

FEBRUARY 2023



River to Sea Transportation
Planning Organization (R2CTPO)
2570 W International Speedway Blvd.
Suite 100
Daytona Beach, FL 32114

Final Report

LIGHTING JUSTIFICATION REPORT

Taylor Road / Dunlawton Avenue (SR 421) from
Summer Trees Road to Spruce Creek Road



VHB
250 E. Robinson St.
Orlando, FL 32803

Final Report

Lighting Justification Report

For

SR 421 from Taylor Road/Dunlawton Avenue (SR 421) from Summer
Trees Road to Spruce Creek Road

Task Work Order TOF-VHB-08

Prepared For



River to Sea Transportation Planning Organization
2570 W. International Speedway Boulevard
Suite 100
Daytona Beach, FL - 32114

Prepared By



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This item has been digitally Signed and Sealed by Vinod Vishwanatha on
the date adjacent to the seal.

Printed Copies of this document are not considered signed and sealed
and the signature must be verified on any electronic copies.

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Executive Summary

This Lighting Justification Report (LJR) was developed for the Taylor Road / Dunlawton Avenue corridor from Summer Trees Road to Spruce Creek Road using American Association of State Highway and Transportation Officials (AASHTO) and Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting (27) TAC (27) warrants. The study corridor was assessed for lighting by splitting the corridor into following five segments:

- 1) Summer Trees Road to Williamson Boulevard
- 2) Williamson Boulevard to Taylor Branch Road (*lighting present along both sides of this segment*)
- 3) Taylor Branch Road to Clyde Morris Boulevard
- 4) Clyde Morris Boulevard to Nova Road
- 5) Nova Road to Spruce Creek Road

AASHTO does not have specific warrants to justify lighting on an arterial roadway. However, it does state that lighting should be applied for safety, efficiency, and comfort where the governmental agencies agree. The TAC (27) warrant method of warranting roadway lighting yielded a value of **64.59** for the segment of Dunlawton Avenue from Clyde Morris Boulevard to Nova Road which is above the required 60.0 to warrant roadway lighting. It should be noted that TAC (27) warrant score for the segments of Summer Trees Road to Williamson Boulevard (**57.74**) and Nova Road to Spruce Creek Road (**58.04**) are slightly lower than the weighted score of 60.0 to warrant roadway lighting.

The Net Present Value (NPV) assessment for the segment of Dunlawton Avenue, east of Taylor Branch Road resulted in positive values suggesting lighting along these segments are economically justified. The NPV for the segment from Summer Trees Road to Williamson Boulevard resulted in a negative value suggesting lighting along this segment is not economically justified.

Based upon the results of the TAC (27) warrant and NPV assessment lighting along the Dunlawton Avenue between Taylor Branch Road and Spruce Creek Road is recommended. The segment between Taylor Branch Road and Clyde Morris Boulevard has a TAC (27) weighted score of 48.97 which is less than the TAC (27) warrant score of 60.0. and a positive NPV (\$504,509). The segment

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Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

between Clyde Morris Boulevard and Nova Road has a TAC (27) weighted score of 64.59 (greater than warrant score of 60.0) and a positive NPV (\$158,554). The segment between Nova Road and Spruce Creek Road has a TAC (27) weighted score of 58.04 which is slightly less than the TAC (27) warrant score of 60.0 and a positive NPV (\$885,346).

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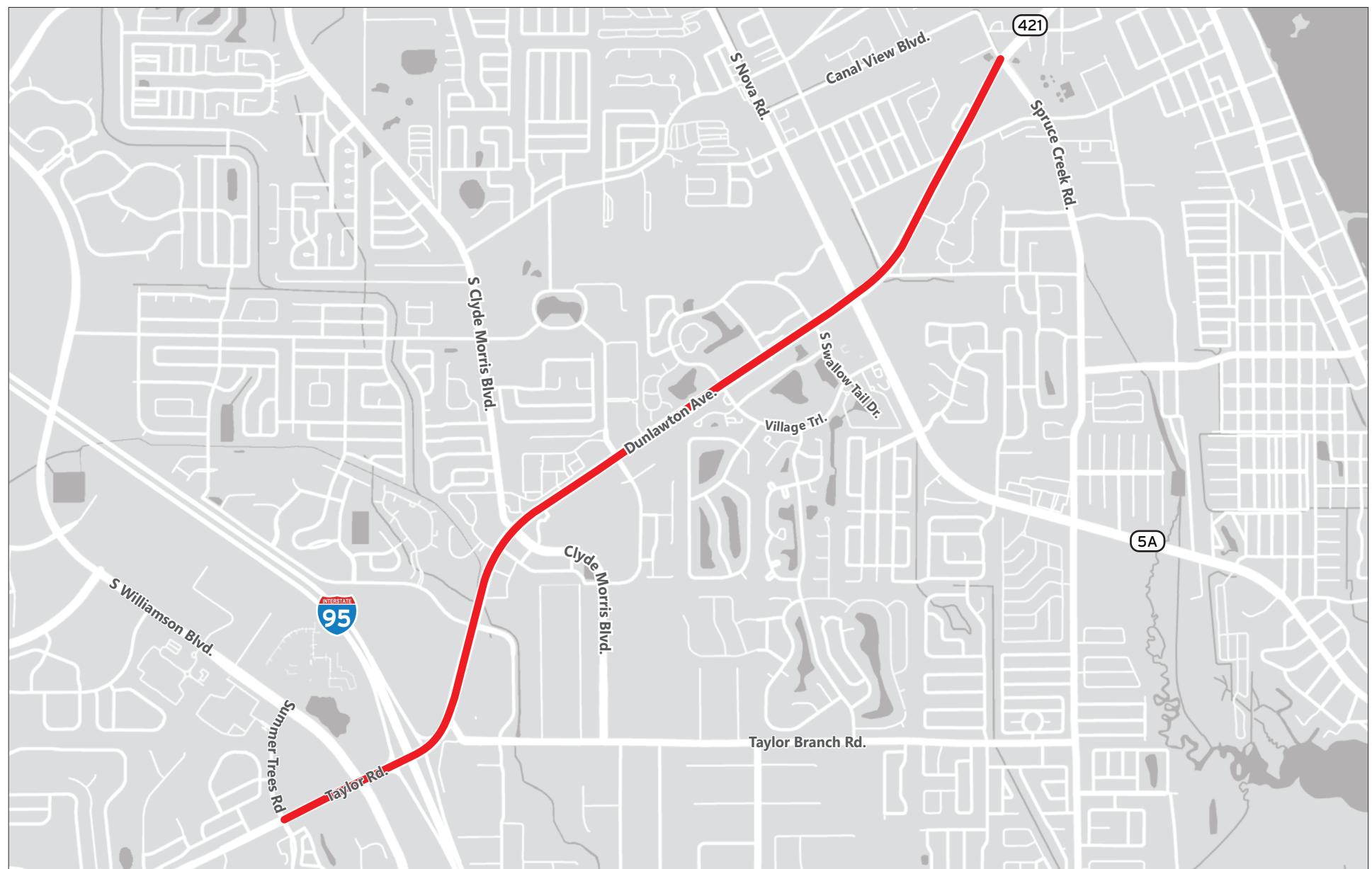
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SECTION 1.0 – INTRODUCTION

VHB was retained to perform a lighting justification report for Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road. The study segments of Taylor Road / Dunlawton Avenue is located within City of Port Orange in Volusia County, Florida. A location map is included as

Figure 1. As part of the justification and warrant analysis, the geometric, operational, and environmental factors, as well as the ratio of night and day crash rates were evaluated utilizing the procedures developed in the August 2012 FHWA Lighting Handbook which utilizes the Transportation Association of Canada (TAC) Guide for the Design of Roadway Lighting (27) (TAC (27)) warranting system. This was done to analyze the night-time visual information needs in order to determine if complete roadway lighting is warranted and justified. The procedure is in accordance with the requirements of the Manual on Uniform Traffic Studies (MUTS-2016 Edition). The roadway was also analyzed utilizing the format set forth in the Roadway Lighting Design Guide 2018, established by the American Association of State Highway and Transportation Officials (AASHTO). This report analyzed the Average Annual Daily Traffic (AADT) and the night-to-day crash rates to determine if a complete roadway lighting system is warranted and justified.



— Study Corridor



Figure 1

Study Corridor
Lighting Justification Report
Taylor Road/Dunlawton Avenue from
Summer Trees Road to Spruce Creek
Road

SECTION 2.0 – ROADWAY LIGHTING WARRANT ANALYSIS

SECTION 2.1 – AASHTO WARRANTS

AASHTO's Roadway Lighting Design Guide 2018 does not establish specific warrants for the installation of roadway lighting on conventional arterial/collector roadways. It states, "In general, lighting may be considered for those locations where the relevant governmental agencies agree that lighting would contribute substantially to the safety, efficiency, and comfort of vehicular or pedestrian traffic."

SECTION 2.2 – TAC (27) WARRANTS

The TAC (27) Warranting System is an analytical approach to warranting lighting. It goes through several factors of a proposed or existing road in determining whether lighting is warranted. These factors are each weighted accordingly and then totaled. A total score of 60.0 warrants roadway lighting.

The TAC (27) warrants were evaluated for the Taylor Road / Dunlawton Avenue study corridor by splitting it into five segments:

- 1) Summer Trees Road to Williamson Boulevard
- 2) Williamson Boulevard to Taylor Branch Road (*street lighting present on both sides of this segment*)
- 3) Taylor Branch Road to Clyde Morris Boulevard
- 4) Clyde Morris Boulevard to Nova Road
- 5) Nova Road to Spruce Creek Road

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Geometric Factors

Geometric conditions of a roadway facility, to a large extent, determine the driving task and the information needed necessary to perform the task safely and efficiently. Included in the geometric factors are the number of lanes, lane widths, median openings per mile, curb cuts, curves, grades, sight distance, and on street parking. The geometric factors for the study segments are summarized in [Table 1](#).

Table 1: Summary of Geometric Factors

Segment	# of Lanes	Lane Width	Median Openings per mile	Driveways & Entrances per mile	Horizontal Curve Radius (Feet)
Summer Trees Road to Williamson Boulevard	4	11.0 – 11.7 feet	7.4	26.0	>1,969
Williamson Boulevard to Taylor Branch Road	6	11.0 – 11.7 feet	8.4	8.5	1,476 – 1,969
Taylor Branch Road to Clyde Morris Boulevard	6	11.0 feet	7.8	18.7	>1,969
Clyde Morris Boulevard to Nova Road	6	11.0 – 12.0 feet	4.6	12.3	1,476 -1,969
Nova Road to Spruce Creek Road	4	12.0 feet	6.7	22.3	>1,969

There is no on-street parking along the study corridor and the sight distance along all the segments was calculated to be greater than 689'.

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Operational Factors

The operational factors are evaluated to provide an indication of how well the facility operates to satisfy its intended function. Included in the operational factors are the number of signals, left turn lanes at intersections, median widths, operating speed and pedestrian traffic at night. *Table 2* summarizes these operational factors for the study segments.

Table 2: Summary of Operational Factors

Segment	Posted Speed (MPH)	# of Signals	Presence of Left Turn lanes	Median Width	Pedestrian Traffic
Summer Trees Road to Williamson Boulevard	45	2	Yes	36.0 feet	Medium
Williamson Boulevard to Taylor Branch Road	45	3	Yes	36.0 feet	Medium
Taylor Branch Road to Clyde Morris Boulevard	50	2	Yes	30.0 - 36.0 feet	Medium
Clyde Morris Boulevard to Nova Road	50	3	Yes	32.0 – 40.0 feet	Medium
Nova Road to Spruce Creek Road	45	1	Yes	18.0 – 40.0 feet	Medium

The night-time pedestrian traffic was assumed to be medium along the study corridor.

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Environmental Factors

The environmental factors are evaluated to consider their effects on night-time driving. Included in the environmental factors are the percent and type of development, setback distances, ambient lighting and raised curb median. *Table 3* summarizes these environmental factors for the study segments:

Table 3: Summary of Environmental Factors

Segment	Development/ Land use (% of Corridor length)	Set back distance	Ambient lighting	Raised Curb	Pedestrian Traffic
Summer Trees Road to Williamson Boulevard	Commercial/ Residential (100%)	50 – 100 feet	Moderate	At all intersections	Medium
Williamson Boulevard to Taylor Branch Road	Commercial (100%)	50 – 100 feet	Moderate	At all intersections	Medium
Taylor Branch Road to Clyde Morris Boulevard	Commercial/ Residential (100%)	50 – 100 feet	Distracting	At all intersections	Medium
Clyde Morris Boulevard to Nova Road	Commercial/ Residential (100%)	50 – 125 feet	Moderate	At all intersections	Medium
Nova Road to Spruce Creek Road	Commercial/ Residential (>90%)	50 – 110 feet	Moderate	At all intersections	Medium

*Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road***Crash Rates**

Desirably, the end result of improving the night-time driving environment is to reduce the night crash rate and potential for crashes. Therefore, historical night-crash analysis serves as a means of determining the need for fixed roadway lighting. This analysis evaluates the ratio of night to day crashes.

Crash rates for this study were calculated from crash history reports from the Florida Department of Transportation (FDOT) which were for a three-year span from January 2019 to December 2021. These reports were reviewed and night and day crash data was tabulated to determine the number of crashes per year in each category.

The Annual Average Daily Traffic (AADT) volumes were obtained for each segment from historical AADT data from the FDOT for the same years the crash data was obtained. The crash rate for each segment for day and night traffic was calculated by using the following formula:

$$\text{Crash Rate} = ((\text{Night or Day}) \text{ Accidents per Year} \times 1,000,000) / (\text{Project Length in Miles} \times \text{AADT} \times \% \text{AADT} (\text{Night or Day}) \times 365 \text{ day / yr} \times \# \text{ Years of Data})$$

The crash rates for night traffic were divided by the crash rates for the day traffic to come up with the ratio of night-to-day crash rate.

The crash rate evaluation for the segments of the study corridor are summarized in [*Table 4*](#). The ratio of night-to-day crashes for the study segment of Taylor Road / Dunlawton Avenue from Williamson Boulevard to Taylor Branch Road is greater than 2.0, while other segments were found to be less than 2.0. The crash data summaries for the study segments can be found in [*Appendix A*](#).

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Table 4: Crash Rate Evaluation

Segment	Length (Miles)	AADT ⁽¹⁾	Night Time % AADT ⁽²⁾	# of Crashes			Crash Rate			Night-to-Day Crash Rate
				Total	Day Time	Night Time	Total	Day Time	Night Time	
Summer Trees Road to Williamson Boulevard	0.3	14,867	11%	105	88	17	23.95	22.55	35.25	1.56
Williamson Boulevard to Taylor Branch Road	0.4	52,500	11%	196	153	43	9.60	8.42	19.15	2.27
Taylor Branch Road to Clyde Morris Boulevard	0.6	52,500	11%	287	252	35	7.79	7.69	8.64	1.12
Clyde Morris Boulevard to Nova Road	1.3	39,333	11%	388	313	75	6.93	6.28	12.18	1.94
Nova Road to Spruce Creek Road	0.9	32,333	11%	213	178	35	6.70	6.29	10.01	1.59

(1) Represents Average of AADTs reported during Year 2019 – Year 2021

(2) The %AADT is based on Synopsis report available for FDOT Station # 790458

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

TAC Warrant Evaluation

Each of the study segment was evaluated against the TAC warrants using the classification factors summarized above. As shown in [Table 5](#), the weighted score for study segment of Dunlawton Avenue from Clyde Morris Boulevard to Nova Road exceeds the warranting score of 60.0 warranting lighting along this segment. However, the weighted scores for the segments of Taylor Road from Summer Trees Road to Williamson Boulevard and Dunlawton Avenue from Nova Road to Spruce Creek Road resulted in slightly lower values (approximately 2.0) than the warranting score of 60.0. The segment of Dunlawton Avenue from Taylor Branch Road to Clyde Morris Boulevard resulted with a score of 48.97 lower than the warranting score of 60.0. The TAC warrant sheet for individual study segments of Taylor Road / Dunlawton Avenue are included in [Appendix B](#).

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Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Table 5: TAC Warrant Evaluation Summary

Segment	Weighted Score by Classification Factors					Warranting Condition Score	Difference	Warrant Meet?
	Geometric	Operational	Environmental	Collision	Total			
Summer Trees Road to Williamson Boulevard	11.90	16.50	7.14	22.20	57.74	60.00	-2.26	No
Williamson Boulevard to Taylor Branch Road	<i>Lighting Present along both sides of the segment</i>							
Taylor Branch Road to Clyde Morris Boulevard	12.20	17.15	8.52	11.10	48.97	60.00	-11.03	No
Clyde Morris Boulevard to Nova Road	18.10	17.15	7.14	22.20	64.59	60.00	4.59	Yes
Nova Road to Spruce Creek Road	11.20	17.50	7.14	22.20	58.04	60.00	-1.96	No

SECTION 3.0 – NET PRESENT VALUE ANALYSIS

Per MUTS Section 14.3, the Net Present Value Analysis (NPV) is used to determine if lighting along any of the segments of Taylor Road / Dunlawton Avenue are justified. If the total crash cost is equal to or greater than the cost of construction, maintenance and operation of a lighting system then lighting is justified for High Crash Locations (HCL). At other locations, the NPV is used to rank the order of lighting projects. Essentially, the higher the NPV the greater the benefit. The present worth analysis along the study segments (for well lighted conditions and no lighting conditions) were determined using the Present worth analysis spreadsheets 750-020-21c and 750-020-21d from MUTS for four (4) lane and six (6) lane segments, respectively. The present worth analysis for the study segments are included in [Appendix C](#).

Three variables were considered to evaluate the costs associated with lighting the study segments. Installation cost (IC), Present Value of Energy Cost (Operations, PVEC) and Present Value Maintenance Cost (Maintenance, PVMC). These variables are based on the anticipated number of poles for a new system. The anticipated number of poles was calculated based on the use of the FDOT's Lighting Criteria from the FDOT Design Manual for a major arterial roadway of 1.5 foot-candles. The lighting analysis software, AGI32, was used to calculate the required pole spacing and number of poles required to meet the 1.5 foot-candle requirement. The AGI132 analysis resulted in a spacing of 355 feet and 307 feet along the four (4) lane and six (6) lane segments. The AGI32 outputs are included in [Appendix D](#).

Installation Cost (IC) - Based on the use of FDOT Unit Cost History for Area 8 for the pay items associated with the lighting installation. The calculations of cost of installation along the study segments can be found in [Appendix E](#).

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Present Value of Energy Cost (Operations, PVEC) - The cost associated with operating these light poles (cost of electricity) during the life cycle of the luminaire. The annual energy cost is calculated as follows:

$$\text{Annual Energy Cost} = \text{Cost per KW-H} * \text{Watts/Luminaire} * \text{Usage (hours/day)}$$

Cost per KW-H = \$0.11 (Florida Average)

Each luminaire is assumed to be of 279 Watts or 0.279KW and operates for 11 hours per day.

The present value of energy cost is then derived assuming a 4.0% rate of return and 20 years of service life using the following formula:

$$\text{PVEC} = \text{Annual Energy Cost} / (1 + \text{Rate of Return})^{\text{Service Life}}$$

Present Value of Maintenance Cost (Maintenance, PVMC) - It is assumed that the annual maintenance cost associated with each luminaire (light pole) is approximately \$200 per year. The present value of maintenance cost is derived assuming a 4.0% rate of return and 20 years of service life using the following formula:

$$\text{PVMC} = \text{Annual Cost of Maintenance} (\$200 * \# \text{ Of Luminaires}) / (1 + \text{Rate of Return})^{\text{Service Life}}$$

Table 6, the net present value analysis for the study segments suggest, that positive NPV values for the segments of Dunlawton Avenue, east of Taylor Branch Road justifying installation of lights along the corridor.

Table 6: Net Present Value Analysis

Segment	Present Worth Value			# of Luminaries	Installation Cost (IC)	Operations Cost (PVEC)	Maintenance Cost (PVMC)	Total Cost	Net Present Value	Lighting Justified?
	No Lighting	With Lighting	Benefit							
Summer Trees Road to Williamson Boulevard	\$2,351,702	\$2,149,182	\$202,520	10	\$210,842	\$11,247	\$2,000	\$224,089	-\$21,569	No
Williamson Boulevard to Taylor Branch Road	<i>Lighting is present along both sides of this segment</i>									
Taylor Branch Road to Clyde Morris Boulevard	\$15,604,515	\$14,668,244	\$936,271	20	\$405,167	\$22,494	\$4,000	\$431,661	\$504,609	Yes
Clyde Morris Boulevard to Nova Road	\$18,285,603	\$17,188,467	\$1,097,136	44	\$880,294	\$49,488	\$8,800	\$938,582	\$158,554	Yes
Nova Road to Spruce Creek Road	\$17,262,166	\$15,775,611	\$1,486,555	26	\$566,766	\$29,243	\$5,200	\$601,209	\$885,346	Yes

SECTION 4.0 – CONCLUSION AND RECOMMENDATION

AASHTO and TAC (27) warrants were used to analyze the study corridor of Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road. The study corridor was assessed for lighting by splitting the corridor into following five segments:

- 1) Summer Trees Road to Williamson Boulevard
- 2) Williamson Boulevard to Taylor Branch Road (*lighting present along both sides of this segment*)
- 3) Taylor Branch Road to Clyde Morris Boulevard
- 4) Clyde Morris Boulevard to Nova Road
- 5) Nova Road to Spruce Creek Road

As stated in the report, AASHTO does not have specific warrants to justify lighting on an arterial roadway. However, it does state that lighting should be applied for safety, efficiency and comfort where the governmental agencies agree. The TAC (27) warrant method of warranting roadway lighting yielded a value of **64.59** for the segment of Clyde Morris Boulevard to Nova Road which is above the required 60.0 to warrant roadway lighting. It should be noted that TAC (27) warrant score for the segments of Summer Trees Road to Williamson Boulevard (**57.74**), and Nova Road to Spruce Creek Road (**58.04**) are slightly lower than the weighted score of 60.0 to warrant roadway lighting.

The NPV assessment for the segment of Dunlawton Avenue, east of Taylor Branch Road resulted in positive values suggesting lighting along these segments are economically justified. The NPV for the segment from Summer Trees Road to Williamson Boulevard resulted in a negative value suggesting lighting along this segment is not economically justified.

Based upon the results of the TAC (27) warrant and NPV assessment lighting along the Dunlawton Avenue between Taylor Branch Road and Spruce Creek Road is recommended. The segment between Taylor Branch Road and Clyde Morris Boulevard has a TAC (27) weighted score of 48.97 which is less than the TAC (27) warrant score of 60.0. and a positive NPV (\$504,509). The segment between Clyde Morris Boulevard and Nova Road has a TAC (27) weighted score of 64.59 (greater

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

than warrant score of 60.0) and a positive NPV (\$158,554). The segment between Nova Road and Spruce Creek Road has a TAC (27) weighted score of 58.04 which is slightly less than the TAC (27) warrant score of 60.0 and a positive NPV (\$885,346).

Lighting Justification Report

Taylor Road / Dunlawton Avenue from Summer Trees Road to Spruce Creek Road

Appendix A: Crash Data

CRASH SUMMARY

MAJOR ROUTE: Dunlawton Avenue
INTERSECTING ROUTE: Summer Trees Road to Williamson Boulevard

STUDY PERIOD: 1/1/2019 to 12/31/2021

COUNTY: Volusia
CITY: Port Orange
ENGINEERS: VHB

CRASH REF. NO.	HSMV NO.	DATE	DAY	TIME	DOB	AGE	PED /BIKE /MOTORCYCLE	ALCOHOL/ DRUGS	CRASH TYPE	FATAL	INJURY	PROPERTY DAMAGE	Lighting Conditions	PAVEMENT CONDITIONS
86	87740632	7/18/2020	Saturday	7:40 PM	-	-	Vehicle	No	Sideswipe	0	0	\$1,200	Daylight	Dry
87	24032129	10/5/2020	Monday	3:53 PM	-	-	Vehicle	No	Sideswipe	0	0	\$1,550	Daylight	Dry
88	24032773	10/16/2020	Friday	9:39 AM	-	-	Vehicle	No	Left Turn	0	2	\$15,000	Daylight	Dry
89	24032020	7/27/2020	Monday	3:14 PM	-	-	Vehicle	No	Rear End	0	0	\$1,000	Daylight	Dry
90	89398680	6/5/2021	Saturday	9:20 AM	-	-	Vehicle	No	Left Turn	0	0	\$2,000	Daylight	Dry
91	89398730	6/20/2021	Sunday	8:33 AM	-	-	Vehicle	No	Right Turn	0	0	\$10,000	Daylight	Dry
92	89399014	9/12/2021	Sunday	1:39 PM	-	-	Vehicle	No	Other	0	0	\$750	Daylight	Dry
93	89398909	8/13/2021	Friday	12:31 PM	-	-	Vehicle	No	Rear End	0	0	\$16,000	Daylight	Wet
94	87741254	5/4/2020	Monday	3:11 PM	-	-	Vehicle	No	Angle	0	1	\$8,000	Daylight	Dry
95	89398994	9/6/2021	Monday	2:50 PM	-	-	Vehicle	No	Rear End	0	1	\$20,000	Daylight	Dry
96	87738583	3/3/2019	Sunday	11:39 AM	-	-	Vehicle	No	Rear End	0	1	\$6,000	Daylight	Dry
97	87739317	3/4/2019	Monday	2:52 PM	-	-	Vehicle	No	Sideswipe	0	0	\$10,000	Daylight	Dry
98	87739043	1/16/2019	Wednesday	8:31 AM	-	-	Vehicle	No	Sideswipe	0	1	\$10,000	Daylight	Dry
99	87741231	3/11/2020	Wednesday	1:10 PM	-	-	Vehicle	No	Left Turn	0	0	\$4,000	Daylight	Dry
100	89399076	9/24/2021	Friday	9:37 PM	-	-	Vehicle	No	Rear End	0	2	\$1,500	Dark - Not Lighted	Dry
101	89399380	12/16/2021	Thursday	12:23 PM	-	-	Vehicle	No	Right Turn	0	0	\$9,500	Daylight	Dry
102	24033337	1/14/2021	Thursday	4:37 PM	-	-	Vehicle	No	Sideswipe	0	0	\$4,500	Daylight	Dry
103	87740248	9/28/2019	Saturday	5:40 PM	-	-	Vehicle	Yes	Rear End	0	0	\$1,000	Daylight	Dry
104	89398568	5/8/2021	Saturday	4:16 PM	-	-	Vehicle	No	Sideswipe	0	1	\$40,000	Daylight	Dry
105	89399019	9/13/2021	Monday	3:23 PM	-	-	Vehicle	No	Left Turn	0	1	\$10,000	Daylight	Dry
Total										0	42	\$559,701		

TOTAL CRASHES	CRASH DESCRIPTION										CRASH TYPE								
	FATAL CRASHES	INJURY CRASHES	TOTAL INJURIES	PROPERTY DAMAGE	PED/BIKE/MOTORCYCLE	LIGHTING CONDITION			ROADWAY CONDITIONS				ANGLE	LEFT TURN	RIGHT TURN	REAR END	SIDE SWIPE	HEAD ON	
						DAYLIGHT	DARK - LIGHTED	DARK - NOT LIGHTED	DUSK	DAWN	WET	DRY							
						88	14	2	1	0	9	96	9	10	2	39	30	0	
105	0	31	42	105	0	84%	13%	2%	1%	0%	91%	9%	9%	10%	3%	37%	29%	0%	
CRASH TYPE																			
BACKED INTO	PARKED CAR	COLL. W/ MV ON ROAD	PEDESTRIAN	BIKE	BIKE IN BIKE LANE	MOTORCYCLE/ MOPED	TRAIN	ANIMAL	HIT SIGN/ SIGN POST	HIT GUARDRAIL	HIT UTILITY POLE	HIT FENCE	HIT CONC BARRIER WALL	HIT BR/PIER/ ABUTT	HIT TREE/ SHRUB	HIT CONST SIGN/BARR/ BR/ PIER	TRAFFIC GATE	CRASH ATTENUATOR	FIXED OBJECT
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
OTHER FIXED OBJECT	MOVEABLE OBJECT	RAN INTO DITCH/ CULVERT	RAN OFF ROAD	OVERTURNED	OCCUPANT FELL FROM VEHICLE	TRACTOR TRAILER JACKKNIFED	FIRE	EXPLOSION	DOWNHILL RUNAWAY	CARGO LOSS OR SHIFT	SEPARATION OF UNITS	MEDIAN CROSSOVER	ALL OTHER						
0	0	0	0	1	0	0	0	0	0	0	0	0	12						
0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	11%						

Appendix B: TAC (27) Warrants

TAC Warrant Evaluation: Dunlawton Avenue from Summer Trees
Road to Williamson Boulevard

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	3	1.05
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	1	0.15
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1
Subtotal Geometric Factors								11.9	G
Operational Factors									
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	3	0.45
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	1	0.35
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								16.5	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	5	0.75
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	4	0.6
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	3	1.05
Subtotal Environmental Factors								7.14	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	4	22.2
Subtotal Collision Factors								22.2	A

Notes: 1 Lighting Warranted

G + O + E + A = Total Warranting Points

57.74

2 Pedestrian Activity Level

Warranting Condition

60.00

3 Two Way Left Turn Lane

Difference ±

-2.26 D

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

TAC Warrant Evaluation: Dunlawton Avenue from Taylor Road to
Clyde Morris Boulevard

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	3	1.05
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	1	0.15
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1
Subtotal Geometric Factors								12.2	G
Operational Factors									
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	1	0.15
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	5	3
13	Pedestrian Activity Level (See Note 2)			Low	Medium	High	3.15	4	12.6
Subtotal Environmental Factors								17.15	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	5	0.75
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	4	0.6
17	Ambient (off Roadway) Lighting	Nil	Sparse	Moderate	Distracting	Intense	1.38	4	5.52
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	3	1.05
Subtotal Environmental Factors								8.52	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	2	11.1
Subtotal Collision Factors								11.1	A

Notes: 1 Lighting Warranted

G + O + E + A = Total Warranting Points 48.97

2 Pedestrian Activity Level

Warranting Condition 60.00

3 Two Way Left Turn Lane

Difference ± -11.03 D

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

TAC Warrant Evaluation: Dunlawton Avenue from Clyde Morris Boulevard to Nova Road

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	3	1.05
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	2	11.8
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	1	0.15
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1
Subtotal Geometric Factors								18.1	G
Operational Factors									
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	1	0.15
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	5	3
13	Pedestrian Activity Level (See Note 2)			Low	Medium	High	3.15	4	12.6
Subtotal Environmental Factors								17.15	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	5	0.75
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	4	0.6
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	3	1.05
Subtotal Environmental Factors								7.14	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	4	22.2
Subtotal Collision Factors								22.2	A

Notes: 1 Lighting Warranted

G + O + E + A = Total Warranting Points

Warranting Condition

64.59

2 Pedestrian Activity Level

Difference ±

60.00

3 Two Way Left Turn Lane

D

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

4.59

TAC Warrant Evaluation: Dunlawton Avenue from Nova Road to Spruce Creek Road

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	1	0.35
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	1	0.15
8	Parking	Prohibited	Loading	Off Peak	One Side	Both Sides	0.10	1	0.1
Subtotal Geometric Factors								11.2	G
Operational Factors									
9	Signalized Intersections (%)	80 to 100	70 to 80	60 to 70	50 to 60	0 to 50	0.15	5	0.75
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	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	4	12.6
Subtotal Environmental Factors								17.5	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	5	0.75
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	4	0.6
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	3	1.05
Subtotal Environmental Factors								7.14	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	4	22.2
Subtotal Collision Factors								22.2	A

Notes: 1 Lighting Warranted

G + O + E + A = Total Warranting Points

58.04

2 Pedestrian Activity Level

Warranting Condition

60.00

3 Two Way Left Turn Lane

Difference ±

-1.96

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

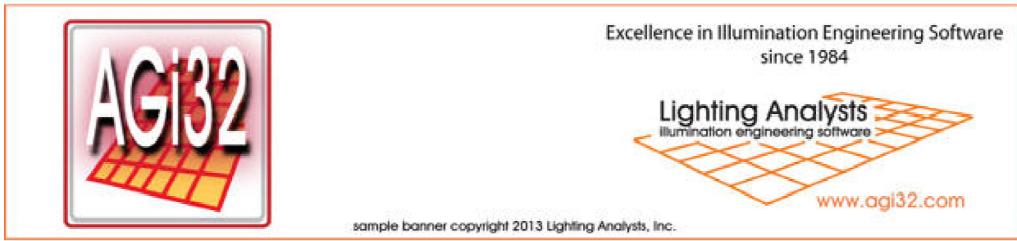
6 Worst case geometric factors for a segment of roadway shall apply

7 Also includes isolated medians (non-continuous) between intersections

D

Appendix C: Present Worth Analysis

Appendix D: AG132 Outputs



Roadway Optimizer - Layout 1

General:

6 Lane Section

Roadway Standard: IES RP-8-14

R-Table: R3 (Slightly Specular), QO=0.07 Actual QO Value: 0.07

Roadway Layout:

Layout Type: Two Rows, Staggered, With Median; 2R_STG_w/M

Roadway Width: 42 ft

Median Width: 30 ft

Lanes In Direction Of Travel: 3

Driver's Side Of Roadway: Right

Luminaire Information:

ATB2 80BLEDE15 XXXXX R3 3K

Description: ATB2 80BLEDE15 XXXXX R3 3K

File Name: ATB2_80BLEDE15_XXXXX_R3_3K.ies

Lumens Per Lamp: N.A.

Number Of Lamps: 1

Total Lamp Lumens: N.A.

Luminaire Lumens: 39489

Luminaire Watts: 388

Efficiency (%): N.A.

S/P Ratio: 1.00

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: 307

Spacing - Row 2: 307

Label	X-Coord	Y-Coord	Z-Coord	Orient	Tilt	Spin
ATB2_80BLEDE15_XXXX... .	921	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	614	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	307	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	0	-20	45	90	0	0

Roadway Optimizer - Layout 1 - Cont.

Luminaire Location Summary:

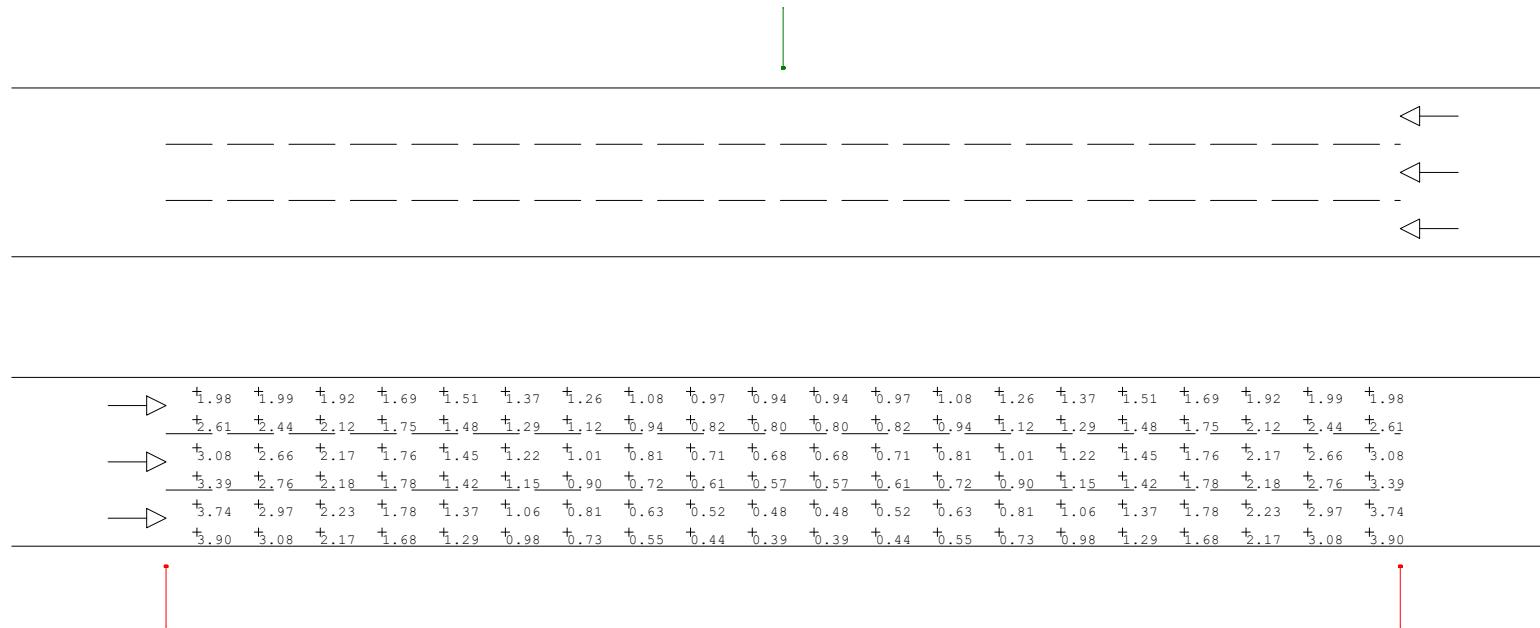
Coordinates in ft

ATB2_80BLEDE15_XXXX...	-307	-20	45	90	0	0
ATB2_80BLEDE15_XXXX...	1074.5	134	45	270	0	0
ATB2_80BLEDE15_XXXX...	767.5	134	45	270	0	0
ATB2_80BLEDE15_XXXX...	460.5	134	45	270	0	0
ATB2_80BLEDE15_XXXX...	153.5	134	45	270	0	0
ATB2_80BLEDE15_XXXX...	-153.5	134	45	270	0	0
ATB2_80BLEDE15_XXXX...	-460.5	134	45	270	0	0

Total Number of locations: 11

Roadway Optimizer - Layout 1

RoadOpt_1_Illum



Illuminance (Fc)

Average = 1.53

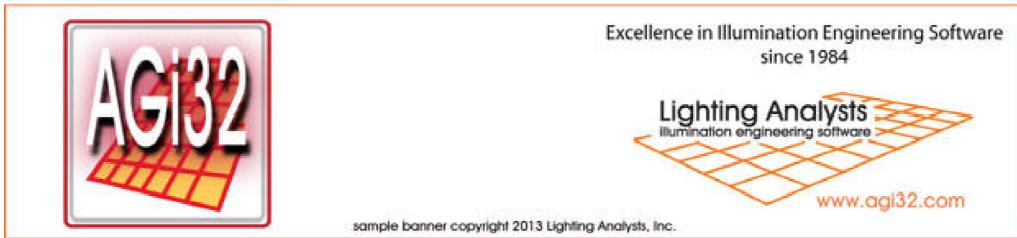
Maximum = 3.90

Minimum = 0.39

Avg/Min Ratio = 3.92

Max/Min Ratio = 10

Max/Avg Ratio = 2.55



Roadway Optimizer - Layout 2

General:

4 Lane Section

Roadway Standard: IES RP-8-14

R-Table: R3 (Slightly Specular), Q0=0.07 Actual Q0 Value: 0.07

Roadway Layout:

Layout Type: Two Rows, Staggered, With Median; 2R_STG_w/M

Roadway Width: 28 ft

Median Width: 40 ft

Lanes In Direction Of Travel: 2

Driver's Side Of Roadway: Right

Luminaire Information:

ATB2_80BLEDE15_XXXXX_R3_3K

Description: ATB2_80BLEDE15_XXXXX_R3_3K

File Name: ATB2_80BLEDE15_XXXXX_R3_3K.ies

Lumens Per Lamp: N.A.

Number Of Lamps: 1

Total Lamp Lumens: N.A.

Luminaire Lumens: 39489

Luminaire Watts: 388

Efficiency (%): N.A.

S/P Ratio: 1.00

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: 355

Spacing - Row 2: 355

Label	X-Coord	Y-Coord	Z-Coord	Orient	Tilt	Spin
ATB2_80BLEDE15_XXXX... .	1065	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	710	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	355	-20	45	90	0	0
ATB2_80BLEDE15_XXXX... .	0	-20	45	90	0	0

Roadway Optimizer - Layout 2 - Cont.

Luminaire Location Summary:

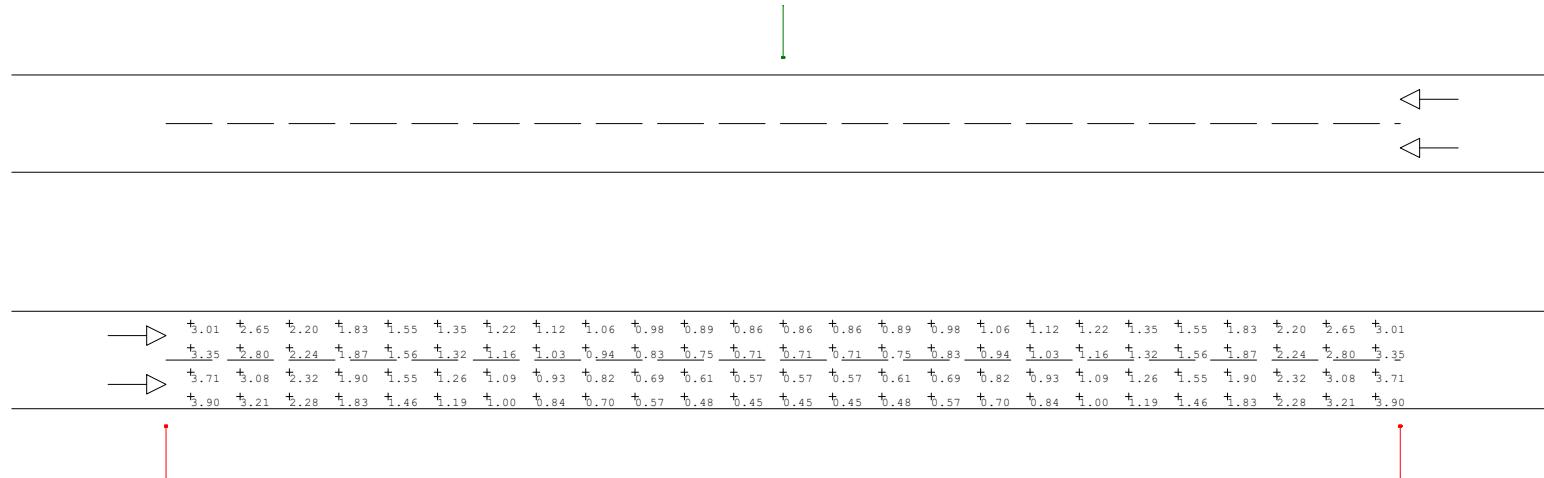
Coordinates in ft

ATB2_80BLEDE15_XXXX...	-355	-20	45	90	0	0
ATB2_80BLEDE15_XXXX...	1242.5	116	45	270	0	0
ATB2_80BLEDE15_XXXX...	887.5	116	45	270	0	0
ATB2_80BLEDE15_XXXX...	532.5	116	45	270	0	0
ATB2_80BLEDE15_XXXX...	177.5	116	45	270	0	0
ATB2_80BLEDE15_XXXX...	-177.5	116	45	270	0	0
ATB2_80BLEDE15_XXXX...	-532.5	116	45	270	0	0

Total Number of locations: 11

Roadway Optimizer - Layout 2

RoadOpt_1_Illum



Illuminance (Fc)

Average = 1.5

Maximum = 3.90

Minimum = 0.45

Avg/Min Ratio = 3.33

Max/Min Ratio = 8.67

Max/Avg Ratio = 2.6

Appendix E: Installation Costs

Installation Cost - SR 421 (Summer Tree Road to Williamson Boulevard)

Pay item	Description	Quantities	Unit Cost	Total Cost
715-4-11	LIGHT POLE COMPLETE, F&I- STD, 30'	10	\$5,300.00	\$53,000
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24	11	\$640.00	\$7,040
630-2-11	CONDUIT, F& I, OPEN TRENCH	0	\$7.50	\$0
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	3168	\$21.00	\$66,528
715-1-12	LIGHTING CONDUCTORS, F&I, INSUL,NO.8-6	9504	\$2.25	\$21,384
715-7-11	LOAD CENTER F&I	1	\$13,000.00	\$13,000
715-500-1	POLE CABLE DISTRIBUTION SYSTEM, CONVENTIONAL	10	\$500.00	\$5,000

Total Cost \$165,952

10% MOT	\$16,595
10% Mobilization	\$18,255
5% Unknown	\$10,040

Project Cost	\$210,842
Per mile	\$702,807

Installation Cost - SR 421 (Taylor Road to Clyde Morris Boulevard)

Pay item	Description	Quantities	Unit Cost	Total Cost
715-4-11	LIGHT POLE COMPLETE, F&I- STD, 30'	20	\$5,300.00	\$106,000
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24	22	\$640.00	\$14,080
630-2-11	CONDUIT, F& I, OPEN TRENCH	0	\$7.50	\$0
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	6336	\$21.00	\$133,056
715-1-12	LIGHTING CONDUCTORS, F&I, INSUL,NO.8-6	19008	\$2.25	\$42,768
715-7-11	LOAD CENTER F&I	1	\$13,000.00	\$13,000
715-500-1	POLE CABLE DISTRIBUTION SYSTEM, CONVENTIONAL	20	\$500.00	\$10,000

Total Cost \$318,904

10% MOT	\$31,890
10% Mobilization	\$35,079
5% Unknown	\$19,294

Project Cost	\$405,167
Per mile	\$675,278

Installation Cost - SR 421 (Clyde Morris Boulevard to Nova Road)

Pay item	Description	Quantities	Unit Cost	Total Cost
715-4-11	LIGHT POLE COMPLETE, F&I- STD, 30'	44	\$5,300.00	\$233,200
635-2-11	PULL & SPLICING BOX, F&I, 13" X 24	48	\$640.00	\$30,720
630-2-11	CONDUIT, F& I, OPEN TRENCH	0	\$7.50	\$0
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	13728	\$21.00	\$288,288
715-1-12	LIGHTING CONDUCTORS, F&I, INSUL, NO.8-6	41184	\$2.25	\$92,664
715-7-11	LOAD CENTER F&I	2	\$13,000.00	\$26,000
715-500-1	POLE CABLE DISTRIBUTION SYSTEM, CONVENTIONAL	44	\$500.00	\$22,000

Total Cost \$692,872

10% MOT	\$69,287
10% Mobilization	\$76,216
5% Unknown	\$41,919

Project Cost	\$880,294
Per mile	\$677,149

Installation Cost - SR 421 (Nova Road to Spurce Creek Road)

Pay item	Description	Quantities	Unit Cost	Total Cost
715-4-11	LIGHT POLE COMPLETE, F&I- STD, 30'	26	\$5,300.00	\$137,800
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24	29	\$640.00	\$18,560
630-2-11	CONDUIT, F& I, OPEN TRENCH	0	\$7.50	\$0
630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	9504	\$21.00	\$199,584
715-1-12	LIGHTING CONDUCTORS, F&I, INSUL,NO.8-6	28512	\$2.25	\$64,152
715-7-11	LOAD CENTER F&I	1	\$13,000.00	\$13,000
715-500-1	POLE CABLE DISTRIBUTION SYSTEM, CONVENTIONAL	26	\$500.00	\$13,000

Total Cost \$446,096

10% MOT	\$44,610
10% Mobilization	\$49,071
5% Unknown	\$26,989

Project Cost	\$566,766
Per mile	\$629,740

Appendix F: Responses to Comments on Draft Report



To: Stephan C. Harris,
Transportation Planner
River to Sea TPO

Date: 02/09/2023

Memorandum

Project #: 63308.08

From: Vinod Vishwanatha, P.E., PTOE

Re: SR 421/Dunlawton Avenue LJR – Responses to Comments

This Memorandum summarizes the responses to comments provided by various agencies on the Draft SR 421/Dunlawton Avenue/Taylor Road from Summer Trees Road to Spruce Creek Road – Lighting Justification Report provided to River to Sea Transportation Planning Organization (TPO) on December 29, 2022.

Comments from River to Sea TPO

Comment # 1

Add "SR 421" as an alternative name to Taylor Road/Dunlawton Avenue in the Title/Cover Page.

Response:

The title/cover page is updated as requested.

Comment # 2

Correct "Taylor Road" to "Taylor Branch Road" throughout the report. There are six instances, two on Page 2, one on page 6, two on page 7, and two on page 18.

Response:

"Taylor Road" is replaced to read as "Taylor Branch Road" throughout the report, including the tables contained within the report.

Comments from City of Port Orange

Comment # 1

Based on the recommendation on page 18 and 19, streets lights are recommended from Clyde Morris Blvd. to Spruce Creek Rd. and not recommended from Summer Trees Road to Williamson Blvd. but there is no recommendation for the segment from Taylor Road to Clyde Morris Blvd. The Appendix B TAC (27) score is 48.97 for the segment from Taylor Rd. to Clyde Morris Blvd., which would not warrant the lights on this segment but the NPV for this segment in Table 6 on PDF Page 17 indicates that lights are warranted on this segment. Please clarify.

Response:

The recommendations section is revised to recommend lighting along the segment of Dunlawton Avenue (SR 421) from Taylor Branch Road to Spruce Creek Road.

Comment #2

Sheet 18 - The numbering sequence in Section 4.0 that listed the five segments analyzed is 6 through 10 and should be 1 through 5.

Response:

The report is updated to address the numbering as requested.