



**TOWN OF MIAMI LAKES, FLORIDA  
REGULAR AGENDA  
Workshop**

**February 11, 2020**

**7:30 PM**

**Government Center**

**6601 Main Street Miami Lakes, FL33014**

Video stream of meetings can be viewed here:

<https://pub-miamilakes.escribemeetings.com>

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1. **CALL TO ORDER**
2. **MOMENT OF SILENCE**
3. **PLEDGE OF ALLEGIANCE**
4. **PUBLIC COMMENTS**

All comments or questions from the attending public to the Council shall be directed to the Mayor, in a courteous tone. No person other than the Council and the person recognized by the Mayor as having the floor, shall be permitted to enter into discussion without the permission of the Mayor. To ensure the orderly conduct and efficiency of the meeting, public comments shall be limited to three (3) minutes maximum per person; however, the Mayor may authorize the extension of the aforesaid time frame, and any extension shall apply to other individuals speaking on the same subject.

No clapping, applauding, heckling, verbal outburst in support of, or in opposition to a speaker or his/her remarks shall be permitted. Should a member of the audience become unruly, or behave in any manner that disrupts the orderly and efficient conduct of the meeting, the Mayor is given the right and the authority to require such person to leave the Council Chambers.

As a courtesy to others, all electronic devices must be set to silent mode to avoid disruption of the proceedings.

**Remote Public Comments:** Please register with the Town Clerk from the date the agenda is released to the date before the meeting. For additional information, please

contact [clerk@miamilakes-fl.gov](mailto:clerk@miamilakes-fl.gov)

**Live Remote Public Comments:** Livestreamed meetings will now allow the submission of Live Remote Public Comments. If you wish to be part of the scheduled Zoom meeting, please join the meeting by clicking on the URL Link below:

[Live Remote Public Comments](#)

## **5. ITEMS FOR DISCUSSION OR ACTION**

- a. **Canopy Presentation**
- b. **Town Wide Street Light Presentation**

## **6. ADJOURNMENT**

This meeting is open to the public. A copy of this Agenda and the backup therefore, has been posted on the Town of Miami Lakes Website at [miamilakes-fl.gov](http://miamilakes-fl.gov) and is available at Town Hall, 6601 Main Street, Miami Lakes 33014. In accordance with the Americans with Disabilities Act of 1990, all persons who are disabled and who need special accommodations to participate in this meeting because of that disability should contact Town Hall at 305-364-6100 two days prior to the meeting.

Anyone wishing to appeal any decision made by the Miami Lakes Town Council with respect to any matter considered at this meeting or hearing will need a record of the proceedings and for such purpose, may need to ensure that a verbatim record of the proceedings is made which record includes the testimony and evidence upon which the appeal is to be based.

Any member of the public wishing to speak on a public hearing matter on this Agenda or under public comments for items not on this Agenda, should fill out a speaker card and provide it to the Town Clerk, prior to commencement of the meeting. Any person presenting documents to the Town Council should provide the Town Clerk with a minimum of 15 copies.



**MIAMI LAKES**  
*Growing Beautifully*

**CANOPY PROTECTION WORKSHOP  
FEBRUARY 11, 2020**

# OVERVIEW

- TREE INVENTORY
- TREE MANAGEMENT PLAN
- TREE REMOVAL PERMIT PROCESS
- ENFORCEMENT AND FINES
- NEW FLORIDA LAW – “PRIVATE PROPERTY RIGHTS”
- Q & A
- NEXT STEPS



## **Town of Miami Lakes Memorandum**

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**To:** Honorable Mayor & Councilmembers

**From:** Edward Pidermann, Town Manager

**Subject:** Roadway Lighting Study Workshop

**Date:** February 11, 2020

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### **Recommendation:**

In 2017, the Town of Miami Lakes (“Town”) worked with Tanko Lighting to complete a comprehensive streetlight assessment and design to convert to high-efficiency Light Emitting Diodes (LED) streetlight fixtures from the Town’s existing High-Pressure Sodium (HPS) system. The project, completed in 2018, replaced approximately 918 Town-owned streetlights throughout the Town, including standard streetlights (called “cobra heads”) and decorative streetlights.

At the February 5, 2019 Regular Council Meeting, Councilmember Luis Collazo introduced a new business item titled “Supplemental Street Lighting.” The purpose of this item was to have a discussion with respect to reviewing the adequacy of the current street lighting system and identify areas which could benefit from additional street lighting since the completion of the LED conversion project.

In 2019, the Town contracted the services of Wood Environment and Infrastructure Solutions, Inc. (Wood) to perform an audit of street lighting within the Town and provide recommendations to increase the performance of the street lighting system. The report was completed in December 2019 and the results are presented at this workshop.

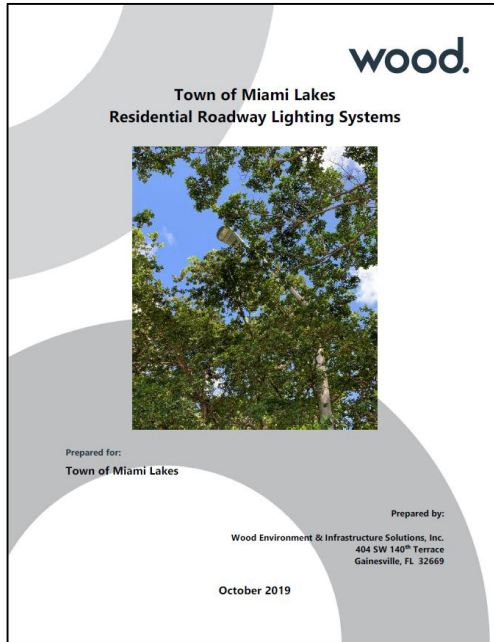
### **Attachments:**

Power Point Presentation – Roadway Lighting Study Workshop  
Report – 2012 Roadway Lighting Systems Assessment Report  
Report – 2019 Residential Roadway Lighting Systems Assessment Report



# Roadway Lighting Study Workshop

February 11, 2020

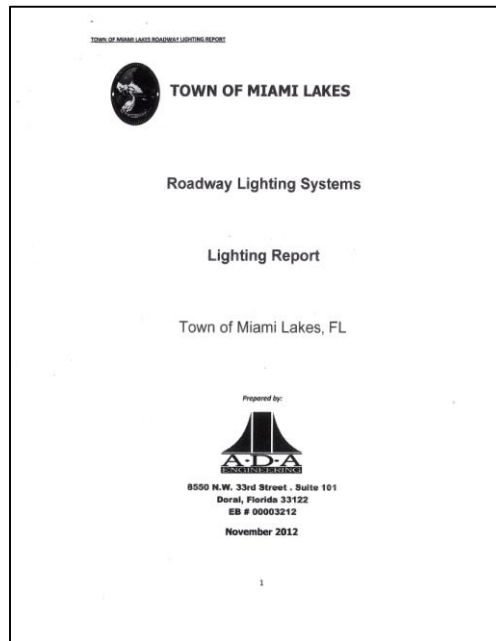


## Link to Strategic Plan

- Strategic Priority Area 4: Environmental Sustainability
  - Goal 4: Achieve Universal Environmental Sustainability in Public and Private Environments, Operations, and Infrastructure
    - Objective:
      - 4.2 Deploy and Diffuse LED Technology Town Wide

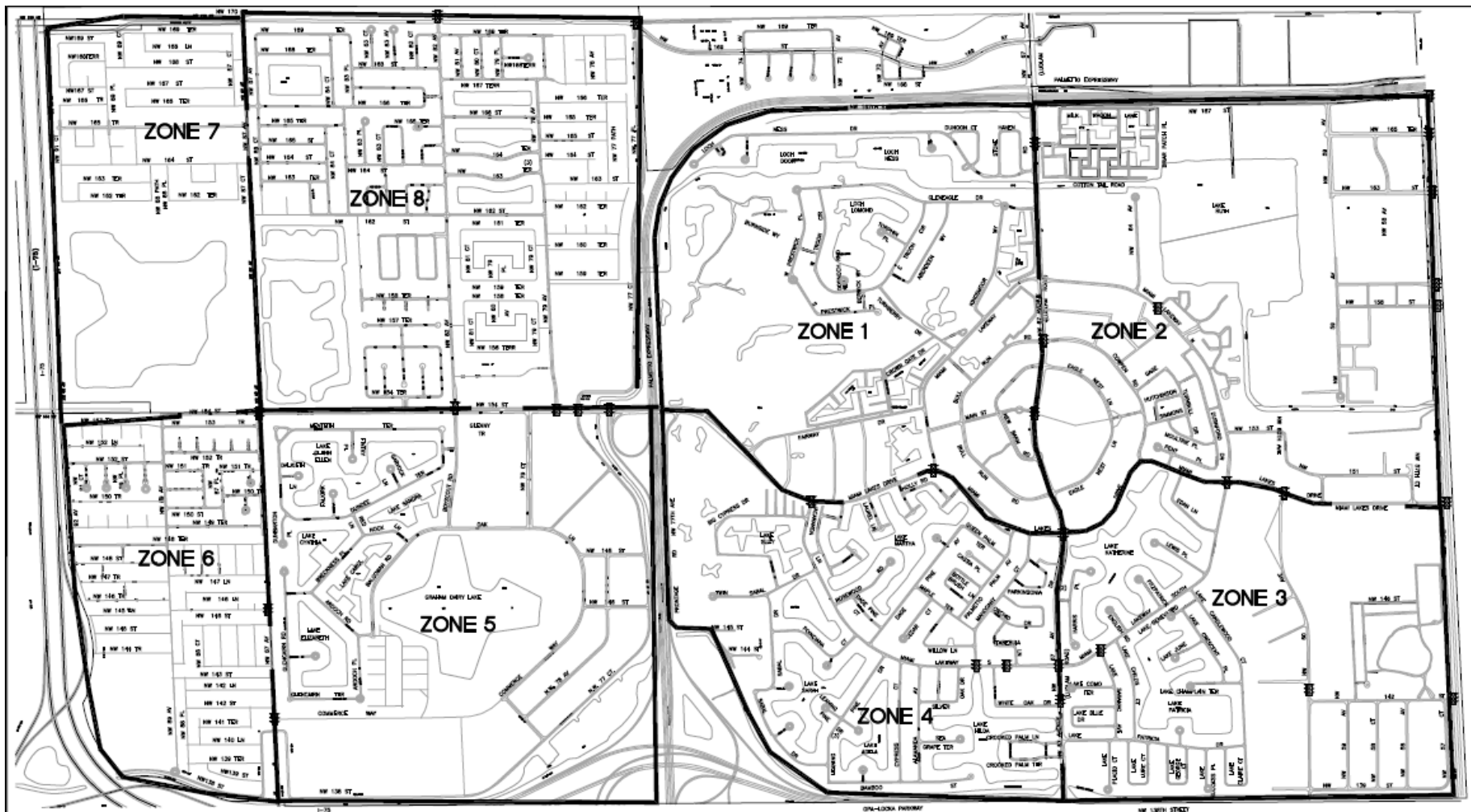
# Streetlight Assessment History

2012



2019





## TOWN OF MIAMI LAKES ZONE LIMITS

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION



2550 N.W. 32ND STREET • SUITE 101  
 MIAMI, FLORIDA 33142  
 PHONE: (305) 551-4555 FAX: (305) 551-4577  
 WWW.MIAMILAKES.FL  
 10/15/2010

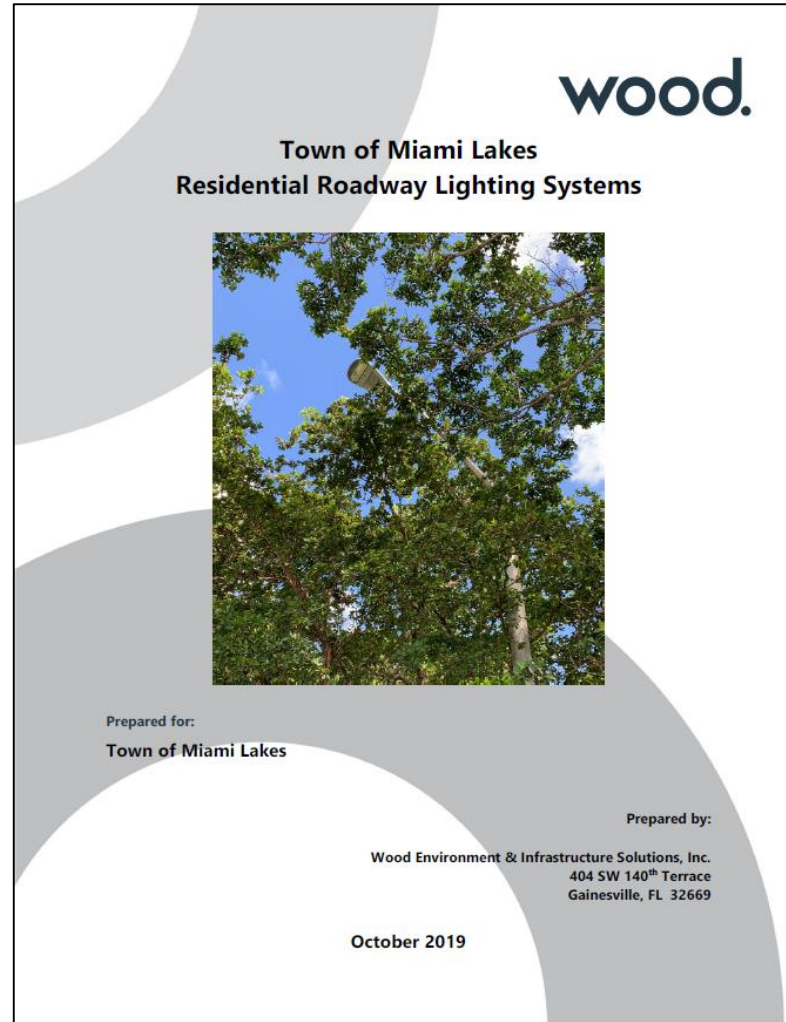
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

# Estimated Cost of Improvements (2012 Report)

## 5.1 Opinion of Probable Cost

Pay Item	Description	Unit	Unit Price	Quantity	Total Price
522-1	Sidewalks concrete 4"	SY	\$27.00	9000	\$243,000.00
551-1-1	Directional bore <6"	LF	\$11.90	142784	\$1,699,129.60
715-1-12	Lighting conductor #6	LF	\$1.11	756704	\$839,941.44
715-1-13	Lighting conductor #4	LF	\$1.70	100000	\$170,000.00
715-2-11	Conduit Underground	LF	\$2.43	142784	\$346,965.12
715-516-120	Light pole Al 20'	EA	\$2,358.00	692	\$1,631,736.00
715-14-11	Pull box roadside	EA	\$334.00	300	\$100,200.00
715-14-12	Pull box sidewalk	EA	\$370.00	392	\$145,040.00
715-500-1	Pole cable distribution system	EA	\$419.00	692	\$289,948.00
715-7-11	Load Center	EA	\$7,690.00	16	\$123,040.00
				Total:	\$5,589,000.16

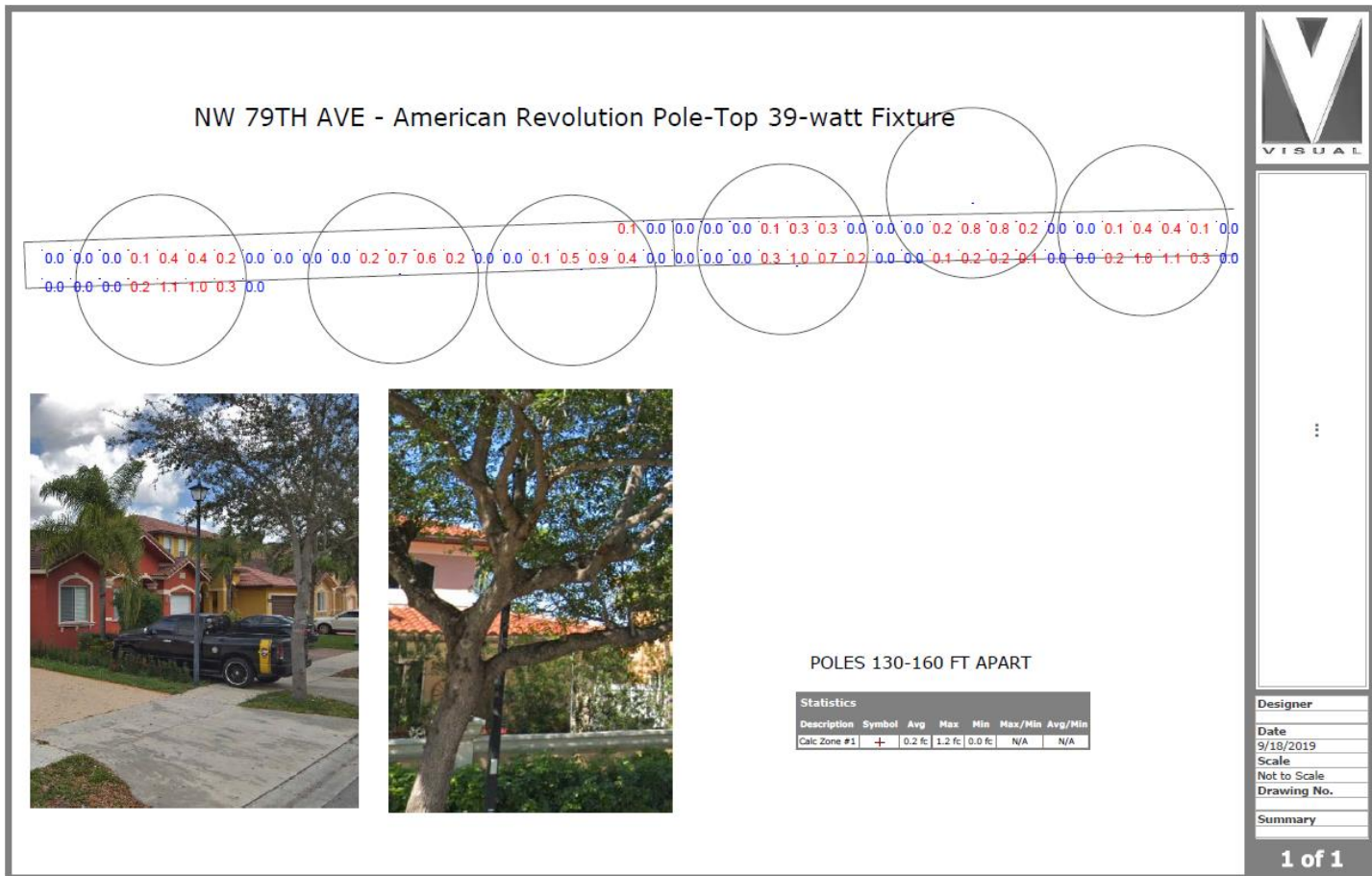
# 2019 Streetlight Assessment



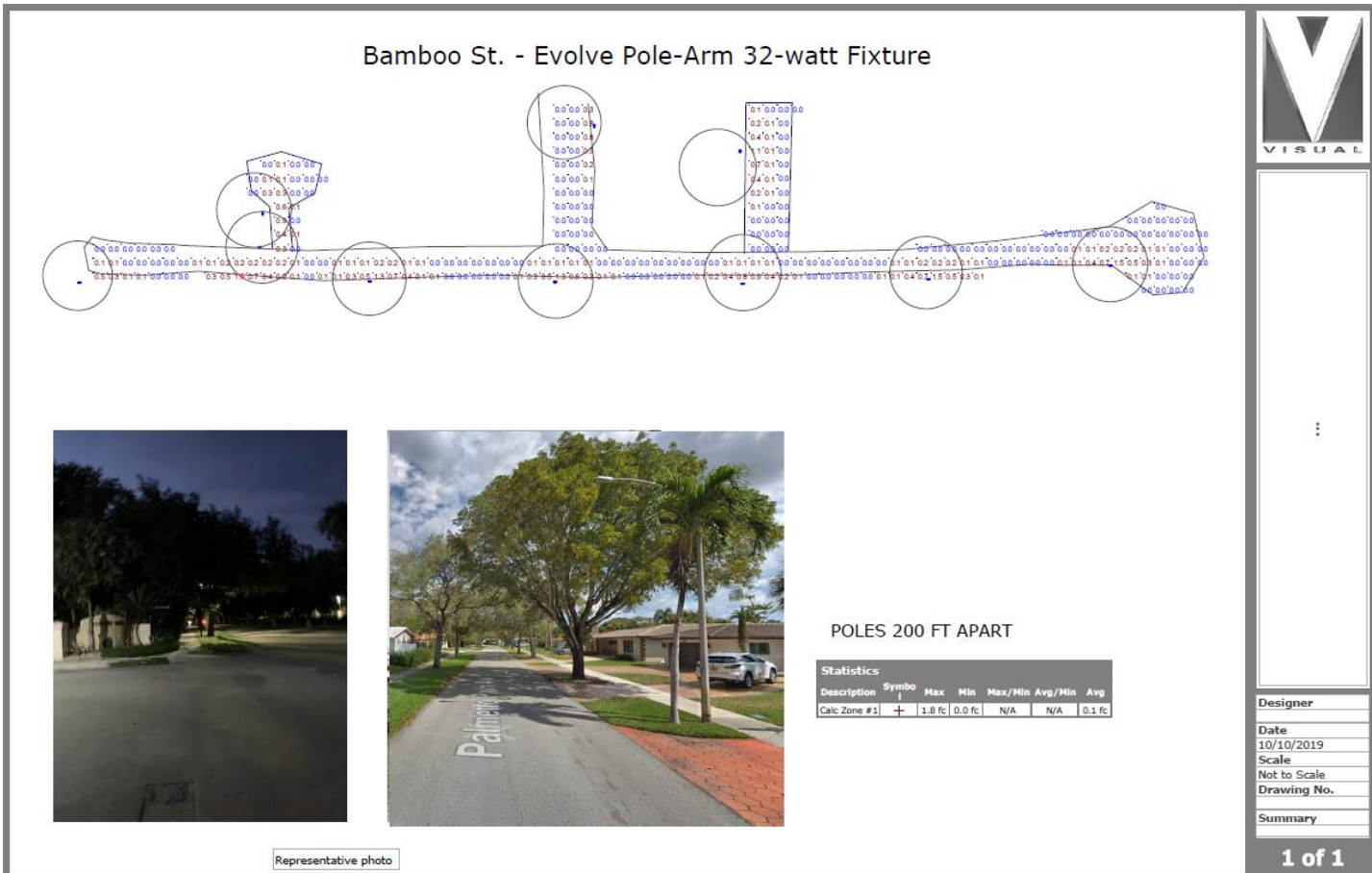
# Typical Light Fixtures



# Existing Photometric Modelling



# Existing Photometric Modelling



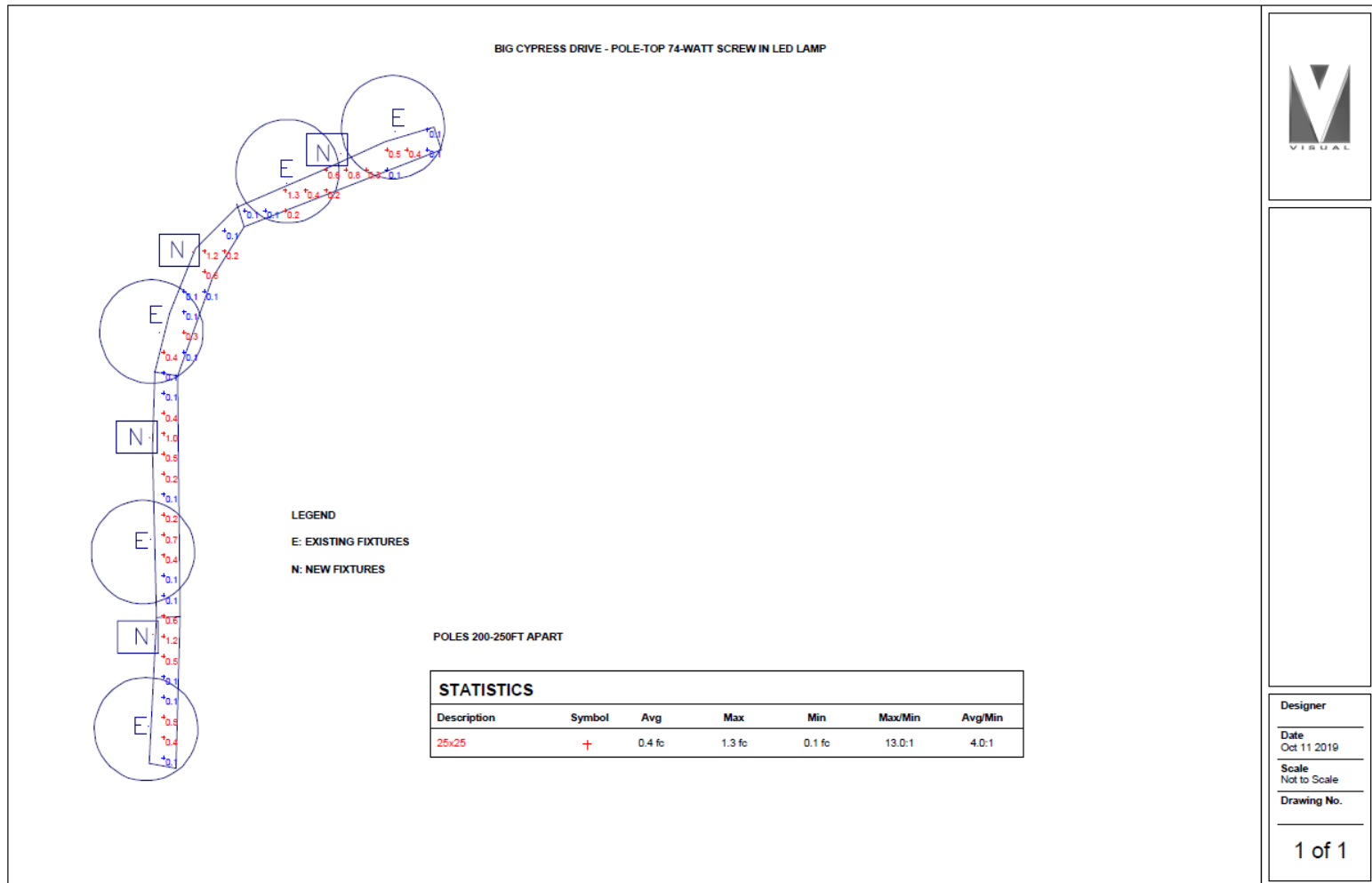
# Recommended Solutions – Installation of Additional Fixtures

Lighting Calculation for:							\$0.1200 per kWh Energy Cost						
Town of Miami Lakes Residential Street Lighting													
Location	ECM#	Usage Area Type (Choose from Menu)	Pre-Retrofit Equipment			Proposed Action (Choose from Menu)	Post-Retrofit Equipment						
			Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code		Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code	Installed Total Cost	Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)
Existing LED Street Lighting													
American Revolution 39-Watt 3000K	L-01	Night	LED	654	LED PT AR 39w	DND	LED	654	LED PT AR 39w	\$ -			
RSW 45-Watt 3000K	L-01	Night	LED	188	LED-PA RSW 45w	DND	LED	188	LED-PA RSW 45w	\$ -			
Evolve LED 32W Type B	L-01	Night	LED	396	LED-PA 32w	DND	LED	396	LED-PA 32w	\$ -			
75W Screw-In Lamp	L-01	Night	LED	40	LED-PT 75w Screw	DND	LED	40	LED-PT 75w Screw	\$ -			
Proposed LED Street Lighting													
American Revolution 39-Watt 3000K	L-01	Night	LED		LED PT AR 39w	Install 1L Fixture	LED	654	LED PT AR 39w	\$ 1,468,230			
RSW 45-Watt 3000K	L-01	Night	LED		LED-PA RSW 45w	Install 1L Fixture	LED	188	LED-PA RSW 45w	\$ 510,420			
Evolve LED 32W Type B	L-01	Night	LED		LED-PA 32w	Install 1L Fixture	LED	396	LED-PA 32w	\$ 1,168,200			
75W Screw-In Lamp	L-01	Night	LED		LED-PT 75w Screw	Install 1L Fixture	LED	40	LED-PT 75w Screw	\$ 88,000			
				1,278				2,556			\$3,234,850	-49.64	-217,414
				# of Fixtures				# of Fixtures			Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)

# Recommended Solutions – Replacement of Existing Fixtures

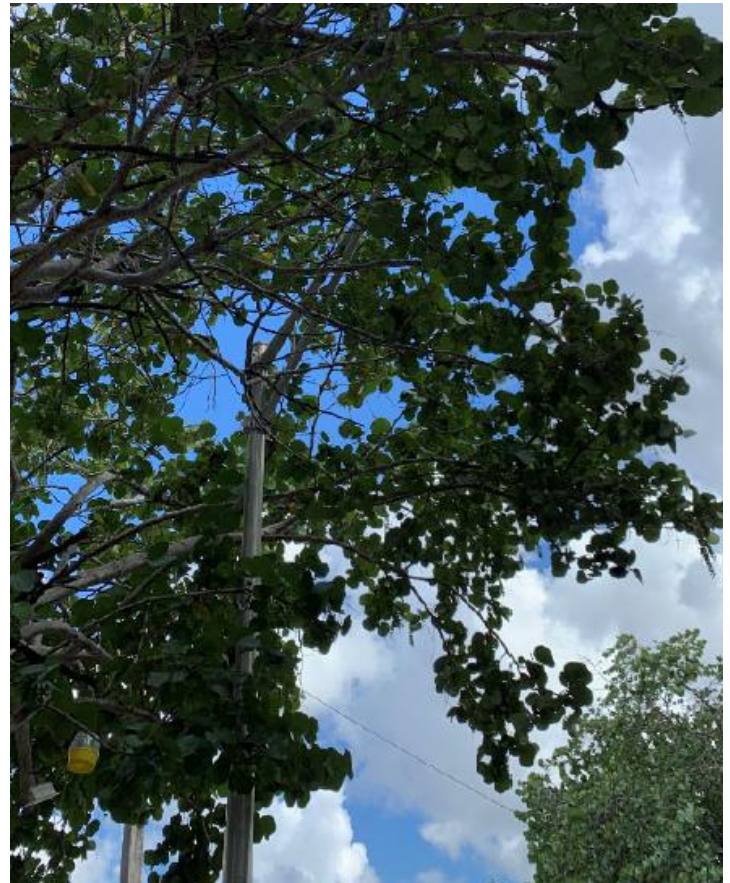
Lighting Calculation for:									\$0.1200			per kWh Energy Cost								
Town of Miami Lakes Residential Street Lighting- Option 2																				
Location	ECM#	Usage Area Type (Choose from Menu)	Pre-Retrofit Equipment			Proposed Action (Choose from Menu)	Post-Retrofit Equipment													
			Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code		Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code	Installed Total Cost	Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)							
Existing LED Street Lighting																				
American Revolution 39-Watt 3000K	L-01	Night	LED	654	LED PT AR 39w	Replace 1L Fixture	LED	654	LED PT AR 78w	\$ 474,150										
RSW 45-Watt 3000K	L-01	Night	LED	188	LED-PA RSW 45w	Replace 1L Fixture	LED	188	LED PT AR 78w	\$ 136,300										
Evolve LED 32W Type B	L-01	Night	LED	396	LED-PA 32w	Replace 1L Fixture	LED	396	LED-PA 52w	\$ 366,300										
75W Screw-In Lamp	L-01	Night	LED	40	LED-PT 75w Scrw	Replace 1L Fixture	LED	40	LED PT AR 125w	\$ 35,000										
				1,278				1,278			\$1,011,750	-41.63	-182,339							
				# of Fixtures				# of Fixtures			Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)							

# Proposed Photometric Modelling

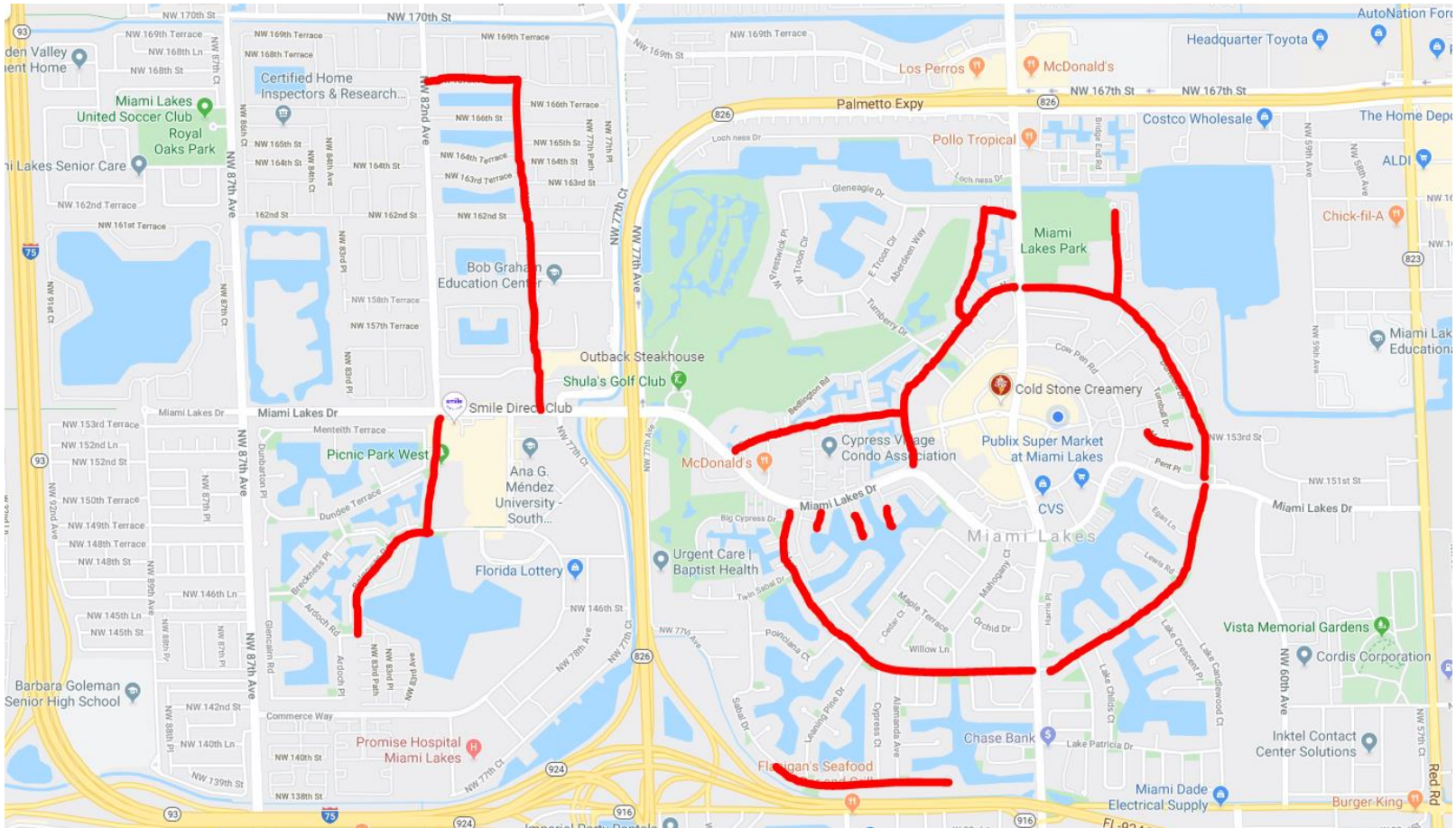


# Challenges

- Tree canopy causing shadows
- Existing fixture spacing
- Existing underground infrastructure



# Recommended Streets/Areas for Initial Improvements







# **TOWN OF MIAMI LAKES**

## **ROADWAY LIGHTING SYSTEMS LIGHTING REPORT**

Prepared by:



8550 NW 33<sup>rd</sup> Street, Suite 101  
Doral, Florida 33122  
EB# 00003212

March 2013

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# **CHAPTER 1 - SCOPE AND TECHNICAL APPROACH FOR EVALUATING THE EXISTING STREET LIGHTING SYSTEMS**

## **1.1 Scope of the Lighting Report**

The scope of this report is limited to a general evaluation of the existing street lighting systems in the Town of Miami Lakes. The report includes estimated and measured values of the illuminance on selected streets which are representative of most of the streets in the Town, a general evaluation of the physical conditions of the existing light poles, luminaires & circuits and an opinion of probable cost for improvements of the street lighting systems. This report also includes the description of the GIS shapefile created for the Town of Miami Lakes, which was developed to be used in conjunction with the Town of Miami Lakes Asset identification System, which was provided as a separate document.

## **1.2 Basis of Calculation**

The estimated values are calculated using the typical photometric curves for FPL luminaires with high pressure sodium (HPS) lamps of 100 W (9500 lumens), 150 W (16000 lumens), 200 W (22000 lumens) or 400 W (51000 lumens). Information about the wattage of the existing lamps was provided by the Town of Miami Lakes. The estimated values do not take into account the interference to the light from the existing trees located on swales or residential properties.

Typical sections of streets and pole spacing shown in this report are intended to be representative of most of the streets in order to determine if the existing lighting systems are providing the current recommended average illuminance values for the streets and sidewalks.

## **1.3 Measurements**

Measured values shown in this report were taken to evaluate the difference between the estimated and measured values. The values were taken along the center line of the selected streets to minimize interference from existing trees.

## **1.4 Interpretation of Results**

Differences between the estimated average values and current values of illuminance and uniformity ratios are expected, since the actual luminaires could have different photometric curves and also because the arm length and mounting height are estimated; but the average illuminance values will depend mostly on the total lumens provided by the luminaires.

Where the estimated and measured values in one street coincide and are below the current recommended values shown in Table A in Section 1.5, improvements to the lighting system are recommended for all streets with similar sections and the same pole layout, luminaires and lamps. In other cases, additional measurement and analysis, which are not part of this report's scope, will be required.

In some streets ADA obtained measured values higher than the estimated calculated values. This indicated that the actual lamp wattage was higher than the lamp wattage used in the calculations. For example, it would be expected that measured values for a 150 Watts HPS lamps to be 1.68 times greater than the average illuminance for a 100 Watts HPS lamps (16 000 lumens / 9 500 lumens). For this reason, the actual wattage of the existing lamps should be verified before following recommendations for improvements of the existing lighting systems.

## 1.5 Recommended Illuminance Values

Table “A”, from the AASHTO Roadway Lighting Design Guide, depicts the current recommended average illuminance values for streets and sidewalks:

**Table A – Current Recommended Average Illuminance Values for Streets and Sidewalks**

	AVERAGE MAINTAINED ILLUMINANCE FOOT CANDLE	UNIFORMITY RATION AVERAGE/MINIMUM
<b>Local Streets</b>		
Commercial Areas	0.8	6
Intermediate	0.7	6
Residential Areas	0.4	6
<b>Minor Arterials</b>		
Commercial Areas	1.4	4
Intermediate	1.0	6
Residential Areas	0.7	4
<b>Sidewalks</b>		
Commercial Areas	1.3	3
Intermediate	0.8	4
Residential Areas	0.4	6

Note: For sidewalks in residential areas, when pedestrian security is not a concern, IESNA recommends a minimum average illuminance of 0.2 fc with a uniformity ratio of 5.

## CHAPTER 2 - ESTIMATE OF THE EXISTING AVERAGE ILLUMINANCE VALUES AND MEASURED ILLUMINANCE VALUES

### 2.1 Zone Numbers and Pole ID References

The zone numbers used in this report refer to the map shown below and also provided on **Appendix “B”**, which shows the Town of Miami Lakes divided into eight zones. This map was developed as part of the Town of Miami Lakes Asset Identification System.



Pole identification numbers refer to the GIS files provided with this report, which include a complete map of the Town with the location and identification number of each light pole.

### 2.2 Streets located in Zone No. 1 (North of Miami Lakes Drive from NW 67 Avenue to Palmetto Expressway) (excluding Bull Run and streets on the east side of Bull Run)

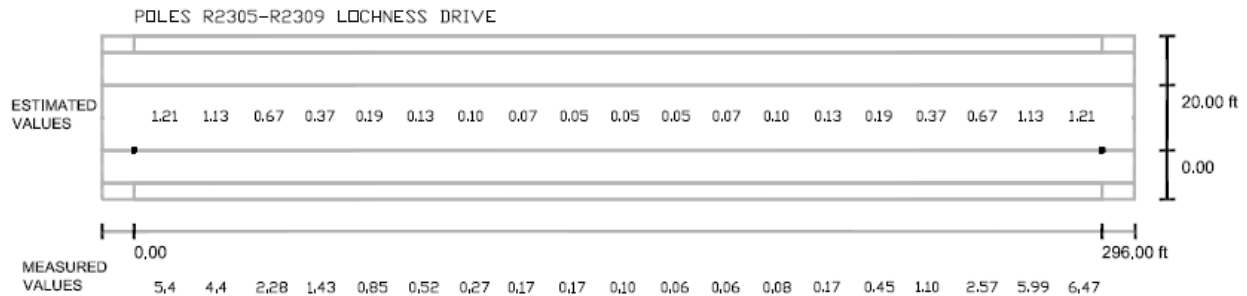
The typical section for these segments of streets consists of a 50 foot right of way, 20 foot wide two-lane roadway with 10 foot swales and 5 foot sidewalk along both sides.

The lighting systems for most of the streets in Zone 1 consists of cobra head luminaires mounted 30 feet high, on standard aluminum light poles. Poles are located along one side of the roadway. Pole arms are 12 feet long and pole setbacks are 10 feet from the edge of pavement. Pole spacing varies between 200 and 300 feet. The luminaires are equipped with 100 W high pressure sodium lamps (HPS) lamps.

The estimated average maintained illuminance segments for streets with cobra head luminaires spaced at 300 feet with 100 W HPS lamps is 0.32 fc with a uniformity ratio of 5.3. The estimated average illuminance on the sidewalks is 0.12 FC with uniformity ratio of 2.4. For areas where poles are spaced 200 feet apart,

the estimated average illuminance on the streets is 0.5 fc, and the estimated average illuminance on the sidewalks is 0.2 fc. Further analysis, will be required to evaluate the need for improvements in the lighting system for specific segments of streets in this zone.

Estimated and measured values along Lochness Drive center line between two consecutive poles are shown below. The measurements were taken between two poles spaced 296 feet apart. For this condition the estimated average illuminance value is 0.31 fc, but the measured values are very high compared to the estimated values, which indicate that in this case lamp wattage verification is required. If the luminaires in this zone are equipped with lamps of more wattage, general improvements in the lighting system will not be required.

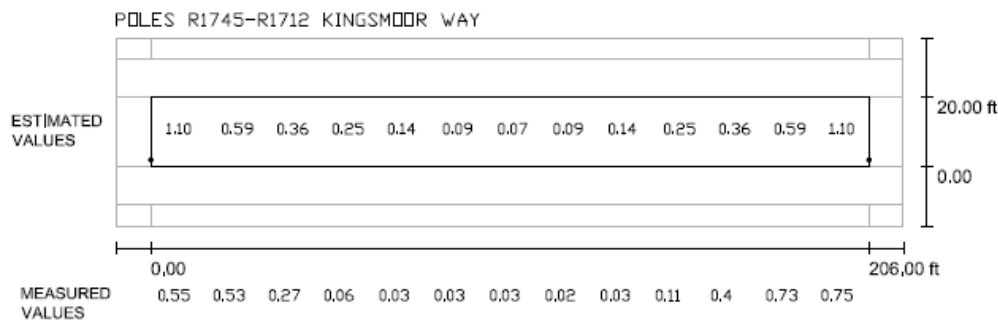


On NW 166 terrace the luminaires are equipped with 150 W HPS lamps spaced about 200 feet, no improvements are recommended for this street.

On Kingsmoor Way the light poles are equipped with open bottom luminaires at 25 feet high with 100W HPS lamps. Poles in this street are located along one side of the street and spaced at 200 feet. Pole set back is 10 feet from edge of pavement. Pole arms are 12 feet long.

The estimated average illuminance value on Kingsmoor Way is 0.38 fc with a uniformity ratio of 5.4. The estimated average illuminance on the sidewalk located on the luminaires side is 0.24 fc with a uniformity ratio of 6 and on the opposite sidewalk the is 0.15 fc with a uniformity ratio of 2. Since there are many obstacles to the existing street lights in this street because of the existing trees, the actual illuminance on most segments of the sidewalks is expected to be zero.

Estimated and measured values along Kingsmoor Way center line between two consecutive poles are shown below. The measurements were taken between two poles spaced 206 feet. For this condition the estimated average illuminance values without obstacles is 0.37 fc with a uniformity ratio of 6, but because of the interference to the light from the trees the measured values are below the estimated values.



If there are security concerns in this area, improvements on the illuminance mostly on the sidewalks along Kingsmoor Way will be required.

The Fairway Drive typical section is different from typical streets, it consists of a 70 foot right of way, 24-foot wide two-lane roadway with 18-foot wide swale and 5 feet sidewalk along both sides. Luminaires on Fairway Drive are cobra head with 150 HPS lamps. Pole spacing varies from 200 feet to 400 feet. The estimated average illuminance value on the segments of Fairway Drive where standard concrete light poles are spaced 400 feet is 0.32 fc with a uniformity ratio of 16. The actual average illuminance value is lower in most cases because of the interference from the existing trees to the street lights. Improvements are recommended for segments of this street where poles are spaced at 400 feet.

## **2.3 Streets located in Zone No. 2 (from Miami Lakes Drive to Palmetto Expressway and from NW 67<sup>th</sup> Avenue to NW 57 Avenue)**

The typical section for streets located between North Miami Lakeway and NW 57<sup>th</sup> Avenue from 163<sup>th</sup> street to Palmetto Expressway (except NW 64 Avenue) consists of a 60 feet right of way, 56 feet wide two-lane roadway without sidewalks.

The lighting system for these streets consists of cobra head luminaires at 30 feet high, mounted on standard concrete light poles. Pole arm is 10 feet long. Pole setback from edge of pavement is about 5 feet. The luminaires are equipped with 150 W HPS lamps. Poles are located along one side of the street with average spacing of 250 feet. The estimated average maintained illuminance for these streets is 0.4 fc with a uniformity ratio of 5. No improvements of the lighting system will be required.

The typical section for the segment of NW 64<sup>th</sup> Avenue consists of a 70 foot right of way with a 26 feet wide two-lane roadway with a 6 foot parking lane on the west side, swales and 5 foot sidewalks along both sides.

The lighting system for this street consists of open bottom luminaires at 25 feet high, mounted on standard concrete light poles. Pole arm is 10 feet long. Pole setback from edge of pavement is about 10 feet. The luminaires are equipped with 100 W HPS lamps. Poles are located along the west side of the street with average spacing of 230 feet. The estimated average maintained illuminance for these streets 0.28 fc with a uniformity ratio of 6. Improvements of the lighting system for this street segment are recommended.

The typical section for streets located between North Miami Lakeway and NW 57<sup>th</sup> Avenue from Miami Lakes Drive to NW 159<sup>th</sup> Street consists of a 50 foot right of way, 28 feet to 30 feet wide two-lane roadway, with swales and with or without sidewalks. The lighting system for these streets consists of open bottom luminaires at 25 feet high, mounted on standard aluminum light poles. Pole arm is 10 feet long. Pole setback from edge of pavement is about 6 feet. The luminaires are equipped with 100 W HPS lamps. Poles are located along one side of the streets with average spacing of 300 feet. The estimated average maintained illuminance for these streets varies from 0.21 fc with a uniformity ratio of 10. Improvements of the lighting system for these streets are recommended.

The typical section for streets located between North Miami Lakeway and Eagle Nest Lane consists of a 50 foot right of way with a 18 to 20 feet wide two-lane roadway, 10 to 12 foot swales and 5 foot sidewalks along both sides. The lighting system for these streets consists of open bottom luminaires at 25 feet high, mounted on light poles. Pole arm is 10 feet long. Pole setback is 10 feet from edge of pavement. The luminaires are equipped with 100 W HPS lamps. Poles are located along one side of the streets with average spacing of 300 feet.

The estimated average maintained illuminance for these streets is 0.25 fc with a uniformity ratio of 13. Average illuminance on the sidewalks located on the luminaires side is 0.2 fc and average illuminance on the sidewalks located on the opposite side of the luminaires is below 0.1 fc. Improvements of the lighting system for these streets are recommended.

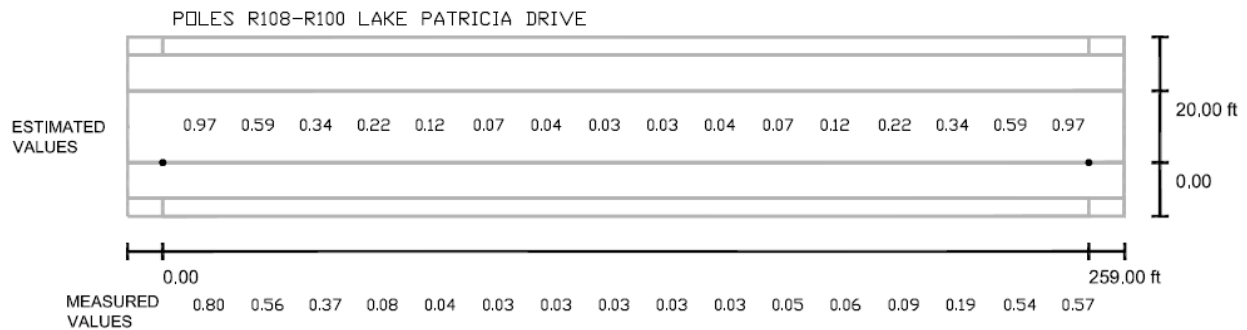
## 2.4 Streets located in zone #3 (from Miami Lakes Drive to NW 138<sup>th</sup> Street from NW 57 Avenue to NW 67 Avenue)

The typical section for streets located between Miami Lakes Drive and NW 138<sup>th</sup> Street from NW 60 Avenue to NW 67 Avenue consists of right of way of 50 feet, with a 20 feet wide two-lane roadway with 10 foot swales and 5 foot sidewalks along both sides.

The lighting system for most of the streets consists of open bottom luminaires 25 feet high, mounted on standard concrete and aluminum light poles or utility poles with average spacing of 300 feet. Pole arm is 10 feet long. Pole setback is 10 feet from edge of pavement. The luminaires are equipped with 100 W HPS lamps.

The estimated average maintained illuminance for streets with right of way of 50 feet and 100 HPS lamps is 0.25 fc with a uniformity ratio of 13. Average illuminance on the sidewalks located along the luminaires side is 0.2 fc and average illuminance on the sidewalks located on the opposite side of the luminaires is below 0.1 fc. Improvements of the lighting system for these streets are recommended.

Estimated and measured values along Lake Patricia center line between two consecutive poles are shown below. The measurements were taken between two poles spaced 259 feet apart. For this condition the estimated average illuminance values is 0.29 fc.



The typical section of Miami Lakeway South in this zone consists of an 80 foot right of way, 22 feet wide two way roadway with an 18 feet swale and 5 feet sidewalk along southbound side and variable swale with average widths of 30' and 5 foot sidewalks on the northbound side. Poles on Miami Lakeway South are spaced from 200 to 350 feet. The average illuminance along Miami Lakeway in this zone is estimated to be below the values shown above for typical streets, therefore. Improvements in the lighting system are recommended.

The typical section for NW 57<sup>th</sup> Court, NW 58<sup>th</sup> Avenue, NW 58<sup>th</sup> Court, NW 59<sup>th</sup> Avenue, NW 60<sup>th</sup> Avenue, between NW 138<sup>th</sup> Street and NW 142<sup>th</sup> Street consists of a 50 foot right of way, 28 to 30 foot wide two-lane roadway, with swales and without sidewalks. The lighting system consists of open bottom luminaires mounted on standard concrete and aluminum light poles or utility poles. Pole arm is about 10 feet long. Pole setback is 14 feet. The luminaires are equipped with 100 W HPS lamps. Poles are located along one side of the street. The average spacing between poles is 270 feet.

The estimated average maintained illuminance for these streets is 0.2 fc with a uniformity ratio of 8. The actual average illuminance value is lower in most cases because of the interference to the light from the existing trees. Improvements of the lighting system for these streets are recommended.

Estimated and measured values along NW 57 Court center line between two consecutive poles are shown below. The measurements were taken between two poles spaced only 166 feet. For this condition the estimated average illuminance values is 0.36 fc.



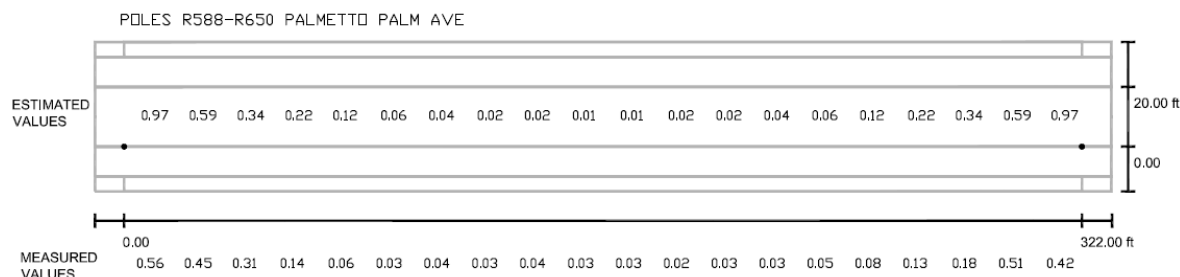
## 2.5 Streets located in Zone No. 4 (South of Miami Lakes Drive from NW 67 Avenue to Palmetto Expressway)

The typical section for these segments of streets consists of a 50 foot right of way, 20 foot wide two-lane road with 10 foot swales and 5 foot sidewalks along both sides.

The lighting system for most of the streets consists of open bottom luminaires 25 feet high, mounted on standard aluminum light poles or utility poles spaced at 300 feet. Pole arm is about 10 feet long. Pole setback is 10 feet from edge of pavement. The luminaires are equipped with 100 W HPS lamps, except that some poles are equipped with 200 W HPS lamps.

The estimated average maintained illuminance for the streets with open bottom luminaires with 100W HPS lamps, is 0.25 fc with a uniformity ratio of 13. The average illuminance on the sidewalks located along the luminaires side is 0.2 fc and the average illuminance on the sidewalks located on the opposite side of the luminaires is below 0.1 fc. Improvements of the lighting system for these streets are recommended.

Estimated and measured values along Palmetto Palm Avenue center line between two consecutive poles are shown below. The measurements were taken between two poles spaced 322 feet apart. For this condition the estimated average illuminance values is 0.23 fc.



The lighting system for some other streets in this zone consists of light poles with contemporary post top luminaires at an estimate height of 18 feet, located along both sides of the street on some segments and along one side of the street in other segments of the street. The estimated average maintained illuminance for the streets with top mounted luminaires is 0.2 fc with a uniformity ratio of 4. The actual average illuminance values are lower in most cases because of the interference to the light from the existing

trees. Improvements of the lighting system for these streets are recommended.

Miami Lakeway in this zone has a 70 foot right of way. The section of this street consists of a 24 feet wide two way roadway with an 18 foot swale and 5 foot sidewalks along both sides. Poles on Miami Lakeway are spaced from 200 to 300 feet. The average illuminance along this segment of Miami Lakeway is estimated to be below the values shown above for typical streets. Improvements of the lighting system for this street are recommended.

## **2.6 Streets located in Zone No. 5 (South of Miami Lakes Drive from Palmetto Expressway to NW 87 Avenue)**

The typical section for these segments of streets consists of a 50 foot right of way, 20 feet wide two-lane roadway with a 10 foot swale and 5 feet sidewalk at both sides, except Balgowan Road and Commerce Way. The lighting system for typical streets consists of open bottom luminaires 25 feet high, mounted on standard aluminum light poles or utility poles. Pole arm is 10 feet long. Pole setback is 10 feet from edge of pavement. The luminaires are equipped with 100 W HPS lamps. Poles are located along one side of the streets with average spacing of 300 feet.

The estimated average maintained illuminance for typical streets is 0.25 fc with a uniformity ratio of 13. Average illuminance on the sidewalks located on the the luminaires side is 0.2 fc and average illuminance on the sidewalks located on the opposite side of the luminaires is below 0.1 fc. Improvements of the lighting system for these streets are recommended.

Balgowan Road section consists of a 60 foot right of way, 36 feet two way roadway with a 7 feet wide swale and 5 feet sidewalk at both sides. The lighting system for Balgowan Road consists of open bottom luminaires 25 feet high, mounted on standard aluminum light poles or utility poles along one side of the street. Pole arm is about 10 feet long. Pole setback is 6 feet and pole spacing is 230 feet. The luminaires are equipped with 100 W high pressure sodium lamps (HPS) lamps. The estimated average maintained illuminance for Balgowan road is 0.26 fc with a uniformity ratio of 5. Average illuminance on the sidewalks located on the the luminaires side is 0.25 fc with a uniformity ratio of 5 and average illuminance on the sidewalks located on the opposite side of the luminaires is below 0.1 fc. Improvements of the lighting system for these streets are recommended.

Commerce Way has a standard lighting system with cobra head luminaires at both sides of the street from NW 82 Avenue to NW 87 Avenue and open bottom luminaires on one side of the street from NW 82 Avenue to the East. Luminaires are equipped with 150 W HPS lamps

The estimated average illuminance value on both segments of Commerce Way are 1.45 FC with a uniformity ratio of 2.3 in the segment with light poles located at both sides of the street and 0.69 FC with a uniformity ratio of 4 in the segment of the street with light poles located along one side of the street. No Improvements are required in the lighting system for these streets

## **2.7 Streets located in Zone No. 6 (From NW 87<sup>th</sup> Avenue to I-75 & from NW 138<sup>th</sup> Street to NW 154<sup>th</sup> Street) & streets located in Zones No. 7 & No. 8 (From NW 154<sup>th</sup> Street to NW 170<sup>th</sup> Street & from Palmetto Expressway to I-75**

The typical section for these segments of streets consists of a 50 foot right of way, 20 to 23 foot wide two-lane roadway, with an 8.5 to 10 foot swales and 5 feet sidewalks along both sides.

The lighting system for most of the streets consists of traditional post top luminaires mounted on decorative

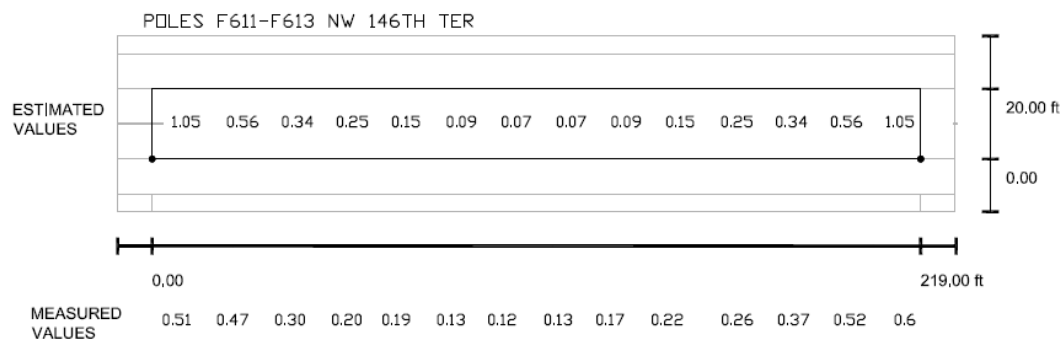
light poles at 17 feet high. Pole setback is 8 feet. The luminaires are equipped with 100 W HPS lamps. Poles are located along both sides of the street spaced from 300 feet to 400 feet along each side. Some streets are provided with open bottom luminaires mounted at 25 feet on decorative light poles spaced 120 feet apart on one side.

The estimated average maintained illuminance for streets with contemporary post top luminaires varies from 0.25 fc with a uniformity ratio of 3 to 0.21 fc with a uniformity ratio of 6. The estimated average illuminance on the sidewalks is 0.2 fc with a uniformity ratio of 10.

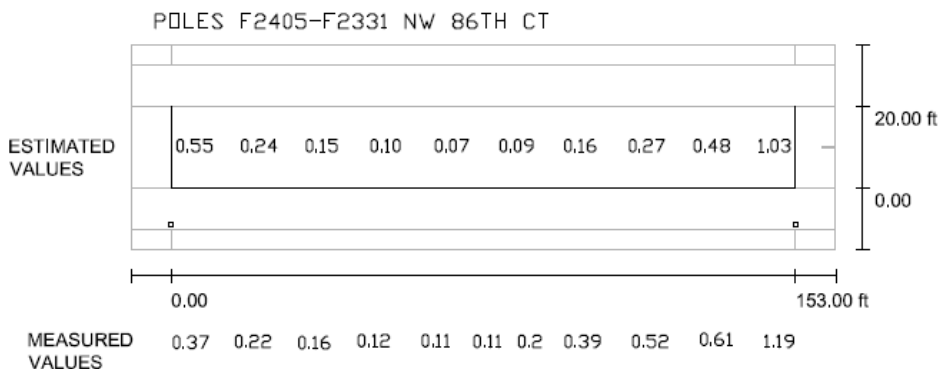
The actual average illuminance values are lower in most cases because of the interference from the existing trees.

We recommend verification of the actual wattage of the luminaires and the installation of luminaires equipped with 150 HPS lamps on each light pole, which will provide the required average illuminance value for most of these streets. (The capacity of the existing circuits and the conditions of the existing light poles should be evaluated before the replacement of the luminaires or lamps).

Estimated and measured values along NW 146<sup>th</sup> Terrace center line between two consecutive poles are shown below. Poles have open bottom luminaires about 25 feet high. The measurements were taken between two poles spaced at 219 feet. For this condition the estimated average illuminance values is 0.34 fc with a uniformity ratio of 5.7



Estimated and measured values along NW 86<sup>th</sup> Court center line between two consecutive poles are shown below. Poles have top mounted traditional luminaires about 15 feet high. In this case one pole has a 100 W HPS lamp and the other has a 150 Watt HPS lamp. The measurements were taken between two poles spaced at 153 feet. For this condition the estimated average illuminance values is 0.29 fc with uniformity ratio of 4.8. Improvement of the lighting system for this street is recommended.



## CHAPTER 3 - PHYSICAL CONDITIONS OF THE EXISTING LIGHTING SYSTEM

### 3.1 Inspections

A visual inspection of the existing light poles was carried out to check their general physical conditions.

Photos of damaged poles and luminaires are shown on **Appendix “A”**. Hand hole covers are missing for some poles and there are broken luminaires. There is also a pole located at 6725 Kingsmore Way that was hit by a car and it's in bad condition.

Along Jacaranda Lane, Laurel Lane and Holly Road (See **Appendix “A”**) there are some areas where the original swales have been paved in front of the properties. As a result the existing light poles located in these areas are now exposed to vehicular damage. There is also a pole on Laurel Lane located inside the residential property. Luminaires in these streets are post top with 100 W HPS lamps.

Based on information received from the maintenance staff, most of the light poles are not connected to load centers, instead they are connected to the closest utility pole or resident meter can. Most of the light poles don't have ground pull boxes.

### 3.2 As-built plans

There is no documented information (as-built plans) which would indicate if the existing lighting systems meet current design standards for grounding and circuit protection.

## CHAPTER 4 - RECOMMENDATIONS

### 4.1 Recommendations

- 1 It is recommended that hand hole covers be replaced for all poles with missing hand hole covers.
- 2 Broken luminaires should be repaired or replaced.
- 3 A program for improving the lighting systems should be developed. This program should include the design of new lighting circuits or the design of complete new lighting systems according to the conditions of the existing street lighting system on each street. Each light pole (new or existing to remain) will be provided with a ground pull box and a cable distribution system. Each street will be provided with a lighting circuit connected to a load center.
- 4 A program for trimming trees that obstruct existing lights should be established.
- 5 Improvements to the lighting along the sidewalks and at intersections should be evaluated if there are areas where pedestrian or driver security is a concern.
- 6 Lighting improvements are recommended on Jacaranda Lane, Laurel Lane, and Holly Road where some of the existing light poles are exposed to vehicular damage. New lighting systems per current standards should be provided for these streets.
- 7 Provide new lighting systems for the streets summarized below, where the existing lighting systems do not provide the required illuminance values and uniformity ratios shown in Table A, as indicated in this report.
  - Fairway Drive
  - NW 64<sup>th</sup> Avenue
  - Streets located between North Miami Lakeway and NW 57<sup>th</sup> Avenue from Miami Lakes Drive to NW 159<sup>th</sup>
  - Streets located between North Miami Lakeway and Eagle Nest Lane
  - Streets located between Miami Lakes Drive and NW 138<sup>th</sup> Street from NW 60 Avenue to NW 67 Avenue
  - NW 57th Court, NW 58th Avenue, NW 58th Court, NW 59th Avenue, NW 60th Avenue, between NW 138<sup>th</sup> Street and NW 142th Street
  - Streets located in Zone No. 4 (South of Miami Lakes Drive from NW 67 Avenue to Palmetto Expressway).
  - Streets located in Zone No. 5 (South of Miami Lakes Drive from Palmetto Expressway to NW 87 Avenue), except Commerce Way
- 8 Verify the actual lamp wattage of the existing light poles located in Zones #6 and #7 and coordinate with FPL for the improvement of the existing lighting systems to meet the current design criteria and standards.

## CHAPTER 5 - COST OF IMPROVEMENTS OF THE STREET LIGHTING SYSTEMS

### 5.1 Opinion of Probable Cost

Pay Item	Description	Unit	Unit Price	Quantity	Total Price
522-1	Sidewalks concrete 4"	SY	\$27.00	9000	\$243,000.00
551-1-1	Directional bore <6"	LF	\$11.90	142784	\$1,699,129.60
715-1-12	Lighting conductor #6	LF	\$1.11	756704	\$839,941.44
715-1-13	Lighting conductor #4	LF	\$1.70	100000	\$170,000.00
715-2-11	Conduit Underground	LF	\$2.43	142784	\$346,965.12
715-516-120	Light pole Al 20'	EA	\$2,358.00	692	\$1,631,736.00
715-14-11	Pull box roadside	EA	\$334.00	300	\$100,200.00
715-14-12	Pull box sidewalk	EA	\$370.00	392	\$145,040.00
715-500-1	Pole cable distribution system	EA	\$419.00	692	\$289,948.00
715-7-11	Load Center	EA	\$7,690.00	16	\$123,040.00
				Total:	\$5,589,000.16

#### Assumptions:

- 1 The quantities are calculated only for poles owned by the Town of Miami Lakes which are located in areas where illumination improvements are recommended.
- 2 Cost of directional bore includes the conduit.
- 3 Each new or existing light pole will be provided with a ground pull box and cable distribution system.
- 4 New conduits and circuits will be provided for all poles (new or existing) along both sides of each street.
- 5 An estimate of 16 new load centers is included (three to four load centers per zone).
- 6 An estimate of 692 light poles for replacing and supplementing the existing lighting systems is included.
- 7 This opinion of probable cost does not include the cost of improvements of the lighting systems owned by FPL and the design fee for the Town's lighting systems recommended improvements.

## CHAPTER 6 - GIS MAPPING

### 6.1 General

Two ESRI based GIS shapefiles were prepared by ADA and provided to the Town of Miami Lakes. These shapefiles represented the location of light poles within the Town and a basemap delineating the estimated limits of roadway edge of pavement (EOP), sidewalks, waterways, and property limits throughout the Town.

### 6.2 Light Pole Shapefile

The light pole shapefile (ML\_stlights.shp) was developed using a shapefile provided by the Town. This shapefile contained the estimated location of existing light poles and identified each light pole with one of three different classifications. This classification system used 'E', 'F', and 'R' identifies depending on the service provided by FPL. The nomenclature was as follows:

- 'F' (Full) is given to all poles owned by FP&L
- 'R' (Re-Lamp) is given to all poles owned by the town, but with the lamps maintained by FPL
- 'E' (Energy) is given to all poles owned by the town which are only energized by FP&L.

The first step in the light poles shapefile development process involved manually adjusting the location of all light poles with an 'R' designation using high resolution aerial imagery available from the County - light poles with an 'E' or 'F' designation were not a part of this survey. Once the location of these poles were adjusted, the coordinates were updated in the shapefile attribute table. The attribute table containing each points spatial coordinate was then converted into an excel file in order to import the points into AutoCAD where additional edits concerning the inventory process were performed. The light poles were renumbered based on load center zone locations, circuit numbers, and light pole zone locations. This information was also carried back to into the GIS shapefile attribute table.

The light pole shapefile contains eleven separate fields containing pertinent data populated through this inventory. The fields are described as follows given the field names from the GIS shapefile:

- FID – A unique identifier automatically populated by ArcMap.
- Shape – Field automatically populated by ArcMap.
- LABELS – A unique ID number for each light pole.
- ADDRESS – The address of the nearest lot to the light pole location. Since the street in the lot address in many cases is not based on the street where the pole is located, the field P\_street should be checked first.
- COMPONENT – Describes the type of lamp and wattage.
- OWNED\_BY– Defines the ownership of the light pole (i.e. FP&L, Town of Miami Lakes).
- LAT – The latitudinal coordinate of the light pole
- LONG – The longitudinal coordinate of the light pole
- MARK –Original pole classification as defined in the original shapefile provided by the Town ('R', 'E' or 'F')
- TAG – Pole Identification Tag. By default the pole identification tag was generated using the 'MARK' and 'LABELS' fields, until the field was subsequently updated with a tag number based on the load center name and circuit number (See Town of Miami Lakes Street Lighting Assets Identification System).
- P\_STREET – The street where the pole is located.
- P\_REF – Reference to the pole location along the street.

## 6.2 Basemap Shapefile

The basemap shapefile (ML\_basemap.shp) was developed using the Miami-Dade County Property Appraiser shapefile as a starting point in the delineation process. The County shapefile was imported into CAD and used as an initial base layer for visually identifying the relative location of property limits. High resolution aerial imagery, available through the County, was also used in the delineation process in order to identify other pertinent features. Using these two items, the relative location of roadways, sidewalks, and waterways throughout the Town.

The basemap shapefile contains seven separate fields containing information developed during the delineation process or derived from the Miami-Dade County Property Appraiser shapefile. The fields are described as follows given the field names from the GIS shapefile:

- FID – A unique identifier automatically populated by ArcMap.
- Shape – Field automatically populated by ArcMap.
- Layer – The type of entity delineated which includes:
  - EOP – Edge of pavement for roadways.
  - Property Line – Physical limits of residential, commercial, or public/governmental properties.
  - Sidewalk – Defined sidewalk areas.
  - Future Sidewalk – Areas adjacent to existing sidewalks that may be defined as the future location of sidewalks.
  - Sod – Visibly sodded areas.
  - Water – Bodies of water such as canals, lakes, or ponds.
- Area\_SqFt – The area of the delineated entity in square feet as calculated in GIS.
- FOLIO - The Miami-Dade County folio number of the property delineated. Only defined for properties and not water, EOP, sod, and sidewalks.
- ZIP\_CODE – The zip code of the property delineated. Only defined for properties and not water, EOP, sod, and sidewalks.
- Address – The address of the property delineated. Only defined for properties and not water, EOP, sod, and sidewalks.

It should be noted that the shapefiles developed for this project are intended for inventory purposes only and do not accurately represent the legal limits of the entities delineated. These shapefiles do not take the place of field surveys by a licensed surveyor and cannot be used to determine official right-of-way limits, proof of ownership, nor can it be used for any other purposes than those intended by the Town.



# **TOWN OF MIAMI LAKES**

## **Roadway Lighting Systems**

### **Lighting Report Appendix A Photos**

**Town of Miami Lakes, FL**

*Prepared by:*



**8550 N.W. 33rd Street . Suite 101  
Doral, Florida 33122  
EB # 00003212**

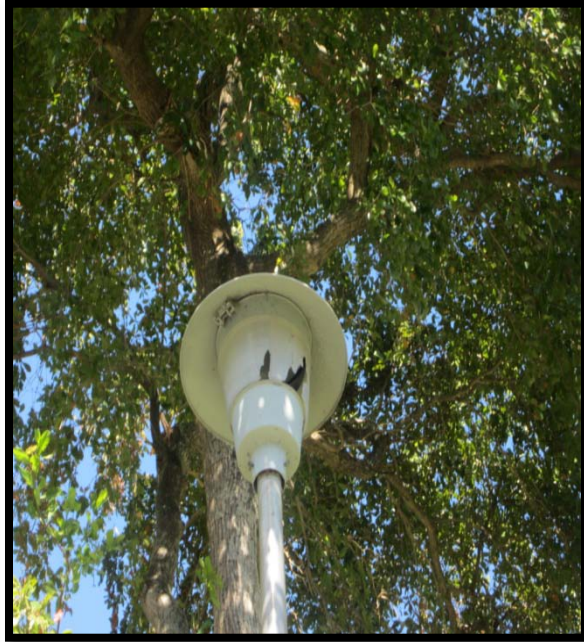
**March 2013**

For pole identification numbers refer to the GIS files provided with this report, which include a complete map of the town with the location and identification number of each light pole.





R-764(a) – Big Cypress Drive



R-767 (b) – Big Cypress Drive



R-877(a) – Big Cypress Drive



R-877 (b) – Big Cypress Drive



R-20 (a) – Lake Claire CT



R-20 (b) – Lake Claire CT



R-71 (a) – Lake Success PL



R-71(b) – Lake Success PL



R-642 (a) – Parkinsonia Drive



R-642(b) – Parkinsonia Drive



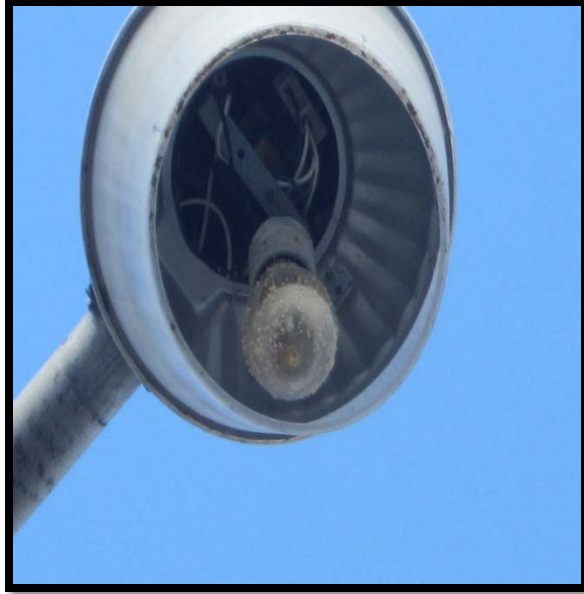
R-443 (a) – Candle Wood



R-443 (b) – Candle Wood



R-656 (a) – Fitzpatric RD



R-656 (b) – Fitzpatric RD



R-768 (a) - Miami Lakeway South



R-768 (b) - Miami Lakeway South



F-1644a – NW 77<sup>th</sup> PL



F-1644b – NW 77<sup>th</sup> PL



F-1648a – NW 159<sup>th</sup> Terrace



F-1648b – NW 159<sup>th</sup> Terrace



R-106 - Lake Patricia Drive



R-1246 - Pent PL



R-1797a – Kingsmoor Way



R-1797b - Kingsmoor Way



F-766 (a) – NW 148<sup>th</sup> Terrace



F-766 (b) – NW 148<sup>th</sup> Terrace



F-308(a) - NW 142<sup>nd</sup> LN



F-308 (b) – NW 142<sup>nd</sup> LN



F-315 (a) - NW 142<sup>nd</sup> LN



F-315 (b) - NW 142<sup>nd</sup> LN



F-2826(a) – Sabal Drive



F-2826 (b) – Sabal Drive



F-2939 (a) – NW 169<sup>th</sup> Terrace



F-2939 (b) – NW 169<sup>th</sup> Terrace



F-2712(a) - NW 87<sup>th</sup> CT



F-2712 (b) - NW 87<sup>th</sup> CT



F-2676 (a) - NW 87<sup>th</sup> CT



F-2676 (b) - NW 87<sup>th</sup> CT



F-2718(a) – NW 168<sup>th</sup> LN



F-2718 (b) – NW 168<sup>th</sup> LN



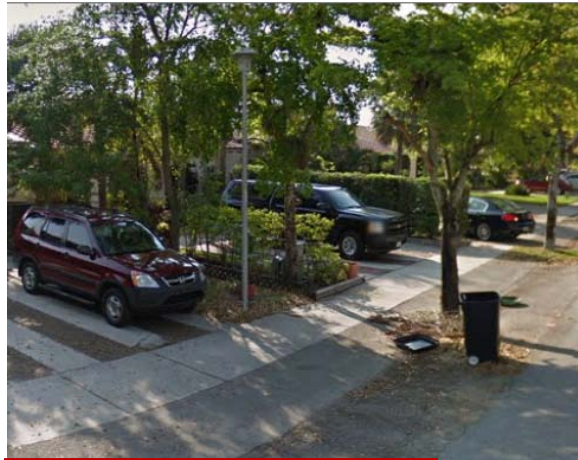
R-1043 – Holly Road



R-9478 – Holly Road



R-924 – Holly Road



R-939– Laurel Lane



R-716– Jacaranda Lane



# **TOWN OF MIAMI LAKES**

## **Roadway Lighting Systems**

### **Lighting Report Appendix B Zone Map**

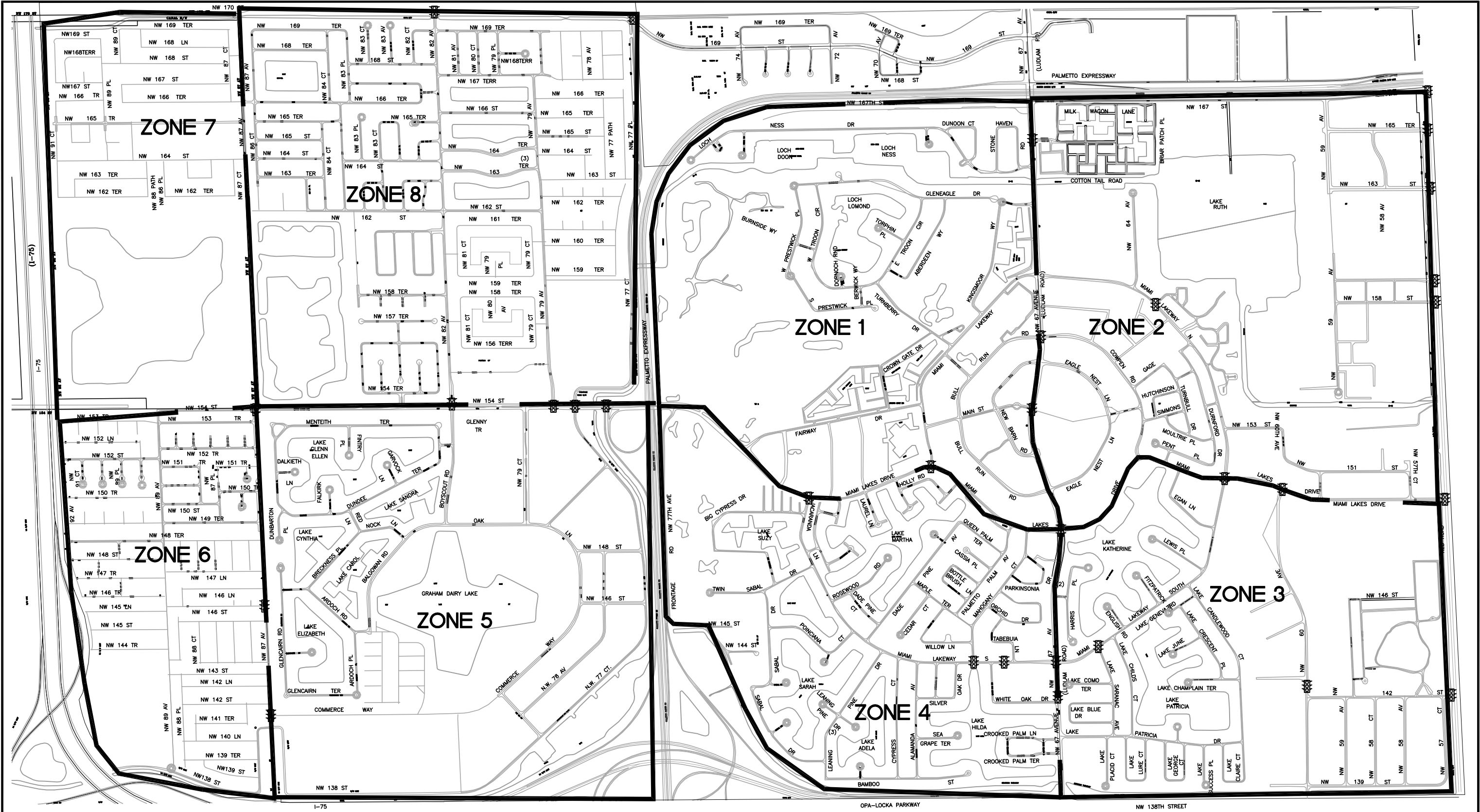
**Town of Miami Lakes, FL**

*Prepared by:*




**8550 N.W. 33rd Street . Suite 101  
Doral, Florida 33122  
EB # 00003212**

**March 2013**



# TOWN OF MIAMI LAKES ZONE LIMITS

REVISIONS							
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY



8550 N.W. 33RD STREET - SUITE 101  
DORAL, FLORIDA 33122  
PHONE (305) 551-4608 FAX (305) 551-8977  
WWW.ADAENG.NET CA # 60103212  
GUILLERMO E. SANTOS PEREZ, P.E.  
P.E. LICENSE NO. 70709

DESIGNED BY	NAME	DATE	DRAWN BY	NAME	DATE
CHECKED BY			CHECKED BY		
SUPERVISED BY: GUILLERMO E. SANTOS PEREZ					

# **Town of Miami Lakes Residential Roadway Lighting Systems**



**Prepared for:**

**Town of Miami Lakes**

**Prepared by:**

**Wood Environment & Infrastructure Solutions, Inc.  
404 SW 140<sup>th</sup> Terrace  
Gainesville, FL 32669**

**October 2019**

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- 2.2 Town Zone Numbers
- 2.3 Street Trees and Their Impact on Roadway Lighting Conditions
- 2.4 Zones 6, 7, and 8 – American Revolution Pole-Top 39-watt Fixture
- 2.5 Zone 6 - RSW Pole-Arm 45-watt Fixture
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- Appendix B Zone Map
- Appendix C Existing Photometric Modelling
- Appendix D Recommended Solutions
- Appendix E Cutsheets

## List of Acronyms

%	percent
fc	foot-candle
HID	high-intensity discharge
kW	kilowatt
kWh	kilowatts per hour
LED	light emitting diode
NA	not applicable
sq ft	square feet

## Executive Summary

Wood Environmental & Infrastructure Solutions, Inc. (Wood) performed a roadway lighting assessment for the Town of Miami Lakes, Florida. Construction cost estimates and changes in energy usage are based on experience from similar projects. Results are expected to be accurate within +/- 30%. This report presents the findings of Wood's onsite roadway lighting assessment, results of photometric modelling of residential roadway fixtures and recommended solutions to correct lighting deficiencies.

Wood's assessment of the Town of Miami Lake's roadway lighting system found areas of low-light levels throughout their residential areas. These low light levels can be attributed to the following causes:

- Insufficient maintenance of the town's tree canopy is causing significant shadows throughout its residential neighbourhoods. Fixtures are often located above trees, inside the tree canopy or behind trees which greatly decreases the ability of the lighting to reach the roadway and sidewalk as intended.
- Photometric modelling and field light level measurements show that even without the tree canopy the desired light levels would not be reached by the existing fixtures. The spacing of the existing fixtures is too great to meet the recommended light level of 0.4-foot candle (fc).

Wood presents two exterior lighting upgrade options in Section 3 of this report. Option 1 involves installing new light poles and fixtures to meet recommended light levels and would cost an estimated \$3.2M. Option 2 involves replacing fixtures on existing poles with higher water fixtures. This option would increase light levels close to recommended light levels and would cost an estimated \$1.0M.

## Section 1.0 Scope and Technical Approach

### 1.1 Scope of Lighting Assessment

The scope of work for the lighting assessment included the following tasks:

**Task 1 - Onsite assessment of the roadway lighting systems.** A two-person team gathered the necessary onsite lighting details. Information gathered will include verification of LED upgrades, measurement of representative street light levels, and photographs. The onsite visit to assess roadway lighting conditions was performed on August 20-21, 2019.

**Task 2 - Photometric study and drawings.** Photometric modelling of representative roadway lighting will be developed to be presented in the report and show areas of deficient light levels. Photometric modelling will be used to develop recommendations to correct deficiencies.

**Task 3 - Roadway Lighting System Assessment Report.** This report includes an inventory of new LED fixtures installed by FPL, list of deficient areas, recommendations for new LED fixtures in areas which are significantly under- or over-lit, and previously deficient areas that have improved with the LED installation. The report will be prepared based on available information and include a summary of observations, analysis, conclusions, photo documentation, recommended products cut-sheets, and cost estimates.

### 1.2 Recommended Illuminance Values

Table 1 presents recommended illuminance levels from the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide used in the Roadway Lighting Report prepared by ADA Engineering for the Town of Miami Lakes in 2012.

**Table 1: Recommended Illuminance Values**

Local Streets	Average Maintained Illuminance (fc)	Max Uniform Ratio (Average/Minimum)
Commercial Areas	0.8	6 to 1
Intermediate	0.7	6 to 1
Residential Areas	0.4	6 to 1
<b>Minor Arterials</b>		
Commercial Areas	1.4	4 to 1
Intermediate	1.0	6 to 1
Residential Areas	0.7	4 to 1
<b>Sidewalks</b>		
Commercial Areas	1.3	3 to 1
Intermediate	0.8	4 to 1
Residential Areas	0.4	6 to 1

The residential street in the Town of Miami Lakes is classified as Local Street – Residential. Our photometric design criteria used 0.4 fc which was also the recommended light level in the 2012 report.

## Section 2.0 Roadway Illuminance Values and Issues

This section will discuss the findings from onsite audit and photometric analysis of the existing fixtures serving the residential areas of the Town of Miami Lakes. These fixtures were installed in 2017 as part of the Town's upgrade project which converted roadway lighting to LED fixtures.

### 2.1 Residential Roadway Fixture Types

There are four fixtures types used for roadway lighting in residential areas and these are presented in Table 2-1. Photographs of these fixtures are presented in Appendix A.

**Table 2-1: Residential Roadway Lighting Fixtures**

Fixture Type	Fixture Owner	Number of Fixtures	General Location	Typical Location
American Revolution 39-Watt 3000K	FPL	654	Zones 6, 7, and 8	14068 NW 88TH PI
RSW 45-Watt 3000K	FPL	188	Zone 6	14921 NW 89TH Ct
Evolve LED 32W Type B	ToML	396	Zones 1, 2, 3, 4, and 5	14598 Mahogany Ct
75W Screw-In Lamp	ToML	40	Zone 4	7246 Jacaranda Ln

### 2.2 Town Zone Numbers

The zone numbers used in this report refer to the map provided in Appendix B, which shows the Town of Miami Lakes divided in eight zones. This Map was developed as part of the Town of Miami Lakes Asset Identification System.

### 2.3 Street Trees and Their Impact on Roadway Lighting Conditions

The residential areas of the Town of Miami Lakes generally have a healthy and attractive tree canopy. As with cities throughout the country balancing the aesthetic appeal of street trees with their negative impact on street lighting is a difficult task. Wood found many areas where tree shadows reduced lighting uniformity and visibility on the sidewalks and streets. Examples of areas where light fixtures are blocked by trees are presented in Appendix A. Balancing the preservation of trees for environmental benefits and the removal/pruning of trees for traffic safety is a delicate process. Governing bodies, planners, and the public must work together to reach consensus when managing such a sensitive issue.

The photometric analysis, presented in Section 2.4, shows that even without the tree canopy the roadway light levels in the residential areas would be significantly below recommended light levels. However, in many areas the existing tree canopy would make it impossible to meet desired light levels even with lighting upgrades. Wood recommends that the Town work with residents and the company that provides tree maintenance to come up with a plan that will improve roadway light levels and maintain the aesthetic value of the town's tree canopy. A much more aggressive program of tree pruning is required to prevent excessive shadows and raise light levels.

Light levels were most impacted in Zones 1, 2, 3, and 4 where the tree canopy is more mature. The residential areas in these zones were generally served by post-arm fixtures which were sometime located above or in the tree canopy. The post-top fixtures that are prevalent in Zones 6, 7, and 8 are mounted on lower poles and more likely to be under the tree canopy. Wood recommends that measures taken to reduce shadows caused by the tree canopy start in Zones, 1, 2, 3, and 4.

## 2.4 Zones 6, 7, and 8 – American Revolution Pole-Top 39-watt Fixture

The American Revolution Pole-Top 398-watt fixture is the most common type of residential roadway fixture in the Town of Miami Lakes. This decorative pole-top fixture is present throughout Zones 7 and 8, and located between NW 146<sup>rd</sup> St on North, Palmetto Frontage Rd on the East and South and NW 89<sup>th</sup> Ave on the West in Zone 6. The area served by these fixtures is classified as Local Street-Residential and the desired sustained light level is 0.4 fc with a minimum average-to-minimum uniformity ration of six.

These fixtures are typically 130 to 160 feet apart. Light levels measurements in the field ranged from 2.6 fc to 0 fc. Over half of the distance between the fixtures had a measured light level of 0.0 fc. Photometrics for these fixtures prepared by Wood are presented in Appendix C. The photometrics show that even with without the presence of the tree canopy the light level between the fixtures drops to 0.0 fc and the average light level is 0.2 fc.

Shadow from trees are a problem in many areas served by these fixtures. The tree canopy seemed to cause the most problems with reduced light levels in Zone 8. In some areas the light pole position between the sidewalk and residences which greatly reduces light levels on the roadway.

## 2.5 Zone 6 - RSW Pole-Arm 45-watt Fixture

These pole-arm fixtures are located in between Miami Lakes Drive on the north, NW 87 Avenue on the east, NW 92<sup>nd</sup> Avenue on the west, and to the south by NW 144 Terrace and 146<sup>th</sup> Street in Zone 6. The area served by these fixtures is classified as Local Street-Residential and the desired sustained light level is 0.4 fc with a minimum average-to-minimum uniformity ration of six.

These fixtures are typically 130 to 180 feet apart. Light levels measurements in the field ranged from 0.8 fc to 0.0 fc. Over half of the distance between the fixtures had a measured light level of 0.0 fc. Photometrics for these fixtures prepared by Wood are presented in Appendix C. The photometrics show that even with without the presence of the tree canopy the light level between the fixtures drops to 0.0 fc and the average light level is 0.3 fc.

The tree canopy in this area is less mature than other areas of the Town of Miami Lakes. Because these fixtures are on 30-ft poles with pole-arm fixtures, the light level reduction caused by the tree canopy is limited in this area.

## 2.6 Zones 1 through 5 - Evolve Pole-Arm 32-watt Fixture

These pole-arm fixtures are the main residential light fixture serving Zones 1 through 5. The area served by these fixtures is classified as Local Street-Residential and the desired sustained light level is 0.4 fc with a minimum average-to-minimum uniformity ration of six.

These fixtures are typically 200 to 300 feet apart. Light levels measurements in the field ranged from 3.4 fc to 0.0 fc. Over half of the distance between the fixtures had a measured light level of 0.0 fc. Photometrics for these fixtures prepared by Wood are presented in Appendix C. The photometrics show that even with without the presence of the tree canopy the light level between the fixtures drops to 0.0 fc and the average light level is 0.1 fc.

The tree canopy if these zones is thick on often located beneath the fixtures. This is causing substantial shadowing and reduction of light levels.

## 2.7 Zone 4 – Pole-Top 75-watt Screw in Lamp

These post-top fixtures were retrofit with 75-watt screw-in lamps as part of the 2017 LED lighting upgrades project. These fixtures are located in the northwest portion of Zone 4.

These fixtures are typically 200 to 250 feet apart. Light levels measurements in the field ranged from 1.6 fc to 0 fc. Most of the space between the fixtures had a measured light level of 0.0 fc. Photometrics for these fixtures prepared by Wood are presented in Appendix C. The photometrics show that even without the presence of the tree canopy the light level between the fixtures drops to 0.0 fc and the average light level is 0.2 fc.

The tree canopy if the area served by these fixtures is thick on often located between the fixtures. This is causing substantial shadowing and reduction of light levels.

## Section 3.0 Recommendations

Wood assessment of the residential roadway lighting in the Town of Miami Lakes identified problems with the tree canopy causing significant shadows on roadway and sidewalks, and light fixtures spaced too far apart to reach the recommended light level of 0.4 fc. The light levels in much of the space between fixtures drops to 0.0 fc either because existing fixtures are not strong enough, the poles are spaced too far apart, or because of shadows from the tree canopy.

Wood recommendations to address the problems identified in this report are as follow:

- Tree Canopy Maintenance: The first step the town should take is to greatly increase maintenance of the tree canopy with a concerted effort to reduce tree shadows reducing light from roadway fixtures. The town should include residents in the decision-making process to reduce public outcry regarding the increased pruning of tree canopy.
- Option 1: Install Additional Roadway Lighting: Wood did an analysis of the additional fixtures required to bring roadway light levels to the desired 0.4 fc (see Appendix D). Findings of this analysis include the following:
  - For each of the four fixture types used for residential roadway lighting the town would need to install approximately twice as many fixtures. For aesthetic reasons, the new fixtures added in Wood's analysis are the same as the existing fixtures for each deficient area (see Appendix E: Cutsheets for details).
  - The cost to install additional fixtures for all four fixture types is \$3.2M.
  - The installation cost does not include energy usage of the new fixtures which would cost the town approximately \$26K per year (assuming a cost of \$0.12 per kWh). This option will increase energy usage associated with street lighting by approximately 100%.
  - The worst performing fixture used by the town is the 32-watt pole arm fixture in Zones 1, 2, 3, 4, and 5. It is recommended that fixture upgrades start in these Zones. The estimated costs associated with the recommended Option 1 upgrades in Zones 1-5 is \$1.3M.
- Option 2: Replace Existing Fixtures with Higher Wattage Fixtures: Wood's analysis of replacing existing fixtures with high wattage fixtures brought light levels to within 10% of the desired light level of 0.4 fc (see Appendix D for details). Finding of this analysis include the following:
  - For aesthetic reasons, the replacement fixtures used in Wood's analysis are higher wattage versions of the existing fixtures (see Appendix E: Cutsheets for details).
  - The cost to replace existing fixtures with higher wattage fixtures for all four fixture types is estimated to be 1.0M.
  - The installation cost does not include the additional energy usage of the new fixtures which would cost the town approximately \$22K per year (assuming a cost of \$0.12 per kWh). This option will increase energy usage associated with street lighting by approximately 85%.
  - The worst performing fixture used by the town is the 32-watt pole arm fixture in Zones 1, 2, 3, 4, and 5. It is recommended that fixture upgrades start in these Zones. The estimated costs associated with the recommended Option 2 upgrades in Zones 1-5 is \$366K.

## **Appendix A**

### **Photographs**



Photo 1: American Revolution 39-watt 3000K

Photo 3: RSW 45-watt 3000K



Photo 2: American Revolution 39-watt 3000K

Photo 4 RSW 45-watt 3000K

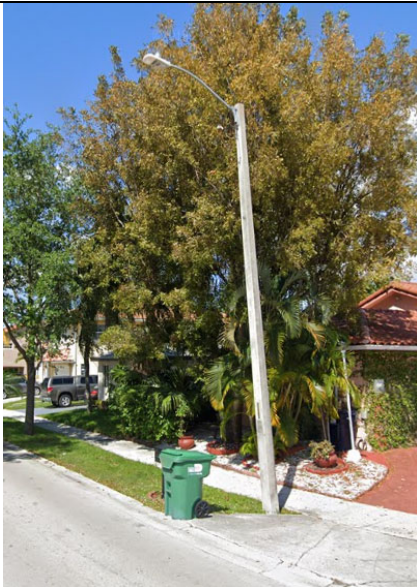




Photo 5: Evolve LED 32W Type B



Photo 6: Evolve LED 32W Type B

Photo 7: 75-watt Screw-In LED Lamp

Photo 8: Residential Street with Shadows from Trees

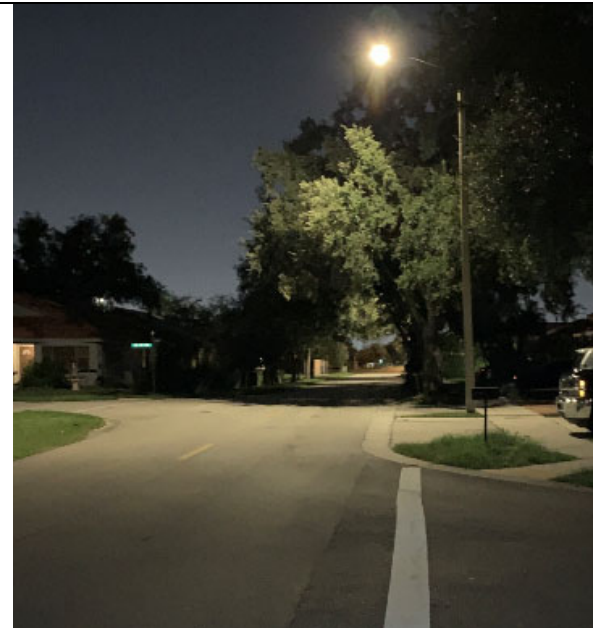
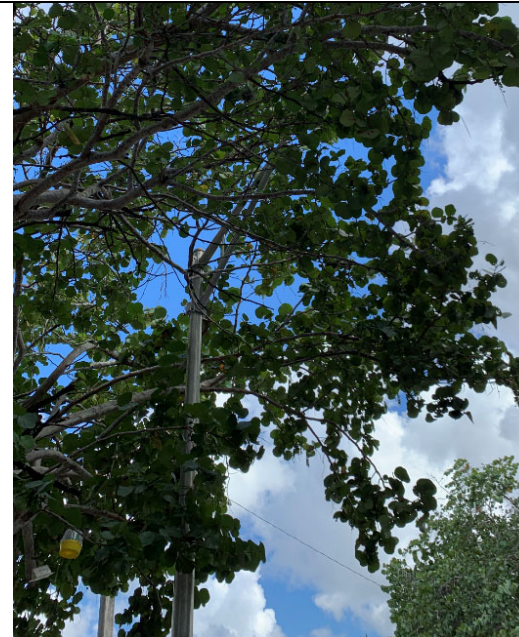




Photo 9: Roadway Fixture Located Behind Tree, Zone 7  
Photo 11: Roadway Fixture Located Above Tree, Zone 3



Photo 10: Roadway Fixture Located Behind Tree, Zone 8  
Photo 12: Roadway Fixture Located Behind Tree, Zone 2



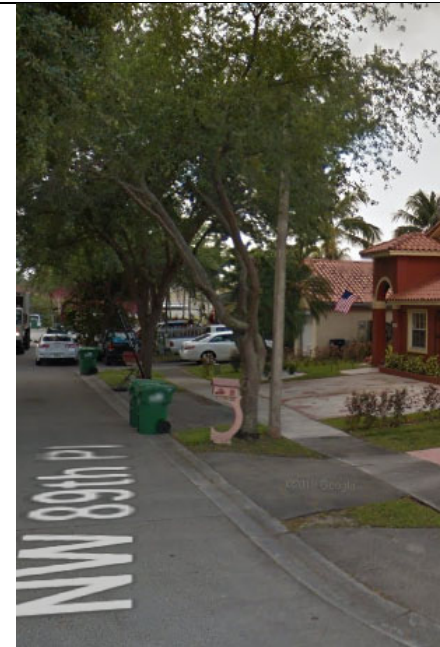
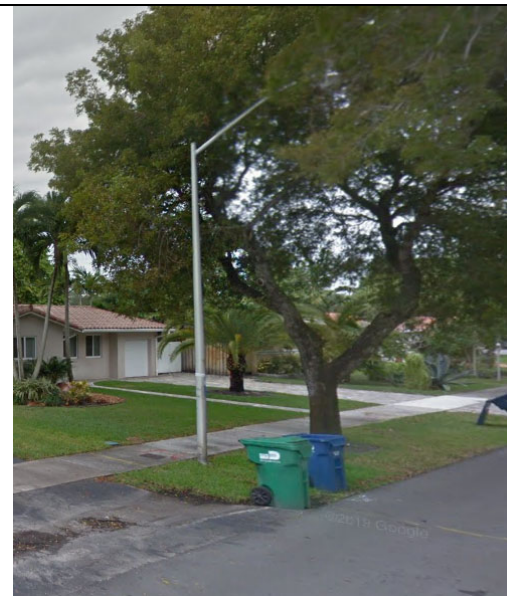


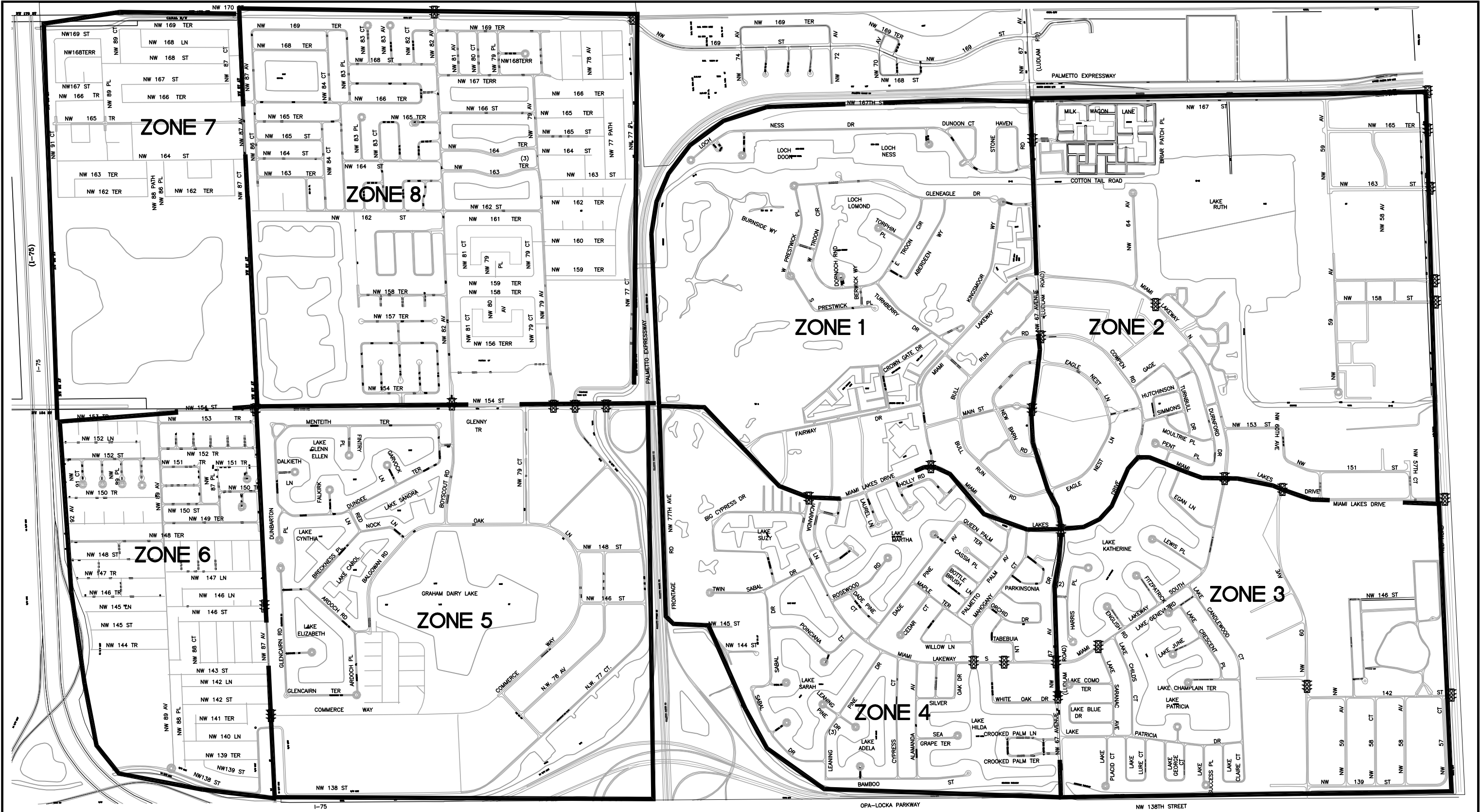
Photo 9: Roadway Fixture Located Behind Tree, Zone 6  
 Photo 11: Roadway Fixture Located Above Tree, Zone 1

Photo 10: Roadway Fixture Located Behind Tree, Zone 6  
 Photo 12: Roadway Fixture Located Behind Tree, Zone 4




## **Appendix B**

### **Zone Map**



# TOWN OF MIAMI LAKES ZONE LIMITS

REVISIONS							
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY



8550 N.W. 33RD STREET - SUITE 101  
DORAL, FLORIDA 33122  
PHONE (305) 551-4608 FAX (305) 551-8977  
WWW.ADAENG.NET CA # 0069212  
GUILLERMO E. SANTOS PEREZ P.E.  
P.E. LICENSE NO. 70709

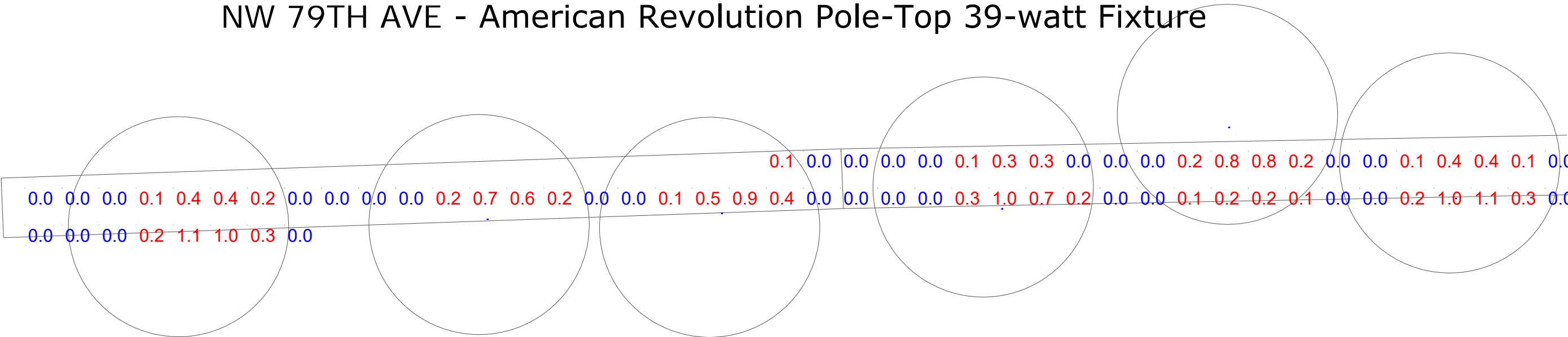
NAME	DATE	NAME	DATE
DESIGNED BY		DRAWN BY	
CHECKED BY		CHECKED BY	
SUPERVISED BY: GUILLERMO E. SANTOS PEREZ			

## **Appendix C**

# **Existing Photometric Modelling**



NW 79TH AVE - American Revolution Pole-Top 39-watt Fixture



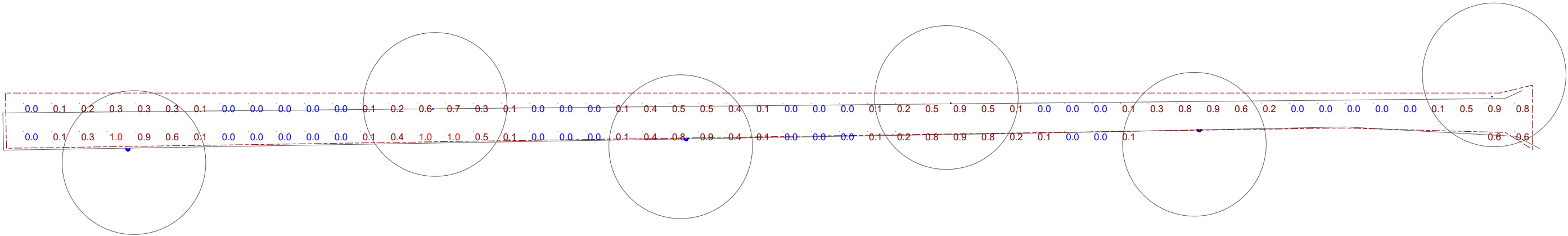
POLES 130-160 FT APART

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #1	+	0.2 fc	1.2 fc	0.0 fc	N/A	N/A

⋮

Designer
Date
9/18/2019
Scale
Not to Scale
Drawing No.
Summary

NW 147TH TERRACE - RSW Pole-Arm 45-watt Fixture



POLES 130-180 FT APART

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone	+	0.3 fc	1.0 fc	0.0 fc	N/A	N/A



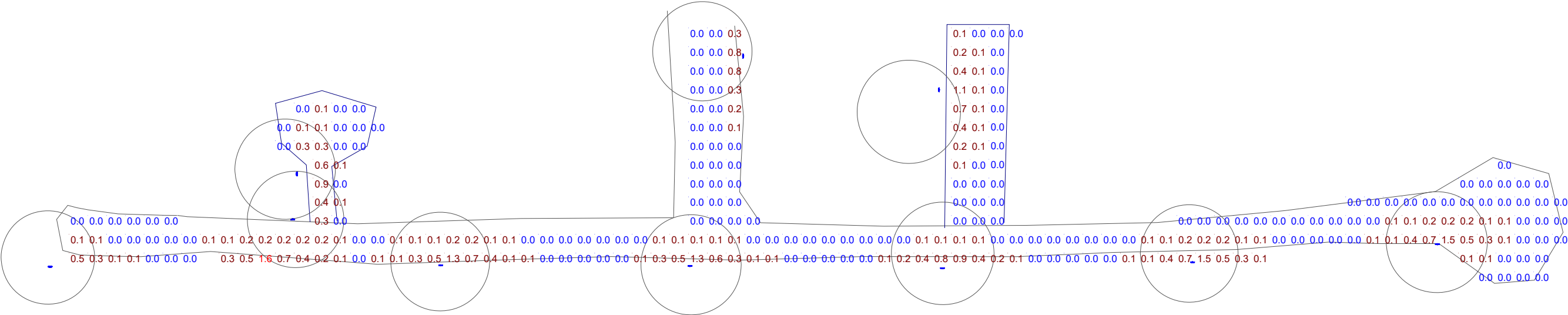
VISUAL

⋮

Designer
Date
9/18/2019
Scale
Not to Scale
Drawing No.
Summary

1 of 1

Bamboo St. - Evolve Pole-Arm 32-watt Fixture



POLES 200 FT APART

Statistics						
Description	Symbo	Max	Min	Max/Min	Avg/Min	Avg
Calc Zone #1	+	1.8 fc	0.0 fc	N/A	N/A	0.1 fc

Representative photo

⋮

Designer

Date

10/10/2019

Scale

Not to Scale

Drawing No.

Summary

1 of 1



## **Appendix D**

### **Recommended Solutions**

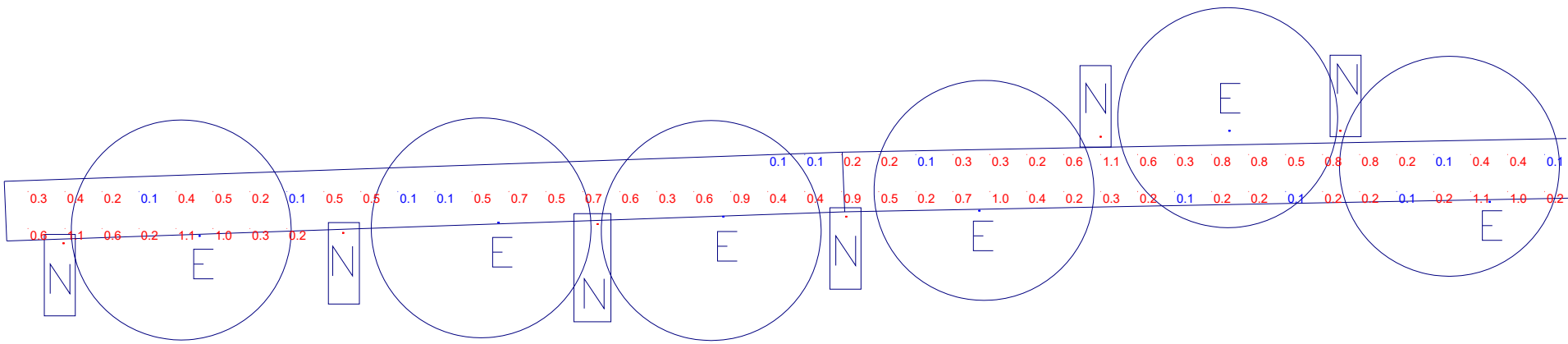
## **Option – 1**

### **Installation of Additional Fixtures**

Lighting Calculation for: Town of Miami Lakes Residential Street Lighting							\$0.1200	per kWh Energy Cost						
Location	ECM#	Usage Area Type (Choose from Menu)	Pre-Retrofit Equipment			Proposed Action (Choose from Menu)	Post-Retrofit Equipment							
			Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code		Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code	Installed Total Cost	Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)	
Existing LED Street Lighting														
American Revolution 39-Watt 3000K	L-01	Night	LED	654	LED PT AR 39w	DND	LED	654	LED PT AR 39w	\$ -				
RSW 45-Watt 3000K	L-01	Night	LED	188	LED-PA RSW 45w	DND	LED	188	LED-PA RSW 45w	\$ -				
Evolve LED 32W Type B	L-01	Night	LED	396	LED-PA 32w	DND	LED	396	LED-PA 32w	\$ -				
75W Screw-In Lamp	L-01	Night	LED	40	LED-PT 75w Scrw	DND	LED	40	LED-PT 75w Scrw	\$ -				
Proposed LED Street Lighting														
American Revolution 39-Watt 3000K	L-01	Night	LED		LED PT AR 39w	Install 1L Fixture	LED	654	LED PT AR 39w	\$ 1,468,230				
RSW 45-Watt 3000K	L-01	Night	LED		LED-PA RSW 45w	Install 1L Fixture	LED	188	LED-PA RSW 45w	\$ 510,420				
Evolve LED 32W Type B	L-01	Night	LED		LED-PA 32w	Install 1L Fixture	LED	396	LED-PA 32w	\$ 1,168,200				
75W Screw-In Lamp	L-01	Night	LED		LED-PT 75w Scrw	Install 1L Fixture	LED	40	LED-PT 75w Scrw	\$ 88,000				
				1,278				2,556			\$3,234,850	-49.64	-217,414	
				# of Fixtures				# of Fixtures			Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)	



NW 79TH - AMERICAN REVOLUTION POLE-TOP 39-WATT FIXTURE



LEGEND

E = EXISTING FIXTURES

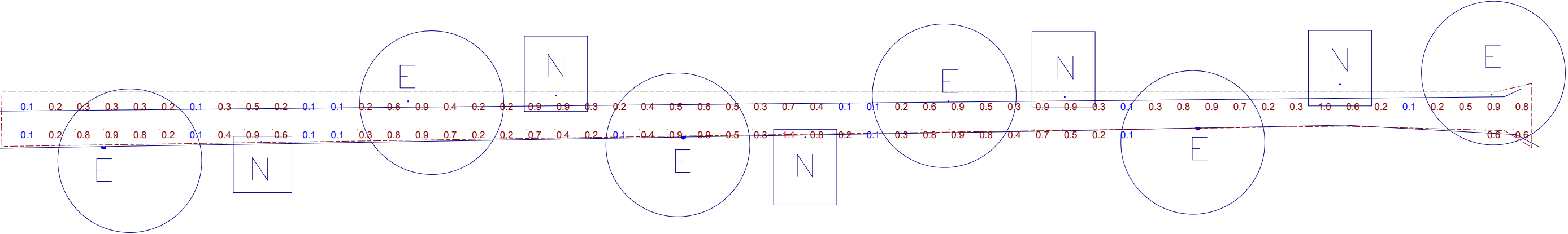
N = NEW FIXTURES

NOTE: POLES 130-160 FT APART

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #3	+	0.4 fc	1.1 fc	0.1 fc	11.0:1	4.0:1

Designer
Date
10/11/2019
Scale
Not to Scale
Drawing No.
Summary

NW 147TH TERRACE - RSW POLE-ARM 45-WATT FIXTURE



LEGEND  
E = EXISTING FIXTURES  
N = NEWLY ADDED  
FIXTURES

NOTE: POLES 130-180FT APART

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone	+	0.5 fc	1.1 fc	0.1 fc	11.0:1	5.0:1



Visual Lighting Software

Designer
Date
Oct 11 2019
Scale
Not to Scale
Drawing No.
Summary



**VISUAL**



**N: NEW FIXTURE**

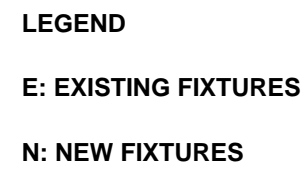
## STATISTICS

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #4	+	0.4 fc	4.3 fc	0.1 fc	43.0:1	4.0:1

**Date**  
Oct 11 2019

**Scale**  
Not to Scale

Drawing No.



## STATISTICS

STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
25x25	+	0.4 fc	1.3 fc	0.1 fc	13.0:1	4.0:1

**Date**  
Oct 11 2019

**Scale**  
Not to Scale

Drawing No.

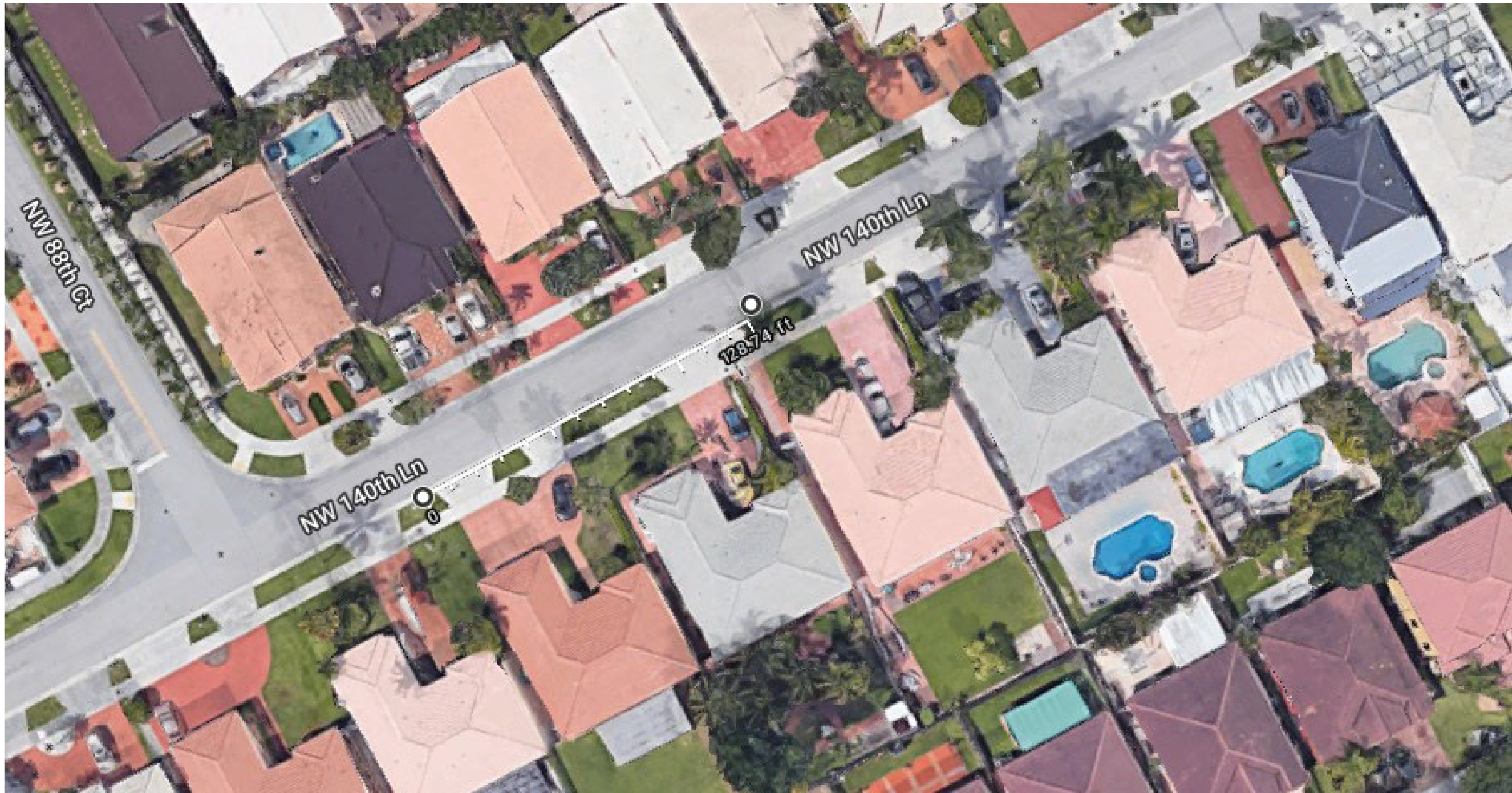
## **Option - 2**

### **Replacement of Existing Fixtures**

Lighting Calculation for:							\$0.1200	per kWh Energy Cost					
Town of Miami Lakes Residential Street Lighting- Option 2													
Location	ECM#	Usage Area Type (Choose from Menu)	Pre-Retrofit Equipment			Proposed Action (Choose from Menu)	Post-Retrofit Equipment						
			Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code		Fixture Type (Choose from Menu)	# of Fixtures	Ballast Code	Installed Total Cost	Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)
Existing LED Street Lighting													
American Revolution 39-Watt 3000K	L-01	Night	LED	654	LED PT AR 39w	Replace 1L Fixture	LED	654	LED PT AR 78w	\$ 474,150			
RSW 45-Watt 3000K	L-01	Night	LED	188	LED-PA RSW 45w	Replace 1L Fixture	LED	188	LED PT AR 78w	\$ 136,300			
Evolve LED 32W Type B	L-01	Night	LED	396	LED-PA 32w	Replace 1L Fixture	LED	396	LED-PA 52w	\$ 366,300			
75W Screw-In Lamp	L-01	Night	LED	40	LED-PT 75w Scrw	Replace 1L Fixture	LED	40	LED PT AR 125w	\$ 35,000			
				1,278				1,278			\$1,011,750	-41.63	-182,339
				# of Fixtures				# of Fixtures			Sum of Total Cost per Building	Sum of Peak kW Savings	Sum of Annual Energy Savings (kWh)

PROPOSED PHOTOMETRIC LAYOUT FOR:

Wood PLC - Zone 6, 7 and 8 pole-top LED Fixtures AcroBrwEx 247L



(1) GENERAL NOTES  
CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaires. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.

2) NO OBJECTS CONSIDERED IN CALCULATIONS UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



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Wood PLC, - Zone 6, 7 and 8 pole-top LED Fixtures 247L_P55			
P1279218			
Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY



Luminaire Schedule						
Symbol	Qty	Label	LLF	Description	Lum. Watts	Lum. Lumens
☐	7	247L_P55_XX_40K_R2_AY	0.630	247L P55 XX 40K R2 AY	78.2	7390

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Object_2_Top_1	Illuminance	Fc	0.39	0.6	0.2	2.0	3.0

**IMPORTANT**  
Presentation plans only  
Do not use for construction

# AREA LAYOUT

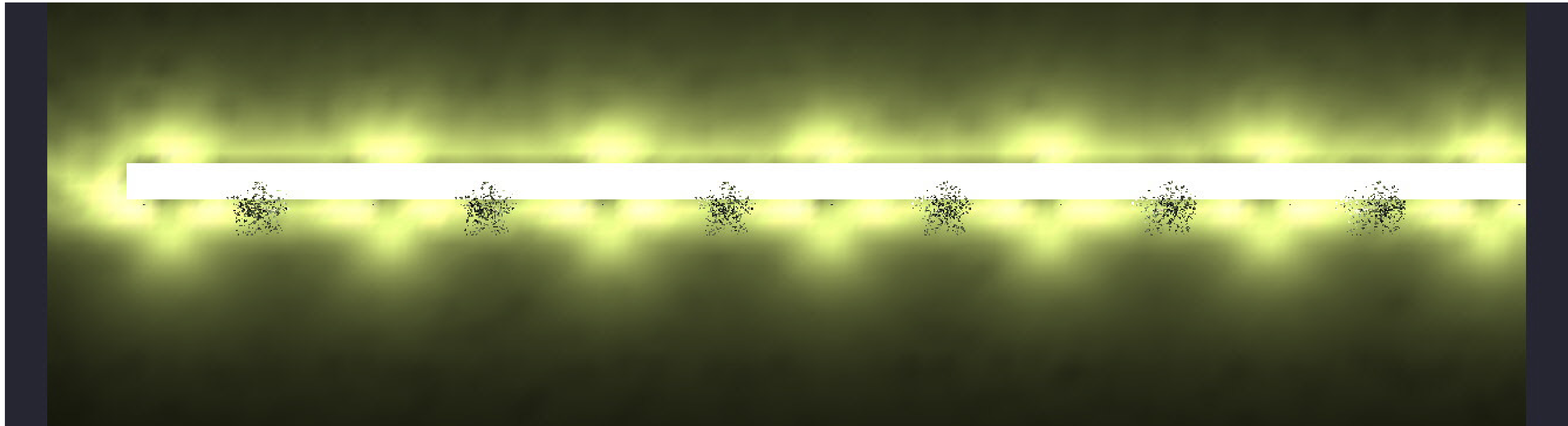
(1) GENERAL NOTES  
CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaires. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.

2) NO OBJECTS CONSIDERED IN CALCULATIONS UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



Wood PLC, - Zone 6, 7 and 8 pole-top LED Fixtures 247L_P55 P1279218 Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY



Luminaire Schedule						
Symbol	Qty	Label	LLF	Description	Lum. Watts	Lum. Lumens
☐	7	247L_P55_XX_40K_R2_AY	0.630	247L P55 XX 40K R2 AY	78.2	7390

Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	FC Requirements
Object_2_Top_1	Illuminance	Fc	0.39	0.6	0.1	3.7	6.0	0.4 FC

**RENDERING**

(1) GENERAL NOTES  
CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaires. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.

2) NO OBJECTS CONSIDERED IN CALCULATIONS  
UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



Confidential & Proprietary - Copyright © 2015 Orion Energy Systems, Inc.

Wood PLC, - Zone 6, 7 and 8 pole-top LED Fixtures 247L_P55			
P1279218			
Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY

1. DESCRIPTION OF PHOTOMETRIC DRAWING:  
THE PURPOSE OF THE FOLLOWING DRAWING(S) IS TO CREATE A CLOSE REPRESENTATION OF FOOT-CANDLE READINGS THE CLIENT CAN EXPECT TO ACHIEVE AFTER THE FIXTURES HAVE BEEN INSTALLED. INCLUDED IN THIS SET OF DRAWING(S) WILL BE A FIXTURE LAYOUT, A LUMINAIRE SCHEDULE SHOWING THE TOTAL NUMBER OF FIXTURES REQUIRED (PER FIXTURE TYPE) AND LIGHT LOSS FACTOR USED FOR EACH FIXTURE AND A CALCULATION SCHEDULE SHOWING THE AVERAGE, MAXIMUM AND MINIMUM FOOT-CANDLE READINGS PER AREA.

2. FIELD VERIFICATION:  
CALCULATIONS ARE PROVIDED USING INDUSTRY RECOGNIZED SOFTWARE AND ARE PROVIDED FORESTIMATION PURPOSES ONLY. HOWEVER, ACTUAL LIGHTING LEVELS WILL VARY DEPENDING ON FIELD CONDITIONS INCLUDING BUT NOT LIMITED TO ROOM CHARACTERISTICS AND TEMPERATURE. THE CALCULATIONS CORRESPOND TO THE INFORMATION PROVIDED TO ORION. ASSUMPTIONS MAY BE MADE FOR INFORMATION THAT IS NOT PROVIDED.IT IS THE RESPONSIBILITY OF THOSE USING THIS SERVICE TO VERIFY THAT OUR INPUT DATA IS CONSISTENT WITH ACTUAL FIELD CONDITIONS. CALCULATIONS ARE SUBJECT TO LIMITATIONS OF THE SOFTWARE. DUE TO THE ABOVE CONSIDERATIONS, ORION WILL NOT GUARANTEE THAT ACTUAL LIGHT LEVELS MEASURED IN THE FIELD WILL MATCH THE INITIAL CALCULATIONS. ALTHOUGH ALL EFFORTS HAVE BEEN MADE TO PLACE LIGHT FIXTURES FREE OF OBSTACLES WHEN PROVIDED WITH SUCH INFORMATION, IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY FIXTURE LOCATIONS ARE FREE OF ANY STEEL, HVAC, SPRINKLER SYSTEMS, ETC. IT IS ALSO THE CONTRACTORS RESPONSIBILITY TO MAKE SURE LIGHT FIXTURES ARE INSTALLED IN ACCORDANCE WITH LOCAL CODES, FM GLOBAL AND ESFR.

3. PERMITTING  
IT IS THE RESPONSIBILITY OF THE LICENCED CONTRACTOR TO CONTACT THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) TO VERIFY ALL LOCAL CODES AND TO ENSURE COMPLIANCE OF THESE CODES.

4. IES FILES  
IESNA STANDS FOR THE "ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA" AND BUILDING ACOUSTICS & LIGHTING LABS TESTS TO THEIR STANDARDS AS WELL AS MANY OTHERS. AN IES DATA FILE IS AN ELECTRONIC PHOTOMETRIC DATA FILE THAT CAN BE PUT INTO AN APPLICATION PROGRAM TO DETERMINE YOUR LUMINAIRES PERFORMANCE INSTANTLY. THESE STANDARDS ARE ESTABLISHED TO ENSURE THAT ALL THE INDEPENDENT LABORATORIES WILL GIVE COMPARABLE RESULTS. THUS ALLOWING MANUFACTURER A TO TEST WITH ONE LAB AND MANUFACTURER B TO TEST WITH ANOTHER LAB AND YOU CAN DIRECTLY COMPARE THE TWO RESULTING REPORTS IN AREAS OF EFFICIENCY, LIGHT DISTRIBUTION AND SO ON.

5. LIGHT METER VARIABLES  
DUE TO THE FACT THAT LIGHT METERS ARE NOT ALL MADE BY THE SAME MANUFACTURER, YOU MAY SEE DIFFERENT READINGS DEPENDING ON THE LIGHT METER BEING USED. OTHER VARIABLES WHICH MAY CREATE DIFFERENT LIGHT READINGS THAN WHAT IS SHOWN ON THE PHOTOMETRIC LAYOUT MAY INCLUDE BUT ARE NOT LIMITED TO: SHADOWS PRODUCED BY FRAMING, HVAC, EVAPORATORS, ETC.

6. DEFINITION OF TERMS

EFFICACY  
A MEASUREMENT OF HOW EFFECTIVE THE LIGHT SOURCE IS IN CONVERTING ELECTRICAL ENERGY TO LUMENS OF VISIBLE LIGHT. EXPRESSED IN LUMENS-PER-WATT (LPW) THIS MEASURE GIVES MORE WEIGHT TO THE YELLOW REGION OF THE SPECTRUM AND LESS WEIGHT TO THE BLUE AND RED REGION WHERE THE EYE IS NOT AS SENSITIVE.

LUMINAIRE EFFICIENCY  
THE EFFICIENCY OF A LUMINAIRE OR FIXTURE IS THE PERCENTAGE OF THE TOTAL LUMENS PRODUCED THAT ARE DELIVERED BY THE FIXTURE.

FOOT CANDLES  
A UNIT OF ILLUMINANCE OR INCIDENT LIGHT REFLECTING FROM A SURFACE. IT IS DEFINED AS THE AMOUNT OF LIGHT ON A ONE SQUARE FOOT SURFACE ONE FOOT FROM A STANDARD CANDLE. ONE FOOTCANDLE IS EQUAL TO ONE LUMEN PER SQUARE FOOT.

ILLUMINANCE  
ILLUMINANCE IS THE TOTAL LUMINOUS FLUX INCIDENT ON A SURFACE, PER UNIT AREA. IT IS A MEASURE OF HOW MUCH THE INCIDENT LIGHT ILLUMINATES THE SURFACE. ILLUMINANCE IS MEASURED IN FOOTCANDLES OR LUX.

LIGHT EMITTING DIODE (LED)  
A SOLID THAT DIRECTLY CONVERTS ELECTRICAL IMPULSES INTO LIGHT. LED'S ARE TEMPERATURE DEPENDANT, NOT ONLY FOR LONG LIFE, BUT SO THAT THE MAXIMUM LIGHT OUTPUT, QUALITY AND RELIABILITY OF THE DEVICE IS PRESERVED.

LIGHT LOSS FACTOR (LLF)  
THE PRODUCT OF ALL FACTORS THAT CONTRIBUTE TO LOWERING THE ILLUMINATION LEVEL INCLUDING REFLECTOR DEGRADATION, DIRT, LAMP DEPRECIATION OVER TIME, VOLTAGE FLUCTUATIONS, ETC.

LUMENS  
A MEASURE OF THE LUMINOUS FLUX OF LIGHT EMITTED BY A SOURCE. FOR EXAMPLE, A DINNER CANDLE PROVIDES ABOUT 12 LUMENS. A 60-WATT SOFT WHITE INCANDESCENT LAMP PROVIDES ABOUT 840 LUMENS.

LUMINAIRE  
A COMPLETE LIGHTING UNIT CONSISTING OF A LAMP (OR LAMPS), BALLAST (OR BALLASTS) AS REQUIRED TOGETHER WITH THE PARTS DESIGNED TO DISTRIBUTE THE LIGHT, POSITION AND PROTECT THE LAMPS AND CONNECT THEM TO THE POWER SUPPLY. A LUMINAIRE IS OFTEN REFERRED TO AS A FIXTURE.

LUMINANCE  
A MEASURE OF "SURFACE BRIGHTNESS" WHEN AN OBSERVER IS LOOKING IN THE DIRECTION OF THE SURFACE. IT IS MEASURED IN CANDELAS PER SQUARE METER (OR PER SQUARE FOOT) AND WAS FORMERLY REFERRED TO AS "PHOTOMETRIC BRIGHTNESS."

REFLECTANCE  
THE RATIO OF LIGHT REFLECTED FROM A SURFACE TO THAT INCIDENT UPON IT.

WATTS  
A UNIT OF ELECTRICAL POWER. LAMPS ARE RATED IN WATTS TO INDICATE THE RATE AT WHICH THEY CONSUME ENERGY.

American Revolution LED  
Series 247L

PRODUCT OVERVIEW



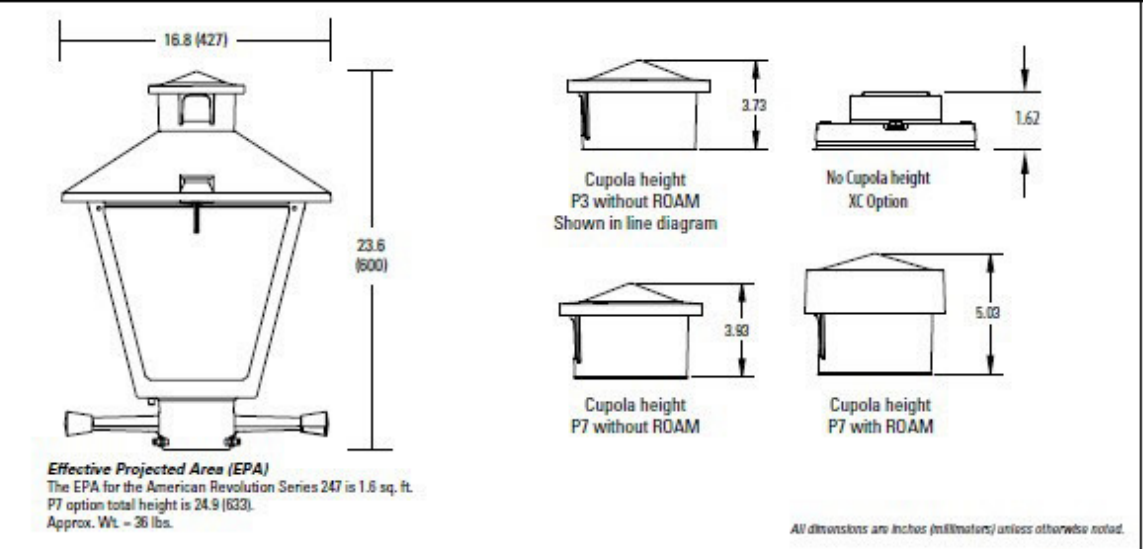
Applications:

Streetscapes  
Walkways  
Pathways  
Parks



- Features:**
- Colonial LED luminaire, replaces HID models up to 150W HPS for street and area lighting applications
  - Ten (10) LED performance packages deliver just the right amount of light for any given application up to 8300 lumens
  - Available in color temperature choices of 2700K, 3000K, 4000K, and 5000K
  - Four (4) distinct light distribution options provide design flexibility, available in Type II, Type III, Type IV, and Type V
  - Available with acrylic or polycarbonate lens
  - Die-cast aluminum housing, engineered for sturdy lifelong performance
  - Die-cast aluminum hood features a trigger latch (TL) option and captive thumb screws for fast, easy electrical and optical chamber access
  - Housing is tenon pole-mounted on a 2-3/8" or 3" OD slip fitter and secured by three set screws
  - Rated L70, LED life greater than 100,000 hours at 25°C
  - Complies with all applicable ANSI C136 standards
  - CSA listed and suitable for up to 40° C ambient
  - Surge protection device (standard) exceeds ANSI/IEEE C62.41-2002 Category C High (10kV/10kA) and ANSI C136.2-2015 Enhanced (10kV/5kA). 20kV Option exceeds ANSI/IEEE C62.41-2002 Category C High (10kV/10kA) and ANSI C136.2-2015 Extreme (20kV/10kA)
  - Equipped with LED electronic 0-10V dimmable driver

DIMENSIONS



American Revolution Series 247L LED



American Revolution LED  
Series 247L

ORDERING INFORMATION

Example: 247L P30 AS 40K R3 AY

Series		Performance Package		Voltage	Color Temperature (CCT)
247L American Revolution LED	Package	Input Watts	Lumens (nominal)	AS 120-277V	27K 2700K
	P10	12	1,400	AH 347V-480V	30K 3000K
	P15	18	2,000		40K 4000K
	P20	23	2,500		50K 5000K
	P25	33	3,400		
	P30	40	3,800		
	P35	33	3,700		
	P40	39	4,400		
	P45	46	5,000		
	P50	64	6,500		
P55	77	7,500			

Distribution		Optics		Options	
R2 Type II	AT Acrylic	Paint <sup>1</sup>		(blank)	Black (standard)
R3 Type III	PV Polycarbonate	GF	Gray		
R4 Type IV		DOB	Dark Bronze		
R5 Type V		WH	White		
		BZ	Bronze		

Controls	Miscellaneous	House-Side Shields
(blank) 3 pin NEMA photocell (standard) NB No photocell receptacle P7 7 pin NEMA photocell PCLL <sup>1</sup> Solid State Long Life Photocell (120-277V) P34 <sup>1</sup> Solid State Long Life Photocell (347V) P40 <sup>1</sup> Solid State Long Life Photocell (400V) PCSS <sup>1</sup> Solid state photocell, 120-277V (Not CSA Listed) AD Field adjustable output module DALI DALI driver (special request) PND Part night dimming SH Shorting cap SMT Shorting cap (not CSA listed)	SS Stainless steel hardware TL Tool-less latch NL1T1 1" x 1" NEMA label NL2X2 2" x 2" NEMA label XL Not CSA Listed LBN <sup>1</sup> Lubber Bolt BCC <sup>1</sup> ROAM Cupola Cap XC <sup>1</sup> No Cupola CR Spray Pre-Coat Finish 20kV 20kV/10kA surge protection device FPDxx Factory programmable driver	HSB House Side Black HSW House Side White  <b>Prewired leads</b> L1H 11' prewire leads L83 3ft prewire leads L10 10ft prewire leads L20 20ft prewire leads L25 25ft prewire leads L30 30ft prewire leads

Note: Check the OPTIONS MATRIX on Page 3 for compatibility & restrictions.

**AEL American Electric Lighting**  
1422 Midway Avenue, 1025 Columbus Street, Greenville, OH 45603  
www.american-electric-lighting.com  
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**Warranty:** Five-year limited warranty. Complete warranty terms located at: [www.american-electric-lighting.com/warranty-terms](https://www.american-electric-lighting.com/warranty-terms)  
Actual performance may differ as a result of end-user environment and application.  
All values are design or typical values, measured under laboratory conditions at 25 °C.  
Specifications subject to change without notice.  
Please contact your sales representative for the latest product information.

# SPEC SHEETS

(1) GENERAL NOTES  
CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaries. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.

2) NO OBJECTS CONSIDERED IN CALCULATIONS UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5

Wood PLC, - Zone 6, 7 and 8 pole-top LED Fixtures 247L\_P55  
P1279218  
Miami Lakes FL

DRAWING	DATE	DRAWN BY	REVIEWED BY

PROPOSED PHOTOMETRIC LAYOUT FOR:

Wood PLC - Zones 1 through 4 LED GE Evolve ERL1-06

"This is the main fixture for the residential areas in Zones 1, 2, 3, 4 and 5



(1) GENERAL NOTES  
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3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



Wood PLC, - Zones 1 through 4 LED GE Evolve ERL1-06			
P1279218			
Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY
01	11/14/19	SWL	EWD



Luminaire Schedule						
Symbol	Qty	Label		LLF	Description	Lum. Watts
—■	5	ERL1_06A340	-347-480V	0.700	ERL1_06A340 -347-480V	52

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Object_3_Top_1	Illuminance	Fc	0.37	1.6	0.0	N.A.	N.A.

**IMPORTANT**  
Presentation plans only  
Do not use for construction

# AREA LAYOUT

(1) GENERAL NOTES CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaires. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.	2) NO OBJECTS CONSIDERED IN CALCULATIONS UNLESS OTHERWISE NOTED ON THE PRINT. 3) STANDARD REFLECTION VALUES CEILING: .8 WALLS: .5 FLOOR: .2 RACKING: .5
---	---



Wood PLC, - Zones 1 through 4 LED GE Evolve ERL1-06			
P1279218			
Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY
01	11/14/19	SWL	EWD



Luminaire Schedule						
Symbol	Qty	Label	LLF	Description	Lum. Watts	Arr. Lum. Lumens
—⌘	5	ERL1_06A340_-347-480V	0.700	ERL1_06A340_-347-480V	52	6000

Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	FC Requirements
Object_3_Top_1	Illuminance	Fc	0.37	1.6	0.0	N.A.	N.A.	50 FC

**RENDERING**

(1) GENERAL NOTES  
CONFIDENTIAL INFORMATION Please Note: This data is based upon certain specific assumed reflectances and characteristics of the proposed environment. Any deviation from these reflectances or assumed characteristics may affect the actual performance of the luminaires. Based on the factors, Orion Energy Systems, Inc. can not guarantee these results.

2) NO OBJECTS CONSIDERED IN CALCULATIONS  
UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



Wood PLC, - Zones 1 through 4 LED GE Evolve ERL1-06			
P1279218			
Miami Lakes FL			
DRAWING	DATE	DRAWN BY	REVIEWED BY
01	11/14/19	SWL	EWD

1. DESCRIPTION OF PHOTOMETRIC DRAWING:  
THE PURPOSE OF THE FOLLOWING DRAWING(S) IS TO CREATE A CLOSE REPRESENTATION OF FOOT-CANDLE READINGS THE CLIENT CAN EXPECT TO ACHIEVE AFTER THE FIXTURES HAVE BEEN INSTALLED. INCLUDED IN THIS SET OF DRAWING(S) WILL BE A FIXTURE LAYOUT, A LUMINAIRE SCHEDULE SHOWING THE TOTAL NUMBER OF FIXTURES REQUIRED (PER FIXTURE TYPE) AND LIGHT LOSS FACTOR USED FOR EACH FIXTURE AND A CALCULATION SCHEDULE SHOWING THE AVERAGE, MAXIMUM AND MINIMUM FOOT-CANDLE READINGS PER AREA.

2. FIELD VERIFICATION:  
CALCULATIONS ARE PROVIDED USING INDUSTRY RECOGNIZED SOFTWARE AND ARE PROVIDED FORESTIMATION PURPOSES ONLY. HOWEVER, ACTUAL LIGHTING LEVELS WILL VARY DEPENDING ON FIELD CONDITIONS INCLUDING BUT NOT LIMITED TO ROOM CHARACTERISTICS AND TEMPERATURE. THE CALCULATIONS CORRESPOND TO THE INFORMATION PROVIDED TO ORION. ASSUMPTIONS MAY BE MADE FOR INFORMATION THAT IS NOT PROVIDED.IT IS THE RESPONSIBILITY OF THOSE USING THIS SERVICE TO VERIFY THAT OUR INPUT DATA IS CONSISTENT WITH ACTUAL FIELD CONDITIONS. CALCULATIONS ARE SUBJECT TO LIMITATIONS OF THE SOFTWARE. DUE TO THE ABOVE CONSIDERATIONS, ORION WILL NOT GUARANTEE THAT ACTUAL LIGHT LEVELS MEASURED IN THE FIELD WILL MATCH THE INITIAL CALCULATIONS. ALTHOUGH ALL EFFORTS HAVE BEEN MADE TO PLACE LIGHT FIXTURES FREE OF OBSTACLES WHEN PROVIDED WITH SUCH INFORMATION, IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY FIXTURE LOCATIONS ARE FREE OF ANY STEEL, HVAC, SPRINKLER SYSTEMS, ETC. IT IS ALSO THE CONTRACTORS RESPONSIBILITY TO MAKE SURE LIGHT FIXTURES ARE INSTALLED IN ACCORDANCE WITH LOCAL CODES, FM GLOBAL AND ESFR.

3. PERMITTING  
IT IS THE RESPONSIBILITY OF THE LICENCED CONTRACTOR TO CONTACT THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) TO VERIFY ALL LOCAL CODES AND TO ENSURE COMPLIANCE OF THESE CODES.

4. IES FILES  
IESNA STANDS FOR THE "ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA" AND BUILDING ACOUSTICS & LIGHTING LABS TESTS TO THEIR STANDARDS AS WELL AS MANY OTHERS. AN IES DATA FILE IS AN ELECTRONIC PHOTOMETRIC DATA FILE THAT CAN BE PUT INTO AN APPLICATION PROGRAM TO DETERMINE YOUR LUMINAIRES PERFORMANCE INSTANTLY. THESE STANDARDS ARE ESTABLISHED TO ENSURE THAT ALL THE INDEPENDENT LABORATORIES WILL GIVE COMPARABLE RESULTS. THUS ALLOWING MANUFACTURER A TO TEST WITH ONE LAB AND MANUFACTURER B TO TEST WITH ANOTHER LAB AND YOU CAN DIRECTLY COMPARE THE TWO RESULTING REPORTS IN AREAS OF EFFICIENCY, LIGHT DISTRIBUTION AND SO ON.

5. LIGHT METER VARIABLES  
DUE TO THE FACT THAT LIGHT METERS ARE NOT ALL MADE BY THE SAME MANUFACTURER, YOU MAY SEE DIFFERENT READINGS DEPENDING ON THE LIGHT METER BEING USED. OTHER VARIABLES WHICH MAY CREATE DIFFERENT LIGHT READINGS THAN WHAT IS SHOWN ON THE PHOTOMETRIC LAYOUT MAY INCLUDE BUT ARE NOT LIMITED TO: SHADOWS PRODUCED BY FRAMING, HVAC, EVAPORATORS, ETC.

6. DEFINITION OF TERMS

EFFICACY  
A MEASUREMENT OF HOW EFFECTIVE THE LIGHT SOURCE IS IN CONVERTING ELECTRICAL ENERGY TO LUMENS OF VISIBLE LIGHT. EXPRESSED IN LUMENS-PER-WATT (LPW) THIS MEASURE GIVES MORE WEIGHT TO THE YELLOW REGION OF THE SPECTRUM AND LESS WEIGHT TO THE BLUE AND RED REGION WHERE THE EYE IS NOT AS SENSITIVE.

LUMINAIRE EFFICIENCY  
THE EFFICIENCY OF A LUMINAIRE OR FIXTURE IS THE PERCENTAGE OF THE TOTAL LUMENS PRODUCED THAT ARE DELIVERED BY THE FIXTURE.

FOOT CANDLES  
A UNIT OF ILLUMINANCE OR INCIDENT LIGHT REFLECTING FROM A SURFACE. IT IS DEFINED AS THE AMOUNT OF LIGHT ON A ONE SQUARE FOOT SURFACE ONE FOOT FROM A STANDARD CANDLE. ONE FOOTCANDLE IS EQUAL TO ONE LUMEN PER SQUARE FOOT.

ILLUMINANCE  
ILLUMINANCE IS THE TOTAL LUMINOUS FLUX INCIDENT ON A SURFACE, PER UNIT AREA. IT IS A MEASURE OF HOW MUCH THE INCIDENT LIGHT ILLUMINATES THE SURFACE. ILLUMINANCE IS MEASURED IN FOOTCANDLES OR LUX.

LIGHT EMITTING DIODE (LED)  
A SOLID THAT DIRECTLY CONVERTS ELECTRICAL IMPULSES INTO LIGHT. LED'S ARE TEMPERATURE DEPENDANT, NOT ONLY FOR LONG LIFE, BUT SO THAT THE MAXIMUM LIGHT OUTPUT, QUALITY AND RELIABILITY OF THE DEVICE IS PRESERVED.

LIGHT LOSS FACTOR (LLF)  
THE PRODUCT OF ALL FACTORS THAT CONTRIBUTE TO LOWERING THE ILLUMINATION LEVEL INCLUDING REFLECTOR DEGRADATION, DIRT, LAMP DEPRECIATION OVER TIME, VOLTAGE FLUCTUATIONS, ETC.

LUMENS  
A MEASURE OF THE LUMINOUS FLUX OF LIGHT EMITTED BY A SOURCE. FOR EXAMPLE, A DINNER CANDLE PROVIDES ABOUT 12 LUMENS. A 60-WATT SOFT WHITE INCANDESCENT LAMP PROVIDES ABOUT 840 LUMENS.

LUMINAIRE  
A COMPLETE LIGHTING UNIT CONSISTING OF A LAMP (OR LAMPS), BALLAST (OR BALLASTS) AS REQUIRED TOGETHER WITH THE PARTS DESIGNED TO DISTRIBUTE THE LIGHT, POSITION AND PROTECT THE LAMPS AND CONNECT THEM TO THE POWER SUPPLY. A LUMINAIRE IS OFTEN REFERRED TO AS A FIXTURE.

LUMINANCE  
A MEASURE OF "SURFACE BRIGHTNESS" WHEN AN OBSERVER IS LOOKING IN THE DIRECTION OF THE SURFACE. IT IS MEASURED IN CANDELAS PER SQUARE METER (OR PER SQUARE FOOT) AND WAS FORMERLY REFERRED TO AS "PHOTOMETRIC BRIGHTNESS."

REFLECTANCE  
THE RATIO OF LIGHT REFLECTED FROM A SURFACE TO THAT INCIDENT UPON IT.

WATTS  
A UNIT OF ELECTRICAL POWER. LAMPS ARE RATED IN WATTS TO INDICATE THE RATE AT WHICH THEY CONSUME ENERGY.

Evolve™ LED Roadway Lighting  
LED Roadway Luminaire (ERL1-ERLH-ERS1-ERS2)



current  
powered by GE

Product Features

The Evolve™ LED Roadway Luminaire is optimized for customers requiring a LED solution for local, collector and major roadways. LED's unique reflective optics are designed to optimize application efficiency and minimize glare. The modern design incorporates the heat sink directly into the unit for heat transfer to protect LED life. This valuable unit has a 100,000 hour design life, significantly reducing maintenance needs and expense over the life of the fixture. This efficient solution lowers energy consumption compared to traditional HID fixture for additional operating cost savings.

Applications

- Designed to meet recommended luminance and maintenance requirements for local, collector and major roadway/street classifications.

Housing

- The modern design incorporates Castrol-Integral heatsink for maximum heat transfer.
- Meets 30 vibration per ANSI C136.31-2010.
- Die Cast Enclosure.

LED & Optical Assembly

- Evolve™ light engine consisting of reflective technology designed to optimize application efficiency and minimize glare.
- Utilize high brightness LEDs, 70 CRI at 3000K and 4000K typical.
- Life 75 years and reports in accordance with IESNA standards.

Lumen Maintenance

- Lumen Maintenance per TM21.

Rating

- UL listed, suitable for wet locations per UL 1598.
- Std. Optical enclosure tested per ANSI C136.25-2009: ERL1 & ERL2 I.L. & P.M. ERLH & P.M.
- Upward Light Output Ratio (ULOR) = 0.
- Compliant with the increased restriction requirements of RoHS.

Note: Heat sink tested to thermal conduction approach per UL and UL listing.

Product	Color	Temp	Warranty
ERL1	02-08	40°C to 55°C	5 Year
ERL2	02-08	40°C to 55°C	5 Year
ERLH	02-08	40°C to 55°C	5 Year
ERS1	02-08	40°C to 55°C	5 Year
ERS2	02-08	40°C to 55°C	5 Year

Designated start may be experienced at -30°C.

Housing

- Slidestar with +/- 5 degree of adjustment for leveling.
- Integrate die cast mounting pipe strap.
- Adjustable for 1.25 in. or 2 in. mounting pipe.

Finish

- Corrosion resistant polyester powder paint, minimum 2.0 mil thickness.
- Standard colors: Black, Gray and Dark Bronze.
- RAL & custom colors available.
- Optional coastal finish available.

Electrical

- 120-277VAC and 347/480VAC.
- System power factor is >95% and THD <20%.\*
- Class 100 surge rating.
- 0-10V dimming standard or DALI dimming available upon request for 0.1% to 100%.
- Surge Protection per ANSI C136.2-2015.
- Standard 480VAC "Nec 110.21 Street".
- Optional Secondary 100V/240V "Enhanced HID Strikes".
- Photo electric sensors (PI) available.
- EMF: Type A1 CTR Part 51 Class A.
- Photo electric sensors (PI) available.

Warranty

- 5 Year Standard
- 10 Year Optional

Suggested HID Replacement Lumen Levels

- 4,000-5,000 lumens to replace 100W HPS Cobra head
- 7,000-8,000 lumens to replace 150W HPS Cobra head
- 8,500-11,000 lumens to replace 200W HPS Cobra head
- 11,000-14,000 lumens to replace 250W HPS Cobra head
- 21,000-28,000 lumens to replace 400W HPS Cobra head

Note: Actual replacement lumens may vary based upon mounting height, pole spacing, design details, etc.

Ordering Number Logic  
Evolve™ LED Streetlight (ERL1)

ERL1										ERL2										ERLH										ERS1										ERS2									
Product		Color		Temp		Warranty		Product		Color		Temp		Warranty		Product		Color		Temp		Warranty		Product		Color		Temp		Warranty		Product		Color		Temp		Warranty											
ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year	ERL1	02-08	40°C to 55°C	5 Year										
ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year	ERL2	02-08	40°C to 55°C	5 Year						
ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year	ERLH	02-08	40°C to 55°C	5 Year		
ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year	ERS1	02-08	40°C to 55°C	5 Year		
ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year	ERS2	02-08	40°C to 55°C	5 Year		

# SPEC SHEETS

(1) GENERAL NOTES  
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2) NO OBJECTS CONSIDERED IN CALCULATIONS  
UNLESS OTHERWISE NOTED ON THE PRINT.

3) STANDARD REFLECTION VALUES  
CEILING: .8  
WALLS: .5  
FLOOR: .2  
RACKING: .5



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Wood PLC, - Zones 1 through 4 LED GE Evolve ERL1-06

P1279218

Miami Lakes FL

DRAWING	DATE	DRAWN BY	REVIEWED BY
01	11/14/19	SWL	EWD

## **Appendix E**

### **Cutsheets**

# Evolve™ LED Roadway Lighting

LED Roadway Luminaire (ERL1-ERLH-ERS1-ERS2)



**current**  
powered by GE

## Product Features

The Evolve™ LED Roadway Luminaire is optimized for customers requiring a LED solution for local, collector and major roadways. GE's unique reflective optics are designed to optimize application efficiency and minimize glare. The modern design incorporates the heat sink directly into the unit for heat transfer to prolong LED life. This reliable unit has a 100,000 hour design life, significantly reducing maintenance needs and expense over the life of the fixture. This efficient solution lowers energy consumption compared to traditional HID fixture for additional operating cost savings.

### Applications

- Designed to meet recommended luminance and illuminance requirements for local, collector and major roadway/street classifications.

### Housing

- The modern design incorporates Casting-integral heatsink for maximum heat transfer.
- Meets 3G vibration per ANSI C136.31-2010.
- Die Cast Enclosure.



### LED & Optical Assembly

- Evolve™ light engine consisting of reflective technology designed to optimize application efficiency and minimize glare.
- Utilizes high brightness LEDs, 70 CRI at 3000K and 4000K typical.
- LM-79 tests and reports in accordance with IESNA standards.

### Lumen Maintenance

- Lumen Maintenance per TM21.

### Ratings

-  listed, suitable for wet locations per UL 1598.
- Std. Optical enclosure rated per ANSI C136.25-2009: ERL1 = IP65, ERS1-2 = IP66, ERLH = IP65.
- Upward Light Output Ratio (ULOR) = 0.
- Compliant with the material restriction requirements of RoHS.
-  3000k must be selected to meet IDA certification and approval - ERL1 and ERLH only.

Product ID	Lumen Output	Ambient Rating
ERL1	02-09	-40°C to 50°C
ERLH	10-11	-40°C to 50°C
ERLH	13-15	-40°C to 40°C
ERS1	10-15	-40°C to 50°C
ERS2	16-23	-40°C to 50°C
ERS2	25-28	-40°C to 40°C

Delayed start may be experienced <-35°C.

### Mounting

- Slipfitter with +/- 5 degree of adjustment for leveling.
- Integral die cast mounting pipe stop.
- Adjustable for 1.25 in. or 2 in. mounting pipe.

### Finish

- Corrosion resistant polyester powder paint, minimum 2.0 mil. thickness.
- Standard colors: Black, Gray and Dark Bronze.
- RAL & custom colors available.
- Optional coastal finish available.

### Electrical

- 120-277 VAC and 347-480 VAC.
- System power factor is >90% and THD <20%.\*
- Class "A" Sound rating.
- 0-10V dimming standard or DALI dimming available upon request for 120V-277V.
- Surge Protection per ANSI C136.2-2015:
  - Standard: 6kV/3kA "Basic: (120 Strikes)"
  - Optional Secondary: 10kV/5kA "Enhanced: (40 Strikes)"
- EMI: Title 47 CFR Part 15 Class A
- Photo electric sensors (PE) available.

\* System power factor and THD is tested and specified at 120V input and maximum load conditions. THD<26% for 347/480V supply with 03 power level.

### Warranty

- 5 Year Standard
- 10 Year Optional

### Suggested HID Replacement Lumen Levels

- ~4,000–5,000 lumens to replace 100W HPS Cobra-head
- ~7,000–8,800 lumens to replace 150W HPS Cobra-head
- ~8,500–11,500 lumens to replace 200W HPS Cobra-head
- ~11,500–14,000 lumens to replace 250W HPS Cobra-head
- ~21,000–28,000 lumens to replace 400W HPS Cobra-head

**Note:** Actual replacement lumens may vary based upon mounting height, pole spacing, design criteria, etc.

# Ordering Number Logic

## Evolve™ LED Streetlight (ERL1)



ERL1

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION	CCT	CONTROLS	COLOR	OPTIONS
<b>E</b> = Evolve <b>R</b> = Roadway <b>L</b> = Local <b>1</b> = Single Module	<b>0</b> = 120-277* <b>1</b> = 120 <b>2</b> = 208 <b>3</b> = 240 <b>4</b> = 277 <b>5</b> = 480 <b>D</b> = 347 <b>H</b> = 347-480*  * Not available with Fusing. Must choose a descreeet voltage with F option.	<b>02*</b> <b>03</b> <b>04</b> <b>05</b> <b>06</b> <b>07</b> <b>08</b> <b>09</b>  See Data Table for more information.  *120V only, not compatible with 0-10V dimming.	<b>A1</b> = Extra Narrow Asymmetric <b>B1</b> = Narrow Asymmetric (Medium) <b>C1</b> = Asymmetric (Short) <b>D1</b> = Asymmetric Forward <b>E1</b> = Asymmetric (Medium) <b>F1</b> = Asymmetric (Wide) <b>G1</b> = Asymmetric (Extra Wide)  See Data Table for more information	<b>30</b> = 3000K <b>40</b> = 4000K	<b>A</b> = ANSI C136.41 7-pin <b>D</b> = ANSI C136.41 7-pin receptacle with Shorting Cap <b>E</b> = ANSI C136.41 7-pin Receptacle with non-Dimming PE Control.*  * PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete.  <b>NOTE:</b> Dimming controls wired for 0-10V standard unless DALI option "U" requested.	<b>GRAY</b> = Gray <b>BLCK</b> = Black <b>DKBZ</b> = Dark Bronze	<b>A</b> = 4 Bolt Slipfitter † <b>F</b> = Fusing <b>G</b> = Internal Bubble Level <b>I</b> = IP66 Optical <b>L</b> = Tool-Less Entry <b>R</b> = Optional Secondary Enhanced Surge Protection (10kV/5kA) <b>U</b> = Universal DALI Programmable +^ <b>X</b> = Single Package # <b>Y</b> = Coastal Finish * <b>XXX</b> = Special Options  † Contact manufacturer for Lead-Time. # Std Packaging = 20 units per container. * Recommended for installations within 1 mile from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^ Not available in 347V, 480V or 347-480V for Lumen Level 07 and 08.

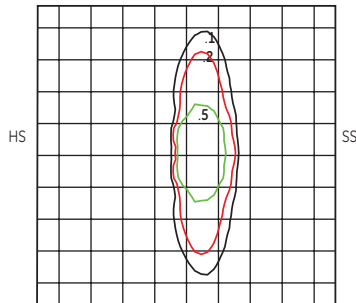
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING		IES FILE NUMBER 4000K		IES FILE NUMBER 3000K	
			4000K	3000K	120-277V	347-480V	4000K	3000K	120-277V	347-480V	120-277V	347-480V
ERL1	02	A1	1900	1800	15	N/A	B1-U0-G1	B1-U0-G1	ERL1_02A140_-120VIES	N/A	ERL1_02A130_-120VIES	N/A
ERL1		B1	1900	1800			B1-U0-G0	B1-U0-G0	ERL1_02B140_-120VIES	N/A	ERL1_02B130_-120VIES	N/A
ERL1		C1	2000	1900			B1-U0-G1	B1-U0-G1	ERL1_02C140_-120VIES	N/A	ERL1_02C130_-120VIES	N/A
ERL1		D1	1900	1800			B1-U0-G0	B1-U0-G0	ERL1_02D140_-120VIES	N/A	ERL1_02D130_-120VIES	N/A
ERL1		E1	2000	1900			B1-U0-G0	B1-U0-G0	ERL1_02E140_-120VIES	N/A	ERL1_02E130_-120VIES	N/A
ERL1		F1	2000	1900			B1-U0-G1	B1-U0-G1	ERL1_02F140_-120VIES	N/A	ERL1_02F130_-120VIES	N/A
ERL1	03	G1	2000	1900	25	28	B1-U0-G1	B1-U0-G1	ERL1_02G140_-120VIES	N/A	ERL1_02G130_-120VIES	N/A
ERL1		A1	2800	2700			B1-U0-G1	B1-U0-G1	ERL1_03A140_-120-277VIES	ERL1_03A140_-347-480VIES	ERL1_03A130_-120-277VIES	ERL1_03A130_-347-480VIES
ERL1		B1	2900	2800			B1-U0-G1	B1-U0-G1	ERL1_03B140_-120-277VIES	ERL1_03B140_-347-480VIES	ERL1_03B130_-120-277VIES	ERL1_03B130_-347-480VIES
ERL1		C1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03C140_-120-277VIES	ERL1_03C140_-347-480VIES	ERL1_03C130_-120-277VIES	ERL1_03C130_-347-480VIES
ERL1		D1	2900	2800			B1-U0-G1	B1-U0-G1	ERL1_03D140_-120-277VIES	ERL1_03D140_-347-480VIES	ERL1_03D130_-120-277VIES	ERL1_03D130_-347-480VIES
ERL1		E1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03E140_-120-277VIES	ERL1_03E140_-347-480VIES	ERL1_03E130_-120-277VIES	ERL1_03E130_-347-480VIES
ERL1	04	F1	3000	2900	32	35	B1-U0-G1	B1-U0-G1	ERL1_03F140_-120-277VIES	ERL1_03F140_-347-480VIES	ERL1_03F130_-120-277VIES	ERL1_03F130_-347-480VIES
ERL1		G1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03G140_-120-277VIES	ERL1_03G140_-347-480VIES	ERL1_03G130_-120-277VIES	ERL1_03G130_-347-480VIES
ERL1		A1	3800	3700			B1-U0-G1	B1-U0-G1	ERL1_04A140_-120-277VIES	ERL1_04A140_-347-480VIES	ERL1_04A130_-120-277VIES	ERL1_04A130_-347-480VIES
ERL1		B1	3900	3800			B1-U0-G1	B1-U0-G1	ERL1_04B140_-120-277VIES	ERL1_04B140_-347-480VIES	ERL1_04B130_-120-277VIES	ERL1_04B130_-347-480VIES
ERL1		C1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04C140_-120-277VIES	ERL1_04C140_-347-480VIES	ERL1_04C130_-120-277VIES	ERL1_04C130_-347-480VIES
ERL1		D1	3900	3800			B1-U0-G1	B1-U0-G1	ERL1_04D140_-120-277VIES	ERL1_04D140_-347-480VIES	ERL1_04D130_-120-277VIES	ERL1_04D130_-347-480VIES
ERL1	05	E1	4000	3900	41	45	B1-U0-G1	B1-U0-G1	ERL1_04E140_-120-277VIES	ERL1_04E140_-347-480VIES	ERL1_04E130_-120-277VIES	ERL1_04E130_-347-480VIES
ERL1		F1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04F140_-120-277VIES	ERL1_04F140_-347-480VIES	ERL1_04F130_-120-277VIES	ERL1_04F130_-347-480VIES
ERL1		G1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04G140_-120-277VIES	ERL1_04G140_-347-480VIES	ERL1_04G130_-120-277VIES	ERL1_04G130_-347-480VIES
ERL1		A1	4800	4600			B2-U0-G1	B2-U0-G1	ERL1_05A140_-120-277VIES	ERL1_05A140_-347-480VIES	ERL1_05A130_-120-277VIES	ERL1_05A130_-347-480VIES
ERL1		B1	4800	4600			B2-U0-G1	B2-U0-G1	ERL1_05B140_-120-277VIES	ERL1_05B140_-347-480VIES	ERL1_05B130_-120-277VIES	ERL1_05B130_-347-480VIES
ERL1		C1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05C140_-120-277VIES	ERL1_05C140_-347-480VIES	ERL1_05C130_-120-277VIES	ERL1_05C130_-347-480VIES
ERL1	06	D1	4800	4600	53	58	B1-U0-G1	B1-U0-G1	ERL1_05D140_-120-277VIES	ERL1_05D140_-347-480VIES	ERL1_05D130_-120-277VIES	ERL1_05D130_-347-480VIES
ERL1		E1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05E140_-120-277VIES	ERL1_05E140_-347-480VIES	ERL1_05E130_-120-277VIES	ERL1_05E130_-347-480VIES
ERL1		F1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05F140_-120-277VIES	ERL1_05F140_-347-480VIES	ERL1_05F130_-120-277VIES	ERL1_05F130_-347-480VIES
ERL1		G1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05G140_-120-277VIES	ERL1_05G140_-347-480VIES	ERL1_05G130_-120-277VIES	ERL1_05G130_-347-480VIES
ERL1		A1	5700	5500			B2-U0-G1	B2-U0-G1	ERL1_06A140_-120-277VIES	ERL1_06A140_-347-480VIES	ERL1_06A130_-120-277VIES	ERL1_06A130_-347-480VIES
ERL1		B1	5800	5600			B2-U0-G1	B2-U0-G1	ERL1_06B140_-120-277VIES	ERL1_06B140_-347-480VIES	ERL1_06B130_-120-277VIES	ERL1_06B130_-347-480VIES
ERL1	07	C1	6000	5800	67	72	B2-U0-G1	B2-U0-G1	ERL1_06C140_-120-277VIES	ERL1_06C140_-347-480VIES	ERL1_06C130_-120-277VIES	ERL1_06C130_-347-480VIES
ERL1		D1	5800	5600			B1-U0-G1	B1-U0-G1	ERL1_06D140_-120-277VIES	ERL1_06D140_-347-480VIES	ERL1_06D130_-120-277VIES	ERL1_06D130_-347-480VIES
ERL1		E1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06E140_-120-277VIES	ERL1_06E140_-347-480VIES	ERL1_06E130_-120-277VIES	ERL1_06E130_-347-480VIES
ERL1		F1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06F140_-120-277VIES	ERL1_06F140_-347-480VIES	ERL1_06F130_-120-277VIES	ERL1_06F130_-347-480VIES
ERL1		G1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06G140_-120-277VIES	ERL1_06G140_-347-480VIES	ERL1_06G130_-120-277VIES	ERL1_06G130_-347-480VIES
ERL1		A1	6700	6500			B2-U0-G2	B2-U0-G2	ERL1_07A140_-120-277VIES	ERL1_07A140_-347-480VIES	ERL1_07A130_-120-277VIES	ERL1_07A130_-347-480VIES
ERL1	08	B1	6800	6600	88	92	B2-U0-G1	B2-U0-G1	ERL1_07B140_-120-277VIES	ERL1_07B140_-347-480VIES	ERL1_07B130_-120-277VIES	ERL1_07B130_-347-480VIES
ERL1		C1	7000	6800			B2-U0-G1	B2-U0-G1	ERL1_07C140_-120-277VIES	ERL1_07C140_-347-480VIES	ERL1_07C130_-120-277VIES	ERL1_07C130_-347-480VIES
ERL1		D1	6800	6600			B2-U0-G1	B2-U0-G1	ERL1_07D140_-120-277VIES	ERL1_07D140_-347-480VIES	ERL1_07D130_-120-277VIES	ERL1_07D130_-347-480VIES
ERL1		E1	7000	6800			B2-U0-G1	B2-U0-G1	ERL1_07E140_-120-277VIES	ERL1_07E140_-347-480VIES	ERL1_07E130_-120-277VIES	ERL1_07E130_-347-480VIES
ERL1		F1	7000	6800			B2-U0-G2	B2-U0-G2	ERL1_07F140_-120-277VIES	ERL1_07F140_-347-480VIES	ERL1_07F130_-120-277VIES	ERL1_07F130_-347-480VIES
ERL1		G1	7000	6800			B2-U0-G2	B2-U0-G2	ERL1_07G140_-120-277VIES	ERL1_07G140_-347-480VIES	ERL1_07G130_-120-277VIES	ERL1_07G130_-347-480VIES
ERL1	09	A1	8200	8000	90	94	B2-U0-G2	B2-U0-G2	ERL1_08A140_-120-277VIES	ERL1_08A140_-347-480VIES	ERL1_08A130_-120-277VIES	ERL1_08A130_-347-480VIES
ERL1		B1	8300	8100			B2-U0-G1	B2-U0-G1	ERL1_08B140_-120-277VIES	ERL1_08B140_-347-480VIES	ERL1_08B130_-120-277VIES	ERL1_08B130_-347-480VIES
ERL1		C1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_08C140_-120-277VIES	ERL1_08C140_-347-480VIES	ERL1_08C130_-120-277VIES	ERL1_08C130_-347-480VIES
ERL1		D1	8300	8100			B2-U0-G1	B2-U0-G1	ERL1_08D140_-120-277VIES	ERL1_08D140_-347-480VIES	ERL1_08D130_-120-277VIES	ERL1_08D130_-347-480VIES
ERL1		E1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_08E140_-120-277VIES	ERL1_08E140_-347-480VIES	ERL1_08E130_-120-277VIES	ERL1_08E130_-347-480VIES
ERL1		F1	8500	8200			B2-U0-G2	B2-U0-G2	ERL1_08F140_-120-277VIES	ERL1_08F140_-347-480VIES	ERL1_08F130_-120-277VIES	ERL1_08F130_-347-480VIES
ERL1	10	G1	8500	8200	90	94	B2-U0-G2	B2-U0-G2	ERL1_08G140_-120-277VIES	ERL1_08G140_-347-480VIES	ERL1_08G130_-120-277VIES	ERL1_08G130_-347-480VIES
ERL1		A1	8400	8100			B2-U0-G2	B2-U0-G2	ERL1_09A140_-120-277VIES	ERL1_09A140_-347-480VIES	ERL1_09A130_-120-277VIES	ERL1_09A130_-347-480VIES
ERL1		B1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_09B140_-120-277VIES	ERL1_09B140_-347-480VIES	ERL1_09B130_-120-277VIES	ERL1_09B130_-347-480VIES
ERL1		C1	8800	8400			B2-U0-G1	B2-U0-G1	ERL1_09C140_-120-277VIES	ERL1_09C140_-347-480VIES	ERL1_09C130_-120-277VIES	ERL1_09C130_-347-480VIES
ERL1		D1	8500	8200			B2-U0-G2	B2-U0-G2	ERL1_09D140_-120-277VIES	ERL1_09D140_-347-480VIES	ERL1_09D130_-120-277VIES	ERL1_09D130_-347-480VIES
ERL1		E1	8800	8400			B2-U0-G1	B2-U0-G1	ERL1_09E140_-120-277VIES	ERL1_09E140_-347-480VIES	ERL1_09E130_-120-277VIES	ERL1_09E130_-347-480VIES
ERL1	11	F1	8800	8400	90	94	B2-U0-G2	B2-U0-G2	ERL1_09F140_-120-277VIES	ERL1_09F140_-347-480VIES	ERL1_09F130_-120-277VIES	ERL1_09F130_-347-480VIES
ERL1		G1	8800	8400			B2-U0-G2	B2-U0-G2	ERL1_09G140_-120-277VIES	ERL1_09G140_-347-480VIES	ERL1_09G130_-120-277VIES	ERL1_09G130_-347-480VIES

# Photometrics

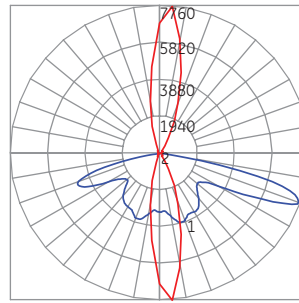
## Evolve™ LED Streetlight (ERL1)

### ERL1 Extra Narrow Asymmetric (08A1)

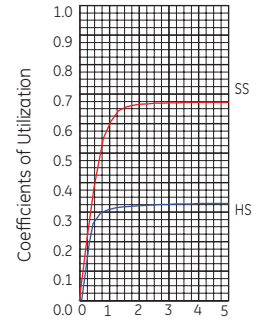
8,200 Lumens  
4000K  
ERL1\_08A140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



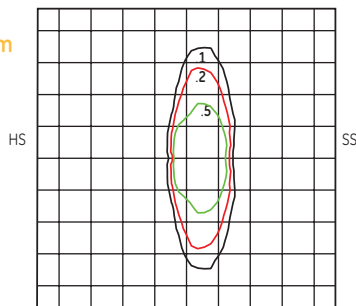
— Vertical plane through horizontal angle  
of maximum candlepower at 85°  
— Vertical plane through horizontal angle of 70°



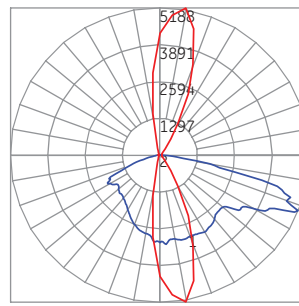
Street Width/Mounting Height

### ERL1 Narrow Asymmetric Medium (08B1)

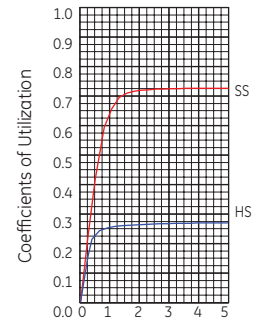
8,300 Lumens  
4000K  
ERL1\_08B140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



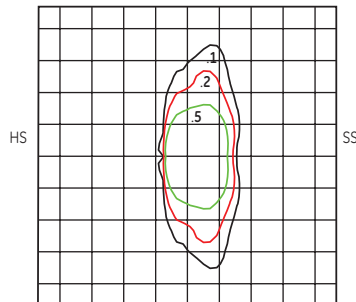
— Vertical plane through horizontal angle  
of maximum candlepower at 80°  
— Vertical plane through horizontal angle of 68°



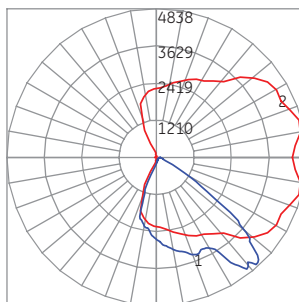
Street Width/Mounting Height

### ERL1 Asymmetric Short (08C1)

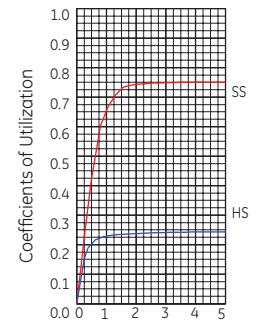
8,500 Lumens  
4000K  
ERL1\_08C140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



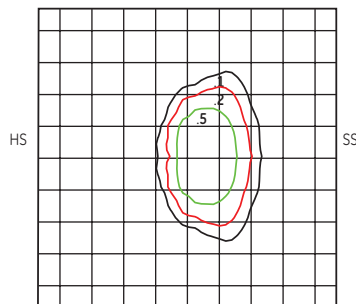
— Vertical plane through horizontal angle  
of maximum candlepower at 15°  
— Vertical plane through horizontal angle of 42°



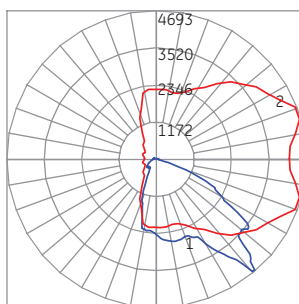
Street Width/Mounting Height

### ERL1 Asymmetric Forward (08D1)

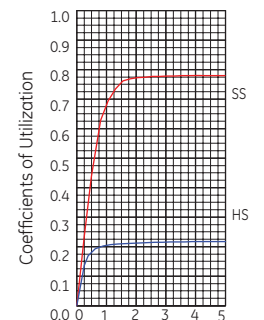
8,300 Lumens  
4000K  
ERL1\_08D140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 15°  
— Vertical plane through horizontal angle of 42°



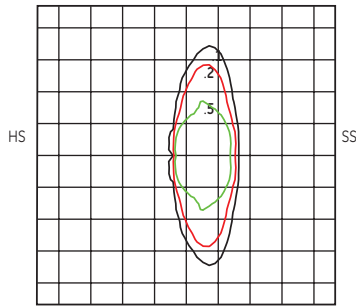
Street Width/Mounting Height

# Photometrics

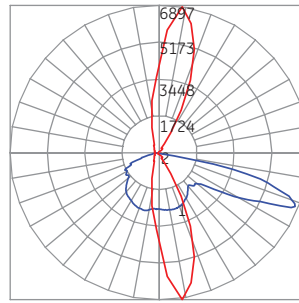
## Evolve™ LED Streetlight (ERL1)

### ERL1 Asymmetric Medium (08E1)

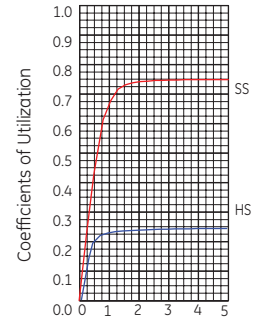
8,500 Lumens  
4000K  
ERL1\_08E140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



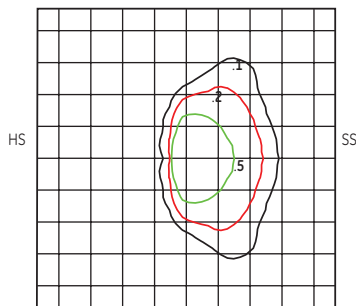
— Vertical plane through horizontal angle  
of maximum candlepower at 80°  
— Vertical plane through horizontal angle of 69°



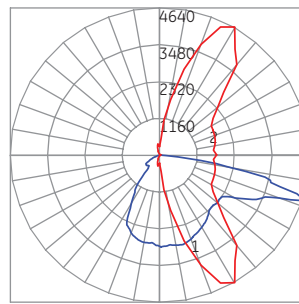
Street Width/Mounting Height

### ERL1 Asymmetric Wide (08F1)

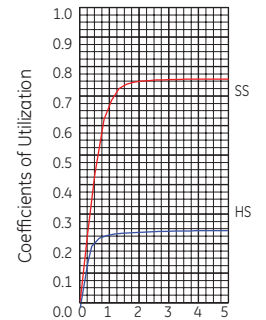
8,500 Lumens  
4000K  
ERL1\_08F140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



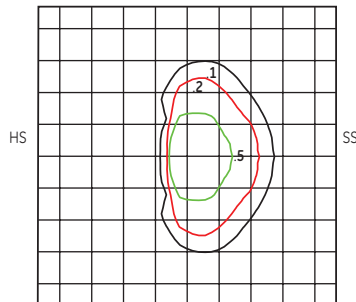
— Vertical plane through horizontal angle  
of maximum candlepower at 60°  
— Vertical plane through horizontal angle of 73°



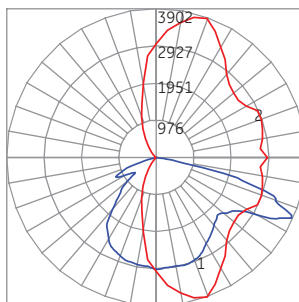
Street Width/Mounting Height

### ERL1 Asymmetric Extra Wide (08G1)

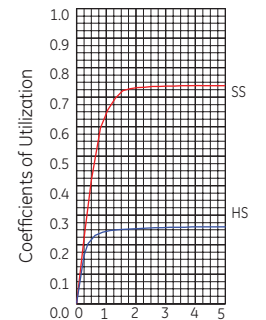
8,500 Lumens  
4000K  
ERL1\_08G140\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 70°  
— Vertical plane through horizontal angle of 66°



Street Width/Mounting Height

# Ordering Number Logic

## Evolve™ LED Streetlight (ERLH)



ERLH

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION	CCT	CONTROLS	COLOR	OPTIONS
<b>E</b> = Evolve <b>R</b> = Roadway <b>L</b> = Local <b>H</b> = High Output	<b>0</b> = 120-277* <b>1</b> = 120 <b>2</b> = 208 <b>3</b> = 240 <b>4</b> = 277 <b>5</b> = 480 <b>D</b> = 347 <b>H</b> = 347-480* * Not available with Fusing. Must choose a discreet voltage with F option.	<b>10</b> <b>11</b> <b>13</b> <b>14</b> <b>15</b> See Data Table for more information.	<b>A1</b> = Extra Narrow Asymmetric <b>B1</b> = Narrow Asymmetric (Medium) <b>C1</b> = Asymmetric (Short) <b>D1</b> = Asymmetric Forward <b>E1</b> = Asymmetric (Medium) <b>F1</b> = Asymmetric (Wide) <b>G1</b> = Asymmetric (Extra Wide) See Data Table for more information	<b>30</b> = 3000K <b>40</b> = 4000K	<b>A</b> = ANSI C136.41 7-pin <b>D</b> = ANSI C136.41 7-pin receptacle with Shorting Cap <b>E</b> = ANSI C136.41 7-pin Receptacle with non-Dimming PE Control.* * PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. <b>NOTE:</b> Dimming controls wired for 0-10V standard unless DALI option "U" requested.	<b>GRAY</b> = Gray <b>BLCK</b> = Black <b>DKBZ</b> = Dark Bronze	<b>A</b> = 4 Bolt Slipfitter † <b>F</b> = Fusing <b>G</b> = Internal Bubble Level <b>I</b> = IP66 Optical <b>L</b> = Tool-Less Entry <b>R</b> = Optional Secondary Enhanced Surge Protection (10kV/5kA) <b>U</b> = Universal DALI Programmable + ^ <b>X</b> = Single Package # <b>Y</b> = Coastal Finish * <b>XXX</b> = Special Options



PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER	
			4000K	3000K		4000K	3000K	4000K	3000K
ERLH	10	A1	9500	9100	90	B3-U0-G2	B3-U0-G2	ERLH_10A140__IES	ERLH_10A130__IES
ERLH		B1	9800	9500		B3-U0-G1	B2-U0-G1	ERLH_10B140__IES	ERLH_10B130__IES
ERLH		C1	10000	9600		B2-U0-G1	B2-U0-G1	ERLH_10C140__IES	ERLH_10C130__IES
ERLH		D1	9800	9500		B2-U0-G2	B2-U0-G2	ERLH_10D140__IES	ERLH_10D130__IES
ERLH		E1	10000	9600		B2-U0-G2	B2-U0-G2	ERLH_10E140__IES	ERLH_10E130__IES
ERLH		F1	10000	9600		B2-U0-G2	B2-U0-G2	ERLH_10F140__IES	ERLH_10F130__IES
ERLH		G1	10000	9600		B2-U0-G2	B2-U0-G2	ERLH_10G140__IES	ERLH_10G130__IES
ERLH	11	A1	10900	10500	108	B3-U0-G2	B3-U0-G2	ERLH_11A140__IES	ERLH_11A130__IES
ERLH		B1	11200	10800		B3-U0-G2	B3-U0-G1	ERLH_11B140__IES	ERLH_11B130__IES
ERLH		C1	11500	11100		B3-U0-G2	B3-U0-G2	ERLH_11C140__IES	ERLH_11C130__IES
ERLH		D1	11200	10800		B2-U0-G2	B2-U0-G2	ERLH_11D140__IES	ERLH_11D130__IES
ERLH		E1	11500	11100		B3-U0-G2	B3-U0-G2	ERLH_11E140__IES	ERLH_11E130__IES
ERLH		F1	11500	11100		B3-U0-G2	B3-U0-G2	ERLH_11F140__IES	ERLH_11F130__IES
ERLH		G1	11500	11100		B3-U0-G2	B3-U0-G2	ERLH_11G140__IES	ERLH_11G130__IES
ERLH	13	A1	12300	11900	125	B3-U0-G2	B3-U0-G2	ERLH_13A140__IES	ERLH_13A130__IES
ERLH		B1	12700	12200		B3-U0-G2	B3-U0-G2	ERLH_13B140__IES	ERLH_13B130__IES
ERLH		C1	13000	12500		B3-U0-G2	B3-U0-G2	ERLH_13C140__IES	ERLH_13C130__IES
ERLH		D1	12700	12200		B3-U0-G2	B2-U0-G2	ERLH_13D140__IES	ERLH_13D130__IES
ERLH		E1	13000	12500		B3-U0-G2	B3-U0-G2	ERLH_13E140__IES	ERLH_13E130__IES
ERLH		F1	13000	12500		B3-U0-G2	B3-U0-G2	ERLH_13F140__IES	ERLH_13F130__IES
ERLH		G1	13000	12500		B3-U0-G2	B3-U0-G2	ERLH_13G140__IES	ERLH_13G130__IES
ERLH	14	A1	13300	12800	139	B3-U0-G3	B3-U0-G3	ERLH_14A140__IES	ERLH_14A130__IES
ERLH		B1	13700	13200		B3-U0-G2	B3-U0-G2	ERLH_14B140__IES	ERLH_14B130__IES
ERLH		C1	14000	13500		B3-U0-G2	B3-U0-G2	ERLH_14C140__IES	ERLH_14C130__IES
ERLH		D1	13700	13200		B3-U0-G2	B3-U0-G2	ERLH_14D140__IES	ERLH_14D130__IES
ERLH		E1	14000	13500		B3-U0-G2	B3-U0-G2	ERLH_14E140__IES	ERLH_14E130__IES
ERLH		F1	14000	13500		B3-U0-G2	B3-U0-G2	ERLH_14F140__IES	ERLH_14F130__IES
ERLH		G1	14000	13500		B3-U0-G2	B3-U0-G2	ERLH_14G140__IES	ERLH_14G130__IES
ERLH	15	A1	14200	13700	161	B3-U0-G3	B3-U0-G3	ERLH_15A140__IES	ERLH_15A130__IES
ERLH		B1	14700	14200		B3-U0-G2	B3-U0-G2	ERLH_15B140__IES	ERLH_15B130__IES
ERLH		C1	15000	14500		B3-U0-G2	B3-U0-G2	ERLH_15C140__IES	ERLH_15C130__IES
ERLH		D1	14700	14200		B3-U0-G2	B3-U0-G2	ERLH_15D140__IES	ERLH_15D130__IES
ERLH		E1	15000	14500		B3-U0-G2	B3-U0-G2	ERLH_15E140__IES	ERLH_15E130__IES
ERLH		F1	15000	14500		B3-U0-G2	B3-U0-G2	ERLH_15F140__IES	ERLH_15F130__IES
ERLH		G1	15000	14500		B3-U0-G2	B3-U0-G2	ERLH_15G140__IES	ERLH_15G130__IES

# Ordering Number Logic

## Evolve™ LED Streetlight (ERS1)



ERS1

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION	DRIVE CURRENT	CCT	CONTROLS	COLOR	OPTIONS
<b>E</b> = Evolve <b>R</b> = Roadway <b>S</b> = Scalable <b>1</b> = Single Module	<b>0</b> = 120-277* <b>1</b> = 120 <b>2</b> = 208 <b>3</b> = 240 <b>4</b> = 277 <b>5</b> = 480 <b>D</b> = 347 <b>H</b> = 347-480* * Not available with Fusing. Must choose a discreet voltage with F option.	<b>10</b> <b>11</b> <b>13</b> <b>14</b> <b>15</b> See Data Table for more information.	<b>A1</b> = Extra Narrow Asymmetric <b>B1</b> = Narrow Asymmetric (Medium) <b>C1</b> = Asymmetric (Short) <b>D1</b> = Asymmetric Forward <b>E1</b> = Asymmetric (Medium) <b>F1</b> = Asymmetric (Wide) <b>G1</b> = Asymmetric (Extra Wide) See Data Table for more information	<b>X</b> = Not Applicable	<b>30</b> = 3000K <b>40</b> = 4000K	<b>A</b> = ANSI C136.41 7-pin <b>D</b> = ANSI C136.41 7-pin receptacle with Shorting Cap <b>E</b> = ANSI C136.41 7-pin Receptacle with non-Dimming PE Control.* * PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. <b>NOTE:</b> Dimming controls wired for 0-10V standard unless DALI option "U" requested.	<b>GRAY</b> = Gray <b>BLCK</b> = Black <b>DKBZ</b> = Dark Bronze	<b>F</b> = Fusing <b>G</b> = Internal Bubble Level <b>L</b> = Tool-Less Entry <b>R</b> = Optional Secondary Enhanced Surge Protection (10kV/5kA) <b>T</b> = 20kV/10kA Surge Protection per IEEE/ANSI C62.41.2-2002 † <b>U</b> = Universal DALI Programmable+^ <b>Y</b> = Coastal Finish* <b>XXX</b> = Special Options * Recommended for installations within 1 mile from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^Not available at 347V, 480V or 347-480V.

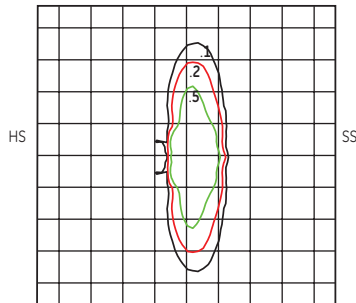
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER	
			4000K	3000K		4000K	3000K	4000K	3000K
ERS1	10	A1	9500	9200	90	B3-U0-G2	B3-U0-G2	ERS1_10A1X40__IES	ERS1_10A1X30__IES
ERS1		B1	9800	9500		B3-U0-G1	B2-U0-G1	ERS1_10B1X40__IES	ERS1_10B1X30__IES
ERS1		C1	10000	9600		B2-U0-G1	B2-U0-G1	ERS1_10C1X40__IES	ERS1_10C1X30__IES
ERS1		D1	9800	9500		B2-U0-G2	B2-U0-G2	ERS1_10D1X40__IES	ERS1_10D1X30__IES
ERS1		E1	10000	9600		B2-U0-G2	B2-U0-G2	ERS1_10E1X40__IES	ERS1_10E1X30__IES
ERS1		F1	10000	9600		B2-U0-G2	B2-U0-G2	ERS1_10F1X40__IES	ERS1_10F1X30__IES
ERS1		G1	10000	9600		B2-U0-G2	B2-U0-G2	ERS1_10G1X40__IES	ERS1_10G1X30__IES
ERS1	11	A1	10900	10500	108	B3-U0-G2	B3-U0-G2	ERS1_11A1X40__IES	ERS1_11A1X30__IES
ERS1		B1	11200	10800		B3-U0-G2	B3-U0-G1	ERS1_11B1X40__IES	ERS1_11B1X30__IES
ERS1		C1	11500	11100		B3-U0-G2	B3-U0-G2	ERS1_11C1X40__IES	ERS1_11C1X30__IES
ERS1		D1	11200	10800		B2-U0-G2	B2-U0-G2	ERS1_11D1X40__IES	ERS1_11D1X30__IES
ERS1		E1	11500	11100		B3-U0-G2	B3-U0-G2	ERS1_11E1X40__IES	ERS1_11E1X30__IES
ERS1		F1	11500	11100		B3-U0-G2	B3-U0-G2	ERS1_11F1X40__IES	ERS1_11F1X30__IES
ERS1		G1	11500	11100		B3-U0-G2	B3-U0-G2	ERS1_11G1X40__IES	ERS1_11G1X30__IES
ERS1	13	A1	12300	11900	125	B3-U0-G2	B3-U0-G2	ERS1_13A1X40__IES	ERS1_13A1X30__IES
ERS1		B1	12700	12200		B3-U0-G2	B3-U0-G2	ERS1_13B1X40__IES	ERS1_13B1X30__IES
ERS1		C1	13000	12500		B3-U0-G2	B3-U0-G2	ERS1_13C1X40__IES	ERS1_13C1X30__IES
ERS1		D1	12700	12200		B3-U0-G2	B2-U0-G2	ERS1_13D1X40__IES	ERS1_13D1X30__IES
ERS1		E1	13000	12500		B3-U0-G2	B3-U0-G2	ERS1_13E1X40__IES	ERS1_13E1X30__IES
ERS1		F1	13000	12500		B3-U0-G2	B3-U0-G2	ERS1_13F1X40__IES	ERS1_13F1X30__IES
ERS1		G1	13000	12500		B3-U0-G2	B3-U0-G2	ERS1_13G1X40__IES	ERS1_13G1X30__IES
ERS1	14	A1	13300	12800	139	B3-U0-G3	B3-U0-G3	ERS1_14A1X40__IES	ERS1_14A1X30__IES
ERS1		B1	13700	13200		B3-U0-G2	B3-U0-G2	ERS1_14B1X40__IES	ERS1_14B1X30__IES
ERS1		C1	14000	13500		B3-U0-G2	B3-U0-G2	ERS1_14C1X40__IES	ERS1_14C1X30__IES
ERS1		D1	13700	13200		B3-U0-G2	B3-U0-G2	ERS1_14D1X40__IES	ERS1_14D1X30__IES
ERS1		E1	14000	13500		B3-U0-G2	B3-U0-G2	ERS1_14E1X40__IES	ERS1_14E1X30__IES
ERS1		F1	14000	13500		B3-U0-G2	B3-U0-G2	ERS1_14F1X40__IES	ERS1_14F1X30__IES
ERS1		G1	14000	13500		B3-U0-G2	B3-U0-G2	ERS1_14G1X40__IES	ERS1_14G1X30__IES
ERS1	15	A1	14200	13700	161	B3-U0-G3	B3-U0-G3	ERS1_15A1X40__IES	ERS1_15A1X30__IES
ERS1		B1	14700	14200		B3-U0-G2	B3-U0-G2	ERS1_15B1X40__IES	ERS1_15B1X30__IES
ERS1		C1	15000	14500		B3-U0-G2	B3-U0-G2	ERS1_15C1X40__IES	ERS1_15C1X30__IES
ERS1		D1	14700	14200		B3-U0-G2	B3-U0-G2	ERS1_15D1X40__IES	ERS1_15D1X30__IES
ERS1		E1	15000	14500		B3-U0-G2	B3-U0-G2	ERS1_15E1X40__IES	ERS1_15E1X30__IES
ERS1		F1	15000	14500		B3-U0-G2	B3-U0-G2	ERS1_15F1X40__IES	ERS1_15F1X30__IES
ERS1		G1	15000	14500		B3-U0-G2	B3-U0-G2	ERS1_15G1X40__IES	ERS1_15G1X30__IES

# Photometrics

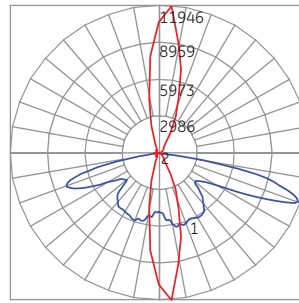
## Evolve™ LED Streetlight (ERLH and ERS1)

### ERLH and ERS1 Extra Narrow Asymmetric (15A1)

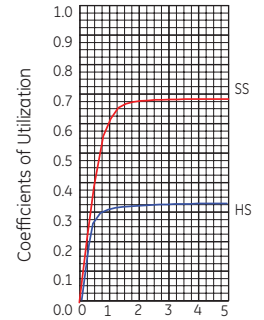
14,200 Lumens  
4000K



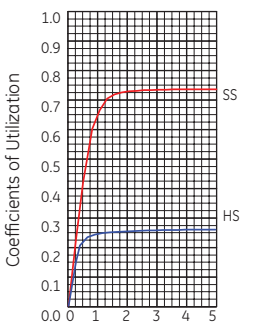
Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 85°  
— Vertical plane through horizontal angle of 71°



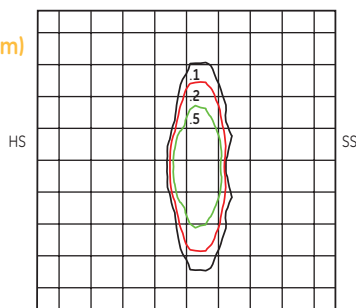
Coefficients of Utilization



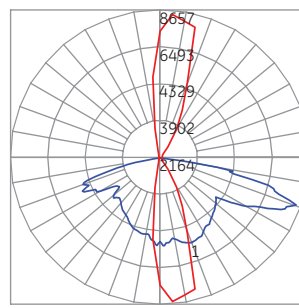
Coefficients of Utilization

### ERLH and ERS1 Narrow Asymmetric (Medium) (15B1)

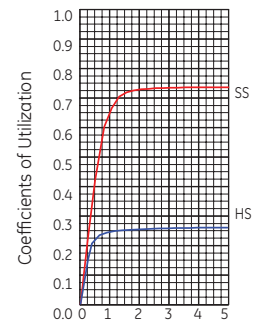
14,700 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



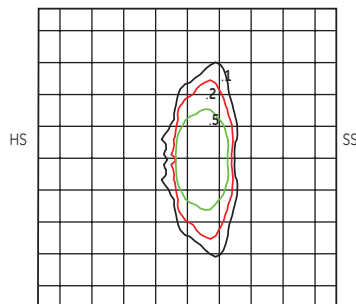
— Vertical plane through horizontal angle  
of maximum candlepower at 85°  
— Vertical plane through horizontal angle of 71°



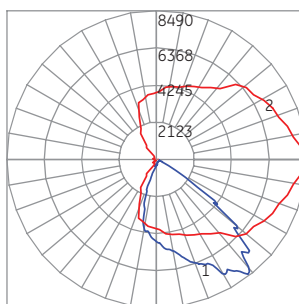
Coefficients of Utilization

### ERLH and ERS1 Asymmetric Short (15C1)

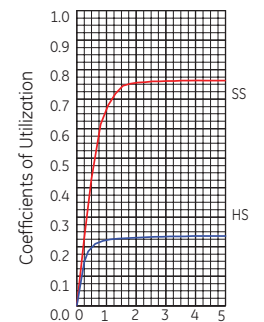
15,000 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



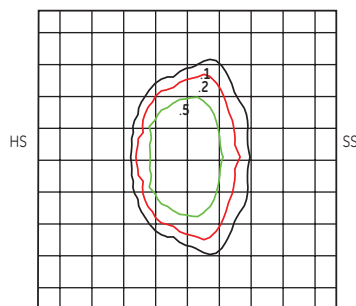
— Vertical plane through horizontal angle  
of maximum candlepower at 0°  
— Vertical plane through horizontal angle of 38°



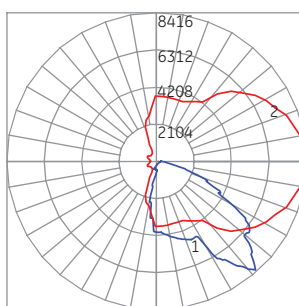
Coefficients of Utilization

### ERLH and ERS1 Asymmetric Forward (15D1)

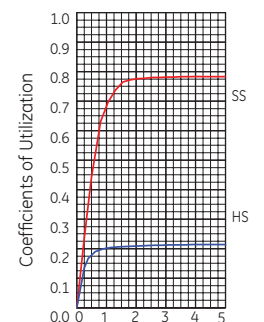
14,700 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 5°  
— Vertical plane through horizontal angle of 41°



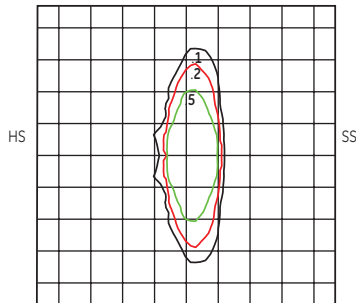
Coefficients of Utilization

# Photometrics

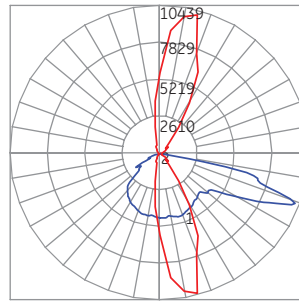
## Evolve™ LED Streetlight (ERLH and ERS1)

### ERLH and ERS1 Asymmetric Medium (15E1)

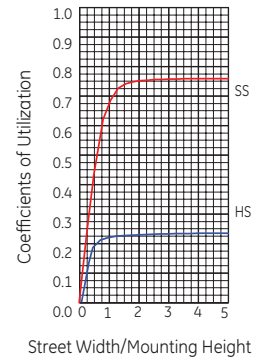
15,000 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade

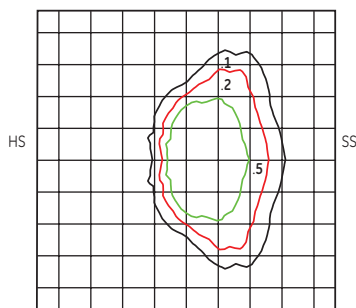


— Vertical plane through horizontal angle  
of maximum candlepower at 75°  
— Vertical plane through horizontal angle of 70°

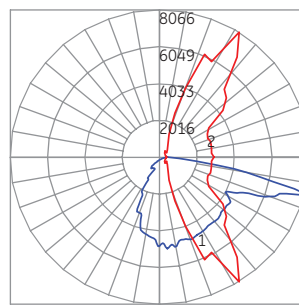


### ERLH and ERS1 Asymmetric Wide (15F1)

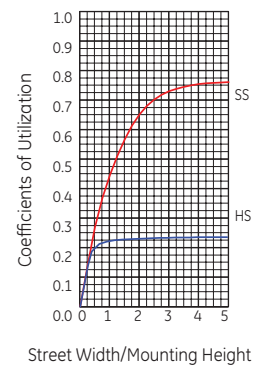
15,000 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade

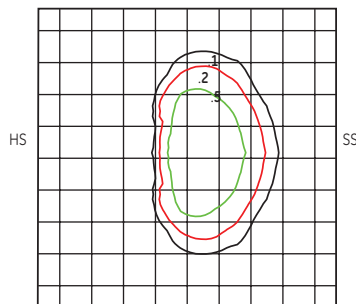


— Vertical plane through horizontal angle  
of maximum candlepower at 60°  
— Vertical plane through horizontal angle of 75°

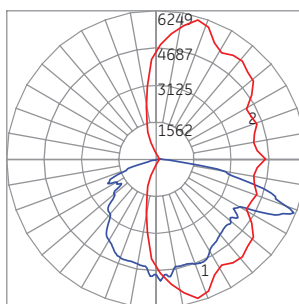


### ERLH and ERS1 Asymmetric Extra Wide (15G1)

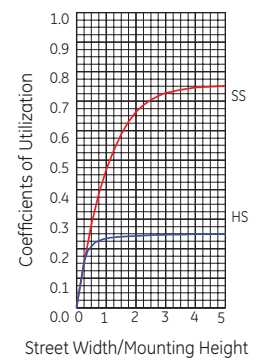
15,000 Lumens  
4000K



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 75°  
— Vertical plane through horizontal angle of 68°



# Ordering Number Logic

## Evolve™ LED Streetlight (ERS2)



ERS2

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION	DRIVE CURRENT	CCT	CONTROLS	COLOR	OPTIONS
<b>E</b> = Evolve <b>R</b> = Roadway <b>S</b> = Scalable <b>2</b> = Double Module	<b>0</b> = 120-277* <b>1</b> = 120 <b>2</b> = 208 <b>3</b> = 240 <b>4</b> = 277 <b>5</b> = 480 <b>D</b> = 347 <b>H</b> = 347-480* * Not available with Fusing. Must choose a descreeet voltage with F option.	<b>16</b> <b>18</b> <b>19</b> <b>21</b> <b>23</b> <b>25</b> <b>27</b> <b>28</b> See Data Table for more information.	<b>A1</b> = Extra Narrow Asymmetric <b>B1</b> = Narrow Asymmetric (Medium) <b>C1</b> = Asymmetric (Short) <b>D1</b> = Asymmetric Forward <b>E1</b> = Asymmetric (Medium) <b>F1</b> = Asymmetric (Wide) <b>G1</b> = Asymmetric (Extra Wide) See Data Table for more information	<b>X</b> = Not Applicable	<b>30</b> = 3000K <b>40</b> = 4000K	<b>A</b> = ANSI C136.41 7-pin <b>D</b> = ANSI C136.41 7-pin receptacle with Shorting Cap <b>E</b> = ANSI C136.41 7-pin Receptacle with non-Dimming PE Control.* * PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. <b>NOTE:</b> Dimming controls wired for 0-10V standard unless DALI option "U" requested.	<b>GRAY</b> = Gray <b>BLCK</b> = Black <b>DKBZ</b> = Dark Bronze	<b>A</b> = 4 Bolt Slipfitter † <b>F</b> = Fusing <b>G</b> = Internal Bubble Level <b>L</b> = Tool-Less Entry <b>R</b> = Optional Secondary Enhanced Surge Protection (10kV/5kA) <b>T</b> = 20kV/10kA Surge Protection per IEEE/ANSI C62.41.2-2002 † <b>U</b> = Universal DALI Programmable + ^ <b>Y</b> = Coastal Finish* <b>XXX</b> = Special Options † Contact manufacturer for Lead-Time. * Recommended for installations within 1 mile from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^ Not available at 347V, 480V or 347-480V.

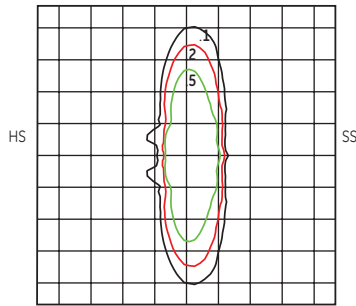
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER	
			4000K	3000K		4000K	3000K	4000K	3000K
ERS2	16	A1	15200	14700	132	B3-U0-G3	B3-U0-G3	ERS2_16A1X40	ERS2_16A1X30
ERS2		B1	15700	15100		B3-U0-G2	B3-U0-G2	ERS2_16B1X40	ERS2_16B1X30
ERS2		C1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16C1X40	ERS2_16C1X30
ERS2		D1	15700	15100		B3-U0-G2	B3-U0-G2	ERS2_16D1X40	ERS2_16D1X30
ERS2		E1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16E1X40	ERS2_16E1X30
ERS2		F1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16F1X40	ERS2_16F1X30
ERS2	18	G1	16000	15400	157	B3-U0-G2	B3-U0-G2	ERS2_16G1X40	ERS2_16G1X30
ERS2		A1	17100	16500		B3-U0-G3	B3-U0-G3	ERS2_18A1X40	ERS2_18A1X30
ERS2		B1	17600	17000		B3-U0-G2	B3-U0-G2	ERS2_18B1X40	ERS2_18B1X30
ERS2		C1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18C1X40	ERS2_18C1X30
ERS2		D1	17600	17000		B3-U0-G2	B3-U0-G2	ERS2_18D1X40	ERS2_18D1X30
ERS2		E1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18E1X40	ERS2_18E1X30
ERS2	19	F1	18000	17400	162	B3-U0-G3	B3-U0-G2	ERS2_18F1X40	ERS2_18F1X30
ERS2		G1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18G1X40	ERS2_18G1X30
ERS2		A1	18000	17300		B3-U0-G3	B3-U0-G3	ERS2_19A1X40	ERS2_19A1X30
ERS2		B1	18600	17900		B3-U0-G2	B3-U0-G2	ERS2_19B1X40	ERS2_19B1X30
ERS2		C1	19000	18300		B3-U0-G2	B3-U0-G2	ERS2_19C1X40	ERS2_19C1X30
ERS2		D1	18600	17900		B3-U0-G2	B3-U0-G2	ERS2_19D1X40	ERS2_19D1X30
ERS2	21	E1	19000	18300	193	B3-U0-G2	B3-U0-G2	ERS2_19E1X40	ERS2_19E1X30
ERS2		F1	19000	18300		B3-U0-G3	B3-U0-G3	ERS2_19F1X40	ERS2_19F1X30
ERS2		G1	19000	18300		B3-U0-G3	B3-U0-G2	ERS2_19G1X40	ERS2_19G1X30
ERS2		A1	20000	19300		B3-U0-G3	B3-U0-G3	ERS2_21A1X40	ERS2_21A1X30
ERS2		B1	20600	19900		B3-U0-G2	B3-U0-G2	ERS2_21B1X40	ERS2_21B1X30
ERS2		C1	21000	20300		B3-U0-G2	B3-U0-G2	ERS2_21C1X40	ERS2_21C1X30
ERS2	23	D1	20600	19900	219	B3-U0-G2	B3-U0-G2	ERS2_21D1X40	ERS2_21D1X30
ERS2		E1	21000	20300		B3-U0-G2	B3-U0-G2	ERS2_21E1X40	ERS2_21E1X30
ERS2		F1	21000	20300		B3-U0-G3	B3-U0-G3	ERS2_21F1X40	ERS2_21F1X30
ERS2		G1	21000	20300		B3-U0-G3	B3-U0-G3	ERS2_21G1X40	ERS2_21G1X30
ERS2		A1	21900	21100		B4-U0-G3	B3-U0-G3	ERS2_23A1X40	ERS2_23A1X30
ERS2		B1	22500	21700		B3-U0-G3	B3-U0-G2	ERS2_23B1X40	ERS2_23B1X30
ERS2	25	C1	23000	22200	243	B3-U0-G2	B3-U0-G2	ERS2_23C1X40	ERS2_23C1X30
ERS2		D1	22500	21700		B3-U0-G2	B3-U0-G2	ERS2_23D1X40	ERS2_23D1X30
ERS2		E1	23000	22200		B3-U0-G2	B3-U0-G2	ERS2_23E1X40	ERS2_23E1X30
ERS2		F1	23000	22200		B3-U0-G3	B3-U0-G3	ERS2_23F1X40	ERS2_23F1X30
ERS2		G1	23000	22200		B3-U0-G3	B3-U0-G3	ERS2_23G1X40	ERS2_23G1X30
ERS2		A1	23800	23000		B4-U0-G3	B4-U0-G3	ERS2_25A1X40	ERS2_25A1X30
ERS2	27	B1	24500	23600	275	B4-U0-G3	B3-U0-G3	ERS2_25B1X40	ERS2_25B1X30
ERS2		C1	25000	24100		B3-U0-G2	B3-U0-G2	ERS2_25C1X40	ERS2_25C1X30
ERS2		D1	24500	23600		B3-U0-G3	B3-U0-G3	ERS2_25D1X40	ERS2_25D1X30
ERS2		E1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25E1X40	ERS2_25E1X30
ERS2		F1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25F1X40	ERS2_25F1X30
ERS2		G1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25G1X40	ERS2_25G1X30
ERS2	28	A1	25700	24800	280	B4-U0-G3	B4-U0-G3	ERS2_27A1X40	ERS2_27A1X30
ERS2		B1	26500	25600		B4-U0-G3	B4-U0-G3	ERS2_27B1X40	ERS2_27B1X30
ERS2		C1	27000	26000		B4-U0-G3	B4-U0-G3	ERS2_27C1X40	ERS2_27C1X30
ERS2		D1	26500	25600		B3-U0-G3	B3-U0-G3	ERS2_27D1X40	ERS2_27D1X30
ERS2		E1	27000	26000		B4-U0-G3	B4-U0-G3	ERS2_27E1X40	ERS2_27E1X30
ERS2		F1	27000	26000		B4-U0-G4	B4-U0-G3	ERS2_27F1X40	ERS2_27F1X30
ERS2	28	G1	27000	26000	280	B4-U0-G3	B4-U0-G3	ERS2_27G1X40	ERS2_27G1X30
ERS2		A1	26600	25600		B4-U0-G3	B4-U0-G3	ERS2_28A1X40	ERS2_28A1X30
ERS2		B1	27400	26400		B4-U0-G3	B4-U0-G3	ERS2_28B1X40	ERS2_28B1X30
ERS2		C1	28000	26900		B4-U0-G3	B4-U0-G3	ERS2_28C1X40	ERS2_28C1X30
ERS2		D1	27400	26400		B3-U0-G3	B3-U0-G3	ERS2_28D1X40	ERS2_28D1X30
ERS2		E1	28000	26900		B4-U0-G3	B4-U0-G3	ERS2_28E1X40	ERS2_28E1X30
ERS2	28	F1	28000	26900	280	B4-U0-G4	B4-U0-G3	ERS2_28F1X40	ERS2_28F1X30
ERS2		G1	28000	26900		B4-U0-G4	B4-U0-G3	ERS2_28G1X40	ERS2_28G1X30

# Photometrics

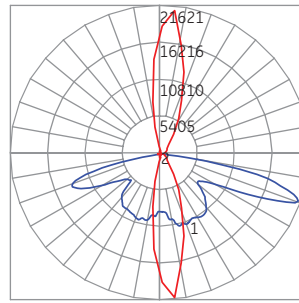
## Evolve™ LED Streetlight (ERS2)

### ERS2 Extra Narrow Asymmetric (27A1)

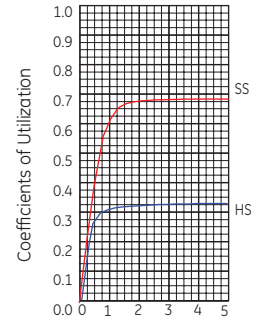
25,700 Lumens  
4000K  
ERS2\_27A1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



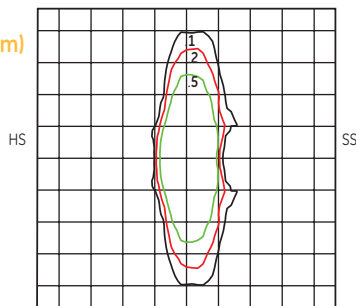
— Vertical plane through horizontal angle  
of maximum candlepower at 85°  
— Vertical plane through horizontal angle of 71°



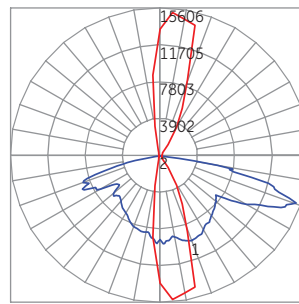
Street Width/Mounting Height

### ERS2 Narrow Asymmetric (Medium) (27B1)

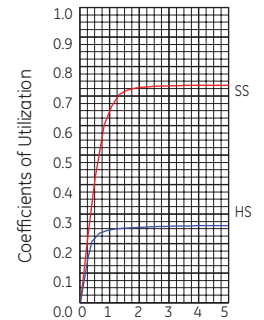
26,500 Lumens  
4000K  
ERS2\_27B1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



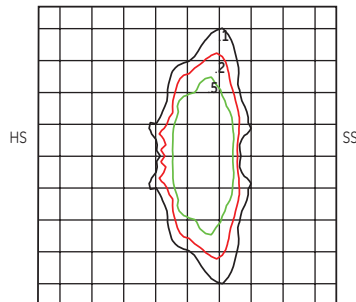
— Vertical plane through horizontal angle  
of maximum candlepower at 85°  
— Vertical plane through horizontal angle of 71°



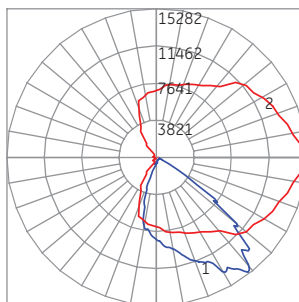
Street Width/Mounting Height

### ERS2 Asymmetric Short (27C1)

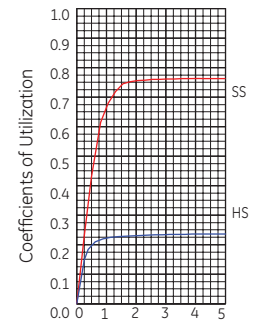
27,000 Lumens  
4000K  
ERS2\_27C1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



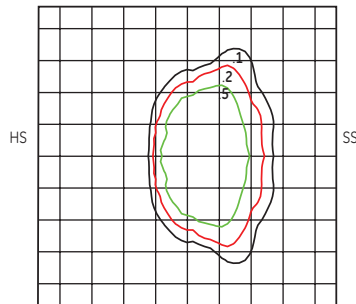
— Vertical plane through horizontal angle  
of maximum candlepower at 0°  
— Vertical plane through horizontal angle of 38°



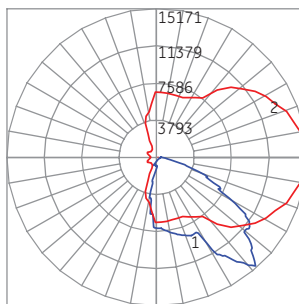
Street Width/Mounting Height

### ERS2 Asymmetric Forward (27D1)

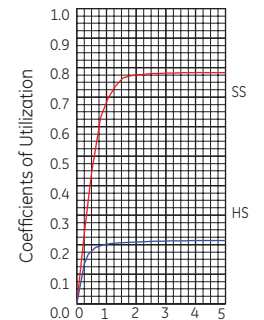
26,500 Lumens  
4000K  
ERS2\_27D1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade



— Vertical plane through horizontal angle  
of maximum candlepower at 5°  
— Vertical plane through horizontal angle of 41°



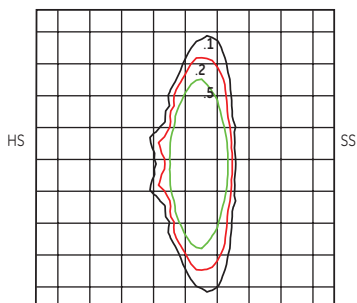
Street Width/Mounting Height

# Photometrics

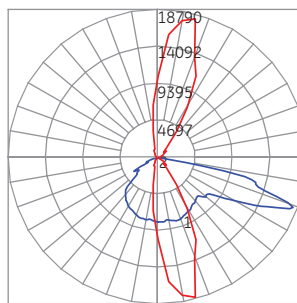
## Evolve™ LED Streetlight (ERS2)

### ERS2 Asymmetric Medium (27E1)

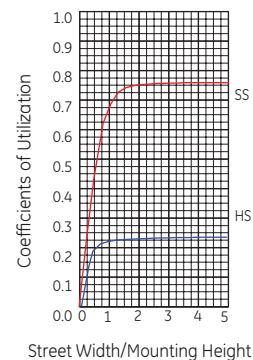
27,000 Lumens  
4000K  
ERS2\_27E1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade

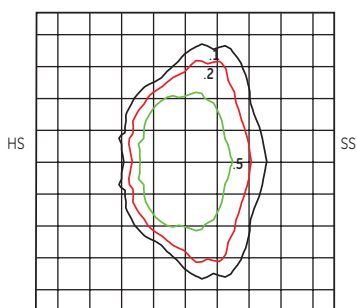


— Vertical plane through horizontal angle  
of maximum candlepower at 75°  
— Vertical plane through horizontal angle of 70°

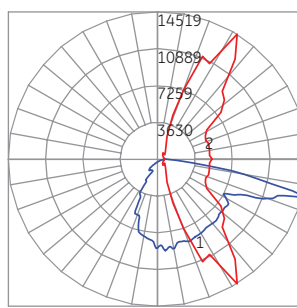


### ERS2 Asymmetric Wide (27F1)

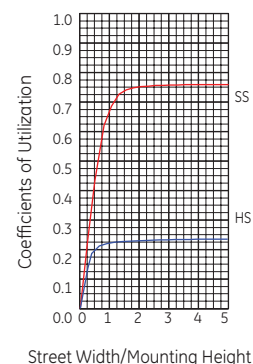
27,000 Lumens  
4000K  
ERS2\_27F1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade

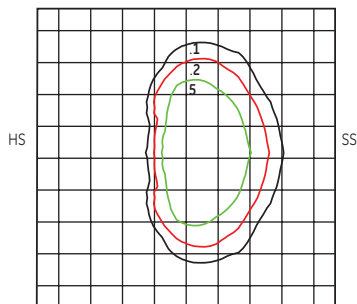


— Vertical plane through horizontal angle  
of maximum candlepower at 60°  
— Vertical plane through horizontal angle of 75°

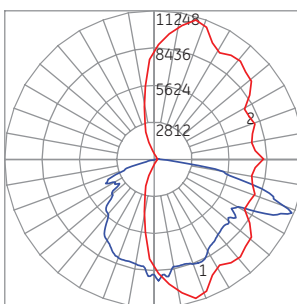


### ERS2 Asymmetric Extra Wide (27G1)

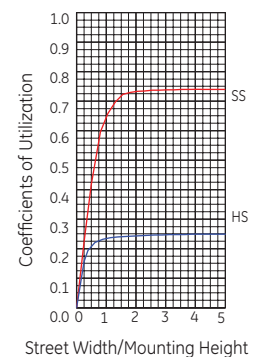
27,000 Lumens  
4000K  
ERS2\_27G1X40\_\_\_\_.IES



Grid Distance in Units of  
Mounting Height at 30' Initial  
Footcandle Values at Grade

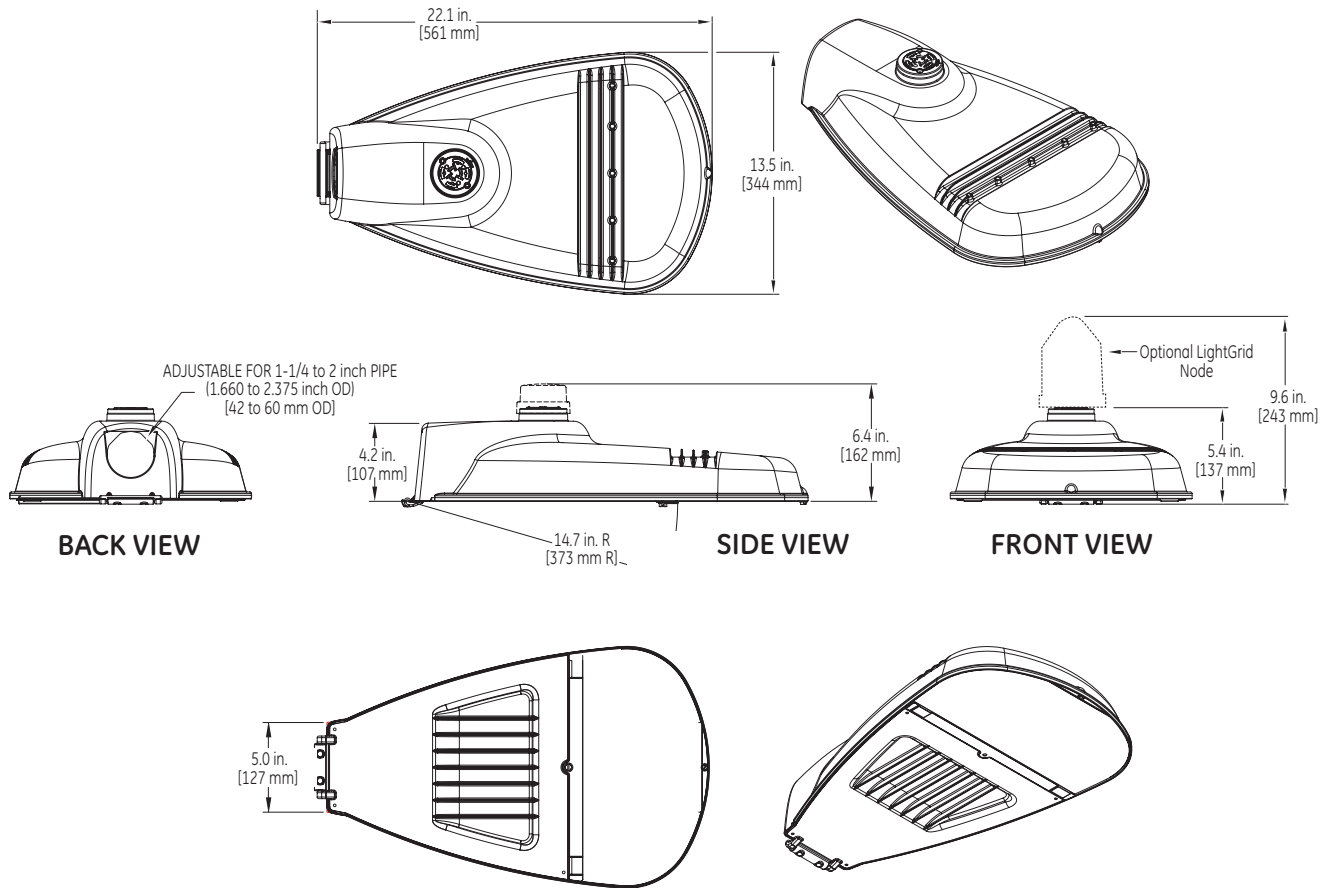


— Vertical plane through horizontal angle  
of maximum candlepower at 75°  
— Vertical plane through horizontal angle of 68°



## Product Dimensions

### Evolve™ LED Streetlight (ERL1)

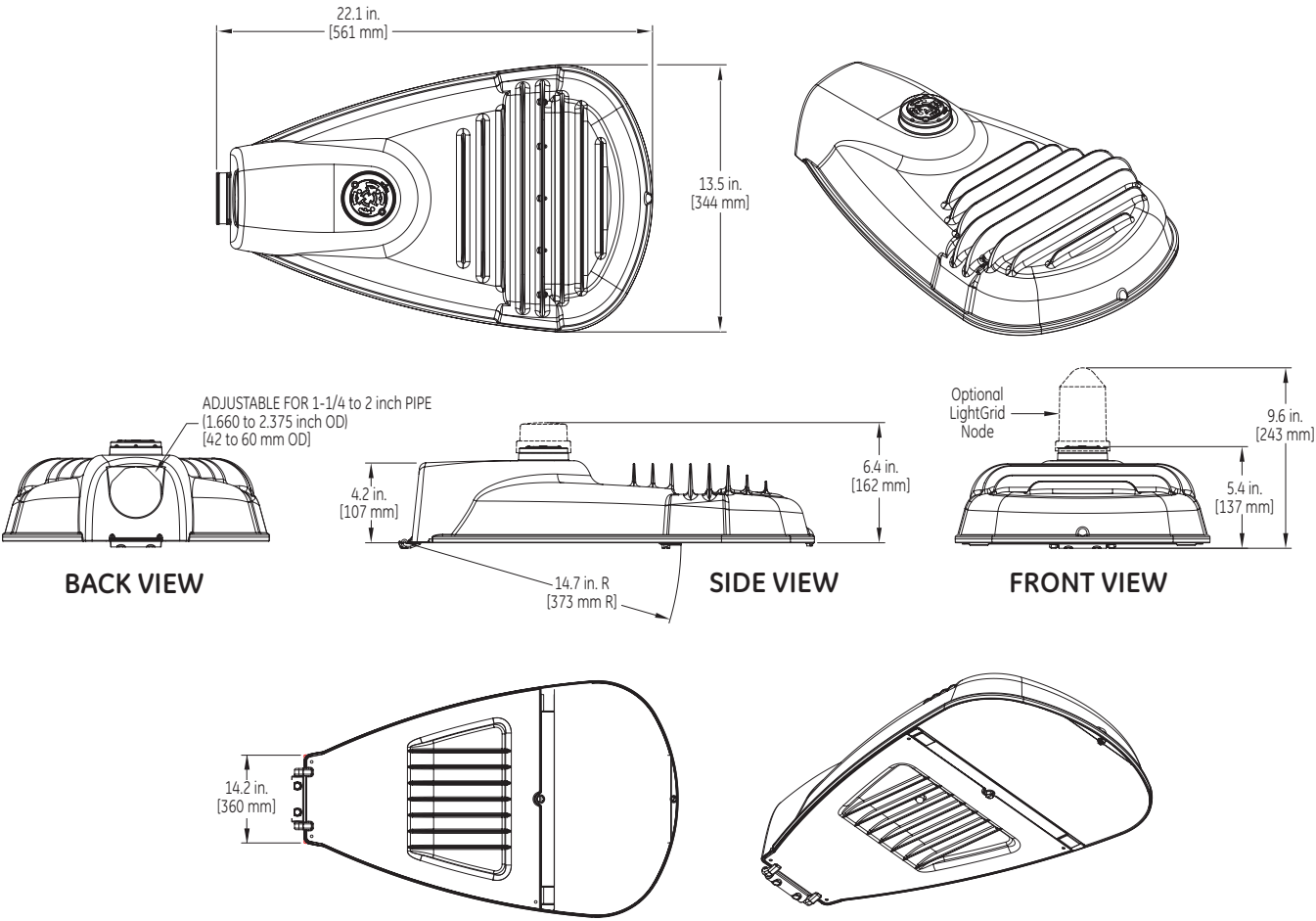


#### DATA

- Approximate net weight: 12.4 lbs (5.6 kgs) - Without XFMR
- Approximate net weight: 15.5 lbs (7 kgs) - With XFMR
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

# Product Dimensions

## Evolve™ LED Streetlight (ERLH)

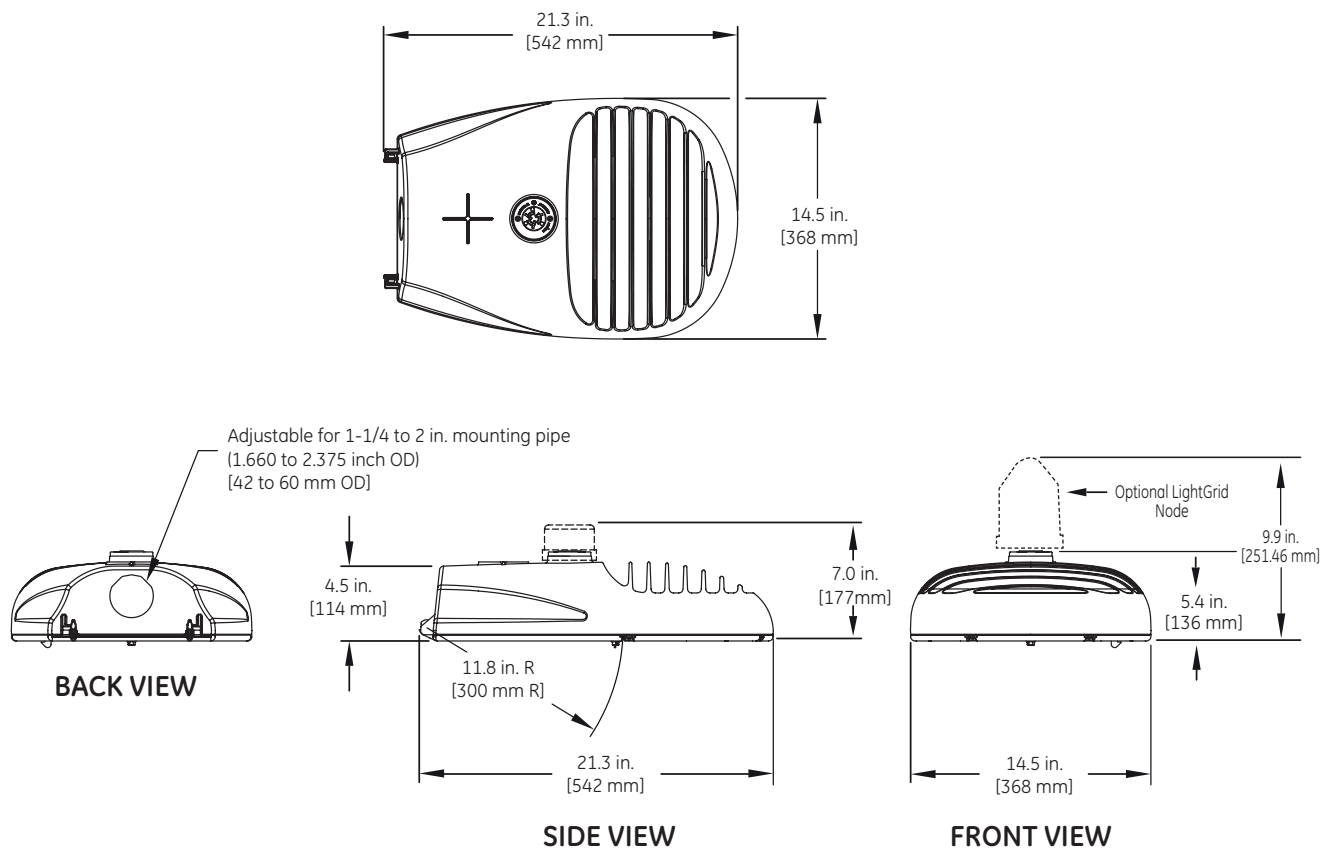


### DATA

- Approximate net weight: 15.15 lbs (6.9 kgs) - 2 Bolt Slipfitter
- Approximate net weight: 15.85 lbs (7.2 kgs) - 4 Bolt Slipfitter
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

## Product Dimensions

### Evolve™ LED Streetlight (ERS1)

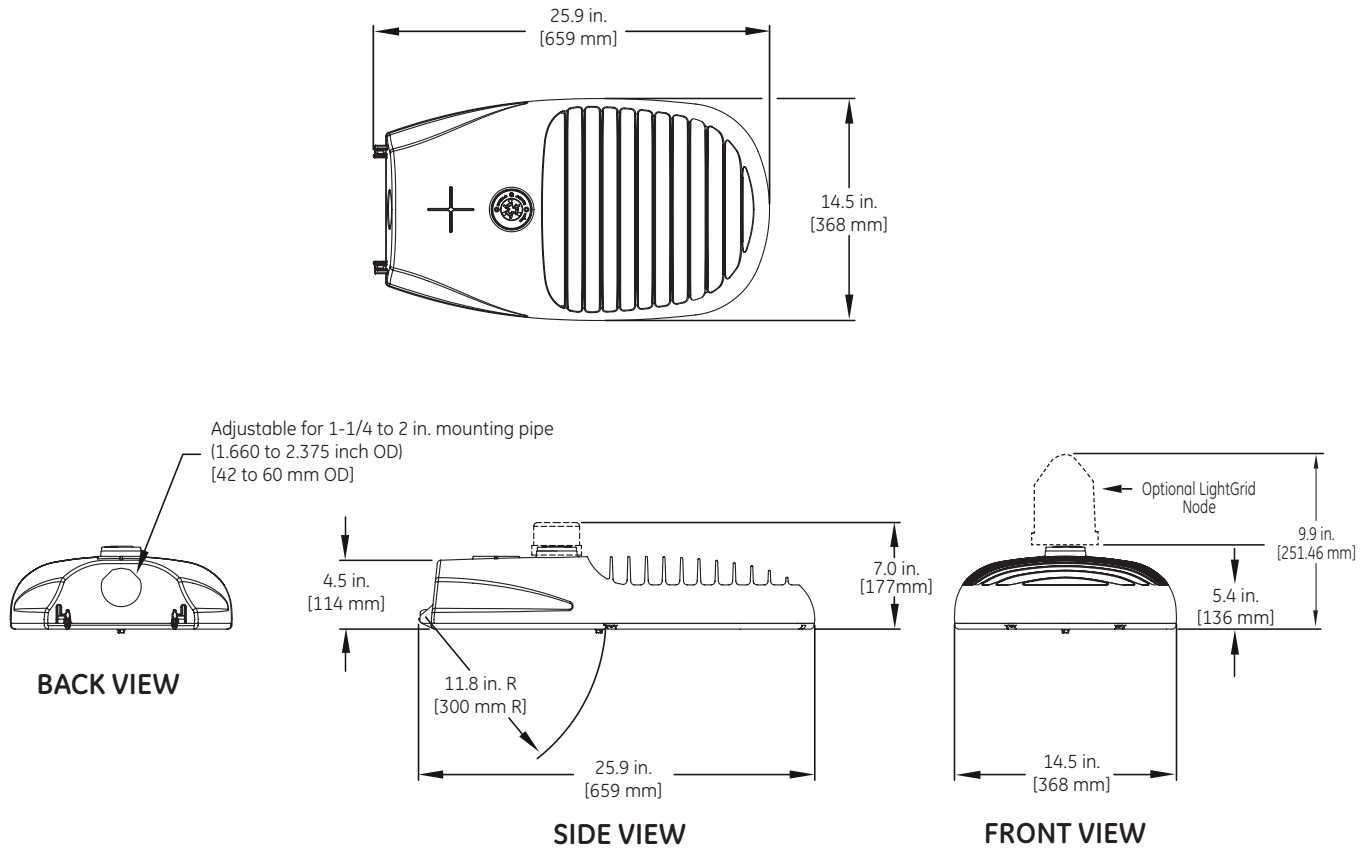


#### DATA

- Approximate net weight: 20 lbs (9.1 kgs) to 25 lbs (11.4 kgs)
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

## Product Dimensions

### Evolve™ LED Streetlight (ERS2)



#### DATA

- Approximate net weight: 25 lbs (11.4 kgs) to 29 lbs (13.2 kgs)
- Effective Projected Area (EPA): 0.7 sq ft max (0.065 sq m)

**current**  
powered by GE

[www.currentbyge.com](http://www.currentbyge.com)

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OLP3105 (Rev 09/21/16)



# American Revolution LED

## Series 247L

### PRODUCT OVERVIEW



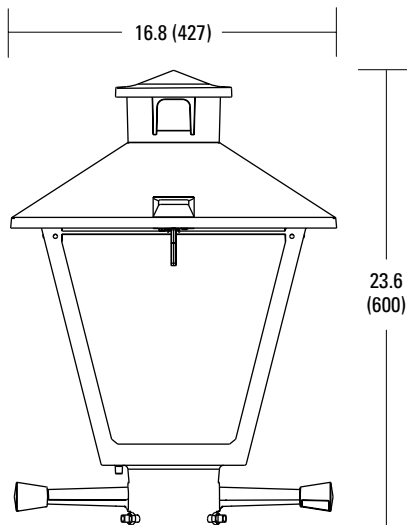
### Applications:

Streetscapes  
Walkways  
Pathways  
Parks

### Features:

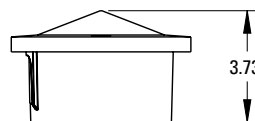
- Die-cast aluminum housing and hood for long-life performance
- Die-cast trigger latch (TL) and captive thumb screws option available for easy access to internal components
- Optical assembly designed for maximum performance, available in Type II, Type III and Type V
- Hinged hood and captive thumb screws provision afford quick, easy access to electrical and optical area for servicing
- Slipfitter with three set screws allows secure installation to pole sizes 2-3/8" or 3" O.D.
- Surge protection device (standard) exceeds ANSI C62.41 Category C1 criteria (surge tested at 10kV/5kA)
- Complies with ANSI: C136.2, C136.10, C136.15
- CSA listed and suitable for up to 30°C ambient
- Rated L70, LED life greater than 100,000 hours at 25°C
- Replaces up to 150W HPS light source incumbant models
- LED electronic 0V-10V dimmable driver
- DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/QPL](http://www.designlights.org/QPL) to confirm which versions are qualified.

### DIMENSIONS

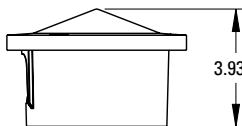


#### Effective Projected Area (EPA)

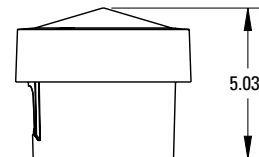
The EPA for the American Revolution Series 247 is 1.6 sq. ft.  
P5 or P7 option total height is 24.9 (633).  
Approx. Wt. = 36 lbs.



Cupola height  
P3 without ROAM  
Shown in line diagram



Cupola height  
P5/P7 without ROAM



Cupola height  
P5/P7 with ROAM

All dimensions are inches (millimeters) unless otherwise noted.

# American Revolution LED

## Series 247L

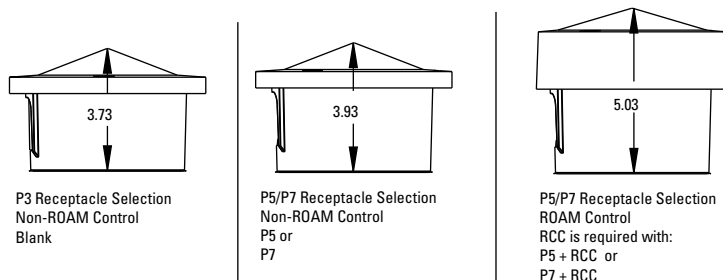
### ORDERING INFORMATION

**Example:** 247L 20LEDE70 MVOLT 4K R3 AY

Series	Performance Package	Voltage	Color Temperature (CCT)
<b>247L</b> American Revolution LED	<b>20LEDE10</b> 20 Chips, 1050 mA Driver, 72 input watts <b>20LEDE70</b> 20 Chips, 700 mA Driver, 45 input watts <b>10LEDE10</b> 10 Chips, 1050 mA Driver, 38 input watts <b>10LEDE70</b> 10 Chips, 700 mA Driver, 25 input watts <b>10LEDE53</b> 10 Chips, 525 mA Driver, 18 input watts <b>10LEDE35</b> 10 Chips, 350 mA Driver, 13 input watts	<b>MVOLT</b> Multi-volt, 120-277V <b>347</b> 347V <b>480</b> 480V	<b>3K</b> 3000K <b>4K</b> 4000K <b>5K</b> 5000K

Distribution	Optics	Options
<b>R2</b> Type II <b>R3</b> Type III <b>R5</b> Type V	<b>AY</b> Acrylic <b>PY</b> Polycarbonate	<u>Paint</u> <sup>1</sup> <b>(blank)</b> Black (standard) <b>GY</b> Gray <b>DDB</b> Dark Bronze <b>WH</b> White <b>BZ</b> Bronze  <u>Photocontrol</u> <b>(blank)</b> 3 pin NEMA Photocontrol Receptacle (standard) <b>NR</b> <sup>2</sup> No Photocontrol Receptacle <b>P5</b> <sup>3</sup> 5 pin NEMA Photocontrol Receptacle (dimmable driver included) <b>P7</b> <sup>3</sup> 7 pin NEMA Photocontrol Receptacle (dimmable driver included) <b>PCLL</b> <sup>4,5</sup> Solid State Long Life Photocontrol <b>PCSS</b> <sup>4,5,6</sup> Not CSA Listed Solid State Long Life Photocontrol (120-277V)  <u>Miscellaneous</u> <b>SS</b> Stainless steel hardware <b>NL</b> NEMA Label <b>XL</b> Not CSA Listed <b>TL</b> Tool-less Entry <b>LDR</b> <sup>7</sup> Ladder Rest <b>SH</b> Shorting Cap <b>SHX</b> <sup>6</sup> Not CSA Listed Shorting Cap <b>HSB</b> House Side Shield Black <b>HSW</b> House Side Shield White <b>CR</b> Enhanced Corrosion Resistant Finish <b>RCC</b> <sup>8</sup> ROAM Dimming Node Cupola Cover  <u>Accessories</u> <b>RNC57</b> <sup>3</sup> ROAM Dimming Node Cupola Cover

Cupola size based on type of control and receptacle



#### Notes:

- Other colors available, please contact factory
- PC and SH not available with NR option
- Taller cupola cover (RCC) is required when used with ROAM or other similar wireless monitoring control systems
- Standard failure mode="Fail On"
- Photocontrols supplied with ANSI Standard Turn-On levels
- XL option is required
- Ships with unit, field installed
- Required when using ROAM or other similar wireless monitoring control systems



AEL Headquarters, 3825 Columbus Road, Granville, OH 43023

[www.americanelectriclighting.com](http://www.americanelectriclighting.com)

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**Warranty** Five-year limited warranty. Complete warranty terms located at:

[www.acuitybrands.com/CustomerResources/Terms\\_and\\_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx)

Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

# American Revolution LED

## Series 247L

### OPERATING CHARACTERISTICS

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org/OPL](http://www.designlights.org/OPL) to confirm which versions are qualified.

LED Quantity, mA, CCT	Input Watts	TOTAL LUMENS											
		R2-AY	LPW	R3-AY	LPW	R5-AY	LPW	R2-PY	LPW	R3-PY	LPW	R5-PY	LPW
20LEDE10 3K	73	5,495	75	5,553	76	6,068	83	5,156	71	5,210	71	5,694	78
20LEDE10 4K	73	5,900	81	5,962	82	6,516	89	5,451	75	5,576	76	6,111	84
20LEDE10 5K	73	5,937	81	5,999	82	6,556	90	5,568	76	5,626	77	6,149	84
20LEDE70 3K	46	4,103	89	4,147	90	4,531	99	3,848	84	3,889	85	4,249	92
20LEDE70 4K	46	4,407	96	4,453	97	4,867	106	4,115	89	4,164	91	4,545	99
20LEDE70 5K	46	4,434	96	4,481	97	4,897	106	4,140	90	4,184	91	4,573	99
10LEDE10 3K	39	2,936	75	2,967	76	3,242	83	2,779	71	2,808	72	3,068	79
10LEDE10 4K	39	3,153	81	3,187	82	3,482	89	2,959	76	2,990	77	3,267	84
10LEDE10 5K	39	3,173	81	3,206	82	3,504	90	2,981	76	3,011	77	3,292	84
10LEDE70 3K	26	2,115	81	2,137	82	2,336	90	2,012	77	2,034	78	2,223	86
10LEDE70 4K	26	2,271	87	2,295	88	2,508	96	2,106	81	2,128	82	2,326	89
10LEDE70 5K	26	2,285	88	2,309	89	2,523	97	2,126	82	2,148	83	2,347	90
10LEDE53 3K	19	1,662	87	1,681	88	1,836	97	1,561	82	1,578	83	1,724	91
10LEDE53 4K	19	1,785	94	1,804	95	1,972	104	1,670	88	1,688	89	1,845	97
10LEDE53 5K	19	1,796	95	1,816	96	1,984	104	1,683	89	1,702	90	1,859	98
10LEDE35 3K	14	1,150	82	1,162	83	1,270	91	1,079	77	1,090	78	1,191	85
10LEDE35 4K	14	1,234	88	1,248	89	1,364	97	1,162	83	1,175	84	1,284	92
10LEDE35 5K	14	1,243	89	1,256	90	1,372	98	1,165	83	1,177	84	1,287	92

# RSW Series

RSW™ LED Street Luminaire – Small

## Product Description

The Cree® RSW Series, utilizing WaveMax® Technology, will transform the way utilities and municipalities light their residential streets. With the first viable LED streetlight at warm CCT, the RSW Series delivers up to 127 LPW, enhanced visual comfort with reduced glare and high color contrast leading to improved overall illumination using less energy. The RSW Series provides warm, inviting dark sky friendly lighting that makes good economic sense.

**Applications:** Residential roads, collector roads, parking lots, and general area spaces

## Performance Summary

Utilizes Cree WaveMax® Technology

Assembled in the U.S.A. of U.S. and imported parts

**Initial Delivered Lumens:** Up to 5,000

**Efficacy:** Up to 127 LPW

**CRI:** Minimum 70 CRI (3000K, 4000K & 5000K); 80 CRI (2700K, 3000K, 4000K & 5000K)

**CCT:** 2700K, 3000K, 4000K, 5000K

**Limited Warranty\*:** 10 years

\* See <http://lighting.cree.com/warranty> for warranty terms

## Accessories

Field-Installed	
<b>Backlight Control Shield</b> RSW-BLSS - Provides 1 mounting height cutoff - 0.5" (13mm) 301 stainless steel construction - Refer to initial delivered lumen tables for lumen output	<b>Cul-De-Sac Shield</b> RSW-CLSS - Provides backlight and sidelight control - 0.5" (13mm) 301 stainless steel construction - Lumen multiplier: 0.77
<b>Bird Guard</b> RSW-BRDGRDS - 5052-H32 aluminum construction	<b>Front Light Shield</b> RSW-FLSS - Provides front light control - 0.5" (13mm) 301 stainless steel construction - Lumen multiplier: 0.87

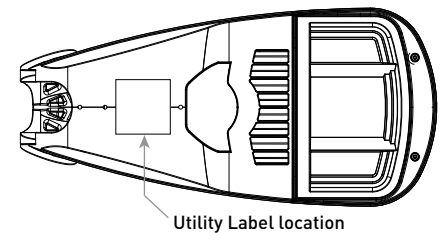
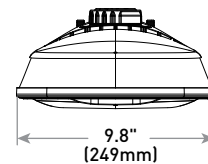
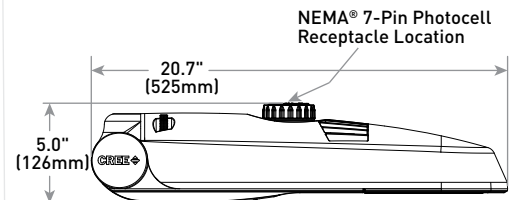
## Ordering Information

Example: RSWS-A-HT-2ME-3L-27K8-UL-GY-N

RSWS	A	HT				UL		N	
Product	Version	Mounting	Optic	Lumen Package**	CCT/CRI	Voltage	Color Options	Utility Label/Receptacle	Options
RSWS Small	A	HT Horizontal Tenon	2LG* Type II Long 2ME* Type II Medium 3ME* Type III Medium	3L 3,000 lumens 5L 5,000 lumens	27K8 2700K, 80 CRI 30K7 3000K, 70 CRI 30K8 3000K, 80 CRI 40K7 4000K, 70CRI 40K8 4000K, 80 CRI 50K7 5000K, 70CRI 50K8 5000K, 80CRI	UL Universal 120-277V	BK Black BZ Bronze GY Grey	N Utility Label and NEMA® 7-Pin Photocell Receptacle - External wattage label per ANSI C136.15 - 7-pin receptacle per ANSI C136.41 - Factory connected 0-10V dim leads - Photocell or shorting cap by others	Q4/Q3/Q2/Q1 Field Adjustable Output - Must select Q4, Q3, Q2, or Q1 - Offers full range lumen adjustability - Includes wattage label for setting selected - Refer to pages 5 & 6 for power and lumen values - Luminaire may also be dimmed through 7-Pin receptacle with use of dimming control by others - Refer to <a href="#">dimming spec sheet</a> for dimming multipliers  SS X3/X2/X1 Stainless Steel Bolts Locked Lumen Output - Must select X3, X2, or X1 - Lumen output is permanently locked to the setting selected - Includes wattage label for setting selected - Refer to pages 5 & 6 for power and lumen values - Dimming is only available through 7-Pin receptacle with use of dimming control by others - Refer to <a href="#">dimming spec sheet</a> for dimming multipliers

\* Available with Backlight Shield when ordered with field-installed accessory (see table above)

\*\* Lumen Package codes identify approximate light output only. Actual lumen output levels vary depending on CCT and optic selection. Refer to Initial Delivered Lumen tables for specific lumen values



Weight*
9.4 lbs. [4.3kg]

\* RSW-BLSS, RSW-CLSS, or RSW-FLSS Accessories: add 0.4 lbs. [0.2kg]



Rev. Date: V14 03/21/2019



US: [lighting.cree.com](http://lighting.cree.com)

T (800) 236-6800 F (262) 504-5415

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Canada: [www.cree.com/canada](http://www.cree.com/canada)

T (800) 473-1234 F (800) 890-7507

## Product Specifications

### CREE WAVEMAX® TECHNOLOGY

Featuring up to 90% optical efficiency and precise control, Cree WaveMax® Technology provides unmatched comfort and decreased LED source luminance by smoothly spreading brightness over a broader area. When integrated with luminous surfaces made of a polymer medium engineered with DiamondFacet™ optical elements, extremely high efficacy luminaires are the result – ultimately creating more visually comfortable and appealing environments while exceeding illumination performance.

### CONSTRUCTION & MATERIALS

- Housing constructed of high strength, lightweight bulk molding compound for long weathering and durability
- UV stabilized polymeric door with handle pocket for tool-less entry
- Straight in wiring to terminal block for power input (#6-#14 AWG)
- Optic box and driver enclosure inside optic box meet IP66 requirements
- Mounts on 1.25" [32mm] IP, 1.66" [42mm] O.D. or 2" [51mm] IP, 2.375" [60mm] O.D. horizontal tenon (minimum 8" [203mm] in length) and is adjustable +/- 5° in 2.5° increments to allow for fixture leveling (two axis T-level included)
- Luminaire secures with two grade 5 steel mounting bolts w/clear zinc clad finish standard; optional 316 stainless steel mounting bolts available with SS option
- Comes standard with Utility Label per ANSI C136.15 and 7-pin NEMA® Photocell Receptacle per ANSI C136.41
- **Weight:** 9.4 lbs. [4.3kg]; add 0.4 lbs. [0.2kg] for RSW-BLSS, RSW-CLSS, or RSW-FLSS accessories

### ELECTRICAL SYSTEM

- **Input Voltage:** 120-277V, 50/60Hz
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- When code dictates fusing, a slow blow fuse or type C/D breaker should be used to address inrush current
- **10V Source Current:** 0.15mA
- **Operating Temperature Range:** -40°C - +50°C [-40°F - + 122°F]

### REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- Meets CALTrans 611 Vibration testing
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Meets FCC Part 15, Subpart B, Class A standards for conducted and radiated emissions
- Meets Buy American requirements within ARRA
- RoHS compliant. Consult factory for additional details
- Dark Sky Friendly, IDA Approved when ordered with 27K or 30K CCT
- DLC and DLC Premium qualified versions available. Please refer to <https://www.designlights.org/search/> for most current information
- **CA RESIDENTS WARNING:** Cancer and Reproductive Harm – [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

Electrical Data*								
Lumen Package	CCT/CRI	System Watts 120-277V	Utility Label Wattage	Efficacy	Total Current (A)			
					120V	208V	240V	277V
3L	27K8	32	30	103	0.27	0.16	0.14	0.13
	30K7	28	30	118	0.23	0.14	0.12	0.11
	30K8	31	30	106	0.25	0.15	0.13	0.12
	40K7	26	30	127	0.21	0.13	0.11	0.10
	40K8	29	30	114	0.24	0.14	0.13	0.11
	50K7	26	30	127	0.21	0.13	0.11	0.10
	50K8	28	30	118	0.23	0.14	0.12	0.11
5L	27K8	53	50	94	0.44	0.26	0.23	0.20
	30K7	45	50	111	0.37	0.22	0.20	0.18
	30K8	51	50	98	0.42	0.25	0.22	0.20
	40K7	41	40	122	0.34	0.20	0.18	0.16
	40K8	47	50	106	0.39	0.23	0.20	0.18
	50K7	41	40	122	0.34	0.20	0.18	0.16
	50K8	45	50	111	0.37	0.22	0.20	0.18

\* Electrical data at 25°C (77°F). Actual wattage may differ by +/- 10% when operating between 120-277V +/- 10%

RSWS Series Ambient Adjusted Lumen Maintenance <sup>1</sup>					
Ambient	Initial LMF	25K hr Projected <sup>2</sup> LMF	50K hr Projected <sup>2</sup> LMF	75K hr Projected <sup>2</sup> LMF	100K hr Calculated <sup>3</sup> LMF
5°C (41°F)	1.04	1.03	1.02	1.02	1.02
10°C (50°F)	1.03	1.02	1.01	1.01	1.01
15°C (59°F)	1.02	1.01	1.00	1.00	1.00
20°C (68°F)	1.01	1.00	0.99	0.99	0.98
25°C (77°F)	1.00	0.98	0.98	0.98	0.97

<sup>1</sup> Lumen maintenance values at 25°C (77°F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing. Luminaire ambient temperature factors (LATF) have been applied to all lumen maintenance factors. Please refer to the [Temperature Zone Reference Document](#) for outdoor average nighttime ambient conditions.

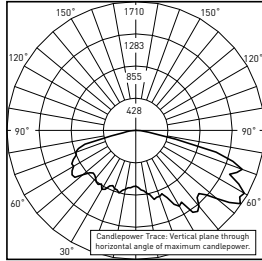
<sup>2</sup> In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip

<sup>3</sup> In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip

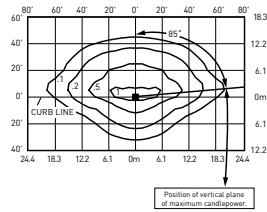
## Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards. To obtain an IES file specific to your project consult:  
<http://lighting.cree.com/products/outdoor/street-and-roadway/rsw-series>

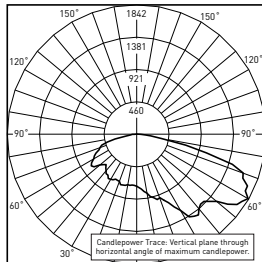
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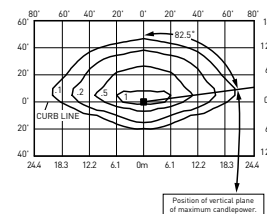
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11624878.01  
RSWS-A-\*\*-2LG-3L-30K7-UL-GY-N  
**Initial Delivered Lumens:** 3,294



**RSWS-A-\*\*-2LG-3L-30K7-UL-GY-N**  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,300  
Initial FC at grade

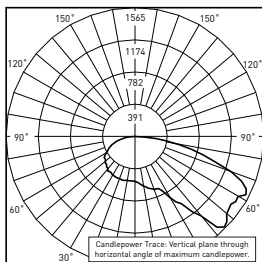


**CESTL Test Report #:** 11675461.06  
RSWS-A-\*\*-2LG-3L-30K7-UL-GY-N  
w/RSW-BLSS  
**Initial Delivered Lumens:** 3,080

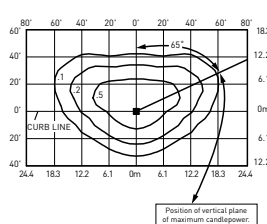


**RSWS-A-\*\*-2LG-3L-30K7-UL-GY-N**  
w/RSW-BLSS  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,050  
Initial FC at grade

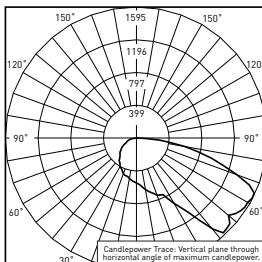
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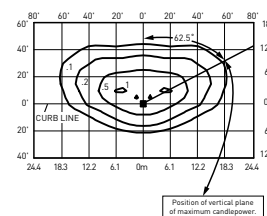
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11644102.09  
RSWS-A-\*\*-2ME-3L-30K7-UL-GY-N  
**Initial Delivered Lumens:** 3,251



**RSWS-A-\*\*-2ME-3L-30K7-UL-GY-N**  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,300  
Initial FC at grade



**CESTL Test Report #:** 11675461.02  
RSWS-A-\*\*-2ME-3L-30K7-UL-GY-N  
w/RSW-BLSS  
**Initial Delivered Lumens:** 2,975



**RSWS-A-\*\*-2ME-3L-30K7-UL-GY-N**  
w/RSW-BLSS  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,050  
Initial FC at grade

#### Type II Long Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,300	B1 U0 G1
5L	All	5,000	B1 U0 G1

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

#### Type II Long w/BLS Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,050	B1 U0 G1
5L	All	4,630	B1 U0 G1

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

#### Type II Medium Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,300	B1 U0 G1
5L	All	5,000	B1 U0 G2

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

#### Type II Medium w/BLS Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,050	B1 U0 G1
5L	All	4,630	B1 U0 G2

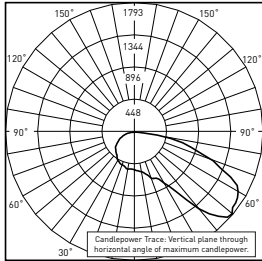
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

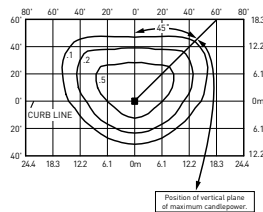
## Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards. To obtain an IES file specific to your project consult:  
<http://lighting.cree.com/products/outdoor/street-and-roadway/rsw-series>

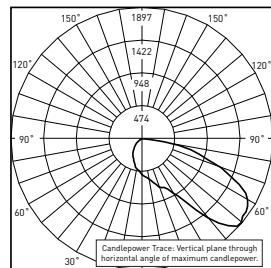
### 3ME



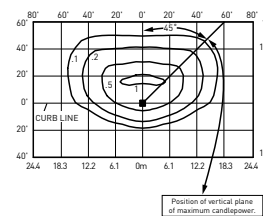
**UL Verification Services Test Report #:**  
11644102.08  
RSWS-A-\*\*-3ME-3L-30K7-UL-GY-N  
**Initial Delivered Lumens:** 3,399



**RSWS-A-\*\*-3ME-3L-30K7-UL-GY-N**  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,300  
Initial FC at grade



**CESTL Test Report #:** 11675461.01  
RSWS-A-\*\*-3ME-3L-30K7-UL-GY-N  
w/RSW-BLSS  
**Initial Delivered Lumens:** 3,113



**RSWS-A-\*\*-3ME-3L-30K7-UL-GY-N**  
w/RSW-BLSS  
**Mounting Height:** 25' (7.6m) A.F.G.  
**Initial Delivered Lumens:** 3,050  
Initial FC at grade

### Type III Medium Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,300	B1 U0 G1
5L	All	5,000	B1 U0 G1

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

### Type III Medium w/BLS Distribution

Lumen Package	CRI	2700K/3000K/4000K/5000K	
		Initial Delivered Lumens*	BUG Ratings** Per TM-15-11
3L	All	3,050	B1 U1 G1
5L	All	4,630	B1 U1 G2

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -10 and +10% of initial delivered lumens

\*\* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit:  
<https://www.ies.org/wp-content/uploads/2017/03/TM-15-11BUGRatingsAddendum.pdf>. Valid with no tilt

## Luminaire EPA

Horizontal Tenon Mount – Weight: 9.4 lbs. (4.3kg); RSW-BLSS, RSW-CLSS, or RSW-FLSS Accessories: add 0.4 lbs. (0.2kg)					
Luminaire	Single	2 @ 90°	2 @ 180°	3 @ 90°	4 @ 90°
<b>Tenon Configuration</b> If used with Cree tenons, please add tenon EPA with luminaire EPA					
Standard Luminaire	0.61	0.89	1.22	1.50	1.78
Luminaire w/RSW-BLSS, RSW-CLSS or RSW-FLSS Accessory	0.61	1.25	1.22	1.85	2.49

## Tenon EPA

Part Number	EPA
PD Series Tenons	0.09
PT Series Tenons	0.10
WM-2L	0.13
XA-TMDA8	0.19

Tenons and Brackets* (must specify color)	
<b>Square Internal Mount Horizontal Tenons (Aluminum)</b> - Mounts to 4" (102mm) square aluminum or steel poles PD-1H4 – Single PD-3H4(90) – 90° Triple PD-2H4(90) – 90° Twin PD-4H4(90) – 90° Quad PD-2H4(180) – 180° Twin	<b>Round External Mount Horizontal Tenons (Aluminum)</b> - Mounts to 2.375"-3" (60-76mm) O.D. round aluminum or steel poles or tenons PT-1H – Single PT-3H(90) – 90° Triple PT-2H(90) – 90° Twin PT-4H(90) – 90° Quad PT-2H(180) – 180° Twin
<b>Wall Mount Brackets</b> - Mounts to wall or roof WM-2L – Extended Horizontal	<b>Direct Arm Pole Adaptor Bracket</b> - Mounts to 3-6" (76-152mm) round or square aluminum or steel poles XA-TMDA8

\* Refer to the [Bracket and Tenons spec sheet](#) for more details

**Field Adjustable Output (Q4/Q3/Q2/Q1) Option Description:**

The Field Adjustable Output option enables the street and area luminaire within the RSW Series on this page to be tuned to the exact needs of a particular application through multiple levels of adjustment. When ordered with the Q option, the luminaire will be shipped from the factory at the selected lumen output, will be fully adjustable between the outputs, and will include a wattage label that indicates the wattage of the luminaire at the selected lumen output (Rounded to nearest 10 watts per ANSI C136.15-2015.). Additional dimming functionality is available when a dimming control (by others) is used in the 7-Pin receptacle.

**Locked Lumen Output (X3/X2/X1) Option Description:**

The Locked Lumen Output option on this page permanently locks the lumen output on the RSW Series street and area luminaire to the setting selected. When ordered with the X option, the luminaire will be shipped from the factory at the lumen output setting selected, and will include a wattage label that indicates the wattage of the setting selected. When this option is selected, the luminaire output is not able to be adjusted in the field except if a dimming control (by others) is used in the 7-Pin receptacle.

**Q & X Option Power & Lumen Data – 3L**

Q Option Setting	X Option Setting	CCT/CRI	System Watts <sup>†</sup>	Label Wattage	Lumen Values <sup>†</sup>		Optics Qualified on DLC QPL	
			120-277V		2LG, 2ME & 3ME	w/BLS	Standard	Premium
Q4 (Full Power)	N/A (Full Power)	27K8	32	30	3,300	3,050	2LG, 2ME, 3ME	
		30K7	28	30				2LG, 2ME, 3ME
		30K8	31	30			2LG, 2ME, 3ME	
		40K7	26	30				2LG, 2ME, 3ME
		40K8	29	30				2LG, 2ME, 3ME
		50K7	26	30				2LG, 2ME, 3ME
		50K8	28	30				2LG, 2ME, 3ME
		50K8	28	30				2LG, 2ME, 3ME
Q3	X3	27K8	26	30	2,756	2,547	2LG, 2ME, 3ME	
		30K7	23	20				2LG, 2ME, 3ME
		30K8	25	30			2LG, 2ME, 3ME	
		40K7	21	20				2LG, 2ME, 3ME
		40K8	23	20				2LG, 2ME, 3ME
		50K7	21	20				2LG, 2ME, 3ME
		50K8	23	20				2LG, 2ME, 3ME
		50K8	23	20				2LG, 2ME, 3ME
Q2	X2	27K8	20	20	2,169	2,004	2LG, 2ME, 3ME	
		30K7	17	20				2LG, 2ME, 3ME
		30K8	19	20			2LG, 2ME, 3ME	
		40K7	16	20				2LG, 2ME, 3ME
		40K8	18	20				2LG, 2ME, 3ME
		50K7	16	20				2LG, 2ME, 3ME
		50K8	17	20				2LG, 2ME, 3ME
		50K8	17	20				2LG, 2ME, 3ME
Q1	X1	27K8	15	20	1,633	1,509	2LG (120V), 2ME (120V), 3ME (120V)	
		30K7	13	10				2LG (120V), 2ME (120V), 3ME (120V)
		30K8	15	20			2LG (120V), 2ME (120V), 3ME (120V)	
		40K7	12	10				2LG (120V), 2ME (120V), 3ME (120V)
		40K8	14	10				2LG (120V), 2ME (120V), 3ME (120V)
		50K7	12	10				2LG (120V), 2ME (120V), 3ME (120V)
		50K8	13	10				2LG (120V), 2ME (120V), 3ME (120V)
		50K8	13	10				2LG (120V), 2ME (120V), 3ME (120V)

<sup>†</sup> Electrical and lumen data at 25°C (77°F). Actual wattage and lumen output may differ by +/-10% when operating between 120-277V +/-10%

**Field Adjustable Output (Q4/Q3/Q2/Q1) Option Description:**

The Field Adjustable Output option enables the street and area luminaire within the RSW Series on this page to be tuned to the exact needs of a particular application through multiple levels of adjustment. When ordered with the Q option, the luminaire will be shipped from the factory at the selected lumen output, will be fully adjustable between the outputs, and will include a wattage label that indicates the wattage of the luminaire at the selected lumen output (Rounded to nearest 10 watts per ANSI C136.15-2015.). Additional dimming functionality is available when a dimming control (by others) is used in the 7-Pin receptacle.

**Locked Lumen Output (X3/X2/X1) Option Description:**

The Locked Lumen Output option on this page permanently locks the lumen output on the RSW Series street and area luminaire to the setting selected. When ordered with the X option, the luminaire will be shipped from the factory at the lumen output setting selected, and will include a wattage label that indicates the wattage of the setting selected. When this option is selected, the luminaire output is not able to be adjusted in the field except if a dimming control (by others) is used in the 7-Pin receptacle.

**Q & X Option Power & Lumen Data – 5L**

Q Option Setting	X Option Setting	CCT/CRI	System Watts†	Label Wattage	Lumen Values†		Optics Qualified on DLC QPL	
			120-277V		2LG, 2ME & 3ME	w/BLS	Standard	Premium
Q4 (Full Power)	N/A (Full Power)	27K8	53	50	5,000	4,630	2LG, 2ME, 3ME	
		30K7	45	50				2LG, 2ME, 3ME
		30K8	51	50			2LG, 2ME, 3ME	
		40K7	41	40				2LG, 2ME, 3ME
		40K8	47	50			2LG, 2ME, 3ME	
		50K7	41	40				2LG, 2ME, 3ME
		50K8	45	50			2LG, 2ME, 3ME	
Q3	X3	27K8	49	50	4,654	4,310	2LG, 2ME, 3ME	
		30K7	41	40				2LG, 2ME, 3ME
		30K8	46	50			2LG, 2ME, 3ME	
		40K7	38	40				2LG, 2ME, 3ME
		40K8	43	40			2LG, 2ME, 3ME	
		50K7	38	40				2LG, 2ME, 3ME
		50K8	41	40			2LG, 2ME, 3ME	
Q2	X2	27K8	42	40	4,105	3,801	2LG, 2ME, 3ME	
		30K7	36	40				2LG, 2ME, 3ME
		30K8	40	40			2LG, 2ME, 3ME	
		40K7	33	30				2LG, 2ME, 3ME
		40K8	38	40			2LG, 2ME, 3ME	
		50K7	33	30				2LG, 2ME, 3ME
		50K8	36	40			2LG, 2ME, 3ME	
Q1	X1	27K8	36	40	3,617	3,350	2LG, 2ME, 3ME	
		30K7	30	30				2LG, 2ME, 3ME
		30K8	34	30			2LG, 2ME, 3ME	
		40K7	28	30				2LG, 2ME, 3ME
		40K8	32	30			2LG, 2ME, 3ME	
		50K7	28	30				2LG, 2ME, 3ME
		50K8	30	30			2LG, 2ME, 3ME	

† Electrical and lumen data at 25°C (77°F). Actual wattage and lumen output may differ by +/-10% when operating between 120-277V +/-10%



# 480Vac Metal Halide & HPS 80W LED Replacement Lamp

- Built-in Surge Suppressors & Protection •
- Bright • High CRI • High Lumen Output •
- Suitable for Open & Enclosed Fixtures •
- High Power Factor • Self Ballasted •
- Rated Life 50,000 Hours (\*) •



**208V – 277V – 347V – 480V**

Available in:

CCT 5,500K  $\pm 10\%$  (CW) for MH Replacement

CCT 3,000K  $\pm 10\%$  (WW) for HPS Replacement

- Simple Installation • High Lumen per Watt • Rugged Design •

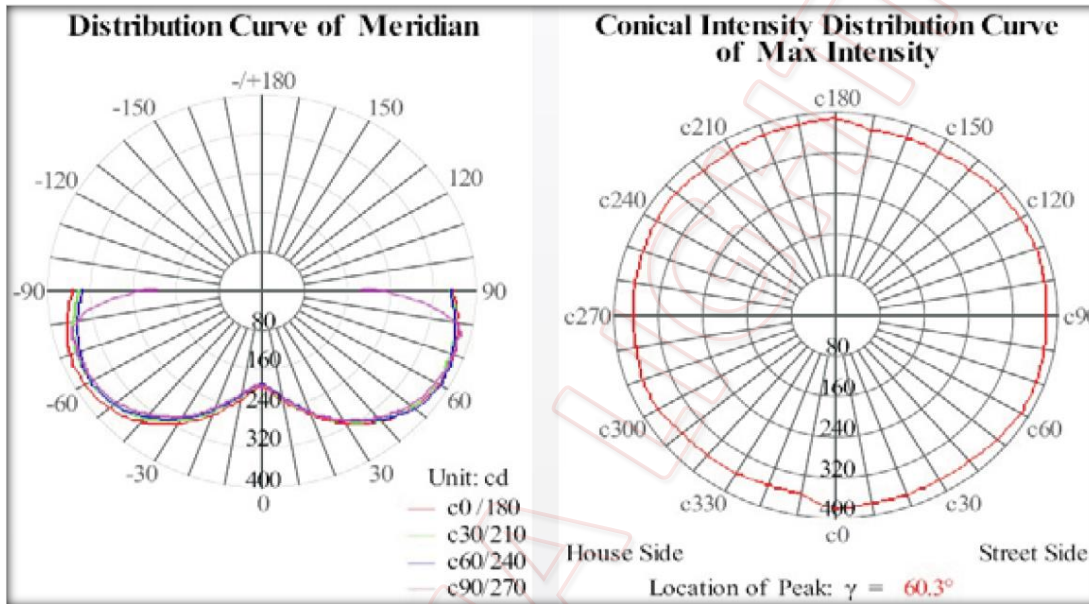
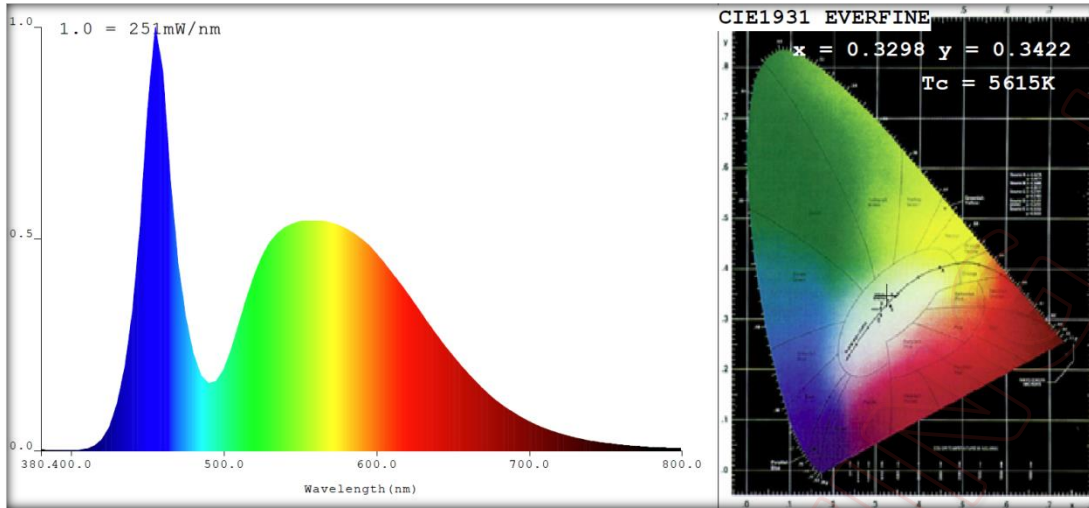


Model	Product	Size	Power	Flux	Equivalent
CL-80W11H-55K-E39	LED Lamp 80W 360° 55K MH Replacement	$\varnothing 4\frac{3}{8} \times 7''$	80W Max.	11,000 Lumen	320W MH
CL-80W11H-30K-E39	LED Lamp 80W 360° 30K HPS Replacement	$\varnothing 4\frac{3}{8} \times 7''$	80W Max.	10,100 Lumen	320W HPS

- 208-480Vac  $\sim 50/60\text{Hz}$  • PF > 0.9 • Med. (E26) or Mogul (E39) Lamp Base •  $\sim 125 \text{ lm/W}$  • CRI > 75 •
- (\*) Rated Life 50,000 Hrs. ( $L_{70} B_{50}$ ) at  $T_{[A]}$  25°C Max. • CCT 5500K (55K) or 3000K (30K)  $\pm 10\%$  •



# 80W Cluster LED Lamp



Model	Product	Power	Equivalent
CL-80W11H-xxK-E39	Cluster LED Bulb	80W	320W MH/HPS
Input Voltage	Power/Power Factor	Efficacy	Flux
208-480Vac ~50/60Hz	80W Max. P.F. ≈ 0.97	~135 lm/W	11,000 Lumen (CW) 10,100 Lumen (WW)
Color Rendering	Color Temperature	Beam Angle	Life
CRI ÷ 75~80	30K ÷ CCT 3,000K ±10% 55K ÷ CCT 5,500K ±10%	360°	5-Years / 50,000 Hours (L <sub>70</sub> B <sub>50</sub> ) T <sub>A</sub> 25°C Max.