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## 1 Typical Sections

The Estero Boulevard lighting segments correspond to the Refresh Estero Boulevard construction segments, with the addition of “Segment 0” the town-owned roadway north of Segment 1.



Figure 1: Project Segments (Refresh Fort Myers Beach [www.refreshfmbeach.com](http://www.refreshfmbeach.com))



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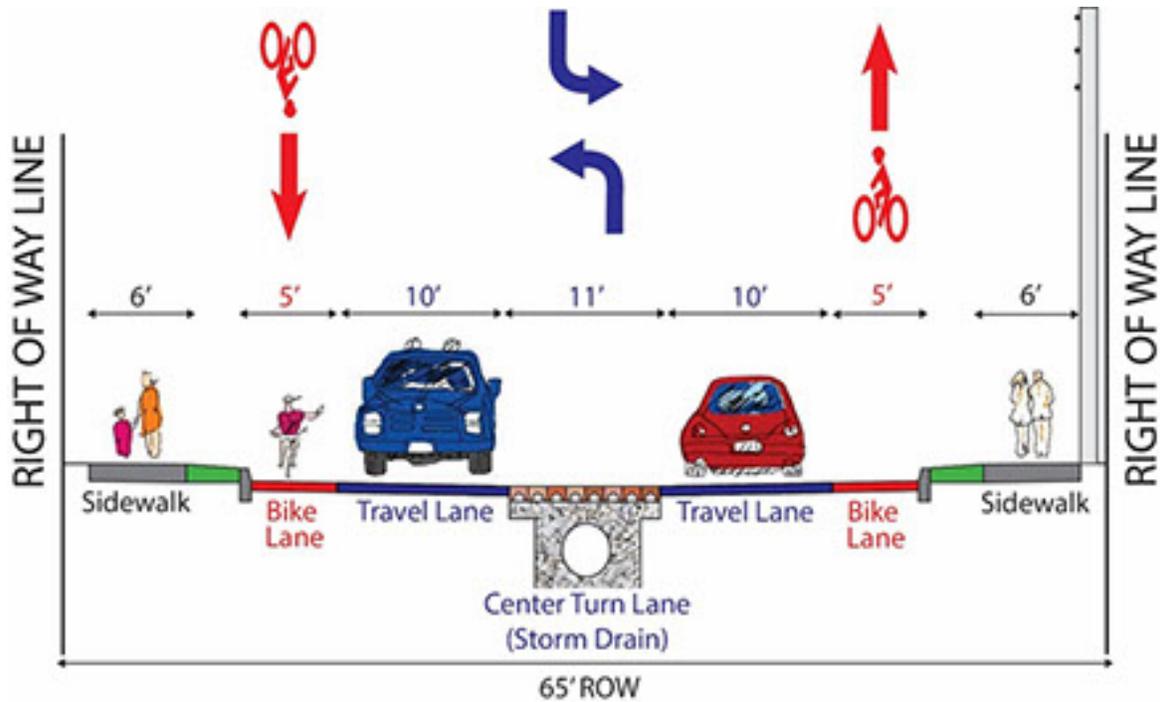


Figure 2: Typical Section (Refresh Fort Myers Beach [www.refreshfmbeach.com](http://www.refreshfmbeach.com))

Segment	Location	Functional Class	Length (ft)	Widths (feet)									Travel Lane Width	Total Width	Right-of-Way
				West Sidewalk	West Buffer	West Bike Lane	West Travel Lane	Center / Turn Lane	East Travel Lane	East Bike Lane	East Buffer	East Sidewalk			
0	Bowditch Pointe to Crescent St	Local	5659	6	8	5	10	0	10	5	8	6	20	58	
1	Crescent St to Lovers Lane	Minor Arterial	5650	9.5	0	0	10	11	10	0	0	9.5	31	50	50'
2	Lovers Lane to Strandview Ave	Minor Arterial	6200	6	4	5	10	11	10	5	4	6	31	61	65'
3A	Strandview Ave to Glenview Manor Dr	Minor Arterial	1700	6	0	5	10	11	10	5	0	6	31	53	Varies 57.5 to 65'
3B	Glenview Manor Dr to Lazy Way	Minor Arterial	2500	6	4	5	10	4	10	5	4	6	24	54	Varies 50-57'
3C	Lazy Way to Lanark	Minor Arterial	1550	6	4	5	10	11	10	5	4	6	31	61	65'
4A	Lanark to Flamingo St	Minor Arterial	1400	6	4	5	10	11	10	5	4	6	31	61	65'
4B	Flamingo St to Albatross St	Minor Arterial	2050	8	4	5	10	11	10	5	4	10	31	67	100'
5	Albatross St to Bay Beach Ln	Minor Arterial	3900	8	4	5	10	11	10	5	4	8	31	65	80' Typically
6	Bay Beach Ln to Estrellita Dr	Minor Arterial	5200	8	4	5	10	11	10	5	4	8	31	65	80' Typically

Table 1: Typical Section Dimensions



Each of the Estero Boulevard segments has different cross-sectional dimensions as shown in Table 1 above, and there is some dimensional variation within the segments. The dimensions affect the spacing and selection of luminaires. For example, a wider roadway might require closer spacing, or a luminaire with a different distribution type to help light reach further across the road. In the final detailed design, luminaires will be selected and located as needed to meet design criteria for all parts of Estero Boulevard. For today's analysis, a conservative average cross section is used to estimate fixture counts and costs.

## 2 Luminaires

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Street lighting designs are prepared using photometric files from existing manufacturers' products; however, the construction documents must be prepared on a specifications basis so that any product meeting those specifications can be used. The specifications basis is required of all public projects to ensure fair and equal business opportunity to all manufacturers that offer a product that meets those specifications. The discussion here is about what general type of lighting equipment to consider, which specifications are important, and the pros and cons of each. Specific manufacturers' product examples are shown here, but there is no implication of commitment to that product – only an intention to consider a *type* of product.

Each luminaire below is shown with a table indicating whether the luminaire is listed by the Florida Fish and Wildlife Conservation Commission (FWC) and Florida Power & Light (FPL).

- FWC wildlife lighting certification is recommended, but not required for lighting along Estero Boulevard. It is recommended, because certification eases the plans review and permitting process for lighting systems in wildlife-sensitive areas, and it may provide a level of comfort to the public about the lighting used in their community.

FWC certification involves approval of the product specifications and photometrics and inspection of a physical product specimen. The FWC suspended its Wildlife Lighting Certification Program during COVID and is anticipated to resume the process soon. Once resumed, the certification process would add one to three months to the design process for products not currently certified.

- FPL certification is required for products used within the FPL lighting program. It is not required or recommended for town-owned systems. The existing high-pressure sodium (HPS) lighting along Estero Boulevard is an FPL utility program system. The FPL list includes a subset of wildlife-certified luminaires.

FPL certification involves approval of the product specifications and photometrics, and salt-spray and electrical surge testing of physical product specimens. The test process takes four to six months. Inclusion on FPL's wildlife-certified list requires prior certification by FWC.



## 2.1 Existing HPS System

Currently Listed by	Yes / No
FWC	No
FPL	Yes

This is the existing system that is proposed to be replaced by the Estero Boulevard Lighting Project. It is an FPL lighting program system whereby the maintenance and energy costs are paid by a monthly flat fee according to an agreement between the town and FPL.

The Estero Boulevard system is composed of about 130 200W HPS luminaires with an average spacing of 260' mounted on FPL's concrete distribution poles. The monthly cost is about \$14 per luminaire, or \$1,800/month, \$21,840/year.

The cost is relatively low for 6.8 miles of roadway lighting for many reasons, including:

- The system makes use of existing concrete distribution poles.
- The existing system does not provide adequate light levels, uniformity, or accommodation of wildlife needs; thus, the system is proposed to be replaced. During turtle season, many of the lights are turned off, because they are visible from the beach, leaving long stretches of dark roadway during the nesting season.

This system will be replaced, but it's a data point to note that a low-cost option is to leave the inadequate system in place.



Figure 1 - Photo of an existing HPS luminaire on Estero Boulevard

## 2.2 White LED

Currently Listed by	Yes / No
FWC	No
FPL	Yes

- With FPL, there is an even lower cost option to simply switch each HPS to more energy-efficient LED light with similar characteristics. Doing so would reduce the monthly FPL fees to about \$9 per luminaire, or \$1,170/month, \$14,040/year. Similar to the existing system:



Figure 2 - Example: Typical Cooper, Cree, AEL white LED luminaire



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- A one-for-one replacement scheme would make use of existing concrete distribution poles.
  - A one-for-one replacement would not provide adequate light levels, uniformity, or accommodation of wildlife needs. During turtle season, many of the lights would need to be turned off, because they would be visible from the beach, leaving long stretches of dark roadway during the nesting season.
- b. It is possible to construct an FPL system that is compliant with current lighting criteria by adding lights on poles that do not currently have lights, and by installing new poles. A pole added within the line of distribution line costs about \$13,000 with significant additional costs associated with attaching distribution electric lines to the poles. Poles outside the distribution line are estimated to cost about \$4000 plus possible additional monthly rental fees for conductor and other appurtenances.

It is estimated that a design-compliant system with white LEDs would require about two and a half times the number of existing luminaires for a uniform Estero Boulevard lighting system and could require 100 additional poles, construction of which would be a direct initial cost to the town. The resulting appearance would be similar to the existing power pole like, but with more poles.

As with any FPL lighting system, if there is a reported turtle disorientation event and a white FPL light is suspected for any reason, that light will be turned off, again leaving areas of darkness along Estero Boulevard.

- c. Contrary to popular belief, it is possible to design a roadway lighting system in wildlife-sensitive areas using white LED lighting by locating luminaires and shielding lights so that no light is visible from nesting areas. Skyglow is controlled by good equipment selection and design. Because there are well-documented relationships between light color, visibility, and safety, this is the preferred option for functionality of drivers, pedestrians, cyclists and all night-time road users during the entire year.

A town-owned (i.e., non-FPL program) system's capital costs would be borne entirely by the town. Costs for the above options are shown in Table 2.

### 2.3 Amber LED

Currently Listed by	Yes / No
FWC	Yes
FPL	Yes*

\* A Cree (manufacturer) amber luminaire is FWC and FPL certified; however, Visionaire, the manufacturer preferred and requested by Lee County and specified for the Old San Carlos / 5<sup>th</sup> Street / North Estero Boulevard intersection, is



Figure 3 – Example: Visionaire amber LED



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not on FPL’s approved products list (APL) and would need to undergo FPL testing to be used within the monthly-fee utility program. Most of Estero Boulevard is a Lee County roadway, and as such, it is important to coordinate the town’s design with the county.

FPL’s listed amber luminaires have relatively low light output. The Visionaire light output is comparable to that of more broad-spectrum LEDs; however, preliminary photometric calculations show that its higher power does not result in proportionally greater spacing, and consequently its total system cost is relatively high.

Costs are shown in Table 2

**2.4 Dual-Source Amber / White LEDs**

Currently Listed by	Yes / No
FWC	No*
FPL	No

\* The eLuminaire (manufacturer) product being considered is not FWC certified; however, this manufacturer does carry other FWC certified products.

This dual source option would be amber during turtle season, switching to broad-spectrum lighting outside turtle season. This remains the recommended option because of its year-around accommodation of road users, pedestrians, bicyclists and wildlife.

The dual-source option seems to be experiencing an emerging market. King Luminaire is another provider of dual-source luminaires.

Costs are shown in Table 2.



Figure 4 - Example: eLuminaire dual source amber / white LED

**2.5 Standalone Solar Lighting System**

Currently Listed by	Yes / No
FWC	No
FPL	No

There is a lighting project in Sarasota at South Lido Key Beach with 270 light pole units at 18’ mounting height that is proposed to use solar power. The Town has requested that this option be included in the system comparisons. A PowerPoint presentation about the project implies that the selected option includes a solar array on top of each light pole. The project’s PowerPoint photos represent a roadway cross section that is comparable to many of the Estero Boulevard segments, so a rough extrapolation per mile of



Figure 5 - Sarasota's proposed solar lighting system.



the system's lifetime costs provide an estimate of the lifetime cost of a similar system for Estero Boulevard, if the photos and calculations providing the basis for claims in the PowerPoint presentation are accurate.

Extrapolating the costs per mile of lifetime ownership for Fort Myers Beach would be greater than \$11 million for the "Standalone Solar Pole Lighting System with Integral Batteries" option in the presentation. Standalone means there is no backup connection to the grid.

Not addressed in the PowerPoint are estimates of total energy consumption and concerns related to damage caused by harmonic frequency vibrations from wind loads on the projected area of a solar panel atop a light pole, as well as the luminaire and bracket. There is not enough information available in the PowerPoint to assess the feasibility or appropriateness of Sarasota's project for the Town of Fort Myers Beach, nor is there a basis for construction costs given.

### **3 Ownership and Controls**

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The system selection carries control and operations implications. Both FPL and town-owned systems would be supplied with networked lighting control systems with automatic outage reporting.

#### **3.1 FPL Utility Program Systems**

FPL utility program systems are controlled by FPL's network, and is a simple on/off control. The dual-source option would be controlled with the FPL network with on/off controls for each source. FPL's network recognizes problems quickly, but response times are not guaranteed.

#### **3.2 Town-Owned Systems**

A town-owned system would provide more robust control options than simple on/off. The town could implement curfews or dimming for certain areas / times based on need which would reduce light levels and increase energy savings on metered connections. It would give the town better control over its operations and maintenance and allow for such improvements as guaranteed 24-hour response time. Development of a maintenance plan for a town-owned system is included with the Estero Boulevard Lighting Project, should a town-owned system be selected. Town-owned systems can include future enhancements such as Wi-Fi, electric vehicle charging, gunshot detection, pedestrian detection, color-changing or decorative accents for holidays and events.

### **4 Timing Considerations**

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The system selection carries timing implications.



#### **4.1 FPL Utility Program Systems**

A new FPL utility program system using equipment already listed by FPL's program takes about three to six months to design, depending on how much additional infrastructure needs to be added.

A new FPL utility program system using equipment not FPL-listed must be tested and accepted by FPL which adds another four to six months to the design.

If wildlife certification is desired within the FPL program, a system using equipment not certified by FWC adds yet another one to three months, once FWC resumes the certification program post-COVID.

#### **4.2 Town-Owned Systems**

A town-owned system takes about six months to design if no new certifications are required.

As above, a town-owned system using equipment not yet certified by FWC adds one to three months, once FWC resumes the certification program post-COVID.

### **5 Other Financing Options: ESCOs**

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There is a third option besides FPL or town ownership for financing and maintaining lighting systems through an Engineering Service Company (ESCO). Similar to FPL programs, ESCOs have low initial costs, with capital costs, maintenance and energy payments occurring over time. The lifetime costs for systems under ESCO participation are anticipated to be a percentage over town-owned cost. The consultant, as part of its lighting project scope to investigate funding options, has begun discussions with some ESCOs that service lighting projects.

- Eaton Lighting Services headquartered in Georgia serves projects much larger than the Estero Boulevard Project. Eaton would only consider funding and maintenance of this project if it were combined with another larger project.
- West Florida Trane has a Fort Myers office and may consider funding and maintenance of Estero Boulevard lighting.
- Smart City Capital has an office in Fort Lauderdale and may consider funding and maintenance of Estero Boulevard lighting.

### **6 Basis of Construction Estimates**

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The cost estimates in this document are taken from manufacturers' product budget prices together with FDOT's Item Average Unit (construction) Costs Statewide in 2020. Initial costs for FPL systems are higher than anticipated because of the number of additional FPL poles estimated to be needed, with some being located in the distribution pole line – a choice that carries significant costs.



Except for the special amber and dual amber/white luminaires, all construction and finishes are per standard FDOT specifications. Decorative options and finishes would increase the initial cost of town-owned systems. Decorative options and finishes are generally not available with FPL systems.

## 7 Carbon Considerations

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Carbon calculations in Table 2 are based on an estimated  $7.09 \times 10^{-4}$  metric tons  $\text{CO}_2/\text{kWh}$ . Carbon contributions from equipment manufacture and installation methods were not considered.



## 8 System Comparison

	System Description	Certified		Owner	Lumens	Watts	Light Color	Typical Spacing (ft)	No. Luminaires	Initial Cost	Annual Energy kWh	Monthly FPL Cost Per Luminaire	Annual FPL Program Cost	Annual Energy Cost	Annual Maint Cost	30-year Lifetime Cost	Lifetime Carbon Tons	Notes
		FPL	FWC															
2.1	Existing HPS - Cooper Lighting	✓		FPL	17701	225	HPS	280	130	0	117,439	\$14	\$ 21,840	included w/ fee	included w/ fee	\$ 655,200	2,740	
2.2a	White LED one-for-one HPS replacement	✓		FPL	14388	99	4000K	280	130	0	51,673	\$9	\$ 13,884	included w/ fee	included w/ fee	\$ 416,520	1,206	
2.2b	White LED design compliant system	✓		FPL	14388	99	4000K	120	325	\$ 2,660,000	129,183	\$9	\$ 34,710	included w/ fee	included w/ fee	\$ 3,701,300	3,014	
2.2c	White LED design compliant system	✓		Town	14388	99	4000K	120	325	\$ 3,500,000	129,183	N/A	N/A	\$ 10,335	\$ 16,250	\$ 4,297,538	3,014	
2.3a	Amber LED (Cree)	✓	✓	FPL	6000	140	594 nm Amber	70	513	\$ 3,412,000	288,357	\$15	\$ 92,340	included w/ fee	included w/ fee	\$ 6,182,200	6,728	
2.3b	Amber LED (Cree)	✓	✓	Town	6000	140	594 nm Amber	70	513	\$ 2,660,000	288,357	N/A	N/A	\$ 23,069	\$ 25,650	\$ 4,121,558	6,728	
2.3c	Amber LED Visionaire BSX-II		✓	FPL	12900	430	Amber	80	500	\$ 3,360,000	863,225	\$25	\$150,000	included w/ fee	included w/ fee	\$ 7,860,000	20,140	
2.3d	Amber LED Visionaire BSX-II		✓	Town	12900	430	Amber	80	500	\$ 4,700,000	863,225	N/A	N/A	\$ 69,058	\$ 25,000	\$ 7,521,740	20,140	
2.4a	Dual Amber/White eLuminaire			FPL	16500 Amber 17000 White	185W Amber 150W White	Amber/ White	120	300	\$ 2,560,000	201,754	\$25	\$ 90,000	included w/ fee	included w/ fee	\$ 5,260,000	4,707	
2.4b	Dual Amber/White eLuminaire			Town	16500 Amber 17000 White	185W Amber 150W White	Amber/ White	120	300	\$ 4,780,000	201,754	N/A	N/A	\$ 16,140	\$ 15,000	\$ 5,714,209	4,707	
2.5	Solar Lighting			Town	12200	not analyzed	560 nm Amber	not analyzed	1341	\$10,493,827	not analyzed	N/A	N/A	not analyzed	not analyzed	\$ 11,237,500	not analyzed	

Table 2: Comparative System Features and Costs



## 9 Recommendations

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At the first and second stakeholder meetings, the consultant's recommendation was to pursue the feasibility of a dual-source white/amber luminaire, color-switchable by the control network according to the turtle nesting calendar. This solution uses the high-visibility broad-spectrum light during the non-nesting part of the year, which coincides with the winter season's increased visitor numbers. The system switches to amber during turtle nesting season.

After preliminary discussions with the FWC about the certification process and likelihood of approval, in spite of today's COVID-related certification-program suspension, the recommendation continues to be the dual-source solution, because of its singular ability to accommodate the turtles during nesting season during part of the year and provide improved visibility for pedestrians and all roadway users during the rest of the year.

A town-owned system would allow better control of its lighting operations and maintenance, and allow for modification or addition of future features as described in part 3.2, above.