Florida Department of
TRANSPORTATION

Clearlake Road (SR 501) PD&E Study: Lighting Justification Report (LJR)

From Michigan Avenue to Industry Road

FPID: 433605-1-22-01

ETDM #: 13120

January 2017

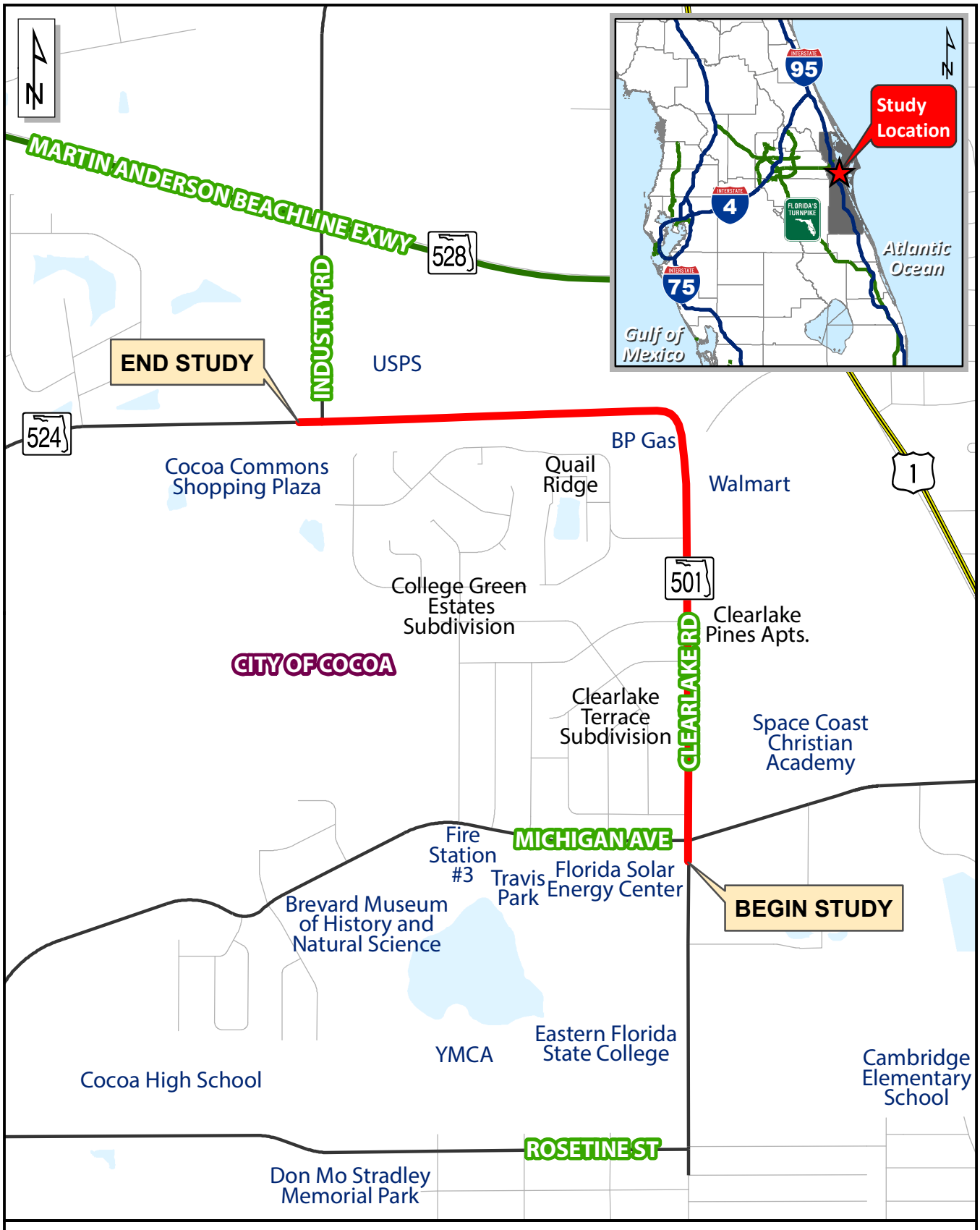
Contents

I. General

This report contains the result of a highway lighting justification for State Road 501 (Clearlake Road) from Michigan Avenue (MP 2.235) to Industry Road (MP 3.358) in Brevard County, Florida. See Figure 1 Location Map. This analysis was done to determine the need for highway lighting as part of the design project to widen from two to four lanes divided, with bicycle lanes and sidewalks on both sides. Figure 1 shows the general limits and area of the proposed project.

II. Existing Conditions

Clearlake Road between Michigan Avenue to the south and Industry Road to the north is classified as an Urban Principle Arterial. For a short distance (0.137 miles) north of Michigan Avenue, the road has four lanes with a 12-foot wide paved median. For the next 0.457 miles northward, the roadway has one, 12-foot wide lane southbound with grass shoulders and two, 12-foot wide lanes with curb and gutter in the northbound direction. For the last 0.529 miles, the roadway has two, 12-foot wide lanes, one in each direction, with four foot paved shoulders. The posted speed limit along this section of Clearlake Road varies and is posted at 40 mph and 45 mph. The various typical sections found along this corridor is due in part to roadway improvements required of adjacent developers. There are signalized intersections at Michigan Avenue, Otterbein Avenue, and Industry Road. It is anticipated that the improved roadway will be a four lane urban typical section. Clearlake Road is not a Strategic Intermodal System (SIS) facility but Industry Road has an interchange with SR 528 (Beachline Expressway) located just to the north which is a designated SIS facility connecting the City of Orlando and the Orlando International Airport to the west with the Port of Port Canaveral to the east. There is conventional cobra head lighting at the intersection of Clearlake Road and Michigan Avenue and north of the intersection on the east side of Clearlake Road up to Otterbein Avenue. North of the intersection of Clearlake Road and Otterbein Avenue up to the north entrance of Walmart, lighting is provided from the Walmart and the Paradise Shoppes of Cocoa on the east and west sides, respectively. There is also a conventional cobra head light pole just south of the Clearlake Road and Otterbein Avenue intersection on the west side as well as on the west side of Clearlake Road at the 90 degree bend in front of the BP gas station.



Clearlake Road (SR 501) PD&E Study
From Michigan Avenue
to Industry Road
Brevard County

Study Location Map

FPID: 433605-1-22-01 | ETDM: 13120

Centennial FDOT 1915 ★ 2015

The following table summarize the existing conditions of the study area:

Feature	Description
Main Street	SR 501 (Clearlake Road)
Side Streets	Michigan Avenue
	Mantis Drive
	La Marche Drive
	Calvados Drive
	Otterbein Avenue
	East Industry Road
Area Location	Brevard County, Florida
Adjacent Land Uses	Residential/Commercial/Undeveloped
Signalized Intersections	Michigan Avenue
	Otterbein Avenue
	Industry Road
SR 501	**Cross Section:** Four 11 to 14-foot wide lanes, two-way divided urban arterial with 7-foot bike lane on both sides of the road and a 22-foot wide median
	Access: Class 4
	Posted Speed Limit: 35 - 45 mph
	Median Openings: 9
	Alignment: Flat
	Pedestrian Crossing: 3 locations
	Sidewalks: Yes
	Street lighting: No
	Utilities: Overhead power lines along each side of the road

III. Purpose

The purpose of the highway lighting justification report is to document the procedure and findings used to determine if highway lighting systems should be considered for Clearlake Road.

IV. Procedure

A. Procedure defined:

The FDOT Manual on Uniform Traffic Studies (MUTS), Chapter 14, establishes a two-step procedure for analyzing and justifying roadway lighting systems.

STEP ONE: Lighting Justification – FHWA Lighting Handbook

1) Use the August 2012 FHWA Lighting Handbook to determine which warranting system to apply.
   a. For collectors, major arterials, and local streets, the Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting is used.

b. For freeways, bridges, and interchanges, the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Warranting System is used.

2) If the applicable TAC or AASHTO warrants are met, then a Net Present Value (NPV) analysis should be made.

3) Quantify safety benefits of the lighting project versus cost of construction, maintenance, and operation of the lighting project using Highway Safety Manual (HSM) predictive methods if applicable. Additionally, convert crash frequency to dollars using FDOT crash costs found in Chapter 23 of the Plans Preparation Manual (PPM)

STEP TWO: Net Present Value Analysis

1) Determine if the project is a High Crash Location (HCL) identified by the State Safety Office's Annual List.

a. If the project is a High Crash Location (HCL): Use the Net Present Value analysis (NVP) to determine if highway lighting or the project is justified by using the following equation:

Total Crash Cost ≥ Costs of Construction, Maintenance, and Operation Costs.

b. For all other locations: The NPV should be used to rank projects according to their value in benefit to the public. (High NPV offers more value, low NPV offers less value).

2) Determine if the project is an Existing Lighting System or a Non-Existing Lighting System.

a. If the project is an existing lighting system:

1. Use the HSM Predictive Method to determine crash impacts without lighting. If the HSM is not applicable, use the reasonable "default" value of 3.0 crashes per million vehicles.
2. The cost of installation is not used in the cost evaluation.

b. If the project is a proposed lighting system:

1. Use actual crash date collected at the site. If there is no applicable crash data, use the reasonable "default" value of 3.0 crashes per million vehicles.

B. Procedure applied to current project:

STEP ONE: Lighting Justification – FHWA Lighting Handbook

1) TAC Determination and Warrant Analysis

The Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting warrant system applies, as the roadway in the current project is classified as an urban principle arterial highway.

- General Overview

The warrants for Highway Lighting are used to provide minimum conditions in which lighting may be justified. The TAC warrants are the primary set of guidelines to be met as per the FDOT *MUTS*. The following warrants for roadway lighting are included in the TAC publication Roadway Lighting Design Guide, 2005 edition.

These warrants include:

1. *Lighting may be considered for those locations where the respective governmental agencies concur that lighting will contribute substantially to the efficiency and safety and comfort of vehicular or pedestrian traffic.*

2. *Lighting may be provided for all major arterials in urbanized areas and for locations or sections of streets and highways where the ratio of night to day crash rates are higher than the statewide average for similar locations, and a study indicates that lighting may be expected to significantly reduce the nighttime crash rate.*

The highway lighting warrant analysis involved two phases. The first phase was to collect data needed for the second phase, warrant analysis.

The warrant analysis was based on the procedure laid out in Chapter 14 of the Manual on Uniform Traffic Studies (MUTS). This procedure includes two steps: determining whether or not the roadway lighting would meet the Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting warrants, and determining a benefit-cost analysis ratio.

The TAC Manual does state that roadway lighting should be used if it will contribute substantially to the safety, comfort, and efficiency of vehicle and pedestrian traffic. The Federal Highway Administration's manual entitled "Roadway Lighting Handbook" presents an analytical approach to highway lighting warrants. These warrants were developed for various roadway types. The

roadway type evaluation form that represents SR 501 Clearlake Road is "Non-Controlled Access Facility".

- Data Collection

The non-controlled access facility evaluation form is divided into four classification factors. These factors are geometric, operation, environment, and accidents. Accident data was obtained from the FDOT District One Safety Office. Crash reduction due to lighting can be predicted for rural two-lane roadways, rural multi-lane roadways up to four through lanes, and urban/suburban arterials up to four through-lanes. The study area is a 4 lane divided roadway and crash reduction due to lighting can be predicated utilizing the Highway Safety Manual (HSM) predictive method.

The following data was used for the evaluation form:

- Geometric Factors (Existing Data)

Geometric factors of the roadway facility determine the driving task and the information necessary to perform the driving task safely and efficiently. Following are the description of those factors for the SR 501 Clearlake Road study area:

1.	No. of Lanes:	SR 501 Clearlake Road is a 4-lane roadway
2.	Lane Width:	SR 501 Clearlake Road travel lanes vary from 11 to 14-foot wide
3.	Median Openings/Mile:	There are 9 median opening approx. 1.43 miles
4.	Driveway & Entrances/Mile:	There are 35 Driveway & Entrances approx. 1.43 miles
5.	Horizontal Curve Radius:	3,550 feet (Maximum Horizontal)
6.	Vertical Grades:	SR 501 Clearlake Road in the study area is flat with grades less than 3%
7.	Sight Distance:	Sight distance appears greater than 700 feet for the entire limits
8.	Parking:	Parking is not permitted within the study limits

- Operation Factors (Existing Data)

The operational factors are evaluated to provide an indication of how effective the roadway facility operated to satisfy its intended function:

1. Signals: Traffic signals are at SR 501 Clearlake Road and:
    a. Michigan Avenue (MP 2.235)
    b. Otterbein Avenue (MP 2.671)

c. Industry Road (MP 3.358)

2. Left-Turn Lane: Left Turn lanes exist at all major signalized intersections.
3. Median Width: Median width is 22-feet.
4. Operating Speed: 35 - 45 mph
5. Pedestrian Traffic: Based on the nature of the roadway, pedestrian traffic is estimated to be medium (at night).

- Environmental Factors (Existing Data-Estimated)

The environmental factors were reviewed to consider their effects on nighttime driving. Following are the description of those factors for the SR 501 Clearlake Road study area:

1. Percent Development: Approximately 80% of the land appears developed.
2. Area Classification: The existing classification is residential/commercial.
3. Setback Distance: The minimum building is less than 50-feet from the outside of edge of travel lane.
4. Ambient lighting: Ambient lighting is sparse within the project study area.
5. Raised Curb Median: Raised curb median is along majority of the length of the project.

- Accident Factor (Three-Year History Data 2011-2014)

1. Ratio of Night-to-Day Accident Rate (N/D Ratio): 2.53

$$\text{N/D Ratio} = \frac{(No.\ of\ Night\ Accidents)(1-\%\ ADT\ at\ Night)}{(No.\ of\ Day\ Accidents)(\%\ ADT\ at\ Night)}$$

No. of Night Accidents: 69
No. of Day Accidents: 109
% ADT at Night: 20

$$\text{N/D Ratio} = \frac{(69)(1-0.20)}{109(.20)} = 2.53$$

Warrant Analysis Results

The data from the classifications factors detailed in the previous section was applied to the non-controlled access facility evaluation form and is presented in Table 1 (Appendix I). A total of 62.01 points was scored within this table, which was greater than the warranting condition

(60 points). The ratio of night to day accidents has been calculated to be 2.53 which is above the required ratio of 2. For this condition, continuous lighting is warranted.

2) Net Present Value Analysis Determination

Referring to Chapter 14.2.2 in the Manual on Uniform Traffic Studies in which it states:

> "Designers should first address TAC warrants; if these conditions are met, then a NPV analysis should be made."

3) B/C Ratio Application

a) B/C Analysis

Chapter 14.1 in the Manual on Uniform Traffic studies states a designer can apply either the benefit/cost (B/C) ratio or the net present value (NPV) analysis.

> "The crash benefit of lighting installation is then converted to dollars and a benefit/cost (B/C) ratio and/or net present value (NPV) is computed using the cost of the lighting project."

Since the conditions were not met and the NPV analysis should not have been used, the benefit/cost (B/C) ratio is applied. See below and Appendix G for calculations.

$$Benefit - Cost = \frac{ADT * \%ADtn * 365 * NRU * CRF * ACC}{(AIC + TMC + AEC) * 1{,}000{,}000}$$

Where:

ADT	=	Average daily traffic (Projected)
%ADTn	=	Percent of ADT at night
NRU	=	Night crash rate unlighted
CRF	=	Crash reduction factor
ACC	=	Average crash cost
AIC	=	Annualized installation cost
TMC	=	Total maintenance cost
AEC	=	Annual energy cost

i. Number of Poles, Luminaires, and Wattage

As part of this report, preliminary lighting analysis was performed for the project segment based on FDOT lighting requirements. The results of the analysis recommend that a spacing of 162 feet utilizing opposite pole arrangement shoulder be applied. Luminaires are recommended to be 247-Watt Light-Emitting Diode (LED) cobraheads (GE Evolved LED ERS4 or equal) with a mounting height of 45 feet, in order to meet FDOT standard values. Also, luminaires are to be pole mounted with 15-foot arm lengths and 20 feet setbacks, making the luminaire offset five feet. For additional lighting analysis details, please refer to Appendix H.

ii. Night Accident Rate Unlighted (NRU)

The calculation of the Night Rate Unlighted (NRU) utilized the FDOT Crash Analysis Report (CAR) from 2009 to 2013, which is included in Appendix B of this report. Crash data from this report, along with the Average Daily Traffic (ADT), the percent of ADT at night (%ADTn) which is based on 24-hour traffic counts, and the project length, were used to compute the NRU. The NRU was computed for the entire project. These segmental calculations are shown in the following pages.

$$NRU = \frac{Night\ Accidents * 1{,}000{,}000}{ADT * \%ADTn * 365 * Project\ Length * Years\ in\ Crash\ Report}$$

1. NRU Calculation for Entire Project Length

$$NRU = \frac{69 * 1{,}000{,}000}{21040 * 0.20 * 365 * 1.43 * 5}$$

$\boldsymbol{NRU}$ = 6.28

iii. Average Crash Cost (ACC)

The table below shows the economic loss values used to calculate the Average Crash Cost. These values were obtained from Table 23.5.2 FDOT KABCO Crash Costs of the Plans Preparation Manual, Volume 1 Chapter 23 (Appendix E).

Average Crash Cost for the Entire Project Segment

Crash Type	No. of Crashes by Type	Economic Loss per Crash	Total Economic Loss
Damage Only	160	$7,600	$1,216,000.00
Injury (evident)	213	$157,170	$33,477,210.00
Fatality	0	$10,230,000	$0
		Total	$34,693,210.00

$$\boldsymbol{ACC} = \frac{\$34{,}693{,}210.00}{373} = \$93{,}011.29$$

iv. Crash Reduction Factor

The Crash Reduction Factor (CRF) for SR 501 Clearlake Road, was obtained from the CMF Clearinghouse:

CRF (Urban Mainline) = 0.40

v. Interest Rate and Capital Recovery Factor

The interest rate used to calculate the Capital Recovery Factor is 4% with a service life of 15 years.

$$\boldsymbol{Capital\ Recovery\ Factor} = \frac{\boldsymbol{IR} * (\mathbf{1} + \boldsymbol{IR})^{\boldsymbol{S}}}{(\mathbf{1} + \boldsymbol{IR})^{\boldsymbol{S}} - \mathbf{1}}$$

$$\boldsymbol{Capital\ Recovery\ Factor} = \mathbf{0.090}$$

vi. Annualized Installation Cost (AIC)

Based on past projects and the Long Range Estimate (LRE), the average construction cost per light pole is approximately $7,992.

$$AIC = \frac{Initial\ Cost\ (\$)}{Pole} * Capital\ Recovery\ Factor * \frac{No.of\ Poles}{Mile}$$

$$AIC = \frac{\$7{,}992}{Pole} * 0.090 * \frac{93\ Poles}{Mile}$$

$\boldsymbol{AIC}$ = $66,893.04

vii. Total Annual Maintenance Cost (TMC)

The annual maintenance cost per standard lighting luminaire is based on the typical value of $200 per luminaire / pole for conventional lighting.

$$TMC = \frac{No.\,of\ Poles}{Mile} * \frac{Luminaire}{Pole} * Annual\ Maintenance\ Cost$$

$$TMC = \frac{93\ Poles}{Mile} * \frac{1\ Luminaire}{Pole} * \$200$$

$\boldsymbol{TMC}$ = $18,600.00

viii. Electrical Energy Cost

Electrical Energy Cost is based on the Average Electrical Cost (AEC) in Florida, approximately $ 0.0919 / kWh. This is based on a number published by the US Energy Information Administration (Appendix F).

$$AEC = \frac{No.\,of\ Poles}{Mile} * \frac{Luminaire}{Pole} * \frac{Watts}{Luminaire} * \frac{1kW}{1000\ Watts} * \frac{\$}{kWH} * \frac{11\ Hours}{Day} * \frac{365\ Days}{1\ Year}$$

$$AEC = \frac{93\ Poles}{Mile} * \frac{1\ Luminaire}{Pole} * \frac{400\ W}{Luminaire} * \frac{1\ kW}{1000\ W} * \frac{\$0.0919}{kWH} * \frac{11\ Hours}{Day} * \frac{365\ Days}{1\ Year}$$

$\boldsymbol{AEC}$ = $13,726.00

ix. Calculation of Benefit – Cost Ratio (New Roadway Lighting Systems)

$$\boldsymbol{Benefit/Cost\ Ratio} = \frac{\mathbf{ADT} * \%\mathbf{ADTn} * \mathbf{365} * \mathbf{NRU} * \mathbf{CRF} * \mathbf{ACC}}{(\boldsymbol{AIC} + \boldsymbol{TMC} + \boldsymbol{AEC}) * \mathbf{1,000,000}}$$

ADT	=	Average daily traffic (Projected)
%ADTn	=	Percent of ADT at night
NRU	=	Night crash rate unlighted
CRF	=	Crash reduction factor
ACC	=	Average crash cost
AIC	=	Annualized installation cost
TMC	=	Total maintenance cost
AEC	=	Annual energy cost

$$\boldsymbol{Benefit/Cost\ Ratio} = \frac{\mathbf{21,040} * \mathbf{0.20} * \mathbf{365} * \mathbf{6.28} * \mathbf{0.40} * \mathbf{93,011.29}}{(\mathbf{66,893.04} + \mathbf{18,600} + \mathbf{13,726.00}) * \mathbf{1,000,000}}$$

$$\boldsymbol{Benefit\ /Cost\ Ratio} = \boldsymbol{3.62}$$

b) B/C Analysis Results

For the roadway segment of SR 501 Clearlake Road from Michigan Road to Industry Road the percentage of crashes occurring at night is 39%, which is slightly higher than the statewide average of 34% (see table below). Thus, based on the AASHTO warrants cited, a new lighting system for SR 501 Clearlake Road from Michigan Road to Industry Road is justified.

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	Night Crashes	Total Crashes	% Night Crashes	Statewide Average
Entire Study Area	69	178	39%	34%

In addition to evaluating the AASHTO warrants, a Benefit-Cost Analysis was performed. Part of that analysis involved calculating the Average Crash Cost associated with the roadway.

Location	Average Crash Cost
Project Segment	$93,011.29

STEP TWO: Net Present Value Analysis

Based on FHWA, TAC and MUTS, the lighting is warranted and the NPV analysis should not be applied. As such, the B/C ratio already calculated in this report, ensures compliance with Chapter 14 of FDOT MUTS Lighting Justification Procedure without requiring a continuation to Step Two and the net present value analysis.

V. Conclusion

The overall Benefit-Cost Ratio for the entire roadway segment is 3.62 and the Night to Day Crash rate is 2.53.

A Benefit-Cost Ratio of 1.0 or more justifies lighting for high crash locations, as identified by the State Safety Office, and a benefit-cost ratio of 2.0 or more justifies lighting for all other locations. Therefore, the overall Benefit-Cost analysis contained in this report is justified. The present study shows that the benefit-cost ratio and the lighting warrants analysis justify the installation of continuous roadway lighting. Therefore, the installation of a lighting system along SR 501 is recommended in the study limits.

Appendix A – Annual Average Daily Traffic

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2015 HISTORICAL AADT REPORT

COUNTY: 70 - BREVARD

SITE: 0358 - ON SR-501, 0.239 MI. E OF SR-524 (UCLP)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2015	21000 C	W 11000	E 10000	9.00	53.80	4.40
2014	22000 C	W 11500	E 10500	9.00	53.80	5.80
2013	17400 C	W 9200	E 8200	9.00	54.20	3.40
2012	19700 C	W 9200	E 10500	9.00	53.60	3.10
2011	21000 C	W 11000	E 10000	9.00	54.30	3.50
2010	20100 C	W 10500	E 9600	10.91	56.02	3.80
2009	22000 C	W 11500	E 10500	11.80	61.02	4.10
2008	21000 C	W 11000	E 10000	11.37	57.79	4.10
2007	22000 C	W 11500	E 10500	9.20	54.21	3.80
2006	23000 C	W 11500	E 11500	11.35	57.22	2.90
2005	21000 C	W 11000	E 10000	11.30	53.80	4.00
2004	18600 F	W 9400	E 9200	10.10	56.80	4.00
2003	18200 C	W 9200	E 9000	9.80	53.10	4.00
2002	16900 C	W 8700	E 8200	9.90	53.90	7.60
2001	17000 C	W 8600	E 8400	11.40	60.10	1.60
2000	14500 C	W 7200	E 7300	10.20	52.40	9.40

Year AADT
2013 17400
2012 19700
2011 21000
2010 20100
2009 22000
AVG AADT = (17400+19700+21000+20100+22000) = 20040

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; F = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2015 HISTORICAL AADT REPORT

COUNTY: 70 - BREVARD

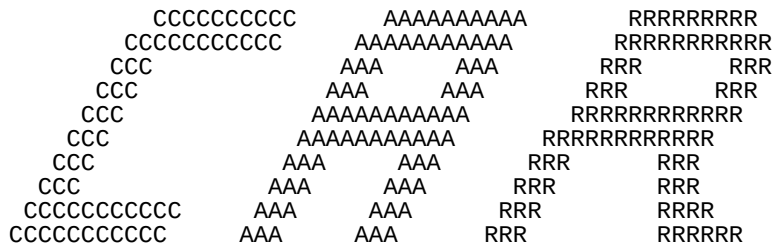
SITE: 5206 - ON SR-501, 0.113 MI. N OF MICHIGAN AVE. (UVL)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2015	21500 C	N 10500	S 11000	9.00	53.80	6.40
2014	21000 C	N 11000	S 10000	9.00	53.80	7.10
2013	18700 C	N 9700	S 9000	9.00	54.20	8.90
2012	23000 C	N 12500	S 10500	9.00	53.60	6.80
2011	22000 C	N 11000	S 11000	9.00	54.30	7.20
2010	22500 C	N 11500	S 11000	10.91	56.02	5.70
2009	24000 C	N 12500	S 11500	11.80	61.02	7.40
2008	23000 C	N 11500	S 11500	11.37	57.79	6.70
2007	22500 C	N 11500	S 11000	9.20	54.21	6.00
2006	21000 C	N 10500	S 10500	11.35	57.22	7.80
2005	26000 C	N 13500	S 12500	11.30	53.80	4.80
2004	21000 C	N	S	10.10	56.80	3.90
2003	18500 C	N	S	9.80	53.10	3.10
2002	15500 C	N	S	9.90	53.90	5.30
2001	18500 C	N	S	11.40	60.10	3.20
2000	16000 C	N	S	10.20	52.40	3.30

Year AADT
2013 18700
2012 23000
2011 22000
2010 22500
2009 24000
AVG AADT = (18700+23000+22000+22500+24000) = 22040

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; F = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

Appendix B – Crash Data



C R A S H R E P O R T I N G S Y S T E M

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MESSAGE CLASS: .........  Q
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USERID: ................  TO562SJ
DETAIL SORT ORDER: .....  1 - SORT BY ROADWAY, MILE POINT
PRINT SEGMENTS? ........  Y
PRINT INTERSECTIONS? ...  N
SUMMARY FORMAT: ........  2 - TOP LINE ALL BREAKS
OVERRIDE VALUES:
 MAX # OF BREAKS: ......  99
 CRASH RATE CATEGORY: ...
 AVERAGE DAILY TRAFFIC:..
 # OF LEGS: ............
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FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL

CRN	ROADWYID	M	N	S	ADT	Y	M	D	H	CRCC	A	H	L	W	R	T	R	SL	R	A	V	V	VM	V	PI	CC	D	V	V	V	V	PI	CC	D	#	#	N
AUM	COSUC	I	EN	TR	VAR	E	O	A	O	RALA	L	AE	I	E	D	RC	OC	IO	O	C	ET	EU	EO	E	OM	OA	RA	ET	EU	EM	E	OM	OA	RA			UI
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831354730	70011000	02.084	2471	501	019800	11	12	15	15	U-4DP	0	09	1	1	1	01	01	02	R	2	01	01	01	N	02	77	00	01	01	01	E	14	00	00	2	0	00
831356970	70011000	02.084	2471	501	018500	12	02	13	08	U-4DP	0	03	1	1	1	01	01	02	R	2	03	01	03	S	05	03	73	08	05	01	N	01	00	66	2	0	00
831361650	70011000	02.084	2471	501	018500	12	05	31	16	U-4DP	0	03	1	2	1	01	01	04	R	1	01	01	03	W	12	03	18	03	01	01	N	02	00	30	2	0	02
831377430	70011000	02.084	2471	501	017300	13	05	31	22	U-4DP	0	38	5	1	1	06	01	02	R	2	01	01	03	W	01	03	19	01	01	01	N	04	00	21	2	0	00
903779850	70011000	02.097	2921	501	022500	09	03	18	15	U-4DP	0	03	1	1	1	05	01	01	L	A	01	01	03	S	02	02	48	01	01	01	S	14	00	56	2	0	00
831381790	70011000	02.101	2921	501	017300	13	09	30	14	U-4DP	0	11	1	1	1	01	77	04	R	S	01	01	06	W	01	03	40	10	00	88		00	00	55	2	0	01
902560430	70011000	02.103	2921	501	020300	10	09	03	21	U-4DP	0	11	5	1	1	77	01	04	L	S	01	01	77	W	01	77	28	10	01	77	N	04	00	14	2	0	01
822896280	70011000	02.112	2921	501	019800	11	12	05	05	U-4DP	0	10	4	1	1	01	01	04	R	S	01	01	05	W	02	01	49	10	00	88		00	00	20	2	0	01
902555030	70011000	02.140	2921	501	020300	10	09	22	13	U-4DP	0	09	1	1	1	01	01	01	L	2	03	01	02		11	03	19	01	01	01	S	01	00	17	2	0	00
902868370	70011000	02.141	2921	501	022500	09	11	20	17	U-4DP	0	77	4	1	1	03	01	01	R	S	11	01	01	N	01	10	59					00	00	1	0	01
831382600	70011000	02.175	2473	501	017300	13	10	22	20	U-4DP	0	03	4	3	2	01	01	01	R	U	03	01	05	N	09	03	51	01	01	01	N	02	00	55	2	0	01
087224650	70011000	02.188	2473	501	020300	10	09	10	17	U-4DP	0	01	1	1	1	03	01	03	R	1	01	01	01	N	01	02	00	01	01	02	N	08	00	52	2	0	00
831381760	70011000	02.197	2473	501	017300	13	09	27	13	U-4DP	0	11	1	1	1	01	01	04	R	2	01	01	05	W	02	03	53	77	00	88	S	01	00	27	2	0	01
822895490	70011000	02.216	2473	501	019800	11	10	06	19	U-4DP	0	01	4	1	1	01	77	03	R	2	01	01	77	N	01	77	00	02	01	02	N	08	00	25	2	0	05
831378030	70011000	02.216	2473	501	017300	13	06	14	18	U-4DP	0	01	1	1	1	01	01	03	L	1	03	01	01	S	01	02	24	02	01	01	S	08	00	62	3	0	00
831379790	70011000	02.226	2473	501	017300	13	08	05	16	U-4DP	0	01	1	1	2	01	08	02	R	1	01	01	02	N	01	10	24	01	01	02	E	08	00	00	2	0	00
087223430	70011000	02.231	2473	501	019800	11	02	23	19	U-4DP	0	05	4	1	1	05	01	02	L	2	03	01	05	S	01	03	37	88	88	88	U	00	00	66	1	0	01
903765020Y	70011000	02.235	2473	501	022500	09	02	02	19	U-4DP	0	01	2	3	2	01	01	01	S	2	03	01	01	E	01	10	29	01	01	01	E	17	00	47	2	0	00
903779080	70011000	02.235	2473	501	022500	09	02	13	17	U-4DP	0	09	1	1	1	05	01	02	L	1	00	00	01	E	00	10	00	11	01	02	E	08	00	57	2	0	00
903991390	70011000	02.235	2473	501	022500	09	03	24	18	U-4DP	0	10	1	1	1	05	01	02	L	1	88	88	88	U	00	77	37	01	01	01	W	14	00	26	1	0	01
902554450	70011000	02.235	2473	501	022500	09	06	14	17	U-4DP	0	04	1	2	1	05	01	02	R	1	01	01	03	S	05	03	16	01	01	01	N	14	00	16	2	0	00
902868600	70011000	02.235	2473	501	022500	09	12	04	21	U-4DP	0	09	4	3	2	05	09	02	R	U	10	01	77	N	01	18	65	02	01	05	N	01	00	63	2	0	01
903766130	70011000	02.235	2473	501	022500	09	12	29	88	U-4DP	0	77	4	1	1	05	01	02	R	U	02	01	03	S	01	03	22	03	77	01	N	02	00	46	3	0	02
903791130	70011000	02.235	2473	501	020300	10	05	18	15	U-4DP	0	02	1	1	1	05	01	02	I	M	01	01	01	N	01	11	19	01	01	03	S	14	00	61	2	0	00
903791240	70011000	02.235	2473	501	020300	10	08	16	13	U-4DP	0	77	1	1	1	05	01	02	R	1	01	01	77	S	01	77	28	01	01	01	S	04	00	18	3	0	04
903791500	70011000	02.235	2473	501	020300	10	11	13	13	U-4DP	0	02	1	1	1	01	01	02	I	M	01	01	01	N	14	12	20	01	01	03	S	02	00	70	2	0	07
732936560	70011000	02.235	2473	501	020300	10	11	23	07	U-4DP	0	03	2	1	1	08	01	02	L	2	01	08	01	W	01	01	00	01	01	01	S	13	00	00	2	0	00
903991550	70011000	02.235	2473	501	020300	10	12	01	18	U-4DP	0	01	2	1	1	05	01	02	R	U	00	00	01	N	00	77	00	01	01	01	N	08	00	46	2	0	00
903951140	70011000	02.235	2473	501	019800	11	01	19	08	U-4DP	0		5	1	1	05	00	02	R	U							00	01	01	01	N	07		27	2	0	00
822895230	70011000	02.235	2473	501	019800	11	09	04	14	U-4DP	2	01	1	1	1	05	01	02	R	1	01	01	01	S	01	02	58	01	01	02	S	07	10	32	2	0	04
822895500	70011000	02.235	2473	501	019800	11	10	07	10	U-4DP	0	01	1	2	2	05	01	02	S	L	01	00	01	E	01	02	74	03	01	02	E	08	00	27	2	0	02
123752730	70011000	02.235	2473	501	019800	11	11	04	22	U-4DP	0	09	4	1	1	05	01	02	R	1	01	01	01	N	01	11	49	01	01	03	S	02	02	26	2	0	01
831356390	70011000	02.235	2473	501	018500	12	01	26	20	U-4DP	0	02	4	1	1	05	01	02	L	2	01	01	03	S	01	03	00	01	01	01	N	04	00	21	2	0	04
831356340	70011000	02.235	2473	501	018500	12	01	28	17	U-4DP	0	02	4	1	1	05	01	02	I	M	03	01	03	S	04	03	15	11	01	01	N	01	00	27	2	0	02
831367650	70011000	02.235	2473	501	018500	12	10	01	18	U-4DP	0	08	1	1	1	10	77	02	R	1	01	01	03	W	01	77	61					00	00	2	0	00
831369230	70011000	02.235	2473	501	018500	12	10	01	17	U-4DP	0	03	1	1	1	05	01	02	R	1	01	01	01	N	01	77	46	01	01	03	W	13	77	32	2	0	00

COMMENT: 1 - SORT BY ROADWAY, MILE POINT
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL

CRN	ROADWYID	M	N	S	ADT	Y	M	D	H	CRCC	A	H	L	W	R	T	R	SL	R	A	V	V	VM	V	PI	CC	D	V	V	V	V	PI	CC	D	#	#	N
ARS	CSE	I	EN	TR	VAR	E	O	A	O	RALA	L	AE	I	E	D	RC	OC	IO	O	C	ET	EU	EO	E	OM	OA	RA	ET	EU	EM	E	OM	OA	RA			UI
UMH	OCU	L	AO	AO	EIA	A	N	Y	U	ATAT	C	RV	G	A		AO	AO	TC	A	C	HY	HS	HV	H	IP	NU	IG	HY	HS	HO	H	IP	NU	IG	V	K	MN
SBH	NTU	E	RD	TA	RLF	R	T		R	SESE		ME	H	T	S	FN	DN	EA	D		IP	IE	IM		NA	TS	VE	IP	IE	IV		NA	TS	VE	E	I	BJ
E	TIT	O	S		GI		H			H SG	I	FN	T	H	U	FT	D	T		L	CE	C	CN	D	TC	RE	/	CE	C	C	D	TC	RE	/	H	L	EU
R	YOB	S	T		EC					O	N	UT	I	E	R	IR	T	I	S	N	L	L1	LT	I	T	I	P1	L	L2	L2	I	T	I	P2	C	L	RR
	N N	T								R	V	L	N	R	F	CO	N	O	D		E1	E	E	R	O	B1	E	E2	E	E	R	O	B2	E	L	E
										Y		1	G			L	S	N		#			1	1	F1		D				2	F2		D	S	D
831370590	70011000	02.235	2473	501	018500	12	12	06	22	U-4DP	0	04	4	1	1	05	01	02	S	C	01	01	03	E	01	01	62	88	88	88	U	00	00	20	1	0	01
831371980	70011000	02.235	2473	501	017300	13	01	05	19	U-4DP	0	08	4	3	2	05	01	02	L	1	03	01	01	S	01	10	31	01	01	03	S	08	00	34	2	0	00
831372400	70011000	02.235	2473	501	017300	13	01	16	12	U-4DP	0	27	1	1	1	05	01	02	R	S	01	01	77	E	01	77	62							00	00	1	0	01
831374920	70011000	02.235	2473	501	017300	13	03	12	14	U-4DP	0	05	1	1	1	05	01	02	R	2	03	01	05	W	01	01	52	10	00	88		00	00	65	2	0	01
831378340	70011000	02.235	2473	501	017300	13	06	24	18	U-4DP	0	01	1	1	1	00	01	02	R	1	03	00	88	N	02	77	53	00	00	88		01	00	52	3	0	00
831383480	70011000	02.235	2473	501	017300	13	11	11	18	U-4DP	0	09	5	1	1	01	01	02	R	2	03	01	06	N	06	03	00	01	01	01	N	11	00	23	2	0	00
831383650	70011000	02.235	2473	501	017300	13	11	16	20	U-4DP	0	03	4	3	2	05	01	02	I	M	01	01	01	N	14	11	00	01	01	03	W	10	00	27	2	0	01
831380900	70011000	02.246	2473	501	018700	13	09	07	20	U-4DP	0	01	2	1	1	05	01	03	L	3	01	01	01	S	01	02	23	03	01	02	S	08	00	29	2	0	00
902855360	70011000	02.254	2473	501	022500	10	09	03	09	U-4DP	0	11	5	1	1	77	01	04	R	S	01	01	02	W	01	77	28	10	01	77	N	04	00	14	2	0	01
087213770	70011000	02.259	1685	501	022500	10	03	25	20	U-4DP	0	04	4	1	1	01	01	04	R	1	01	01	01	W	01	03	16	01	01	01	N	01	00	21	2	0	00
831359860	70011000	02.263	1685	501	023000	12	05	02	16	U-4DP	0	09	1	1	1	05	01	03	L	1	03	01	06	S	01	77	26	02	08	02	N	09	00	63	2	0	00
831357190	70011000	02.273	1685	501	023000	12	02	17	16	U-4DP	0	01	1	3	2	01	01	02	L	2	01	01	01	S	01	77	17	08	05	02	S	08	00	47	2	0	00
831358780	70011000	02.273	1685	501	023000	12	03	18	16	U-4DP	0	09	1	1	1	06	01	02	L	2	00	01	01	E	01	03	76	01	01	01	S	03	00	53	2	0	00
831375070	70011000	02.273	1685	501	018700	13	03	23	08	U-4DP	0	09	3	3	2	01	01	02	L	2	01	01	06	S	06	03	00	03	01	01	S	04	00	34	2	0	00
831380580	70011000	02.286	1685	501	018700	13	08	31	14	U-4DP	0	01	1	1	1	01	01	04	R	2	03	01	03	E	05	03	63	01	01	01	N	01	00	28	2	0	00
831378430	70011000	02.292	1685	501	018700	13	06	22	11	U-4DP	0	03	1	1	1	01	01	01	R	1	02	01	77	N	11	06	53	01	01	01	E	01	00	73	2	0	00
831362100	70011000	02.325	1685	501	023000	12	06	07	03	U-4DP	0	01	1	2	2	01	00	01	R	2	01	01	01	N	01	02	56	01	01	02	N	08	00	45	2	0	01
903791530	70011000	02.330	1685	501	022500	10	11	15	09	U-4DP	0	09	1	1	1	01	01	01	L	1	01	01	03	E	14	03	31	02	01	01	S	02	00	48	2	0	01
903991590	70011000	02.330	1685	501	022000	11	04	04	22	U-4DP	0	10	5	1	1	05	01	01	R	1	01	00	01	N	02	01	34	88	88	88	U	00	00	00	1	0	00
831370340	70011000	02.330	1685	501	023000	12	12	04	07	U-4DP	0	01	1	1	1	05	01	01	L	2	03	01	01	S	01	02	16	03	01	02	S	08	00	37	4	0	01
806323830	70011000	02.373	1685	501	022500	10	08	02	18	U-2DP	0	01	1	1	1	03	01	04	L	1	03	01	01	S	01	02	36	03	01	05	S	08	00	19	3	0	03
831371520	70011000	02.373	1685	501	023000	12	12	12	19	U-2DP	0	01	4	3	2	01	01	01	R	1	01	01	01	N	01	10	58	00	01	02	N	08	00	30	2	0	01
822657240	70011000	02.444	1426	501	022000	11	09	03	09	U-2DP	0	28	1	1	1	01	01	03	R	S	03	01	01	N	01	02	33							00	00	1	0	00
820974190	70011000	02.491	1426	501	022000	11	05	04	08	U-2DP	0	03	1	1	1	01	01	02	L	1	01	01	01	S	10	77	62	03	01	05	N	02	00	33	2	0	00
831373360	70011000	02.546	1427	501	018700	13	02	06	17	U-2DP	0	04	1	1	1	01	01	02	M	T	01	01	03	S	13	03	44	03	77	01	E	12	00	63	2	0	00
831381420	70011000	02.546	1427	501	018700	13	09	21	15	U-2DP	0	09	1	1	1	01	01	02	L	1	01	01	01	E	01	03	00	01	01	01	S	05	00	23	2	0	00
837088580	70011000	02.546	1427	501	018700	13	12	31	12	U-2DP	0		1	2	1	06	01	02	L	1							00	01	01	03	S	11		33	2	0	00
831383500	70011000	02.576	1427	501	017400	13	11	08	08	U-2DP	0	18	4	1	1	01	01	01	R	S	01	01	06	N	10	77	21							00	00	1	0	00
902560370	70011000	02.633	2741	501	022000	09	07	30	13	U-2DP	0	17	1	3	3	05	01	02	L	1	01	01	03	S	01	02	22							77	00	1	0	00
902851170	70011000	02.633	2741	501	020100	10	12	11	18	U-2DP	0	77	4	1	1	01	02	03	L	1	11	01	01	S	16	01	23							00	00	1	0	01
903991350	70011000	02.671	2741	501	022000	09	01	27	00	U-2DP	1	01	4	1	1	05	01	02	R	R	01	01	05	N	01	02	22	03	01	05	N	09	00	31	2	0	00
903968240	70011000	02.671	2741	501	022000	09	01	31	17	U-2DP	1	02	1	1	1	05	01	02	R	1	03	01	01	N	01	02	47	01	01	01	N	09	10	17	3	0	02
902869340	70011000	02.671	2741	501	022000	09	07	09	02	U-2DP	0	01	1	1	1	05	01	02	L	1	01	00	01		00	02	00	01	01	02	S	08	77	41	2	0	00
903986580	70011000	02.671	2741	501	022000	09	08	24	18	U-2DP	0	77	1	3	2	05	01	02	U	U	01	01	03	N	14	01	24	01	01	01	S	14	00	37	2	0	01
902899330	70011000	02.671	2741	501	022000	09	09	03	15	U-2DP	0	03	1	1	1	05	01	02	S	1	01	01	01	S	01	02	80	01	01	01	W	03	00	55	2	0	01
903991450	70011000	02.671	2741	501	022000	09	10	05	19	U-2DP	0	01	2	2	2	05	01	02	R	U	01	01	01	E	00	02	00	01	01	01	S	08	00	70	2	0	00
903968700	70011000	02.671	2741	501	022000	09	12	23	11	U-2DP	0	01	1	1	1	05	01	02	T	U	01	08	11	W	02	15	51	01	01	02	W	09	00	30	2	0	00

```
COMMENT:                                      1 - SORT BY ROADWAY, MILE POINT
  FROM: 01/01/2009 TO 12/31/2014                                      RAMPS INCL
  FROM CO/SEC/SUB: 70 011 000                 MP: 002.084              INFL INCL
  TO   CO/SEC/SUB: 70 011 000                 MP: 003.358             CR/OS INCL

   C      ROADWYID   M     N    S    ADT   Y  M  D  H  CRCC  A H  L W R T  R  SL R A V  V  VM V PI CC D  V  V  V  V PI CC D  # # N
   R N    C S  S     I     EN   TR   VAR   E  O  A  O  RALA  L AE I E D RC OC IO O C ET EU EO E OM OA RA ET EU EM E OM OA RA     UI
   A U    O E  E     L     AO   AO   EIA   A  N  Y  U  ATAT  C RV G A   AO AO TC A C HY HS HV H IP NU IG HY HS HO H IP NU IG V K MN
   S M    U C  SC    E     RD   TA   RLF   R  T     R  SESE    ME H T S FN DN EA D   IP IE IM   NA TS VE IP IE IV   NA TS VE E I BJ
   H B    N T  UT    P     EE   ED   AYF      H        H SG  I FN T H U FT  D  T   L CE C  CN D TC RE /  CE C  C  D TC RE /  H L EU
     E    T I  BI    O     S         G I                  O  N UT I E R IR  T  I S N L  L1 LT I  T I  P1 L  L2 L2 I  T I  P2 C L RR
     R    Y O  O     S     T         E C                  R  V L  N R F CO  N  O D   E1 E  E  R O  B1 E  E2 E  E  R O  B2 E  L E  E
            N  N     T                                    Y     1 G      L  S  N   #        1 1 F1    D           2 F2    D  S D  D
***********************************************************************************************************************************
903950030 70011000 02.671 2741  501 020100 10 02 25 17 U-2DP 0 02 1 1 1 05 01 02 S 1 00 00 01    01 10 00 01 01 02 W 08 11 40 2 0 01
737269600 70011000 02.671 2741  501 020100 10 06 30 17 U-2DP 0 01 1 1 1 05 01 02 R 1 03 01 01 N 01 02 62 01 01 02 N 08 10 49 2 0 00
902856500 70011000 02.671 2741  501 021000 11 01 31 13 U-2DP 0 01 1 1 1 05 01 02 L 1 03 01 01 S 01 10 20 02 01 02 S 08 00 40 2 0 00
902553960Y70011000 02.671 2741  501 021000 11 07 21 15 U-2DP 0 09 1 1 1 06 01 03 T 1 77 01 88 N 01 03 36 01 01 01 E 01 13 82 2 0 01
822895140 70011000 02.671 2741  501 021000 11 08 21 13 U-2DP 0 09 1 1 1 05 01 02 R 2 01 01 01 N 01 01 21 03 01 03 S 05 00 59 2 0 01
831356230 70011000 02.671 2741  501 019700 12 01 18 18 U-2DP 0 01 1 1 1 05 01 02 L 1 03 01 03 N 06 03 58 03 01 01 N 02 00 54 2 0 01
831363800 70011000 02.671 2741  501 019700 12 07 19 20 U-2DP 0 03 4 3 2 05 01 02 I M 01 01 01 N 02 11 16 01 01 01 E 08 00 85 2 0 00
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COMMENT: 1 - SORT BY ROADWAY, MILE POINT
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL

C R N A U S M H B E R	ROADWYID C S E C T I O N	S E C T I O N	M I L E P O S T	N E A R A O R D	S T A T E D	ADT VAR EIA RLF AYF	Y E A R	M O N T H	D A Y	H O U R	CRCC RALA ATAT SESE SG	A L C	H AE RV ME I N	I E G H T	E D A S	T RC AO FN IR	R OC AO DN T	SL IO TC EA I	R O C D L	A C	V ET HY CE E1	V EU HS L L1	VM EO HV IM LT	V E H I	PI OM IP NA T	CC OA NU TS I	D RA IG VE P1	V ET HY IP E	V EU HS IE L2	V EM HO IV L2	V E H I	PI OM IP NA T	CC OA NU TS I	D RA IG VE P2	# # V K I	N UI MN BJ EU RR
	N	N	T				Y						1	G			L	S	N	#			1	1	F1						2	F2			D	S	D	D
831356040	70070000	04.649	6047		524	014500	11	12	27	16	S-2DP	0	77	1	3	2	01	08	02	R	S	01	08	03	W	04	12	24								00	00	1	0	00
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831362820	70070000	04.649	6047		524	013400	12	06	24	01	S-2DP	0	30	4	2	1	01	01	01	R	S	01	01	77	W	19	77	29								00	00	1	0	00
831368860	70070000	04.649	6047		524	013400	12	10	22	14	S-2DP	0	01	1	1	1	05	01	02	R	2	01	01	01	E	01	10	27	00	01	02	E	08	77	37	2	0	01
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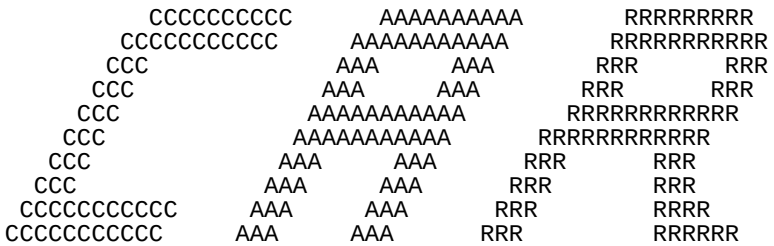
831375270	70070000	04.649	6047		524	012100	13	03	27	15	S-2DP	0	03	1	1	1	05	01	02	I	M	02	01	03	E	02	01	26	01	01	01	W	02	00	57	2	0	01
087274280	Y70070000	04.654	6047		524	023000	11	06	29	17	S-4DR	0	01	1	2	2	77	08	01	R	U	01	00	01	E	01	12	43	03	00	01	E	01	77	26	2	0	02
903792850	Y70070000	04.668	6047		524	021000	10	05	21	07	S-4DR	2	06	1	1	1	01	01	03	L	U	02	01	01	S	02	08	19	77	01	02	S	09	02	57	2	0	00

COMMENT: 1 - SORT BY ROADWAY, MILE POINT
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL

	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
FOR YEAR	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	8	10	12	20	0	10	4	1
2010	0	0	0	11	25	8	19	0	25	3	1
2011	0	0	0	10	19	8	18	0	19	3	2
2012	0	0	0	11	16	11	22	0	16	5	1
2013	0	0	0	13	14	26	39	0	14	3	1
TOTAL	0	0	0	53	84	65	118	0	84	18	6



C R A S H R E P O R T I N G S Y S T E M

N O T I C E: THE INFORMATION CONTAINED IN THIS DOCUMENT (REPORT, SCHEDULE, LIST, OR DATA) HAS BEEN COMPILED FROM INFORMATION COLLECTED FOR THE PURPOSE OF IDENTIFYING, EVALUATING, OR PLANNING SAFETY ENHANCEMENTS. THIS PRODUCT IDENTIFIES INFORMATION USED FOR THE PURPOSE OF DEVELOPING HIGHWAY SAFETY CONSTRUCTION IMPROVEMENT PROJECTS WHICH MAY BE IMPLEMENTED UTILIZING FEDERAL-AID HIGHWAY FUNDS. ANY DOCUMENT DISPLAYING THIS NOTICE SHALL BE USED ONLY FOR THOSE PURPOSES DEEMED APPROPRIATE BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. SEE TITLE 23, UNITED STATES CODE, SECTION 409.

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I/O NAME: ..............  CARI113
PROGRAM ID: ............  CARPJ13
REPORT NUMBER: .........  01
RUN CLASS: .............  A
MESSAGE CLASS: .........  Q
PRINTER DEST: ..........  RMT56
# COPIES: ..............  01
ACCOUNT #: .............  5590562
SUBMIT W/HOLD? .........  N
USERID: ................  TO562SJ
DETAIL SORT ORDER: .....  1 - SORT BY ROADWAY, MILE POINT
PRINT SEGMENTS? ........  Y
PRINT INTERSECTIONS? ...  N
SUMMARY FORMAT: ........  2 - TOP LINE ALL BREAKS
OVERRIDE VALUES:
 MAX # OF BREAKS: ......  99
 CRASH RATE CATEGORY: ...
 AVERAGE DAILY TRAFFIC:..
 # OF LEGS: ............
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COMMENT:                                     1 - SORT BY ROADWAY, MILE POINT
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  TO   CO/SEC/SUB: 70 070 000                MP: 004.749          CR/OS INCL

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   R N    C S   S    I     EN   TR   VAR   E  O  A  O  RALA  L AE I E D RC OC IO O C ET EU EO E OM OA RA ET EU EM E OM OA RA     UI
   A U    O E   E    L     AO   AO   EIA   A  N  Y  U  ATAT  C RV G A   AO AO TC A C HY HS HV H IP NU IG HY HS HO H IP NU IG V K MN
   S M    U C  SC    E     RD   TA   RLF   R  T     R  SESE    ME H T S FN DN EA D   IP IE IM   NA TS VE IP IE IV   NA TS VE E I BJ
   H B    N T  UT    P     EE   ED   AYF      H        H SG  I FN T H U FT  D  T   L CE C  CN D TC RE /  CE C  C  D TC RE /  H L EU
     E    T I  BI    O     S         G I                O  N UT I E R IR  T  I S N L  L1 LT I  T I  P1 L  L2 L2 I  T I  P2 C L RR
     R    Y O   O    S     T         E C                R  V L  N R F CO  N  O D   E1 E  E  R O  B1 E  E2 E  E  R O  B2 E  L E  E
            N   N    T                                  Y     1 G      L  S  N   #        1 1 F1    D           2 F2    D  S D  D
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776844220 70011000 03.358 6047  501 022000 09 11 10 17 S-2DP 0 03 2 2 1 03 01 02 R 1 01 01 01 W 14 03 18 02 01 01 N 01 00 49 2 0 00
903969700 70011000 03.358 6047  501 020100 10 03 12 23 S-2DP 0 31 4 2 2 01 01 02 R S 01 01 03 N 01 12 19                00 00 1 0 04
902852920 70011000 03.358 6047  501 021000 11 06 05 00 S-2DP 0 32 4 1 1 01 06 02 R 1 11 01 88 W 01 06 49                00 00 1 0 00
831371970 70011000 03.358 6047  501 017400 13 01 04 19 S-2DP 0 03 4 1 1 05 01 02 L 2 03 00 03 E 02 03 29 01 00 01 W 01 00 46 2 0 00
831372140 70011000 03.358 6047  501 017400 13 01 10 13 S-2DP 0 01 1 2 1 05 01 02 R 1 03 01 01 E 01 02 00 01 01 02 E 08 00 37 2 0 00
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831373330 70011000 03.358 6047  501 017400 13 02 05 18 S-2DP 0 01 4 1 1 05 01 02 L U 01 01 01 W 01 02 47 01 01 01 W 08 00 17 2 0 00
831373790 70011000 03.358 6047  501 017400 13 02 15 22 S-2DP 0 03 5 1 1 05 01 02 L 1 01 01 03 E 01 03 17 03 01 01 W 14 00 49 2 0 00
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831375140 70011000 03.358 6047  501 017400 13 03 25 16 S-2DP 0 01 1 1 1 05 01 02 R L 01 01 01 E 01 10 19 03 00 02 W 08 00 54 2 0 00
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903991530 70070000 04.554 3134  524 015000 10 07 20 19 S-2DP 0 01 1 1 1 03 01 01 L 2 01 01 01 W 01 10 57 01 01 01 W 17 00 43 2 0 01
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737269110 70070000 04.649 6047  524 015000 10 02 09 17 S-2DP 0 03 2 3 2 01 01 02 R 1 03 01 05 W 06 02 30 01 01 03 E 01 00 54 2 0 01
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831356040 70070000 04.649 6047  524 014500 11 12 27 16 S-2DP 0 77 1 3 2 01 08 02 R S 01 08 03 W 04 12 24                00 00 1 0 00
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COMMENT: 1 - SORT BY ROADWAY, MILE POINT
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FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL

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 A U    O E   E     L      AO    AO   EIA   A  N  Y  U  ATAT C RV G A   AO AO TC A C HY HS HV H IP NU IG HY HS HO H IP NU IG V K MN
 S M    U C   SC    E      RD    TA   RLF   R  T     R  SESE   ME H T S FN DN EA D   IP IE IM   NA TS VE IP IE IV   NA TS VE E I BJ
 H B    N T   UT    P      EE    ED   AYF      H        H SG I FN T H U FT  D  T   L CE C  CN D TC RE / CE C  C  D TC RE / H L EU
   E    T I   BI    O      S          G I                 O N UT I E R IR  T  I S N L  L1 LT I  T I  P1 L  L2 L2 I  T I  P2 C L RR
   R    Y O    O    S      T          E C                 R V L  N R F CO  N  O D   E1 E  E  R O  B1 E  E2 E  E  R O  B2 E L E  E
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902899460	70070000	04.749	0829	524	023500	09	09	25	18	S-4DR	0	05	1	1	1	05	01	02	L	R	01	01	05	S	02	77	74	01	01	01	W	09	00	47	2	0	01
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087213760	70070000	04.749	0829	524	021000	10	03	19	17	S-4DR	0	01	1	1	1	05	01	02	R	L	00	00	01	E	00	02	00	02	01	02	E	01	00	44	2	0	00
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822895090	70070000	04.749	0829	524	023000	11	08	14	20	S-4DR	0	03	5	3	2	05	08	02	R	1	03	01	01	N	05	77	22	01	01	01	W	14	00	39	2	0	01
123752090	70070000	04.749	0829	524	023000	11	08	18	13	S-4DR	0	05	1	1	1	05	00	02	M	M	03	01	05	W	01	77	00						00	00	1	0	00
087216850	70070000	04.749	0829	524	023000	11	08	23	21	S-4DR	0	01	4	1	1	05	00	02	L	1	01	01	01	W	01	10	54	03	01	02	W	01	00	50	2	0	01
822895330	70070000	04.749	0829	524	023000	11	09	10	09	S-4DR	0	01	1	1	1	05	01	02	L	1	01	00	01	S	01	02	00	01	01	02	S	01	77	37	2	0	00
822895310	70070000	04.749	0829	524	023000	11	09	14	22	S-4DR	0	01	4	1	1	05	01	02	L	U	01	01	01	W	01	02	82	03	01	02	W	07	00	23	2	0	01
822058080	70070000	04.749	0829	524	023000	11	09	19	20	S-4DR	0	01	5	1	1	05	01	02	R	1	01	08	04	E	09	04	48	01	01	02	E	01	00	51	2	0	00
831354850	70070000	04.749	0829	524	023000	11	12	13	21	S-4DR	0	01	5	1	1	05	01	02	L	1	01	01	01	W	02	10	21	01	01	01	W	08	00	30	2	0	01
831355340	70070000	04.749	0829	524	023000	12	01	02	09	S-4DR	3	01	1	2	1	00	01	02	R	1	00	00	88	E	01	02	52	01	01	02	E	08	11	51	3	0	01
831363850	70070000	04.749	0829	524	023000	12	05	15	21	S-4DR	0	01	1	3	2	01	77	03	T	2	02	01	01	S	01	01	53	03	01	01	S	08	00	32	2	0	00
831362120	70070000	04.749	0829	524	023000	12	06	07	08	S-4DR	0	01	1	3	2	05	01	02	R	1	03	00	01	E	01	02	00	01	01	02	E	08	00	18	3	0	00
831364730	70070000	04.749	0829	524	023000	12	07	22	15	S-4DR	0	01	1	3	2	05	00	02	L	R	03	01	01	S	01	77	33	01	01	01	S	08	00	52	2	0	00
831382820	70070000	04.749	0829	524	021000	13	10	25	20	S-4DR	0	02	4	1	1	01	01	02	R	2	03	01	03	S	02	03	48	03	01	01	N	04	00	58	2	0	01

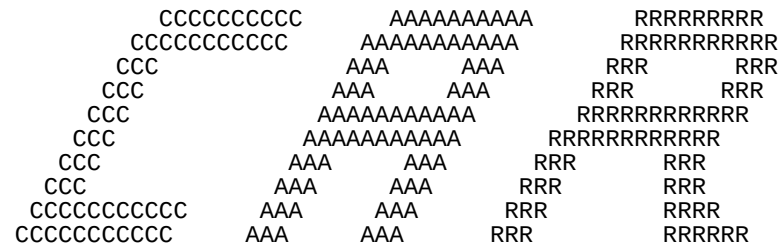
COMMENT: 1 - SORT BY ROADWAY, MILE POINT
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL

FOR YEAR	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	5	12	9	14	0	12	3	1
2010	0	0	0	9	13	3	12	0	13	1	0
2011	0	0	0	6	7	5	11	0	7	1	0
2012	0	0	0	6	8	4	10	0	8	1	0
2013	0	0	0	4	5	9	13	0	5	8	0
TOTAL	0	0	0	30	45	30	60	0	45	14	1

*** REPORT TOTALS ***

CUMULATIVE TOTALS FOR ALL LOCATIONS SUBMITTED - OVERLAPPING OR INTERSECTING LOCATIONS MAY RESULT IN CRASHES COUNTED MORE THAN ONCE

FOR	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
YEAR	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	13	22	21	34	0	22	7	2
2010	0	0	0	20	38	11	31	0	38	4	1
2011	0	0	0	16	26	13	29	0	26	4	2
2012	0	0	0	17	24	15	32	0	24	6	1
2013	0	0	0	17	19	35	52	0	19	11	1
TOTAL	0	0	0	83	129	95	178	0	129	32	7



C R A S H R E P O R T I N G S Y S T E M

N O T I C E: THE INFORMATION CONTAINED IN THIS DOCUMENT (REPORT, SCHEDULE, LIST, OR DATA) HAS BEEN COMPILED FROM INFORMATION COLLECTED FOR THE PURPOSE OF IDENTIFYING, EVALUATING, OR PLANNING SAFETY ENHANCEMENTS. THIS PRODUCT IDENTIFIES INFORMATION USED FOR THE PURPOSE OF DEVELOPING HIGHWAY SAFETY CONSTRUCTION IMPROVEMENT PROJECTS WHICH MAY BE IMPLEMENTED UTILIZING FEDERAL-AID HIGHWAY FUNDS. ANY DOCUMENT DISPLAYING THIS NOTICE SHALL BE USED ONLY FOR THOSE PURPOSES DEEMED APPROPRIATE BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. SEE TITLE 23, UNITED STATES CODE, SECTION 409.

```
I/O NAME: ..............  CARO112
PROGRAM ID: ............  CARPJ12
REPORT NUMBER: .........  01
RUN CLASS: .............  A
MESSAGE CLASS: .........  Q
PRINTER DEST: ..........  RMT56
# COPIES: ..............  01
ACCOUNT #: .............  5590562
SUBMIT W/HOLD? .........  N
USERID: ................  TO562SJ
DETAIL SORT ORDER: .....  1 - COUNTY, ON-ROAD, INTERSECTING ROAD, DIR,DIST, DATE, CRASH RPT#
PRINT SEGMENTS? ........  Y
PRINT INTERSECTIONS? ...  N
SUMMARY FORMAT: ........  2 - TOP LINE ALL BREAKS
OVERRIDE VALUES:
 MAX # OF BREAKS: ......  99
 CRASH RATE CATEGORY: ...
 AVERAGE DAILY TRAFFIC:..
 # OF LEGS: ............
```

REPORT..CARPJ12-1 FLORIDA - DEPARTMENT OF TRANSPORTATION PAGE NO 1
DATE....2015-01-28 (CAR) CRASH ANALYSIS REPORTING SYSTEM
TIME....13:50:28:5 CRASH LOCATION SUMMARY FOR STATE ROADS I/O... CARO112
COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL	AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	011	000	2.084	2.372	SR 501	0.288	21	57	20803	4.342	2.918	99.90	0	50	30	$ 7,812,648
05	70	011	000	2.372	2.829	SR 501	0.457	11	33	20801	1.584	2.753	57.50	0	17	19	$ 3,538,194
05	70	011	000	2.829	3.358	SR 501	0.529	14	28	20040	1.205	1.387	43.45	0	17	16	$ 6,174,420
05	70	011	000	2.084	3.358	SR 501	1.274	N/A	118	20486	2.064	*******	*****	0	84	65	**********

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	011	000	2.084	3.358	SR 501	1.274	N/A	118	20486	2.064	******* *****	0	84	65	**********

CRASHES PER MONTH

14	JANUARY	13	FEBRUARY	12	MARCH	1	APRIL	7	MAY	10	JUNE
6	JULY	8	AUGUST	12	SEPTEMBER	8	OCTOBER	11	NOVEMBER	16	DECEMBER

NUMBER OF CRASHES PER HARMFUL EVENT

1ST #	%	CATEGORY DESCRIPTION
0	0.00	UNKNOWN/NOT CODED
37	31.35	COLL. W/MV IN TRANS. REAR-END
6	5.08	COLL. W/MV IN TRANS. HEAD-ON
20	16.94	COLL. W/MV IN TRANS. ANGLE
6	5.08	COLL. W/MV IN TRANS. LFT-TURN
2	1.69	COLL. W/MV IN TRANS. RGT-TURN
1	0.84	COLL. W/MV IN TRANS. SIDESWIP
0	0.00	COLL. W/MV IN TRANS. BAKD INTO
2	1.69	COLL. W/PARKED CAR
16	13.55	COLLISION WITH MV ON ROADWAY
3	2.54	COLL. W/ PEDESTRIAN
5	4.23	COLL. W/ BICYCLE
0	0.00	COLL. W/ BICYCLE (BIKE LANE)
0	0.00	COLL. W/ MOPED
0	0.00	COLL. W/ TRAIN
0	0.00	COLL. W/ ANIMAL
0	0.00	MV HIT SIGN/SIGN POST
1	0.84	MV HIT UTILITY POLE/LIGHT POLE
2	1.69	MV HIT GUARDRAIL
0	0.00	MV HIT FENCE
0	0.00	MV HIT CONCRETE BARRIER WALL
0	0.00	MV HIT BRDGE/PIER/ABUTMNT/RAIL
0	0.00	MV HIT TREE/SHRUBBERY
0	0.00	COLL. W/CONSTRCTN BARRICDE/SGN
0	0.00	COLL. W/TRAFFIC GATE
0	0.00	COLL. W/CRASH ATTENUATORS
0	0.00	COLL. W/FIXED OBJCT ABOVE ROAD
1	0.84	MV HIT OTHER FIXED OBJECT
1	0.84	COLL. W/MOVEABLE OBJCT ON ROAD
1	0.84	MV RAN INTO DITCH/CULVERT
2	1.69	RAN OFF ROAD INTO WATER
1	0.84	OVERTURNED
1	0.84	OCCUPANT FELL FROM VEHICLE
0	0.00	TRACTOR/TRAILER JACKNIFED
0	0.00	FIRE
0	0.00	EXPLOSION
0	0.00	DOWNHILL RUNAWAY
0	0.00	CARGO LOSS OR SHIFT
1	0.84	SEPARATION OF UNITS
0	0.00	MEDIAN CROSSOVER
9	7.62	ALL OTHER (EXPLAIN)

CRASHES PER DAY AND HOUR

	MON	TUE	WED	THU	FRI	SAT	SUN	TOT	%
** AM **									
MIDNT - 1:59		1					3	4	3.38
2:00 - 3:59				2				2	1.69
4:00 - 5:59	1							1	0.84
6:00 - 7:59		2		1	1			4	3.38
8:00 - 9:59	3		2		3	2		10	8.47
10:00 - 11:59	1		2		1	1		5	4.23
AM TOTAL	5	3	4	3	5	3	3	26	22.03
** PM **									
NOON - 1:59	2	1	2	2	1	2	1	11	9.32
2:00 - 3:59	2	3	2	3	4	3	2	19	16.10
4:00 - 5:59	3	4	4	3	4	2	4	24	20.33
6:00 - 7:59	7	2	4	1	3	2	1	20	16.94
8:00 - 9:59		1		3	2	3		9	7.62
10:00 - 11:59	1			2	4	1		8	6.77
PM TOTAL	15	11	12	14	18	13	8	91	77.11
UNKNOWN		1						1	0.84
** TOTAL **	20	15	16	17	23	16	11	118	100.00
** % **	16.94	12.71	13.55	14.40	19.49	13.55	9.32	100.00	

CRASHES BY LIGHTING CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
72	61.01	DAYLIGHT	28	23.72	DARK (STREET LIGHT)
8	6.77	DUSK	9	7.62	DARK (NO STREET LIGHT)
1	0.84	DAWN	0	0.00	UNKNOWN

CRASHES BY ROAD SURFACE CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
93	78.81	DRY	24	20.33	WET
1	0.84	SLIPPERY	0	0.00	ICY
0	0.00	ALL OTHER	0	0.00	UNKNOWN

CRASHES BY WEATHER CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
86	72.88	CLEAR	15	12.71	CLOUDY
17	14.40	RAIN	0	0.00	FOG
0	0.00	ALL OTHER	0	0.00	UNKNOWN

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE	ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	011	000	2.084	3.358	SR	501	1.274	N/A	118	20486	2.064	******* *****	0	84	65	**********

TRAFFICWAY CHARACTER (PER CRASH)

TOTAL	%	DESCRIPTION
90	76.27	STRAIGHT-LEVEL
18	15.25	STRAIGHT-UPGRADE/DOWNGRADE
9	7.62	CURVE-LEVEL
1	0.84	CURVE-UPGRADE/DOWNGRADE

DIRECTION OF TRAVEL (PER VEHICLE)

TOTAL	%	DESCRIPTION	%	DESCRIPTION
36	15.92	EAST	72	31.85 NORTH
0	0.00	OFF-ROAD	67	29.64 SOUTH
1	0.44	UNNWN		

ROAD CONDITIONS AT TIME OF CRASH (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
3	2.54	117	99.15	UNKNOWN/NOT CODED
106	89.83	1	0.84	NO DEFECTS
1	0.84	0	0.00	OBSTRUCTION WITH WARNING
0	0.00	0	0.00	OBSTRUCTION WITHOUT WARNING
0	0.00	0	0.00	ROAD UNDER REPAIR/CONSTRUCTI
0	0.00	0	0.00	LOOSE SURFACE MATERIALS
1	0.84	0	0.00	SHOULDERS SOFT/LOW/HIGH
0	0.00	0	0.00	HOLES/RUTS/UNSAFE PAVED EDGE
3	2.54	0	0.00	STANDING WATER
1	0.84	0	0.00	WORN/POLISHED/ROAD SURFACE
3	2.54	0	0.00	ALL OTHER(EXPLAIN)

VISION OBSTRUCTED (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
2	1.69	55	46.61	UNKNOWN/NOT CODED
94	79.66	55	46.61	VISION NOT OBSCURED
2	1.69	1	0.84	INCLEMENT WEATHER
4	3.38	0	0.00	PARKED/STOPPED VEHICLE
4	3.38	0	0.00	TREES/CROPS/BUSHES
0	0.00	0	0.00	LOAD ON VEHICLE
0	0.00	0	0.00	BUILDING/FIXED OBJECT
0	0.00	1	0.84	SIGNS/BILLBOARDS
0	0.00	0	0.00	FOG
0	0.00	0	0.00	SMOKE
0	0.00	1	0.84	GLARE
12	10.16	5	4.23	ALL OTHER (EXPLAIN)

SITE LOCATION (PER CRASH)

TOTAL	%	DESCRIPTION
17	14.40	NOT AT INTERSECTION/RRX/BRIDGE
80	67.79	AT INTERSECTION
11	9.32	INFLUENCED BY INTERSECTION
10	8.47	DRIVEWAY ACCESS
0	0.00	RAILROAD CROSSING
0	0.00	BRIDGE
0	0.00	ENTRANCE RAMP
0	0.00	EXIT RAMP
0	0.00	PARKING LOT/TRAFFIC WAY
0	0.00	PARKING LOT AISLE OR STALL
0	0.00	PRIVATE PROPERTY
0	0.00	TOLL BOOTH
0	0.00	PUBLIC BUS STOP ZONE
0	0.00	ALL OTHER

TRAFFIC CONTROL (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
1	0.84	54	45.76	NOT APPLICABLE
44	37.28	21	17.79	NO CONTROL
0	0.00	0	0.00	SPECIAL SPEED ZONE
4	3.38	2	1.69	SPEED CONTROL SIGN
0	0.00	0	0.00	SCHOOL ZONE
59	50.00	36	30.50	TRAFFIC SIGNAL
4	3.38	1	0.84	STOP SIGN
0	0.00	0	0.00	YIELD SIGN
1	0.84	0	0.00	FLASHING LIGHT
0	0.00	0	0.00	RAILROAD SIGNAL
1	0.84	1	0.84	OFFICER/GUARD/FLAGMAN
0	0.00	0	0.00	POSTED NO U-TURN
0	0.00	0	0.00	NO PASSING ZONE
4	3.38	3	2.54	ALL OTHER

SIDE OF ROAD (PER CRASH)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
0	0.00	END OF ST RD	7	5.93	INTERSECTION
42	35.59	LEFT	1	0.84	MEDIAN
0	0.00	PARKING LOT/	57	48.30	RIGHT
8	6.77	SIDE RD RIGH	2	1.69	SIDE RD LEFT

ALCOHOL/DRUG USE (PER DRIVER/PEDESTRIAN)

TOTAL	%	DESCRIPTION
154	68.14	UNKNOWN/NOT CODED
67	29.64	NOT DRINKING OR USING DRUGS
3	1.32	ALCOHOL-UNDER INFLUENCE
3	1.32	DRUGS-UNDER INFLUENCE
0	0.00	ALCOHOL & DRUGS-UNDER INFLUEN
0	0.00	HAD BEEN DRINKING
0	0.00	PENDING BAC TEST RESULTS

WORK AREA (PER VEHICLE/PEDESTRIAN)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
223	98.67	NONE	1	0.44	NEARBY
0	0.00	ENTERED			

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	011	000	2.084	3.358	SR 501	1.274	N/A	118	20486	2.064	*******	*****	0	84	65 **********

VEHICLE MOVEMENT (PER VEHICLE)

TOTAL	%	DESCRIPTION
110	48.67	STRAIGHT AHEAD
33	14.60	SLOWING/STOPPED/STALLED
39	17.25	MAKING LEFT TURN
0	0.00	BACKING
11	4.86	MAKING RIGHT TURN
5	2.21	CHANGING LANES
0	0.00	ENTERING/LEAVING PARKING SPACE
0	0.00	PROPERLY PARKED
0	0.00	IMPROPERLY PARKED
0	0.00	MAKING U-TURN
1	0.44	PASSING
0	0.00	DRIVERLESS OR RUNAWAY VEH.
0	0.00	NOT IN TRANSPORT
14	6.19	ALL OTHERS

CONTRIBUTING CAUSES - VEHICLE

1ST	%	2ND	%	DESCRIPTION
188	83.18	0	0.00	NO DEFECTS
0	0.00	0	0.00	DEFECTIVE BRAKES
0	0.00	0	0.00	WORN/SMOOTH TIRES
1	0.44	0	0.00	DEFECTIVE/IMPROPER LIGHTS
0	0.00	0	0.00	PUNCTURE/BLOWOUT
0	0.00	0	0.00	STEERING MECH.
0	0.00	0	0.00	WINDSHIELD WIPERS
0	0.00	0	0.00	EQUIPMENT/VEHCILE DEFECT
11	4.86	1	0.44	ALL OTHER
0	0.00	0	0.00	UNKNOWN

VEHICLE SPEED (BEFORE CRASH)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
26	11.50	UNKNOWN	25	11.06	41-50
30	13.27	STOPPED	2	0.88	51-60
26	11.50	0-5	1	0.44	61-70
27	11.94	6-10	0	0.00	71-80
9	3.98	11-15	0	0.00	81-90
12	5.30	16-20	0	0.00	91-100
30	13.27	21-30	0	0.00	100+
35	15.48	31-40	0	0.00	PARKED

CONTRIBUTING CAUSES - DRIVER/PEDESTRIAN

1ST	2ND	3RD	DESCRIPTION
0	213	224	UNKNOWN/NOT CODED
98	0	0	NO IMPROPER DRIVING/ACTION
28	2	0	CARELESS DRIVING
31	0	0	FAILED TO YEILD RIGHT OF WAY
0	0	0	IMPROPER BACKING
0	0	0	IMPROPER LANE CHANGE
4	0	0	IMPROPER TURN
0	0	0	ALCOHOL-UNDER INFLUENCE
1	0	0	DRUGS-UNDER INFLUENCE
0	0	1	ALCOHOL DRUGS-UNDER INFLUENC
12	3	0	FOLLOWED TOO CLOSELY
5	2	0	DISREGARDED TRAFFIC SIGNAL
6	0	0	EXCEEDED SAFE SPEED LIMIT
0	1	0	DISREGARDED STOP SIGN
0	0	0	FAILED TO MAINTAIN EQUIP/VEH
2	0	1	IMPROPER PASSING
0	0	0	DROVE LEFT OF CENTER
0	0	0	EXCEEDED STATED SPEED LIMIT
1	0	0	OBSTRUCTING TRAFFIC
0	0	0	IMPROPER LOAD
0	0	0	DISREGARDED OTHER TRAFFIC CO
0	0	0	DRIVING WRONG SIDE/WAY
0	0	0	FLEEING POLICE
0	0	0	VEHICLE MODIFIED
0	0	0	DRIVER DISTRACTION
39	6	1	ALL OTHER (EXPLAIN)

RESIDENCE (DRIVER AND PEDESTRIAN)

TOTAL	%	DESCRIPTION
64	28.69	CNTY OF CR
1	0.44	ELSEWHERE
3	1.34	NON-RES
0	0.00	FOREIGN
159	71.30	UNKNOWN

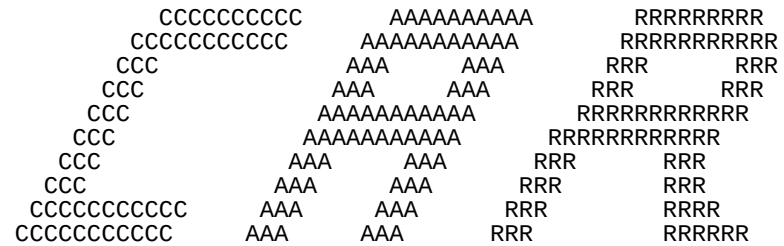
SAFETY EQUIPMENT IN USE (PER PERSON)

1ST	%	2ND	%	DESCRIPTION
90	25.28	277	77.80	UNKNOWN
22	6.17	0	0.00	NOT IN USE
139	39.04	0	0.00	SEAT BELT/SHOULDER HARNESS
6	1.68	1	0.28	CHILD RESTRAINT
14	3.93	15	4.21	AIR BAG - DEPLOYED
81	22.75	59	16.57	AIR BAG - NOT DEPLOYED
4	1.12	3	0.84	SAFETY HELMENT
0	0.00	1	0.28	EYE PROTECTION
0	0.00	0	0.00	OTHER

TOTAL # OF VEHICLES: 226 TOTAL # OF DRIVERS: 223 TOTAL # OF PEDESTRIANS: 4
TOTAL # OF PERSONS (PEDESTRIANS, DRIVERS, PASSENGERS): 356

COMMENT:
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 011 000 MP: 002.084 INFL INCL
TO CO/SEC/SUB: 70 011 000 MP: 003.358 CR/OS INCL

FOR YEAR	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	8	10	12	20	0	10	4	1
2010	0	0	0	11	25	8	19	0	25	3	1
2011	0	0	0	10	19	8	18	0	19	3	2
2012	0	0	0	11	16	11	22	0	16	5	1
2013	0	0	0	13	14	26	39	0	14	3	1
TOTAL	0	0	0	53	84	65	118	0	84	18	6



C R A S H R E P O R T I N G S Y S T E M

N O T I C E: THE INFORMATION CONTAINED IN THIS DOCUMENT (REPORT, SCHEDULE, LIST, OR DATA) HAS BEEN COMPILED FROM INFORMATION COLLECTED FOR THE PURPOSE OF IDENTIFYING, EVALUATING, OR PLANNING SAFETY ENHANCEMENTS. THIS PRODUCT IDENTIFIES INFORMATION USED FOR THE PURPOSE OF DEVELOPING HIGHWAY SAFETY CONSTRUCTION IMPROVEMENT PROJECTS WHICH MAY BE IMPLEMENTED UTILIZING FEDERAL-AID HIGHWAY FUNDS. ANY DOCUMENT DISPLAYING THIS NOTICE SHALL BE USED ONLY FOR THOSE PURPOSES DEEMED APPROPRIATE BY THE FLORIDA DEPARTMENT OF TRANSPORTATION. SEE TITLE 23, UNITED STATES CODE, SECTION 409.

```
I/O NAME: ..............  CARO112
PROGRAM ID: ............  CARPJ12
REPORT NUMBER: .........  01
RUN CLASS: .............  A
MESSAGE CLASS: .........  Q
PRINTER DEST: ..........  RMT56
# COPIES: ..............  01
ACCOUNT #: .............  5590562
SUBMIT W/HOLD? .........  N
USERID: ................  TO562SJ
DETAIL SORT ORDER: .....  1 - COUNTY, ON-ROAD, INTERSECTING ROAD, DIR,DIST, DATE, CRASH RPT#
PRINT SEGMENTS? ........  Y
PRINT INTERSECTIONS? ...  N
SUMMARY FORMAT: ........  2 - TOP LINE ALL BREAKS
OVERRIDE VALUES:
 MAX # OF BREAKS: ......  99
 CRASH RATE CATEGORY: ...
 AVERAGE DAILY TRAFFIC:..
 # OF LEGS: ............
```

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	070	000	4.305	4.649	SR 524	0.344	14	35	14000	3.317	1.387 99.99	0	34	15	$ 7,718,025
05	70	070	000	4.649	4.749	SR 524	0.100	23	47	22300	9.619	1.299 99.99	0	26	26	$ 11,011,912
05	70	070	000	4.749	4.749	SR 524	0.000	41	23	22300	0.000	1.289 0.00	0	9	14	$ 3,141,961
05	70	070	000	4.305	4.749	SR 524	0.444	14	60	15884	3.883	1.387 99.99	0	45	30	$ 13,230,900

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	070	000	4.305	4.749	SR 524	0.444	14	60	15884	3.883	1.387 99.99	0	45	30	$ 13,230,900

CRASHES PER MONTH

6	JANUARY	6	FEBRUARY	10	MARCH	2	APRIL	4	MAY	6	JUNE
4	JULY	4	AUGUST	8	SEPTEMBER	2	OCTOBER	2	NOVEMBER	6	DECEMBER

NUMBER OF CRASHES PER HARMFUL EVENT

1ST #	%	CATEGORY DESCRIPTION
0	0.00	UNKNOWN/NOT CODED
24	40.00	COLL. W/MV IN TRANS. REAR-END
3	5.00	COLL. W/MV IN TRANS. HEAD-ON
9	15.00	COLL. W/MV IN TRANS. ANGLE
5	8.33	COLL. W/MV IN TRANS. LFT-TURN
3	5.00	COLL. W/MV IN TRANS. RGT-TURN
2	3.33	COLL. W/MV IN TRANS. SIDESWIP
0	0.00	COLL. W/MV IN TRANS. BAKD INTO
0	0.00	COLL. W/PARKED CAR
3	5.00	COLLISION WITH MV ON ROADWAY
1	1.66	COLL. W/ PEDESTRIAN
1	1.66	COLL. W/ BICYCLE
0	0.00	COLL. W/ BICYCLE (BIKE LANE)
0	0.00	COLL. W/ MOPED
0	0.00	COLL. W/ TRAIN
0	0.00	COLL. W/ ANIMAL
0	0.00	MV HIT SIGN/SIGN POST
0	0.00	MV HIT UTILITY POLE/LIGHT POLE
1	1.66	MV HIT GUARDRAIL
0	0.00	MV HIT FENCE
0	0.00	MV HIT CONCRETE BARRIER WALL
0	0.00	MV HIT BRDGE/PIER/ABUTMNT/RAIL
0	0.00	MV HIT TREE/SHRUBBERY
0	0.00	COLL. W/CONSTRCTN BARRICDE/SGN
0	0.00	COLL. W/TRAFFIC GATE
0	0.00	COLL. W/CRASH ATTENUATORS
0	0.00	COLL. W/FIXED OBJCT ABOVE ROAD
0	0.00	MV HIT OTHER FIXED OBJECT
0	0.00	COLL. W/MOVEABLE OBJCT ON ROAD
1	1.66	MV RAN INTO DITCH/CULVERT
2	3.33	RAN OFF ROAD INTO WATER
1	1.66	OVERTURNED
1	1.66	OCCUPANT FELL FROM VEHICLE
0	0.00	TRACTOR/TRAILER JACKNIFED
0	0.00	FIRE
0	0.00	EXPLOSION
0	0.00	DOWNHILL RUNAWAY
0	0.00	CARGO LOSS OR SHIFT
0	0.00	SEPARATION OF UNITS
0	0.00	MEDIAN CROSSOVER
3	5.00	ALL OTHER (EXPLAIN)

CRASHES PER DAY AND HOUR

	MON	TUE	WED	THU	FRI	SAT	SUN	TOT	%
** AM **									
MIDNT - 1:59							3	3	5.00
2:00 - 3:59									0.00
4:00 - 5:59									0.00
6:00 - 7:59	1			2	1			4	6.66
8:00 - 9:59	1			1	1	1		4	6.66
10:00 - 11:59	1							1	1.66
AM TOTAL	3			3	2	1	3	12	20.00
** PM **									
NOON - 1:59	1		1	2				4	6.66
2:00 - 3:59	1	1	3	1	1	1	3	11	18.33
4:00 - 5:59	2	3	1	1	2		2	11	18.33
6:00 - 7:59	2	2		1	3			8	13.33
8:00 - 9:59	2	4	2		2		1	11	18.33
10:00 - 11:59			1		2			3	5.00
PM TOTAL	8	10	8	5	10	1	6	48	80.00
UNKNOWN									0.00
** TOTAL **	11	10	8	8	12	2	9	60	100.00
** % **	18.33	16.66	13.33	13.33	20.00	3.33	15.00	100.00	

CRASHES BY LIGHTING CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
36	60.00	DAYLIGHT	12	20.00	DARK (STREET LIGHT)
5	8.33	DUSK	7	11.66	DARK (NO STREET LIGHT)
0	0.00	DAWN	0	0.00	UNKNOWN

CRASHES BY ROAD SURFACE CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
46	76.66	DRY	13	21.66	WET
0	0.00	SLIPPERY	0	0.00	ICY
1	1.66	ALL OTHER	0	0.00	UNKNOWN

CRASHES BY WEATHER CONDITION

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
40	66.66	CLEAR	11	18.33	CLOUDY
8	13.33	RAIN	0	0.00	FOG
1	1.66	ALL OTHER	0	0.00	UNKNOWN

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	070	000	4.305	4.749	SR 524	0.444	14	60	15884	3.883	1.387	99.99	0	45	30	$ 13,230,900

TRAFFICWAY CHARACTER (PER CRASH)

TOTAL	%	DESCRIPTION
49	81.66	STRAIGHT-LEVEL
0	0.00	STRAIGHT-UPGRADE/DOWNGRADE
11	18.33	CURVE-LEVEL
0	0.00	CURVE-UPGRADE/DOWNGRADE

DIRECTION OF TRAVEL (PER VEHICLE)

TOTAL	%	DESCRIPTION	%	DESCRIPTION
43	36.75	EAST	11	9.40 NORTH
0	0.00	OFF-ROAD	16	13.67 SOUTH
0	0.00	UNNWN		

ROAD CONDITIONS AT TIME OF CRASH (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
3	5.00	60	100.00	UNKNOWN/NOT CODED
51	85.00	0	0.00	NO DEFECTS
0	0.00	0	0.00	OBSTRUCTION WITH WARNING
0	0.00	0	0.00	OBSTRUCTION WITHOUT WARNING
0	0.00	0	0.00	ROAD UNDER REPAIR/CONSTRUCTI
0	0.00	0	0.00	LOOSE SURFACE MATERIALS
1	1.66	0	0.00	SHOULDERS SOFT/LOW/HIGH
0	0.00	0	0.00	HOLES/RUTS/UNSAFE PAVED EDGE
3	5.00	0	0.00	STANDING WATER
0	0.00	0	0.00	WORN/POLISHED/ROAD SURFACE
2	3.33	0	0.00	ALL OTHER(EXPLAIN)

VISION OBSTRUCTED (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
0	0.00	34	56.66	UNKNOWN/NOT CODED
51	85.00	24	40.00	VISION NOT OBSCURED
0	0.00	0	0.00	INCLEMENT WEATHER
1	1.66	0	0.00	PARKED/STOPPED VEHICLE
0	0.00	0	0.00	TREES/CROPS/BUSHES
0	0.00	0	0.00	LOAD ON VEHICLE
0	0.00	0	0.00	BUILDING/FIXED OBJECT
0	0.00	0	0.00	SIGNS/BILLBOARDS
0	0.00	0	0.00	FOG
0	0.00	0	0.00	SMOKE
0	0.00	0	0.00	GLARE
8	13.33	2	3.33	ALL OTHER (EXPLAIN)

SITE LOCATION (PER CRASH)

TOTAL	%	DESCRIPTION
9	15.00	NOT AT INTERSECTION/RRX/BRIDGE
47	78.33	AT INTERSECTION
4	6.66	INFLUENCED BY INTERSECTION
0	0.00	DRIVEWAY ACCESS
0	0.00	RAILROAD CROSSING
0	0.00	BRIDGE
0	0.00	ENTRANCE RAMP
0	0.00	EXIT RAMP
0	0.00	PARKING LOT/TRAFFIC WAY
0	0.00	PARKING LOT AISLE OR STALL
0	0.00	PRIVATE PROPERTY
0	0.00	TOLL BOOTH
0	0.00	PUBLIC BUS STOP ZONE
0	0.00	ALL OTHER

TRAFFIC CONTROL (PER CRASH)

1ST	%	2ND	%	DESCRIPTION
1	1.66	32	53.33	NOT APPLICABLE
17	28.33	4	6.66	NO CONTROL
0	0.00	0	0.00	SPECIAL SPEED ZONE
4	6.66	0	0.00	SPEED CONTROL SIGN
0	0.00	0	0.00	SCHOOL ZONE
34	56.66	22	36.66	TRAFFIC SIGNAL
3	5.00	0	0.00	STOP SIGN
0	0.00	1	1.66	YIELD SIGN
0	0.00	0	0.00	FLASHING LIGHT
0	0.00	0	0.00	RAILROAD SIGNAL
0	0.00	0	0.00	OFFICER/GUARD/FLAGMAN
0	0.00	0	0.00	POSTED NO U-TURN
0	0.00	0	0.00	NO PASSING ZONE
1	1.66	1	1.66	ALL OTHER

SIDE OF ROAD (PER CRASH)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
0	0.00	END OF ST RD	3	5.00	INTERSECTION
26	43.33	LEFT	1	1.66	MEDIAN
0	0.00	PARKING LOT/	27	45.00	RIGHT
1	1.66	SIDE RD RIGH	2	3.33	SIDE RD LEFT

ALCOHOL/DRUG USE (PER DRIVER/PEDESTRIAN)

TOTAL	%	DESCRIPTION
67	57.26	UNKNOWN/NOT CODED
47	40.17	NOT DRINKING OR USING DRUGS
1	0.85	ALCOHOL-UNDER INFLUENCE
1	0.85	DRUGS-UNDER INFLUENCE
1	0.85	ALCOHOL & DRUGS-UNDER INFLUEN
1	0.85	HAD BEEN DRINKING
0	0.00	PENDING BAC TEST RESULTS

WORK AREA (PER VEHICLE/PEDESTRIAN)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
118	100.85	NONE	0	0.00	NEARBY
0	0.00	ENTERED			

COMMENT: *** SEGMENT RATES SELECTED *** FORMAT: 2 - TOP LINE ALL BREAKS
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL OVERRIDE VALUES: MAX # OF BREAKS => 99
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL CRASH RATE CATEGORY =>
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL AVG DAILY TRAFFIC =>

DST	CO	SEC	SUB	BEG-MP	END-MP	ROUTE ID	LENGTH	CATG	CRASHES	ADT	ACTUAL AVERAGE	%CONF	#FTL	#INJ	#PDO	ECON LOSS
05	70	070	000	4.305	4.749	SR 524	0.444	14	60	15884	3.883	1.387	99.99	0	45	30 $ 13,230,900

VEHICLE MOVEMENT (PER VEHICLE)

TOTAL	%	DESCRIPTION
56	47.86	STRAIGHT AHEAD
26	22.22	SLOWING/STOPPED/STALLED
20	17.09	MAKING LEFT TURN
1	0.85	BACKING
4	3.41	MAKING RIGHT TURN
0	0.00	CHANGING LANES
0	0.00	ENTERING/LEAVING PARKING SPACE
0	0.00	PROPERLY PARKED
0	0.00	IMPROPERLY PARKED
1	0.85	MAKING U-TURN
0	0.00	PASSING
0	0.00	DRIVERLESS OR RUNAWAY VEH.
0	0.00	NOT IN TRANSPORT
6	5.12	ALL OTHERS

CONTRIBUTING CAUSES - VEHICLE

1ST	%	2ND	%	DESCRIPTION
101	86.32	0	0.00	NO DEFECTS
0	0.00	0	0.00	DEFECTIVE BRAKES
0	0.00	0	0.00	WORN/SMOOTH TIRES
0	0.00	0	0.00	DEFECTIVE/IMPROPER LIGHTS
0	0.00	0	0.00	PUNCTURE/BLOWOUT
0	0.00	0	0.00	STEERING MECH.
0	0.00	0	0.00	WINDSHIELD WIPERS
0	0.00	0	0.00	EQUIPMENT/VEHCILE DEFECT
5	4.27	0	0.00	ALL OTHER
0	0.00	0	0.00	UNKNOWN

VEHICLE SPEED (BEFORE CRASH)

TOTAL	%	DESCRIPTION	TOTAL	%	DESCRIPTION
9	7.69	UNKNOWN	16	13.67	41-50
22	18.80	STOPPED	2	1.70	51-60
11	9.40	0-5	1	0.85	61-70
12	10.25	6-10	0	0.00	71-80
5	4.27	11-15	0	0.00	81-90
5	4.27	16-20	0	0.00	91-100
18	15.38	21-30	0	0.00	100+
16	13.67	31-40	0	0.00	PARKED

CONTRIBUTING CAUSES - DRIVER/PEDESTRIAN

1ST	2ND	3RD	DESCRIPTION
0	109	116	UNKNOWN/NOT CODED
47	0	0	NO IMPROPER DRIVING/ACTION
18	2	0	CARELESS DRIVING
12	0	0	FAILED TO YEILD RIGHT OF WAY
1	0	0	IMPROPER BACKING
0	0	0	IMPROPER LANE CHANGE
3	1	0	IMPROPER TURN
0	0	0	ALCOHOL-UNDER INFLUENCE
1	0	0	DRUGS-UNDER INFLUENCE
0	0	0	ALCOHOL DRUGS-UNDER INFLUENC
8	0	1	FOLLOWED TOO CLOSELY
1	1	0	DISREGARDED TRAFFIC SIGNAL
4	0	0	EXCEEDED SAFE SPEED LIMIT
0	0	0	DISREGARDED STOP SIGN
0	0	0	FAILED TO MAINTAIN EQUIP/VEH
0	0	1	IMPROPER PASSING
0	0	0	DROVE LEFT OF CENTER
0	0	0	EXCEEDED STATED SPEED LIMIT
0	0	0	OBSTRUCTING TRAFFIC
0	0	0	IMPROPER LOAD
0	0	0	DISREGARDED OTHER TRAFFIC CO
0	0	0	DRIVING WRONG SIDE/WAY
0	0	0	FLEEING POLICE
0	0	0	VEHICLE MODIFIED
0	0	0	DRIVER DISTRACTION
23	5	0	ALL OTHER (EXPLAIN)

RESIDENCE (DRIVER AND PEDESTRIAN)

TOTAL	%	DESCRIPTION
47	40.17	CNTY OF CR
1	0.85	ELSEWHERE
1	0.85	NON-RES
0	0.00	FOREIGN
69	58.97	UNKNOWN

SAFETY EQUIPMENT IN USE (PER PERSON)

1ST	%	2ND	%	DESCRIPTION
24	14.72	131	80.36	UNKNOWN
20	12.26	0	0.00	NOT IN USE
76	46.62	0	0.00	SEAT BELT/SHOULDER HARNESS
3	1.84	0	0.00	CHILD RESTRAINT
7	4.29	4	2.45	AIR BAG - DEPLOYED
32	19.63	25	15.33	AIR BAG - NOT DEPLOYED
1	0.61	2	1.22	SAFETY HELMENT
0	0.00	1	0.61	EYE PROTECTION
0	0.00	0	0.00	OTHER

TOTAL # OF VEHICLES: 117 TOTAL # OF DRIVERS: 117 TOTAL # OF PEDESTRIANS: 1
TOTAL # OF PERSONS (PEDESTRIANS, DRIVERS, PASSENGERS): 163

COMMENT:
FROM: 01/01/2009 TO 12/31/2014 RAMPS INCL
FROM CO/SEC/SUB: 70 070 000 MP: 004.305 INFL INCL
TO CO/SEC/SUB: 70 070 000 MP: 004.749 CR/OS INCL

FOR YEAR	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	5	12	9	14	0	12	3	1
2010	0	0	0	9	13	3	12	0	13	1	0
2011	0	0	0	6	7	5	11	0	7	1	0
2012	0	0	0	6	8	4	10	0	8	1	0
2013	0	0	0	4	5	9	13	0	5	8	0
TOTAL	0	0	0	30	45	30	60	0	45	14	1

*** REPORT TOTALS ***

CUMULATIVE TOTALS FOR ALL LOCATIONS SUBMITTED - OVERLAPPING OR INTERSECTING LOCATIONS MAY RESULT IN CRASHES COUNTED MORE THAN ONCE

FOR	FATAL CRASH STATISTICS			INJURY CRASH STATS		PROPERTY DAMAGE ONLY	TOTALS			INFLUENCE CRASHES OCCURRING ON INTERSECTING RDWYS	
YEAR	CRASHES	FATALITIES	INJURIES	CRASHES	INJURIES	CRASHES	CRASHES	FATALITIES	INJURIES	AT INT.	INFL AREA
2009	0	0	0	13	22	21	34	0	22	7	2
2010	0	0	0	20	38	11	31	0	38	4	1
2011	0	0	0	16	26	13	29	0	26	4	2
2012	0	0	0	17	24	15	32	0	24	6	1
2013	0	0	0	17	19	35	52	0	19	11	1
TOTAL	0	0	0	83	129	95	178	0	129	32	7

Appendix C – MUTS Chapter 14

2016

Manual on Uniform Traffic Studies

Traffic Engineering & Operations Office
605 Suwannee Street, M.S. 36
Tallahassee, Florida 32399-0450

CHAPTER 14 ROADWAY LIGHTING JUSTIFICATION PROCEDURE

14.1 PURPOSE

(1) The procedures for roadway lighting justification are based on FHWA guidelines contained in the ***August 2012 FHWA Lighting Handbook***. In Florida, the predictive methodologies contained in Part C of the ***Highway Safety Manual*** (HSM) are given priority and should be used for the lighting justification crash cost analysis where applicable. The safety impact of existing or proposed lighting projects can be quantified with predictive equations (safety performance functions – SPFs) available in the HSM. These formulas allow for the prediction of crash frequency for a given facility with and without lighting. The crash benefit of lighting installation is then converted to dollars and a benefit/cost (B/C) ratio and/or net present value (NPV) is computed using the cost of the lighting project.

(2) The procedure allows lighting projects to be ranked according to priority for construction. Those with a higher NPV have more value in benefits to the public than those with a lower NPV. For explanation of the NPV analysis see ***HSM Section 7.6.1.1***. The procedure compares benefits to the public from crash reduction to the project cost for installation, maintenance, and operation. Analysis of existing lighting systems to determine if they should be retained is also possible.

14.2 STEP 1: LIGHTING JUSTIFICATION - FHWA LIGHTING HANDBOOK

(1) The procedures outlined in Section 4 of the ***August 2012 FHWA Lighting Handbook*** should be followed to determine roadway lighting justification. For collectors, major arterials, and local streets, the warrant system is based on Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting. For freeways, bridges, and interchanges, the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide Warranting System is used. Per ***FDOT Plans Preparation Manual Volume I, Section 7.3.4***, all interchanges on the interstate highway system shall be lighted. A warrant analysis may be required for federal funding, but will not be used as the determining factor for the installation of lighting at interstate interchanges. Consistent with the ***Florida Intersection Design Guide***, lighting is required at all roundabouts. Further, signalized intersections having marked crosswalks with pedestrian signals shall be lighted.

(2) It should be noted the conditions described in the ***August 2012 FHWA Lighting Handbook*** are roadway conditions under which lighting may be considered warranted and do not necessarily describe the sites where lighting is specifically justified. Designers should first address ***TAC*** and ***AASHTO*** warrants; if these conditions are met, then a NPV analysis should be made. The initial lighting justification analysis is based upon geometric factors. The spreadsheet has been modified to English Units and is provided in ***Lighting Geometric and Operational Factors* (*Form No. 750-020-20).*** A completed example of the form is shown in ***Figure 14-1***.

(3) The procedure to justify a lighting project consists of quantifying the safety benefits of the lighting project versus the cost of construction, maintenance, and operation of the lighting project. The safety benefits should be quantified using HSM predictive method procedures if applicable. Currently, crash reduction due to lighting can be predicted for rural two-lane roadways, rural multi-lane roadways up to four through lanes, and urban/suburban arterials up to four through-lanes. The urban/suburban arterials analysis can also be conducted for five lane roadways with a two-way left turn lane. Crash reduction due to lighting at intersections within these roadway types can also be predicted. A summary of applicable facilities is shown in Table 1. The Predictive Method procedures can be applied to existing or proposed roadway facilities. For facilities not listed above and in Table 1, the crash modification factors (CMFs) shown in Part D of the HSM (Section 13.13) should be applied. Should the FHWA CMF Clearinghouse be used, only CMFs having four or five stars are acceptable.

Table 14-1. Facility Types and Site Types Included in the HSM Predictive Method

HSM Chapter	Undivided Roadway Segments	Divided Roadway Segments	Intersections			
			Stop Control on Minor Leg(s)		Signalized	
			3-Leg	4-Leg	3-Leg	4-Leg
10—Rural Two-Lane Roads	✓	—	✓	✓	—	✓
11—Rural Multilane Highways	✓	✓	✓	✓	—	✓
12—Urban and Suburban Arterial Highways	✓	✓	✓	✓	✓	✓

Source: Highway Safety Manual, 2010, Table 3-2

(4) The difference in crash frequency can then be converted to dollars using FDOT crash costs provided in ***Chapter 23 of the Plans Preparation Manual (PPM)***. Data needs and additional details for applying the HSM Predictive Method are provided in ***Chapter 5 of the MUTS*** for surface streets. After reviewing Chapter 5, if the HSM methodologies are not applicable to the facility type being analyzed, then ***Section 14.3.2*** of this chapter should be considered.

Figure 14-1. Lighting Geometric and Operational Factors Form No. 750-020-20

State of Florida Department of Transportation

Form 750-020-20
TRAFFIC ENGINEERING
February 2015

LIGHTING GEOMETRIC AND OPERATIONAL FACTORS

Item No.	Classification Factor	Rating Factor "R"					Weight "W"	Enter "R" Here	Score "R"x"W"	
		1	2	3	4	5				
	Geometric Factors (See Note 6)									
1	Number of Lanes	≤4	5	6	7	≥8	0.15	3	0.45	
2	Lane Width (ft.)	>11.8	11.2 to 11.8	10.5 to 11.2	9.8 to 10.5	<9.8	0.35	2	0.7	
3	Median Openings/mile	<4 or 1-way	4 to 8	8 to 12	12 to 15	>15 or No Median	1.40	2	2.8	
4	Driveways and Entrances/mile	<32	32 to 64	64 to 97	97 to 129	>129	1.40	2	2.8	
5	Horizontal Curve Radius (ft.)	>1969	1476 to 1969	738 to 1476	574 to 738	<574	5.90	5	29.5	
6	Vertical Grades (%)	<3	3 to 4	4 to 5	5 to 7	>7	0.35	1	0.35	
7	Sight Distance (ft.)	>689	492 to 689	295 to 492	197 to 295	<197	0.15	4	0.6	
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1	
								Subtotal Geometric Factors	37.3	G
	Operational Factors									
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	2	0.3	
10	Left Turn Lane	All Major Intersections or 1-way	Substantial Number of Major Intersections	Most Major Intersections	Half of the Intersections	Infrequent Number or TWTL (See Notes 1 & 3)	0.70	3	2.1	
11	Median Width (ft.)	> 32	20 to 32	10 to 20	4 to 10	0 to 4	0.35	3	1.05	
12	Operating or Posted Speed (mph) (See Note 5)	≤ 25	30	35	45	≥50	0.60	4	2.4	
13	Pedestrian Activity Level (See Note 2)			Low	Medium	High	3.15	3	9.45	
								Subtotal Environmental Factors	15.3	O
	Environmental Factors									
14	Percentage of Development Adjacent to Road (%) (See Note 4)	nil	nil to 30	30 to 60	60 to 90	>90	0.15	4	0.6	
15	Area Classification	Rural	Industrial	Residential	Commercial	Downtown	0.15	4	0.6	
16	Distance from Development to Roadway (ft) (See Note 4)	>200	150 to 200	100 to 150	50 to 100	<50	0.15	100	15	
17	Ambient (off Roadway) Lighting	Nil	Sparse	Moderate	Distracting	Intense	1.38	3	4.14	
18	Raised Curb Median	None	Continuous	At All Intersections (100%)	At Most Intersections (51% to 99%)	At Few Intersections (≤50%) (See Note 7)	0.35	4	1.4	
								Subtotal Environmental Factors	21.74	E
	Collision Factors									
19	Night-to-Day Collision Ratio	<1	1.0 to 1.2	1.2 to 1.5	1.5 to 2.0	>2.0 (See Note 1)	5.55	3	16.65	
								Subtotal Collision Factors	16.65	A

Notes: 1 Lighting Warranted
2 Pedestrian Activity Level
3 Two Way Left Turn Lane
4 Development defined as Commercial, Industrial or Residential Buildings
5 85th Percentile night speed should be used if available, otherwise posted Speed Limit shall be used
6 Worst case geometric factors for a segment of roadway shall apply
7 Also includes isolated medians (non-continuous) between intersections

G + O + E + A = Total Warranting Points	90.99	
Warranting Condition	60.00	
Difference ±	30.99	D

14.3 STEP 2: NET PRESENT VALUE ANALYSIS

(1) The purpose of this step in the roadway lighting justification procedure is to determine if the project is justified based on its NPV. If the total crash cost is equal to or greater than cost of construction, maintenance, and operation of the lighting project, then lighting is justified for high crash locations (HCL) as identified by the State Safety Office's annual HCL list. This list may be obtained directly from the State Safety Office or downloaded from the FDOT CAR system. At other locations, the NPV should be used to rank projects according to their value in benefit to the public. Those with a higher NPV offer more value than those with a lower NPV when the cost of construction, maintenance, and operation are comparable. The procedure can be used to analyze either an existing or proposed lighting system. There are two primary differences between the two analyses.

(2) The first difference is that, for an existing lighting system, the HSM Predictive Method can be used to determine crash impacts of the system without lighting. For a proposed system, the night unlighted crash rate is based on actual crash data collected at the site. In cases when the HSM methodology is not applicable or reliable crash data are not available, a minimum unlighted crash rate of 3.0 crashes per million vehicle miles has been determined to be a reasonable "default" value for conditions in Florida.

(3) The second difference between the analyses is that if an existing lighting system is being evaluated to determine if it should continue to operate, the cost of the installation is not considered because it is a sunk cost. This recognizes that the initial investment in lighting hardware has already been made.

14.3.1 Net Present Value Computations using the HSM Methodology

(1) The NPV computations when the HSM methodology is applicable can be computed using the procedure outlined in this section. The use of a spreadsheet is required. Example spreadsheets can be downloaded from the MUTS website for the application of the HSM Methodology NPV calculations. NPV computations can be conducted using a six step process, outlined as follows:

- Step 1: Identify or compute crash frequencies for NO LIGHTING CONDITIONS
- Step 2: Quantify monetary cost of crashes for NO LIGHTING CONDITIONS
- Step 3: Identify or compute crash frequencies for LIGHTED CONDITIONS

- Step 4: Quantify monetary cost of crashes for LIGHTED CONDITIONS
- Step 5: Compute difference: BENEFIT = Monetary cost of crashes for NO LIGHTING CONDITIONS – Monetary cost of crashes for LIGHTED CONDITIONS
- Step 6: Next steps: Compute NPV

(2) It should be noted that the crashes predicted using HSM methodologies are not nighttime-only crashes, but rather a compilation of all day and night crashes. However when modifying the lighting parameter in the methodology (unlighted to lighted), the methodology automatically adjusts for the impact of lighting to nighttime crashes only.

(3) A sample illustration of the application of the six-step process is presented in the following section. Note that the sample has been developed using only two years of analysis. In reality, the calculations shown below would be conducted for the each year in the design life of the project. The analysis steps are outlined as follows:

(a) Step 1: Crashes are predicted for the Roadway with NO LIGHTING using HSM methodologies as outlined in Chapter 5 of the MUTS. Crashes are then distributed by severity using the default severity distributions found in the HSM. The table below illustrates an $N_{predicted}$ value being the predicted number of crashes computed using the HSM Predictive Method. This value is then distributed by severity per the KABCO scale using HSM default severity distribution values.

Year	AADT	TOTAL	K	A	B	C	O
		$N_{predicted}$ (crashes/year)	Fatal	Inc. Injury	Non Inc. Injury	Pos. Injury	PDO
2012	17300	3.15	0.041	0.170	0.343	0.457	2.139
2013	17676	3.22	0.042	0.174	0.351	0.467	2.186

Repeat for all years being analyzed, the number of years analyzed will depend on the design life of the lighting project.

Computed using HSM Default Distributions

(b) Step 2: Quantify the monetary cost of crashes for the NO LIGHTING condition.

(c) Step 2A: Compute the annual costs using FDOT costs contained in Chapter 23 of the Plans Preparation Manual (PPM) and shown in the table below. The following tables below illustrate the computation for two years of data, 2012 and 2013. This process is repeated for each year in the design life of the project.

Crash Severity	Comprehensive Crash Cost
Fatal (K)	$10,100,000
Severe Injury (A)	$818,636
Moderate Injury (B)	$163,254
Minor Injury (C)	$99,645
Property Damage Only (O)	$6,500

Year		K	A	B	C	O	TOTAL
		Fatal	Inc. Injury	Non Inc. Injury	Pos. Injury	PDO	$N_{predicted}$ (crashes/ year)
2012	Crashes	0.041	0.170	0.343	0.457	2.139	3.15
	Cost per Crash Type	$10,100,000	$818,636	$163,254	$99,645	$6,500	
	Total Cost per Crash Type	$414,100	$139,168	$55,996	$45,538	$13,904	
	Total Cost for 2012	**$668,706**					

Year		K	A	B	C	O	TOTAL
		Fatal	Inc. Injury	Non Inc. Injury	Pos. Injury	PDO	$N_{predicted}$ (crashes/ year)
2013	Crashes	0.042	0.174	0.351	0.467	2.186	3.22
	Cost per Crash Type	$10,100,000	$818,636	$163,254	$99,645	$6,500	
	Total Cost per Crash Type	$424,200	$142,443	$57,302	$46,534	$14,209	
	Total Cost for 2013	**$684,688**					

Repeat for all years being analyzed

(d) Step 2B: Compute the present worth for each year using the equation shown below. This process is repeated for each year in the design life of the project. Add up all the present worth of costs. The example below illustrates a computation for year 2013 assuming the present year is 2012. The Discount (interest) rate to be utilized in benefit/cost analysis is 4% per PPM Section 23.5 paragraph y.

$$Present\ worth = \frac{Final\ Value}{(1+0.04)^{years}}$$

$$For\ 2013\ Present\ Worth = \frac{\$\ 684{,}688}{(1+0.04)^2} = \$\ 633{,}033$$

Year	AADT	$N_{predicted}$ (crashes/year)	Total Cost	Present Worth of Cost
2012	17300	3.15	$668,706	$668,706
2013	17676	3.22	$684,688	$633,033
Total Present Worth of Cost				$1,301,738

(e) Step 3 and 4: Repeat the entire process for the LIGHTED conditions.

(f) Step 5: Compute the difference (Savings) between the NO LIGHTING and LIGHTED conditions. Assuming that the entire process for LIGHTED conditions yields a Total Present Worth of Cost of $702,000, the table below illustrates the monetary savings the lighted project yields.

Scenario	Present Worth
NO-BUILD	$1,301,738
BUILD	$702,000
Savings for LIGHTED conditions	$599,738

(g) Step 6: Compare the present value of the lighting project costs (i.e., construction, maintenance, and operation) to the monetary savings. Note that to determine if lighting should be maintained for existing lighting infrastructure where an evaluation is being conducted, the construction cost is considered a sunk cost and should not be included in the computations. The equation presented in Step 2 can be used to determine the present value of annual costs. Assuming for this example that the total project cost (i.e., construction, maintenance, and operation) is $250,000, yielding a NPV of $349,738.

(4) Examples of Present Worth Analysis for ***Rural-Two Lane Road (Form 750-020-21-a)***, ***Present Worth Analysis for Rural-Multilane Road (Form 750-020-21-b)***, and ***Present Worth Analysis for Urban/Suburban Arterial (Form 750-020-21-c)*** completed spreadsheets providing crash cost calculations are shown in ***Figure 14-2***, ***Figure 14-3*** and ***Figure 14-4***, respectively.

Figure 14-2. Rural Two-Lane Road Example (Form No. 750-020-21-a)

State of Florida Department of Transportation

Present Worth Analysis
Rural Two Lane Road
No Build Alternative

General Information

Analyst:	JFR	Date:	9/1/2014
Agency or Company:		FDOT	

Site Information

Location ID:	N/A	County:	Miami-Dade
City:	Miami	M.P. - M.P.	

Manual Input from Analysis

Growth Rate =	1.0%	Opening Year =	2012		
Opening Year AADT =	12,000	Rate of Return =	4.0%		
Segment Length =	0.11	Segment =	Segment1		

Default Distribution for Crash Severity Level (2008-2012 Florida HSM Crash Distribution)

Fatality =	3.7%	Possible Injury =	20.6%
Incapacitating =	14.2%	Property Damage Only =	40.9%
Non-Incapacitating =	20.6%		100.0%

	Year	AADT	Annual Number of Crashes					Annual Cost						
			Site Specific ($N_{predicted}$)	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Total Cost*	Present Value
0	2012	12,000	0.5	0.018	0.070	0.102	0.102	0.202	$184,624	$57,431	$16,615	$10,141	$1,313	$268,810	$268,810
1	2013	12,120	0.5	0.018	0.071	0.102	0.102	0.203	$185,711	$57,769	$16,713	$10,201	$1,321	$270,394	$259,994
2	2014	12,241	0.5	0.018	0.071	0.103	0.103	0.204	$186,801	$58,108	$16,811	$10,261	$1,329	$271,980	$251,461
3	2015	12,364	0.5	0.019	0.071	0.104	0.104	0.206	$187,892	$58,447	$16,909	$10,321	$1,337	$273,569	$243,202
4	2016	12,487	0.5	0.019	0.072	0.104	0.104	0.207	$188,986	$58,787	$17,007	$10,381	$1,344	$275,161	$235,209
5	2017	12,612	0.5	0.019	0.072	0.105	0.105	0.208	$190,081	$59,128	$17,106	$10,441	$1,352	$276,756	$227,473
6	2018	12,738	0.5	0.019	0.073	0.105	0.105	0.209	$191,178	$59,470	$17,205	$10,501	$1,360	$278,354	$219,987
7	2019	12,866	0.5	0.019	0.073	0.106	0.106	0.210	$192,277	$59,811	$17,304	$10,562	$1,368	$279,954	$212,742
8	2020	12,994	0.5	0.019	0.073	0.107	0.107	0.212	$193,378	$60,154	$17,403	$10,622	$1,376	$281,556	$205,731
9	2021	13,124	0.5	0.019	0.074	0.107	0.107	0.213	$194,480	$60,497	$17,502	$10,683	$1,384	$283,161	$198,945
10	2022	13,255	0.5	0.019	0.074	0.108	0.108	0.214	$195,584	$60,840	$17,601	$10,743	$1,391	$284,768	$192,379
11	2023	13,388	0.5	0.019	0.075	0.108	0.108	0.215	$196,689	$61,184	$17,701	$10,804	$1,399	$286,377	$186,025
12	2024	13,522	0.5	0.020	0.075	0.109	0.109	0.216	$197,795	$61,528	$17,800	$10,865	$1,407	$287,988	$179,876
13	2025	13,657	0.5	0.020	0.076	0.110	0.110	0.218	$198,903	$61,872	$17,900	$10,925	$1,415	$289,600	$173,926
14	2026	13,794	0.5	0.020	0.076	0.110	0.110	0.219	$200,011	$62,217	$18,000	$10,986	$1,423	$291,214	$168,169
15	2027	13,932	0.5	0.020	0.076	0.111	0.111	0.220	$201,120	$62,562	$18,099	$11,047	$1,431	$292,829	$162,598
16	2028	14,071	0.5	0.020	0.077	0.111	0.111	0.221	$202,231	$62,908	$18,199	$11,108	$1,439	$294,446	$157,207
17	2029	14,212	0.5	0.020	0.077	0.112	0.112	0.223	$203,342	$63,253	$18,299	$11,169	$1,447	$296,064	$151,991
18	2030	14,354	0.5	0.020	0.078	0.113	0.113	0.224	$204,453	$63,599	$18,399	$11,230	$1,454	$297,682	$146,944
19	2031	14,497	0.6	0.020	0.078	0.113	0.113	0.225	$205,566	$63,945	$18,499	$11,291	$1,462	$299,301	$142,061
20	2032	14,642	0.6	0.020	0.079	0.114	0.114	0.226	$206,678	$64,291	$18,600	$11,353	$1,470	$300,921	$137,337
													Total Present Value		$4,122,068

* PDO not included in Total Cost
Shaded cell indicates the AADT is outside the limits

NOTES:
1. Present Value = Future Cash Flow / (1 + Required Rate of Return)$^{\text{Number of Years You Have To Wait For The Cash Flow}}$
2. Traffic Growth Rate = $[(ADT_F / ADT_I)^{1/(F-I)}-1] \times 100$
   where ADT_F = Average Daily Traffic for Future Year
   ADT_I = Average Daily Traffic for Initial Year
   I = Initial Year for ADT
   F = Future Year for ADT

Figure 14-3. Rural-Multilane Road Example (Form No. 750-020-21-b)

State of Florida Department of Transportation

Present Worth Analysis
Rural Multilane Arterial
No Build Alternative

General Information

Analyst: JFR
Agency or Company: FDOT
Date: 9/1/2014

Growth Rate = 1.0%
Opening Year AADT = 26,500
Segment Length = 1.50
Opening Year = 2010
Rate of Return = 4.0%
Segment = Rural Undivided Multilane S

Site Information

Location ID:
City: N/A
Miami
County: Miami-Dade
M.P. - M.P.

Manual Input from Analysis

Default Distribution for Crash Severity Level (2008-2012 Florida HSM Crash Distribution)

Fatality = 2.3%
Incapacitating = 13.1%
Non-Incapacitating = 22.4%
Possible Injury = 24.6%
Property Damage Only = 37.8%
100.1%

	Year	AADT	Annual Number of Crashes					Annual Cost					
			Site Specific ($N_{modified}$)	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Total Cost*	Present Value
0	2010	26,500	11.0	0.252	1.436	2.456	2.686	4.145	$2,547,119	$1,175,878	$400,970	$267,683	$26,940	$4,391,650	$4,391,650
1	2011	26,765	11.1	0.255	1.453	2.485	2.718	4.193	$2,577,099	$1,189,716	$405,690	$270,834	$27,258	$4,443,341	$4,272,443
2	2012	27,033	11.2	0.258	1.470	2.514	2.750	4.243	$2,607,433	$1,203,721	$410,465	$274,022	$27,578	$4,496,641	$4,156,473
3	2013	27,303	11.4	0.261	1.488	2.544	2.782	4.293	$2,638,123	$1,217,890	$415,296	$277,247	$27,903	$4,548,556	$4,043,650
4	2014	27,576	11.5	0.264	1.505	2.574	2.815	4.343	$2,669,174	$1,232,225	$420,184	$280,511	$28,231	$4,602,094	$3,933,889
5	2015	27,852	11.6	0.267	1.523	2.604	2.848	4.394	$2,700,591	$1,246,728	$425,130	$283,812	$28,564	$4,656,262	$3,827,106
6	2016	28,130	11.8	0.271	1.541	2.635	2.882	4.446	$2,732,378	$1,261,403	$430,134	$287,153	$28,900	$4,711,068	$3,723,225
7	2017	28,412	11.9	0.274	1.559	2.666	2.916	4.498	$2,764,539	$1,276,250	$435,197	$290,533	$29,240	$4,766,518	$3,622,162
8	2018	28,696	12.0	0.277	1.577	2.697	2.950	4.551	$2,797,079	$1,291,272	$440,319	$293,952	$29,584	$4,822,622	$3,523,843
9	2019	28,983	12.2	0.280	1.596	2.729	2.985	4.605	$2,830,001	$1,306,470	$445,502	$297,412	$29,932	$4,879,396	$3,428,192
10	2020	29,272	12.3	0.283	1.615	2.761	3.020	4.659	$2,863,311	$1,321,848	$450,745	$300,913	$30,285	$4,936,818	$3,335,137
11	2021	29,565	12.5	0.287	1.634	2.794	3.055	4.714	$2,897,013	$1,337,406	$456,051	$304,455	$30,641	$4,994,925	$3,244,606
12	2022	29,861	12.6	0.290	1.653	2.826	3.091	4.770	$2,931,112	$1,353,148	$461,419	$308,038	$31,002	$5,053,717	$3,156,537
13	2023	30,159	12.8	0.294	1.672	2.860	3.128	4.826	$2,965,612	$1,369,075	$466,850	$311,664	$31,367	$5,113,201	$3,070,866
14	2024	30,461	12.9	0.297	1.692	2.893	3.165	4.882	$3,000,519	$1,385,190	$472,345	$315,332	$31,736	$5,173,385	$2,987,501
15	2025	30,766	13.1	0.301	1.712	2.927	3.202	4.940	$3,035,836	$1,401,494	$477,904	$319,044	$32,110	$5,234,278	$2,906,409
16	2026	31,073	13.2	0.304	1.732	2.962	3.239	4.998	$3,071,568	$1,417,990	$483,529	$322,799	$32,487	$5,295,887	$2,827,517
17	2027	31,384	13.4	0.308	1.753	2.997	3.278	5.057	$3,107,722	$1,434,680	$489,221	$326,599	$32,870	$5,358,221	$2,750,767
18	2028	31,698	13.5	0.311	1.773	3.032	3.316	5.116	$3,144,301	$1,451,567	$494,979	$330,443	$33,257	$5,421,289	$2,676,101
19	2029	32,015	13.7	0.315	1.794	3.068	3.355	5.177	$3,181,310	$1,468,652	$500,805	$334,332	$33,648	$5,485,099	$2,603,461
20	2030	32,335	13.9	0.319	1.815	3.104	3.395	5.238	$3,218,755	$1,485,939	$506,700	$338,268	$34,044	$5,549,661	$2,532,793
													Total Present Value		$71,014,321

* PDO not included in Total Cost
Shaded cell indicates the AADT is outside the limits

NOTES:
1. Present Value = Future Cash Flow / (1 + Required Rate of Return)$^{\text{Number of Years You Have To Wait For The Cash Flow}}$
2. Traffic Growth Rate = $[(ADT_F / ADT_I)^{(1/(F-I))}-1] \times 100$
   where ADT_F = Average Daily Traffic for Future Year
   ADT_I = Average Daily Traffic for Initial Year
   I = Initial Year for ADT
   F = Future Year for ADT

Figure 14-4. Urban/Suburban Arterial Example (Form No. 750-020-21-c)

State of Florida Department of Transportation

Present Worth Analysis
Urban/Suburban Arterial
No Build Alternative

General Information

Analyst: JFR — Date: 9/1/2014
Agency or Company: FDOT

Site Information

Location ID: N/A — County: Miami-Dade
City: Miami — M.P. - M.P.

Manual Input from Analysis

Growth Rate =	1.0%	Opening Year =	2012
Opening Year AADT =	14,500	Rate of Return =	4.0%
Segment Length =	0.50	Segment =	Segment1

Analyze

Default Distribution for Crash Severity Level (2008-2012 Florida HSM Crash Distribution)

Fatality =	1.1%	Possible Injury =	22.7%
Incapacitating =	7.3%	Property Damage Only =	61.0%
Non-Incapacitating =	17.9%		100.0%

	Year	AADT	Annual Number of Crashes					Annual Cost						
			Site Specific ($N_{predicted}$)	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Fatality	Incap.	Non-Inc.	Possible Injury	PDO	Total Cost*	Present Value
0	2012	14,500	2.5	0.028	0.185	0.454	0.576	1.295	$282,084	$151,732	$74,196	$57,431	$8,417	$565,443	$565,443
1	2013	14,645	2.6	0.028	0.188	0.460	0.584	1.311	$285,635	$153,642	$75,130	$58,154	$8,523	$572,661	$550,540
2	2014	14,791	2.6	0.029	0.190	0.466	0.591	1.328	$289,237	$155,580	$76,078	$58,887	$8,630	$579,781	$536,040
3	2015	14,939	2.6	0.029	0.192	0.472	0.598	1.344	$292,890	$157,545	$77,038	$59,631	$8,739	$587,104	$521,933
4	2016	15,089	2.7	0.029	0.195	0.478	0.606	1.362	$296,595	$159,538	$78,013	$60,385	$8,850	$594,530	$508,207
5	2017	15,240	2.7	0.030	0.197	0.484	0.614	1.379	$300,352	$161,559	$79,001	$61,150	$8,962	$602,063	$494,852
6	2018	15,392	2.7	0.030	0.200	0.490	0.621	1.396	$304,164	$163,609	$80,004	$61,926	$9,076	$609,702	$481,857
7	2019	15,546	2.8	0.030	0.202	0.496	0.629	1.414	$308,029	$165,688	$81,020	$62,713	$9,191	$617,451	$469,212
8	2020	15,701	2.8	0.031	0.205	0.503	0.637	1.432	$311,950	$167,797	$82,052	$63,512	$9,308	$625,311	$456,909
9	2021	15,858	2.8	0.031	0.208	0.509	0.646	1.450	$315,927	$169,937	$83,098	$64,321	$9,427	$633,283	$444,936
10	2022	16,017	2.9	0.032	0.210	0.516	0.654	1.469	$319,961	$172,106	$84,159	$65,143	$9,547	$641,369	$433,286
11	2023	16,177	2.9	0.032	0.213	0.522	0.662	1.488	$324,053	$174,307	$85,235	$65,976	$9,669	$649,572	$421,949
12	2024	16,339	3.0	0.032	0.216	0.529	0.671	1.507	$328,204	$176,540	$86,327	$66,821	$9,793	$657,892	$410,917
13	2025	16,502	3.0	0.033	0.218	0.536	0.679	1.526	$332,414	$178,805	$87,434	$67,678	$9,919	$666,331	$400,181
14	2026	16,667	3.0	0.033	0.221	0.542	0.688	1.546	$336,685	$181,102	$88,558	$68,547	$10,046	$674,892	$389,733
15	2027	16,834	3.1	0.034	0.224	0.549	0.697	1.565	$341,017	$183,432	$89,697	$69,429	$10,175	$683,576	$379,566
16	2028	17,002	3.1	0.034	0.227	0.557	0.706	1.586	$345,412	$185,796	$90,853	$70,324	$10,306	$692,385	$369,670
17	2029	17,172	3.1	0.035	0.230	0.564	0.715	1.606	$349,870	$188,194	$92,026	$71,232	$10,439	$701,322	$360,040
18	2030	17,344	3.2	0.035	0.233	0.571	0.724	1.627	$354,392	$190,627	$93,215	$72,153	$10,574	$710,387	$350,667
19	2031	17,518	3.2	0.036	0.236	0.578	0.733	1.648	$358,980	$193,095	$94,422	$73,087	$10,711	$719,583	$341,545
20	2032	17,693	3.3	0.036	0.239	0.586	0.743	1.669	$363,634	$195,598	$95,646	$74,034	$10,850	$728,912	$332,666
														Total Present Value	$9,220,149

* PDO not included in Total Cost
Shaded cell indicates the AADT is outside the limits

NOTES:
1. Present Value = Future Cash Flow / (1 + Required Rate of Return)$^{\text{Number of Years You Have To Wait For The Cash Flow}}$
2. Traffic Growth Rate = $[((ADT_F / ADT_I)^{1/(F-I)})-1] \times 100$
   where ADT_F = Average Daily Traffic for Future Year
   ADT_I = Average Daily Traffic for Initial Year
   I = Initial Year for ADT
   F = Future Year for ADT

14.3.2 Net Present Value Computations when the HSM Part C Methodology is Not Applicable

(1) The procedure to conduct a NPV computation when the HSM Part C Methodology is not applicable follows the same general concept as the procedure when the HSM is applicable. However provided the crash frequency cannot be predicted, it is estimated using an observed field crash rate, or a minimum unlighted crash rate of 3.0 crashes per million vehicle miles.

(2) The procedure follows a similar six-step process as the HSM with some modifications as noted below:

- Step 1: Identify or compute crash frequencies for NO LIGHTING CONDITIONS
- Step 2: Quantify monetary cost of crashes for NO LIGHTING CONDITIONS
- Step 3: Identify or compute crash frequencies for LIGHTED CONDITIONS
- Step 4: Quantify monetary cost of crashes for LIGHTED CONDITIONS
- Step 5: Compute difference: BENEFIT = Monetary cost of crashes for NO LIGHTING CONDITIONS – Monetary cost of crashes for LIGHTED CONDITIONS
- Step 6: Next steps: Compute NPV

(a) Step 1: Crash frequency is computed using the ADT, percent of the ADT at night, and a nighttime crash rate value for unlighted conditions (NRU, see next section for detailed description of this variable). Note that crash frequency is computed for every year in the analysis period. If sufficient information is known to identify a severity distribution, then a table similar to the one shown in Step 1 for the HSM procedure should be produced. If severity distribution is unknown, then a similar table should be produced with the exception of the KABCO distribution columns.

$$N_{unlighted}\left(\frac{crash}{year}\right) = \frac{(ADT * \%ADTn * 365 * NRU)}{1{,}000{,}000}$$

(b) Step 2: Quantify the monetary cost of the UNLIGHTED CONDITIONS crash frequency. If the crash distribution is known or can be estimated, then a similar table to that shown in Step 2 of the HSM procedure must be produced and the formula below computed for every year and crash severity. If the distribution is unknown, then the formula shown below is computed once for every year in the analysis period using the total crash number, and a similar table to that shown in Step 2 of the HSM procedure is produced with the difference being that a single

cost will be computed for each year.

When the distribution of crashes is unavailable, the average crash cost should be used; this value can be obtained from the Historical Crash Method discussion for all state roads found in the FDOT PPM Chapter 23. Finally, the present value of the crash costs for each year in the analysis period must be computed, as shown in Step 2B of the HSM procedure.

$$Present\ Worth\ of\ Cost\ UNLIGHTED\ =\ N_{unlighted} * CC$$

(c) Step 3: Crash frequency is computed using the ADT value, percent of the ADT at night, nighttime crash rate value (NRU), and a crash modification factor (CMF) for lighted conditions. Note that this value is computed for every year in the analysis period. If sufficient information is known to identify a severity distribution, then a table similar to the one shown in Step 1 for the HSM procedure should be produced. If severity distribution is unknown, then a similar table should be produced with the exception of the KABCO distribution columns.

$$N_{lighted}\left(\frac{crash}{year}\right) = \frac{(ADT * \%ADTn * 365 * NRU * CMF)}{1{,}000{,}000}$$

Net Present Value for Lighting Retention

$$NPV = (ADT * \%ADTn * 365 * NRU * CFR * ACC) - [(TMC + AEC) * 1{,}000{,}000]$$

(d) Step 4: Quantify the monetary cost of the LIGHTED CONDITIONS crash frequency. If the crash distribution is known or can be estimated, then a similar table to that shown in Step 2 of the HSM procedure must be produced and the formula below computed for every year and crash severity. If the distribution is unknown, then the formula shown below is computed once for every year in the analysis period using the total crash number, and a similar table to that shown in Step 2 of the HSM procedure is produced with the difference being that a single cost will be computed for each year.

When the distribution of crashes is unavailable, the average crash cost should be used, this value can be obtained from the Historical Crash Method discussion for all state roads found in the ***FDOT PPM Chapter 23***. Finally, the present value of the crash costs for each year in the analysis period must be computed, as show in Step 2B of the HSM procedure.

$$Present\ Worth\ of\ Cost\ LIGHTED = N_{unlighted} * CC$$

(e) Step 5: Compute the difference in cost between lighted and unlighted conditions.

$$Cost\ Difference = Present\ Worth\ of\ Cost\ UNLIGHTED - Present\ Worth\ of\ Cost\ LIGHTED$$

(f) **Step 6:** Compute the Net Present Value.

For New Roadway Lighting Systems (Lighting Installation)

$$NPV = Cost\ Difference - (IC + PVMC + PVEC)$$

For Existing Roadway Lighting Systems (Lighting Retention)

$$NPV = Cost\ Difference - (PVMC + PVEC)$$

Where:

$N_{unlighted}$ = Crash frequency for unlighted conditions, this value may represent all crashes or a specific severity type.

$N_{lighted}$ = Crash frequency for lighted conditions, this value may represent all crashes or a specific severity type.

ADT = Average Daily Traffic (Existing or Projected)

$\%ADTn$ = Percent of ADT at night

NRU = Night crash rate unlighted (see description below)

CMF = Crash modification factor

CC = Crash cost (U.S. dollars per crash from Chap 23 of PPM)

IC = Installation cost

$PVMC$ = Present value of annual maintenance cost

$PVEC$ = Present value of annual electric costs

14.3.2.1 Description of Key Variables

(1) NRU is expressed as nighttime crashes per million vehicle miles for mainline sections or crashes per million entering vehicles for interchanges. The NRU is obtained by searching crash records.

(2) The percent of ADT at night ($\%ADTn$) can be determined by examining traffic data.

(3) Crash modification factors ($CMFs$) are based on an estimate of the crash reduction potential due to the installation of lighting. These values may be obtained from a variety of sources including the Highway Safety Manual or the CMF Clearinghouse.

14.4 DETERMINING OPERATIONAL STATUS OF EXISTING LIGHTING: FREEWAYS

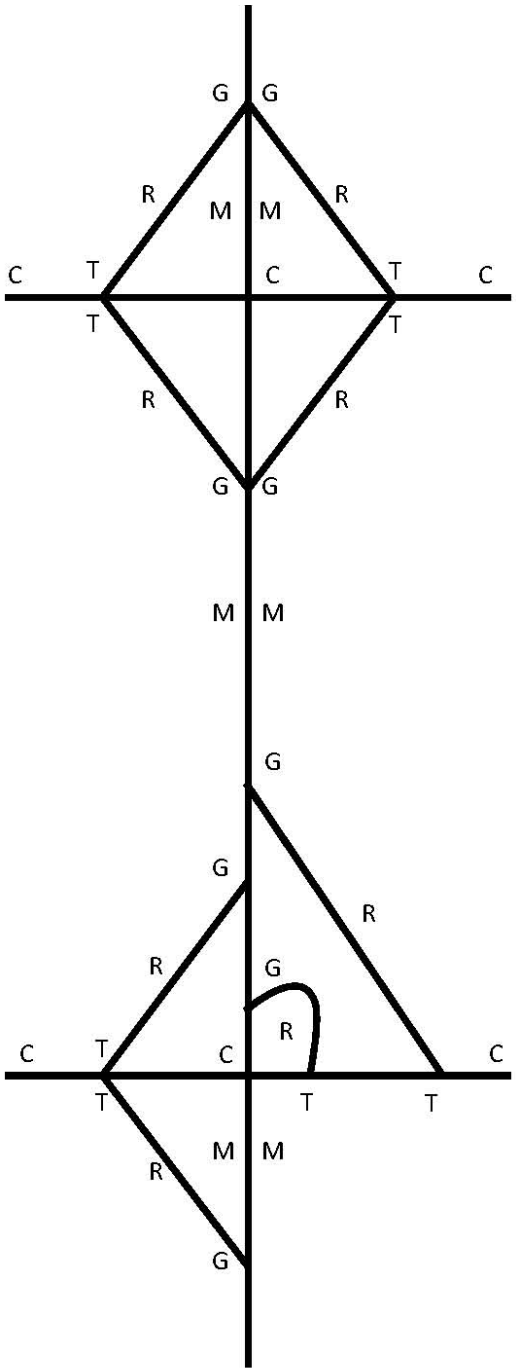
(1) Existing highway lighting systems are subject to various causes of electrical or mechanical malfunction. Pole knockdowns, lightning strikes, damaged-circuits, blown fuses, burned-out bulbs, and other causes result in an operational status almost always less than 100 percent.

(2) This guideline sets forth a procedure that can assist the engineer in determining when a certain section of existing lighting is operating below an acceptable level. The procedure calculates an "operational ratio" of the actual lighting operation level to the base lighting operation level. An acceptable range of operational ratio is between 0.90 and 1.00 for interchanges and for the total lighting system. However, a range between 0.75 and 1.00 is acceptable for mainline systems.

(3) This technique should only be used as a guideline and should not form the basis in all cases for determining when corrective repair work is scheduled for a highway lighting system. The procedure does, however, recognize that cost-effective management of lighting system maintenance involves a value judgment relating to the seriousness of various types, patterns, locations, and the number of failed fixtures.

(4) ***Figure 14-5*** and ***Figure 14-6*** include a graphical presentation of the procedure. Unacceptable levels of operation are defined in ***Table 14-2.***

Figure 14-5. Example Application of Procedure



Gore Areas	G
Terminal Areas	T
Mainline Segments	M
Crossroads Segments	C
Ramp Segments	R

Example Calculation of Numerical Base Lighting Operational Level for configuration shown at left:

	#	Points	Total
Gore Areas	8	(30)	240
Terminal Areas	8	(20)	160
Mainline Segments	6	(10)	60
Crossroads Segments	6	(15)	30
Ramp Segments	8	(15)	120
			610

NOTE: In instances where underdeck lighting is present, all underdeck luminaires per directions, per structure are considered as a single pole for this analysis. If 50% of the underdeck luminaires are inoperative, the "pole" is inoperative.

ALL CONVENTIONAL LIGHTING

Figure 14-6. Graphical Representation

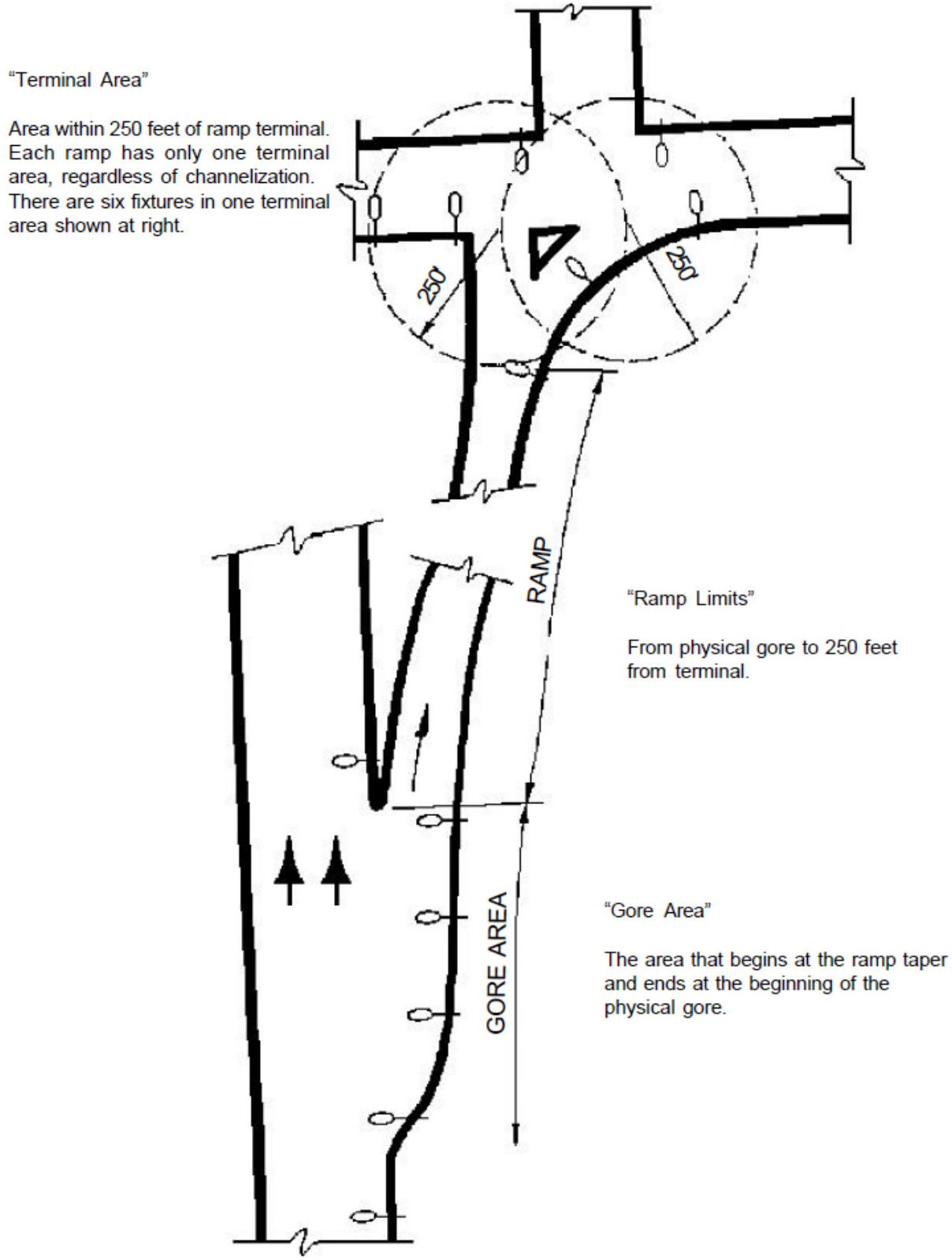


Table 14-2. Guidelines for Assessing Operational Level of Highway Lighting

Type Area	Description	Operational Points For Each Area/Section	Minimum Unacceptable Operating Condition
Gore Area	The area that begins at the ramp taper and ends at the beginning of the physical gore.	30	Two inoperative fixtures within the gore area.
Terminal Area	The area (or groups of areas) within a 250 foot radius, measured from the center of the ramp pavement where it joins the edge of a crossroad.	20	Twenty-five percent of the fixtures inoperative within the terminal area.
Ramp Area	Any section of ramp roadway not considered in a gore or terminal area.	15	Three consecutive fixtures or 50 percent of the total fixtures inoperative along the ramp section.
Mainline Section	Any section of one-way mainline roadway between gore areas.	10	If a mainline section has one or more groups with three or more consecutive luminaires inoperative, the sum of the numbers in the groups is multiplied by two and added to the remaining number of inoperative luminaires.*
Crossroad Section	The two-way traffic section between terminal areas or from terminal areas to the ends of the lighting maintenance.	5	Three consecutive fixtures inoperative along the one side of the crossroad or two consecutive fixtures inoperative along one side of the crossroad opposite two consecutive inoperative fixtures.
High Mast Interchange	When high lighting towers are involved, none of the above sub-areas shall be identified within the interchange. The interchange is defined as the limits of the interchange high mast lighting.	30	Twenty-five percent of the fixtures inoperative or two adjacent towers with all fixtures inoperative.
High Mast Mainline	Mainline high mast lighting shall only apply when towers exist for at least one mile continuously between the end of ramp tapers at successive interchanges.	10	Twenty-five percent of the fixtures inoperative or two adjacent towers with all fixtures inoperative.
*If the sum is greater than 25 percent of the total number of luminaires, then the section is unacceptable.			

(5) It is estimated that approximately 0.6 hour of data collection team time is needed for each mile of the study site. Approximately one-fourth of the inspection time should be spent during daylight hours, during which time the number of installations and knockdowns should be counted. The remaining three-fourths of the inspection time should be spent during nighttime hours, counting burned out luminaires and tabulating data. Examples of completed tables and calculation techniques are provided in ***Figure 14-7***, ***Figure 14-8*****,** and ***Figure 14-9***.

14.5 FORMS ACCESS

(1) Example crash cost spreadsheets for the HSM application can be downloaded from the MUTS website. Reproducible copies of the ***Present Worth Analysis Spreadsheets (Form No. 750-020-21-a*****,** ***750-020-21-b*****,** ***and 750-020-21-c)*** and ***Guidelines for Determining the Operational Status of Existing Lighting Systems on Freeway Facilities (Form Nos. 750-020-15*****,** ***750-020-16*****,** ***and 750-020-17)*** are available in the Department's Forms Library.

Figure 14-7. Operational Status of Existing Lighting for Mainline Sections (Form No. 750-020-15)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION — FORM 750-020-15 TRAFFIC ENGINEERING 07/14

GUIDELINES FOR DETERMINING THE OPERATIONAL STATUS OF EXISTING LIGHTING FACILITIES ON FREEWAY FACILITIES

DATA COLLECTION - MAINLINE SECTIONS

GENERAL SITE INFORMATION

DATE: 6/2/1999	ROADWAY: Interstate 75
COUNTY: Pinellas	STUDY SITE LENGTH (miles): 11.38
DISTRICT: 7	
DATA COLLECTION PERSONNEL: Thomas, Casey, Moran	

MAINLINE SECTION - SPECIFIC INFORMATION

MAINLINE LOCATION:	54th Avenue to Grandy Boulevard
LIGHTING TYPE:	(●) MERCURY ( ) SODIUM ( ) OTHER
POLE CONFIGURATION:	Outside Shoulder
POLE SPACING (ft):	250 ft
WATTAGE:	700
SECTION LENGTH (miles):	1.44
DIRECTION OF TRAVEL:	North

MAINLINE LIGHTING ANALYSIS

OPERATIONAL LEVEL CALCULATIONS:

COLUMN 1	COLUMN 2	COLUMN 3
TOTAL LUMINARY INSTALLATIONS ONE-WAY	NUMBER OF INOPERATIVE LUMINARIES IN GROUPS OF 3 OR MORE ONE DIRECTION	REMAINING INOPERATIVE LUMINARIES ONE DIRECTION
47	7 X 2 = 14	2

ACTUAL LIGHTING OPERATIONAL LEVEL = COLUMN 1 - (COLUMN 2 + COLUMN 3)

BASE LIGHTING OPERATIONAL LEVEL = COLUMN 1

OPERATIONAL RATIO CALCULATIONS:

$$O.R. = \frac{A.L.O.L.}{B.L.O.L.} \quad \frac{31}{47} = 66\%$$

66% < 75% THEREFORE UNACCEPTABLE

NOTE: If the calculated percentage is greater than or equal to 75 percent, the lighting for the section is considered to be operating at an acceptable level. If acceptable, the section is assigned 10 points for use in either Form 750-020-16 or Form 750-020-17.

Figure 14-8. Operational Status of Existing Lighting for Interchanges (Form No. 750-020-16)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION — FORM 750-020-16 TRAFFIC ENGINEERING 07/14

GUIDELINES FOR DETERMINING THE OPERATIONAL STATUS OF EXISTING LIGHTING SYSTEMS ON FREEWAY FACILITIES

DATA COLLECTION - INTERCHANGES

GENERAL SITE INFORMATION

DATE: 6/2/1999	ROADWAY: Interstate 75
COUNTY: Pinellas	STUDY SITE LENGTH (miles): 11.38
DISTRICT: 7	
DATA COLLECTION PERSONNEL: Thomas, Casey, Moran	

INTERCHANGE - SPECIFIC INFORMATION

INTERCHANGE LOCATION:	
LIGHTING TYPE: (●) MERCURY ( ) SODIUM ( ) OTHER	
MAINLINE POLE CONFIGURATION: Outside Shoulder	
MAINLINE POLE SPACING (ft): 250 ft	
WATTAGE: 700	
SECTION LENGTH (miles): N/A	

INTERCHANGE LIGHTING ANALYSIS

BASE LIGHTING OPERATIONAL LEVEL CALCULATIONS (B.L.O.L.):

CONFIGURATION	TOTAL NUMBER	POINTS	TOTAL
GORE AREA	4	30	120
TERMINAL AREA	4	20	80
MAINLINE SEGMENTS	2	10	20
CROSSROAD SEGMENTS	3	5	15
RAMP SEGMENTS	4	15	60
TOTAL			295

ACTUAL LIGHTING OPERATIONAL LEVEL CALCULATIONS (A.L.O.L.):

CONFIGURATION	ACCEPTABLE OPERATIONS	POINTS	TOTAL
GORE AREA	2	30	60
TERMINAL AREA	3	200	60
MAINLINE SEGMENTS	2	10	20
CROSSROAD SEGMENTS	3	5	15
RAMP SEGMENTS	2	15	30
TOTAL			185

OPERATIONAL RATIO CALCULATIONS:

$$O.R. = \frac{A.L.O.L.}{B.L.O.L.} \quad \frac{185}{295} = 0.627$$

0.726 < .90 THEREFORE UNACCEPTABLE

NOTE: The acceptable level for the O.R. is 0.90 or greater.

Figure 14-9. Operational Status of Existing Lighting for System Analysis (Form No. 750-020-17)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

FORM 750-020-17
TRAFFIC ENGINEERING
07/14

GUIDELINES FOR DETERMINING THE OPERATIONAL STATUS OF EXISTING LIGHTING SYSTEMS ON FREEWAY FACILITIES

DATA COLLECTION - SYSTEM ANALYSIS

GENERAL SITE INFORMATION

DATE: 6/2/1999	ROADWAY: Interstate 75
COUNTY: Pinellas	STUDY SITE LENGTH (miles): 11.38
DISTRICT: 7	NO. MAINLINE SECTIONS: 14
	NO. INTERCHANGES: 7

DATA COLLECTION PERSONNEL: Thomas, Casey, Moran

SYSTEM LIGHTING ANALYSIS

The calculation of a Base Lighting Operation Level and an Actual Lighting Operation Level for an entire study site involves the combining of values calculated for both interchanges and mainlines. A system Operational Ratio can then be found by dividing the "System Actual Lighting Operation Level" by the "System Base Lighting Operation Level." The following tables provide a step-by-step process to aid calculating the values.

SYSTEM BASE LIGHTING OPERATIONAL LEVEL CALCULATION:

CONFIGURATION	SUM OF INDIVIDUAL B.L.O.L.'S
INTERCHANGES	2125
MAINLINES	140
TOTAL - SYSTEM B.L.O.L.	2285

SYSTEM ACTUAL LIGHTING OPERATIONAL LEVEL CALCULATION:

CONFIGURATION	SUM OF INDIVIDUAL A.L.O.L.'S
INTERCHANGES	1440
MAINLINES	60
TOTAL - SYSTEM A.L.O.L.	1500

SYSTEM OPERATIONAL RATIO CALCULATION:

SYSTEM OPERATIONAL RATIO: $\frac{\text{SYSTEM A.L.O.L.}}{\text{SYSTEM B.L.O.L.}} = \frac{1500}{2265} = 0.66$

NOTE: An operational ratio value greater than or equal to .90 is considered acceptable.

0.66 < .90 THEREFORE UNACCEPTABLE

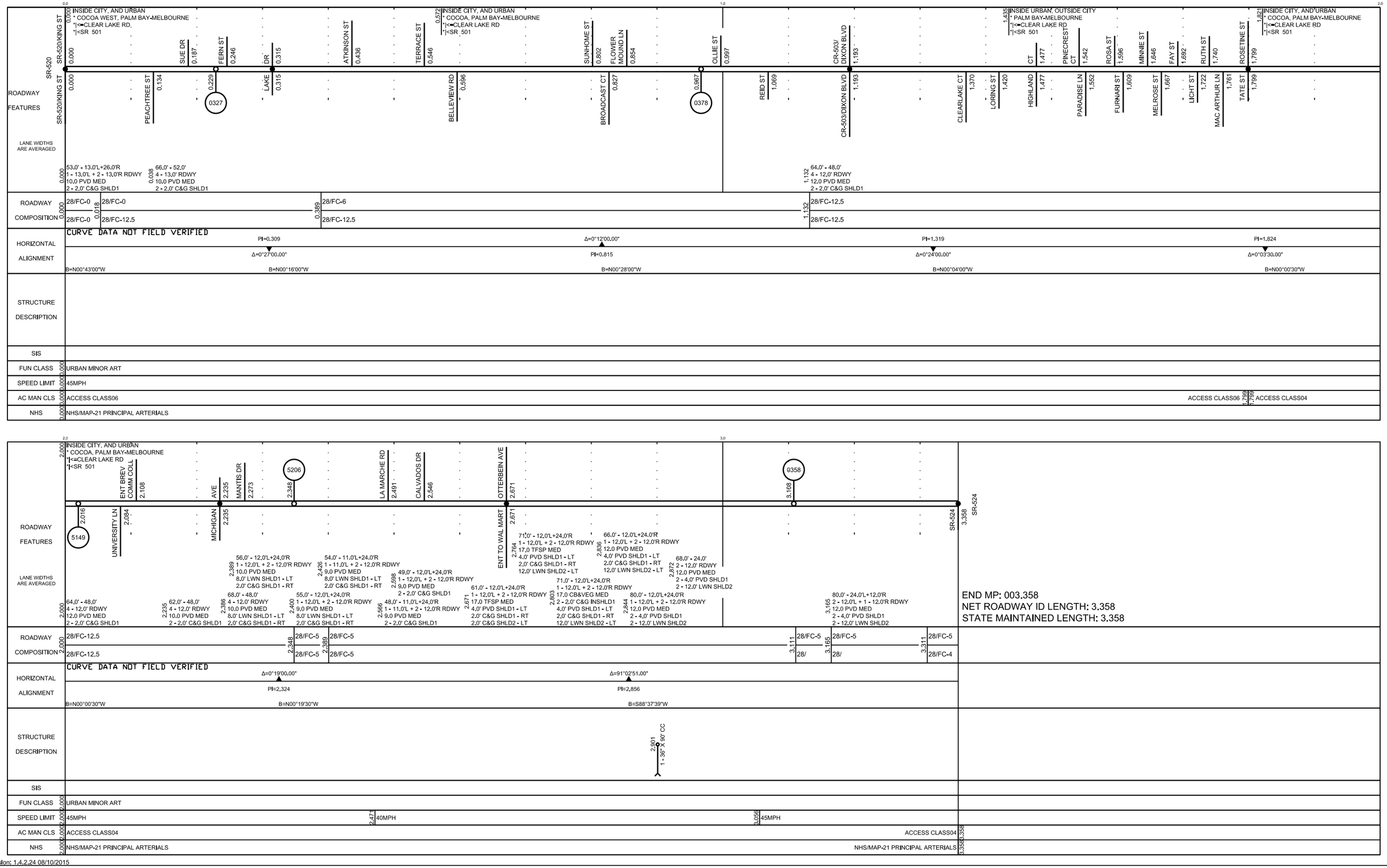
Appendix D – Straight Line Diagram

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	07/13/2015	08/11/2015				
BY	BARRY HALLMAN	Michael Register				

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02		SR 501	BREVARD	05	70011000	1 OF 1



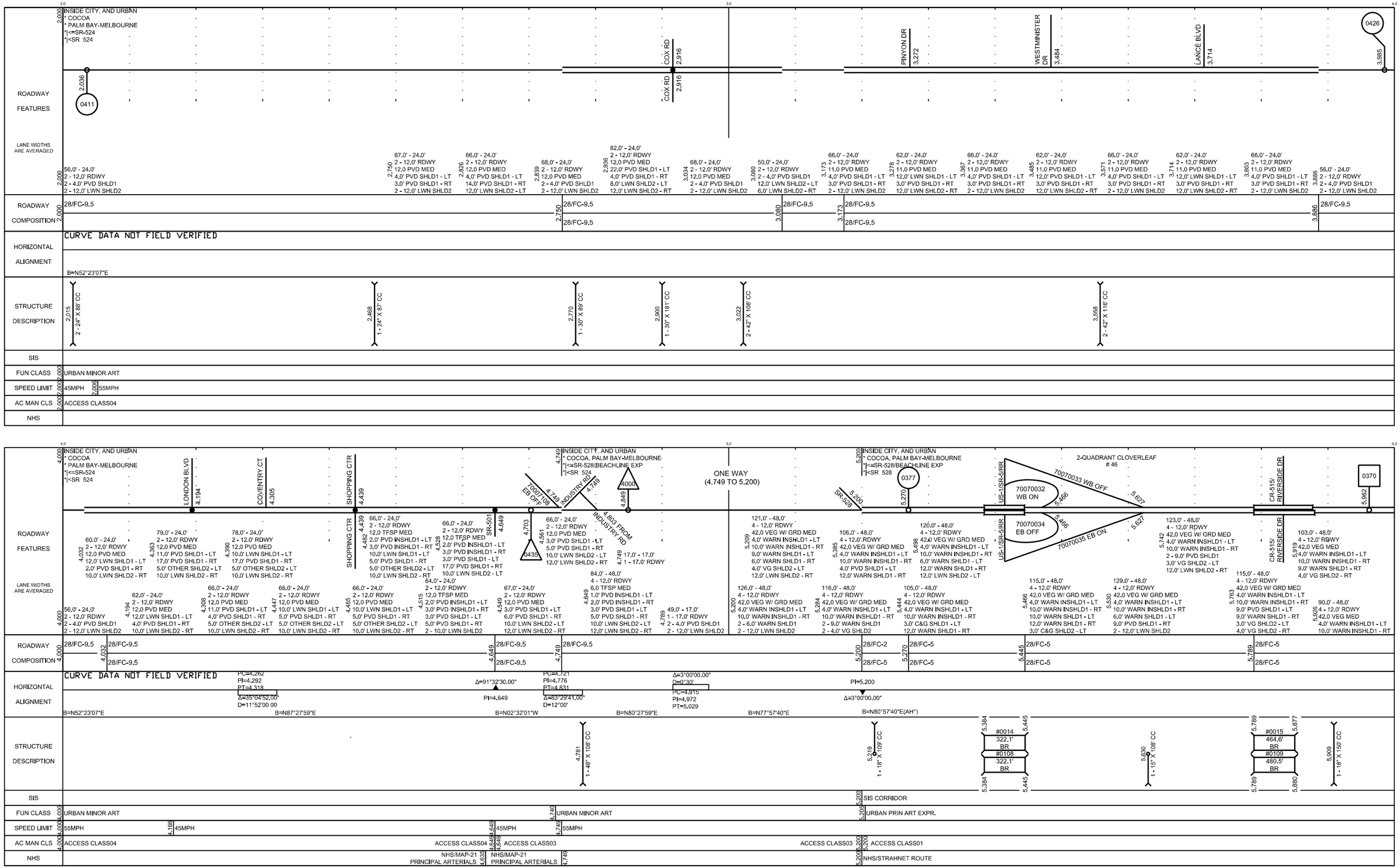
Version: 1.4.2.24 08/10/2015

	5 YR INV	SLD REV	BMP	EMP	INV	SLD REV
DATE	08/20/2016	09/26/2016				
BY	TIFFANY HILL/BARRY HALLMAN	GLEN DVOROVY				

FLORIDA DEPARTMENT OF TRANSPORTATION

STRAIGHT LINE DIAGRAM OF ROAD INVENTORY

SECTION STATUS	INT. or US ROUTE NO.	STATE ROAD NO.	COUNTY	DISTRICT	ROADWAY ID	SHEET NO:
02		SR 524/SR 528	BREVARD	05	70070000	2 OF 4



Version: 1.4.2.24 09/14/2016

Appendix E – FDOT KABCO Crash Costs

Table 23.6.1 FDOT Average Crash Costs by Facility Type

FACILITY TYPE	DIVIDED			UNDIVIDED		
	URBAN	SUBURBAN	RURAL	URBAN	SUBURBAN	RURAL
2-3 Lanes	$109,686	$187,990	$342,662	$125,974	$245,281	$526,887
4-5 Lanes	$119,072	$216,234	$464,901	$107,908	$161,173	$115,320
6+ Lanes	$117,867	$153,957	$313,317	$62,606	n/a	n/a
Interstate	$153,963	n/a	$341,754	n/a	n/a	n/a
Turnpike	$147,939	n/a	$254,951	n/a	n/a	n/a

Average Cost/Crash: **$155,695**

The above values were derived from 2010 through 2014 traffic crash and injury severity data for crashes on state roads in Florida using the formulation described in ***FHWA Technical Advisory "Motor Vehicle Accident Costs", T 7570.2, dated October 31, 1994*** and from a memorandum from USDOT, ***Revised Departmental Guidance: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analyses, dated February 5, 2008*** updating the value of life saved to $5.8 million, updated from $5.8 million to $6 million on March 18, 2009, to $6.2 million on July 29, 2011, and to $9.1 million on February 28, 2013.

http://www.dot.gov/sites/dot.dev/files/docs/VSL%20Guidance%202013.pdf

When utilizing predictive methods or crash severity distributions for analysis, the following crash severity level costs should be used:

Table 23.6.2 FDOT KABCO Crash Costs

Crash Severity	Comprehensive Crash Cost
Fatal (K)	$10,230,000
Severe Injury (A)	$580,320
Moderate Injury (B)	$157,170
Minor Injury (C)	$97,650
Property Damage Only (O)	$7,600

Source: Florida Department of Transportation Crash Analysis Reporting (C.A.R.) System, analysis years 2010 through 2014.

Appendix F – Electricity Costs

U.S. Energy Information Administration

Electric Power Monthly

Data for January 2016 | **Release Date:** March 25, 2016 | **Next Release:** April 25, 2016
| | **Re-release date:** April 4, 2016 |

Previous Issues

Issue: February 2016 Format: pdf Go

Table 5.6.A. Average Price of Electricity to Ultimate Customers by End-Use Sector, by State, January 2016 and 2015 (Cents per Kilowatthour)

	Residential		Commercial		Industrial		Transportation		All Sectors	
Census Division and State	January 2016	January 2015	January 2016	January 2015	January 2016	January 2015	January 2016	January 2015	January 2016	January 2015
New England	18.98	19.76	15.05	16.38	12.10	12.46	8.84	12.09	16.27	17.34
Connecticut	19.86	21.06	15.34	16.71	12.89	13.21	10.91	18.39	17.18	18.49
Maine	17.66	15.62	12.20	14.74	9.12	10.05	--	--	13.87	14.09
Massachusetts	19.34	20.78	15.40	16.53	13.05	13.16	7.39	8.33	16.59	17.84
New Hampshire	18.00	19.15	14.58	15.75	12.70	12.90	--	--	15.79	16.89
Rhode Island	18.41	17.73	15.76	18.00	14.14	15.38	18.23	17.57	16.75	17.63
Vermont	16.62	16.48	14.21	14.06	10.35	10.32	--	--	14.28	14.24
Middle Atlantic	15.15	15.70	11.77	12.53	6.98	7.13	11.05	12.53	12.16	12.85
New Jersey	15.45	15.49	11.87	11.98	9.98	10.26	10.10	12.43	13.10	13.28
New York	16.54	19.31	13.13	14.62	5.47	6.11	12.13	13.79	13.42	15.37
Pennsylvania	13.87	12.96	9.43	9.54	7.10	7.03	7.64	7.31	10.52	10.30
East North Central	12.25	12.13	9.48	9.56	6.74	6.70	6.92	7.13	9.66	9.65
Illinois	11.42	11.51	8.38	8.62	6.31	6.39	6.70	6.53	8.86	9.01
Indiana	10.47	10.64	9.23	9.63	6.51	6.72	9.52	9.66	8.60	8.86
Michigan	14.52	13.59	10.22	10.05	6.90	6.64	11.75	11.91	10.86	10.49
Ohio	12.05	12.07	9.59	9.63	6.84	6.66	7.40	11.73	9.76	9.75
Wisconsin	13.77	13.74	10.71	10.60	7.50	7.38	12.73	--	10.79	10.69
West North Central	10.29	10.07	8.71	8.50	6.54	6.38	8.87	8.15	8.78	8.58
Iowa	10.45	10.22	8.21	8.14	5.41	5.40	--	--	7.94	7.83
Kansas	11.91	11.34	9.93	9.53	7.37	7.36	--	--	10.01	9.67
Minnesota	11.99	11.51	9.50	9.07	6.95	6.68	10.50	9.55	9.72	9.28
Missouri	9.14	9.23	7.83	7.80	5.73	5.52	6.85	6.48	8.16	8.10
Nebraska	9.43	9.18	8.48	8.37	6.93	6.76	--	--	8.40	8.22
North Dakota	8.57	8.34	8.44	8.11	7.91	7.98	--	--	8.30	8.14
South Dakota	10.12	10.02	8.75	8.80	7.21	7.03	--	--	9.08	9.02
South Atlantic	11.28	11.25	9.40	9.51	6.37	6.56	7.74	8.64	9.80	9.88
Delaware	13.16	12.07	10.08	9.13	8.44	NM	--	--	11.27	10.38
District of	13.04	12.00	11.64	12.20	9.44	8.58	8.91	9.29	11.78	11.94

Columbia											
Florida	11.60	11.93	9.58	9.91	8.03	8.31	8.80	9.19	10.50	10.83
Georgia	10.45	10.43	9.65	9.78	5.46	5.86	4.61	5.38	9.08	9.22
Maryland	14.03	13.07	10.94	11.10	7.86	9.13	7.58	9.16	12.33	12.06
North Carolina	10.44	10.54	8.58	8.44	6.16	6.27	8.06	7.67	9.12	9.14
South Carolina	11.72	11.77	9.89	9.92	5.86	5.97	--	--	9.41	9.45
Virginia	10.66	10.80	8.19	8.48	6.97	7.45	8.11	8.75	9.10	9.47
West Virginia	10.68	9.06	9.06	7.81	6.43	5.86	--	--	8.88	7.68
East South Central	10.28	10.28	9.95	10.10	5.57	5.68	--	--	8.75	8.83
Alabama	11.08	10.99	10.90	10.63	5.43	5.58	--	--	8.99	8.95
Kentucky	9.80	9.50	9.09	8.90	5.35	5.15	--	--	8.11	7.80
Mississippi	10.49	11.06	10.05	10.97	6.02	6.54	--	--	8.88	9.58
Tennessee	9.90	9.96	9.78	10.10	5.74	5.94	--	--	8.99	9.18
West South Central	10.12	10.56	7.63	8.03	5.05	5.73	5.58	5.56	7.82	8.45
Arkansas	8.93	8.73	7.85	7.62	5.59	5.64	9.19	10.88	7.58	7.54
Louisiana	8.54	8.80	8.38	8.84	4.94	5.50	7.81	8.38	7.12	7.62
Oklahoma	8.33	8.56	6.84	7.03	4.53	5.06	--	--	6.84	7.17
Texas	10.95	11.55	7.60	8.06	5.09	5.93	5.41	5.33	8.16	8.97
Mountain	10.77	11.13	8.83	9.23	5.75	6.04	9.08	9.84	8.67	8.97
Arizona	10.90	11.05	9.59	9.53	5.38	5.84	8.24	8.07	9.27	9.40
Colorado	10.97	11.40	8.44	9.18	6.50	6.65	8.58	9.88	8.87	9.31
Idaho	9.55	9.66	7.44	7.59	5.70	5.64	--	--	8.00	8.05
Montana	10.20	10.74	9.51	10.83	4.98	5.19	--	--	8.62	9.34
Nevada	11.42	12.70	8.15	9.42	4.97	5.89	8.01	8.70	8.13	9.16
New Mexico	11.45	12.19	9.54	10.24	5.68	6.16	--	--	9.03	9.65
Utah	10.54	10.33	8.19	7.97	5.74	5.63	9.96	10.18	8.20	7.89
Wyoming	10.44	10.28	9.12	8.74	6.56	6.52	--	--	7.97	7.76
Pacific Contiguous	14.11	13.67	12.05	12.08	7.88	7.87	8.25	8.04	12.12	11.86
California	17.76	17.42	13.73	13.85	10.52	10.75	8.21	8.00	14.75	14.62
Oregon	10.20	10.30	8.67	8.72	5.88	5.75	9.15	9.14	8.86	8.79
Washington	9.07	8.13	8.29	7.66	4.40	4.20	9.39	8.27	7.73	6.98
Pacific Noncontiguous	23.23	26.17	21.17	23.87	18.78	23.23	--	--	21.11	24.44
Alaska	19.44	19.36	17.60	17.24	13.76	14.44	--	--	17.50	17.51
Hawaii	26.92	33.08	24.74	30.92	20.80	26.68	--	--	23.85	29.94
U.S. Total	12.01	12.10	9.98	10.26	6.42	6.64	9.46	10.62	9.96	10.18

See Technical notes for additional information on the Commercial, Industrial, and Transportation sectors.
Notes: - See Glossary for definitions. - Values are preliminary estimates based on a cutoff model sample.
See Technical Notes for a discussion of the sample design for the Form EIA-826.
Utilities and energy service providers may classify commercial and industrial customers based on either NAICS codes or demands or usage falling within specified limits by rate schedule.
Changes from year to year in consumer counts, sales and revenues, particularly involving the commercial and industrial consumer sectors, may result from respondent implementation of changes in the definitions of consumers, and reclassifications.
Totals may not equal sum of components because of independent rounding.
Source: U.S. Energy Information Administration, Form EIA-826, Monthly Electric Sales and Revenue Report with State Distributions Report.

Appendix G – Crash Rate Calculations

	Begin MP	End MP	Total Length
Length of Segment	115874.78	123422.16	1.43

Crash Rates			
Year: 2009 - 2013	Total	% AADT	Crash Rate
No. of Nighttime Crashes	69	20	6.28
No. of Daytime Crashes	109	80	2.48

AVG. AADT = 21040

Night to Day Crash Rate =	2.53

Nightime Crash Detail/Costs			
Year: 2009 - 2013	FHWA Rate*	Total	Cost
Fatality	$ 10,230,000.00	0	$ -
Injury (Possible)	$ 157,170.00	213	$ 33,477,210.00
Property Damage Only	$ 7,600.00	160	$ 1,216,000.00
			$ 34,693,210.00

Average Cost/Crash =	$ 93,011.29
W/O Fatality =	$ 93,011.29

		Fixtures	Cost		CAP REC	
Average Daily Traffic	ADT					21040
% of ADT Occuring at Night	ADT*n*					20%
Night Crash Rate Unlighted	NRU					6.28
Crash Reduction Factor	CRF					0.4
Average Crash Cost	ACC				$	93,011.29
Annualized Installation Cost (per mile)	AIC	93	$ 7,992.00		$	66,893.04
Total Annual Maintenance Cost (per mile)	TMC	93	$ 200.00	(per year)	$	18,600.00
Annual Energy Cost (per mile)	AEC	93	$ 0.09	(per year)	$	13,726.00

******** Proposed Spacing 162' 1.43 Miles 7550 46.60493827 **93 Poles**

Benefit - cost Ratio $ 359,036,575,863.82

$ 99,219.04 $ 99,219,040,200

Benefit - cost Ratio	**3.62**

Appendix H – Lighting Layout Analysis

Roadway Optimizer - Layout 1

General:

Roadway Standard: IES RP-8-2000
R-Table: R3 (Slightly Specular), Q0=0.07 Actual QO Value: 0.07

Roadway Layout:

Layout Type: Two Rows, Opposite, With Median; 2R_OPP_w/M
Roadway Width: 24 ft
Median Width: 40 ft
Lanes In Direction Of Travel: 2
Driver's Side Of Roadway: Right

Luminaire Information:

ers4_r3d1550-120-277v_tcm201-
Description: ERS4_R3D1550_____-120-277V
File Name: ers4_r3d1550-120-277v_tcm201-95661.ies
Lumens Per Lamp: N.A.
Number Of Lamps: 1
Total Lamp Lumens: N.A.
Luminaire Lumens: 22500
Luminaire Watts: 247
Efficiency (%): N.A.
Total Light Loss Factor: 1.000
Luminaire Arrangement: SINGLE
Arm Length: 15 ft
Offset: 0 ft

Luminaire Location Summary:
Coordinates in ft

Spacing - Row 1: 162
Spacing - Row 2: 162

Label	X-Coord	Y-Coord	Z-Coord	Orient	Tilt	Spin
ers4_r3d1550-120-27...	648	-20	40	90	0	0
ers4_r3d1550-120-27...	486	-20	40	90	0	0
ers4_r3d1550-120-27...	324	-20	40	90	0	0
ers4_r3d1550-120-27...	162	-20	40	90	0	0
ers4_r3d1550-120-27...	0	-20	40	90	0	0
ers4_r3d1550-120-27...	-162	-20	40	90	0	0
ers4_r3d1550-120-27...	-324	-20	40	90	0	0
ers4_r3d1550-120-27...	648	108	40	270	0	0
ers4_r3d1550-120-27...	486	108	40	270	0	0
ers4_r3d1550-120-27...	324	108	40	270	0	0
ers4_r3d1550-120-27...	162	108	40	270	0	0

Roadway Optimizer - Layout 1 - Cont.

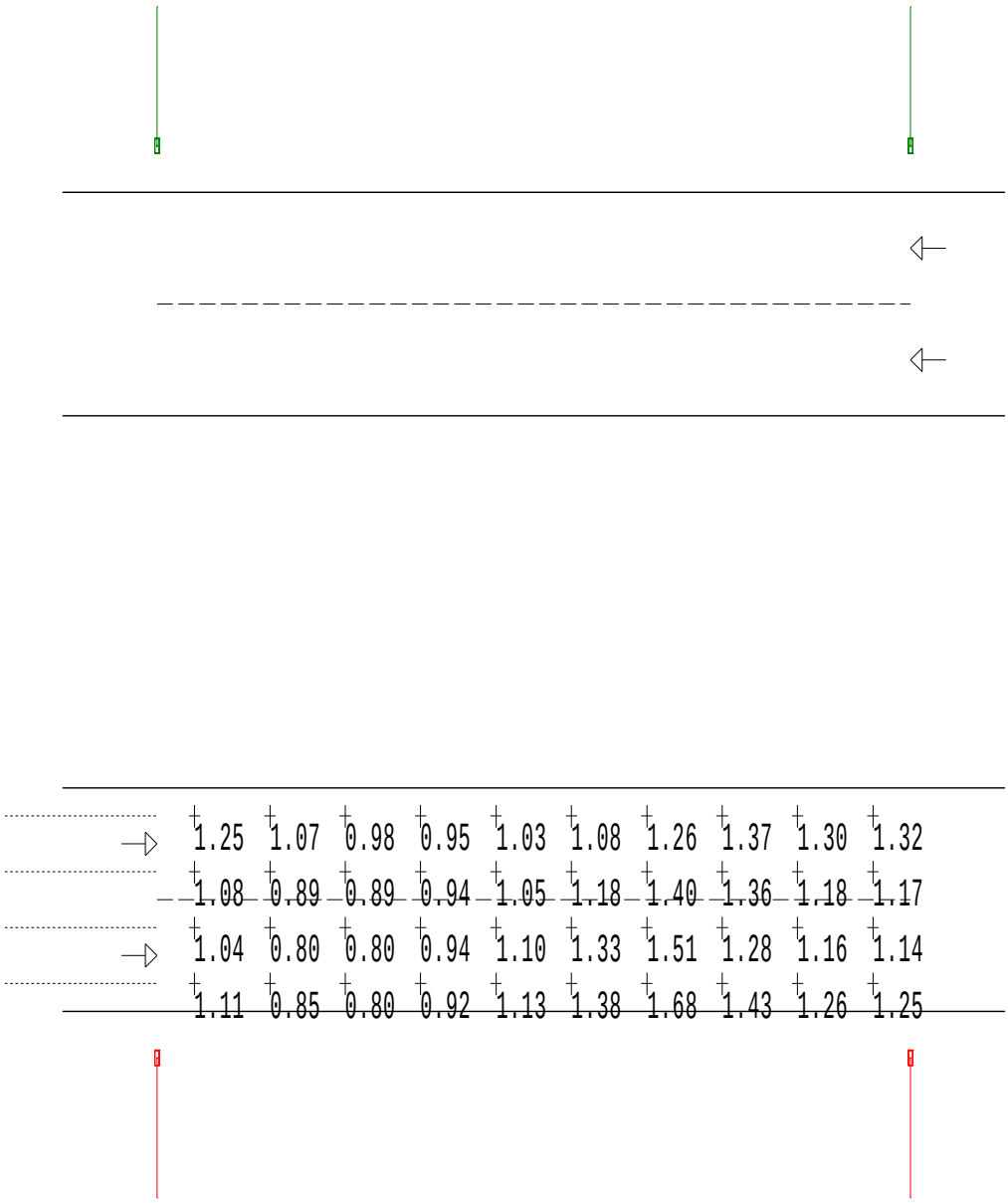
Luminaire Location Summary:
Coordinates in ft

ers4_r3d1550-120-27...	0	108	40	270	0	0
ers4_r3d1550-120-27...	-162	108	40	270	0	0
ers4_r3d1550-120-27...	-324	108	40	270	0	0

Total Number of locations: 14

Roadway Optimizer - Layout 1

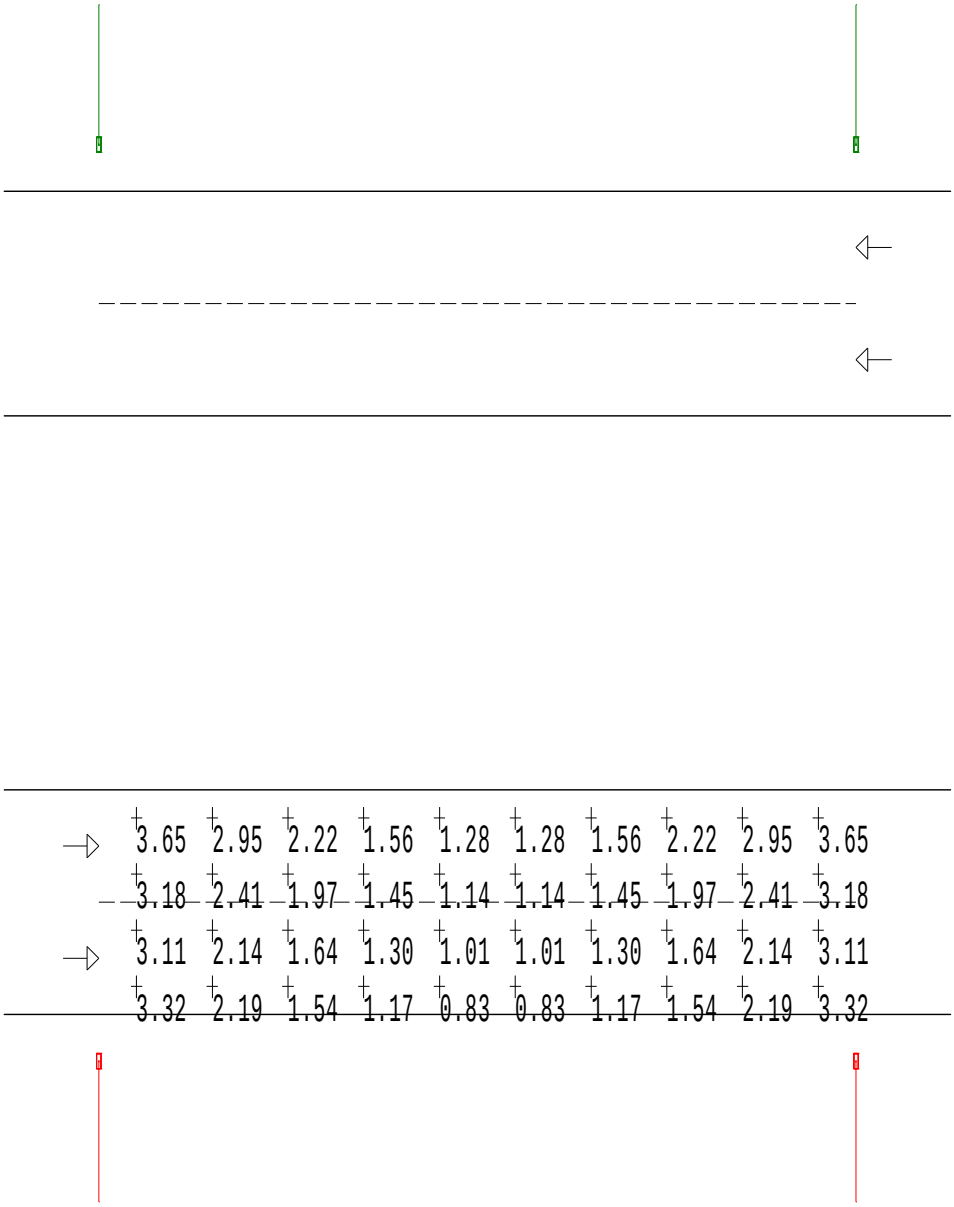
RoadOpt_1_Luminance



Luminance (Cd/SqM)
Average = 1.14
Maximum = 1.68
Minimum = 0.80
Avg/Min Ratio = 1.43
Max/Min Ratio = 2.1
Max/Avg Ratio = 1.47

Roadway Optimizer - Layout 1

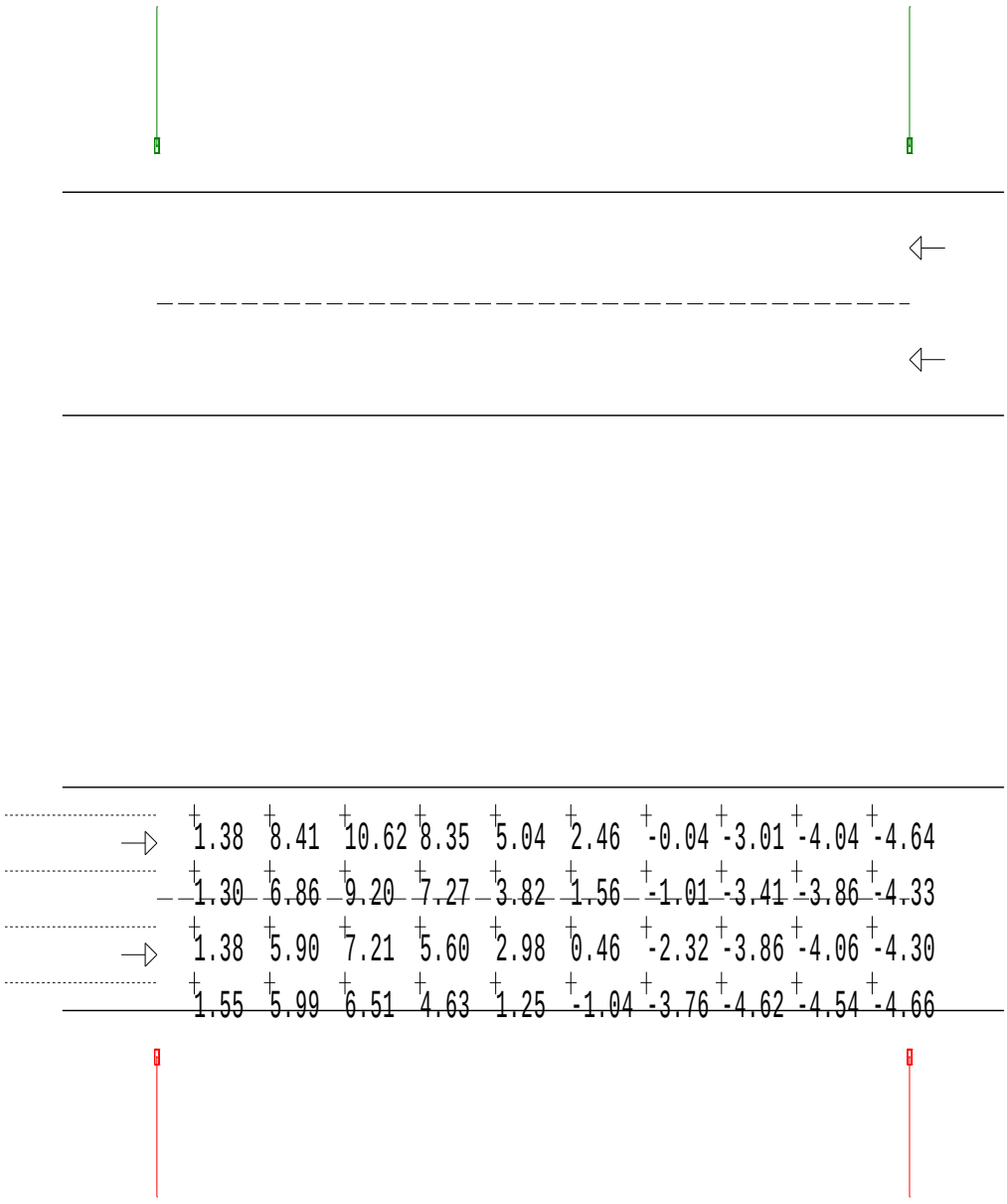
RoadOpt_1_Illum



Illuminance (Fc)
Average = 2
Maximum = 3.65
Minimum = 0.83
Avg/Min Ratio = 2.41
Max/Min Ratio = 4.4
Max/Avg Ratio = 1.83

Roadway Optimizer - Layout 1

RoadOpt_1_Vis_Level

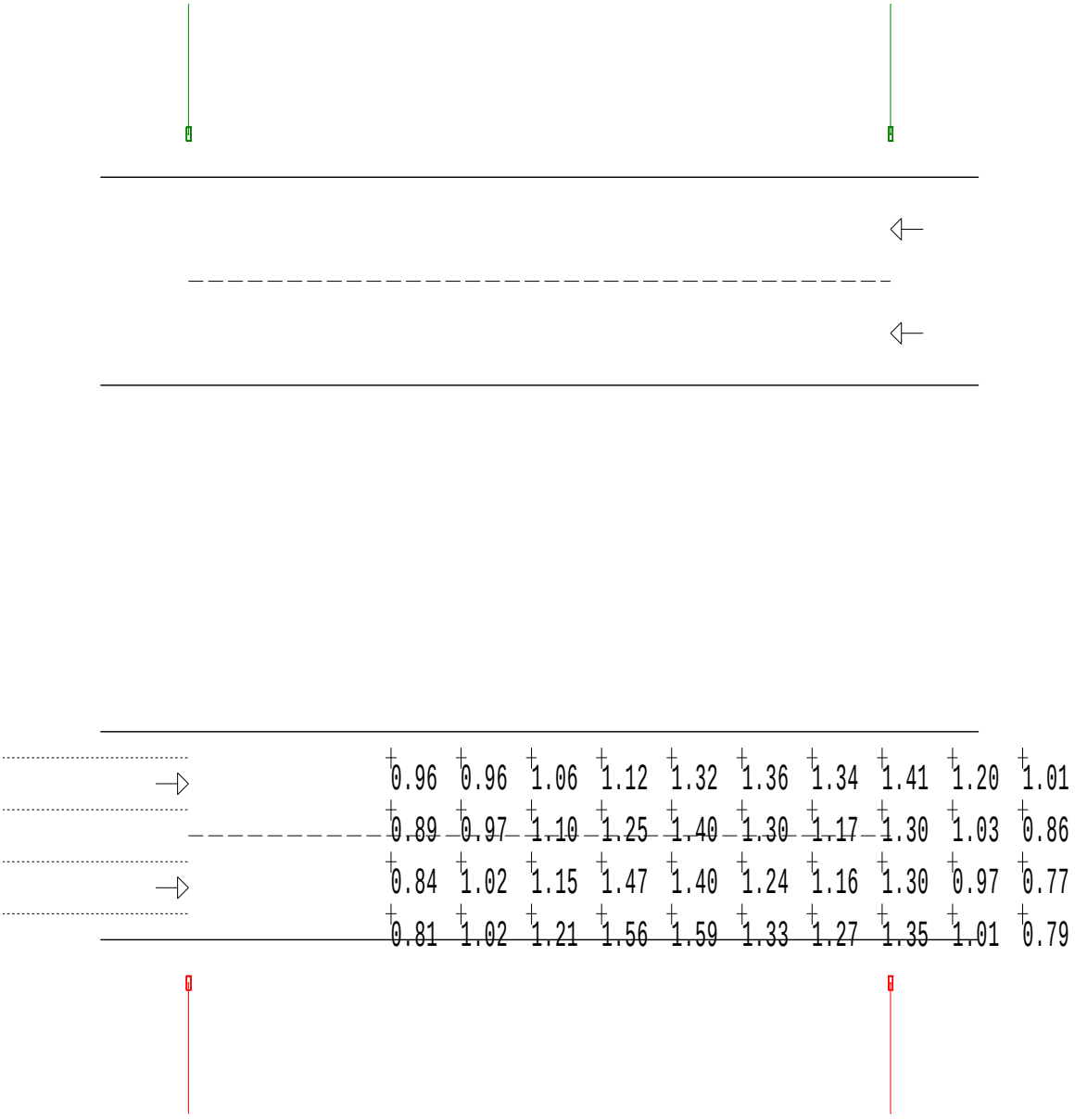


Visibility Level

STV = 3.530551

Roadway Optimizer - Layout 1

RoadOpt_1_Vis_Level_Bkgd_Lum

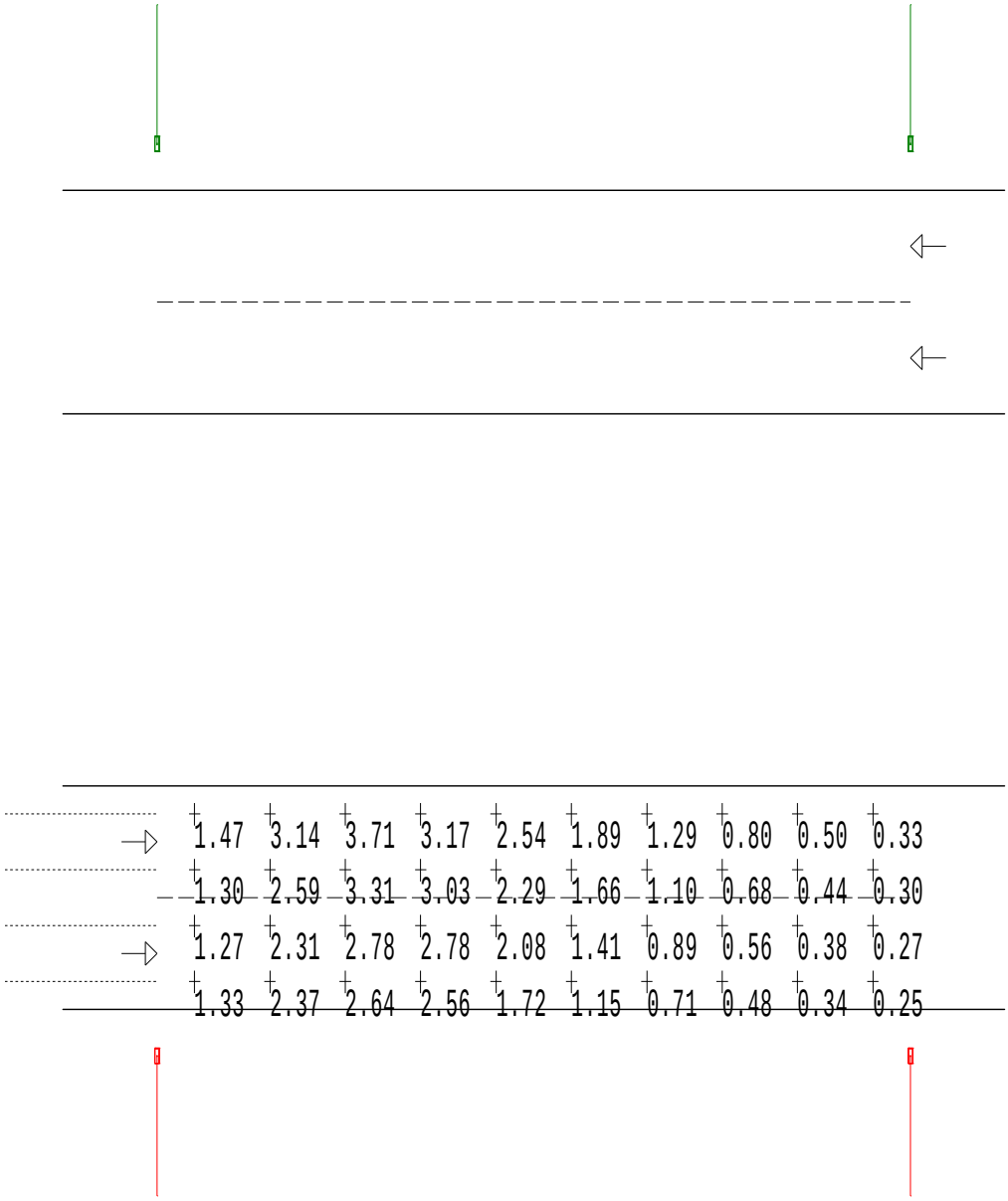


Background Luminance (Cd/SqM)

Average = 1.16
Maximum = 1.59
Minimum = 0.77
Avg/Min Ratio = 1.51
Max/Min Ratio = 2.06
Max/Avg Ratio = 1.37

Roadway Optimizer - Layout 1

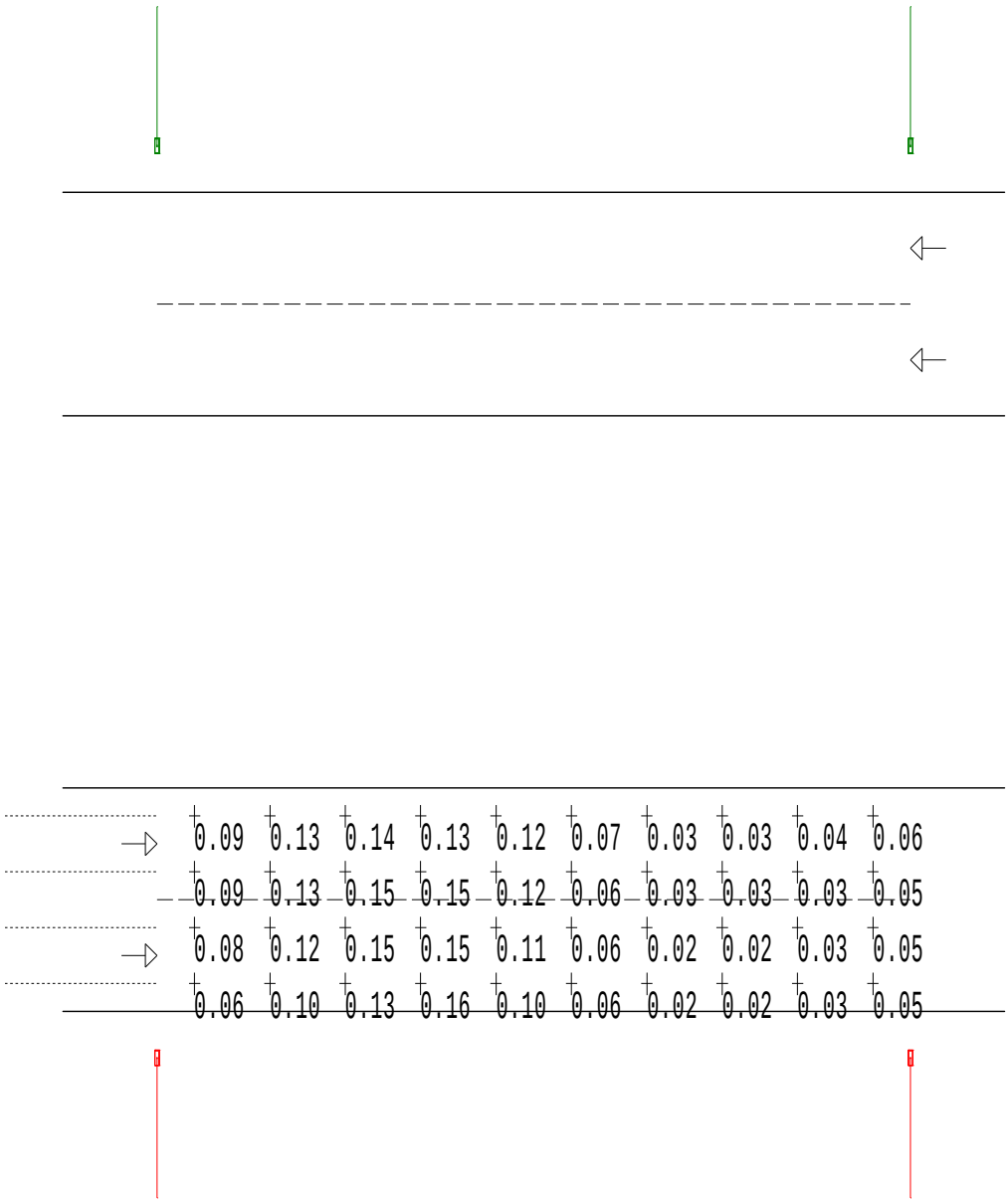
RoadOpt_1_Vis_Level_Target_Lum



Target Luminance (Cd/SqM)
Average = 1.6
Maximum = 3.71
Minimum = 0.25
Avg/Min Ratio = 6.4
Max/Min Ratio = 14.84
Max/Avg Ratio = 2.32

Roadway Optimizer - Layout 1

RoadOpt_1_Veil_Lum



Veiling Luminance (Cd/SqM)
Average = 0.08
Maximum = 0.16
Minimum = 0.02
Avg/Min Ratio = 4
Max/Min Ratio = 8
Max/Avg Ratio = 2
MaxLv Ratio = 0.14
Threshold Increment (TI) = 9.37

Roadway Optimizer - Layout Comparison

	Layout 1
Description	
Roadway Standard	IES RP-8-2000
R-Table	R3
Actual Q0 Value	0.07
Layout Type	2R_OPP_w/M
Road Width	24
Median Width	40
Number Lanes	2
Number Lanes Opposite	0
Drivers Side	Right
Calc Area	Bottom
Label - Row 1	ers4_r3d1550-1 20-277v_tcm201-
MH - Row 1	40
Setback - Row 1	20
+-Orient - Row 1	0
Tilt - Row 1	0
Spin - Row 1	0
Spacing - Row 1	162
Label - Row 2	ers4_r3d1550-1 20-277v_tcm201-
MH - Row 2	40
Setback - Row 2	20
+-Orient - Row 2	0
Tilt - Row 2	0
Spin - Row 2	0
Spacing - Row 2	162
1_Luminance (Cd/SqM)	
Average	1.14
Maximum	1.68
Minimum	0.80
Avg/Min Ratio	1.43

Roadway Optimizer - Layout Comparison - Cont.

	Layout 1
Max/Min Ratio	2.10
Max/Avg Ratio	1.47
1_Illum (Fc)	
Average	2
Maximum	3.65
Minimum	0.83
Avg/Min Ratio	2.41
Max/Min Ratio	4.40
Max/Avg Ratio	1.83
1_Vis_Level	
STV	3.53
1_Vis_Level_Bkgd_Lum (Cd/SqM)	
Average	1.16
Maximum	1.59
Minimum	0.77
Avg/Min Ratio	1.51
Max/Min Ratio	2.06
Max/Avg Ratio	1.37
1_Vis_Level_Target_Lum (Cd/SqM)	
Average	1.6
Maximum	3.71
Minimum	0.25
Avg/Min Ratio	6.40
Max/Min Ratio	14.84
Max/Avg Ratio	2.32
1_Veil_Lum (Cd/SqM)	
Average	0.08
Maximum	0.16
Minimum	0.02
Avg/Min Ratio	4.00

Roadway Optimizer - Layout Comparison - Cont.

	Layout 1
Max/Min Ratio	8.00
Max/Avg Ratio	2
MaxLV Ratio	0.14
Threshold Incr. (TI)	9.37

GE
Lighting

Evolve™ LED Roadway Lighting

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

imagination at work

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

- (UL)/c(UL) 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.

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)

E R L 1
_ _ _ _   _   _ _   _ _   _ _   _   _ _ _ _   _ _ _

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION	CCT	CONTROLS	COLOR	OPTIONS
E = Evolve **R** = Roadway **L** = Local **1** = Single Module	**0** = 120-277* **1** = 120 **2** = 208 **3** = 240 **4** = 277 **5** = 480 **D** = 347 **H** = 347-480* * Not available with Fusing. Must choose a descreet voltage with F option.	**02*** **03** **04** **05** **06** **07** **08** **09** See Data Table for more information. *120V only, not compatible with 0-10V dimming.	**A1** = Extra Narrow Asymmetric **B1** = Narrow Asymmetric (Medium) **C1** = Asymmetric (Short) **D1** = Asymmetric Forward **E1** = Asymmetric (Medium) **F1** = Asymmetric (Wide) **G1** = Asymmetric (Extra Wide) See Data Table for more information	**30** = 3000K **40** = 4000K	**A** = ANSI C136.41 7-pin **D** = ANSI C136.41 7-pin receptacle with Shorting Cap **E** = 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. **NOTE:** Dimming controls wired for 0-10V standard unless DALI option "U" requested.	**GRAY** = Gray **BLCK** = Black **DKBZ** = Dark Bronze	**A** = 4 Bolt Slipfitter † **F** = Fusing **G** = Internal Bubble Level **I** = IP66 Optical **L** = Tool-Less Entry **R** = Optional Secondary Enhanced Surge Protection (10kV/5kA) **U** = Universal DALI Programmable +^ **X** = Single Package # **Y** = Coastal Finish * **XXX** = 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.

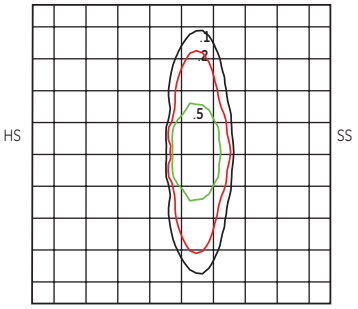
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING		IES FILE NUMBER 4000K		IES FILE NUMBER 3000K	
			4000K	3000K	120-277V	347-480V	4000K	3000K	120-277V	347-480V	120-277V	347-480V
ERL1		A1	1900	1800			B1-U0-G1	B1-U0-G1	ERL1_02A140____-120V.IES	N/A	ERL1_02A130____-120V.IES	N/A
ERL1		B1	1900	1800			B1-U0-G0	B1-U0-G0	ERL1_02B140____-120V.IES	N/A	ERL1_02B130____-120V.IES	N/A
ERL1		C1	2000	1900			B1-U0-G1	B1-U0-G1	ERL1_02C140____-120V.IES	N/A	ERL1_02C130____-120V.IES	N/A
ERL1	02	D1	1900	1800	15	N/A	B1-U0-G0	B1-U0-G0	ERL1_02D140____-120V.IES	N/A	ERL1_02D130____-120V.IES	N/A
ERL1		E1	2000	1900			B1-U0-G0	B1-U0-G0	ERL1_02E140____-120V.IES	N/A	ERL1_02E130____-120V.IES	N/A
ERL1		F1	2000	1900			B1-U0-G1	B1-U0-G1	ERL1_02F140____-120V.IES	N/A	ERL1_02F130____-120V.IES	N/A
ERL1		G1	2000	1900			B1-U0-G1	B1-U0-G1	ERL1_02G140____-120V.IES	N/A	ERL1_02G130____-120V.IES	N/A
ERL1		A1	2800	2700			B1-U0-G1	B1-U0-G1	ERL1_03A140____-120-277V.IES	ERL1_03A140____-347-480V.IES	ERL1_03A130____-120-277V.IES	ERL1_03A130____-347-480V.IES
ERL1		B1	2900	2800			B1-U0-G1	B1-U0-G1	ERL1_03B140____-120-277V.IES	ERL1_03B140____-347-480V.IES	ERL1_03B130____-120-277V.IES	ERL1_03B130____-347-480V.IES
ERL1		C1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03C140____-120-277V.IES	ERL1_03C140____-347-480V.IES	ERL1_03C130____-120-277V.IES	ERL1_03C130____-347-480V.IES
ERL1	03	D1	2900	2800	25	28	B1-U0-G1	B1-U0-G1	ERL1_03D140____-120-277V.IES	ERL1_03D140____-347-480V.IES	ERL1_03D130____-120-277V.IES	ERL1_03D130____-347-480V.IES
ERL1		E1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03E140____-120-277V.IES	ERL1_03E140____-347-480V.IES	ERL1_03E130____-120-277V.IES	ERL1_03E130____-347-480V.IES
ERL1		F1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03F140____-120-277V.IES	ERL1_03F140____-347-480V.IES	ERL1_03F130____-120-277V.IES	ERL1_03F130____-347-480V.IES
ERL1		G1	3000	2900			B1-U0-G1	B1-U0-G1	ERL1_03G140____-120-277V.IES	ERL1_03G140____-347-480V.IES	ERL1_03G130____-120-277V.IES	ERL1_03G130____-347-480V.IES
ERL1		A1	3800	3700			B1-U0-G1	B1-U0-G1	ERL1_04A140____-120-277V.IES	ERL1_04A140____-347-480V.IES	ERL1_04A130____-120-277V.IES	ERL1_04A130____-347-480V.IES
ERL1		B1	3900	3800			B1-U0-G1	B1-U0-G1	ERL1_04B140____-120-277V.IES	ERL1_04B140____-347-480V.IES	ERL1_04B130____-120-277V.IES	ERL1_04B130____-347-480V.IES
ERL1		C1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04C140____-120-277V.IES	ERL1_04C140____-347-480V.IES	ERL1_04C130____-120-277V.IES	ERL1_04C130____-347-480V.IES
ERL1	04	D1	3900	3800	32	35	B1-U0-G1	B1-U0-G1	ERL1_04D140____-120-277V.IES	ERL1_04D140____-347-480V.IES	ERL1_04D130____-120-277V.IES	ERL1_04D130____-347-480V.IES
ERL1		E1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04E140____-120-277V.IES	ERL1_04E140____-347-480V.IES	ERL1_04E130____-120-277V.IES	ERL1_04E130____-347-480V.IES
ERL1		F1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04F140____-120-277V.IES	ERL1_04F140____-347-480V.IES	ERL1_04F130____-120-277V.IES	ERL1_04F130____-347-480V.IES
ERL1		G1	4000	3900			B1-U0-G1	B1-U0-G1	ERL1_04G140____-120-277V.IES	ERL1_04G140____-347-480V.IES	ERL1_04G130____-120-277V.IES	ERL1_04G130____-347-480V.IES
ERL1		A1	4800	4600			B2-U0-G1	B2-U0-G1	ERL1_05A140____-120-277V.IES	ERL1_05A140____-347-480V.IES	ERL1_05A130____-120-277V.IES	ERL1_05A130____-347-480V.IES
ERL1		B1	4800	4600			B2-U0-G1	B2-U0-G1	ERL1_05B140____-120-277V.IES	ERL1_05B140____-347-480V.IES	ERL1_05B130____-120-277V.IES	ERL1_05B130____-347-480V.IES
ERL1		C1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05C140____-120-277V.IES	ERL1_05C140____-347-480V.IES	ERL1_05C130____-120-277V.IES	ERL1_05C130____-347-480V.IES
ERL1	05	D1	4800	4600	41	45	B1-U0-G1	B1-U0-G1	ERL1_05D140____-120-277V.IES	ERL1_05D140____-347-480V.IES	ERL1_05D130____-120-277V.IES	ERL1_05D130____-347-480V.IES
ERL1		E1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05E140____-120-277V.IES	ERL1_05E140____-347-480V.IES	ERL1_05E130____-120-277V.IES	ERL1_05E130____-347-480V.IES
ERL1		F1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05F140____-120-277V.IES	ERL1_05F140____-347-480V.IES	ERL1_05F130____-120-277V.IES	ERL1_05F130____-347-480V.IES
ERL1		G1	5000	4800			B2-U0-G1	B2-U0-G1	ERL1_05G140____-120-277V.IES	ERL1_05G140____-347-480V.IES	ERL1_05G130____-120-277V.IES	ERL1_05G130____-347-480V.IES
ERL1		A1	5700	5500			B2-U0-G1	B2-U0-G1	ERL1_06A140____-120-277V.IES	ERL1_06A140____-347-480V.IES	ERL1_06A130____-120-277V.IES	ERL1_06A130____-347-480V.IES
ERL1		B1	5800	5600			B2-U0-G1	B2-U0-G1	ERL1_06B140____-120-277V.IES	ERL1_06B140____-347-480V.IES	ERL1_06B130____-120-277V.IES	ERL1_06B130____-347-480V.IES
ERL1		C1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06C140____-120-277V.IES	ERL1_06C140____-347-480V.IES	ERL1_06C130____-120-277V.IES	ERL1_06C130____-347-480V.IES
ERL1	06	D1	5800	5600	53	58	B1-U0-G1	B1-U0-G1	ERL1_06D140____-120-277V.IES	ERL1_06D140____-347-480V.IES	ERL1_06D130____-120-277V.IES	ERL1_06D130____-347-480V.IES
ERL1		E1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06E140____-120-277V.IES	ERL1_06E140____-347-480V.IES	ERL1_06E130____-120-277V.IES	ERL1_06E130____-347-480V.IES
ERL1		F1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06F140____-120-277V.IES	ERL1_06F140____-347-480V.IES	ERL1_06F130____-120-277V.IES	ERL1_06F130____-347-480V.IES
ERL1		G1	6000	5800			B2-U0-G1	B2-U0-G1	ERL1_06G140____-120-277V.IES	ERL1_06G140____-347-480V.IES	ERL1_06G130____-120-277V.IES	ERL1_06G130____-347-480V.IES
ERL1		A1	6700	6500			B2-U0-G2	B2-U0-G2	ERL1_07A140____.IES		ERL1_07A130____.IES	
ERL1		B1	6800	6600			B2-U0-G1	B2-U0-G1	ERL1_07B140____.IES		ERL1_07B130____.IES	
ERL1		C1	7000	6800			B2-U0-G1	B2-U0-G1	ERL1_07C140____.IES		ERL1_07C130____.IES	
ERL1	07	D1	6800	6600	67		B2-U0-G1	B2-U0-G1	ERL1_07D140____.IES		ERL1_07D130____.IES	
ERL1		E1	7000	6800			B2-U0-G1	B2-U0-G1	ERL1_07E140____.IES		ERL1_07E130____.IES	
ERL1		F1	7000	6800			B2-U0-G2	B2-U0-G2	ERL1_07F140____.IES		ERL1_07F130____.IES	
ERL1		G1	7000	6800			B2-U0-G2	B2-U0-G2	ERL1_07G140____.IES		ERL1_07G130____.IES	
ERL1		A1	8200	8000			B2-U0-G2	B2-U0-G2	ERL1_08A140____.IES		ERL1_08A130____.IES	
ERL1		B1	8300	8100			B2-U0-G1	B2-U0-G1	ERL1_08B140____.IES		ERL1_08B130____.IES	
ERL1		C1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_08C140____.IES		ERL1_08C130____.IES	
ERL1	08	D1	8300	8100	88		B2-U0-G1	B2-U0-G1	ERL1_08D140____.IES		ERL1_08D130____.IES	
ERL1		E1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_08E140____.IES		ERL1_08E130____.IES	
ERL1		F1	8500	8200			B2-U0-G2	B2-U0-G2	ERL1_08F140____.IES		ERL1_08F130____.IES	
ERL1		G1	8500	8200			B2-U0-G2	B2-U0-G2	ERL1_08G140____.IES		ERL1_08G130____.IES	
ERL1		A1	8400	8100			B2-U0-G2	B2-U0-G2	ERL1_09A140____.IES		ERL1_09A130____.IES	
ERL1		B1	8500	8200			B2-U0-G1	B2-U0-G1	ERL1_09B140____.IES		ERL1_09B130____.IES	
ERL1		C1	8800	8400			B2-U0-G1	B2-U0-G1	ERL1_09C140____.IES		ERL1_09C130____.IES	
ERL1	09	D1	8500	8200	90		B2-U0-G2	B2-U0-G1	ERL1_09D140____.IES		ERL1_09D130____.IES	
ERL1		E1	8800	8400			B2-U0-G1	B2-U0-G1	ERL1_09E140____.IES		ERL1_09E130____.IES	
ERL1		F1	8800	8400			B2-U0-G2	B2-U0-G2	ERL1_09F140____.IES		ERL1_09F130____.IES	
ERL1		G1	8800	8400			B2-U0-G2	B2-U0-G2	ERL1_09G140____.IES		ERL1_09G130____.IES	

Photometrics

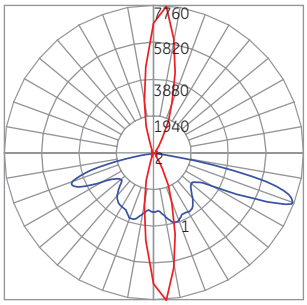
Evolve™ LED Streetlight (ERL1)

ERL1
Extra Narrow Asymmetric (08A1)

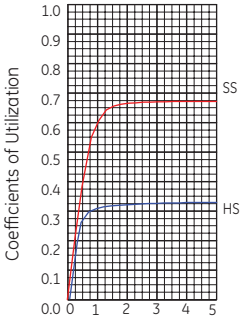
8,200 Lumens
4000K
ERL1_08A140_____.IES



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



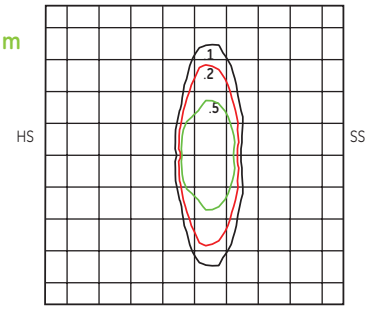
— Vertical plane through horizontal angle of maximum candlepower at 85°
— Vertical plane through horizontal angle of 70°



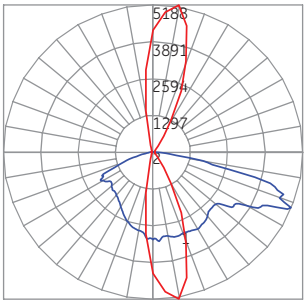
Street Width/Mounting Height

ERL1
Narrow Asymmetric Medium (08B1)

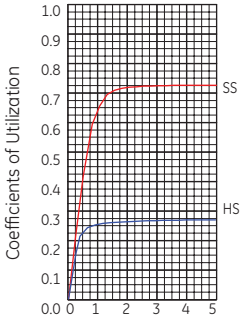
8,300 Lumens
4000K
ERL1_08B140_____.IES



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



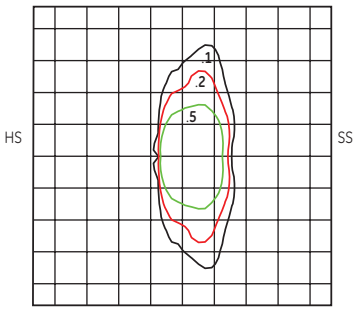
— Vertical plane through horizontal angle of maximum candlepower at 80°
— Vertical plane through horizontal angle of 68°



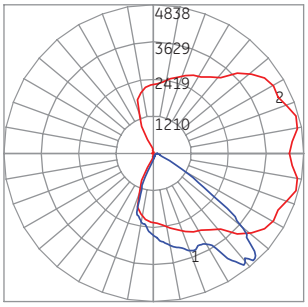
Street Width/Mounting Height

ERL1
Asymmetric Short (08C1)

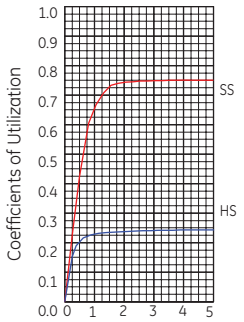
8,500 Lumens
4000K
ERL1_08C140_____.IES



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



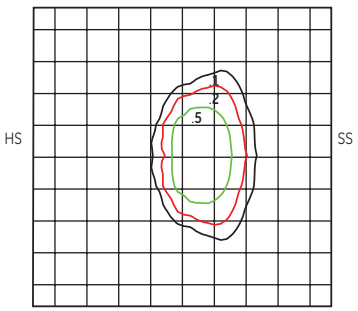
— Vertical plane through horizontal angle of maximum candlepower at 15°
— Vertical plane through horizontal angle of 42°



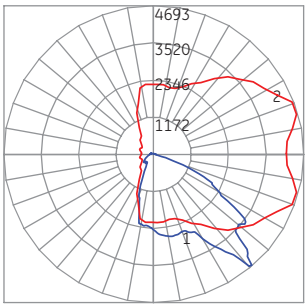
Street Width/Mounting Height

ERL1
Asymmetric Forward (08D1)

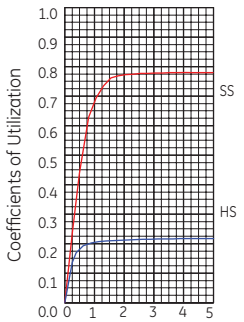
8,300 Lumens
4000K
ERL1_08D140_____.IES



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°



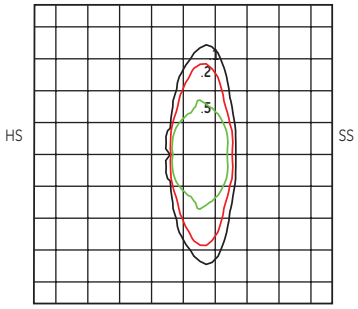
Street Width/Mounting Height

Photometrics

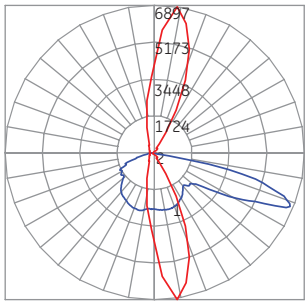
Evolve™ LED Streetlight (ERL1)

ERL1 Asymmetric Medium (08E1)

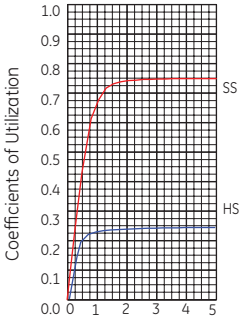
8,500 Lumens
4000K
ERL1_08E140_____.IES



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



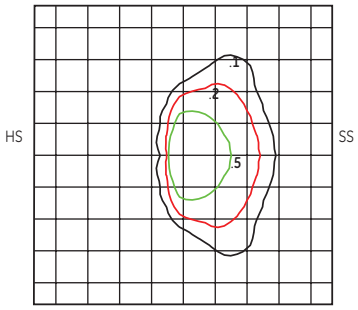
— Vertical plane through horizontal angle of maximum candlepower at 80°
— Vertical plane through horizontal angle of 69°



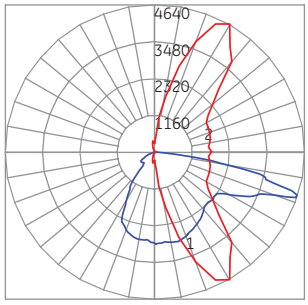
Street Width/Mounting Height

ERL1 Asymmetric Wide (08F1)

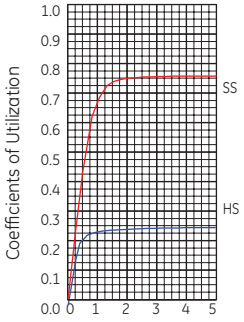
8,500 Lumens
4000K
ERL1_08F140_____.IES



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



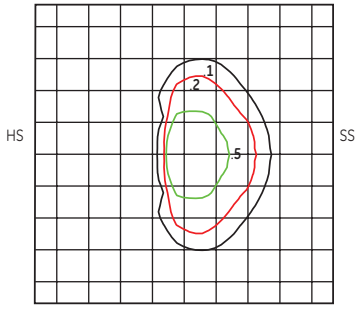
— Vertical plane through horizontal angle of maximum candlepower at 60°
— Vertical plane through horizontal angle of 73°



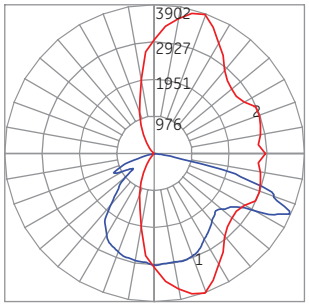
Street Width/Mounting Height

ERL1 Asymmetric Extra Wide (08G1)

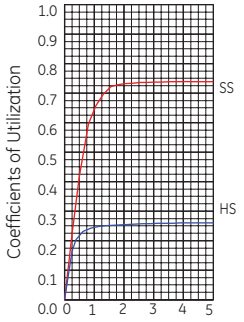
8,500 Lumens
4000K
ERL1_08G140_____.IES



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)

E R L H

____   _   __   __   __   _   ____   ___

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

E R S 1

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

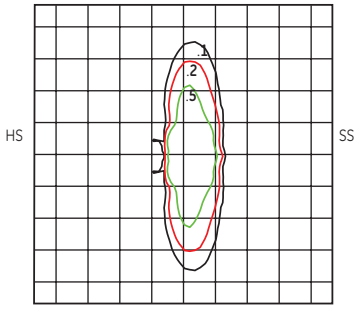
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS 4000K	TYPICAL INITIAL LUMENS 3000K	TYPICAL SYSTEM WATTAGE	BUG RATING 4000K	BUG RATING 3000K	IES FILE NUMBER 4000K	IES FILE NUMBER 3000K
ERS1		A1	9500	9200		B3-U0-G2	B3-U0-G2	ERS1_10A1X40____.IES	ERS1_10A1X30____.IES
ERS1		B1	9800	9500		B3-U0-G1	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	10	D1	9800	9500	90	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		A1	10900	10500		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	11	D1	11200	10800	108	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		A1	12300	11900		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	13	D1	12700	12200	125	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		A1	13300	12800		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	14	D1	13700	13200	139	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		A1	14200	13700		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	15	D1	14700	14200	161	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

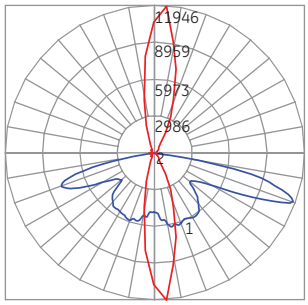
Evolve™ LED Streetlight (ERLH and ERS1)

ERLH and ERS1 Extra Narrow Asymmetric (15A1)

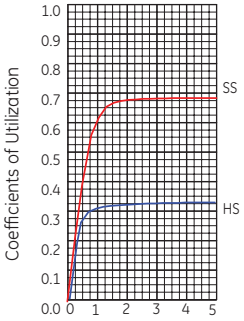
14,200 Lumens
4000K



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



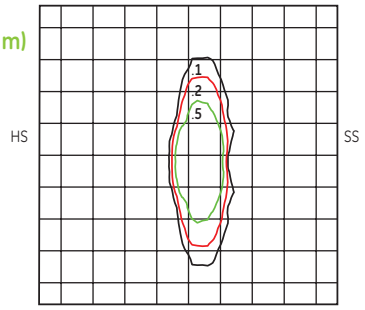
— Vertical plane through horizontal angle of maximum candlepower at 85°
— Vertical plane through horizontal angle of 71°



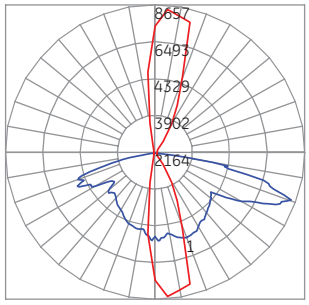
Street Width/Mounting Height

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

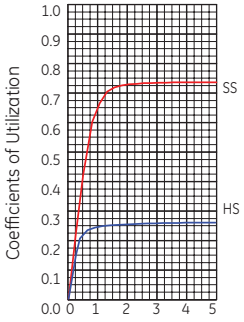
14,700 Lumens
4000K



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



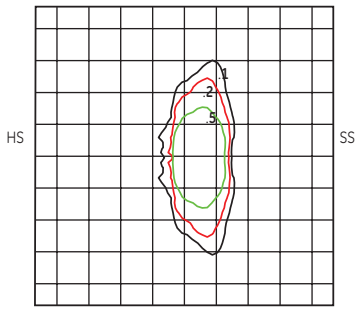
— Vertical plane through horizontal angle of maximum candlepower at 85°
— Vertical plane through horizontal angle of 71°



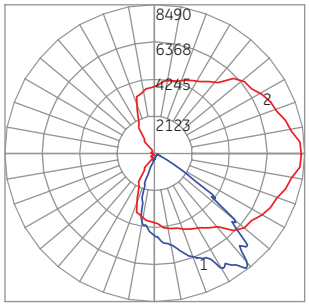
Street Width/Mounting Height

ERLH and ERS1 Asymmetric Short (15C1)

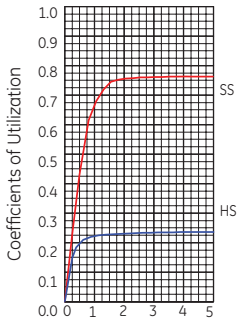
15,000 Lumens
4000K



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



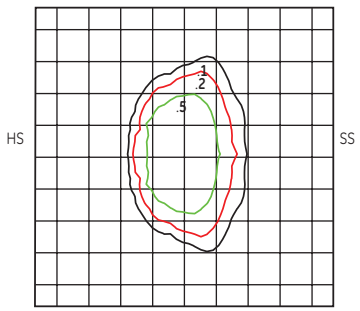
— Vertical plane through horizontal angle of maximum candlepower at 0°
— Vertical plane through horizontal angle of 38°



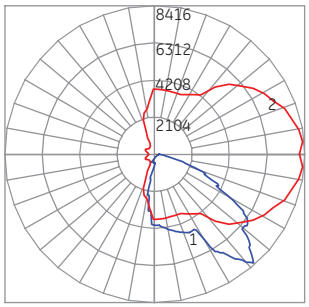
Street Width/Mounting Height

ERLH and ERS1 Asymmetric Forward (15D1)

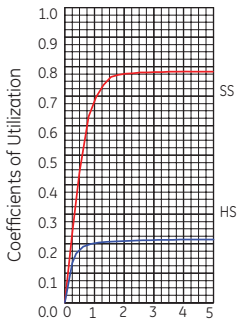
14,700 Lumens
4000K



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°



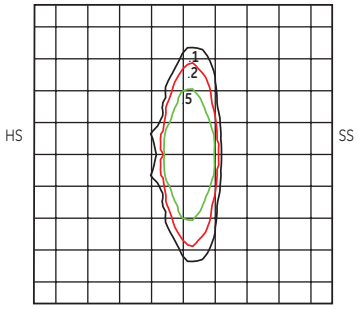
Street Width/Mounting Height

Photometrics

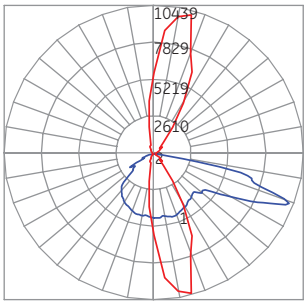
Evolve™ LED Streetlight (ERLH and ERS1)

ERLH and ERS1 Asymmetric Medium (15E1)

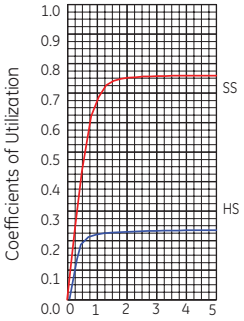
15,000 Lumens
4000K



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



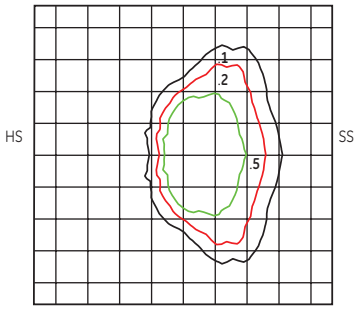
— Vertical plane through horizontal angle of maximum candlepower at 75°
— Vertical plane through horizontal angle of 70°



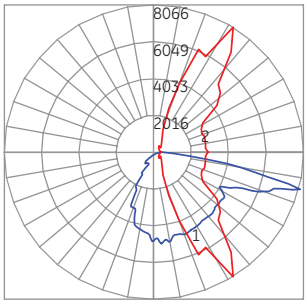
Street Width/Mounting Height

ERLH and ERS1 Asymmetric Wide (15F1)

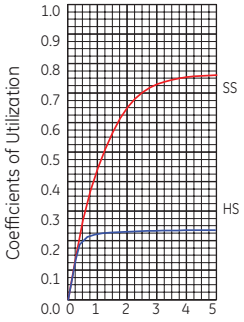
15,000 Lumens
4000K



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



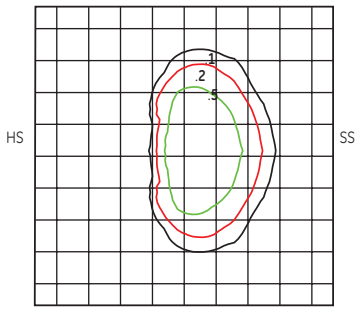
— Vertical plane through horizontal angle of maximum candlepower at 60°
— Vertical plane through horizontal angle of 75°



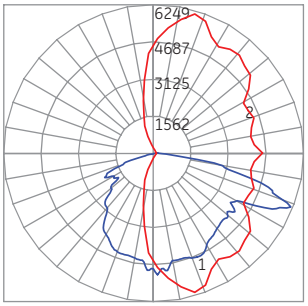
Street Width/Mounting Height

ERLH and ERS1 Asymmetric Extra Wide (15G1)

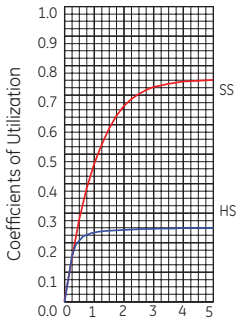
15,000 Lumens
4000K



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°



Street Width/Mounting Height

Ordering Number Logic

Evolve™ LED Streetlight (ERS2)

E R S 2 _ _ _ _ – _ _ – _ _ – _ – _ _ – _ – _ _ _ _ – _ _

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

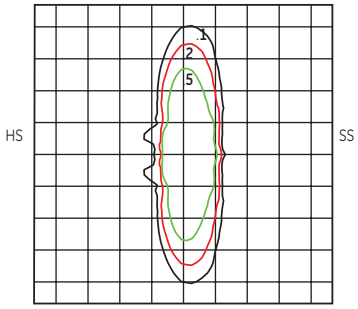
PRODUCT ID	LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER	
			4000K	3000K		4000K	3000K	4000K	3000K
ERS2	16	A1	15200	14700	132	B3-U0-G3	B3-U0-G3	ERS2_16A1X40_____.IES	ERS2_16A1X30_____.IES
ERS2		B1	15700	15100		B3-U0-G2	B3-U0-G2	ERS2_16B1X40_____.IES	ERS2_16B1X30_____.IES
ERS2		C1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16C1X40_____.IES	ERS2_16C1X30_____.IES
ERS2		D1	15700	15100		B3-U0-G2	B3-U0-G2	ERS2_16D1X40_____.IES	ERS2_16D1X30_____.IES
ERS2		E1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16E1X40_____.IES	ERS2_16E1X30_____.IES
ERS2		F1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16F1X40_____.IES	ERS2_16F1X30_____.IES
ERS2		G1	16000	15400		B3-U0-G2	B3-U0-G2	ERS2_16G1X40_____.IES	ERS2_16G1X30_____.IES
ERS2	18	A1	17100	16500	157	B3-U0-G3	B3-U0-G3	ERS2_18A1X40_____.IES	ERS2_18A1X30_____.IES
ERS2		B1	17600	17000		B3-U0-G2	B3-U0-G2	ERS2_18B1X40_____.IES	ERS2_18B1X30_____.IES
ERS2		C1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18C1X40_____.IES	ERS2_18C1X30_____.IES
ERS2		D1	17600	17000		B3-U0-G2	B3-U0-G2	ERS2_18D1X40_____.IES	ERS2_18D1X30_____.IES
ERS2		E1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18E1X40_____.IES	ERS2_18E1X30_____.IES
ERS2		F1	18000	17400		B3-U0-G3	B3-U0-G2	ERS2_18F1X40_____.IES	ERS2_18F1X30_____.IES
ERS2		G1	18000	17400		B3-U0-G2	B3-U0-G2	ERS2_18G1X40_____.IES	ERS2_18G1X30_____.IES
ERS2	19	A1	18000	17400	162	B3-U0-G3	B3-U0-G3	ERS2_19A1X40_____.IES	ERS2_19A1X30_____.IES
ERS2		B1	18600	17900		B3-U0-G2	B3-U0-G2	ERS2_19B1X40_____.IES	ERS2_19B1X30_____.IES
ERS2		C1	19000	18300		B3-U0-G2	B3-U0-G2	ERS2_19C1X40_____.IES	ERS2_19C1X30_____.IES
ERS2		D1	18600	17900		B3-U0-G2	B3-U0-G2	ERS2_19D1X40_____.IES	ERS2_19D1X30_____.IES
ERS2		E1	19000	18300		B3-U0-G2	B3-U0-G2	ERS2_19E1X40_____.IES	ERS2_19E1X30_____.IES
ERS2		F1	19000	18300		B3-U0-G3	B3-U0-G3	ERS2_19F1X40_____.IES	ERS2_19F1X30_____.IES
ERS2		G1	19000	18300		B3-U0-G3	B3-U0-G2	ERS2_19G1X40_____.IES	ERS2_19G1X30_____.IES
ERS2	21	A1	20000	19300	193	B3-U0-G3	B3-U0-G3	ERS2_21A1X40_____.IES	ERS2_21A1X30_____.IES
ERS2		B1	20600	19900		B3-U0-G2	B3-U0-G2	ERS2_21B1X40_____.IES	ERS2_21B1X30_____.IES
ERS2		C1	21000	20300		B3-U0-G2	B3-U0-G2	ERS2_21C1X40_____.IES	ERS2_21C1X30_____.IES
ERS2		D1	20600	19900		B3-U0-G2	B3-U0-G2	ERS2_21D1X40_____.IES	ERS2_21D1X30_____.IES
ERS2		E1	21000	20300		B3-U0-G2	B3-U0-G2	ERS2_21E1X40_____.IES	ERS2_21E1X30_____.IES
ERS2		F1	21000	20300		B3-U0-G3	B3-U0-G3	ERS2_21F1X40_____.IES	ERS2_21F1X30_____.IES
ERS2		G1	21000	20300		B3-U0-G3	B3-U0-G3	ERS2_21G1X40_____.IES	ERS2_21G1X30_____.IES
ERS2	23	A1	21900	21100	219	B4-U0-G3	B3-U0-G3	ERS2_23A1X40_____.IES	ERS2_23A1X30_____.IES
ERS2		B1	22500	21700		B3-U0-G3	B3-U0-G2	ERS2_23B1X40_____.IES	ERS2_23B1X30_____.IES
ERS2		C1	23000	22200		B3-U0-G2	B3-U0-G2	ERS2_23C1X40_____.IES	ERS2_23C1X30_____.IES
ERS2		D1	22500	21700		B3-U0-G2	B3-U0-G2	ERS2_23D1X40_____.IES	ERS2_23D1X30_____.IES
ERS2		E1	23000	22200		B3-U0-G2	B3-U0-G2	ERS2_23E1X40_____.IES	ERS2_23E1X30_____.IES
ERS2		F1	23000	22200		B3-U0-G3	B3-U0-G3	ERS2_23F1X40_____.IES	ERS2_23F1X30_____.IES
ERS2		G1	23000	22200		B3-U0-G3	B3-U0-G3	ERS2_23G1X40_____.IES	ERS2_23G1X30_____.IES
ERS2	25	A1	23800	23000	243	B4-U0-G3	B4-U0-G3	ERS2_25A1X40_____.IES	ERS2_25A1X30_____.IES
ERS2		B1	24500	23600		B4-U0-G3	B3-U0-G3	ERS2_25B1X40_____.IES	ERS2_25B1X30_____.IES
ERS2		C1	25000	24100		B3-U0-G2	B3-U0-G2	ERS2_25C1X40_____.IES	ERS2_25C1X30_____.IES
ERS2		D1	24500	23600		B3-U0-G3	B3-U0-G3	ERS2_25D1X40_____.IES	ERS2_25D1X30_____.IES
ERS2		E1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25E1X40_____.IES	ERS2_25E1X30_____.IES
ERS2		F1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25F1X40_____.IES	ERS2_25F1X30_____.IES
ERS2		G1	25000	24100		B3-U0-G3	B3-U0-G3	ERS2_25G1X40_____.IES	ERS2_25G1X30_____.IES
ERS2	27	A1	25700	24800	275	B4-U0-G3	B4-U0-G3	ERS2_27A1X40_____.IES	ERS2_27A1X30_____.IES
ERS2		B1	26500	25600		B4-U0-G3	B4-U0-G3	ERS2_27B1X40_____.IES	ERS2_27B1X30_____.IES
ERS2		C1	27000	26000		B4-U0-G3	B4-U0-G3	ERS2_27C1X40_____.IES	ERS2_27C1X30_____.IES
ERS2		D1	26500	25600		B3-U0-G3	B3-U0-G3	ERS2_27D1X40_____.IES	ERS2_27D1X30_____.IES
ERS2		E1	27000	26000		B4-U0-G3	B4-U0-G3	ERS2_27E1X40_____.IES	ERS2_27E1X30_____.IES
ERS2		F1	27000	26000		B4-U0-G4	B4-U0-G3	ERS2_27F1X40_____.IES	ERS2_27F1X30_____.IES
ERS2		G1	27000	26000		B4-U0-G3	B4-U0-G3	ERS2_27G1X40_____.IES	ERS2_27G1X30_____.IES
ERS2	28	A1	26600	25600	280	B4-U0-G3	B4-U0-G3	ERS2_28A1X40_____.IES	ERS2_28A1X30_____.IES
ERS2		B1	27400	26400		B4-U0-G3	B4-U0-G3	ERS2_28B1X40_____.IES	ERS2_28B1X30_____.IES
ERS2		C1	28000	26900		B4-U0-G3	B4-U0-G3	ERS2_28C1X40_____.IES	ERS2_28C1X30_____.IES
ERS2		D1	27400	26400		B3-U0-G3	B3-U0-G3	ERS2_28D1X40_____.IES	ERS2_28D1X30_____.IES
ERS2		E1	28000	26900		B4-U0-G3	B4-U0-G3	ERS2_28E1X40_____.IES	ERS2_28E1X30_____.IES
ERS2		F1	28000	26900		B4-U0-G4	B4-U0-G3	ERS2_28F1X40_____.IES	ERS2_28F1X30_____.IES
ERS2		G1	28000	26900		B4-U0-G4	B4-U0-G3	ERS2_28G1X40_____.IES	ERS2_28G1X30_____.IES

Photometrics

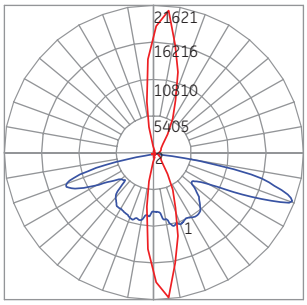
Evolve™ LED Streetlight (ERS2)

ERS2 Extra Narrow Asymmetric (27A1)

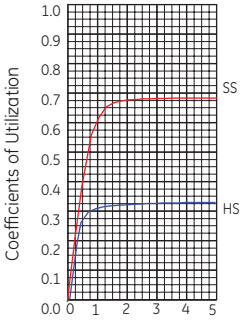
25,700 Lumens
4000K
ERS2_27A1X40____.IES



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



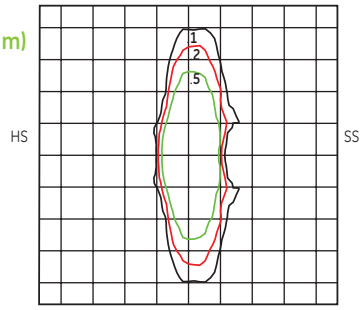
— Vertical plane through horizontal angle of maximum candlepower at 85°
— Vertical plane through horizontal angle of 71°



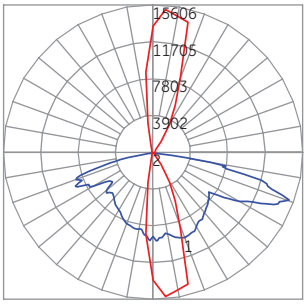
Street Width/Mounting Height

ERS2 Narrow Asymmetric (Medium) (27B1)

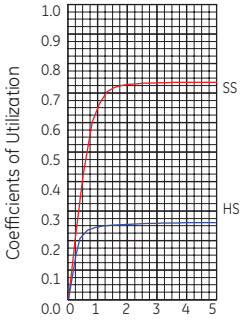
26,500 Lumens
4000K
ERS2_27B1X40____.IES



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



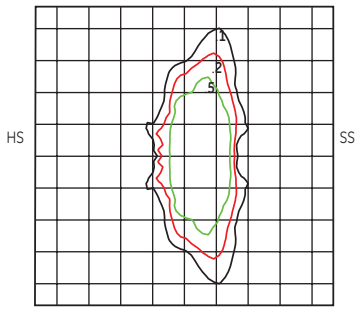
— Vertical plane through horizontal angle of maximum candlepower at 85°
— Vertical plane through horizontal angle of 71°



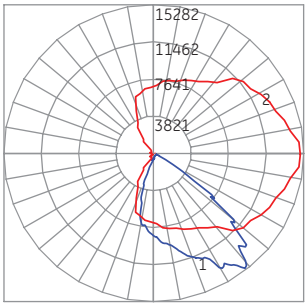
Street Width/Mounting Height

ERS2 Asymmetric Short (27C1)

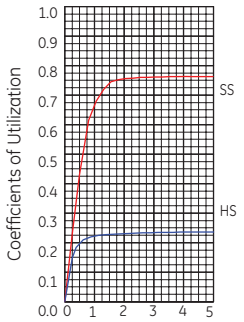
27,000 Lumens
4000K
ERS2_27C1X40____.IES



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



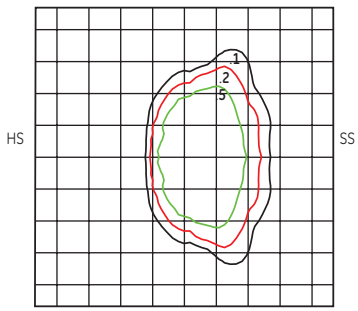
— Vertical plane through horizontal angle of maximum candlepower at 0°
— Vertical plane through horizontal angle of 38°



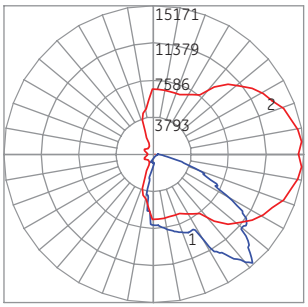
Street Width/Mounting Height

ERS2 Asymmetric Forward (27D1)

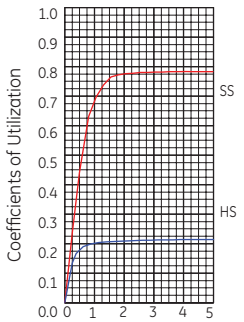
26,500 Lumens
4000K
ERS2_27D1X40____.IES



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°



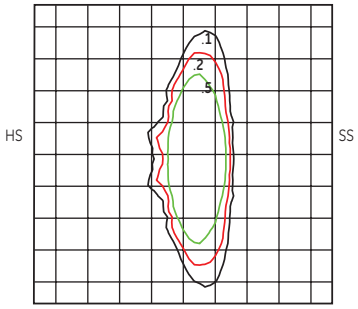
Street Width/Mounting Height

Photometrics

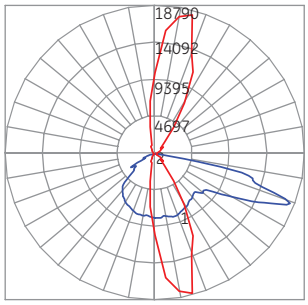
Evolve™ LED Streetlight (ERS2)

ERS2 Asymmetric Medium (27E1)

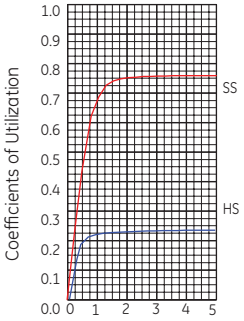
27,000 Lumens
4000K
ERS2_27E1X40____.IES



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



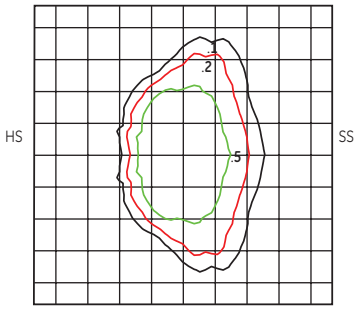
— Vertical plane through horizontal angle of maximum candlepower at 75°
— Vertical plane through horizontal angle of 70°



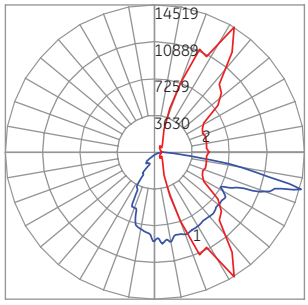
Street Width/Mounting Height

ERS2 Asymmetric Wide (27F1)

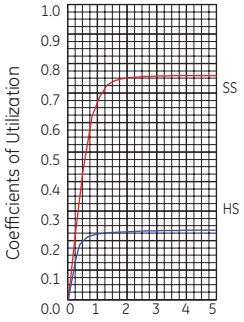
27,000 Lumens
4000K
ERS2_27F1X40____.IES



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



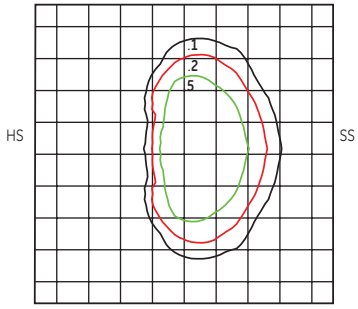
— Vertical plane through horizontal angle of maximum candlepower at 60°
— Vertical plane through horizontal angle of 75°



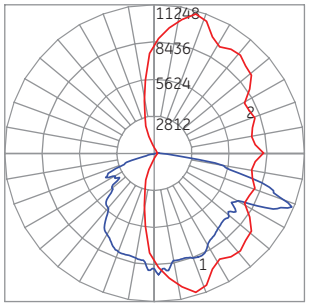
Street Width/Mounting Height

ERS2 Asymmetric Extra Wide (27G1)

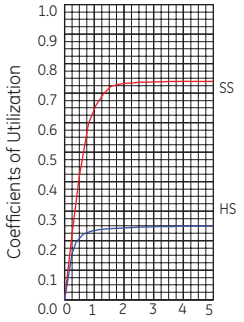
27,000 Lumens
4000K
ERS2_27G1X40____.IES



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



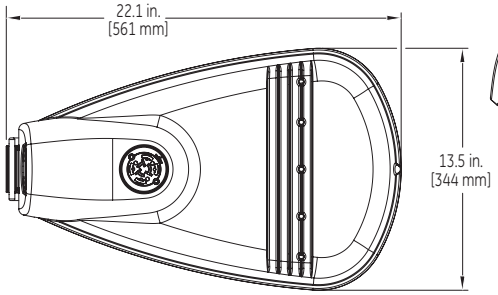
— Vertical plane through horizontal angle of maximum candlepower at 75°
— Vertical plane through horizontal angle of 68°

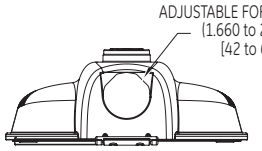


Street Width/Mounting Height

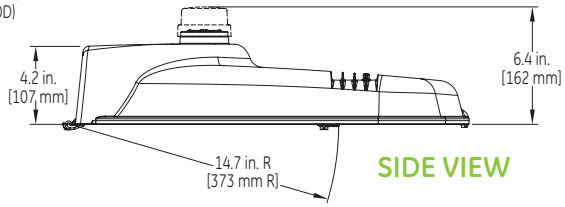
Product Dimensions

Evolve™ LED Streetlight (ERL1)

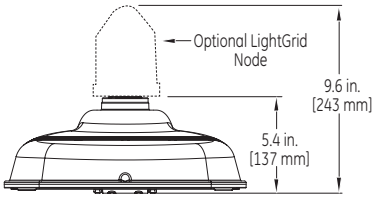




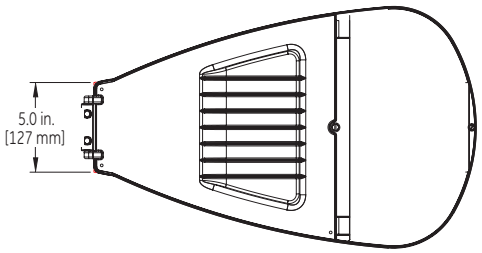
BACK VIEW

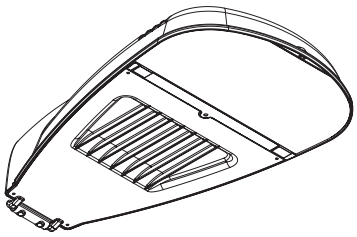


SIDE VIEW



FRONT VIEW



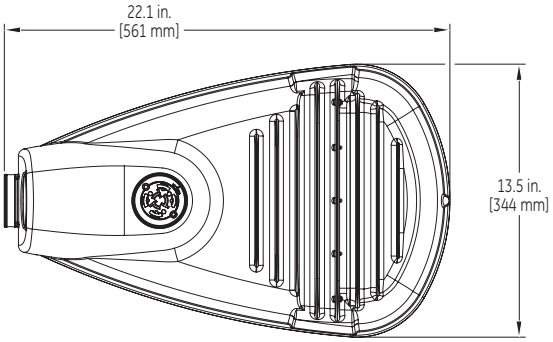


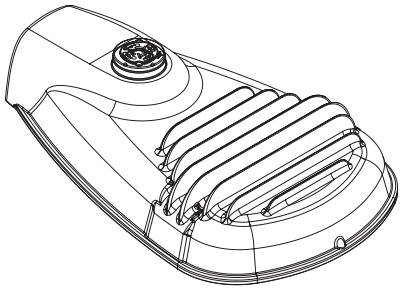
DATA

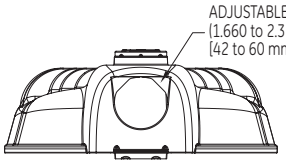
- Approximate net weight: 12.4 lbs (5.6 kgs) - Without XFMR
- Approximate net weight: 15.5 lbs (7 kgs) - With XFMR
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

Product Dimensions

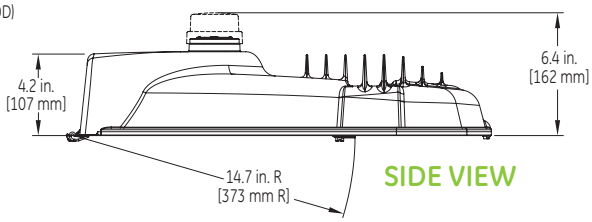
Evolve™ LED Streetlight (ERLH)



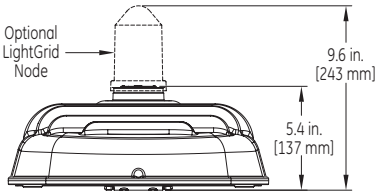




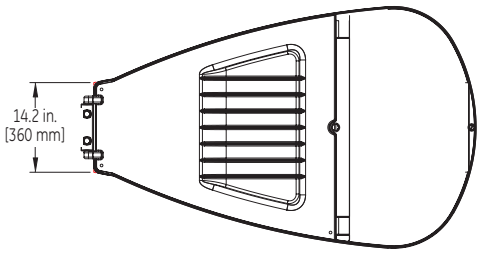
BACK VIEW

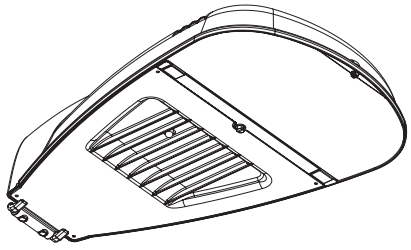


SIDE VIEW



FRONT VIEW



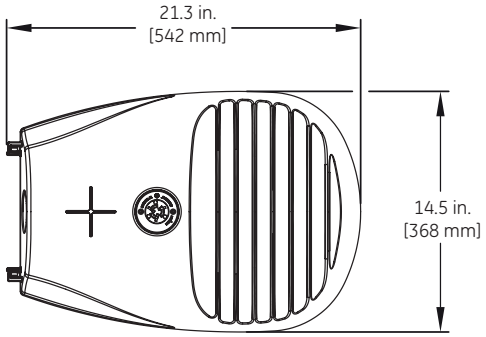


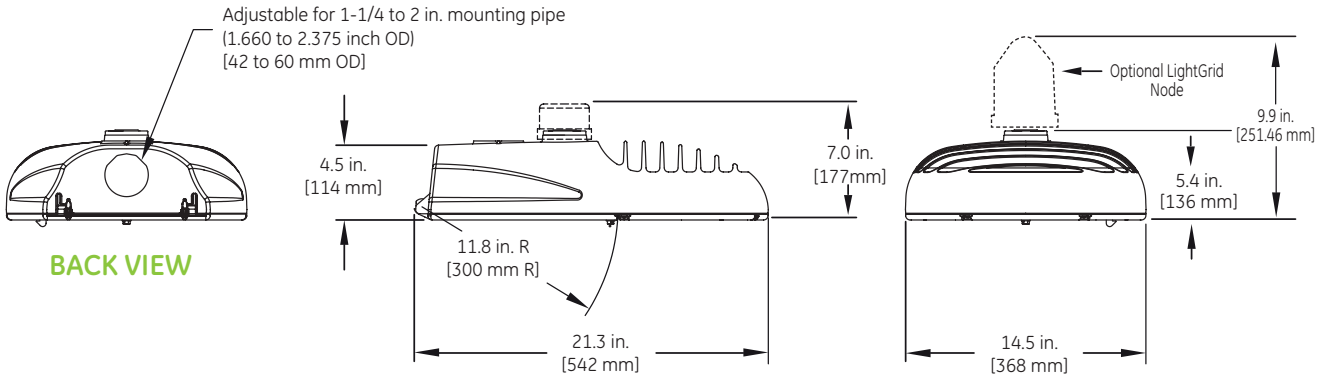
DATA

- 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)





BACK VIEW

SIDE VIEW

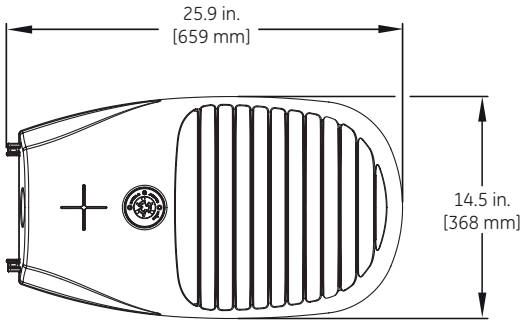
FRONT VIEW

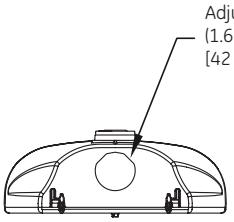
DATA

- 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)

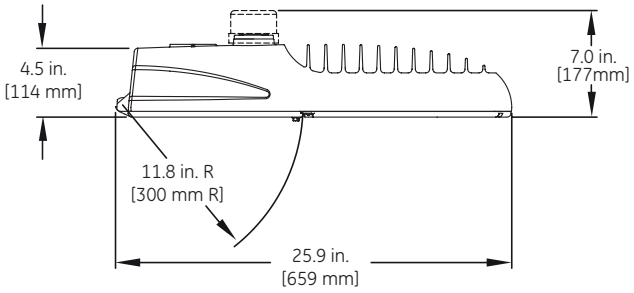
Product Dimensions

Evolve™ LED Streetlight (ERS2)

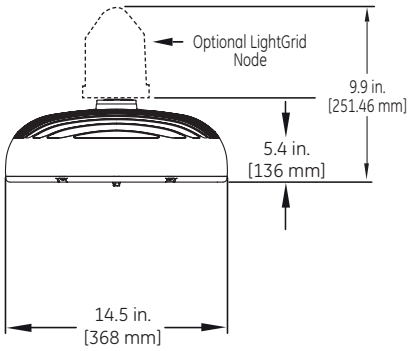




BACK VIEW



SIDE VIEW



FRONT VIEW

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)

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OLP3105 (Rev 04/22/16)

Appendix I – Lighting and Geometric Operational Factors

Form 750-020-20
TRAFFIC ENGINEERING
10/15

State of Florida Department of Transportation

LIGHTING GEOMETRIC AND OPERATIONAL FACTORS

Item No.	Classification Factor	Rating Factor "R"					Weight "W"	Enter "R" Here	Score "R"x"W"
		1	2	3	4	5			
	Geometric Factors (See Note 6)								
1	Number of Lanes	≤4	5	6	7	≥8	0.15	1	0.15
2	Lane Width (ft.)	>11.8	11.2 to 11.8	10.5 to 11.2	9.8 to 10.5	<9.8	0.35	2	0.7
3	Median Openings/mile	<4 or 1-way	4 to 8	8 to 12	12 to 15	>15 or No Median	1.40	2	2.8
4	Driveways and Entrances/mile	<32	32 to 64	64 to 97	97 to 129	>129	1.40	1	1.4
5	Horizontal Curve Radius (ft.)	>1969	1476 to 1969	738 to 1476	574 to 738	<574	5.90	1	5.9
6	Vertical Grades (%)	<3	3 to 4	4 to 5	5 to 7	>7	0.35	1	0.35
7	Sight Distance (ft.)	>689	492 to 689	295 to 492	197 to 295	<197	0.15	3	0.45
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1
								Subtotal Geometric Factors	11.85 **G**
	Operational Factors								
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	4	0.6
10	Left Turn Lane	All Major Intersections or 1-way	Substantial Number of Major Intersections	Most Major Intersections	Half of the Intersections	Infrequent Number or TWTL (See Notes 1 & 3)	0.70	1	0.7
11	Median Width (ft.)	> 32	20 to 32	10 to 20	4 to 10	0 to 4	0.35	2	0.7
12	Operating or Posted Speed (mph) (See Note 5)	≤ 25	30	35	45	≥50	0.60	4	2.4
13	Pedestrian Activity Level (See Note 2)			Low	Medium	High	3.15	4	12.6
								Subtotal Environmental Factors	17 **O**
	Environmental Factors								
14	Percentage of Development Adjacent to Road (%) (See Note 4)	nil	nil to 30	30 to 60	60 to 90	>90	0.15	4	0.6
15	Area Classification	Rural	Industrial	Residential	Commercial	Downtown	0.15	4	0.6
16	Distance from Development to Roadway (ft) (See Note 4)	>200	150 to 200	100 to 150	50 to 100	<50	0.15	5	0.75
17	Ambient (off Roadway) Lighting	Nil	Sparse	Moderate	Distracting	Intense	1.38	2	2.76
18	Raised Curb Median	None	Continuous	At All Intersections (100%)	At Most Intersections (51% to 99%)	At Few Intersections (≤50%) (See Note 7)	0.35	2	0.7
								Subtotal Environmental Factors	5.41 **E**
	Collision Factors								
19	Night-to-Day Collision Ratio	<1	1.0 to 1.2	1.2 to 1.5	1.5 to 2.0	>2.0 (See Note 1)	5.55	5	27.75
								Subtotal Collision Factors	27.75 **A**

Notes: 1 Lighting Warranted
2 Pedestrian Activity Level
3 Two Way Left Turn Lane
4 Development defined as Commercial, Industrial or Residential Buildings
5 85th Percentile night speed should be used if available, otherwise posted Speed Limit shall be used
6 Worst case geometric factors for a segment of roadway shall apply
7 Also includes isolated medians (non-continuous) between intersections

G + O + E + A = Total Warranting Points	62.01	
Warranting Condition	60.00	
Difference ±	2.01	**D**