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Landscape Master Plan
C. Site Development Criteria
Cog. Lighting

Cog. Lighting

Cog.1 Introduction

This lighting plan expands the lighting requirements for Tyndall Air Force Base (AFB) found in the *Tyndall AFB Installation Facilities Standards* (IFS), and presents design and specification criteria for luminaires, lighting design, and controls. These criteria were developed based on the current lighting technologies available, local and federal lighting ordinances, and environmental regulations and protections.

C09.1.1 Opportunities

This lighting plan enables a consistent and uniform lighting design approach throughout Tyndall AFB. It is intended to harness the following opportunities:

- Standardize the various light fixtures used throughout the base to add consistency to the base’s light fixtures, lamp wattages, and pole types and height
- Apply consistent lighting design standards throughout the base, including criteria for turtle-friendly lighting
- Convert older high-intensity discharge (HID) light fixtures to light-emitting diode (LED) fixtures

The utility provider Gulf Coast Electric Cooperative (GCEC) operates and maintains all pole-mounted lighting on base. In coordination with GCEC, light fixtures and poles were selected based on current inventory and to establish a concise and uniform selection of products for use throughout Tyndall AFB.

C09.1.2 Authority

Tyndall AFB lighting requirements are governed by the following, most current, documents:

- Unified Facilities Criteria (UFC) 3-530-01, *Interior and Exterior Lighting Systems and Controls*
- UFC 4-022-01, *Entry Control Facility Access Control Points*
- Surface and Distribution Command/Transportation Engineering Agency (SDDCTEA) Pamphlet 55-15, *Traffic and Safety Engineering for Better Entry Control Facilities*
- Illuminating Engineering Society of North America (IESNA) Handbook
- National Fire Protection Agency (NFPA) 70 / National Electric Code (NEC)
- Florida Building Code (FBC)
- 20191004 HQ USAF/A4C memorandum.

The local code ordinances for the surrounding cities of Panama City, Panama City Beach, and Callaway were also evaluated when developing this lighting plan. Although local lighting codes are not enforced on Tyndall AFB, they were considered and included as best practices in developing this lighting plan. These codes include considerations for turtle-friendly lighting, light trespass, and placement of light fixtures on streets and intersections.

C09.1.3 Warranty

Coordination of design and construction with Tyndall AFB staff, agencies, service providers and third-party contractors is critical to the successful implementation of planned improvements. All work is required to be warrantied regarding location and installation of materials in a manner consistent with the intent of the Landscape Master Plan and IFS, and to not create a conflict for installation of adjacent improvements by others. All potential conflicts will be identified by designers/contractors in respective sections of the Compliance Checklist and reviewed by Tyndall AFB Staff.

C09.1.4 Design Objectives

The following design objectives support the overall base vision and the four key planning strategies described in **Section B, Master Plan Framework**:

- Provide energy-efficient solutions
- Provide uniform lighting criteria to ensure even illumination throughout the base
- Provide turtle-friendly lighting requirements
- Standardize light fixtures, poles and bollards to be used throughout the Base for ease of maintenance

C09.1.5 Design Approach

The lighting approach is based on the following:

- Establishing lighting typologies specific to Tyndall AFB and its districts that promote consistent lighting applications
- Providing consistent lighting materials
- Complying with the UFC requirements
- Complying with other relevant guidelines, including those defined in the Illuminating Engineering Society (IES) Recommended Practices

C09.1.6 Lighting Controls

GCEC will provide lighting controls. Lighting will be controlled by a central lighting 277V contactor system located at each lighting transformer (also provided by GCEC). This type of contactor system typically serves 20 to 30 lights and includes the ability to connect to the utility Supervisory Control and Data Acquisition (SCADA) network, which will connect back to the Utility Operations Center (UOC) to control the lights. From the UOC, each contactor system will be able to turn on/off the group of lights from this centralized location.

C09.1.7 Compliance & Ordinances: Sea Turtle Lighting

Tyndall AFB is located adjacent to a beach that is a common nesting area for sea turtles, which are a federally listed species. Because sea turtles use moonlight as a guide to move toward the sea, disrupting a naturally dark nighttime environment can alter their behavior. To protect sea turtles and other wildlife, the Florida Fish and Wildlife Conservation Commission (FWC) regulates lighting near beaches.

Sea Turtle Friendly Lighting will be implemented on the side of Tyndall AFB west of Highway 98. Within this area, lights will be amber-colored with a wavelength of 560 nanometers (nm). Areas to the east of Highway 98 and other exceptions will be 4000 Kelvin (K) and 80 Color Rendition Index (CRI) to ensure optimal visual acuity at night.

C09.1.8 Compliance & Ordinances: Dark Skies & Light Trespass

Local ordinances do not have requirements for dark skies or light trespass beyond recommendations noted in UFC 3-530-01, which states that all exterior lights must have a BUG rating of U0. BUG rating stands for Backlight, Uplight, and Glare ratings. An Uplight rating of U0 indicates no light is directed above 90 degrees.

Light pollution is a growing concern. As more artificial light turns on, the ability to see stars at night has diminished. Light pollution is caused by excess lighting toward the sky, which blanches out the natural sky. To mitigate light pollution on Tyndall AFB, all light fixtures should be U0 type, and the Backlight and Glare ratings of the fixtures should be minimized to ensure light only shines in the area where it is needed and not beyond.

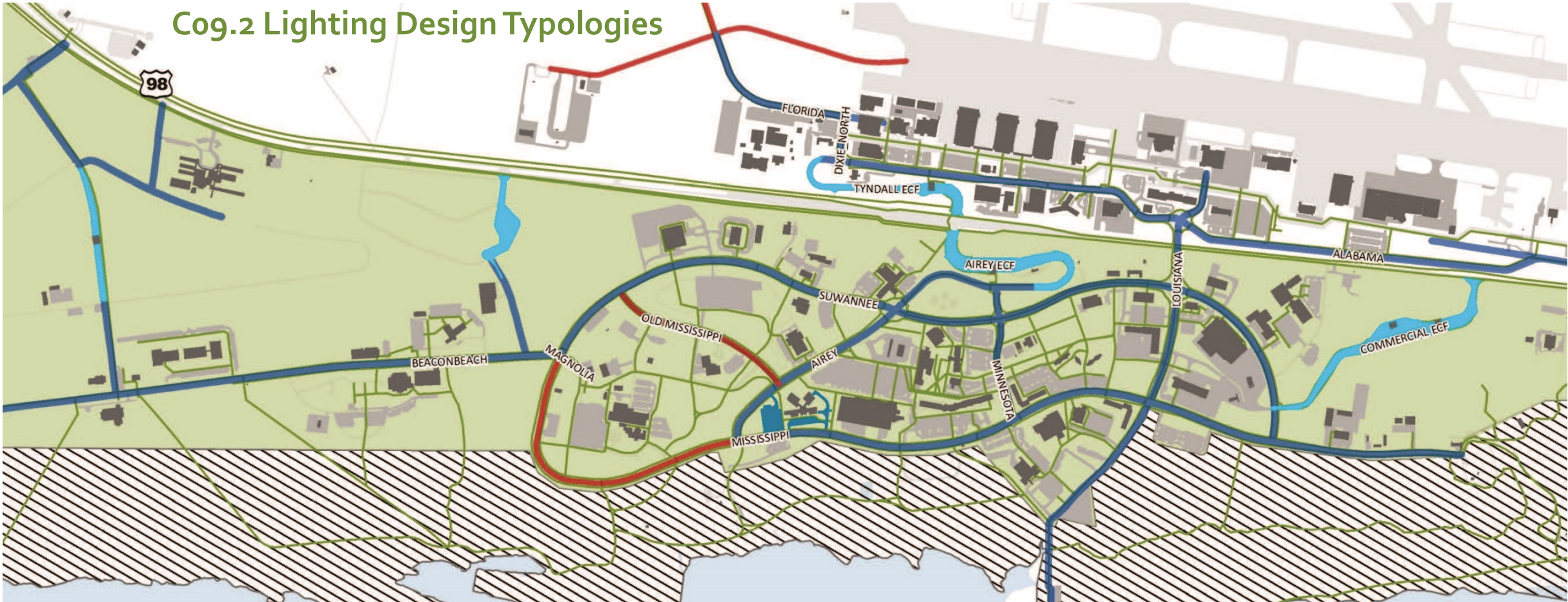


Exhibit C09-2. Lighting Zone Criteria Map

- Pathway/Walkway/Bikeway
- Entry Control Facility Collector
- Low Pedestrian Street Local Low
- Collector Pedestrian Street
- Child Development Center
- Parking
- Sea Turtle Friendly Zone
- Coastal Zone

C09.2.1 Lighting Typologies Overview

Due to range of lighting requirements and the need for long-term guidance that will lead to consistency in implementation, a series of lighting typologies were identified based on the unique needs of the base and its users.

The unique lighting Street Classification typologies are as follows:

- Flightline
- Street - Collector and Local
- Sidewalk/Pathway/Walkway/Bikeway
- Entry Control Facility (ECF)
- Parking Area
- Child Development Center (CDC)

C09.2.2 Lighting Criteria (LiC)

The criteria in this section relate to specific design requirements, including IFS requirements, and guidelines for designers/contractors to follow and Tyndall AFB personnel to review. Additional criteria are provided in the other sections of this **Landscape Master Plan** and are not repeated in this section; however, the requirements for lighting must be coordinated with other site elements. The sections that follow serve as worksheets, with supporting guidance and illustrations, for designers/contractors to use among their teams and in coordination with Tyndall AFB. These worksheets should be used to complete the **Compliance Checklist** submittal for each project. Each requirement includes a selection of check boxes to indicate the applicability of that requirement to a specific context, and to demonstrate compliance with the requirements.

Yes No N/A The designer/contractor either selects “Yes” if compliance has been met, “No” if it has not, or “N/A” if the requirement is not applicable to the project.

Exhibit C09-2. Lighting Design Criteria

Street Classification	Pedestrian Activity Classification	Average Illuminance Footcandles (FC)
Collector	Low	4
Local	Low	3

Exhibit C09-2. Maintained Illuminance Values for Pathway/Walkways/Bikeways

		Average Illuminance Footcandles (FC)
Pathway/Walkway Bikeway	Pedestrian Only	2 Minimum 5 Average

Table Sources: IES RP-8-18 and UFC 3-530-01

C09.2.3 Street Typology - Lighting Criteria

Because the base has an extensive pathway network, most of the streets are considered collector-type with **low pedestrian** activity classification.

- Yes No N/A
- ☐ ☐ ☐ LiC 1. Design lighting along streets as indicated on the lighting zone map.
- ☐ ☐ ☐ LiC 2. Provide street-type light fixtures along all streets. Refer to luminaire specifications for light fixture style and pole heights.
- ☐ ☐ ☐ LiC 3. Use light fixtures in the Sea Turtle-Friendly Lighting Zone that meet the wavelength and color requirements.
- ☐ ☐ ☐ LiC 4. Point light fixtures in the Sea Turtle-Friendly Lighting Zone away from the beach. Provide light fixtures along both sides of the street (as necessary) in other zones.

C09.2.4 Sidewalk/Pathway Typology - Lighting Criteria

The base will have a variety of different sidewalk widths. Criteria listed below are for sidewalks intended as pathways for walkers and bikers. The Multi-Modal Spine is considered a street typology.

- ☐ ☐ ☐ LiC 5. Provide pedestrian-scale luminaires along sidewalks.
- ☐ ☐ ☐ LiC 6. Locate bollards at crosswalks to warn pedestrians of upcoming crossings.

C09.3 Lighting Elements - Luminaire Specifications

C09.3.1 Luminaire Specifications Overview

The luminaire requirements noted on this page are based on the GCEC inventory used on base. Each fixture was selected for ease of maintenance and to provide consistency across the base. The optics and wattage of each fixture should be selected based on the street application to meet the lighting criteria described in **Section C09.2.1 Design Typologies**.

C09.3.2 General Light Fixture Requirements

- Yes No N/A
- ☐ ☐ ☐ LiC 39. Provide optics suitable for application. All fixtures, poles, and arms must be bronze finish and bollards to be gray finish. All poles must be rated to withstand 170-mile per hour winds.
- ☐ ☐ ☐ LiC 40. All fixture housings attached to the building shall not be brown or bronze. Fixture housings can be clear coat aluminum (preferred), light grey or white.

C09.3.3 Streetlighting

- ☐ ☐ ☐ LiC 28. **Pole:** Round, tapered aluminum pole, direct-bury, tenon top breakaway pole, bronze powder coat finish, with a 20-foot mounting height for use in the Support District and a 30-foot mounting height for use in the Flightline District. Use Hapco #RTA Pole or equivalent.
- ☐ ☐ ☐ LiC 29. **Arm:** Aluminum, 4-foot up-sweep streetlight arm, bronze powder coat finish. Use Action Manufacturing AMI-196-A or equivalent.
- ☐ ☐ ☐ LiC 30. **Luminaire:** AEL Autobahn Fixture #ATB2-xxLEDxx-MVOLT-P7 with bronze finish and 7-pin receptacle. LED lamps must be turtle-friendly in the Support District and 4000K color temperature and 80 color rendition index (CRI) in the Flightline District.

C09.3.4 Pedestrian Lighting

- ☐ ☐ ☐ LiC 31. **Pole:** Round, tapered aluminum pole, direct-bury, tenon top breakaway pole, bronze powder coat finish, with a 10-foot mounting height. Hapco #RTA pole or equivalent.
- ☐ ☐ ☐ LiC 32. **Luminaire:** Decorative post top, Invue Arbor #ARB xx LED D1 AP PER7, with bronze finish and 7-pin receptacle. LED lamps must be turtle-friendly in the Support District and 4000K color temperature 80 color rendition index (CRI) in the Flightline District.

C09.3.5 Bollards

- ☐ ☐ ☐ LiC 33. Decorative 36-inch with a gray finish. LED lamps must be turtle-friendly in the Support District and 4000K color temperature and 80 color rendition index (CRI) in the Flightline District.
- ☐ ☐ ☐ LiC 34. Use Invue Arbor #ABB xx LED 36 xx Taman's D1 A AP.



Streetlight Luminaire



Pedestrian Luminaire



Bollard

C09.3.6 Lighting Criteria for Parking Areas

Parking lot lighting levels will follow UFC 3-530-01, *Interior and Exterior Lighting Systems and Controls*. Precise design requirements applicable to Tyndall AFB are indicated below.

- ☐ ☐ ☐ LiC 19. Use streetlight-style fixtures in all parking areas.
- ☐ ☐ ☐ LiC 20. Use wall-mounted lights at building entries. Follow UFC 3-530-01 for lighting requirements.
- ☐ ☐ ☐ LiC 21. Refer to **Section C09.3.1, Luminaire Specifications**, for light fixture style and pole heights.
- ☐ ☐ ☐ LiC 22. Use light fixtures in the Sea Turtle-Friendly Lighting Zone that are amber in color. Use fixtures that have a 4000K color temperature in all other zones.
- ☐ ☐ ☐ LiC 23. Place light fixtures in the Sea Turtle-Friendly Lighting Zone such that the light source is always pointed away from the beach.
- ☐ ☐ ☐ LiC 24. Anchor lights around parking lots should using a 30-inch pedestal to avoid damage from vehicles.

C09.3.7 Parking Area Lighting

- Yes No N/A
- ☐ ☐ ☐ LiC 35. **Pole:** Round, tapered aluminum pole, direct-bury, tenon top pole, bronze powder coat finish, with a 20-foot mounting height for use in the Support District and a 30-foot mounting height for use in the Flightline District. Hapco #RTA pole or equivalent. Alternately, use a 4-bolt anchor base-type pole, tenon top, dark bronze finish.
- ☐ ☐ ☐ LiC 36. **Single Arm:** Aluminum, single, horizontal, tenon top bracket bronze powder coat, Action Manufacturing AMI-21-A or equivalent.
- ☐ ☐ ☐ LiC 37. **Double Arm:** Aluminum, double, horizontal, tenon top bracket bronze powder coat, Action Manufacturing AMI-22-A or equivalent.
- ☐ ☐ ☐ LiC 38. **Luminaire:** AEL Autobahn Fixture #ATB2-xxLEDxx-MVOLT-BZ-P7 with bronze finish and a 7-pin receptacle. LED lamps must be turtle-friendly in the Support District and 4000K color temperature and 80 color rendition index (CRI) in the Flightline District.

C09.3.8 Lighting Criteria for CDCs

CDCs require special lighting considerations.

- ☐ ☐ ☐ LiC 25. Comply with all exterior lighting requirements detailed in UFC 4-740-14, *Design: Child Development Centers*.
- ☐ ☐ ☐ LiC 26. Provide lighting fixtures that are 5 foot-candles average at all CDC driveways, walkways, and parking areas and that have photocell controls to turn lights on at sunset and off at sunrise.

C09.4.1 Street Lighting Calculation Report

Street lighting calculation reports are required for design approval and must demonstrate conformance with lighting requirements described for typologies per the UFC, as illustrated on Exhibit C09-4 below and Exhibits C09-5 on the next page. Reports are to follow IES RP-8-18, *Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*, Chapter 3.

All lighting calculations are to use a Light Loss Factor (LLF) of 0.9.

The lighting calculation summary for streets and sidewalks must show the following information listed below. Parking area lighting calculations may exclude luminance and veiling luminance ratio.

- Average Luminance (in candela per square meter)
- Average Illuminance (in foot-candles)
- Uniformity Ratio Average/Minimum
- Uniformity Ratio Maximum/Minimum
- Veiling Luminance Ratio
- Mounting Heights (grade to source of light)

C09.4.2 Photometry & IES Files

The street lighting calculation report must include an IES file for each luminaire used in the calculations. IES information is available from luminaire manufacturers. Exhibit C09-3 shows an example IES file, which should include the following information listed below. If all criteria listed below cannot be shown within the calculation IES file, supplemental files may be attached to the calculation report to demonstrate compliance.

- Test Number
- Test Lab
- Test Date
- Test Method
- Issue Date
- Manufacturer
- Exact Luminaire Part Number
- Number of Lamps
- Lumens to Lamps
- Multiplier
- Number of Vertical Angles
- Number of Horizontal Angles
- Photometric Type
- Unit Type
- Unit Width
- Unit Length
- Unit Height

C09.4.3 Streetlights Lighting Criteria

Exhibits C09.4.2 and C09.4.3 illustrate the desired spacing and setup for a typical street. The goal of this lighting typology is to provide lighting that is uniformly spaced throughout the various streets. The pole spacing will vary based on the desired lighting levels, pole heights, and fixture optics.

Yes No N/A			
☐	☐	☐	LiC 7. Locate streetlights on both sides of the street in the Flightline District. Single side spacing may be used on narrower streets.
☐	☐	☐	LiC 8. Locate streetlights on one side of the street and face the fixtures away from the beach in other (non-Flightline) districts.
☐	☐	☐	LiC 9. Install pedestrian lights on one side of each sidewalk in all districts.
☐	☐	☐	LiC 10. Place pedestrian lights and streetlights 2 feet clear from the edges of sidewalks or curbs. (Facility clear zone requirements may be more restrictive.)
☐	☐	☐	LiC 11. Adjust fixture and pole spacing as required to achieve uniformity and required lighting levels.
☐	☐	☐	LiC 12. Align pedestrian lights with streetlights when possible.

Exhibit C09.4.1 Sample Illustration of Lighting Calculations

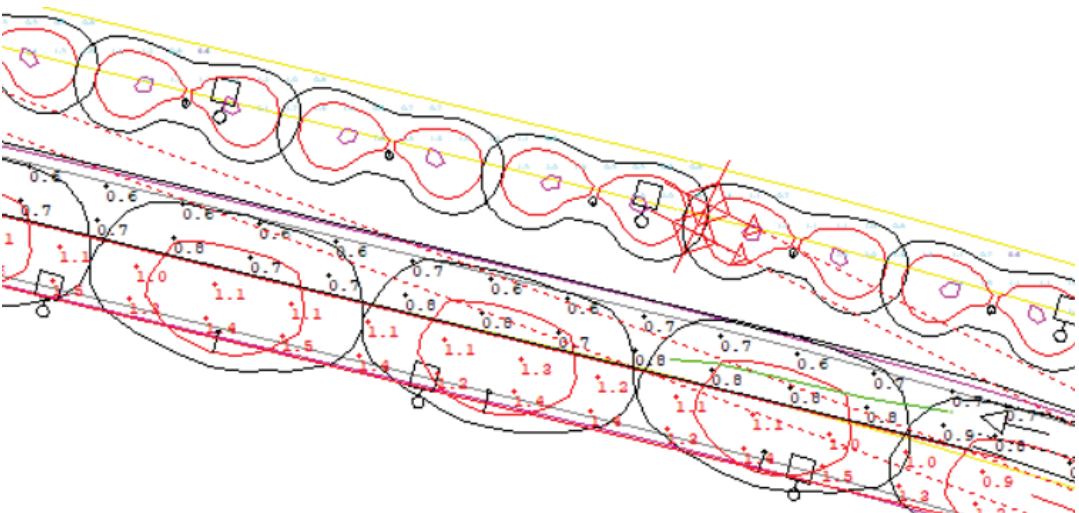


Exhibit C09.4.2 Light Fixture on Both Sides of the Street

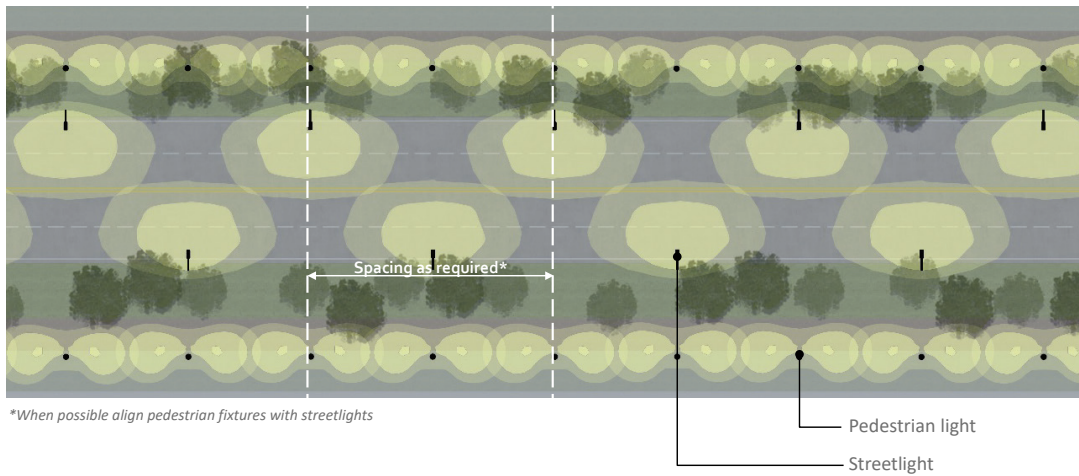
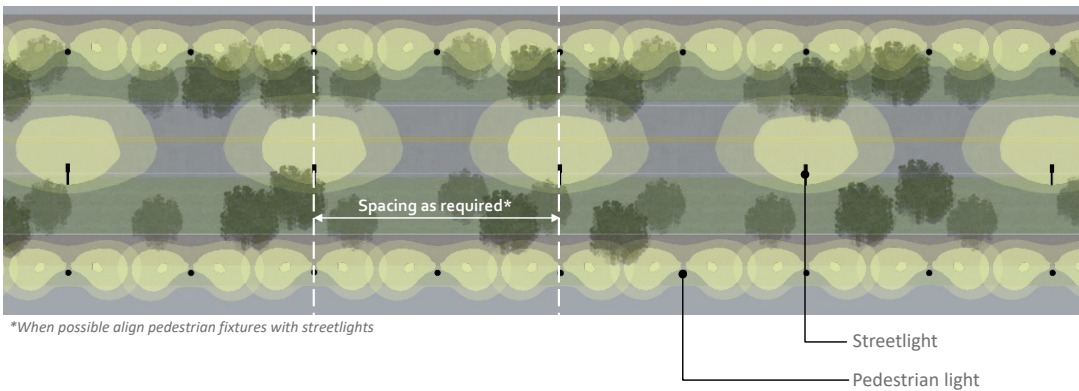


Exhibit C09.4.3 Light Fixture on One Side of the Street



C09.5.1 Lighting for Entry Control Facilities (ECF)

UFC 4-022-01, *Security Engineering: Entry Control Facilities / Access Control Points*, dictates the lighting guidelines for ECFs. Each zone within the ECF requires a different lighting approach. Refer to UFC guidance for exact requirements within each ECF zone. However, the ECF’s total lighting must be uniform, continuous, and complete; the lighting plan must transition from one area to the next so as not blind the driver nor interfere with the Defender’s mission. Specific illumination level(s) is compulsory for each of the explicit areas which comprise the ECF. Separate override lighting control system(s) fully compatible with all exterior and interior lighting components are located in the guard facility of a designated ECF. Lighting control(s) must support 24/7/365 operation accounting for all environmentally and non-environmentally induced factors.

- Yes No N/A
- ☐☐☐

LiC 13. Provide lighting consistent with the lighting zones defined in UFC 4-022-01 and as required within the ECFs.
- ☐☐☐

LiC 14. Provide streetlight-style fixtures.
- ☐☐☐

LiC 15. Augment UFC-compliant automated exterior lighting control(s) located within guard houses to include a Defender-operated override, capable of providing manual activation of the exterior lighting system during dawn, dusk, nighttime, heavily overcast periods, and/or high glare times of the day, as well as any Defender-defined period of operation. Limit Defender operation to on/off, affecting the measure of illumination. In addition, the control will allow fixtures in each zone to be fully dimmable. When facility is not in use, controls default to a pre-programed facility non-operational status.
- ☐☐☐

LiC 16. Design light fixtures to be 4000K and 80 CRI in color temperature.
- ☐☐☐

LiC 17. Adhere to the lighting requirements defined in the SDDCTEA Pamphlet 55-15, *Traffic and Safety Engineering for Better Entry Control Facilities* and governing UFC for all ECF Zones located in the Sea Turtle- Friendly Lighting Zone (Support District). Though lighting ECF requirements take precedence over turtle-friendly lighting, the lighting designer/contractor must minimize the imposition of any deleterious light into the surrounding turtle-friendly area without degrading the ECF’s mission- required lighting.

Exhibit C09.5.1 TAFB Gate Complex with ECF Zones Labeled

