



V I L L A G E O F K E Y B I S C A Y N E

Office of the Village Manager



Village Council
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James Taintor

DATE: January 13, 2015
TO: Honorable Mayor and Members of the Village Council
FROM: John C. Gilbert, Village Manager
RE: Lighting Study

Village Manager
John C. Gilbert

RECOMMENDATION

It is recommended that the Village Council approve the issuance of a Request for Proposals for street lighting on Harbor Drive and W. Mashta Drive for the following:

1. Street lighting for Phases 1 and 2: Retrofit the existing 32 light poles on Harbor Drive from Fernwood Road to W. Enid Drive from metal-halide high density discharge luminaries (HID) to light-emitting diode luminaries (LED); and,
2. Street lighting for Phases 3 and 4: Redesign and rebid the street lighting project on Harbor Drive from W. Enid Drive to Mashta Drive and on W. Mashta Drive to include LED luminaries in place of the currently designed HID luminaries.

BACKGROUND

The 2020 Vision Plan identified the installation of street lighting on major streets with sidewalks. The Harbor Drive and W. Mashta Drive streets were selected as a priority due to the high number of pedestrians that utilize them. Street lighting for Phases 1 and 2 on Harbor Drive from Fernwood Road to W. Enid Drive were completed. On November 18, 2014, the Village Council considered awarding a bid to continue the installation of new street lights for the 3rd Phase of the street lighting project on Harbor Drive from W. Enid Drive to W. Mashta Drive. During this discussion, the Village Council redirected the Administration to evaluate retrofitting the existing street lights for Phases 1 and 2 to LED luminaries and consider rebidding Phase 3 and 4 with LED luminaries.

The attached study found that retrofitting the street lights for Phases 1 and 2 to LED luminaries would save approximately \$150 per street light per year. The cost would be fully amortized over 2.3 years. Street lighting for Phases 3 and 4 would result in the same savings and would be fully amortized over 2.7 years.

Key Biscayne Lighting Report

Analysis of LED versus Traditional



Prepared for:
The Village of Key Biscayne

Prepared by:
John Nel, ASCT. PMP
Sean Compel, P.E.

January 2, 2015

Executive Summary

The Village of Key Biscayne, Miami Dade County, Florida, in accordance with the Village's goals to achieve sustainability, initiated a study to evaluate the replacement of streetlights with high-efficiency light-emitting diodes (LED) models.

This report summarizes an assessment project conducted to evaluate the performance of LED luminaires vs Metal Halide High Intensity Discharge Luminaires (HID) in a street lighting application at Harbor Drive.

The 1st phase of the Harbor Drive Lighting completed in 2007-2008 included the installation of 15 light poles from Fernwood Road to just north of Cypress Drive. The second phase was from Cypress Drive to West Enid and included 17 poles. Both projects used standard 175 Watt Metal Halide HID Luminaires. The 3rd phase has since been designed with identical luminaires, however not constructed, and proposes 7 poles from West Enid to West Mashta. A 4th Phase will include involve Mashta Drive from Harbor Drive to Crandon Boulevard. We estimate that 18 poles will be required for the 4th Phase. Prior to approval of the installation of the 3rd phase, the Village has decided to evaluate LED options, which include simple LED replacements and/or completely new LED Post Top Luminaire fixtures. Our evaluation has indicated that both options can be achieved in these projects.

Estimated economic performance of the LED luminaires as compared to Metal Halide HID Luminaires was also evaluated and energy cost savings around 50% per year can be anticipated. Much of the anticipated cost savings for converting from HID and/or HPS to LED lighting will be further justified by reduced maintenance costs and the extended lifetime. LED lighting has a life expectancy of up to 50,000 hours as compared to an average of 12,000 for traditional bulbs. The life expectancy alone will produce significant costs savings over time.

Phases 1 and 2 can be retro-fitted with new LED lamps at an estimated cost of \$350 per lamp. From our research, we estimate annual energy savings per fixture at approximately \$50 and annual maintenance savings per fixture at \$100, for a **total of \$150 per fixture**. The maintenance estimate includes items such as re-lamping, changing ballasts and other general repairs. These estimated savings can achieve a return on the investment within approximately 2.3 years. The total expected cost for the project which includes 32 poles would be \$11,200.

There are two options that exist for the upcoming projects, **Phases 3 and 4**. Option 1 is to use the same fixture as previous projects and specify the LED bulbs. This would achieve the same look throughout the Village, while still saving energy costs and maintenance costs; the savings per fixture would remain at approximately \$150 per year. Option 2 is to specify an LED fixture which is very similar to the previous fixtures used. See Figures 2 and 3 for a picture comparison. The LED fixture will cost approximately \$400 more than the standard fixture; with a savings of \$150 per fixture the return on investment can be achieved within approximately 2.7 years. Therefore a similar result is achieved.

Project Objectives

The Village recognizes that lighting is a significant fraction of its total electrical usage – Metal Halide High Intensity Discharge (HID) and High Pressure Sodium (HPS) streetlights drawing between 175 and 250 watts apiece for an average of 12 hours per day – and streetlight efficiency is therefore crucial to the Village's progress in sustainability.

The objectives of this study was to examine energy, lighting, and economic performance of LED luminaires as compared to the current standard 175 watt HID luminaires installed on Harbor Drive (Phases 1 and 2) and the proposed/future phases on Harbor Drive and West Mashta Drive. The following key tasks were identified:

- Establish whether or not the poles to be installed as part of Phases 3 and 4 will be suitable for new LED fixtures or will a completely new pole type be required.
- Establish if the LED luminaires will provide an acceptable level of light for the spacing shown on Harbor Drive.
- Provide the Village with the lifecycle costs of LED lights vs traditional bulbs
- Establish the potential cost saving per street light using LED's
- Establish if LED bulb replacements to existing HID luminaires is a viable alternative

The potential electrical demand and energy savings are provided in terms of average wattage and estimated annual kWh usage.

Finally, economic performance was evaluated through simple payback for substitution of the 175 Watt HID street lights with 84 Watt LED luminaires.

Lighting Level and Energy Performance

LED technology is relatively new and has a higher initial capital cost relative to other technologies currently in use. The reduced energy cost that result from lower energy consuming fixtures are not always sufficient to justify the initial capital costs. Much of the anticipated cost savings for converting from HID and/or HPS to LED lighting will be justified by reduced maintenance costs and the extended lifetime. LED lighting has a life expectancy up to 4 times that of the conventional lighting.

Lighting performance is estimated in terms of illuminance (photopic and scotopic), uniformity, correlated color temperature (in Kelvin), and by the posted literature from various manufacturers including GE and Lighting Design Lab.

While lighting level performance varied amongst the various LED luminaires available for street lighting applications, energy savings potential was high in each case, with energy reductions ranging from 50% to 60% over the HID system currently installed in Harbor Drive.

Furthermore maintenance cost reduction for LED luminaires are an added benefit and can be estimated at \$0 for the 1st 5 years.

While it is likely that well designed luminaires with quality components can last beyond the minimum reported LED life of 50,000 hours, industry standard methods to verify these lifetimes are still in development. Additionally, as a luminaire consists of multiple components (LEDs,

driver, housing, coating, etc.), the expected useful life of the luminaire may not be the same as that of the LEDs. Instead, the lifetime should be considered to be limited by the first of all the components comprising the luminaire to fail.

The summary below is provided to illustrate the costs associated with the various fixtures.

Luminaire	Lamp	Wattage	Fixture Costs	Maintenance Costs	Annual Energy Use	Annual Energy Costs
GE Evolve Energy Efficient LED	LED	84 W	\$1250	\$0	367.9 kWh	\$45.99
GE Americana Post Top with electronic ballasts	HID	175 W	\$850	\$150 per year	766.5 kWh	\$95.81
GE Edison Post Top with electronic ballasts	HID	150 W	\$700	\$150 per year	657.0 kWh	\$82.13

LED Retrofit to replace HID lamps up to 175W

Since the 1st and 2nd Phases of the project have already been completed and HID luminaires installed – Stantec has reviewed the option of direct bulb replacement with equivalent reduced energy LED's.

The direct LED replacement for the 175 Watt metal halide HID from Lighting Efficient Design is the LED-8024 Post Top design (see attached data sheet). Alternatively Light Efficient Design also provides a 100 Watt retrofit LED-8027 to replace HID lamps up to 250 Watt which may be a more suited replacement due to the pole spacing and the reduced lumens (~5000 Lm) with LED-8024 (data sheet attached).

LED-8027 has initial lumens at ~ 9500 Lm which is more in line with the lumen output of the existing HID lamps.

The LED-8027M42 is rated for 120-277 VAC has a correlated color temperature (CCT) of 4200K which would be most suitable for a street lighting application. It has a design life expectancy of 50,000 hr. rated L70 LED life. Furthermore it is UL listed for damp locations and rated for enclosed fixtures. Light Efficient Design includes a 5 year warranty.

Stantec's recommendation would be that these direct replacement LED lamps be installed and tested on a couple of fixtures to review their suitability in the roadway application.

Installation Notes:

Light Efficient Design provides the following installation notes.

- When installing LED-8000 series retrofit lamps within HID fixtures, ballast must be bypassed when present.
- 8000 series retrofits are UL damp rated, sealing the fixtures after installation will deliver best results.
- Installing surge/lightning protectors is highly recommended and helps to eliminate premature driver failure caused by surges and other power fluctuations.

Technology and Lighting Quality

An LED is a semi-conducting device that produces light when an electrical current flows through it. It consists of a chip of semi-conducting material treated to create a structure called a p-n (positive-negative) junction. Current flows from the n-side (cathode) to the p-side (anode) when the barrier voltage inherent to the semiconductor materials and the various dopants used in the fabrication of the LED is exceeded. Since very little heat is created, and the voltages and current are relatively small, the resulting emission of photons is efficient compared to the power input. The atomic characteristics of these materials determine the color (frequency) and efficiency of a device. Today, the standard white LED uses a blue LED that acts as a stimulator for its phosphor packaging material. These phosphors are the key to the broad spectrum of light emitted commonly called white light.

LED streetlights emit far less light at high angles (80-90 degrees vertical) than HID and HPS streetlights, reducing the potential for glare which is an important safety issue. LED products outperform HID and HPS in reducing light trespass - the more efficient LED distribution of light should reduce Key Biscayne's contribution to overall sky glow. Finally, in contrast to LEDs, HID and HPS lamps must be treated as universal waste due to mercury content.

Advantages of LED:

- Substantial energy savings.
- Reduced maintenance and operational costs.
- Estimated luminaire life of 50,000 hours – up to 4 times that of HID bulbs.
- Light output can be directed and controlled.
- White light allows better vision at lower light levels
- Improve light quality for improved visibility and safety.
- No hazardous materials. An LED light contains no mercury, which is a toxic substance for humans and animals alike.
- Produces no UV light. Over time, UV light can cause damage to products; for instance, under a UV light, plastic becomes yellow and brittle.

Disadvantages of LED:

- Higher Cost.
- May require closer spacing depending upon the selected luminaire and wattage.
- Unlike traditional lighting, where a fixture might include ballasts and lamps from many manufacturers, LEDs are often all-inclusive fixtures called luminaires. Even if some components are modular for future replacement or upgrade, components of LED luminaires tend to be proprietary and are not interchangeable.
- The Type 2 components made by each manufacturer vary in how the light is distributed. Buyers will need very clear specifications when purchasing the products to keep the distribution pattern in a retrofit.

From a lighting quality standpoint based on the illuminance method of ANSI/IESNA RP-8-00, the GE LED products were found to be standard conformant in all metrics. The HID lights were standard conformant, however are seen as greatly over lighting portions of the roadway (with consequent energy expense). The following photo illustration provides a visual comparison of the lighting quality differences.



Photo 1: Base Case Ground Level Photograph – High Pressure Sodium



Photo 2: Ground Level Photograph under LED

(Acknowledgements – Photos were prepared for the U.S. Department of Energy and Pacific Gas & Electric by Energy Solutions.)

Mounting heights for the post mounted luminaires in the Harbor Drive improvement project is approximately 14 feet above the road surface, and the street lights are located on one side of the street.

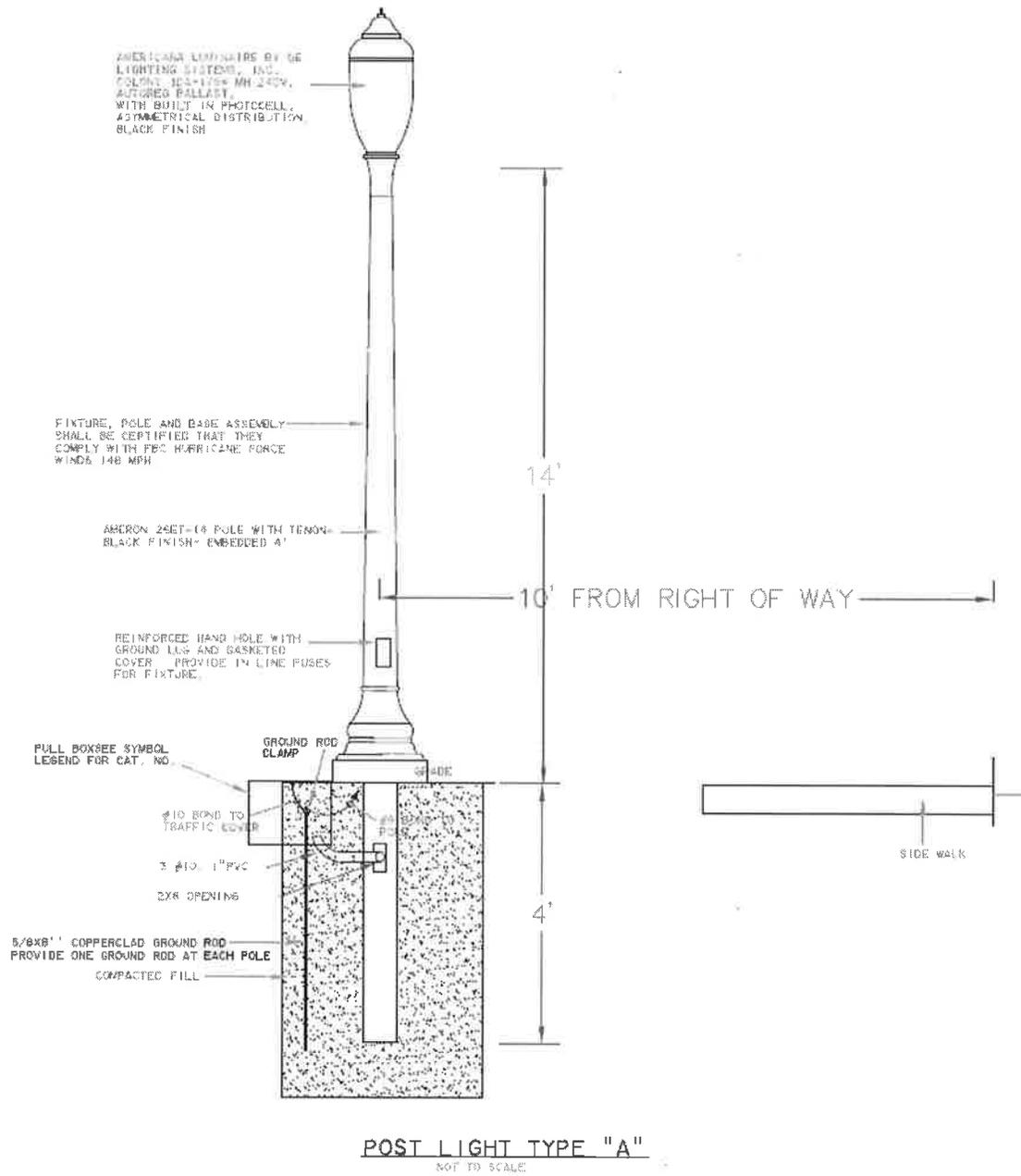


Figure 1 - Americana Luminaire by GE

Visual appearance of the two fixtures provided by GE are much the same.



Figure 2 - Existing GE Americana HID fixture



Figure 3 - Proposed GE Evolve LED Fixture

Although the illustration above shows a white finish on top, Luminaires by GE Lighting Systems have been provided with a Tenon black finish.

Acronyms and Abbreviations

ANSI American National Standards Institute

ANSLG American National Standard Lighting Group

avg:min Average-to-minimum ratio

BUG Backlight, Uplight, and Glare

CCT Correlated color temperature

cd Candela(s)

CIE International Commission on Illumination

CRI CIE General Color Rendering Index (R_a)

DOE U.S. Department of Energy

Duv Distance from the Planckian locus on the CIE 1960 (u, v) diagram

fc Footcandle(s)

HID High-intensity discharge

HPS High-pressure sodium

IES or IESNA Illuminating Engineering Society of North America

IP Ingress protection

LCS Luminaire Classification System

LDD Luminaire Dirt Depreciation

LED Light-emitting diode

LLD Lamp Lumen Depreciation

NEMA National Electrical Manufacturers Association

S/P Scotopic/photopic

SSL Solid-state lighting

W Watt

GE
Lighting Solutions

Decorative Post Top Lighting

Americana™ (AM8 & AM9)



imagination at work

Product Features

Designed for superior photometric performance and architectural appeal, GE Outdoor Area Sighlighters provide broad application flexibility. From parking lots to downtown areas, hospitals to shopping malls, business complexes to residential neighborhoods, these fixtures will satisfy your large area lighting needs, while complementing your aesthetic desires.

Applications

- Residential roadways and walkways
- Shopping centers, malls, plazas and parks

Housing

- Ornamental heavy gauge die cast aluminum base

Finish

- Powder coat paint available in 188 RAL colors

Rating

- Built to  /  standards
- Suitable For Wet Locations

Unique Features

- Terminal Board standard for simplified wiring
- Twist Lock photoelectric receptacle available
- GE designed and built ballast with proven long life and reliability
- Crowns, ribs and finials available
- E39 Mogul base socket standard where lamp is available in mogul base (E26 Medium base socket otherwise)
- Luminaire shipped as components: Base, Optical
- Flip top, no tool entry for fast and easy maintenance
- Accepts 8" and 9" globes

Ordering Number Logic Americana™ (AM8 & AM9)



PROD. ID	WATTAGE	LIGHT SOURCE	VOLTAGE	BALLAST TYPE SELECTION	PE FUNCTION	GLOBE TYPE**	IES DISTRIBUTION TYPE	COLOR	OPTIONS
AM8X = 8" Americana Luminaire	05 = 50 07 = 70 10 = 100 15 = 150 (55V)	S = HPS P = PMH Standard: Lamp not included.	60Hz 0 = 120/208/240/277 Multivolt 1 = 120 2 = 208 3 = 240 4 = 277 5 = 480 D = 347 F = 120X347	See Ballast and Photometric Selection Table A = Autoreg H = HPF Reactor or Lag N = NPF Reactor or Lag	1 = None 2 = PE Receptacle NOTE: Receptacle connected some voltage as unit. Order PE Control separately.	9" GLOBE 1AC = Traditional Prismatic* (Polycarbonate & Acrylic) 1CB = Traditional Standard (Polycarbonate) 1DA = Colony (Acrylic with spun aluminum top) 1HA = Classic (Acrylic) 1LD = 22" Impression (White polycarbonate) 1MA = Colony with crown and ribs installed (Acrylic with spun aluminum top) 8" GLOBE 1AC = Traditional Prismatic* (Polycarbonate & Acrylic) 1BC = Colonial Prismatic (Polycarbonate & Acrylic) 1CB = Traditional Standard (Polycarbonate) 1DA = Colony (Acrylic with spun aluminum top) 1PB = Revival (Polycarbonate) 1MA = Colony with crown and ribs installed (Acrylic with spun aluminum top)	See Ballast and Photometric Selection Tables A = Asymmetric S = Symmetric	ALUM = Aluminum BLCK = Black BRWN = Brown CHGR = Charcoal GRAY = Gray DKBZ = Dark Bronze FGRN = Forest Green GRAY = Gray WHTE = White	J = Expulsion Type Lighting Arrestor (UL not available) L = Safety Latch U = UL Listed (Polycarbonate Globe Required for Ⓢ/Ⓣ)
AM8F = 8" Americana Luminaire Finial Ready*									
AM9X = 9" Americana Luminaire									
AM9F = 9" Americana Luminaire Finial Ready*									

*Order Finial Separately

**Also available with solid or perforated upright shield

Ballast Selection Table

All light sources are clear unless otherwise indicated.

Wattage	Light Source	Ballast Type/Voltage			
		60Hz			
		120	347, 120X347**	480***	Multivolt
50	HPS	H,N	H,N	N/A	H,N
70, 100, 150(55V)	HPS	A,H,N	H,N,A	H,N	H,N,A
70	PMH	H,N	H,N	A,N	H,N
100	PMH	H,N	H,N	N	H,N
150	PMH	H,A	H	N/A	N/A
175	MH (Clean)	A	A	N/A	N/A
175	MH (Coated)	A	A	N/A	N/A

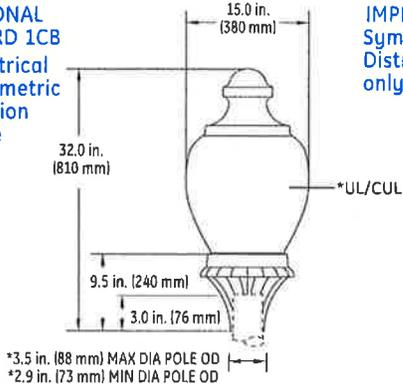
**120X347 Option Available in 100W (PMH only) & 175W (MH only).
*** 480V Option Available in 70W - 150W HPS and 70W & 100W PMH only. Contact Manufacturer for 50 Hz offering.

Photometric Selection Table

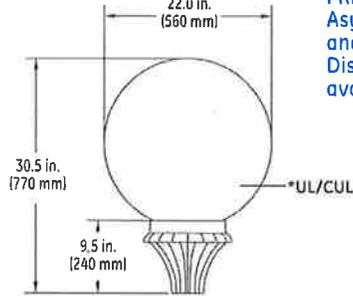
Wattage	Light Source	IES Distribution Type							
		LNA	MN2	MN3	MN4	MS2	MS5	XN5	XS5
50	HPS	451566, 452169	451273	451371, 452264	-	451274	-	451179, 452167 452202, 452218 452248, 452381	451495
70	HPS	451567, 452110	451275	452265	-	451372	451276	451426, 452107 452203, 452219 452249, 452382	451496
100	HPS	451568, 452090	451277	451373	452266	-	451278	451427, 452000 452204, 452220 452250, 452383	451497
150	HPS	452091	451279, 451374	-	451569, 452267	-	451280	451427, 452000 452204, 452221 452251, 452384	451498
50	PMH	452168, 452260	-	-	-	-	-	451427, 452000 452204, 452222	-
70	PMH	452109, 452261	-	-	-	-	-	451427, 452000 452204, 452223	451499
100	PMH	451571, 452088	-	-	452262	451476	-	451427, 452000 452204, 452224	451500

Product Dimensions

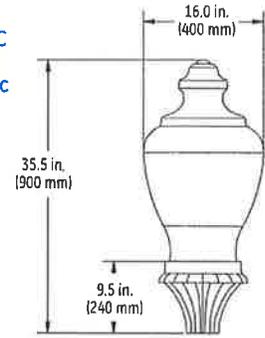
TRADITIONAL STANDARD 1CB
Asymmetrical and Symmetric Distribution available



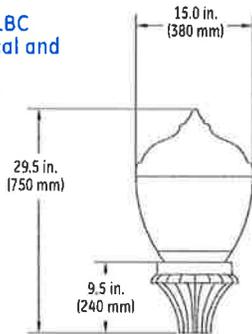
IMPRESSION 1LD (22")
Symmetric Distribution only



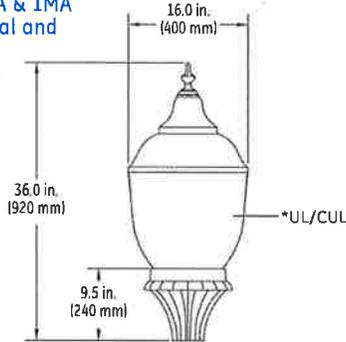
TRADITIONAL PRISMATIC 1AC
Asymmetrical and Symmetric Distribution available



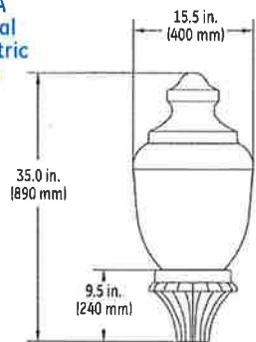
COLONIAL PRISMATIC 1BC
Asymmetrical and Symmetric Distribution available



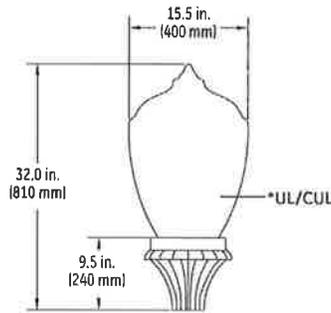
COLONY 1DA & 1MA
Asymmetrical and Symmetric Distribution available



CLASSIC 1HA
Asymmetrical and Symmetric Distribution available

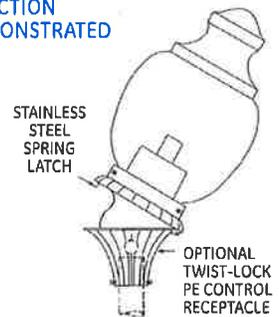


REVIVAL 1PB
Symmetric Distribution only



*UL/CUL
Polycarbonate Only

"FLIP TOP" FUNCTION DEMONSTRATED



DATA

- Approximate Net Weight: 16-20 lbs (7-9 kgs)
- Suggested Mounting Height: 8-16 ft. (2-5 M)
- Effective Projected Area: 1.4 sq. ft. max. (0.13 sq. M max.)



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GE
Lighting

Evolve™ LED Post Top

Avery StreetDreams™ (EPAS)



imagination at work

Product Features

The Evolve™ LED Avery StreetDreams™ Post Top offers energy efficiency and quality of light in a classic, traditional style. The advanced LED optical system provides improved horizontal and vertical uniformity, reduced glare and improved lighting control. GE's unique optical ring technology effectively aims the light where you need it, while eliminating the unsightly shadow circles commonly seen under other LED post top fixtures.

The Avery post top can yield up to a 60-percent reduction in system energy compared with standard HID systems, depending on applications. This reliable system operates well in cold temperatures and offers more than 11 years of service life to reduce maintenance frequency and expense, based on a 50,000 hour life and 12 hours of operation per day.

Applications

- Roadway, site, area, and general lighting utilizing advanced LED optical system providing high uniformity, excellent vertical illuminance, reduced offsite visibility, and reduced on-site glare.

Housing

- Die-cast aluminum housing.
- Classic nostalgic design incorporates the heat sink directly into the unit ensuring maximum heat transfer and long LED life.
- Additional features include both Scroll and Medalian crown & ribs.
- Meets 2G vibration standards per ANSI C136.31-2010. For 3G rating contact factory.

LED & Optical Assembly

- Structured LED array for optimized roadway/walkway photometric and distribution.
- Evolve light engine consisting of nested concentric directional reflectors designed to optimize application efficiency and minimize glare.
- Utilizes high brightness LEDs, 65 CRI at 4100K typical.
- LM-79 tests and reports are performed in accordance with IESNA standards.

Lumen Maintenance

- System rating is 50,000 hours at L85. Contact manufacturer for Lxx rating (Lumen Depreciation) beyond 50,000 hours.

Ratings

- /  listed, suitable for wet locations.
- IP 65 rated optical enclosure per ANSI C136.25-2009.
- Temperature rated at -40° to 50°C.
- Compliant with the material restriction requirements of RoHS.

Mounting

- Post top mounting 3-inch (76mm) OD held in place with six square head set screws.

Finish

- Corrosion resistant polyester powder painted, minimum 2.0 mil. thickness.
- Standard colors: Black & Dark Bronze.
- RAL & custom colors available.

Electrical

- 120-277 volt and 347-480 volt available.
- System power factor is >90% and THD <20%.
- Class "A" sound rating.
- Integral surge protection non-dimming:
 - For 120-277VAC per IEEE/ANSI C62.41.-1991, 4kV/2kA Location Category B2 (120 Events)
 - For 347-480VAC per IEEE/ANSI C62.41.-1991, 6kV/3kA Location Category B3 (120 Events)
- Integral surge protection GE dimming:
 - For 120-480VAC per IEEE/ANSI C62.41.2-2002, 6kV/3kA Location Category B (120 Events)
- Optional high capability surge protection per IEEE/ANSI C62.41.2-2002.
 - Rating 1 - 10kV/5kA Location Category (120 events)
 - Rating 2 - 6kV/3kA Location Category C-Low (5000 events)
- EMI: Title 47 CFR Part 15 Class A



Ordering Number Logic

Avery Streetdreams™ Post Top (EPAS)

EPAS

41

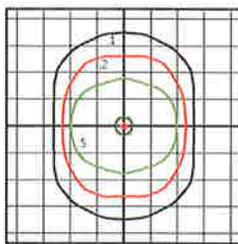
PRODUCT ID	VOLTAGE	OPTICAL CODE	POD TYPE	LED COLOR TEMP	CAGE SELECTION	PE FUNCTION	FINIAL	COLOR	OPTIONS
E = Evolve	0 = 120 - 277 H = 347 - 480		A B* C D*	41 = 4100K	A = Clear Acrylic w/Colony Top B = Clear Acrylic w/Colony Top, Medallion C&R C = Clear Acrylic w/Colony Top, Scroll C&R* D = Clear Acrylic w/Scroll Top E = Clear Acrylic w/Scroll Top, Medallion C&R F = Clear Acrylic w/Scroll Top, Scroll C&R*	1 = None 2 = PE Rec. 4 = PE Rec. with Shorting Cap 5 = PE Rec. with Control # 7 = Dimming PE Receptacle *† (UL only) 9 = Dimming PE Receptacle with Shorting Cap *† (UL only) # PE control not available for 347-480V. Must be a discrete voltage (347V or 480V) † When ordering PE function socket 7 or 9, a dimming driver must also be ordered under the "OPTIONS" column * Order dimming control PE as a separate item	A = Silhouette B = Acorn C = Fluer-De-Lis D = Filagree* E = Blossom* F = Spike G = Oak* H = Steeple J = Gothic X = No Finial	BLCK = Black DKBZ = Dark Bronze FGRN = Forest Green XXXX = Special *Contact manufacturer for other colors	D = Dimmable (0-10 Volt Input)* F = Fusing T = Extra Surge Protection* XXX = Special Options *Contact manufacturer for availability



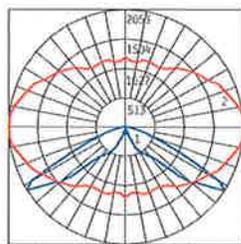
OPTICAL CODE	TYPE	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		POLE SPACING	BUG RATINGS 4100K			IES FILE NUMBER	
		4100K	120-277V	347-480V	2-4 LANES		B	U	G	120-277V	347-480V
C5	Symmetric	5,900	84	90	5:1	B3	U3	G1	EPAS_C5_41A_-120-277V	EPAS_C5_41A_-347-480V	
			48	52		B2	U2	G1	EPAS_E5_41A_-120-277V	EPAS_E5_41A_-347-480V	
E5	Symmetric	3,000	84	90	5:1	B1	U3	G2	EPAS_C3_41A_-120-277V	EPAS_C3_41A_-347-480V	
			48	52		B1	U2	G1	EPAS_E3_41A_-120-277V	EPAS_E3_41A_-347-480V	

Photometrics

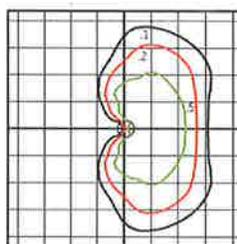
EPAS Type V – Symmetric (C5)
5,900 Lumens, 4100K



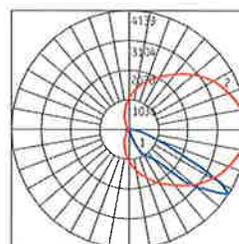
Grid Distance in Units of Mounting Height at 16' Initial Footcandle Values at Grade



Polar Trace Vertical and Horizontal Plane through Horizontal Angle of Maximum Candlepower

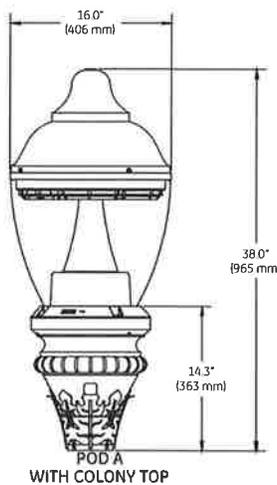


Grid Distance in Units of Mounting Height at 16' Initial Footcandle Values at Grade

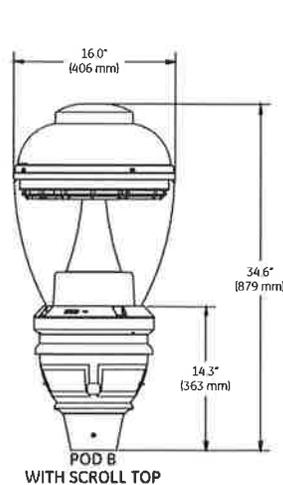


Polar Trace Vertical and Horizontal Plane through Horizontal Angle of Maximum Candlepower

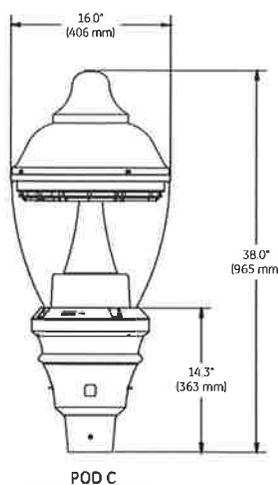
Product Dimensions



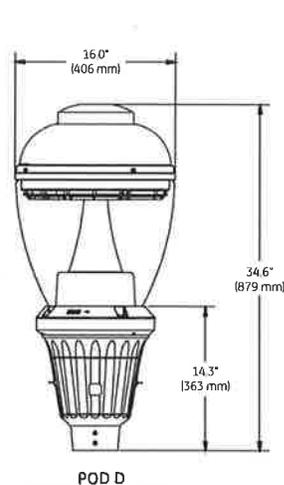
POD A WITH COLONY TOP



POD B WITH SCROLL TOP



POD C WITH COLONY TOP



POD D WITH SCROLL TOP

Fixture Styles

Pods



POD A



POD B



POD C



POD D

Tops



COLONY TOP



SCROLL TOP

Optional Accessories

Crowns & Ribs



SCROLL CROWN & RIBS



MEDALIAN CROWN & RIBS

Finials



FNLBL-ACN
ACORN



FNLBL-BLS
BLOSSOM



FNLBL-FOL
FLEUR-DE-LIS



FNLBL-FIL
FILAGREE



FNLBL-SIL
SILHOUETTE



FNLBL-SPK
SPIKE



FNLBL-OAK
OAK



FNLBL-STP
STEEPLE



FNLBL-GTH
GOTHIC

DATA

- Approximate Net Weight: 43 lbs (20 kgs)
- Suggested Mounting Height: 8-16 ft max (2.5-5 m)
- Effective Projected Area (EPA): 1.4 sq ft max (0.13 sq m)



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OLP2896 (Rev 08/22/14)

LED-8024 Post Top / Site / Wall Pack

45w = 175W
LED MH / HPS

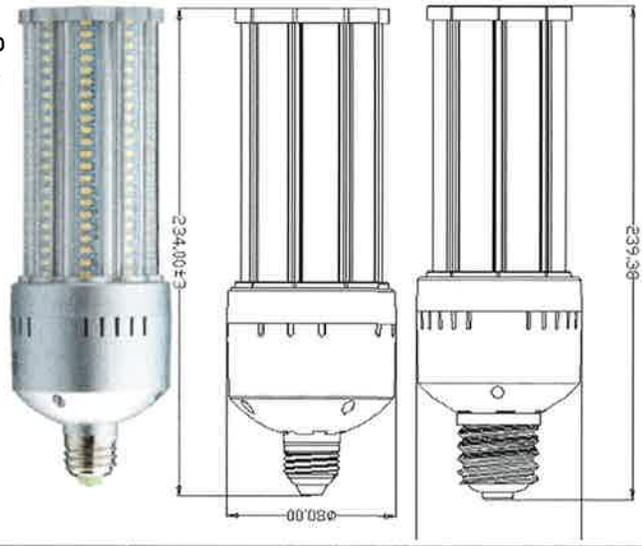
SKU No. (USA)	SKU No. Canada
LED-8024E30	LED-8024E30C 45W, 3000K E26
LED-8024E42	LED-8024E42C 45W, 4200K E26
LED-8024E57	LED-8024E57C 45W, 5700K E26
LED-8024M30	LED-8024M30C 45W, 3000K E39
LED-8024M42	LED-8024M42C 45W, 4200K E39
LED-8024M57	LED-8024M57C 45W, 5700K E39



Description:

LED retrofit design to replace MH and HPS lamps up to 175w. Fully encapsulated, 45 watt LED with E26 or E39 Edison base. Compact size and 360° LED placement allows suitable for fully enclosed post top, shoe box and other typical HID fixtures giving full illumination. UL1598C classification (E39 only) maintains modified fixture's UL certification.

- 45W power consumption
- Replaces up to a 175W HID
- 360° 120-277VAC, Non-Dimmable (USA) 120-347VAC, Non-Dimmable (Canada)
- Available in 3000K, 4200K & 5700K CCT
- >80 CRI
- 50,000 hr. rated L70 LED life
- Operating temp: -40°F - 122°F
- Double Insulated
- UL Listed (US & CA) Damp Locations and rated for enclosed fixtures
- 5 Year warranty



Applications:

LED Post top / Site / Area LED for HID retrofit lamps lower energy costs, bulb and ballast replacement costs and also can greatly reduce costly equipment rental when re-lamping HID lamps on and off cycle. LED for HID retrofits will also eliminate lamp disposal issues due to the mercury content in many HID lamps.

- Outdoor area lighting
- Bollard / Post Top
- Wall Pack
- Cold display
- Security Lighting

Packaging: 9/Master Carton

Unit : 4.7" x 4.7" x 8.9"
Master: 14.8" x 14.8" x 9.5"

Installation Notes:

- When installing LED-8000 series retrofit lamps within HID fixtures, ballast must be bypassed when present.
- 8000 series retrofits are UL damp rated, sealing the fixtures after installation will deliver best results.
- Installing surge/lightning protectors is highly recommended and helps to eliminate premature driver failure caused by surges and other power fluctuations.

Technical Specifications

Bulb Type	HID Retrofit	Mounting	E26 or E39
Bulb Material	Aluminum/ Polycarbonate	LEDs:	176 Samsung/ Mason #5630 LED's
Power Consumption	45 watts	Beam Angle	360°
Initial Lumens	30K: 4541 / 4389 Lm 42K: 4958 / 4979 Lm 57K: 5028 / 4992 Lm	Dimmable	No
Efficacy	97-109 LPW	Replaces	Up to 175W HID
Rated LED Life	Up to 50,000 Hrs.	CCT	3000K 4200K 5700K
Power Factor:	>99	CRI:	> 80
IR / UV	None	Mercury/ Lead Content	None
Warranty	5 year Limited	Dimensions	E: 9.22" X 3.15" M: 9.65 X 3.15"

Note: All specification information falls within a ± 2% range and is subject to change without notice.

NOTE: Light Efficient Design is providing this information to the general public. Please note that all products contained herein are trademarked, copyrighted, and/or have patents pending. Any use of these designs is strictly prohibited without prior written consent. Light Efficient Design protects its proprietary information vigorously in the courts of the United States of America.



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(847) 380-3540 • FAX: (847) 380-3542
www.led-llc.com

LED-8027 Post Top / Site / Wall Pack

100w = 250W
LED MH / HPS

SKU No. (USA)	SKU No. Canada	
LED-8027M30	LED-8027M30C	100W, 3000K
LED-8027M42	LED-8027M42C	100W, 4200K
LED-8027M57	LED-8027M57C	100W, 5700K

Description:

LED retrofit design to replace MH and HPS lamps up to 250w. Fully encapsulated, 100 watt LED with E39 Mogul base. Suitable for fully enclosed post top, shoe box and other typical HID fixtures giving full even illumination. UL1598C classification maintains modified fixture's UL certification.

- 100W power consumption
- Replaces up to a 250W HID
- 360° Illumination
- 120-277VAC, Non-Dimmable (USA)
- 120-347VAC, Non-Dimmable (Canada)
- Available in 3000K, 4200K & 5700K CCT
- >80 CRI
- 50,000 hr. rated L70 LED life
- Operating temp: -40°F - 122°F
- Double insulated
- UL Listed (US & CA) Damp Locations and rated for enclosed fixtures
- 5 Year warranty

Applications:

LED Post top / Site / Area LED for HID retrofit lamps lower energy costs, bulb and ballast replacement costs and also can greatly reduce costly equipment rental when re-lamping HID lamps on and off cycle. LED for HID retrofits will also eliminate lamp disposal issues due to the mercury content in many HID lamps.

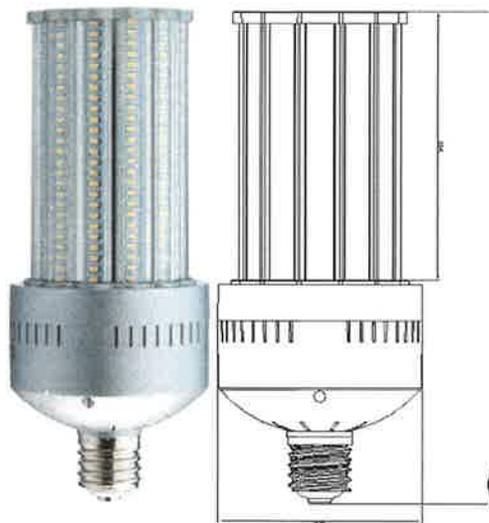
- Outdoor area lighting
- Large Post Top
- Shoe Box
- Area

Packaging: 4/Master Carton

Unit : 7.3" x 7.3" x 13.8"
Master: 15" x 15" x 14.3"

Installation Notes:

- When installing LED-8000 series retrofit lamps within HID fixtures, ballast must be bypassed when present.
- 8000 series retrofits are UL damp rated, sealing the fixtures after installation will deliver best results.
- Installing surge/lightning protectors is highly recommended and helps to eliminate premature driver failure caused by surges and other power fluctuations.



LED for HID RETROFIT



lighting facts
LED Product Partner



LISTED
E347112



CLASSIFIED
E344517

Technical Specifications

Bulb Type	HID Retrofit	Mounting	E39
Bulb Material	Aluminum/ Polycarbonate	LEDs:	300 Samsung #5630 SMD LED's
Power Consumption	100 watts	Beam Angle	120 °
Initial Lumens	3000K: 9162 Lm 4200K: 9516 Lm 5700K: 9738 Lm	Dimmable	No
Efficacy	91-97 LPW	Replaces	Up to 250W HID
Rated LED Life	Up to 50,000 Hrs.	CCT	3000K 4200K 5700K
Power Factor:	>99	CRI:	> 80
IR / UV	None	Mercury/ Lead Content	None
Warranty	5 year Limited	Dimensions	11.9" X 4.9"

Note: All specification information falls within a ± 2% range and is subject to change without notice.

NOTE: Light Efficient Design is providing this information to the general public. Please note that all products contained herein are trademarked, copyrighted, and/or have patents pending. Any use of these designs is strictly prohibited without prior written consent. Light Efficient Design protects its proprietary information vigorously in the courts of the United States of America.

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SPEC LED-8028 5/1/2013

REPORTING LED LUMINAIRE PRODUCT PERFORMANCE

*An Initiative for
Better Solid-State Lighting*

Next Generation Lighting Industry Alliance
with the
U. S. Department of Energy



December 2008

REPORTING LED LUMINAIRE PRODUCT PERFORMANCE

A joint committee of the U.S. Department of Energy (DOE) and the Next Generation Lighting Industry Alliance (NGLIA) has undertaken an effort to assure and improve the quality of Solid-state lighting (SSL) products. This brochure on LED Luminaire Performance reporting is the initial outcome of that effort. The ultimate goal is to develop an expanded community of *SSL Quality Advocates* throughout the supply chain who are committed to support and implement continuous improvement of SSL product quality.

The rapid growth of SSL has resulted in an increasing number of new products on the market for various lighting applications. While some of these are excellent introductions and showcase the energy-savings potential for SSL, quite a few under-performing products are also appearing in the market. Such products can discourage the early adopters of this new technology, significantly delay market penetration, and may thus disadvantage the entire industry. This situation also occurred in the early days of compact fluorescent lighting, inhibiting market acceptance of CFL products and negating significant potential energy savings in subsequent years.

To avoid, or at least reduce, this problem in emerging markets for Solid-state lighting, DOE urges manufacturers to agree, as a foundation of product quality, on accurate and consistent ways to report product performance, whether it is in product labeling, product packaging, product literature, press releases, or manufacturer data sheets.

DOE and NGLIA recommend that a minimum set of critical parameters, described below, be reported by luminaire manufacturers to accurately reflect the performance of their products. While not formal standards or requirements, ideally these recommendations would be uniformly adopted for LED lighting product sold in the United States. These recommendations currently apply only to LED lighting, and this

document refers only to self-contained replacement lamps, light engines, and full luminaire products, not packaged LED devices.¹ Providing luminaire information is intended to better inform designers, contractors, and other professionals about the performance they can expect from a lighting product and its suitability for the intended application. Some subset of these critical parameters, in a simplified form, may also be suitable for the retail market.

The initial five recommended performance to be supplied are:

- Luminaire efficacy
- Light output of the luminaire
- Measured input power
- Correlated color temperature
- Color rendering index

To provide lighting purchasers more product information, other metrics may be considered in the future, such as those related to reliability, product consistency, or construction. While standardization may make these recommendations obsolete, it is often sufficient simply to ensure that results are completely and consistently provided and accompanied by adequate background information to allow buyers to make a fair comparison among the products available for purchase.

¹ For definitions of the various SSL product levels, please refer to ANSI/IESNA RP-16-05 Addendum a, "Nomenclature and Definitions for Illuminating Engineering," May 2008.

LUMINAIRE PERFORMANCE METRICS

Provided *component-level* measurements are, with a few exceptions, adiabatic or nearly so; that is, they are taken over a short interval so as not to appreciably change the temperature of the LED chip during the measurement. As a result, component-level performance figures are generally optimistic and may differ significantly different from those that would be obtained under normal operating conditions.

Manufacturers of luminaires should insist on good component specifications, including thermal performance and lifetime characteristics, from their suppliers, but should also be aware that this information is not sufficient to describe the finished product. One of the most common misrepresentations of luminaire product performance is simply reporting the device performance without accounting for the influence of driver and luminaire design.

The following recommended parameters apply to all embodiments of LED products that include a driver—the “Lamp” and “Luminaire”—but manufacturers must use care in comparing lamp measurements to full luminaire results. Luminaire measurements, unlike component-level measurements, have generally been standardized with the issuing of IESNA Standard LM-79-2008. It is important to note that this standard specifies *absolute* photometry.

Luminaire Efficacy (*Lumens per Watt*) is a specific measure of the net useful light output from the luminaire for a given power input. Properly measured, Luminaire Efficacy combines both the light source system efficacy and luminaire efficiency, allowing for a true comparison of a luminaire regardless of the light source. Luminaire efficacy is the preferred metric for LEDs because it measures the net light output from the luminaire divided by power into the system, accounting for driver, optical, and thermal losses. Methods for

measuring luminaire efficacy of Solid-state lighting fixtures and lamps are defined in the IESNA standard, LM-79-2008.

Provided efficacy values for a given product can vary greatly depending on how light output and power use measurements are taken. For example, light output could be measured from a light source alone, from an entire luminaire, or within a specific test area. Input power could be specified alternatively as into the light source alone, into a ballast plus source, into a power supply with driver electronics, or at the 120 VAC wall plug. The energy-efficiency community has traditionally compared light sources based on system efficacy, rated lamp lumens divided by power into the system that includes source and driver. This doesn't work for LEDs because there are no standard LED lamp packages or lamp ratings, and, perhaps most importantly, because LED performance depends on the thermal, electrical, and optical design of the system or luminaire.

Light Output of Luminaire is the total lumens output by a luminaire (as a whole). For SSL products, luminaire light output must be determined by measuring the output of the entire luminaire (including the LED device, thermal management, fixture, and optics) in an integrating sphere or goniophotometer using absolute photometry.

Measured Power is the total power consumed by a luminaire measured in Watts. In all cases, the luminaire power should be measured upstream of power supply/driver. For example, for a luminaire that includes a wall plug, the measured power is at the wall socket input. For a luminaire wired directly to 120 VAC, the measured power is at the 120 VAC input.

Correlated Color Temperature (CCT) for an SSL luminaire ideally should be determined through integrating sphere testing of the whole luminaire. If this test result is not available, the CCT value for the LED device used in the luminaire can be provided, but information

provided should indicate that the CCT value was measured at the LED device level. The CCT of the luminaire may differ from the CCT of the device for any of several reasons:

- Operating currents and temperatures can affect the color temperature of an LED device.
- Reflective surfaces or a translucent enclosure on the fixture can change the CCT.
- An array of LED sources may include multiple devices with different CCT values.

Ideally, both Color Coordinates in the CIE 1931 x,y Chromaticity diagram and Correlated Color Temperature (CCT in degrees Kelvin) should be reported using ANSI C-78-377-2008, Specifications for the Chromaticity of Solid-state Lighting Products, because there can be confusion about what CCT means, especially if the coordinates are well off the Planckian locus.

Color Rendering Index (CRI) should be measured according to the standard R_a method used for conventional sources. As with other measurements, the CRI should be measured for the luminaire in normal steady-state operation to account for any effects of temperature or luminaire design on color.

AN INVITATION TO JOIN SSL QUALITY ADVOCATES

This brochure is the first step in an ongoing effort to enhance the quality of SSL products. The DOE is developing a pledge program to expand the community of *SSL Quality Advocates* committed to quality improvement. Luminaire manufacturers who join agree to add a simple *Lighting Facts*[™] label to the product, packaging, or accompanying literature specifying the minimum parameters. Similar recommendations will soon be available for source manufacturers. Other *SSL Quality Advocates*, including those who purchase or specify, agree to ask that their suppliers adhere to these recommendations. Please watch DOE's *SSL Quality Advocates* website at www.lighting-facts.com, for forthcoming information on how your company can participate by taking the *SSL Quality Pledge*.

Lighting Facts[™]
LED Product

Light Output (Lumens)	840
Watts	9
Lumens per Watt (Efficacy)	93

Color Accuracy Color Rendering Index (CRI)	87
--	-----------

Light Color
Correlated Color Temperature (CCT) **3100 (Warm White)**

2600K 3200K 4500K 6500K

Warm White Bright White Daylight

Visit www.lighting-facts.com for the *Label Reference Guide*.

All results are according to IESNA LM-79-2008, Approved Method for the Electrical and Photometric Testing of Solid-State Lighting

The Lighting Facts label provides a quick and simple summary of the critical parameters for a luminaire described in this brochure.