIVALENT ⁴	LUMINAIRE EFFICACY RATING (LM/W)
40W49LED4K-ES	3150	42	47	0.39	0.20	0.17	285	70 W	67
65W49LED4K-ES	4200	65	72	0.60	0.30	0.26	428	100 W	58
90W49LED4K-ES	5040	90	102	0.85	0.43	0.37	571	150 W	49

¹ L70 = 100,000 hrs (at ambient temperature = 25°C and forward current = 700 mA)

² May vary depending on the optical distribution used

³ System wattage includes the lamp and the LED driver

⁴ Compared to Square Lantern (equivalence should always be confirmed by a photometric layout)

WATTAGE	LE2 LE3 LE4 LE5
	ACDR
40W49LED4K-ES	✓
65W49LED4K-ES	✓
90W49LED4K-ES	✓

VOLTAGE

120 / 208 / 240 / 277

✓ : Available

OPTICAL SYSTEMS / LED



Globe

IP66 rated optical system, composed of individual pre-oriented lens to achieve desired distribution, assembled with the globe permanently sealed onto the lower part of the heat sink.

- LE2: Asymmetrical
- LE3: Asymmetrical
- LE4: Asymmetrical
- LE5: Symmetrical (square)

➤ House shield available in option (HS)

* Photometry available on Philips Lumec web site www.philips.com/lumec.

LAMPS / HID

WATTAGE	S26A/S26N/S40/S41/S41P			S41-GL		
	RACE3 RACE3D RACE5	RR3 RR3MD RR5	HX3 HX5	RACE3 RACE3D RACE5	RR3 RR3MD RR5	HX3 HX5
50 MH, medium	✓	✓	✓	✓	✓	✓
70 MH, medium	✓	✓	✓	✓	✓	✓
100 MH, medium	✓	✓	✓	✓	✓	✓
150 MH, medium	✓	✓	✓	✓	✓	✓
200 MH, mogul	RB	N/A	RB	✓	N/A	✓
35 HPS, medium	✓	✓	✓	✓	✓	✓
50 HPS, mogul	✓	✓	✓	✓	✓	✓
70 HPS, mogul	✓	✓	✓	✓	✓	✓
100 HPS, mogul	✓	✓	✓	✓	✓	✓
150 HPS, mogul	✓	✓	✓	✓	✓	✓
200 HPS, mogul	RB	N/A	RB	✓	N/A	✓
250 HPS, mogul	RB	N/A	RB	✓	N/A	✓
250 PSMH, mogul	RB	N/A	RB	✓	N/A	✓

✓ : Available N/A : Not available RB : Remote Ballast Required

OPTICAL SYSTEMS /

S26 / S26P / S40 / S41 / S41P

(Lamps not included)



HX Optics

Sealed optical chamber consisting of a hydroformed reflector permanently assembled on the globe.

HX3: Asymmetrical
HX5: Symmetrical
> House shield available in option (HS)



RR Optics

Round borosilicate refractor.

RR5: Symmetrical
RR3: Asymmetrical
RR3MD: Asymmetrical with deflector



RACE Optics

Round acrylic (max. 100w) or borosilicate (150w and more) refractor with segmented upright recovery dome.

RACE3: Asymmetrical
RACE5: Symmetrical
RACE3D: Asymmetrical with deflector

* Photometry available on Philips Lumec web site www.philips.com/lumec.

CosmoPolis™ / new generation of ceramic metal halide lamp

WATTAGE	S26A/S26N/S40/S41		
	RACE3 RACE3D RACE5	RR3 RR3MD RR	HX3 HX5
60 CW	✓	✓	✓
90 CW	✓	✓	✓
140 CW ¹	✓	✓	✓

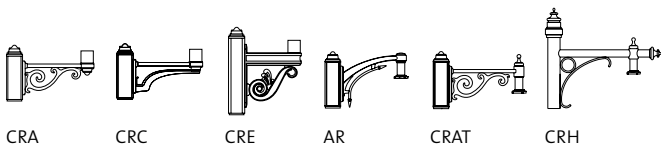
✓ : Available 1 : Not available with 120 volts

LUMINAIRE OPTIONS

HS House shield
(with HX only)

MOUNTINGS

(Consult the Pole Guide for details and the complete line of mountings)



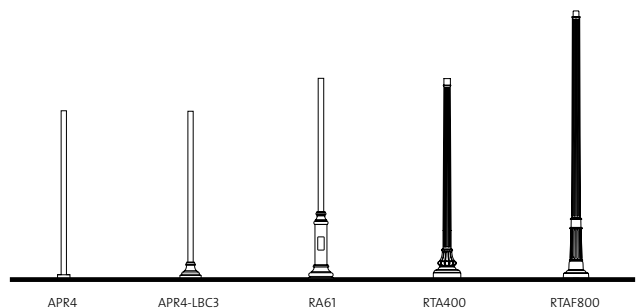
FINISHES

(Consult Philips Lumec's Color Chart for complete specifications)

The specially formulated Lumital powder coat finish is available in a range of many standard colors.

POLES AND POLE OPTIONS

(Consult the Pole Guide for details and the complete line of poles)



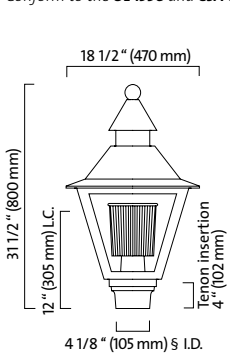
ORDERING SAMPLE

LUMINAIRE	LAMP	OPTICAL SYSTEM	VOLTAGE	MOUNTING & CONFIGURATION	POLE	FINISH
S40-ACDR	100 MH	HX3	120	SFR-CRC-2	RTA900-15	BKTX

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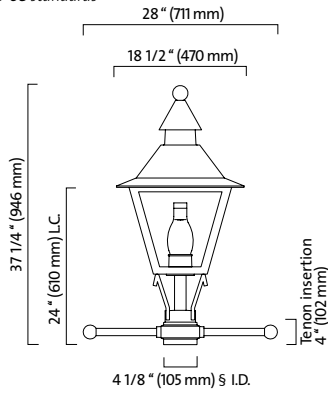
LUMINAIRES

Conform to the **UL 1598** and **CSA C22.2 No. 250.0-08** standards



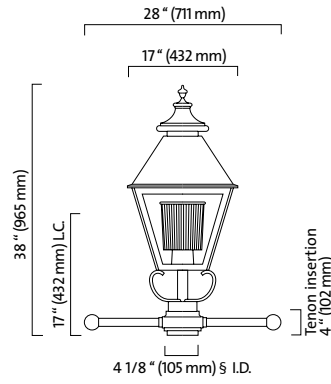
L20-RR-SFR

EPA: 2.14 sq. ft
Weight: 36 lbs (16.3 kg)



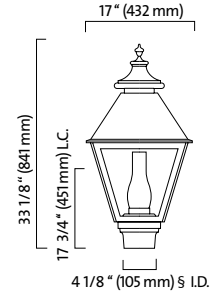
L21A-SE / L21N-SE

sans bras décoratif
SEP: 2.46 sq. ft
Weight: 50 lbs (22.7 kg)



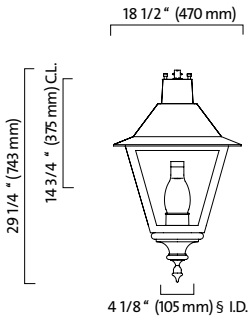
L26SA-RR / L26NA-RR

sans bras décoratif
SEP: 2.69 sq. ft
Weight: 50 lbs (22.7 kg)



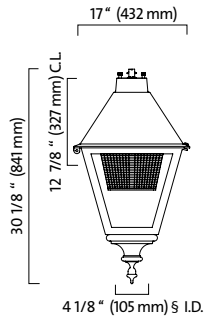
L40S-SE-SFR

SEP: 2.33 sq. ft
Weight: 47 lbs (21.3 kg)



L20P-SE

EPA: 2.41 sq. ft
Weight: 36 lbs (16.3 kg)



L26SP-RACE

EPA: 1.86 sq. ft
Weight: 50 lbs (22.7 kg)

> These lanterns are available with the following lens finishes:

PC-C : Clear polycarbonate

GL-C : Clear tempered glass

LAMPES / HID

OPTICAL SYSTEMS /

L20 / L21 / L26S / L40S

(Lamps not included)

WATTAGE	L20/L21/L20P			L26SA/L26SN/L26SP				L40S		
	RACE3 RACE3D RACE5	RR3 RR3MD RR5	SE3 SE5	RACE3 RACE3D RACE5	RR3 RR3MD RR5	SE3 SE5	SG1 SG2 SG3 SGFM SGQ	RACE3 RACE3D RACE5	RR3 RR3MD RR5	SE3 SE5
50 MH, medium	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
70 MH, medium	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
100 MH, medium	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
150 MH, medium	RB	✓	RB	RB	✓	RB	RB	RB	✓	RB
200 MH, mogul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RB	N/A	RB
35 HPS, medium	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
50 HPS, mogul	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
70 HPS, mogul	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
100 HPS, mogul	RB	✓	RB	✓	✓	RB	RB	RB	✓	RB
150 HPS, mogul	RB	✓	RB	RB	✓	RB	RB	RB	✓	RB
200 HPS, mogul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RB	N/A	RB
250 HPS, mogul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RB	N/A	RB
250 PSMH, mogul	N/A	N/A	N/A	N/A	N/A	N/A	N/A	RB	N/A	RB

✓ : Available N/A : Not available RB : Remote Ballast Required

VOLTAGE

120 / 208 / 240 / 277 / 347 / 480

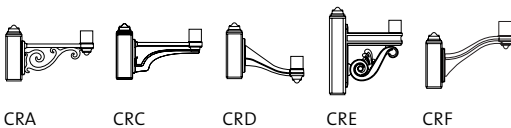
> Multi-top ballast also available.

LUMINAIRE OPTIONS

HS House shield
(only with SE and SG)

MOUNTINGS

(Consult the Pole Guide for details and the complete line of mountings)



FINISHES

(Consult Philips Lumec's Color Chart for complete specifications)

The specially formulated Lumital powder coat finish is available in a range of many standard colors.

ORDERING SAMPLE

LUMINAIRE	LAMP	OPTICAL SYSTEM	VOLTAGE	OPTIONS	MOUNTING & CONFIGURATION	POLE	FINISH
L20-PCC	100 MH	SE3	120	HS	SFR-CR1-1A	R80-12	BKTX

Philips Lumec reserves the right to substitute materials or change the manufacturing process of its products without prior notification. For the latest updates go to www.philips.com/lumec.



RR Optics

Round borosilicate refractor.

RR5: Asymmetrical
RR3: Asymmetrical
RR3MD: Asymmetrical with medium deflector



SE Optics

Hydro-formed cut-off reflector system set in faceted arc-image duplicating patterns

SE5: Symmetrical
SE3: Asymmetrical

> House shield available in option (HS)



RACE Optics

Round acrylic (max. 100w) or borosilicate (150w and more) refractor with segmented upright recovery dome.

RACE3: Asymmetrical
RACE5: Asymmetrical
RACE3D: Asymmetrical with medium deflector



Optique SG

(NOT AVAILABLE IN L20 AND L21)

Segmented cut-off reflector system set in faceted arc-image duplicating patterns.

SGQ: Asymmetrical
SG1: Asymmetrical
SG2: Asymmetrical with deflector
SG2: Asymmetrical
SGFM: Forward throw

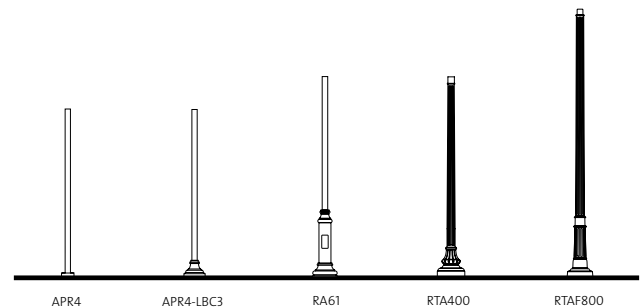
> House shield available in option (HS)

Add ACDR or GL suffix to optical system code

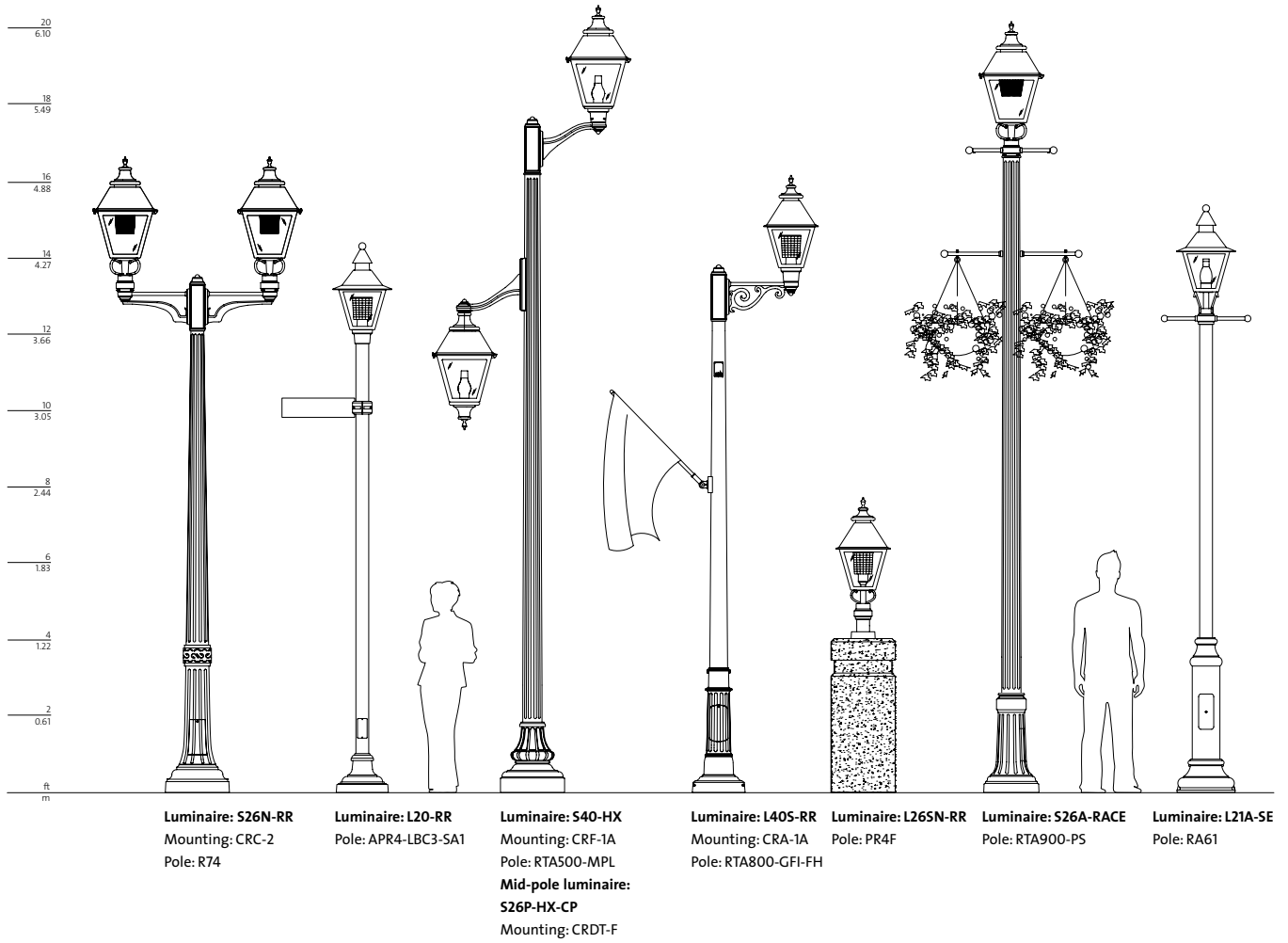
* Photometry available on Philips Lumec web site www.philips.com/lumec.

POLES AND POLE OPTIONS

(Consult the Pole Guide for details and the complete line of poles)



ASSEMBLY EXAMPLES





>>
LUMINAIRE > S26A-HX-LF
POLE > CUSTOM



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/ Some luminaires use fluorescent or high intensity discharge (HID) lamps that contain small amounts of mercury. Such lamps are labeled "Contains Mercury" and/or with the symbol "Hg." Lamps that contain mercury must be disposed of in accordance with local requirements. Information regarding lamp recycling and disposal can be found at www.lamprecycle.org



The choice to not print paper brochures anymore but to make them available on-line is an example of the positive environmental actions that Philips Lumec has decided to undertake. This not only considerably reduces our paper consumption but also guarantees the exactitude of the information our clients receive.