Kauai Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant: Hawaii Department of Transportation (HDOT)

This Participant Inclusion Plan (PIP) template provides a convenient method for non-federal entities to provide the required information to apply for incidental take authorization under the terms of the KSHCP (the Program). Each applicant is required to complete and submit a PIP as part of their application materials in order to apply for an Incidental Take License (ITL) from the State of Hawaii Department of Land and Natural Resources (DLNR) and an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) under the KSHCP.

All applicants should consult the KSHCP document for the terms and conditions and the approval process through which the PIP will be evaluated by the DLNR and the USFWS. Staff from the USFWS and the DLNR can provide assistance with completion of this PIP. State of Hawaii DLNR may require fees for this service under the state's habitat conservation "technical assistance program."

All capitalized terms used in this PIP are as defined in the KSHCP, unless indicated otherwise.

General Provisions Applicable to this Application.

> Neither this PIP, nor the information contained therein, including without limitation all tables, information, data, estimates of take, costs, nor any action taken by the State pursuant to the PIP shall in any way be construed as an admission by the State of any liability, wrongdoing, or violation of law, regulation, contract or policy, or violation of federal, state or local statute or regulation.

KSHCP Participant Inclusion Plan (PIP)

Thank you for your interest in the Kauai Seabird HCP.

Instructions: Please complete all items in **Part I and II** of this form by providing information requested for each item below. Additional pages may be attached to this template as needed to adequately provide the necessary information. Non-federal entities should consult the KSHCP document for items requested in this PIP template and the terms and conditions of the KSHCP (a separate USFWS process is available for federal entities or entities with a federal nexus).

Staff from the DLNR and/or the USFWS may contact the applicant regarding any incomplete information or items needing further clarification. This PIP must be deemed complete before they are able to be processed; incomplete PIP forms will not be processed.

Part 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Kauai Harbors Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner's behalf.

Participant/Applicant Name: Hawaii Department of Transportation—Harbors Division (HDOT-H)

Physical Address/Location of Facility:
Nawiliwili Harbor
3242 Waapa Road
Lihue, Hawaii 96766

Port Allen Harbor
4300 Waialo Road
Eleele, Hawaii 96705

Mailing Address:
Harbors Administration Kauai District
3242 Waapa Road
Lihue, Hawaii 96766

Primary Contact:
Ownership Name: Director Jade T. Butay
Address:
Hawaii Department of Transportation
Aliiaimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813
Email: jade.butay@hawaii.gov
Telephone: (808) 587-2150

Alternate Contact:
Name: Deputy Director _____
Address:
Hawaii Department of Transportation
Aliiaimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813
Telephone: (808) 587-2150
Email: jade.butay@hawaii.gov

Alternate Contact:
Name: Paul J. Conry, Senior Associate Ecologist
Address:
H. T. Harvey & Associates
745 Fort Street, Suite 2003
Honolulu, Hawaii 96813-3820
Telephone: (808) 441-2081
Email: pconry@harveyecology.com

Lihue Airport Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner's behalf.

Participant/Applicant Name: Hawaii Department of Transportation—Airports Division (HDOT-A)

Physical Address/Location of Facility:
Lihue Airport
3901 Mokulele Loop #6
Lihue, Hawaii

Mailing Address:
Lihue Airport
3901 Mokulele Loop #6
Lihue, HI 96766

Primary Contact:
Ownership Name: Director Jade T. Butay
Address:
Hawaii Department of Transportation
Aliiaimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813
Email: jade.butay@hawaii.gov
Telephone: (808) 587-2150

Alternate Contact:
Name: Deputy Director _____
Address:
Hawaii Department of Transportation

Aliiaimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813
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Honolulu, Hawaii 96813-3820
Telephone: (808) 441-2081
Email: pconry@harveyecology.com

Kauai Harbors Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

Nawiliwili Harbor: Portions of Tax Map Key plats (4) 3-2-03, and (4) 3-2-04. A list of the Nawiliwili Harbor TMK parcels being covered under this HCP are detailed in Kauai Harbors Table 1. The boundary of Nawiliwili Harbor is shown in Kauai Harbors Figure 1.

Port Allen Harbor: Portion of Tax Map Key plat (4) 2-1-03. The boundary of Port Allen Harbor is shown in Kauai Harbors Figure 2. The Port Allen Harbor TMK parcels being covered under this HCP are listed below and shown in Kauai Harbors Figure 2.

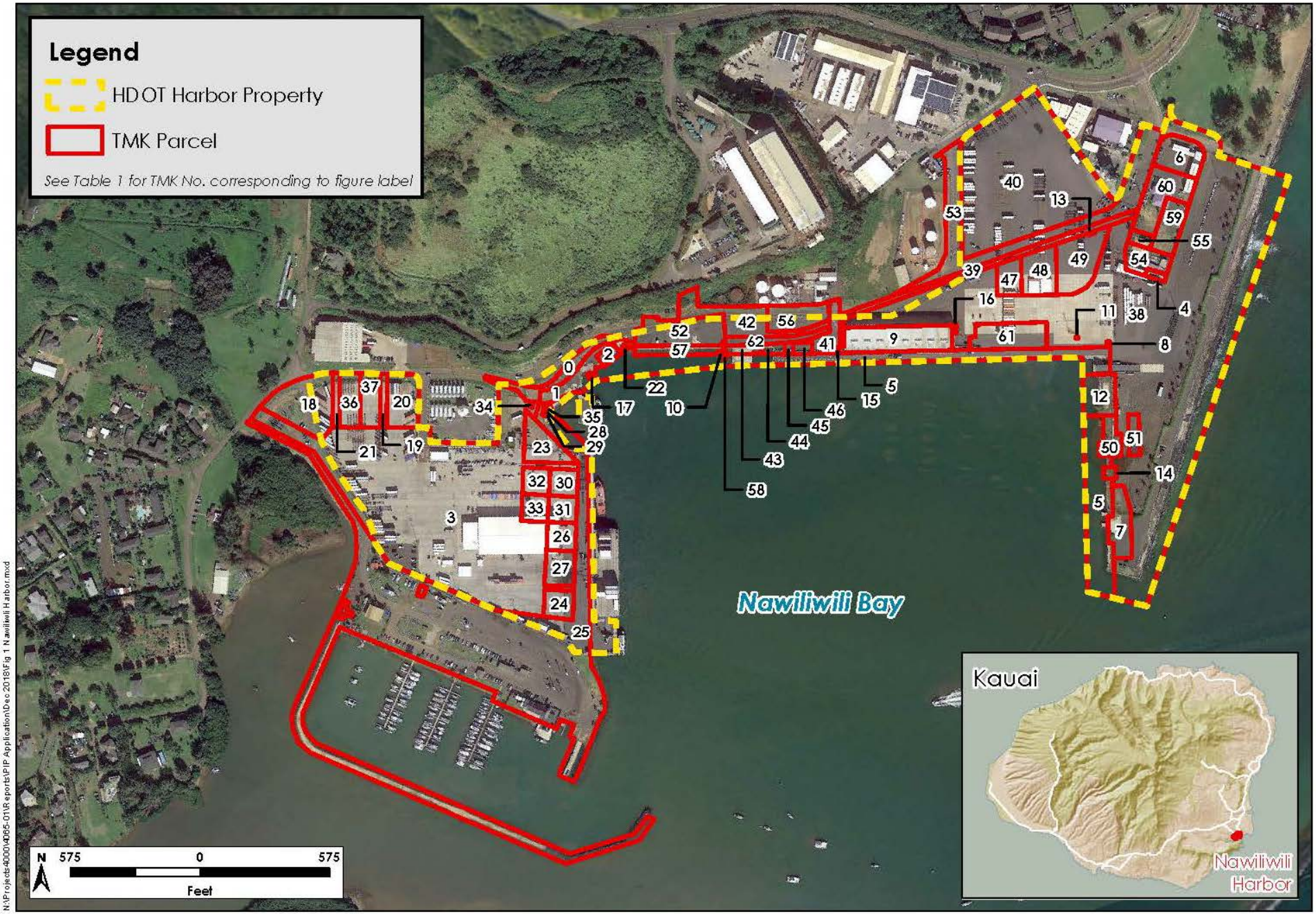
Label ID	TMK No.	Amount
0	421003021	
1	421003033	
2	421003006	Partial
3	421003015	
4	421003022	
5	421003019	Partial
6	421003020	

An aerial view of Nawiliwili Harbor, the location of buildings and structures with exterior lights that are covered by the HCP, and other site features of the property, are provided in Kauai Harbors Figure 3.

An aerial view of Port Allen Harbor, the location of buildings and structures with exterior lights that are covered by the HCP, and other site features of the property, are provided in Kauai Harbors Figure 4.

Kauai Harbors Table 1. A List of the Nawiliwili Harbor Tax Map Key Parcels Being Covered under the KSHCP and Referenced in Kauai Harbors Figure 1

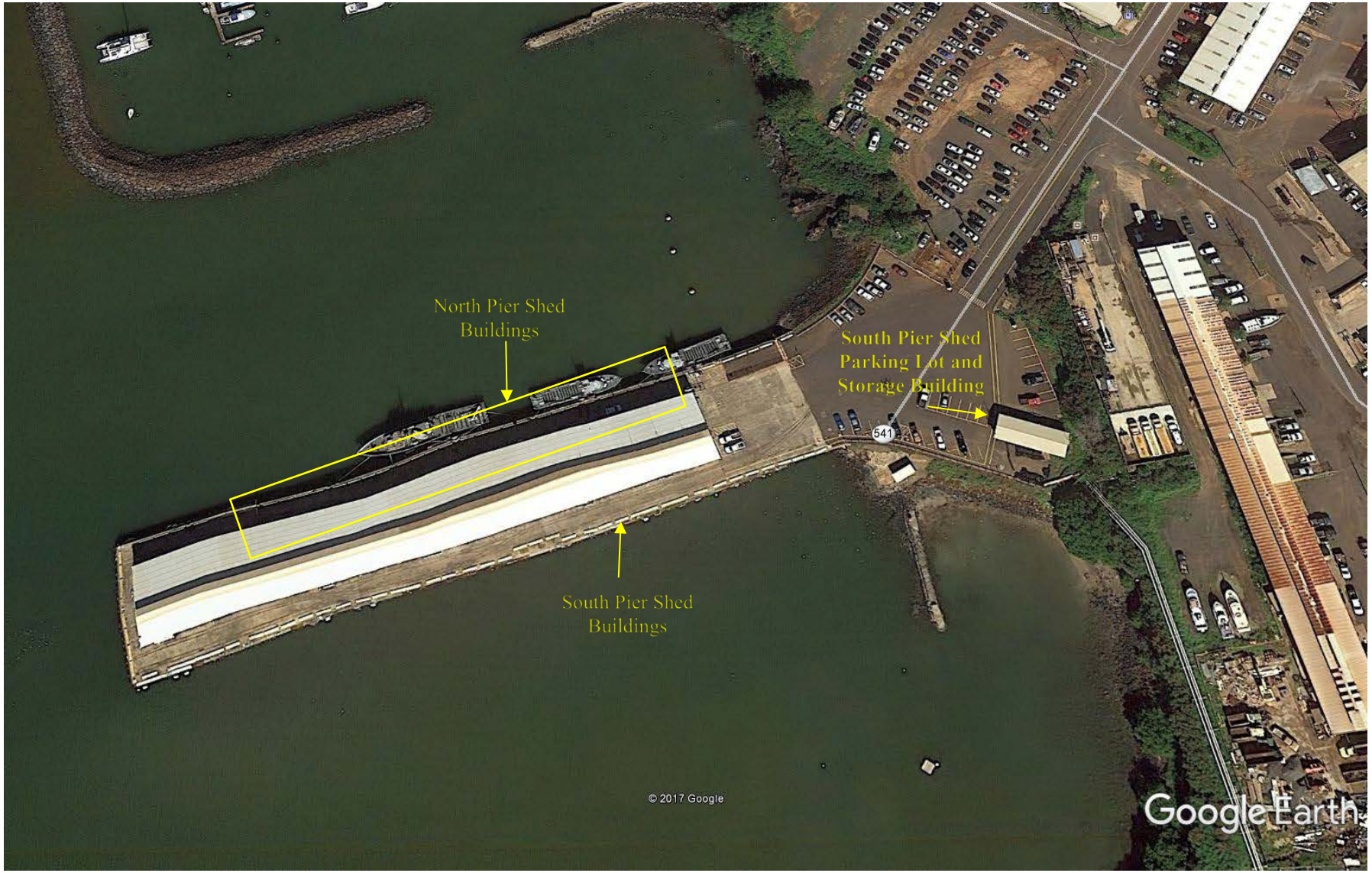
Label ID	TMK No.	Amount	Label ID	TMK No.	Amount
0	432003001		34	432003055	
1	432003002		35	432003057	
2	432003003		36	432003072	
3	432003007	Partial	37	432003073	
4	432004052		38	432004002	Partial
5	432004054		39	432004008	Partial
6	432004057		40	432004015	
7	432004059		41	432004018	Partial
8	432004061		42	432004019	Partial
9	432004063		43	432004024	
10	432004064		44	432004025	
11	432004065		45	432004026	
12	432004067		46	432004027	
13	432004070		47	432004028	
14	432004072		48	432004029	
15	432004074		49	432004030	
16	432004075		50	432004031	
17	432003023		51	432004032	
18	432003031	Partial	52	432004034	Partial
19	432003032		53	432004035	Partial
20	432003033		54	432004036	
21	432003038		55	432004037	
22	432003040		56	432004039	Partial
23	432003041		57	432004042	
24	432003042		58	432004043	
25	432003043	Partial	59	432004044	
26	432003045		60	432004048	
27	432003046		61	432004051	
28	432003047		62	432003999	
29	432003048				
30	432003051				
31	432003052				
32	432003053				
33	432003054				



Kauai Harbors Figure 1. Nawiliwili Harbor Tax Map Key Parcel Boundaries

Kauai Harbors Figure 2. Port Allen Harbor Tax Map Key Boundaries

Kauai Harbors Figure 3. Aerial View of Nawiliwili Harbor Showing the Location Buildings and Harbor Facilities with Exterior Lighting



Kauai Harbors Figure 4. Aerial View of Port Allen Harbor Showing the Location of Buildings and Harbor Facilities with Exterior Lighting

Lihue Airport Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

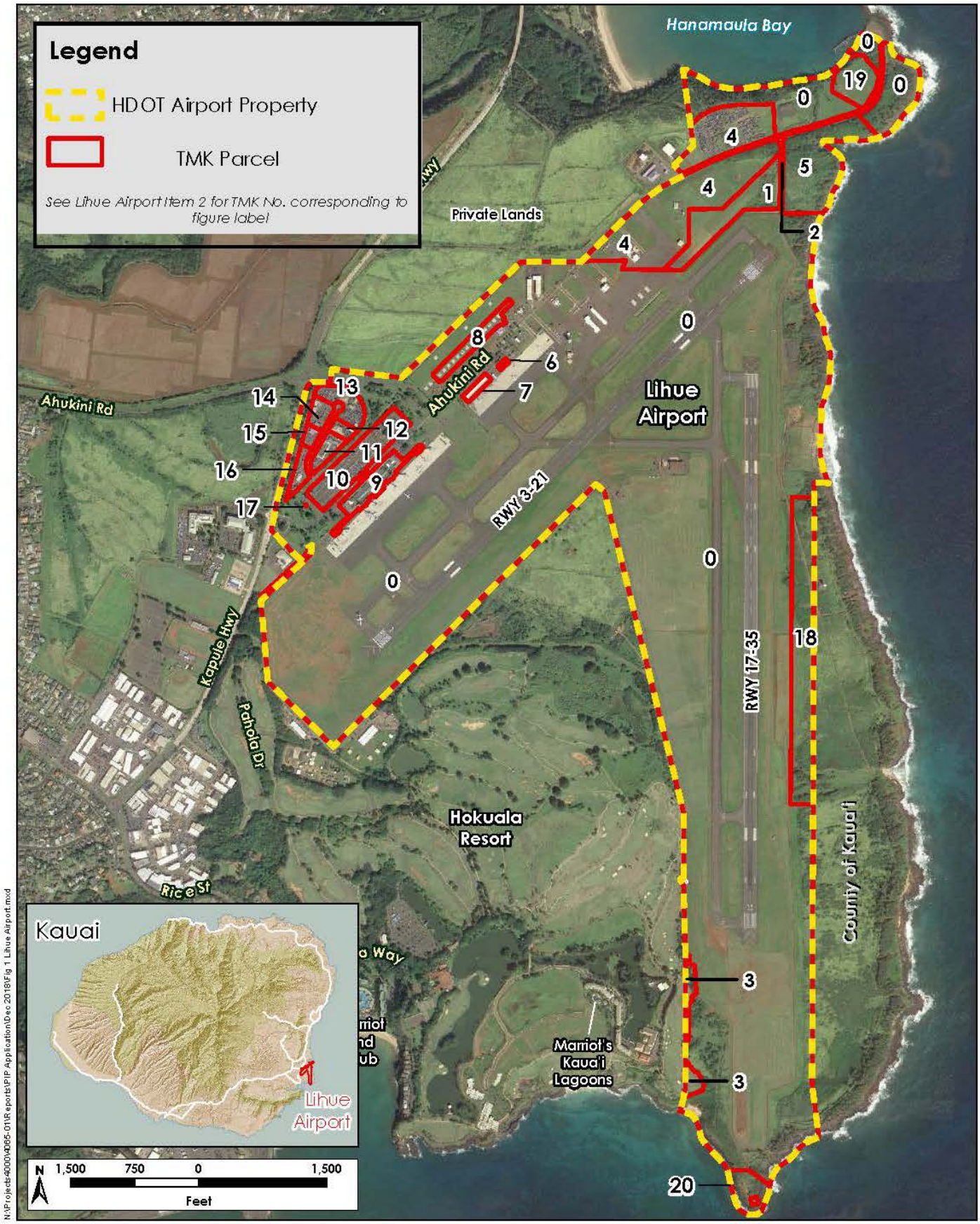
See Lihue Airport Figures 1 and 2, depicting the Lihue Airport (915 Acres, 1.5 miles east of Lihue, 153 feet above mean sea level):

__X__ Portion of Tax Map Key plat (4) 3-5-01. The Lihue Airport TMK parcels being covered under this HCP are listed below and shown in Lihue Airport Figure 1. The boundary of Port Allen Harbor is shown in Kauai Harbors Figure 2.

Label ID	TMK No.	Amount
0	435001008	
1	435001009	
2	435001092	
3	435001109	
4	435001158	
5	435001160	
6	435001147	
7	435001146	
8	435001148	
9	435001135	
10	435001091	
11	435001134	
12	435001133	
13	435001132	
14	435001131	
15	435001130	
16	435001129	
17	435001137	
18	435001005	
19	435001159	
20	435001128	Partial

__X__ Lihue Airport survey map (Lihue Airport Figure 1)
__X__ Map of property (airport layout plan) (Lihue Airport Figure 2)

An aerial view of Lihue Airport, the location of buildings and structures with exterior lights that are covered by the HCP other site features of the property, are provided in Lihue Airport Figure 2.



Lihue Airport Figure 1. Lihue Airport Tax Map Key Parcels

Lihue Airport Figure 2. Lihue Airport Boundary and Location of Facilities with Outdoor Lighting.

Kauai Harbors Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season, etc.). For "Types of lights" please use the following categories:

- **Parking Lights**
- **Signage Illumination**
- **Wall-pack Building Lights**
- **Landscaping/Grounds/Accent/Bollards**
- **Indoor lights visible from outdoors**
- **Roof Floodlights**
- **High-mast Lights**
- **Other Lights**

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

Kauai is served by two deep-draft commercial harbors, Nawiliwili Harbor and Port Allen Harbor. A general description of each is provided below. For its lawful land, water, and ocean use activities, HDOT is applying for an ITP under the KSHCP for the Newell's shearwater (*Puffinus newelli*), Hawaiian petrel (*Pterodroma sandwichensis*), and band-rumped storm petrel (*Oceanodroma castro*).

Nawiliwili Harbor

Nawiliwili Harbor is owned and operated by the State of Hawaii and is the island's primary commercial and transportation center, located 1 mile from the county seat in Lihue. It is located on the southeast coast of Kauai and is just 4 miles from Lihue Airport, with easy access to the island's highway system through Waapa Road. Facilities include piers for the handling of both overseas and interisland containerized and general cargo, as well as cruise ship passengers and crews.

Nawiliwili Harbor is a human-made port, dredged from naturally formed Nawiliwili Bay. The ocean frontage consists of concrete piers or large rock and boulder fill. The existing harbor facilities include three piers providing over 1,800 feet of berthing space:

- Piers 1 and 2 together are 1,214 feet long with a depth of 34 feet at pier side.
- Pier 3, completed in 1994, is 635 feet long and contains over 16 acres of paved yard.

In addition, construction of a segmented pier approximately 100 feet long was completed in 2008.

The harbor basin is 1,540 feet wide by 1,950 feet long and is protected by a rock-faced jetty and a 2,150-foot-long breakwater. Kauai Harbors Table 2 and Kauai Harbors Figure 3 provides details of the existing facilities and external lighting, which is mandated for security and safety reasons for lawful operational activities at Nawiliwili Harbor. Lighting is important especially during twilight hours and from sunset to sunrise to protect this critical infrastructure, in compliance with federal requirements.

Adjacent to the commercial harbor is the Nawiliwili Small Boat Harbor, managed by DLNR's Division of Boating and Ocean Recreation. Nawiliwili Harbor does not have any beach area along its ocean frontage; the nearest beach area is at Nawiliwili Park and Kalapaki Beach, fronting the Kauai Marriot Beach Resort more than 900 feet from the property. The beach is 980 feet from the closest light feature at the harbor.

Nawiliwili Harbor and its operational and administrative activities are regulated by the U.S. Coast Guard (USGC) and Customs and Border Protection (CBP), U.S. Department of Homeland Security (DHS), Occupational Safety and Health Administration (OSHA), and the U.S. Department of Labor. Additionally, the portions of the harbor behind security fencing are designated and regulated by the CBP as "secured or sterile" (restricted) areas. These designated and restricted areas are accessible only by individuals who successfully complete a stringent Security Threat Assessment and Criminal History Security Check and who are issued a Transportation Worker Identification Card, which must be visibly displayed on their persons at all times. Entry by unauthorized individuals into these restricted areas is a federal violation. Containerized imported cargo must be inspected by CBP, and imported and exported products are inspected by the Hawaii Department of Agriculture. HDOT-H provides 24-hour security for the facilities through a contract with a private security services firm. On behalf of HDOT-H, each contracted private security officer must be qualified and certified to conduct their security duties at the facility as well as to successfully complete a Security Threat Assessment and Criminal History Security Check. Restricted areas are surrounded by a security fence, which serves to restrict access by unauthorized individuals, but also controls access by feral dogs or cats that may opportunistically prey on downed seabirds. All security requirements imposed on Nawiliwili Harbor are mandated under a Facility Security Plan (FSP), which is co-approved by a representative of the USCG and a designed official of Nawiliwili Harbor. The contents of the FSP are classified as Security Sensitive Information (SSI) and can be reviewed only "on an as needed basis" and released with proper written authorization.

Nawiliwili Harbor is the island's primary port of call, through which most maritime cargo is imported and through which island products are exported. All of Kauai's containerized cargo is received here and the harbor is the preferred destination for cruise ships, limited to vessels with lengths not exceeding 1000 feet. In addition to cruise ship passengers the harbor handles commodities including darkened molasses; construction materials such as lumber, rebar, and cement; petroleum products such as gasoline; jet fuel and liquefied natural gas and propane; and scrap metal.

Nawiliwili Harbor has regularly scheduled cargo services by Matson, Inc. and Young Brothers, Limited shipping lines. Matson Inc. has weekly tug and barge service to Nawiliwili on Friday and Sunday, operating out of Pier 2. Matson vessels typically operate during day light hours and are in port from 7:00 am – 2:00 pm on Friday and 7:00 am – 3:00 pm on Sundays. Night operational lighting is typically not used unless departure is delayed for some reason.

Young Brothers has weekly tug and barge cargo service to Nawiliwili Harbor on Tuesday and Friday, operating out of Pier 3. Young Brothers tug and barge vessels typically arrive in the morning and depart later that same day after dark. The vessels are usually in port until 8:00 – 10:00 pm requiring full operational night lighting when vessels are actively loading and unloading with heavy equipment operators present.

The cruise ship Pride of America is the other vessel that makes regularly scheduled overnight visits to Nawiliwili Harbor, operating out of Pier 2. It arrives at 7:00 am on Thursday and departs at 2:00 pm on Friday. It requires night operational lights while in port, but Pier 2 has a reduced amount of lighting with three high-mast poles illuminating the pier. Only those portions of Pier 2 where lighting is needed for passenger access and safety are illuminated with night operational lights.

Nawiliwili is considered a daylight port for large vessels such as cruise ships, fuel tankers, and propane vessels which typically enter and leave port in a single day during daylight hours. Container cargo operations, such as Matson and Young Brothers, arrive by tug and barges and are not limited by daylight port only operations. The fuel tanker stays overnight, but does not require port side operational lights during these periods. Large cruise ships that do visit typically do so in a single day and do not stay overnight, but may not depart port until after dark, requiring elevated lighting levels to support those operations.

Port Allen Harbor

Port Allen Harbor is Kauai's second commercial harbor, located on the south coast of the island, 20 miles from Lihue Airport and 106 nautical miles from Honolulu Harbor. Port Allen Harbor is nestled in the naturally formed Hanapepe Bay. The Hanapepe River flows into the bay, but because much of the water has been diverted for irrigation purposes, sediments deposited by the river are minimal. The bay is surrounded by the old plantation communities of Hanapepe and Eleele to the north. Waialo Road provides access to the harbor from Kaumualii Highway. The dimension of the harbor basin is 1,200 feet by 1,500 feet and is protected by a 1,200-foot breakwater. The entrance channel is 500 feet wide with a depth of 35 feet. Adjacent to the commercial harbor is the Port Allen Small Boat Harbor managed by the DLNR Division of Boating and Ocean Recreation.

Port Allen Harbor is a smaller facility that serves the military, petroleum suppliers, and more recently, small charter and excursion boat operators. The harbor facilities include two 600-foot-long piers located on opposite sides of the primary pier structure. The north pier has a depth of 25 feet, while the south pier has a depth of 35 feet. The U.S. Navy Pacific Missile Range Facility (PMRF) leases the north pier berths, while the south pier berths are used by charters and excursion operators. Port Allen has facilities for liquid bulk (e.g., petroleum) cargo. There are roughly 1.5 acres of shed and open storage space at the facility. The north side of the pier used by PMRF has security fencing across the pier entrance and at the end of the PMRF-leased space. Port Allen is not regulated by a USCG FSP.

Port Allen Harbor is considered a daylight port and does not have high-mast lights to illuminate large vessel night operations. The regularly scheduled service by a large vessel is the fuel barge that visits every other Monday. The vessel arrives at first light and departs by 3:00 pm. The smaller sized charter and excursion operators use the pier in the early evening and at night, to service their boats. The south side of the facility is not fenced and is open to public access. The pier is a popular fishing spot and heavily used by the public for night fishing. The harbor is staffed by a harbor agent during the day, Monday - Friday and is unmanned on weekends and at night. Night lighting for facility security is on a timer and comes on at dusk and stays on overnight. The night lighting is limited to every other light along the Pier Shed. Tenants also provide their own external lighting to illuminate their work areas.

Kauai Harbors Figures 3 and 4 above show the location of buildings and features at Nawiliwili Harbor and Port Allen Harbor. Kauai Harbors Tables 2 and 3 below describe the type of lights at the building locations shown in these figures, their purpose, and measures implemented to avoid or minimize take impacts to Covered Species. Appendix A provides information on the specifications of the various types of lights used at each facility.

Kauai Harbors Table 2. Outdoor Lighting at Nawiliwili Harbor

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Harbor Yard	LED High-mast Lighting, Pole mounted at 82 ft high, 4000K, Dimmable (Holophane HMLED2 12 4K)	Paved container yard supporting Piers 1, 2, and 3	To provide operational safety and port security for yard operations, dock operations, yard storage, and yard parking areas	With the 2016 energy-savings program, high-pressure sodium light fixtures were replaced with downward pointed, full cut-off LED light fixtures. High-mast light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5. Further, lights are dimmed when no pier operations are in progress.
Harbor Yard Roadways	LED High-mast Lighting, Pole mounted at 28-44 ft high, 4000K, (Holophane HMLED2 06 4K)	Internal roadway between Piers 2 and 3	To provide operational safety and port security for internal yard roadway	With the 2016 energy-savings program, high-pressure sodium light fixtures were replaced with downward pointed, full cut-off LED light fixtures. Street light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Roadway Lighting, D series area luminaire, Pole mounted at 30 ft high, 4000K, (Lithonia DSX0 LED 20C 1000 40K)	Paved roadway off Waapa Road to Young Brothers entry gate to Pier 3.	To provide operational safety and port security for access roadway off Waapa Road	Downward pointed, full cut-off fixtures are compliant with night sky protection strategy under HRS Section 201-8.5.
Harbor Administration Building	LED Wall-pack Building Lights, 4000K. (RAB WPLED13N/PC2	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Recessed Ceiling Mount Downlight Building Lights, 4000K, (Precision RF6LED5G4-277)	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Ceiling Mount Canopy Downlight Building Lights, 4000K, (Cree CPY250-A-DM-F-C-UL-SV-PML)	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Harbor Maintenance Baseyard Buildings	LED Wall-pack Building Lights, 4000K. (RAB WPLED13N/PC2)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Flood Light Fixture – Flood or shoebox mount, LED, 4000K, (Holophane PMLED-03-4K)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Ceiling/wall mount Florescent Strip Fixture; 4000K, (Precision SIL-1X8-XL-F-UL-40K-CW8-JP)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	Downward pointed, full cut-off fixture, all ceiling/wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
Warehouse Pier 2 Building (occupied by Matson)	LED Wall-pack Building Lights, 4000K, dusk to dawn timer. (RAB WPLED3T78NW/PC2)	Pier 2	To provide operational safety and security for Matson processing and storage facilities.	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
	LED Flood Light Fixture, Flood or shoebox mount, 4000K, (Holophane PMLED-04-4K)	Pier 2	To provide operational safety and security for Matson processing and storage facilities	Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.
Warehouse Pier 3 Building (occupied by Young Brothers)	LED High Bay Fixture, ceiling mounted high bay, 4 LED modules, 4000K, (Cree PKG-304-5M-DM-04)	Pier 3	To provide operational safety and security for Young Brothers processing and storage facilities	Downward pointed, full cut-off fixture, all ceiling/wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.

Kauai Harbors Table 3. Outdoor Lighting at Port Allen Harbor

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Port Allen South Pier Shed Buildings	LED Wall-pack Building Lights, 4000K, dusk to dawn timer (RAB WPLED13N/PC2, RAB WPLED18N/PC2, RAB WPLED26N/PC2)	South Pier Shed Berths Walls	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves, night time setting of every other light turned off and are compliant with night sky protection strategy under HRS Section 201-8.5.
Port Allen South Pier Shed Buildings	LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Shed Walkway, Berth Walls	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves, turned off when no operations in progress and are compliant with night sky protection strategy under HRS Section 201-8.5.
Port Allen South Pier Shed Parking Lot	LED Flood Light Fixture, Flood mount on side of building, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Shed East End Parking Lot	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off function achieved by aiming angle and are compliant with night sky protection strategy under HRS Section 201-8.5.
Port Allen South Pier Parking Lot Storage Shed	LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Storage Building at back of Parking Lot	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off function achieved by aiming angle, wall-pack building light mounted under eaves.
Port Allen North Pier Shed Buildings	LED Wall-pack Building Lights, 4000K	North Pier Shed	To provide operational safety and security for U.S. Navy PMRF pier facilities	The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any measures taken to minimize take impacts are the responsibility of the U.S. Navy PMRF.
	LED Flood Light Fixture, Flood mount, 4000K	North Pier Shed	To provide operational safety and security for U.S. Navy PMRF pier facilities	The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any measures taken to minimize take impacts are the responsibility of the U.S. Navy PMRF.

Kauai Harbors Table 4. Green Sea Turtle (Honu) Assessment for the Site and Facility

Please provide the information requested below for each facility, parcel, and site to help determine if potential exists for take (pages may be attached). If potential exists for take of the green sea turtle, measures to avoid impacts to the honu from the effects of light attraction may be required. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the honu, and provide further guidance.		
Are any of the facilities located adjacent to a beach?	**Yes / No**	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Nawiliwili Harbor	No	
Port Allen Harbor	No	
Are any of the Covered Activities (lights) visible from a beach?	**Yes / No**	**If yes, describe the specific lights (type, quantity, height, purpose) & specific location; provide map & photos showing distance from beach**
Nawiliwili Harbor	No	
Port Allen Harbor	No	
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	**Yes / No**	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**
Nawiliwili Harbor	No	
Port Allen Harbor	No	

Lihue Airport Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season, etc.). For "Types of lights" please use the following categories:

- **Parking Lights**
- **Signage Illumination**
- **Wall-pack Building Lights**
- **Landscaping/Grounds/Accent/Bollards**
- **Indoor lights visible from outdoors**
- **Roof Floodlights**
- **Other Lights**

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table and green sea turtle assessment table below may each be modified as needed to provide the necessary information.

Lihue Airport

Lihue Airport is part of a statewide system that includes most of the major air carrier and general aviation airports in the Hawaiian Islands. It is part of the Kauai Island District.

Lihue Airport is classified by the FAA as a Class 1 Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. In order to serve air carrier operations, Lihue Airport is required to have 14 CFR Part 139 Airport Certification and hold a Part 139 Air Operating Certificate issued by the FAA, to ensure safety in air transportation. To obtain a certificate, an airport must agree to certain operational and safety standards, including having Part 139 compliant runway/taxiway and apron lighting and signage, lighting, and obstruction lighting. Lihue Airport is also governed by the provisions of Chapters 261, 262, and 263 of the Hawaii Revised Statutes. HDOT-A has compiled and published "Administrative Rules for Public Airports" (Title 19), promulgating rules and regulations for operation of the Airports Division (HDOT-A) and the individual airports throughout the state.

Lihue Airport occupies 915 acres and is situated about 1.5 miles east of Lihue, on the southeast coast of the island of Kauai. The airport promotes the freedom of movement of passengers and commerce and provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter/air taxis, air cargo, and general aviation activities. Airfield facilities include two runways (6,500 by 150 feet), taxiways, aprons, eight gates, navigational aids (ILS, VORTAC, DME, and PAPI/VASI), an airport traffic control tower, and helipads.

Vehicular access to the airport is provided by Ahukini Road, which extends from Kapule Highway. The passenger terminal is served by a one-way loop roadway branching off Ahukini Road and encircling a public parking lot. The remaining facilities are served directly by Ahukini Road.

Airport support elements include the Federal Aviation Administration (FAA) air traffic control tower, aircraft rescue and firefighting facilities, National Weather Service office and balloon launch facility,

HDOT-A Airport Maintenance facilities, fuel storage and loading facilities, concessions (food and beverage, retail, Wifi, rental cars) and airport service roads.

Airspace usage in the Lihue terminal area is influenced by urban development, resort and recreational areas (golf course), military activities, and terrain features. Some of these activities and operations may attract avian activity, but must comply with safety, security, and health regulations, some limit the use of airspace, and some do both.

There are currently no restrictions that influence aircraft performance on approaches or departures. The control tower advises arriving and departing aircraft to minimize overflights of the town of Lihue to the southwest. With respect to approach procedures, air traffic from the north must maintain an altitude of 1,500 feet until final approach.

Lihue Airport Figure 1 above shows the TMK parcels that compose the airport property. Lihue Airport Figure 2 above uses Google Earth imagery to show the landscape-scale features of Lihue Airport and identifies those buildings and features that have outdoor lights. Lihue Airport Table 1 describes the outdoor airport lighting. Appendix A provides information on the specifications of the various types of lights used at the facility.

Lihue Airport Table 1. Outdoor Lighting at Lihue Airport

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Main Ramp/Apron (Aircraft Operating Area)	HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps, on timer from dusk to 12:30 a.m.	The aircraft apron, ramp and taxiways servicing the main passenger terminal.	To provide operational safety and security for aircraft movement, servicing, maintenance, baggage handling, and passenger service	Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after the last flight departs for the night.
	HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps			Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after departure of the last flight.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture.
Terminal Building (Public Access)	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)	Main terminal public access areas, vehicle and pedestrian access	To provide operational safety and security for public, airport workers, and tenants.	Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)			Downward pointed, full cut-off fixture
	LED Ceiling Mount High Bay Parking Structure Luminaire, 4000K, (Cree PKG 304 PS DM 04-40K)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, High Bay Canopy Light, 4300K, (Cree CAN EDG 5S DM 04 43K)			Downward pointed, full cut-off fixture
Terminal Building (Public Access Indoor Lighting)	LED Interior Indoor Lights Visible from Outside. LED Fluorescent Light. On motion sensor to dim to 10% level when not occupied.	Main terminal public access passenger holding areas, pedestrian access	To provide operational safety and security for public, airport workers, and tenants.	Internal building lighting, passenger holding areas on motion sensor to dim to 10% level when not occupied.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Public Parking Lot	LED Pole Mounted Parking Lot Light, 4000K, Solar Powered dusk to dawn timer. Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340 LED Bollard Walkway light, 3 ft high, 5500K, Solar Powered dusk to dawn timer. First Light PLB 102 BZ SYM 55K 04 SEC)	Public Car Park	To provide public safety and security for visitors to airport and enable surveillance of parking areas to maintain airport security.	Downward pointed, full cut-off fixture Downward pointed, full cut-off fixture
Rental Car Lots (public access road)	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)	Rental car facilities access road	To provide safe driving, walking and working conditions for public, workers, and businesses.	Downward pointed, full cut-off fixture.
Ahukini Road	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2, R4, R5 GY NR DCDRIVER & EG-340) LED Sign Illumination, flood solar light, 2-light system, 2700K, dimmable. (Solar Illuminations FL57 2 lamp system 45W Panel)	Airport access road to main terminal, cargo and commuter terminal, and heliport Sign lighting along roadway	To provide safe driving, walking and working conditions for the public, airport workers, and tenants	Downward pointed, full cut-off fixture. Mounted above sign. Downward pointed
Cargo Ramp/Apron (Aircraft Operating Area)	HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps MH Metal Halide Lighting, Pole-Mounted Flood Fixture, Metal Halide, (4) 750W lamps, Magnetic ballast	Aircraft apron, parking stalls, and taxiways for the main terminal	To provide operational safety and security for aircraft movement, servicing, and maintenance, baggage handling for passenger service.	Downward pointed, full cut-off function achieved by aiming angle. Downward pointed, full cut-off function achieved by aiming angle. Downward pointed, full cut-off function achieved by aiming angle.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Commuter Terminal and Cargo Building (Public Access)	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)	Cargo and Commuter terminal public access areas, vehicle and pedestrian access	To provide operational safety and security for public, airport workers, and tenants and handling of cargo.	Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture
	LED Pole mounted shoebox area light, 4000K (Cree ARE EDG 3M DA 04 E 40K)			Downward pointed, full cut-off fixture
Heliport Apron (Aircraft Operating Area, T-hangers)	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)	Helicopter apron, T-Hangers, and service area within secure part of airport.	To provide safety and security for aircraft movement, servicing, and maintenance.	Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Flood Light, wall mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Flood Light, pole mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area light, wall mounted, 4000K (Cree ARE EDG 4M AA 04 E UL BZ 700 40K R + WM-2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Light, pole mounted shoebox fixture, 4000K, (Cree ARE EDG 3M DA 04 E UL BZ 525 R)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)			Downward pointed, full cut-off fixture.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Maintenance Area Building	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)	Airport Maintenance Area across from Heliport and Cargo and Commuter Terminal	To provide operational safety and security for airport maintenance personnel and work.	Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 4M WM 02 E - 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)			Downward pointed, full cut-off fixture
Fire Department	LED Flood light, Wall mounted, 4000K (Cree FLD EDG 70 AA 04 D UL BZ 525)	Airport airfield adjacent to runways	To provide operational safety and security for airport fire station, worker safety and facility security	Downward pointed, full cut-off function achieved by aiming angle
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k			Downward pointed, full cut-off fixture
	LED Area Light, Pole mounted, 4000K, (Cree ARE EDG 3M DA 06 D UL BZZ 700 40K P)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, Dimmable (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture

Lihue Airport Table 2. Green Sea Turtle (Honu) Assessment for the Site and Facility

Please provide the information requested below for each facility, parcel, and site to help determine if potential exists for take (pages may be attached). If potential exists for take of the green sea turtle, measures to avoid impacts to the honu from the effects of light attraction may be required. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the honu, and provide further guidance.		
Are any of the facilities located adjacent to a beach?	**Yes / No**	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Lihue Airport	**No**	
Are any of the Covered Activities (lights) visible from a beach?	**Yes / No**	**If yes, describe the specific lights (type, quantity, height, purpose) & specific location; provide map & photos showing distance from beach**
Lihue Airport	**No**	
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	**Yes / No**	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**
Lihue Airport	**No**	

Kauai Harbors Item 4. If applicable, describe any lighting standards (e.g., foot-candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

U.S. Coast Guard. Harbors Operations

The USCG operates under the Pacific Area Instructions 16611. Lighting for harbor facilities is regulated and governed by paragraph #5 of this document, which reads as follows:

5. Lighting

A. Facilities should be illuminated at least to the level of twilight and should be provided sunset to sunrise. The minimum standard for illumination should be one-foot candle at 1 meter above ground. Dock work areas, container unloading and loading areas, waterfront, perimeter, restricted areas and all access points should have 5 foot-candle illumination.

B. Lighting should conform to federal regulations (e.g. OSHA) and comply with voluntary agreements such as U.S. Customs Sea Carrier or Super Carrier Initiatives (if applicable).

C. Updated lighting technology should be used, such as high-pressure sodium, mercury vapor, or metal halide lighting.

D. Lighting should be directed downward, away from guards or offices, or navigable waterways and should produce high contrast with few shadows.

U.S. Coast Guard Code of Federal Regulations Title 33, Chapter I, Subchapter H, Part 105 Maritime Security: Facilities, Subpart B Facility Security Requirements, Section 105.275 Security measures for monitoring, which reads as follows.

A. *General.* The facility owner or operator must ensure the implementation of security measures in this section and have the capability to continuously monitor, through a combination of lighting, security guards, waterborne patrols, automatic intrusion-detection devices, or surveillance equipment, as specified in the approved Facility Security Plan (FSP), the:

1. Facility and its approaches, on land and water;

2. Restricted areas within the facility; and

3. Vessels at the facility and areas surrounding the vessels.

B. *MARSEC Level 1.* At MARSEC Level 1, the facility owner or operator must ensure the security measures in this section are implemented at all times, including the period from sunset to sunrise and periods of limited visibility. For each facility, ensure monitoring capability that:

1. When automatic intrusion-detection devices are used, activates an audible or visual alarm, or both, at a location that is continuously attended or monitored;

2. Is able to function continually, including consideration of the possible effects of weather or of a power disruption;

3. Monitors the facility area, including shore and waterside access to it;

4. Monitors access points, barriers and restricted areas;

5. Monitors access and movements adjacent to vessels using the facility, including augmentation of lighting provided by the vessel itself; and

6. Limits lighting effects, such as glare, and their impact on safety, navigation, and other security activities.

C. *MARSEC Level 2.* In addition to the security measures for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved FSP. These additional measures may include:

1. Increasing the coverage and intensity of surveillance equipment, including the provision of additional surveillance coverage;

2. Increasing the frequency of foot, vehicle or waterborne patrols;

3. Assigning additional security personnel to monitor and patrol; or

4. Increasing the coverage and intensity of lighting, including the provision of additional lighting and coverage.

D. *MARSEC Level 3.* In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner or operator must also ensure implementation of additional security measures, as specified for MARSEC Level 3 in the approved FSP. These additional security measures may include:

1. Switching on all lighting within, or illuminating the vicinity of, the facility;

2. Switching on all surveillance equipment capable of recording activities within or adjacent to the facility;

3. Maximizing the length of time such surveillance equipment can continue to record; or

4. Complying with the instructions issued by those responding to the security incident.

U.S. Coast Guard Code of Federal Regulations Title 33, Chapter I, Subchapter L, Part 126, Section 126.15 Conditions for designation as designated waterfront facility (33 CFR 126.15), the relevant parts of which read as follows:

> (l) Lighting. That subject to applicable dim-out and blackout regulations, such waterfront facility is adequately illuminated during the handling, storing, stowing, loading, discharging or transporting of dangerous cargo thereon; and that kerosene and gasoline lamps and lanterns are not used on such waterfront facility.
>
> ****
>
> (n) Adequacy of guarding, fire extinguishing equipment, and lighting. That the word ‘‘adequate’’, as used in paragraphs (a), (j), and (l) of this section with respect to guarding, fire extinguishing equipment, and lighting, respectively, means that determination which a reasonable person would make under the circumstances of the particular case. Unless there is gross noncompliance, the judgment and determination of the operator of the facility will be acceptable as fulfilling the requirements unless and until the Captain of the Port inspects the facility and notifies the operator thereof in writing in what respect the guarding, fire extinguishing equipment, or lighting, is deemed inadequate and affords such operator an opportunity to correct the deficiency.

U.S. Coast Guard Code of Federal Regulations Title 33, Part 127 – Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas, Subpart B – Waterfront Facilities Handling Natural Gas, provides:

§127.109 Lighting systems.

A. The marine transfer area for LNG must have a lighting system and separate emergency lighting.

B. All outdoor lighting must be located or shielded so that it is not confused with any aids to navigation and does not interfere with navigation on the adjacent waterways.

C. The lighting system must provide an average illumination on a horizontal plane one meter (3.3 feet) above the deck that is—

    1. 54 lux (five foot-candles) at any loading flange; and

    2. 11 lux (one foot-candle) at each work area.

D. The emergency lighting must provide lighting for the operation of the—

    1. Emergency shutdown system;

    2. Communications equipment; and

    3. Firefighting equipment.

U.S. Coast Guard Code of Federal Regulations Title 33, Part 154, Facilities Transferring Oil or Hazardous Material in Bulk, Subpart C – Equipment Requirements, provides:

§154.570 - Lighting.

A. Except as provided in paragraph (c) of this section, for operations between sunset and sunrise, a facility must have fixed lighting that adequately illuminates:

    1. Each transfer connection point on the facility;

    2. Each transfer connection point in use on any barge moored at the facility to or from which oil or hazardous material is being transferred;

    3. Each transfer operations work area on the facility; and

    4. Each transfer operation work area on any barge moored at the facility to or from which oil or hazardous material is being transferred.

B. Where the illumination is apparently inadequate, the COTP may require verification by instrument of the levels of illumination. On a horizontal plane 3 feet above the barge deck or walking surface, illumination must measure at least:

    1. 5.0 foot-candles at transfer connection points; and

    2. 1.0 foot-candle in transfer operations work areas.

C. For small or remote facilities, the COTP may authorize operations with an adequate level of illumination provided by the vessel or by portable means.

D. Lighting must be located or shielded so as not to mislead or otherwise interfere with navigation on the adjacent waterways.

[CGD 75-124, 45 FR 7172, Jan. 31, 1980, as amended by CGD 86-034, 55 FR 36253, Sept. 4, 1990]

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA)

OSHA Code of Federal Regulation Title 29, Part 1917, Marine Terminals, Subpart F - Terminal Facilities, provides:

§1917.123 Illumination.

A. Working and walking areas shall be illuminated. Unless conditions described in the regulations of the United States Coast Guard (33 CFR 126.15(1) and (n), and 33 CFR 154.570) exist in the case of specific operations, illumination in active work areas (for example, cargo transfer points) shall be of an average minimum light intensity of 5 foot-candles. The illumination in other work areas (for example, farm areas) shall be of an average minimum light intensity of 1 foot-candle except for security purposes when a minimum light intensity of 1/2 foot-candle shall be maintained. Where occasional work

tasks require more light than that which is consistently and permanently provided, supplemental lighting shall be used.

B. The lighting intensity shall be measured at the task/working surface in the plane in which the task/working surface is present.

C. Lights shall, so far as possible, be placed so that they will not shine in the eyes of employees.

Footnote: The United State Coast Guard, at 33 CFR 126.15(1) and (n), and 33 CFR 154.570 sets out requirements for illumination at "designated waterfront facilities" and "large oil transfer facilities." [48 FR 30909, July 5, 1983, as amended at 62 FR 40201, July 25, 1997]

Illuminating Engineering Society Standards

ANSI/IES RP-8-14. Roadway Lighting. IES RP-8-14 provides recommended practices for design of fixed lighting for roadways, streets, adjacent bikeways, and pedestrian ways. Its primary purpose is to provide recommended practices for designing new continuous lighting systems for roadways and streets to allow accurate and comfortable visibility at night of possible hazards in sufficient time to allow appropriate action. For a pedestrian, this can mean better visibility of the surrounds and the sidewalk, while for the driver of a motor vehicle, it will mean time to stop or to maneuver around an obstacle. The IES recommended illuminance values for continuously lighted intersections varies from 0.8-3.4 foot-candles corresponding to low to high pedestrian conflict areas at local to major streets and intersections.

American Association of State Highway and Transportation Organization (AASHTO) highway lighting requirements

The roadway lighting at harbor facilities was designed to meet safety standards established by AASHTO in their roadway lighting design guide. The AASHTO standards are the primary source for highway lighting policy, design and warranting used by state departments of transportation.

State of Hawaii Night Sky Protection Strategy, HRS Section 201-8.5

The provision requires all exterior light fixtures to be installed to be fully shielded, defined as “when the lighting fixture is shielded in such a manner that all light rays emitted by the fixture, either directly from the lamp, or indirectly from the fixture, are projected below a horizontal plane running through the lowest point of the fixture.” It also requires “every new outdoor lamp light fixture emitting more than three thousand lumens shall be required to be fully shielded and to have a correlated color temperature of four thousand Kelvin or less”.

Navigational lights that are required for waterway, open ocean, and aircraft safety; and outdoor lighting fixtures that are necessary for compliance with applicable federal, state, or county design standards or guidelines that are related to health and safety for the general public are exempt. Fully shielded replacement lighting fixtures for state managed roadways and highways shall be installed on a case-by-case basis, subject to the availability of capital improvement project funding and compliance with applicable federal, state, or county design standards or guidelines.

Lihue Airport Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

Detailed regulations and standards addressing lighting requirements at airports are prescribed in the following documents.

FAA Advisory Circulars (AC)

AC 150/5345-46E—Specifications for Runway and Taxiway Light Fixtures
https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5345-46E.pdf

Errata sheet for AC 150/5345-46E
https://www.faa.gov/documentLibrary/media/Advisory_Circular/errata-sheet-150-5345-46E.pdf

This FAA advisory circular contains the Federal Aviation Administration (FAA) specifications for light fixtures to be used on airport runways and taxiways. These specifications cover the requirements for various types of runway and taxiway light fixtures and specifies the light type, use, light direction and color. When installed, these lights must be directional or omnidirectional and a specific color for visibility by pilots. All lighting designs contained in this standard are the only means acceptable for the airport to meet the lighting requirements of Title 14 CFR Part 139, Certification of Airports, Section 139.311, Marking, Signs and Lighting.

AC 150/5300-13—Airport Design (dated 2/26/2014)
https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5300-13A-chg1-interactive-201705.pdf

Much of the concentrated outdoor lighting at airports is directed at aircraft parked at aprons located in the nonmovement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and or cargo. Activities such as fueling, maintenance and short/long-term parking take place on an apron. Apron layout depends on aircraft gate positions; aircraft and ground vehicle circulation needs; and aircraft clearance requirements. FAA advisory circular AC 150-5300-13A, Section 510 and A5-8 on marking and lighting of aprons, stipulates that “area lighting of apron areas is desirable, especially at terminal gates. The area light beams must be directed downward and away from runway approaches and control towers. Shielding of the lights may be needed to minimize unwanted glare. Area light spread should cover aircraft service areas. Refer to Illuminating Engineering Society of North America (IES), Recommended Practice for Airport Service Area Lighting, for additional guidance on apron area lighting.”

Illuminating Engineering Society Standards

IES RP-37-15 Outdoor Lighting for Airport Environments. IES RP-37-15 provides recommended practices for all outdoor lighting - air side and land side – for commercial airports. It is essential to provide at least minimum levels of light for safety and efficiency in conducting all work tasks in various areas of the airport. IES RP-37-15 provides guidance for an adequate and safe lighted environment while emphasizing restrictions, regulations and best practices for aircraft servicing and

apron areas; aircraft support services, i.e., fueling, cargo, baggage load/unload; passenger loading and unloading; roadways; vehicle parking facilities; and pedestrian walkways. Aprons and ramp lighting needs to provide illumination of aircraft from nose to tail for servicing and between 2-5-foot candles for tasks such as maintenance, fueling, and cargo loading and unloading. IES recommends illumination standards of between 1-5-foot candles for the landside areas of the airport including parking facilities, parking lots, pedestrian walkways, vehicle transaction areas, and between 0.8-3.4. IES standards for roadway intersections, and 3.0-foot candles for secure access search area parking and roadways. Roadway lighting should eliminate the uplight component. IES standard for security includes vertical lighting in all cases where there is a need to identify people's face and body language and minimize shadows or a silhouette effect as the person moves through a space.

American Association of State Highway and Transportation Organization (AASHTO) highway lighting requirements

The roadway lighting at the Lihue Airport was designed to meet safety standards established by AASHTO in their roadway lighting design guide. The AASHTO standards are the primary source for highway lighting policy, design and warranting used by state departments of transportation.

TSA Airport Security Requirements

Airport security is regulated by TSA under Title 49 Code of Federal Regulations (CFR), part 1542. TSA requires that lighting be of sufficient intensity installed in areas requiring such protection to sufficiently light those areas where vehicles and aircraft maneuver so that such maneuvering may be done safely. In addition, lighting must be sufficient to detect the presences of persons or vehicles and afford positive identification during hours of darkness. Lighting must not affect the night vision requirements of the flight crew members, nor cause direct glare conditions. Lighting must be provided along the airport perimeter and at manned access gates.

State of Hawaii Night Sky Protection Strategy, HRS Section 201-8.5

The provision requires all exterior light fixtures to be installed to be fully shielded, defined as "when the lighting fixture is shielded in such a manner that all light rays emitted by the fixture, either directly from the lamp, or indirectly from the fixture, are projected below a horizontal plane running through the lowest point of the fixture." It also requires "every new outdoor lamp light fixture emitting more than three thousand lumens shall be required to be fully shielded and to have a correlated color temperature of four thousand Kelvin or less". Navigational lights that are required for waterway, open-ocean, and aircraft safety; and outdoor lighting fixtures that are necessary for compliance with applicable federal, state, or county design standards or guidelines that are related to health and safety for the general public are exempt. Fully shielded replacement lighting fixtures for state managed roadways and highways shall be installed on a case-by-case basis, subject to the availability of capital improvement project funding and compliance with applicable federal, state, or county design standards or guidelines.

Kauai Harbors Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

The Harbors Modernization Plan identifies proposed future facilities for HDOT-H. The plan does not contain proposals for future facilities or expansion of existing facilities on the island of Kauai. During December 2013, HDOT-H executed a 20-year term contract with Johnson Controls, Inc. (JCI), to address current and future energy conservation needs, as well as to be dark sky friendly in compliance with HRS § 201-8.5 and to serve as a model for other agencies to follow. In September 2015, the Harbors Division negotiated a $26,200,000 energy savings improvement contract with JCI for approximately 1,030,443 square feet of buildings and 18,025,128 square feet of exterior lighted areas, with a projected 40% average annual energy savings. Approximately 2,346 high-mast light fixtures and 3,381 interior, roadway, and parking lot light fixtures were replaced with variable controls to be in compliance with Occupational Safety and Health Administration (OSHA) rules and the USCG 5-foot candle power requirement in working areas. The new fixtures feature the ability to dim and turn off lighting when not needed, in compliance with Hawaii Revised Statutes section 201-8.5—night sky protection strategy (dark sky friendly). Nawiliwili Harbor has completed its lighting upgrade with full cut-off lights at a cost of $1,209,561.

JCI, HDOT-H's lighting contractor, has completed the lighting upgrades at Port Allen Harbor. These upgrades also include full cut-off lights at a cost of $102,715.

The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H is willing to explore the feasibility of installing light filters to reduce the white/blue hues of the LED light fixtures within safety and security considerations and is currently testing such light filters at Hilo Harbor.

Lihue Airport Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

An HDOT-A contract to repave the runway at Lihue Airport has been awarded. Initially, the repaving was scheduled to take place during evening hours to accommodate the landing and taking off of aircraft. Due to concerns regarding construction lights and airfield lighting during the 2018 seabird fallout season, completion of this project is currently on hold.

HDOT-A has completed Phase 1 lighting upgrade at Lihue Airport that included new full cut-off solar street lights along Ahukini road, full cut-off solar lights in parking lots and maintenance baseyard, new LED site lighting at fire department and maintenance hangars, and new LED light fixtures in the passenger loading and unloading, baggage handling, and interior holding areas in the terminal. Phase 1 improvements at Lihue cost $5,809,601 and were completed in 2016.

HDOT-A has initiated a contract for Phase 2 airport lighting upgrade that will include new full cut-off LED exterior light fixtures with pole, wall and bollard mounting locations. Phase 2 will upgrade exterior lighting in the T-hangers, commuter terminal, maintenance area, cargo terminal, FedEx building, walkway in public parking lot, and wall mounted lighting in the main apron (ramp) area. Phase 2 improvements at Lihue will cost $1,179,314 and are scheduled to be completed in 2018.

HDOT-A has initiated planning with its lighting contractor for Phase 3 of lighting improvements to upgrade 45 high mast lights at its main and cargo apron (ramp) at Lihue and other airports. A pilot

project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements, and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and on securing funding for construction through the legislative budget process. The estimated budget for Phase 3 improvements is $1,917,386, and the tentative timeline for implementation is 2020-2025.

Kauai Harbors Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to <u>avoid</u> the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Nawiliwili Harbor and its operational and administrative activities are regulated by DHS, USCG, CBP, and OSHA. See Kauai Harbors Item 4, above.

USCG and OSHA regulate lighting located in operational areas of the port for security and safety compliance. USCG regulates maritime security nationally and sets security requirements for maritime facilities. Facility owners or operators in general must implement facility security measures and continuously monitor facilities through a combination of lighting, security guards, patrols, detection devices, or surveillance equipment, including the period from sunset to sunrise and periods of limited visibility. USCG requires and approves a FSP for each regulated commercial harbor to identify, prevent, and detect terrorist-related activities in accordance with Title 33, Code of Federal Regulations, Part 105, Subpart D Facility Security Plan (33 CFR 105.405). Known or perceived threats are reflected by assignment of Maritime Security threat codes, which require that applicable security measures be implemented in accordance with the FSP. As threat levels increase, the facility may need to increase coverage and intensity of lighting to higher security levels.

USCG also approves all DHS grants under the Port Security Grant Programs, including the Homeland Security Communications Project (security cameras) and the Port Grant Maritime Network Project. These projects centralize security cameras for surveillance at all regulated commercial harbors in Hawaii, in compliance with the Area Maritime Transportation Security Plans, to strengthen core security capabilities and critical port infrastructure and help achieve the National Preparedness Goal.

Because of USCG security monitoring requirements and OSHA worker safety regulations, alternatives or minimization measures that require operational or facility design changes are limited to those that can comply with existing national security and safety requirements.

1. Avoidance Alternative-The “No Incidental Take” Alternative: Turn off/deactivate <u>all</u> outdoor lights from dusk to dawn during the fledgling fallout season, September 15 to December 15.

   This is not a viable alternative for Nawiliwili Harbor and Port Allen Harbor because of USCG and OSHA security and safety requirements.

   a. Nawiliwili Harbor (Kauai Harbors Table 5).

      Nawiliwili Harbor is Kauai’s primary cargo and cruise ship port, supporting the island’s economy with essential shipments of food, clothing, building materials, cars

and fuel. Interisland cruise ships (Norwegian Cruise Lines, Princess, and others) and seasonal foreign cruise ships use Nawiliwili Harbor, accommodating visitors who support the island's economy.

1. Maritime shipping and cruise ship schedules have vessels in port during all or portions of the night on a regular schedule, necessitating terminal operations at night. The cargo loading areas are lighted when cargo vessels are at berth and during off-loading and on-loading of cargo. The terminal also remains operational when cruise ships remain at berth overnight, allowing passengers to leave the ships to enjoy local activities, dining, and shopping, and eventually to return to the ships.

2. OSHA requires that terminal lights provide illumination at a measurement of five foot-candles for active work areas, and one foot-candle in other work areas, and ½ foot-candle for security purposes (OSHA 29 CFR 1917.123). Terminal lights must thus be activated at specified intensities to enhance worker and public safety during night cargo and passenger operations.

3. USCG oversees the security precautions, hazardous cargo handling, and port operations of Nawiliwili Harbor. USCG regulations and guidance published as Navigation and Vessel Inspection Circulars (NVICs), dictate that terminal lights provide security illumination throughout the night as a security measure for protection of passengers, facilities, personnel, vessels, cargo, and critical infrastructure, as well as for the prevention of terrorist attack (USCG 33 CFR 105.260, 105.275). USCG regulations require that harbor facilities have adequate illumination during the handling, storing, stowing, loading, discharging, or transporting of dangerous cargo between sunset and sunrise, and that fixed lighting provide illumination of between 1 to 5 foot-candles in operation areas (USCG 33 CFR 154.570, 127.109, 126.15)

b. Port Allen Harbor (Kauai Harbors Table 6).

Port Allen Harbor services liquid bulk cargo oil shipments, excursion and charter boats, and commercial fishing operations at its southern berths. Liquid bulk cargo and excursion and charter boat activities are generally daylight operations. Charter and excursion tenants service their boats in late afternoon and into early evening. Commercial fishing boats will occasionally berth on the southern pier and perform maintenance operations at night. The southern pier is open to public access and heavily used by the public for night fishing. The southern berths are illuminated by wall-mounted shed lights, which are shielded and fully cut off. The pier's northern berths are leased to the U.S. Navy PMRF. These berths are also illuminated by wall-mounted shed lights. The parking lot is illuminated by two shed-mounted flood lights.

1. Commercial fishing boats and excursion and charter boats may use the south pier for 24-hour maintenance needs and emergency shelter. The public uses the pier for access to commercial charters and excursion operators, which can come and go after dark. The pier is also used by the public for recreational fishing at night. As a public commercial harbor that provides maritime cargo

operations and passenger services, night lighting is needed for passenger, worker, and public safety (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570).

2. The U.S. Navy leases the northern berths and requires overnight lighting for security purposes.

2. Avoidance Alternative-Restricted Usage of Lighting Alternative: Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)

   This is not a viable alternative for Nawiliwili Harbor and Port Allen Harbor because of USCG and OSHA security and safety requirements.

   a. Nawiliwili Harbor (Kauai Harbors Table 5).

      Maritime shipping and cruise ship schedules have vessels arriving, departing, and in port during all or portions of night. USCG and OSHA regulations require nighttime lighting for security, cargo handling operations, cruise line passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123; USCG 33 CFR 105.275, 126.15, 127.109, 154.570). As a designated commercial port, Nawiliwili needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours.

   b. Port Allen Harbor (Kauai Harbors Table 6).

      Commercial fishing boats and excursion and charter boats may use the south pier for maintenance and emergency shelter during all portions of the night. Public access to commercial charters and excursion operators and to recreational fishing, occurs at night. USCG and OSHA regulations require nighttime lighting for cargo handling, passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123; USCG 33 CFR 126.15, 154.570). As a public commercial harbor, Port Allen needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. The U.S. Navy lights its berths for security purposes throughout the night.

   The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H is willing to explore the feasibility of installing light filters to reduce the white/blue hues of the LED light fixtures within safety and security considerations, and is currently testing such light filters at Hilo Harbor.

Kauai Harbors Table 5. Light Attraction Alternatives to the Taking—Nawiliwili Harbor

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
Avoidance Alternative-The "No Incidental Take" Alternative: **Deactivate <u>all</u> outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15)**	Nawiliwili Harbor is Kauai's primary cargo and cruise ship port. Maritime shipping and cruise ship schedules have vessels in port during all or portions of night. USCG regulation 33 CFR sections 105.275, 126.15, 127.109, and 154.570 require that marine terminal facilities provide adequate illumination throughout the night for security and safe handling of hazardous cargo. OSHA regulation 29 CFR section 1917.123 requires that marine terminal facilities provide illumination at a measurement of one to five foot-candles in work areas and ½ foot-candle for worker safety. Whenever cargo handling and cruise line passenger services are provided after dark, facility lights must be activated at specified intensities to enhance worker and public safety. Because of security and safety requirements, this is not a viable alternative for Nawiliwili Harbor.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)**	Nawiliwili Harbor: Maritime shipping and cruise ship schedules have vessels in port during all or portions of night. USCG and OSHA require night lighting for security and worker and public safety (OSHA 29 CFR 1917.123; USCG 33 CFR 105.275, 126.15, 127.109, 154.570). Nawiliwili Harbor needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. Because of security and safety requirements, this is not a viable alternative for Nawiliwili Harbor.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu)**	Nawiliwili Harbor: Not applicable. No beach area is adjacent to Nawiliwili Harbor.
Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	Not applicable.

Kauai Harbors Table 6. Light Attraction Alternatives to the Taking— Port Allen Harbor

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
Avoidance Alternative-The "No Incidental Take" Alternative: **Deactivate <u>all</u> outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15)**	Port Allen Harbor services liquid bulk cargo, excursion/charter boats, and commercial fishing operations. Most are generally daylight operations, but commercial fishing boats and excursion/charter boats may use the south pier for maintenance and emergency shelter. The public uses the pier for access to commercial charters and excursion operators, which can come and go after dark. The pier is also used by the public for recreational fishing at night. As a public commercial harbor that provides maritime cargo operations, passenger services, and public access, night lighting is needed for passenger, worker, and public safety (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570). The U.S. Navy leases the northern berths, which are lighted overnight. The U.S. Navy requires lights for security purposes. Because of security and safety requirements, this is not a viable alternative for Port Allen Harbor.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)**	Port Allen Harbor: Commercial fishing boats and excursion/charter boats may use the south pier for maintenance and emergency shelter during all portions of the night. Public access to commercial charters and excursion operators, and recreational fishing, occurs at night. USCG and OSHA regulations require nighttime lighting for cargo handling, passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570). As a public commercial harbor, Port Allen needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. The U.S. Navy lights its berths for security purposes all night. Because of security and safety requirements, this is not a viable alternative for Port Allen Harbor.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu)**	Port Allen: Not applicable. No beach areas are adjacent to Port Allen Harbor.
Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	Not applicable.

Lihue Airport Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to <u>avoid</u> the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Avoidance measures seek to avoid adverse effects of lighting on covered seabird species, thereby reducing the chance of incidental take. Kauai Seabird HCP Applicants will be required to implement avoidance alternatives to the "<u>maximum extent practicable</u>" per applicable state and federal laws to receive an incidental take permit/license.

Avoidance measures are those which cease or suspend lighting activities posing threats to the Covered Species. If avoidance measures are not deemed practicable due to facility safety or security reasons, then the applicant must utilize minimization measures to reduce their threats to seabirds.

Kauai Seabird HCP applicants are required to provide justification, such as policies, regulations, or other rationale, for avoidance measures that will not be implemented.

Avoidance Alternatives Considered

Lihue Airport is classified by the FAA as a Class I Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. In order to serve air carrier operations, Lihue Airport is required to hold a Part 139 Air Operating Certificate issued by the FAA, to ensure safety in air transportation. To obtain a certificate, an airport must meet certain operational and safety standards, including having Part 139 compliant runway/taxiway and apron lighting and signage, lighting, and obstruction lighting. It also operates under an Airport Security Program (ASP) approved by the Transportation Security Administration (TSA) requiring security and safety measures be implemented at Lihue Airport. NOTE: The ASP is classified and its contents are Sensitive Security Information. The airport provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter air taxi, air cargo, concession, tenant, and general aviation activities, with well over 100,000 aircraft operations per year. Aircraft operations and servicing occur during nighttime hours and require adequate lighting.

Avoidance alternatives considered for HDOT-A facilities on Kauai are described below and in Lihue Airport Table 3. Each alternative description below is followed by a feasibility determination.

1. Avoidance Alternative-The "No Incidental Take" Alternative: Deactivate all outdoor artificial lights from dusk to dawn during the seabird fallout period (September 15–December 15) each year.

   This is not a viable alternative for Lihue Airport because of FAA and TSA security and safety requirements and regulations.

   a. Lihue Airport is a FAA Class I Airport certified to serve scheduled and unscheduled operations of large air carrier aircraft day and night. Airport lights are required by the FAA for aeronautical safety. The FAA requires specified lighting for runway, taxiway, apron (ramp) operations, and passenger terminal operations. Runway and taxiway lights, by regulation, face skyward to ensure safe aeronautical operations. These lights cannot be deactivated without endangering the lives of passengers and flight crews.

Additionally, the FAA will levy penalties and sanctions if runway, taxiway, and apron lights are not activated during flight operations. TSA also requires lighting for security and safety reasons. The IES has established public safety standards for outdoor lighting for the various airport environments that specify lighting during periods when the public or workers are present and minimum light levels for security. Because the airport is open 24 hours per day, nighttime lighting is required for aspects of airport operations during all or portions of the night.

b. Ahukini Road is an internal airport roadway under HDOT-A's jurisdiction open to the public 24 hours a day. The American Association of State Highway and Transportation Organization (AASHTO) and IES have established lighting standards for public highways and airport roadways to ensure adequate visibility for safe motorist and pedestrian use. Ahukini Road lights meet the AASHTO and IES guidelines. Because public safety is of primary concern, Ahukini Road must remain illuminated during the night. HDOT would be liable for accidents and fatalities if Ahukini Road were inadequately illuminated.

2. Avoidance Alternative-Restricted Usage of Lighting Alternative: Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)

   This is not a viable alternative for Lihue Airport due to FAA and TSA security and safety requirements and regulations.

   a. Lihue Airport is an FAA Class I Airport certified to serve scheduled and unscheduled operations of large air carrier aircraft day and night. Airport lights are required by the FAA for aeronautical safety. TSA requires lighting for security and safety.

   b. Ahukini Road lights must operate at night to ensure motorist and pedestrian safety as required by the AASHTO and IES guidelines for driver safety. This road needs to be accessible to motorists 24 hours a day.

Lihue Airport Table 3. Light Attraction Alternatives to the Taking

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
Avoidance Alternative-The "No Incidental Take" Alternative: **Deactivate <u>all</u> outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15)**	a. It is not feasible for HDOT-A to deactivate all outdoor lights from dusk to dawn at any time of the year. Lihue Airport operates year-round and is subject to FAA and TSA lighting safety and security regulations. Airport lights are required by the FAA for aeronautical safety. The FAA requires specified lighting for runway, taxiway, and apron operations. These lights cannot be deactivated without endangering the lives of passengers and flight crews. Additionally, the FAA will levy penalties and sanctions if runway, taxiway, and apron lights are not activated during flight operations. TSA also requires adequate lighting for security and safety. IES provides recommended practices for all outdoor lighting - air side and land side – for commercial airports to provide an adequate and safe lighted environment. b. Ahukini Road, which fronts Lihue Airport, is under the HDOT-A's jurisdiction. Ahukini Road lights are required for motorist and pedestrian safety. AASHTO and IES have established lighting standards for adequate and safe public use of Ahukini Road. Ahukini Road is open to public use 24 hours per day, and deactivating lights would present a safety hazard. Because motorist safety is of primary concern, Ahukini Road must remain illuminated at night for pedestrian and motorist safety.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)**	a. It is not feasible for HDOT-A to change operations to eliminate the need for outdoor artificial lighting at Lihue Airport. Given the nature of the airport's 24 hours per day, 7 days a week operations, it is necessary for outdoor lights to be illuminated during nighttime hours, to ensure safety for air travel, air carriers, passengers, and workers. Additionally, FAA requires specific lighting for runways, taxiways, and aprons. TSA also requires adequate lighting for security purposes. The airport and public access roadway are open 24 hours per day and require adequate and safe lighting during nighttime hours.
Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu).	Not applicable
Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered.	Not applicable

Kauai Harbors Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in *Appendix E (Guidelines for Adjusting Lighting at Facilities)* of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the "maximum extent practicable" per applicable state and federal laws, which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching for and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e., feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

The following section and tables discuss minimization alternatives that HDOT-A considered for Nawiliwili and Port Allen Harbors to reduce impacts to the "maximum extent practicable":

1. Minimization Alternative: Transition to shielded and/or full cut-off fixtures.

    a. Nawiliwili Harbor.

        USCG and OSHA regulate the lighting located in operational areas for security and safety compliance. USCG regulates maritime security nationally and sets security requirements for maritime facilities. Facility owners or operators in general must implement facility security measures and continuously monitor facilities through a combination of lighting, security guards, patrols, detection devices, or surveillance equipment, including the period from sunset to sunrise and periods of limited visibility. USCG also approves all DHS grants under the Port Security Grant Programs, including the Homeland Security Communications Project (security cameras) and the Port Grant Maritime Network Project. These projects centralize security cameras for all regulated commercial harbors in Hawaii, in compliance with the Area Maritime Transportation Security Plans, to strengthen core security capabilities and critical port infrastructure and help achieve the National Preparedness Goal. USCG also requires a FSP for each regulated commercial harbor to identify, prevent, and detect terrorist-related activities in accordance with Title 33, Code of Federal Regulations, Parts 105, Section 105.405.

        Nawiliwili Harbor already has completed a lighting upgrade to full cut-off LED lights. The harbor has replaced high-mast flood lighting in the cargo operations areas with high-mast, full cut-off LED fixtures.

    b. Port Allen Harbor.

The pier's southern berths are illuminated by wall-mounted shed lights, which have been upgraded to full cut-off fixtures. The pier shed has flood lights that illuminate the parking area and are installed with an aiming angle to achieve full cut-off functionality. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements.

The pier's northern berths are under lease and control of the U.S. Navy PMRF. PMRF is responsible for implementing minimization measures under its ESA obligations.

2. Minimization Alternative: Reduce the number of lights activated from dusk to dawn during the fledgling fallout season (September 15 to December 15).

    a. Nawiliwili Harbor.

    Nawiliwili Harbor's terminal yard lights have been wired so that a portion of the bulbs in the high-mast light fixtures can be turned off (dimmed) during non-operational hours, leaving a smaller portion of the bulbs activated when no operations are in progress. The deactivation varies per light fixture and location, but all of the high mast light fixtures upgraded during Phase 1 improvements have dimming capability. The usual night lighting at Nawiliwili Harbor involves dimming high-mast LED yard lights when no operations are in progress, and turning on to full illuminance only when active cargo or passenger operations are occurring, and only at the specific pier and portion of the pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2). When passenger or cargo operations are not in progress, the high mast lights are dimmed and building lights are turned off, with the exception of wall pack lights for security purposes. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.

    b. Port Allen.

    HDOT-H has implemented an upgrade of lights at Port Allen Harbor to full cut-off fixtures. There are no high mast lights at this facility, and the lights that illuminate the southern berths are wall-mounted shed lights. The wall pack night lighting for Port Allen is set on a timer to turn on from dusk to dawn, but to turn on only every other wall pack fixture to provide security and safety lighting. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed. The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any reduction in the number of lights activated on the north pier must be coordinated with and approved by the PMRF.

    Additional minimization alternatives are discussed in Kauai Harbors Tables 7 and 8.

Kauai Harbors Table 7. Seabird Light Attraction Minimization Measures Considered—Nawiliwili Harbor

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
Change time of light use (lights off earlier)	**Partially**	Full illumination of lights is used only when longshoremen personnel require them. Lights are dimmed or switched off once cargo loading and unloading is finished. The usual night lighting at Nawiliwili Harbor for the high-mast LED yard lights is a dimmed setting. The high-mast lights are turned on to full illuminance only when active cargo or passenger operations are occurring and only at the specific pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2).
Deactivate unnecessary lights	**Partially**	Most harbors lights are dimmed during non-operational hours. High-mast LED yard lights are turned on full illuminance only on the specific days and at the specific piers where active cargo or passenger operations are occurring, and only while those operations are in progress. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.
Replace all outdoor lights with full cut-off fixtures	**Yes**	Nawiliwili Harbor has completed a light transition plan. HDOT-H has replaced high-mast flood lights with new, full cut-off, downward-pointing LED fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.
Shield all outdoor lights with full cut-off shields	**Yes**	Nawiliwili Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. The cut-off specifications are inherent in the fixture, and no additional shielding is needed. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements.
Angle all lights downward	**Yes**	Nawiliwili Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.
Lower intensity (lumens) of outdoor lights	**Partially**	The usual night lighting at Nawiliwili Harbor for the high-mast LED yard lights is a dimmed setting. The high-mast lights are turned on to full illuminance only when active cargo or passenger operations are occurring, and only at the specific pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2). The lumen levels of the lights cannot be permanently lowered because it does not provide the foot-candle illumination required by USCG and OSHA for adequate worker and public safety while cargo and passenger services are being provided (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15).
Change bulb color to non-white spectrum	**No**	The new LED lights installed by HDOT-H are phosphor coasted to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost. Additional research is needed on what light spectrum is not an attraction to seabirds for future lighting improvements. The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H will explore the use of electronic filters for lights to produce a non-white spectrum within safety and security considerations for future light improvements. HDOT-A is currently testing such light filters at Hilo Airport. Additionally, USCG and OSHA regulations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15) require minimum lighting standards for security and safety. Non-white spectrum bulbs would have to meet the foot–candle illumination required for safety and security. The

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
		implementation of future improvements will depend on securing funding for construction through the legislative budget process.
Lower height of light poles	**No**	Cargo operations in limited terminal acreage result in containers being stacked four to five units high. Container stacks could reach as high as 40 feet (containers are generally 8 feet high). Cargo terminal lights must therefore be mounted on poles at significant heights above the containers. This height ensures the containers will not block the lights and that the aisles between rows of stacked containers are satisfactorily illuminated. Nawiliwili Harbor terminal lights are thus mounted on high poles to provide the requisite lighting for ground-level operations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15).
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	HDOT-H staff will, or contract with USDA Wildlife Services (WS) or other contractor to, conduct animal control as part of its management responsibility. Animal control includes trapping and removing cats and conducting surveillance to detect and remove dogs that may enter the facilities. All rubbish is contained in sealed depositories that are removed routinely by the County.
Provide Worker Seabird Awareness Training to staff	**Yes**	USDA WS or other contractor will provide seabird awareness training to HDOT-H staff and harbor security personnel in August prior to the seabird fallout season and on a routine and regular basis throughout the season; workers and security personnel are given summary orientation that enables them to identify seabird species under differing scenarios, including in flight and grounded (alive, injured, dead) and provides written instructions on how to handle and report observations or encounters with grounded seabirds. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.
Provide outreach materials to staff & visitors	**Yes**	As part of the awareness training provided for staff, USDA WS or other contractor will provide KSHCP outreach materials (pamphlets and fliers that contain bulleted information and graphics) to staff, harbor security, and tenants. Information will remain in each harbor vehicle that is used on and around the harbor facilities. Cruise ship visitors are provided with these or similar materials to facilitate seabird light-attraction sensitivity training and enable visitors to report their observations to appropriate personnel, either while aboard ship or in the harbor area and surrounding community.
Host Save Our Shearwaters (SOS) Aid Station	**Partially**	HDOT-H will provide internal SOS aid provisions, but because of security restrictions, is not able to host a public SOS aid station. Any inquiries from the public will be directed to County SOS aid stations.

Kauai Harbors Table 8. Seabird Light Attraction Minimization Measures Considered—Port Allen Harbor

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
Change time of light use (lights off earlier)	**Partially**	There are no tall high-mast lights at the facility and all lights are full cut-off wall and shed mounted fixtures. Port Allen Harbor lights are on a timer and come on from dusk to dawn. The usual night lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15). The U.S. Navy PMRF has security requirements for the north pier.
Deactivate unnecessary lights	**Partially**	Terminal lights will be reduced to lower lighting levels during non-operational hours. Port Allen lights are on a timer and come on from dusk to dawn. The usual night lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15). HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.
Replace all outdoor lights with full cut-off fixtures	**Yes**	Port Allen Harbor has completed a transition plan to replace outdoor lights with full cut-off fixtures in the HDOT-H-operated south pier. Full cut-off functionality for flood lights is achieved by aiming angle. The U.S. Navy is responsible for implementation on the north pier.
Shield all outdoor lights with full cut-off shields	**Yes**	Port Allen Harbor has completed a transition plan to replace outdoor lights with full cut-off fixtures in the HDOT-H-operated south pier. The cut-off specifications are inherent in the fixture, and no additional shielding is needed. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements. The U.S. Navy is responsible for implementation on the north pier.
Angle all lights downward	**Yes**	Port Allen Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.
Lower intensity (lumens) of outdoor lights	**Partially**	Terminal lights will be reduced to lower lighting levels during non-operational hours. Port Allen lights are on a timer and come on from dusk to dawn. The usual night lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15).
Change bulb color to non-white spectrum	**No**	The new LED lights installed by HDOT-H are phosphor coasted to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost. Additional research is needed on what light spectrum is not an attraction to seabirds for future lighting improvements. The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H will explore the use of electronic filters for lights to produce a non-white spectrum within safety and security considerations for future light improvements. HDOT-A is currently testing such light filters at Hilo Airport. Additionally, USCG and OSHA regulations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15) require minimum lighting standards for security and

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
		safety. Non-white spectrum bulbs would have to meet the foot–candle illumination required for safety and security. The implementation of future improvements will depend on securing funding for construction through the legislative budget process.
Lower height of light poles	**No**	Not applicable; there are no pole lights at the facility.
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	HDOT-H will contract with USDA Wildlife Services (WS) or another contractor to, conduct animal control at the harbor. Animal control includes trapping and removing stray cats and dogs roaming at the facilities. All rubbish is contained in sealed depositories that are removed routinely by the County
Provide Worker Seabird Awareness Training to staff	**Yes**	HDOT will contract with USDA Wildlife Services (WS) or other contractor to provide annual seabird awareness training to all staff and tenants during August. Staff and tenants are given summary orientation that enables them to identify seabird species and written instructions on how to handle and report observations or encounters with grounded seabirds. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.
Provide outreach materials to staff & guests	**Yes**	As part of the awareness training provided for staff, USDA Wildlife Services (WS) or other contractor will provide KSHCP outreach materials (pamphlets and fliers that contain bulleted information and graphics) to staff and tenants to put in staff vehicles used at the harbor. Tenants will be asked to display and share outreach materials with their customers.
Host Save Our Shearwaters (SOS) Aid Station	**No**	HDOT will provide seabird aid training and protocol to staff and tenants, but because this facility is open to the public and not manned 24 hours, an SOS aid station will not be set up.

Lihue Airport Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the "maximum extent practicable" per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e., feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

Minimization Alternatives Considered

The ability to modify operations at Lihue Airport is limited. Lihue Airport is classified by the FAA as a Class I Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. As such, Lihue Airport is required to meet numerous lighting requirements specified by the FAA (see response to Lihue Airport Item 4 above) and cannot implement any measures that would prevent compliance with these standards. It also operates under an ASP approved by the TSA requiring security and safety measures be implemented at Lihue Airport. NOTE: The ASP is classified and its contents are Sensitive Security Information. Lihue Airport cannot implement measures that would preclude compliance with TSA security measures. Further safety standards established by IES, prescribe certain levels of lighting necessary to maintain public safety in airport terminals, passenger loading and unloading areas, pedestrian walkways, roadways, and parking facilities. Lihue Airport provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter air taxis, air cargo, concession, tenant, and general aviation activities, with well over 100,000 aircraft operations per year. Airport operations and maintenance and servicing of aircraft occur during night hours and require adequate lighting for security and safety measures and are implemented on a 24-hour, 7 days per week basis.

HDOT-A has implemented a number of allowable minimization measures at Lihue Airport. Lihue Airport Table 4 describes these measures and explains the basis for the conclusion that other measures are not feasible.

Lihue Airport Table 4. Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
Change time of light use (lights off earlier)	**Partially**	Lihue Airport is open 24 hours per day and 365 days per year. As a Class I airport, it services both scheduled and unscheduled large air carrier aircraft throughout the day, including during nighttime operations and emergency response. Airport lights are required for aeronautical safety by the FAA and for airport security by the TSA. FAA establishes standards for apron (ramp) area lights (FAA AC 150/5300 13A, IES RP-37-15 Outdoor Lighting for Airport Environments), requiring that lights be on and illuminate aircraft and workers on the apron when present. Shutting off high-mast apron lights when no aircraft or workers are present is feasible to reduce seabird attraction. The Airport Operations Center turns off the high-mast apron lights when they are not required for aircraft servicing and apron operations, during the seabird fallout season (September 15 through December 15). The apron lights are turned off after the last flight has departed for the night. Airport lighting such as for passenger loading and unloading, passenger walkways, parking facilities, and roadways are open 24 hours per day and 365 days per year. Public safety standards necessitate that these areas remain lit whenever they are occupied. Internal terminal lighting in passenger holding areas visible from outside are on motion detectors that dim lights when rooms are not occupied.
Deactivate unnecessary lights	**Partially**	Airport lights are required for aeronautical safety by the FAA and for airport security by the TSA. FAA establishes standards for apron (ramp) area lights (FAA AC 150/5300 13A, IES RP-37-15 Outdoor Lighting for Airport Environments), requiring that lights be on and illuminate aircraft and workers on the apron when present. Shutting off high-mast apron lights when no aircraft or workers are present is feasible to reduce seabird attraction. The Airport Operations Center turns off the high-mast apron lights when they are not required for aircraft servicing and apron operations, during the seabird fallout season (September 15 through December 15) after the last nightly flight has departed. HDOT will provide outreach and training to airport staff and tenants to manage light attraction risks and to turn off external lighting when work is completed.
Replace all outdoor lights with full cut-off fixtures	**Partially**	HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off LED fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, and maintenance areas of the airport, and wall packs on main apron. Phase 2 is scheduled to be implemented in 2018. Full cut-off functionality for some flood lights is achieved by aiming angle. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
Shield all outdoor lights with full cut-off shields	**Partially**	HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-A will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).
Angle all lights downward	**Yes**	HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, and maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).
Lower intensity (lumens) of outdoor lights	**No**	This measure does not provide the foot-candle illumination required by FAA for adequate safety and security lighting for servicing aircraft on active aprons (ramps) and support facilities (FAA AC 150/5300-13A, IES RP-37-15 Outdoor Lighting for Airport Environments). Additionally, lowering intensity of lighting is not applicable for taxiway and runway lights, which must comply with FAA safety regulations for specific visibility and colors of lights at different areas of runways and taxiways (FAA AC 150/5345-46E).
Change bulb color to non-white spectrum	**No**	The Phase 1 and Phase 2 new LED lights installed by HDOT-A are phosphor coated to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost; changing bulb color is not applicable for taxiway and runway lights, which must comply with FAA safety regulations for specific visibility and colors of lights at different areas of runways and

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
		taxiways (FAA AC 150/5345-46E). Additional research is needed on what light spectrum is not an attraction to seabirds to be evaluated in future light replacement at the main and cargo aprons/ramps; where feasible and permitted under applicable rules, HDOT-A will explore the use of electronic filters for lights to produce a non-white spectrum. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and to incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and on securing funding for construction through the legislative budget process.
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	HDOT-A prohibits unleashed predatory animals such as cats and dogs and the outdoor feeding of animals on the Lihue Airport premises. The U.S. Department of Agriculture (USDA) Wildlife Services (WS) conducts animal control as part of its management responsibility. Animal control includes trapping and removing cats and conducting surveillance to detect and remove dogs that may enter the airfield and introduced barn owls that may present a hazard to aircraft operations and downed seabirds. All rubbish is contained in sealed depositories that are removed routinely by the County.
Provide Worker Seabird Awareness Training to staff	**Yes**	USDA WS or other contractor will provide seabird awareness training to HDOT airport staff, airport security, tenants, and contractor personnel in August prior to the seabird fallout season. HDOT airport operations workers and contract security personnel are given a summary orientation that enables them to identify seabird species under different scenarios, including in flight and grounded (alive, injured, dead), and provides written instructions on how to handle and report observations or encounters with grounded seabirds. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.
Provide outreach materials to staff & guests	**Yes**	As part of the awareness training provided for staff, USDA WS or other contractor will provide KSHCP outreach materials (pamphlets and fliers that contain bulleted information and graphics) to HDOT airport staff, airport security, and tenants. HDOT fliers and information will be provided for each airport operations and security vehicle operating on airport facilities.
Host Save Our Shearwaters (SOS) Aid Station	**Partially**	USDA WS will provide an internal SOS aid station in the secure area of the airport, but because of security restrictions, will not be able to host a public SOS aid station. Any seabirds encountered on airport grounds will be documented, temporarily cared for, and turned over to County SOS aid stations as soon as possible. Any inquiries from the public will be directed to County SOS aid stations.

Kauai Harbors Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the "maximum extent practicable" per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the Participant must provide the reasoning why certain measures will not be implemented. The suggested tables below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Minimization plans for Nawiliwili Harbor and Port Allen Harbor are described in Kauai Harbors Tables 9-12.

Kauai Harbors Table 9. Light Attraction Minimization Plan—Nawiliwili Harbor

List of Buildings/Facilities	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Container yard pole lights – High-mast Lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$843,292 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Container Yard Roadway lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$4,517 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Harbor Administration Building lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$79,179 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Harbor Maintenance Compound Building lights	1. Install full cut-off fixtures 2. Test and install additional shielding on floodlights 3. Reduce number of lights activated when operations not in progress	$44,610 $4,000 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 2018 and ongoing
Warehouse Pier 2 Building lights (occupied by Matson)	1. Install full cut-off function 2. Test and install additional shielding on floodlights 3. Reduce number of lights activated when operations not in progress	$138,049 $4,000 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 2018 and ongoing
Warehouse Pier 3 Building lights (occupied by Young Brothers)	1. Install full cut-off function 2. Reduce number of lights activated when operations not in progress	$99,913 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing

Kauai Harbors Table 10. Light Attraction Avoidance and Minimization Plan—Port Allen Harbor

List of Buildings/Facilities	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
South Pier				
Port Allen South Pier Shed Buildings Wall-pack building lights	1. Install downward-pointing, full cut-off fixtures 2. Reduce number of lights activated. 3. Turn off external lights when work is completed. 4. Lower wall mounted lights to reduce glare	$23,502 $0 $0 $10,000	Harbors Kauai District Manager; Harbors Engineering	Completed 2017 2018 and ongoing 2018 and ongoing 2021
Port Allen South Pier Parking Lot Wall-pack flood lights	1. Install downward-pointing fixture with full cut-off function achieved by aiming angle 2. Test and install additional shielding on floodlights	$20,603 $4,000	Harbors Kauai District Manager; Harbors Engineering	Completed 2017 2018

Kauai Harbors Table 11. Seabird Mortality Minimization Plan—Nawiliwili Harbor

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)	HDOT-H will contract with USDA WS or another contractor to conduct predator control at harbors. USDA WS will live-trap and remove feral cats and dogs from the facility during seabird fallout period (September 15–December 15).	$10,000	Harbors Kauai District Manager
Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)	HDOT-H Kauai District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the facility during seabird fallout period (September 15–December 15).	$0	Harbors Kauai District Manager
Conduct nightly searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).	1. HDOT-H will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors. 2. HDOT-H will include seabird awareness and response activities into the contract with Nawiliwili Harbor Security Staff as part of its hourly security patrols around the facility.	$30,000 $0	Harbors Kauai District Manager
Train staff to follow minimization measures.	HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors, including an annual training program for staff and tenants.	$0 (cost included in task above)	Harbors Kauai District Manager

Kauai Harbors Table 12. Seabird Mortality Minimization Plan—Port Allen Harbor

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)	HDOT-H will contract with USDA WS or another contractor to live-trap and remove feral cats and dogs from the facility during seabird fallout period (September 15–December 15).	$10,000	Harbors Kauai District Manager
Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)	HDOT-H Kauai District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the facility during seabird fallout period (September 15–December 15).	$0	Harbors Kauai District Manager
Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).	1. HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors. 2. Port Allen Harbor staff will incorporate a seabird awareness and response plan into its daily routine at the facility.	$30,000 $0	Harbors Kauai District Manager Port Allen Harbor Agent
Train staff to follow minimization measures.	HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors, including an annual training program for staff and tenants.	$0 (cost included in task above)	Harbors Kauai District Manager

Lihue Airport Item 8. <u>Minimization Plans</u>. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the "maximum extent practicable" per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, an estimated completion schedule, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes).

For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked to future minimization measures and a process to determine how and when those measures will be evaluated, selected, and decided (such as a cost-benefit analysis).

If applicable, the Participant must provide the reasoning why certain measures will not be implemented. The suggested tables below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Minimization plans for Lihue Airport are described in Lihue Airport Tables 5 and 6.

Lihue Airport Table 5. Seabird Light Attraction Minimization Plan—Lihue Airport

List of Buildings/features	Avoidance and Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking lot lights	**Minimization Measures** 1. All overhead lights in the parking lot were replaced with full cut-off solar light fixtures during Phase 1 of HDOT-A's lighting contract. 2. Phase 2 lighting upgrade. HDOT-A plans to upgrade 18 paired (36 lamps) pedestrian pathway lights in the public parking lot to bollard style, cut-off optics, solar powered LED low-level commercial pathway lighting. The upgrade is scheduled to be implemented in 2018.	$8,029 $171,565	Airports Kauai District Manager Airports Kauai District Manager	Completed 2016 2018
Ahukini Road	**Minimization Measures** 1. Lights along Ahukini Road and access road to the rental car facilities were replaced with full cut-off solar light fixtures during Phase 1 of HDOT-A lighting contract.	$4,003,204	Airports Kauai District Manager	Completed 2016
Signage lights	**Minimization Measures** 1. HDOT-A will turn off the lighted airport entrance sign at 10:00 p.m. Lighted waterfalls will be timed to turn off at 10:00 p.m. 2. Lights are directed downward at signs and waterfalls, and there is no upward lighting.	$0 $0	Airports Kauai District Manager Maintenance	2018 Completed 2016
Main Terminal Apron, Cargo Apron, Commuter terminal lighting, helicopter maintenance lighting.	**Minimization Measures** 1. HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016 with full cut-off fixtures (Lihue Airport Table 1). Phase 1 included new LED terminal passenger loading and unloading areas, baggage handling areas, 2. Phase 2 lighting. HDOT-A plans to install additional full cut-off (fully shielded) LED lights, including pole-mounted and wall-mounted LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. 3. Test and install additional shielding on floodlights in maintenance area and at fire station. 4. Phase 3. HDOT-A plans to upgrade roughly 45 overhead high-mast lights at the main apron (ramp) and cargo main apron (ramp) with full cut-off (fully shielded) LED lights. A pilot project is being conducted at Hilo Airport to select best light characteristics. Funding would have to be secured to implement the project. Estimated completion date is 2020-2025 and would be dependent on Legislative funding. 5. The Airport Operations Center will turn off the high-mast apron lights when they are not required for airport operation during the seabird	$1,798,367 $1,007,749 $8,000 $1,917,386 $0	Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager	Completed 2016 2018 2018 2020-2025 2018

List of Buildings/features	Avoidance and Minimization Measures	Cost to Implement	Responsible Staff	Timeline
	fallout season (September 15 through December 15). The Airport Operations Center has area control of the high-mast apron lights, rather than individual pole-level control, and is able to turn off each apron area lights when no operations are in progress. 6. Airport Operations Center will provide outreach and training to staff and airport tenants to manage light attraction risks and to turn off external lighting when work is completed.	$0	Airports Kauai District Manager	2018 and ongoing
Landscaping and grounds lighting	**Minimization Measures** 1. All grounds and accent lights will be directed downward by grounds maintenance staff.	$0	Maintenance	Completed 2017
Other minimization	A letter requiring compliance with seabird-friendly lighting standards will be sent to airport rental tenants as part of seabird awareness training.	$0	Airports Kauai District Manager	2018

Lihue Airport Table 6. Seabird Mortality Minimization Plan

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)	USDA WS routinely traps feral cats year-round at Lihue Airport as part of the wildlife hazard management operations. During the seabird fallout season, the control of feral cats throughout the airport improves the survival and recovery of Covered Seabirds that have been grounded at the airport. Trapping for mongoose also is conducted at the airport for a few weeks after a reported sighting.	$10,000	District Manager
Prohibit feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)	The HDOT-A Kauai Airport District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the Lihue Airport during seabird fallout season (September 15–December 15).	$0	District Manager
Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).	HDOT will contract with USDA WS to implement an annual comprehensive seabird monitoring program at Lihue Airport, including the areas outside of the airport secure areas, such as the parking lot. See monitoring plan.	$50,000	District Manager
Train staff to follow minimization measures.	HDOT will contract with USDA WS to implement an annual training program for all staff to include seabird identification, seabird handling, and response procedures, as well as data recording and documentation techniques.	$0 (cost included in task above)	District Manager

Kauai Harbors Item 9. Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Nawiliwili and Port Allen harbors. The components of the monitoring program are described in Kauai Harbors Tables 13 and 14, and the details of the monitoring protocol, data collection sheets, instructions, and maps of area monitored are provided in Appendix B.

Kauai Harbors Table 13. Covered Seabird Take Monitoring Protocols—Nawiliwili Harbor

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched and the total area to be searched	1. USDA WS or other contract wildlife monitor: Driving and foot searches of harbor property during the fallout season. Combination of driving and walking survey to cover 100% of harbor property. 2. HDOT-H contract security staff: Driving survey of 100% of secure areas of harbor property. 3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season when cargo or cruise ship operations are in progress. 4. Employees must search underneath all vehicles before they are moved at night and first thing in the morning. 5. Intensive monitoring will be implemented in areas containing vegetation/landscaping and various types of vehicles and moveable equipment, and facility vegetation maintenance will include vegetation trimming to help locate fallout birds.	Search as much area as possible
Frequency of searches (number of searches per day or per week)	1. USDA WS or other contract wildlife monitor: Once nightly driving and foot searches of harbor property during the fallout season. 2. HDOT-H security staff: Hourly driving survey of secure areas of harbor property year-round (24 times per day). 3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season when cargo or cruise ship operations are in progress. A monitoring program combining a single nightly search by a dedicated searcher, with hourly routine patrols by HDOT-H security staff provided a 90% detection rate at Nawiliwili Harbor (see Appendix C for details of Searcher Efficiency Trials at Nawiliwili Harbor). These results indicated that once-nightly searches by dedicated searchers, in conjunction with regular patrols by facility security staff, is highly effective and would meet the standard of the KSHCP.	Twice daily
Time of day of searches	1. USDA WS or other contract wildlife monitor: Once nightly search of property during the fallout season, 2-4 hours after sunset. 2. HDOT-H security staff: Hourly driving survey, including the 2-hour period before sunrise. 3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season, 7:00 a.m. to 10:00 p.m., when cargo or cruise ship operations are in progress.	2-3 hours after sunset and within 3 hours after sunrise
Number of searchers per search area	1. USDA WS or other contract wildlife monitor: One staff person per survey. Driving and foot survey through harbor property. 2. HDOT-H security staff: One staff person per survey. 3. HDOT-H operations staff and tenants: Variable number of cargo or cruise ship staff members when operations are in progress.	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Proposed training	1. USDA WS or other contract wildlife monitor: Annual training refresher with County SOS program prior to fallout season. 2. HDOT-H security staff: Annual training prior to fallout season. 3. HDOT-H operations staff and tenants: Annual training prior to fallout season. 4. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.	Annual training covering seabird identification, seabird handling, and response procedures; verified and documented

Kauai Harbors Table 14. Covered Seabird Take Monitoring Protocols—Port Allen Harbor

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched and the total area to be searched	1. USDA WS or other contract wildlife monitor: Foot searches of harbor property during the fallout season. Foot survey to cover 100% of harbor property. 2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds when commercial vessel operations are in progress. 3. Employees must search underneath all vehicles before they are moved at night and first thing in the morning. 4. Intensive monitoring will be implemented in areas containing vegetation/landscaping and various types of vehicles and moveable equipment, and facility vegetation maintenance will include vegetation trimming to help locate fallout birds.	Search as much area as possible
Frequency of searches (number of searches per day or per week)	1. USDA WS or other contract wildlife monitor: Twice-daily foot searches of harbor property during the fallout season. 2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds in active work areas when commercial vessel operations are in progress.	Twice daily
Time of day of searches	1. USDA WS or other contract wildlife monitor: Twice-daily searches of property during the fallout season, 2-4 hours after sunset and during the 2-hour period before sunrise. 2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included) at 7:00–7:30 a.m.; if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds in active work areas when commercial vessel operations are in progress.	2-3 hours after sunset and within 3 hours after sunrise

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Number of searchers per search area	1. USDA WS or other contract wildlife monitor: One staff person per survey. Foot searches through harbor property. 2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants have a variable number of staff members present when commercial operations are in progress.	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training	1. USDA WS or other contract wildlife monitor: Annual training prior to fallout season. 2. HDOT-H operations staff and tenants: Annual training prior to fallout season. 3. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.	Annual training covering seabird identification, seabird handling, and response procedures; verified and documented

Lihue Airport Item 9. Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The monitoring plan describes how the property will be searched for downed Covered Seabirds. A monitoring plan is also required for the green sea turtle if potential exist for take of that species. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

HDOT-A will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Lihue Airport. The components of the monitoring program are described in Lihue Airport Table 7, and the details of the monitoring protocol, data collection sheets, instructions, and maps of area monitored are provided in Appendix B.

Lihue Airport Table 7. Covered Seabird Take Monitoring Protocols—Lihue Airport

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched and the total area to be searched	1. USDA WS or other contract wildlife monitor: Driving and foot searches of lighted portions of airport, including main apron (ramp), main terminal (exterior) main cargo apron (ramp), heliport, maintenance compound, parking lots, Ahukini Road public access areas (see survey route map in Appendix B). 2. DOT-A security staff: Driving survey of 100% of public access areas. Security staff will be trained to recognize seabirds and how to address if down seabird encountered. Opportunistic encounters of seabirds during the fallout season. 3. HDOT-A operations staff and tenants: Will be provided with information regarding seabirds and given instruction as to how to address downed birds. Opportunistic encounters of seabirds in active work areas during the fallout season. 4, Employees must search underneath all vehicles before they are moved at night and first thing in the morning. 5. Intensive monitoring will be implemented in areas containing vegetation/landscaping and various types of vehicles and moveable equipment, and facility vegetation maintenance will include vegetation trimming to help locate fallout birds.	Search as much area as possible
Frequency of searches (number of searches per day or per week)	1. USDA WS or other contract wildlife monitor: Once-daily driving and foot searches of airport property by dedicated staff, plus regular patrols by WS staff throughout the day during the fallout season. 2. HDOT-A security staff: Hourly driving survey of public access areas (24x per day). Opportunistic encounters of seabirds during the fallout season. 3. HDOT-A operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season. A monitoring program combining a single nightly search by a dedicated searcher, with hourly routine patrols by HDOT-H security staff provided a 90% detection rate at Nawiliwili Harbor (see Appendix C for details of Searcher Efficiency Trials at Nawiliwili Harbor). These results indicated that once-nightly searches by dedicated searchers, in conjunction with regular patrols by facility security staff, is highly effective and a similar program implemented at Lihue Airport by WS and HDOT-A staff and security would meet the standard of the KSHCP.	Twice daily
Time of day of searches	1. USDA WS or other contract wildlife monitor: Once-daily dedicated search of property during the fallout season, 2-4 hours after sunset. 2. USDA WS staff: Routine regular patrols by WS staff in morning, during the 2-hour period before sunrise, and throughout the day. 3. HDOT-A security staff: Hourly driving survey, including the 2-hour period before sunrise. 4. HDOT-A operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season.	2-3 hours after sunset and within 3 hours after sunrise
Number of searchers per search area	1. USDA WS or other contract wildlife monitor: One staff person per survey through airport property. 2. HDOT-A security staff: One staff person per survey with two to three staff conducting survey rounds per hour. 3. HDOT-A operations staff and tenants: Variable number of staff members when operations are in progress.	Depends on site conditions and safety considerations

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Proposed training	1. USDA WS or other contract wildlife monitor: Annual training refresher with County SOS program or WS or other contract wildlife monitor trainer in August, prior to fallout season. 2. HDOT-A security staff: Annual training with WS or other contract wildlife monitor trainer in August, prior to fallout season. 3. HDOT-A operations staff and tenants: Annual training with WS or other contract wildlife monitor trainer in August, prior to fallout season. 4. All new hires during fallout season will be shown the training slideshow on first day of work by the trainer, or human resources office.	Annual training covering seabird identification, seabird handling, and response procedures; verified and documented

Kauai Harbors Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the green sea turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

This section does not apply to Nawiliwili Harbor and Port Allen Harbor.

Part A: Monitoring to detect Green Sea Turtle Nests

Please provide the following information; the table below may be used and altered as needed.

1. Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2. Monitoring protocols indicating:
    a. Annual training of searchers;
    b. Frequency of searches (every other day or as much as possible);
    c. Conduct active searching (searching the beach width);
    d. Sufficient number of trained searchers to cover the area; and
    e. Record results of search monitoring.

3. All Participants conducting self-monitoring are required to record the results of search efforts. Records should provide:
    a. Evidence (what was seen). Include description and provide photographs
    b. Location on the beach (GPS) and physically mark the location if possible
    c. Date and time of day
    d. Description of surrounding land use (e.g., vacant, or developed), and
    e. Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches.
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
    a. Evidence of hatchling emergence (description and photos):
    b. Date and time of emergence,
    c. Direction of tracks
    d. Condition of the nest area (e.g., disturbed or not).

Kauai Harbors Table 15. Green Sea Turtle Take Monitoring Protocols – Part A: Monitoring to Detect Nests

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	Not applicable	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	Not applicable	Every other day during nesting season (typ. May 15 to end of August)
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations
Proposed training	Not applicable	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

Kauai Harbors Table 16. Green Sea Turtle Take Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	Not applicable	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations

Lihue Airport Item 10. Components of the Green Sea Turtle (Honu) Minimization and Monitoring Plan (if required). Monitoring and minimization for the green sea turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

This section does not apply to Lihue Airport.

Part A: Monitoring to detect Green Sea Turtle Nests

Please provide the following information; the table below may be used and altered as needed.

1. Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2. Monitoring protocols indicating:
    a. Annual training of searchers;
    b. Frequency of searches (every other day or as much as possible);
    c. Conduct active searching (searching the beach width);
    d. Sufficient number of trained searchers to cover the area; and
    e. Record results of search monitoring.

3. All Participants conducting self-monitoring are required to record the results of search efforts. Records should provide:
    a. Evidence (what was seen). Include description and provide photographs
    b. Location on the beach (GPS) and physically mark the location if possible
    c. Date and time of day
    d. Description of surrounding land use (e.g., vacant, or developed), and
    e. Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches.
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:

    a. Evidence of hatchling emergence (description and photos):
    b. Date and time of emergence,
    c. Direction of tracks
    d. Condition of the nest area (e.g., disturbed or not).

Lihue Airport Table 8. Green Sea Turtle Take Monitoring Protocols – Part A: Monitoring to Detect Nests

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Location and description of the beach, or beaches, surveyed and the linear distance of the beach.	Not applicable	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	Not applicable	Every other day during nesting season (typ. May 15 to end of August)
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations
Proposed training	Not applicable	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

Lihue Airport Table 9. Green Sea Turtle Take Monitoring Protocols – Part B: Monitoring of Identified Nests and Minimization

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Frequency of searches (# per day or per week)	Not applicable	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	Not applicable	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations

Kauai Harbors Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility's monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

USDA WS or other wildlife monitor, under contract with HDOT-H, will provide annual Worker Seabird Awareness and Response Training (WSART) to the Kauai District harbor operations staff, and contract security staff who may encounter fallen seabirds in the performance of their duties. The training will take place during the month of August, before the start of each seabird fallout season (September 15 to December 15). The training will cover the regulatory setting; consequences for noncompliance; standard monitoring, response, and reporting procedures; techniques for proper handling of fallen seabirds; personal protection; agency contacts; and facility locations. The training will incorporate an annual refresher update from the County SOS program.

All recipients of training will sign an attendance sheet, and HDOT will submit the forms with its annual compliance reporting.

The seabird fallout training, including proper handling and care instructions and reporting procedures, will be provided to the following HDOT-H staff:

Nawiliwili Harbor

- Harbors District Manager
- Harbors Assistant Manager
- Harbor Operations
- Harbor Security Officer
- Engineer
- Maintenance Supervisor
- Harbor Agent
- Maintenance Staff
- Contract Security Staff
- USDA Wildlife Services Staff or Contract Monitoring Staff

Port Allen Harbor

- Harbor Agent

- USDA Wildlife Services Staff or Contract Monitoring Staff

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station's pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
10. Complete the Bird Take Field Report.
11. Give the completed "Bird Take Field Report" to the General Manager, or other responsible staff person at the facility.

Contents of Seabird Recovery Kit

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen, and blank "Bird Take Field Reports", or similar form; and
6. Pet carrier –medium sized. If a box is used it must be well ventilated and marked conspicuously "LIVE ANIMAL".

Lihue Airport Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency, and timing specific to the facility's monitoring plan, for seabirds and green sea turtle nests;
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests (if lights shine on a beach), proper nest light screening, and hatchling activity (e.g., emergence);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

USDA WS or other wildlife monitor, under contract with HDOT-A, will provide annual Worker Seabird Awareness and Response Training (WSART) to the Kauai District airport operations staff, and contract security staff who may encounter fallen seabirds in the performance of their duties. The training will take place during the month of August, before the start of each seabird fallout season

(September 15 to December 15). The training will cover the regulatory setting; consequences for noncompliance; standard monitoring, response, and reporting procedures; techniques for proper handling of fallen seabirds; personal protection; agency contacts; and facility locations. The training will incorporate an annual refresher update from the County SOS program.

All recipients of training will sign an attendance sheet, and HDOT will submit the forms with its annual compliance reporting.

The seabird fallout training, including proper handling and care instructions, and reporting procedures will be provided to the following HDOT-A staff:

- Airports District Manager
- Assistant Air Superintendent V
- Assistant Air Superintendent VI
- Security
- Airport Operations Controller
- Airports Operations Controller II
- Contract Security Staff
- USDA Wildlife Services Staff or Contract Monitoring Staff

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station's pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
10. Complete the Bird Take Field Report.
11. Give the completed "Bird Take Field Report" to the USDA WS staff or District Manager.

Contents of Seabird Recovery Kit

1. Latex or nitrile gloves
2. Three towels
3. Hand sanitizer
4. Flashlight or headlamp
5. Clipboard, pen, and blank "Bird Take Field Reports," or similar
6. Pet carrier—medium sized. If a box is used, it must be well ventilated and marked conspicuously "LIVE ANIMAL"

Kauai Harbors Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests):

HDOT-H will display SOS posters and provide outreach materials to staff and tenants annually during the fallout season (September 15–December 15).

Lihue Airport Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests):

HDOT-A will display SOS posters and provide outreach materials to staff and tenants annually during the fallout season (September 15–December 15).

PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Kauai Harbors Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant's take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

Kauai Harbors Table 17. Annual Take Estimate Calculation for Nawiliwili Harbor

Participant/Facility Name: Nawiliwili Harbor	Newell's Shearwater	Hawaiian Petrel[2]	Band-rumped Storm Petrel
Avg. from SOS data–or—monitoring data if available (5 most recent yrs.: 2013-2017 for Newell's Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel)[1]	1.8	0.2	0.0
Unobserved lethal take [90% discovery rate (0.9) as per SEEF Trials–Appendix C, take value calculated as ((1-0.9)/0.9* number observed)].	0.2	0.02	0.0
Total direct take from light attraction (observed + unobserved)	2.0	0.22	0.0
Annual Take Estimate	2.0	0.22	0.0

[1] Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fall out records used to determine average annual take at each facility.
[2] The average take number for Hawaiian Petrel was reported as a combined take for Nawiliwili Harbor and Port Allen Harbor, and totaled one bird in 2003 and 2008. Pending receipt of SOS data with which to clarify the location, it is assumed that both fallout records occurred at Nawiliwili Harbor. One additional Hawaiian Petrel was recorded at Nawiliwili in 2017 yielding a 15-year total of 3 birds, or an annual average of 0.2 bird per year.

Kauai Harbors Table 18. Annual Take Estimate Calculation for Port Allen Harbor

Participant/Facility Name: Port Allen Harbor	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel
Avg. from SOS data–or—monitoring data if available (5 most recent yrs.: 2013-2017 for Newell's Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel) [1]	2.0	0.0	0.0
Unobserved lethal take [50% discovery rate (0.5) as typical, take value calculated as ((1-0.5)/0.5*number observed)].	2.0	0.0	0.0
Total direct take from light attraction (observed + unobserved)	4.0	0.0	0.0
Annual Take Estimate	4.0	0.0	0.0

[1] Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fallout records used to determine average annual take at each facility.

Lihue Airport Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant's take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

Lihue Airport Table 10. Annual Take Estimate Calculation for Lihue Airport

Participant/Facility Name: Lihue Airport	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel[2]
Avg. from SOS data–or—monitoring data if available *(5 most recent yrs.: 2013-2017 for Newell's Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel)*[1]	1.6	0.2	0.07
Unobserved lethal take [75% discovery rate (0.75), take value calculated as ((1-0.75)/0.75*number observed). A 75% discovery rate is proposed for Lihue Airport based on the 90% searcher efficiency rates obtained in SEEF Trials at Nawiliwili Harbor (Appendix C) under similar conditions, staffing coverage, procedures, and monitoring frequency].	0.53	0.07	0.02
Total direct take from light attraction (observed + unobserved)	2.13	0.27	0.09
Annual Take Estimate	2.13	0.27	0.09

[1] Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fall out records used to determine average annual take at each facility.
[2] Information provided in a memo from KSHCP dated April 21, 2016 detailed one fallout record of a Band-rumped Storm Petrel at Lihue Airport in 2007. The values used in the table are reproduced from the April 21, 2016 memo. Note that USDA Wildlife Services recovery records for Lihue Airport do not show recoveries for this species.

Kauai Harbors Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Kauai Harbors Table 19. Requested take authorization and permit/license term coverage for 'a 'o - Newell's Shearwater (*Puffinus Newelli*) for Nawiliwili Harbor

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = unobserved lethal take + 12% SOS birds that are not released)	0.42	0.0	12.6
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	1.58	0.0	47.4

Kauai Harbors Table 20. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (*Puffinus Newelli*) at Port Allen Harbor

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = unobserved lethal take + 12% SOS birds that are not released)	2.24	0.0	67.2
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	1.76	0.0	52.8

Kauai Harbors Table 21. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) at Nawiliwili Harbor

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = unobserved lethal take + 12% SOS birds that are not released)	0.04	0.0	1.2
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	0.18	0.0	5.4

Lihue Airport Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Lihue Airport Table 11. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (*Puffinus Newelli*) for Lihue Airport

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = unobserved lethal take + 12% SOS birds that are not released)*	0.72	0.0	21.6
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	1.41	0.0	42.3

Lihue Airport Table 12. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) for Lihue Airport

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = unobserved lethal take + 12% SOS birds that are not released)*	0.09	0.0	2.7
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	0.18	0.0	5.4

Lihue Airport Table 13. Requested take authorization and permit/license term coverage for ʻakēʻakē –Band-Rumped Storm Petrel (*Oceanodroma castro*) for Lihue Airport

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = unobserved lethal take + 12% SOS birds that are not released)*	0.03	0.0	0.9
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	0.06	0.0	1.8

Note: USDA WS take records for LIH do not show recoveries for this species.

Kauai Harbors Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP[1].

HDOT is statutorily required to generate its own funds for its transportation programs and projects. Independent special funds were thus established for each division. Special funds strive to generate sufficient revenues for program operations, maintenance, and capital improvement costs, and are dependent on revenue generated by facilities operations and tenants.

HDOT-H will provide funding for implementation of the KSHCP from its Harbors Special Fund (B). The amount needed to fund HDOT-H's obligation will be included in the Harbors Division biennium and supplemental budget requests and is limited to the amounts approved in the legislative approval process for those specific fiscal periods. No funds beyond specific fiscal years can be appropriated without legislative approval. HDOT-H will make annual budget requests consistent with the budget approved as part of the KSHCP.

NOTE: HDOT-H is proposing that funds normally used to satisfy the "recovery" provisions of Hawaii Revised Statutes 195D be directed to scientific research on lighting.

[1] The applicant shall post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.

Lihue Airport Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP[2].

HDOT-A is statutorily required to generate its own funds for its transportation programs and projects. Independent special funds were thus established for each of the division's major programs. Each fund strives to generate sufficient revenues for program operation, maintenance costs, and the State General Fund fee for central services. This fee is set at five percent of each special fund's gross revenues after debt service.

These special funds must also provide a higher level of cash financing in the Capital Improvement Program to ease the burden on debt service. Since the Capital Improvement Program is large, HDOT-A continues to rely on reimbursable General Obligation Bonds and federal aid (largely through the U.S. Department of Transportation's FAA) to help finance its programs and projects.

Airport Special Revenue Fund

The Airport Special Revenue Fund was created under Section 261-5, Hawaii Revised Statutes. Its primary revenue sources are the aviation fuel tax, landing fees, airport use charges, concession fees, and investment income. Other revenue sources include rentals and miscellaneous earnings.

HDOT-A will provide funding for implementation of the KSHCP from its Airport Special Revenue Fund (B). The amount needed to fund HDOT-A's obligation will be included in the HDOT-A biennium and supplemental budget requests and is limited to the amounts approved in the legislative approval process for those specific fiscal periods. No funds beyond specific fiscal years can be appropriated without legislative approval. HDOT will make annual budget requests consistent with the budget approved as part of the KSHCP.

Note: HDOT-A is proposing that funds normally used to satisfy the "recovery" provisions of Hawaii Revised Statutes 195D be directed to scientific research on lighting.

The State of Hawaii cannot commit funds that have not been approved by the Legislature, so a provision in the PIP and HCP must be noted that any type of payment is based on approval and availability.

Signature of Participant: _____

Printed Name: _____ Date:_____

The undersigned affirms that all the information included is true and accurate to the best of the Participant's knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality

[2] The applicant shall post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.

Contact Us

Call the KSHCP Office at (808) 245-9160 or visit our office at 4272-B Rice Street, Lihue HI, 96766. Visit the project website: www.Kauai-seabirdhcp.info. We look forward to working with you toward helping Hawaii's unique species!

Kauai Harbors PIP Completion Checklist Form

Item		Completion Check Is each item thoroughly described and information submitted?	Complete? (Y/N)	Information Needed to Make Item Complete or Outstanding Issues Remaining
Part I: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take				
1	Landowner applicant information	▪ Landowner name/organization ▪ Contact information		
2	Property & Facility description	▪ TMK or Legal description ▪ Maps, site plans. ▪ Narrative Description		
3	Covered Activities	▪ Light table/inventory ▪ Honu assessment ▪ Description of Utility structures & support structures ▪ Maps, site plans, photos. ▪ Heights and configurations		
4	Standards for Covered Activities	▪ Regulations provided ▪ Operational needs		
5	Future facility plans	▪ Proposed plans provided ▪ Site plans, arch drawings, ▪ Other information		
6	Alternatives to the Taking	▪ Alternatives addressed ▪ Reasons provided		
7	Minimization measures considered	▪ Minimization measures table (or other info.) completed ▪ Reasons provided ▪ Each Covered Activity ▪ Covered Seabirds and Honu		
8	Minimization plan	▪ Minimization measures provided ▪ Timeline and funding ▪ Plan and process for future minimization measures (e.g., cost-benefit, earmarked funding) ▪ Each Covered Activity (lights & utility) ▪ Covered Seabirds and Honu		
9	Monitoring Plan	▪ Selected self-monitoring or DLNR ▪ Completed plan with protocols ▪ Adequate protocols ▪ Each Covered Activity ▪ Covered Seabird & Honu ▪ Training for searchers		
Part II: Take Estimate, Requested Amount of Take Authorization, and Funding				
1	Take Estimate Calculation	▪ 5-year SOS average ▪ Discovery rate ▪ Covered Seabirds ▪ Honu		
2	Requested take authorization & permit term	▪ Each Covered Species ▪ Reason provided for discrepancy between estimate and requested amount		

3	Proof of Adequate Funding	▪ Financial mechanism ▪ Demonstrated ability to fund		
	Signature	Signed by landowner, facility owner, or authorized responsible party		

Lihue Airport PIP Completion Checklist Form

Item		Completion Check Is each item thoroughly described and information submitted?	Complete? (Y/N)	Information Needed to Make Item Complete or Outstanding Issues Remaining
Part I: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take				
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5	Future facility plans	▪ Proposed plans provided ▪ Site plans, arch drawings, ▪ Other information		
6	Alternatives to the Taking	▪ Alternatives addressed ▪ Reasons provided		
7	Minimization measures considered	▪ Minimization measures table (or other info.) completed ▪ Reasons provided ▪ Each Covered Activity ▪ Covered Seabirds and Honu		
8	Minimization plan	▪ Minimization measures provided ▪ Timeline and funding ▪ Plan and process for future minimization measures (e.g., cost-benefit, earmarked funding) ▪ Each Covered Activity (lights & utility) ▪ Covered Seabirds and Honu		
9	Monitoring Plan	▪ Selected self-monitoring or DLNR ▪ Completed plan with protocols ▪ Adequate protocols ▪ Each Covered Activity ▪ Covered Seabird & Honu ▪ Training for searchers		
Part II: Take Estimate, Requested Amount of Take Authorization, and Funding				
1	Take Estimate Calculation	▪ 5-year SOS average ▪ Discovery rate ▪ Covered Seabirds ▪ Honu		

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3	Proof of Adequate Funding	▪ Financial mechanism ▪ Demonstrated ability to fund		
	Signature	Signed by landowner, facility owner, or authorized responsible party		

Appendix A. Technical Specifications of Outdoor Lights at Nawiliwili Harbor, Port Allen Harbor, and Lihue Airport, Kauai.

Johnson Controls

Lighting Material Manuals

Nawiliwili Harbor

HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031

Johnson Controls
INGENUITY WELCOME

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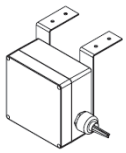
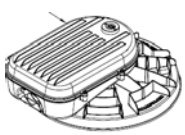
Catalog

Part Name	Image	Additional Description
ELWG0CXXGC		GE - LIGHTGRID GATEWAY
ELWK0A5		GE - LIGHTGRID NODE BOX ASSY 277V
ELWM0CXV		GE - LIGHTGRID CELLULAR MODEM
ELWN0A5		GE - LIGHTGRID NODE 277V
CREE CPY250-A-DM		CPY250-A-DM-F-UL-SV-PML
CREE CR14-22L Troffer		CR14-22L-40K-10V
CREE CR2220L Troffer		CR22-20L-40K-10V
Holo DSX0LED 40C 530		DSX0 LED 20C 530 40K T3M MVOLT
Holo HMLED2 06 4K-480V		HMLED2 12 4K AH G F P7 RFD211068

Johnson Controls
INGENUITY WELCOME

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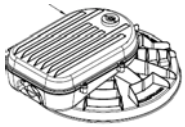
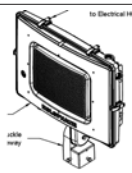
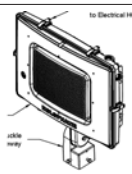
Catalog

Part Name	Image	Additional Description
Holo HMLED2 06 4K-480V		HMLED2 06 4K AH G F P7 RFD211069
Precision LLW2-40-LW-F-U		LLW2-40-LW-F-U
Precision LLW4-40-LW-F-U		LLW4-40-LW-F-U
CREE PKG-304		PKG-304-PD-04-E-UL-SV-525-PML
CREE PKG-304		PKG-304-PD-06-E-UL-SV-525-PML
Holo PMLED 03 4K-277V		PMLED-03-4K-07A-AS-66-1-L-ZP PMLED FV-Z
Holo PMLED 04 4K-277V		PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z
Precision RF6LED5G4-277		RF6LED5G4-277-HDM-6LFLED5G4-40K-WH-WT

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Catalog

Part Name	Image	Additional Description
Precision SIL-1X4-XL		SIL-1X4-XL-F-UL-40K-CW8-JP
Precision SIL-1X8-XL		SIL-1X8-XL-F-UL-40K-CW8-JP
RAB WPLED13NPC2		WPLED13N/PC2
RAB WPLED 13N/PC2		WPLED13N/PC2

ELWG-0-C-XX-G-C

GE
Lighting

LightGrid™ Gateway

Outdoor Wireless Control System

Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features

- GPS module in every gateway
- Automatic gateway registration and display in MAP view
- Real-time update of the status of all the fixtures
- Self-forming & self-restoring mesh network
- Addressable via IPv6
- Nodes, gateway can be spaced up to 500m apart (Clear line of sight)
- Reliable and Secure Encrypted Communications

Applications

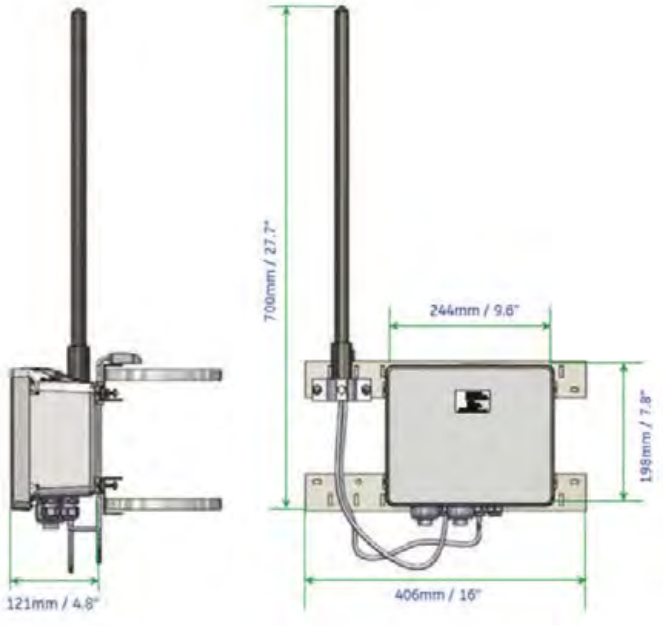
- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

Product Specifications

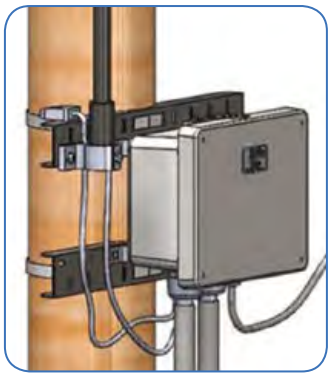
- Input Voltage: 120-277V, 347V—480V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power Consumption: < 3W
- Frequency: 915 MHz ISM Band
- GPS: Accuracy 3m (clear open sky)
- Addressing: IPv6
- Security: AES Encryption, Certificate Based
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Backhaul Communication: Ethernet or Cell (with modem)
- Complies with FCC Part 15 Required Sub Sections
- Complies with UL 916
- Weight: 7 lbs.
- Warranty: 3 years

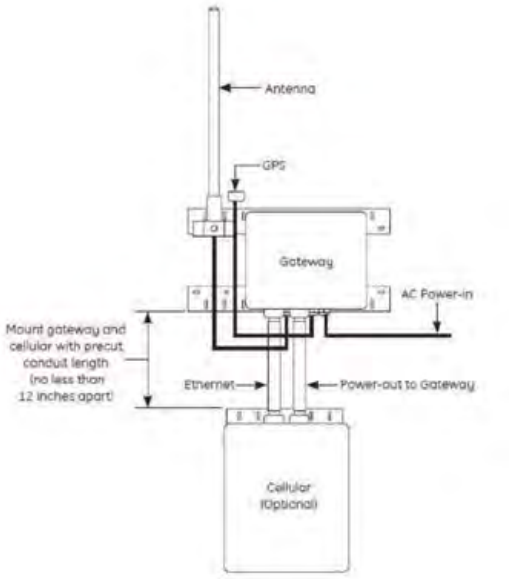
Product Dimensions



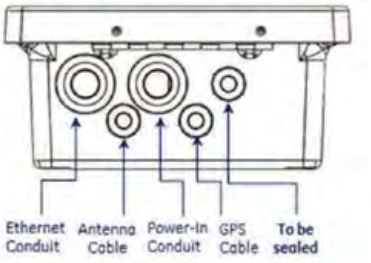
Installation

Gateway will contain two ¾" liquid-tight conduit fittings, and three liquid-tight glands to accommodate customer installation flexibility according to the diagram below, which may require customer to cap or seal unused fittings during installation.

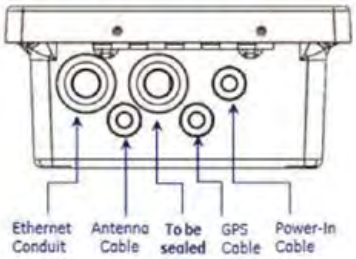




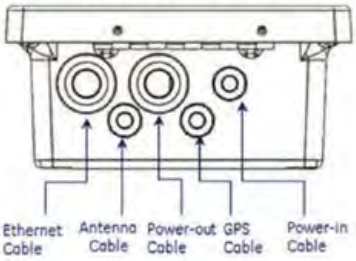
OPTION 1: Power & Ethernet input using conduit (**NO** power-out to external device)



OPTION 2: Power-in via cable. Ethernet in via conduit (**NO** power-out to external device)



OPTION 3: Power-in via cable; Power & Ethernet out to cellular modem via conduit



Packaging

- 1 Gateway Enclosure
- Conduit fittings (2 pcs mounted to enclosure)
- Gland fittings (3 pcs mounted to enclosure)
- GPS module and cable (1 pcs mounted to gland)
- Antenna Cable (1 pc mounted to gland)
- Antenna Pole (1 pc to be installed)
- Pole Mounting Bracket (2 pcs mounted to enclosure)

Ordering Number Logic

E L WG – – **C** – – **G** – **C** – –

PRODUCT ID	VOLTAGE (UL)	ANTENNA	COUNTRY/POLE	GPS	IP COMMUNICATION	NETWORK CONFIGURATION
E L W G	**0** = 120/277 **H** = 480* * 480V Gateway = 120-277V Gateway + 480V to 277V Step Down Transformer	**C** = Standard 18"	**XX** = Default (US) **AR** = Argentina **BR** = Brazil **EL** = El Salvador	**G** = GPS Capability	**C** = Cat 5 Cable Only	**B** = Network B **None** = Default

www.gelighting.com

CTRL002 (Rev 06/10/15)

GE
Lighting

LightGrid™ Cell Modem

Outdoor Wireless Control System

Description

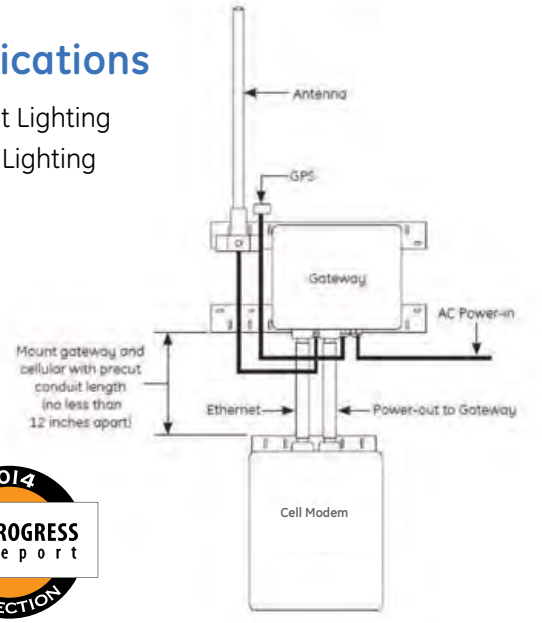
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Specifications

- Input Voltage: 120-277V, 347V—480V
- Weight: 8 lbs
- Dimensions: 15 in. x 13 in. x 7 in
- Mounting Height: 27 ft.–40 ft.
- Warranty: 3 years

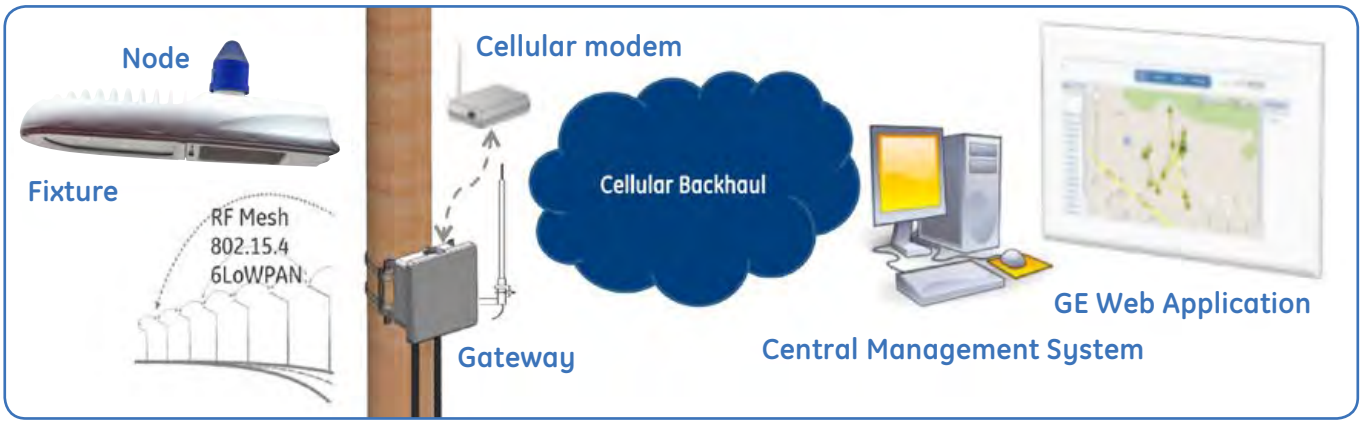
Applications

- Street Lighting
- Area Lighting



2014 PROGRESS Report SELECTION

Cell Based Network



Packaging

- Cellular enclosure (1pc)
- Conduit fitting (2pcs, mounted to enclosure)
- Flexible conduit (2pc)
- Power cable, stripped ends (1pc)
- Ethernet cable (1pc)
- Pole mounting bracket (2pcs, mounted to enclosure)

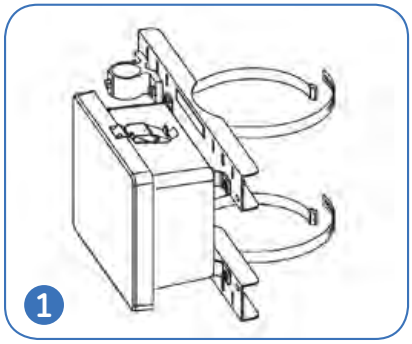
Ordering Number Logic

E L W M — O — C — X — _

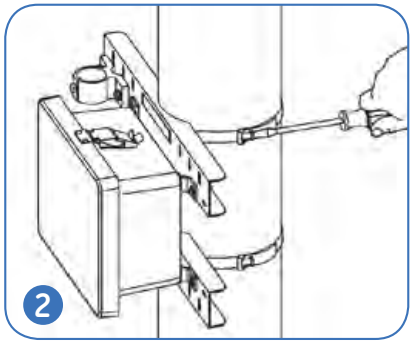
PRODUCT ID	VOLTAGE	IP COMMUNICATION	FUTURE USE	PROVIDER
E L W M	0 = 120-277	C = CAT 5 Cable only	X	V = Verizon R = Rogers X = Future Use

Mounting Gateway and Cellular

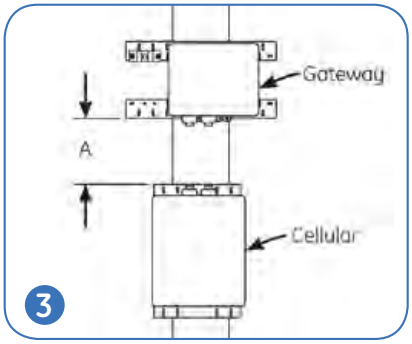
Carefully unpack unit from its packaging. Properly inspect for defects before installing.



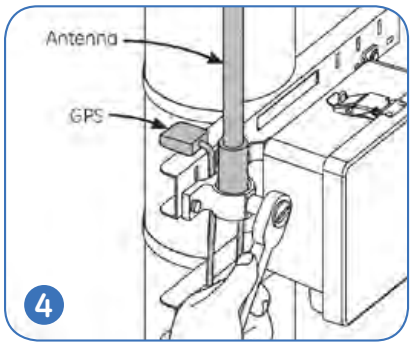
Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.



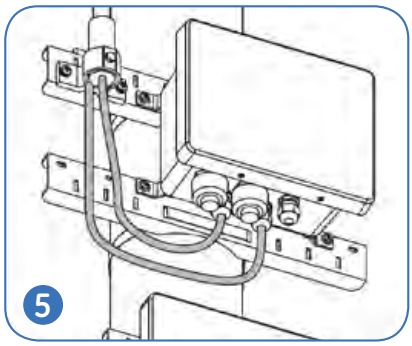
Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.



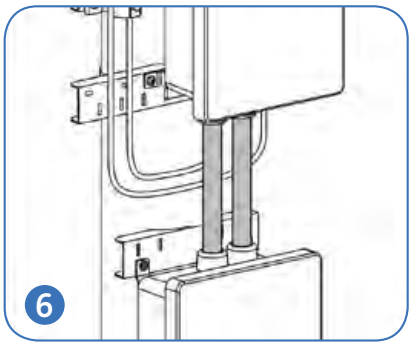
Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power-in/out cable.



Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).



Insert GPS and antenna wires through two glands in bottom of gateway enclosure.



Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.

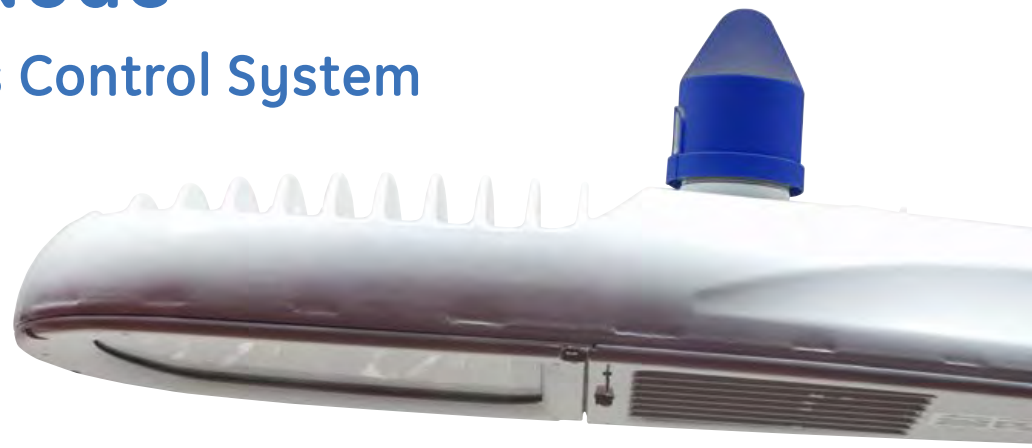
www.gelighting.com

CTRL009 (Rev 06/10/15)

GE
Lighting

LightGrid™ Node

Outdoor Wireless Control System



Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Applications

- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

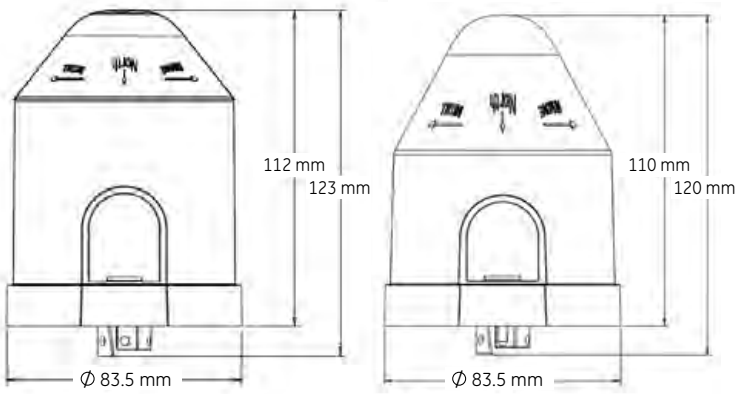
Product Features

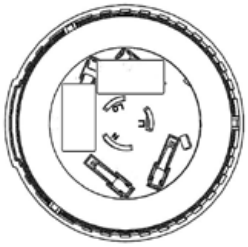
- Utility Grade Measurement up to 0.5% Accuracy
- Self-forming & self-restoring mesh network
- Static IPV6 data addressing and routing
- Reliable and Secure Encrypted Communications
- Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
- Utility grade 15 minute time of use Energy consumption reporting
- Full Autonomous Photocell Functionality (No wireless network required)
- Time Based Lighting schedules to maximize energy savings
- Integrated GPS in each node for Real time Asset Reporting
- Dynamic Lumen Output Level Control
- Real time measurement and storage of Voltage, Current, Wattage, Power Factor, and Hours of operation

Product Specifications

- Input Voltage: 120-277V, 347V and 480V
- Radio Frequency: 915 MHz ISM Band
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Addressing: IPv6
- Dimming: 0-10V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power consumption i.e. <2W 120-277V, < 3W 347 and 480V
- Photocell: Complies with ANSI C136.10-2006
- GPS: Accuracy 3m (clear open sky)
- Security: AES Encryption and Certificate based authentication
- Utility Grade Energy Measurement: Complies with relevant sections of ANSI C12.20
- Complies with FCC Part 15 required sub sections
- Complies with UL 773, Wet Rated, Type 2 Outdoor
- Complies with ANSI C136.41-2013 (ANSI Dimming)
- Warranty: 5 yrs Standard. 10 yrs Extended Warranty Available

Product Dimensions





ANSI Dimming

GE Dimming

Ordering Number Logic

E L W N _ _ _ _ **5** _ _ **G** _ **5** _ _ _

PRODUCT ID	VOLTAGE	PIN CONFIGURATION	PINS	METERING	GPS	MAX WATTAGE	NETWORK CONFIGURATION	COUNTRY/POLE
E L W N	**0** = 120/277 **5** = 480	**D** = GE Dimming **A** = ANSI Dimming	**5** = 5 Pin	**R** = 2% Revenue Grade **U** = 0.5% Utility Grade	**G** = GPS Capability	**5** = 450 Watts	**S** = Stand Alone **B** = Network B **None** = Default	**None** = Default (US)

www.gelighting.com

CTRL001 (Rev 06/10/15)

CPY250-A-DM-D / F-B

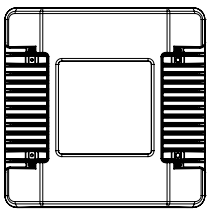
CPY Series LED Canopy / Soffit Luminaire –
Direct Mount – Drop / Flat Lens – 122 Watts

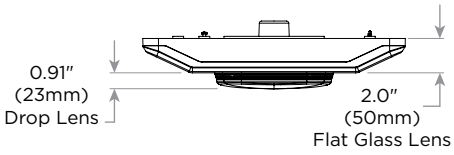
Product Description

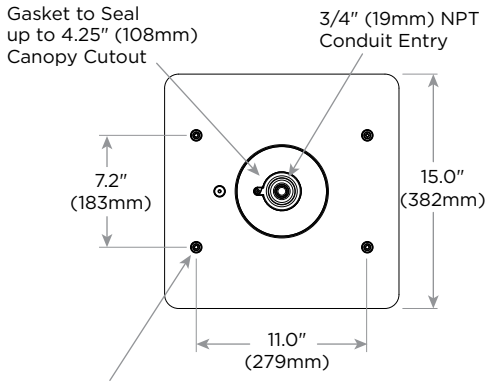
Slim, low profile, easy mounting from below the deck. Luminaire housing constructed of rugged cast aluminum with integral heat sink specifically designed for LED. Luminaire mounts directly to the canopy deck in a 2.0" (51mm) to 4.0" (102mm) round hole and is secured in place with self-sealing screws that provide water-tight seal. Suitable for use in single or double skin canopies with a minimum 4.0" (102mm) wide panels and a minimum 22 gauge, 0.030" (0.7mm) canopy thickness. Direct imaging of LEDs is eliminated with high efficiency patterned flat or 0.91" (23mm) drop glass lens.

Drop Lens

Flat Lens







Performance Summary

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

CRI: Minimum 70 CRI

CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty†: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

Accessories

Field Installed Accessories

XA-BXCCMW
Upgrade Kit for use with Jet-Phillips canopy luminaires

XA-BXCCNW
Upgrade Kit for use with Elsco Franciscan canopy luminaires

XA-BXCCPW
Upgrade Kit for use with LSI Dakota or Masters canopy luminaires

XA-BXCCQW
Upgrade Kit for use with Whiteway Riviera or Rig-A-Lite canopy luminaires

XA-BXCCRW
Upgrade Kit for use with Elsco Merrit canopy luminaires

XA-BXCCSW
Upgrade Kit for use with LSI Richmond or Whiteway Civic canopy luminaires

XA-BXCCJBOX
Junction Box / Stem Kit
- 6.0" (152mm) H x 3/4" (19mm) NPT Stem

XA-BXCCBPW
Beauty Plate

XA-BXCCBPB12W
Beauty Plate w/ 12" (305mm) Backer

XA-BXCCBPB16W
Beauty Plate w/ 16" (406mm) Backer

TPS-2
Tamper Resistant Driver Bit

XA-SENSREM
Hand-Held Remote
- For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

Click below to select Quick Ship products

QUICKSHIP™

For full list of Cree Quick Ship products visit **www.cree.com/lighting/quickship**

Ordering Information

Example: CPY250-A-DM-D-B-UL-WH-OPTIONS

CPY250	A	DM		B			
Product	**Version**	**Mounting**	**Optic**	**Input Power Designator**	**Voltage**	**Color Options**	**Options**
CPY250	**A**	**DM** Direct	**D** 0.91" (23mm)Drop **Lens** **F** Flat Lens	**B** 122W	**UL** Universal 120–277V **UH** Universal 347–480V*	**WH** White (Standard) **SV** Silver **BK** Black **BZ** Bronze **PB** Platinum Bronze	**40K** 4000K Color Temperature - Color temperature per luminaire **DIM** 0–10V Dimming - Control by others - Refer to dimming spec sheet for details - Can't exceed specified input power **ML** Multi-Level (100% / 30% Power) - Refer to ML spec sheet for details **PML** Programmable Multi-Level - Refer to PML spec sheet for details

† See www.cree.com/lighting/products/warranty for warranty terms.

* For input power for 347–480V, refer to the Lumen Output, Electrical, and Lumen Maintenance data table below.

Rev. Date: 01/23/14

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, easy mounting from below the deck
- Luminaire housing constructed of rugged cast aluminum with integral heat sink specifically designed for LED
- Luminaire mounts directly to the canopy deck in a 2.0" (51mm) to 4.0" (102mm) round hole and is secured in place with self sealing screws that provide water-tight seal
- Suitable for single or double skin canopies with minimum 4.0" (102mm) wide panels and a minimum 22 gauge, 0.030" (0.7mm) canopy thickness
- Optional wet listed junction box rated for feed through 8 (4 in, 4 out) #12 AWG conductors
- Fixture housing provided with 3/4" (19mm) conduit entry for direct wire feed
- Simple single hole drill for mounting to canopy
- Alignment pin included for ease of installation if desired (optional; requires drilling of additional hole)
- Below ceiling serviceable driver for ease of upgrade or replacement
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is white. Bronze, black, silver, and platinum bronze are also available

ELECTRICAL SYSTEM

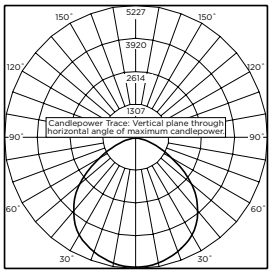
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 6kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

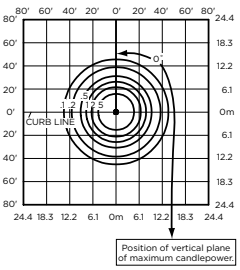
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 pending
- Consult factory for CE Certified products
- 6kV surge suppression protection tested in accordance with IEEE /ANSI C62.41.2
- Product qualified on the DesignLights Consortium™ ("DLC") Products List ("QPL")
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Meets Buy American requirements within ARRA
- Dark Sky Friendly, IDA Approved when ordered with "F" optic

Photometry

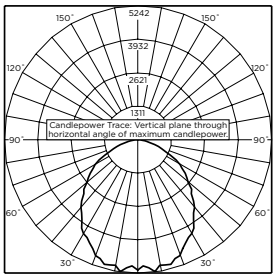
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

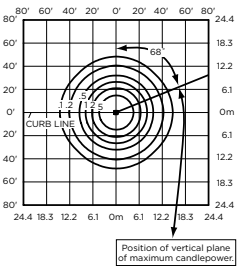




ITL Test Report #: 76865
CPY250-A-**-F-B-UL
Initial Delivered Lumens: 13,636

CPY250-A-**-F-B-UL
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 13,000
Initial FC at grade





CESTL Test Report #: 2013-0112
CPY250-A-**-D-B-UL
Initial Delivered Lumens: 13,242

CPY250-A-**-D-B-UL
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 13,000
Initial FC at grade

Weight

Weight
12.5 lbs (5.7kg)

Lumen Output, Electrical, and Lumen Maintenance Data

CPY250 Canopy Luminaire													
Optic	5700K		4000K		System Watts 120–277V	System Watts 347–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11			120V	208V	240V	277V	347V	480V	
D	13,000	B3 U2 G2	12,400	B3 U2 G2	122	137	1.04	0.60	0.52	0.46	0.40	0.29	94%
F	13,000	B3 U0 G1	12,400	B3 U0 G1	122	137	1.04	0.60	0.52	0.46	0.40	0.29	94%

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 100,000 hours.

CR Series

CR14™ 1' x 4' Architectural LED Troffer

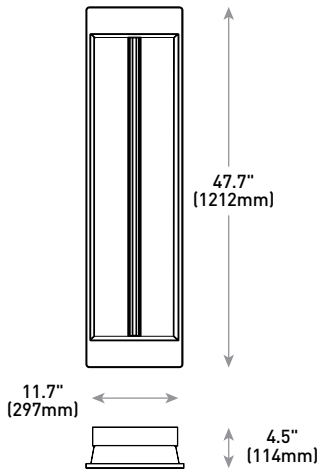
Product Description

The CR14™ Architectural LED troffer delivers up to 130 lumens per watt of exceptional 90 CRI light at 4000 lumens. This breakthrough performance is achieved by combining the high efficacy and high-quality light of Cree TrueWhite® Technology with a unique thermal management design. The CR14 product family is available in warm, neutral, cool, or daylight color temperatures and has step, 0-10V, or Lutron EcoSystem® Enabled dimming options. Its unique indirect illumination design makes the CR14 perfect for use in commercial new construction or renovated spaces.

Performance Summary

- Utilizes Cree TrueWhite® Technology (90 CRI)
- Room-Side Heat Sink
- **Efficacy:** 90-130 LPW
- **Initial Delivered Lumens:** 2,200, 3,100, 4,000, 5,000 lumens
- **Input Power:** 22-50 watts
- **CRI:** 90 CRI (Cree TrueWhite® Technology), 80+ CRI (HD)
- **CCT:** 3000K, 3500K, 4000K, 5000K
- **Input Voltage:** 120-277 VAC or 347 VAC
- **Limited Warranty†:** 10 years
- **Limited Warranty Emergency Back Up (EB) Battery:** 1 Year Battery Back Up. Test regularly in accordance with local codes
- **Lifetime:** Designed to last from 50,000 hours (HD), 75,000 hours (Standard TW), and 100,000 hours (HE TW)
- **Controls:** Step Level to 50%, 0-10V Dimming , Lutron EcoSystem Enabled to 5%*
- **Mounting:** Recessed**

† See www.cree.com/canada for warranty terms
* Reference www.cree.com/lighting for recommended dimming control options
** Acceptable for use with standard 9/16 T-Bar or larger when installed per installation instructions. Consult factory for non-standard grid applications



NOTE: Use of Expanded Junction Box will expand the depth to 6.42" and Emergency Backup will expand the depth to 6.05". Use of 347V will increase luminaire height by 1.4"

Accessories

Field-Installed		
Adjustable Cable AC5- 72 PD8 JB AC5 18/4 72 PD8 JB **Chicago Plenum Field Kit** CPLCR	**Chicago Plenum Field Kit-Emergency** CPLCR EM **Junction Box** EJBCR 5PK - Expanded size junction box for through wiring (5 pack)	**Power Whip** PW 18/4 06 9T/SS CR **347 Volt** CR 347V **Step Dimming to 50%** CR 347V SD **Surface Mount Kit** SMK 14

Ordering Information

Example: CR14-40L-35K-S

CR14					
Product	**Initial Delivered Lumens**	**CCT**	**Voltage**	**Control**	**Options**
CR14	**22L**[1] 22W, 2200 lumens – 100 LPW - Only available in 35K or 40K **31L**[1] 34W 3100 lumens – 90 LPW **40L** 40W 4000 lumens – 100 LPW **40LHE**[1] 30.5W 4000 lumens – 130 LPW (30K) 32W 4000 lumens – 125 LPW (35K) 33W 4000 lumens – 120 LPW (40K) 34.5W 4000 lumens – 115 LPW (50K) **50L**[2] 50W 5000 lumens – 100 LPW	**30K** 3000K **35K** 3500K **40K** 4000K **50K** 5000K	**Blank** 120-277 Volt **34V** 347 Volt - Integrated option available on 40L only. Other types require addition of a 347 accessory kit (see table above)	**S** Step Dimming to 50% **10V** 0-10V Dimming to 5% **LES**[3] Lutron EcoSystem® Enabled to 5%	**HD** **CRI 80+ (44W 4000 lumens – 90 LPW)** - Available only with 40L **EB14**[4,5] **Emergency Backup – 1400 lumens** - Not for use with SMK Kits. Use EB14 SMK **EB14SMK**[4,5] **Emergency Backup with surface mount kit – 1400 lumens** - Includes surface mount kit accessory (SMK-CR14)

1. Not available with HD 2. Not available with HD, EB14, EB14SMK 3. Not available in the following options: 22L: 30K or 50K; 31L: All Colors; 40LHE: All Colors 4. Not available in 50L 5. Not available in LES types except 40L LES type
NOTE: Price adder may apply depending on configuration

Rev. Date: V5B 12/22/2016

US: www.cree.com T (800) 236-6800 F (262) 504-5415
Canada: www.cree.com/canada T (800) 473-1234 F (800) 890-7507

Product Specifications

CREE TRUEWHITE® TECHNOLOGY

A revolutionary way to generate high-quality white light, Cree TrueWhite® Technology is a patented approach that delivers an exclusive combination of 90+ CRI, beautiful light characteristics, and lifelong color consistency, all while maintaining high luminous efficacy – a true no compromise solution

CREE LED TECHNOLOGY

Cree's total systems approach to product development is a comprehensive engineering philosophy that combines the most advanced LED sources, driver technologies, optics and forms. The result is highly-reliable luminaire solutions for both indoor and outdoor applications that reduce energy use, extend lifetimes, and maximize illumination performance and quality.

ROOM-SIDE HEAT SINK

An innovative thermal management system designed to maximize cooling effectiveness by integrating a unique room-side heat sink into the diffusing lens. This breakthrough design creates a pleasing architectural aesthetic while conducting heat away from LEDs in a temperature-controlled environment. This enables the LEDs to consistently run cooler, providing significant boosts to lifetime, efficacy, and color consistency.

CONSTRUCTION & MATERIALS

- Durable 22-gauge steel housing with standard troffer access plate for electrical installation
- One-piece lower reflector finished with a textured high reflectance white polyester powder coating creates a comfortable visual transition from the lens to the ceiling plane
- Includes t-bar clips and holes for mounting support wires enable recessed or suspended installation
- Individual luminaires may be mounted end to end for a continuous row of illumination

OPTICAL SYSTEM

- Unique combination of reflective and refractive optical components achieves a uniform, comfortable appearance while eliminating pixelation and color fringing
- Components work together to optimize distribution, balancing the delivery of high illuminance levels on horizontal surfaces with an ideal amount of light on walls and vertical surfaces. This increases the perception of spaciousness
- Diffusing lens integrated with upward-facing LED strip eliminates direct view of LEDs while lower reflector balances brightness of lens with the ceiling to create a low-glare high angle appearance

ELECTRICAL SYSTEM

- Integral, high-efficiency driver
- **Power Factor:** = 0.9 nominal
- **Input Power:** Stays constant over life
- **Input Voltage:** 120-277V or 347V, 50/60Hz
- **Operating Temperature Range:** 0˚C - + 35˚C (32˚F - + 95˚F)
- **Total Harmonic Distortion:** < 20%

CONTROLS

- Step dimming to 50%*
- Continuous dimming to 5% with 0-10V DC control protocol*
- Lutron EcoSystem® Enabled option allows seamless integration with Lutron EcoSystem controls
- Reference www.creelink.com/exLink.asp?7098214OZ58R34I26620963 for recommended dimming controls and wiring diagrams

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for damp locations
- Designed for indoor use
- UL924 (EB14 option)
- DLC qualified. Please refer to www.designlights.org/QPL for most current information
- RoHS compliant. Consult factory for additional details
- Meets FCC Part 15 standards for conducted and radiated emissions

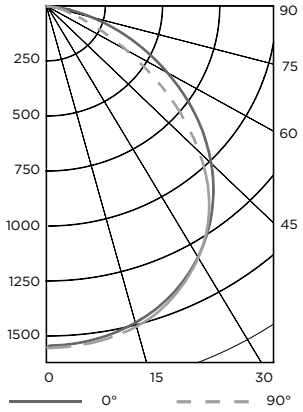
Recommended CR Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial Delivered Lumens	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
0˚C (41˚F)	22L, 31L, 40L, and 50L	1.05	1.04	1.04	1.04	1.04
	40LHE	1.05	1.01	0.98	0.96	0.94
5˚C (41˚F)	22L, 31L, 40L, and 50L	1.04	1.03	1.03	1.03	1.03
	40LHE	1.04	1.00	0.97	0.95	0.93
10˚C (50˚F)	22L, 31L, 40L, and 50L	1.03	1.02	1.02	1.02	1.02
	40LHE	1.03	0.99	0.96	0.94	0.92
15˚C (59˚F)	22L, 31L, 40L, and 50L	1.02	1.01	1.01	1.01	1.01
	40LHE	1.02	0.98	0.95	0.93	0.91
20˚C (68˚F)	22L, 31L, 40L, and 50L	1.01	1.00	1.00	1.00	1.00
	40LHE	1.01	0.97	0.95	0.92	0.90
25˚C (77˚F)	22L, 31L, 40L, and 50L	1.00	0.99	0.99	0.99	0.99
	40LHE	1.00	0.96	0.94	0.91	0.89
30˚C (86˚F)	22L, 31L, 40L, and 50L	0.99	0.98	0.98	0.98	0.98
	40LHE	0.99	0.95	0.93	0.91	0.89
35˚C (95˚F)	22L, 31L, 40L, and 50L	0.98	0.97	0.97	0.97	0.97
	40LHE	0.98	0.94	0.92	0.90	0.88
40˚C (104˚F)	22L, 31L, 40L, and 50L	0.97	0.96	0.96	0.96	0.96
	40LHE	0.97	0.93	0.91	0.89	0.87

[1] Lumen maintenance values at 25˚C (77˚F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT] i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ([DUT] i.e. the packaged LED chip)

Photometry

CR14-40L-30K BASED ON LTL REPORT TEST #: 24294
Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. IESNA LM-79-08 specifies the entire luminaire as the source resulting in a luminaire efficiency of 100%.



Coefficients Of Utilization – Zonal Cavity Method				
RC %:	80			
RW %:	70	50	30	10
RCR: 0	119	119	119	119
1	110	106	102	73
2	101	93	87	82
3	92	82	75	69
4	85	74	65	59
5	78	66	57	51
6	72	60	51	45
7	67	54	46	40
8	63	49	41	36
9	58	45	37	32
10	55	42	34	29

Effective Floor Cavity Reflectance: 20%

Average Luminance Table (cd/m²)				
	Horizontal Angle			
Vertical Angle		0°	45°	90°
	45°	5,407	5,407	5,407
	55°	5,015	5,002	4,673
	65°	4,589	4,315	3,572
	75°	3,039	1,690	1,282
	85°	1,727	1,249	1,321

Zonal Lumen Summary			
Zone	Lumens	% Lamp	Luminaire
0-30	1,220	N/A	30.8%
0-40	1,995	N/A	50.4%
0-60	3,385	N/A	85.5%
0-90	3,959	N/A	100%
0-180	3,959	N/A	100%

Reference http://creecanada.com/products/interior/troffers/cr-series/ for detailed photometric data

Application Reference

Based on CR14-40L-30K Luminaire

Open Space						
Spacing	Initial Delivered Lumens	Lumens	Wattage	LPW	w/ft²	Average fc
8 x 8	22L	2200	22	100	0.35	30
	40L	4000	40	100	0.69	54
	40LHE	4000	30.5	125	0.56	54
	50L	5000	50	100	0.78	68
8 x 10	22L	2200	22	100	0.28	25
	40L	4000	40	100	0.55	45
	40LHE	4000	30.5	125	0.45	45
	50L	5000	50	100	0.62	57
10 x 10	22L	2200	22	100	0.22	21
	40L	4000	40	100	0.44	38
	40LHE	4000	30.5	125	0.36	38
	50L	5000	50	100	0.50	48
10 x 12	22L	2200	22	100	0.19	17
	40L	4000	40	100	0.37	30
	40LHE	4000	30.5	125	0.30	30
	50L	5000	50	100	0.42	38

9' ceiling: 80/50/20 reflectances; 2.5' workplane, open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'

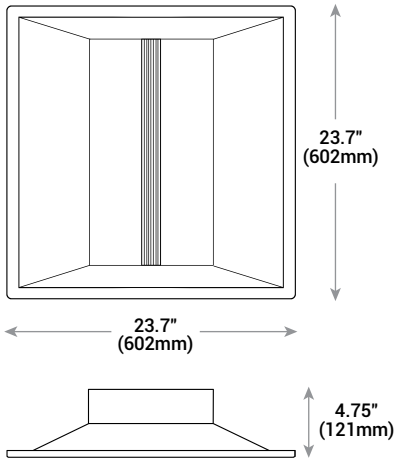
US: www.cree.com T (800) 236-6800 F (262) 504-5415 **Canada: www.cree.com/canada** T (800) 473-1234 F (800) 890-7507

CR Series

CR22™ 2' x 2' Architectural LED Troffer

Product Description

The CR22™ Architectural LED troffer delivers up to 100 lumens per watt of exceptional 90 CRI light at both 2000 and 3200 lumen levels. This breakthrough performance is achieved by combining the high efficacy and high-quality light of Cree TrueWhite® Technology with a unique thermal management design. The CR22™ product family is available in warm, neutral, cool, or daylight color temperatures and has step, 0-10V, or Lutron EcoSystem® Enabled dimming options. Its unique indirect illumination design lightweight design makes the CR22™ perfect for use in commercial new construction or renovated spaces.



NOTE: Use of Expanded Junction Box will expand the depth to 6.67" and Emergency Backup will expand the depth to 6.30". Use of 347V will increase fixture height by 1.4"

Performance Summary

- Utilizes Cree TrueWhite® Technology (90 CRI)
- Room-Side Heat Sink
- **Efficacy:** 90-100 LPW
- **Initial Delivered Lumens:** 2,000, 3,200 lumens
- **Input Power:** 22-35 watts
- **CRI:** 90 CRI (Cree TrueWhite® Technology), 80+ CRI (HD)
- **CCT:** 3000K, 3500K, 4000K, 5000K
- **Input Voltage:** 120-277 VAC or 347 VAC
- **Limited Warranty†:** 10 years
- **Lifetime:** Designed to last from 50,000 hours (HD), 75,000 hours (Standard TW), and 100,000 hours (HE TW)
- **Controls:** Step Level to 50%, 0-10V Dimming or Lutron EcoSystem Enabled to 5%*
- **Mounting:** Recessed**

† See www.cree.com/lighting/products/warranty for warranty terms
* Reference www.cree.com/lighting for recommended dimming control options
** Acceptable for use with standard 9/16 T-Bar or larger when installed per installation instructions. Consult factory for non-standard grid applications

Accessories

Field-Installed		
Adjustable Cable AC5 72 PD8 JB AC5 18/4 72 PD8 JB **Chicago Plenum Field Kit** CPLCR **Chicago Plenum Field Kit-Emergency** CPLCR EM	**Junction Box** EJBCR 5PK - Expanded size junction box for through wiring (5 pack) **Power Whip** PW 18/4 06 9T/SS CR	**347 Volt** CR 347V **Step Dimming to 50%** CR 347V SD **Surface Mount Kit** SMK CR22

Ordering Information

Example: CR22-20L-35K-S

CR22					
Product	**Initial Delivered Lumens**	**CCT**	**Voltage**	**Control**	**Options**
CR22	**20L**[1] 22W 2000 lumens – 90 LPW **32L** 32W 3200 lumens – 100 LPW	**30K** 3000K **35K** 3500K **40K** 4000K **50K** 5000K	**Blank** 120-277 Volt **34** 347 Volt - Integrated option available on 32L only. Other types require addition of a 347 accessory kit (see table above)	**S** Step Dimming to 50% **10V** 0-10V Dimming to 5% **LES**[2] Lutron EcoSystem® Enabled to 5%	**HD** **CRI 80+ (44W 4000 lumens - 90 LPW)** - Available only with 40L **EB14**[3] **Emergency Backup - 1400 lumens** - Not for use with SMK Kits . Use EB14 SMK **EB14SMK**[3] **Emergency Backup with surface mount kit - 1400 lumens** - Includes surface mount kit accessory (SMK-CR22)

1. Not available with HD 2. Not available in 20L 3. Not available in LES types
NOTE: Price adder may apply depending on configuration

Rev. Date: V5 10/28/2015

US: www.cree.com/lighting T (800) 236-6800 F (262) 504-5415
Canada: www.cree.com/canada T (800) 473-1234 F (800) 890-7507

Product Specifications

CREE TRUEWHITE® TECHNOLOGY

A revolutionary way to generate high-quality white light, Cree TrueWhite® Technology is a patented approach that delivers an exclusive combination of 90+ CRI, beautiful light characteristics, and lifelong color consistency, all while maintaining high luminous efficacy – a true no compromise solution.

CREE LED TECHNOLOGY

Cree's total systems approach to product development is a comprehensive engineering philosophy that combines the most advanced LED sources, driver technologies, optics and forms. The result is highly-reliable luminaire solutions for both indoor and outdoor applications that reduce energy use, extend lifetimes, and maximize illumination performance and quality.

ROOM-SIDE HEAT SINK

An innovative thermal management system designed to maximize cooling effectiveness by integrating a unique room-side heat sink into the diffusing lens. This breakthrough design creates a pleasing architectural aesthetic while conducting heat away from LEDs in a temperature-controlled environment. This enables the LEDs to consistently run cooler, providing significant boosts to lifetime, efficacy, and color consistency.

CONSTRUCTION & MATERIALS

- Durable 22-gauge steel housing with standard troffer access plate for electrical installation
- One-piece lower reflector finished with a textured high reflectance white polyester powder coating creates a comfortable visual transition from the lens to the ceiling plane
- Includes t-bar clips and holes for mounting support wires enable recessed or suspended installation
- Individual luminaires may be mounted end to end for a continuous row of illumination

OPTICAL SYSTEM

- Unique combination of reflective and refractive optical components achieves a uniform, comfortable appearance while eliminating pixelation and color fringing
- Components work together to optimize distribution, balancing the delivery of high illuminance levels on horizontal surfaces with an ideal amount of light on walls and vertical surfaces. This increases the perception of spaciousness
- Diffusing lens integrated with upward-facing LED strip eliminates direct view of LEDs while lower reflector balances brightness of lens with the ceiling to create a low-glare high angle appearance

ELECTRICAL SYSTEM

- Integral, high-efficiency driver
- **Power Factor:** = 0.9 nominal
- **Input Power:** Stays constant over life.
- **Input Voltage:** 120-277V or 347V, 50/60Hz
- **Operating Temperature Range:** 0˚C - + 35˚C (32˚F - + 95˚F)
- **Total Harmonic Distortion:** < 20%

CONTROLS

- Step dimming to 50%*
- Optional continuous dimming to 5% with 0-10V DC control protocol*
- Optional Lutron EcoSystem® Enabled option allows seamless integration with Lutron EcoSystem controls*

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for damp locations
- Designed for indoor use
- UL924 (EB14 option)
- DLC qualified. Please refer to www.designlights.org/QPL for most current information
- RoHS compliant. Consult factory for additional details
- Meets FCC Part 15 standards for conducted and radiated emissions

* Reference www.cree.com/lighting for recommended dimming controls and wiring diagrams

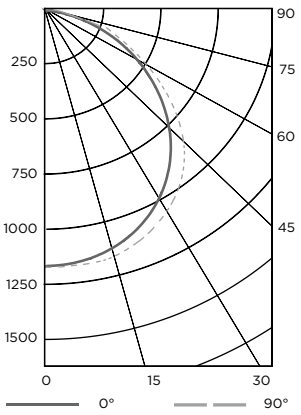
Recommended CR Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial Delivered Lumens	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
0˚C (41˚F)	20L and 32L	1.05	1.04	1.04	1.04	1.04
5˚C (41˚F)	20L and 32L	1.04	1.03	1.03	1.03	1.03
10˚C (50˚F)	20L and 32L	1.03	1.02	1.02	1.02	1.02
15˚C (59˚F)	20L and 32L	1.02	1.01	1.01	1.01	1.01
20˚C (68˚F)	20L and 32L	1.01	1.00	1.00	1.00	1.00
25˚C (77˚F)	20L and 32L	1.00	0.99	0.99	0.99	0.99
30˚C (86˚F)	20L and 32L	0.99	0.98	0.98	0.98	0.98
35˚C (95˚F)	20L and 32L	0.98	0.97	0.97	0.97	0.97
40˚C (104˚F)	20L and 32L	0.97	0.96	0.96	0.96	0.96

[1] Lumen maintenance values at 25˚C (77˚F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)

Photometry

CR22-32L-30K BASED ON LTL REPORT TEST #: 24292
Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. IESNA LM-79-08 specifies the entire luminaire as the source resulting in a luminaire efficiency of 100%..



Coefficients Of Utilization – Zonal Cavity Method				
RC %:	80			
RW %:	70	50	30	10
RCR: 0	119	119	119	119
1	110	105	101	98
2	100	92	85	80
3	91	81	73	67
4	84	72	63	57
5	77	64	55	49
6	71	58	49	43
7	66	52	44	38
8	61	48	39	33
9	57	44	36	30
10	53	40	32	27

Effective Floor Cavity Reflectance: 20%

Reference www.cree.com/Lighting/Products/Indoor/Troffers/CR-Series for detailed photometric data

Average Luminance Table (cd/m²)				
Vertical Angle	Horizontal Angle			
	0°	45°	90°	
45°	3,575	3,864	3,972	
55°	3,164	3,656	3,758	
65°	2,498	3,133	3,347	
75°	1,620	2,348	2,051	
85°	366	252	168	

Zonal Lumen Summary			
Zone	Lumens	% Lamp	Luminaire
0-30	923	N/A	28.1%
0-40	1,527	N/A	46.5%
0-60	2,704	N/A	82.5%
0-90	3,280	N/A	100%
0-180	3,959	N/A	100%

Application Reference

Based on CR22-32L-30K Luminaire

Open Space					
Spacing	Lumens	Wattage	LPW	w/ft²	Average fc
8 x 8	2000L	22W	90	0.35	28
	3200L	32W	100	0.55	44
8 x 10	2000L	22W	90	0.28	23
	3200L	32W	100	0.44	37
10 x 10	2000L	22W	190	0.22	20
	3200L	32W	100	0.35	31
10 x 12	2000L	22W	90	0.19	16
	3200L	32W	100	0.29	25

9' ceiling: 80/50/20 reflectances; 2.5' workplane, open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'

US: www.cree.com/lighting T (800) 236-6800 F (262) 504-5415 **Canada: www.cree.com/canada** T (800) 473-1234 F (800) 890-7507

DSX0 LED 20C 530 40K T3M MVOLT

D-Series LED, Size 0

Area Luminaire

Minimum Scale. Maximum Results.

Pedestrian in scale only, the D-Series LED Area, Size 0 is an extraordinary luminaire that can be configured to meet any site's lighting needs. The versatility and power of this luminaire prove big things really do come in small packages.

Key Features:

- Energy savings of 70% vs. comparable metal halide luminaires; saves $141 per luminaire, per year over 400W metal halide
- 20+ years expected service life (with lumen maintenance up to L99/100,000 hours, 25°C)
- Proprietary precision optics deliver exceptional uniformity and allow for increased spacing, resulting in fewer poles and lower overall cost
- Control options from Acuity Controls include standalone photocell, switched bi-level, part-night scheduled dimming, multi-level motion sensor, and ROAM® wireless monitoring and control

DSX0			
Model	Input Watts	Lumens	Metal Halide Replacement
DSX0 LED P1 40K T3M	38W	4,577	175W
DSX0 LED P3 40K T3M	71W	8,205	250W
DSX0 LED P5 40K T3M	89W	11,346	400W
DSX0 LED P7 40K T3M	166W	17,832	620W

Quick Facts:

- Up to 400W MH replacement
- Lumen packages from 3,000 - 19,000 lumens up to L92/50,000 hours
- Efficacies up to 139 lumens per watt
- 14 factory-rotatable distributions available
- Available in 3000K, 4000K & 5000K CCT and Amber LED
- Weight: 16 lbs; EPA: 0.95 ft^2

D-Series LED Area Luminaire, Size 0

Ordering Information

EXAMPLE: DSX0 LED P6 40K T3M MVOLT SPA DDBXD

DSX0 LED

Series	LEDs	Color temperature	Distribution	Voltage	Mounting
DSX0 LED	**Forward optics** P1 P4 P7 P2 P5 P3 P6 **Rotated optics** P10 P12 P11 P13	30K 3000 K 40K 4000 K 50K 5000 K AMBPC Amber phosphor converted	T1S Type I short T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4M Type IV medium TFTM Forward throw medium T5VS Type V very short T5S Type V short T5M Type V medium T5W Type V wide BLC Backlight control LCCO Left corner cutoff RCCO Right corner cutoff	MVOLT 120 208 240 277 347 480	**Shipped included** SPA Square pole mounting RPA Round pole mounting WBA Wall bracket SPUMBA Square pole universal mounting adaptor RPUMBA Round pole universal mounting adaptor **Shipped separately** KMA8 DDBXD U Mast arm mounting bracket adaptor (specify finish)

Control options			Other options	Finish *(required)*	
Shipped installed			**Shipped installed**	DDBXD	Dark bronze
PER	NEMA twist-lock receptacle only (control ordered separate)	BL30 Bi-level switched dimming, 30%	HS House-side shield	DBLXD	Black
PER5	Five-wire receptacle only (control ordered separate)	BL50 Bi-level switched dimming, 50%	SF Single fuse (120, 277, 347V)	DNAXD	Natural aluminum
PER7	Seven-wire receptacle only (control ordered separate)	PNMTDD3 Part night, dim till dawn	DF Double fuse (208, 240, 480V)	DWHXD	White
DMG	0-10V dimming extend out back of honsing for external control (no controls) (leads exit fixture)	PNMT5D3 Part night, dim 5 hrs	L90 Left rotated optics	DDBTXD	Textured dark bronze
PIR	Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 5fc	PNMT6D3 Part night, dim 6 hrs	R90 Right rotated optics	DBLBXD	Textured black
PIRH	Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 5fc	PNMT7D3 Part night, dim 7 hrs	DDL Diffused drop lens	DNATXD	Textured natural aluminum
PIR1FC3V	Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc	FAO Field adjustable output	BS Bird spikes	DWHGXD	Textured white
PIRH1FC3V	Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc				

Accessories *Ordered and shipped separately.*

Controls & Shields

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)
DSHORT SBK U	Shorting cap
DSX0HS 20C U	House-side shield for 20 LED unit
DSX0HS 30C U	House-side shield for 30 LED unit
DSX0HS 40C U	House-side shield for 40 LED unit
DSX0DDL U	Diffused drop lens (polycarbonate)
PUMBA DDBXD U	Square and round pole universal mounting bracket adaptor (specify finish)
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish)

Please use the spec sheet at www.acuitybrands.com when ordering to ensure component compatibility for your desired configuration.

DSX2
400W - 1000W MH Replacement

DSX1
250W - 750W MH Replacement

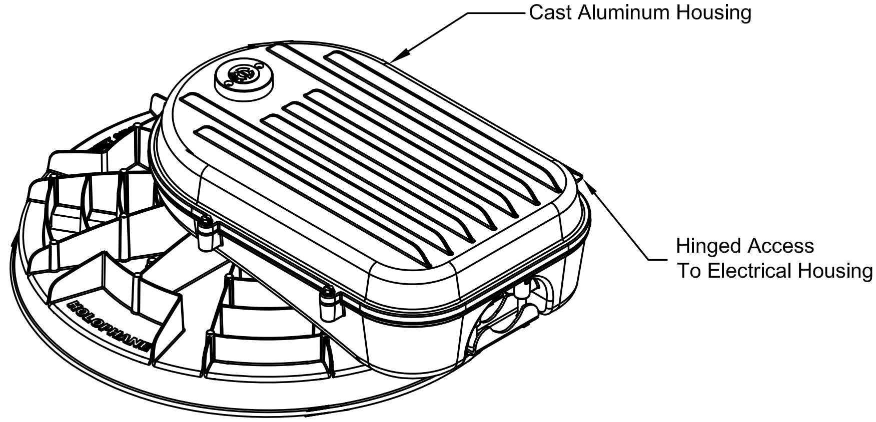
DSX0
175W - 400W MH Replacement

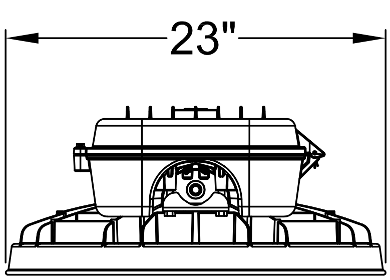
DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

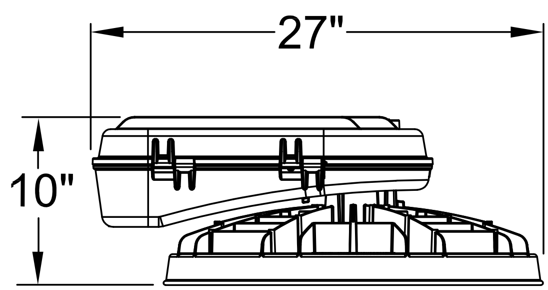
One Lithonia Way, Conyers, GA 30012 | Phone: 800.279.8041 | www.acuitybrands.com

Weight = 52lbs
EPA =1.30 sq. ft
UL1598, 40C, Wet location

HMLED2 06 4K AH G F P7 RFD211068







HMLED2™
LED High Mast Lighting

Infrastructure
Specialty

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LEADER IN LIGHTING SOLUTIONS
An Acuity Brands Company

ORDERING INFORMATION:

HMLED2	6	4K	AH
Series	Number of LED Modules	Color Temperature	Voltage

Series
- HMLED2

Number of LED Modules
- 06 = 06 Modules
- 09 = 09 Modules
- 12 = 12 Modules

Color Temperature
- 4K = 4,000K CCT +/-250K
- 5K = 5,000K CCT +/-250K

Voltage
- AS = Auto-Sensing Voltage (120 - 277 V)
- AH = Auto-Sensing Voltage (347 - 480 V)

G	F	P7 RFD211069	
Housing Color	Optical	Options	Accessories

Housing Color
- A = As Specified
- G = Gray
- H = Graphite
- K = Black
- Z = Bronze
- W =White

Optical
- M = Medium, Asymmetric
- N= Narrow, Asymmetric
- F = Forward Throw, Asymmetric
- AN = Area Narrow
- AW = Area Wide

Options
- AO = Field Adjustable Output
- DM = 0-10v Dimming
- FD1 = Single Fusible Disconnect
- FD2 = Double Fusible Disconnect
- P3 = 3 Pin NEMA Receptacle
- P5 = 5 Pin NEMA Receptacle
- P7 = 7 Pin NEMA Receptacle
- PCSS = DTL Solid-State Lighting Photocontol 120-277V
- PCL1 = DTL DLL Photocontrol for 120-277V
- PCL3 = DTL Twist-off Photocontrol for 347V
- PCL4 = DTL Twist-off Photocontrol for 480V
- PSC= Shorting Cap

Accessories
- F1 = Single Fusing Accessory
- F2 = Double Fusing Accessory
- HMLED2D90 = 90 Degree Shield
- HMLED2D120 = 120 Degree Shield
- HMLED2D180 = 180 Degree Shield

PRODUCT ENGINEERED TO LIMIT INRUSH TO 100A PER CUSTOMERS SPEC

ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

Specifications

General Construction

Rugged die cast, low copper content aluminum 380 alloy electrical and optical housing are polyester powder coated with super durable paint for durability and corrosion resistance. Rigorous pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 5,000 hours exposure to salt fog chamber (per ASTM B117). Four bolt horizontal arm mount with +/- 5 degree vertical adjustment provides 3G vibration rating per ANSI C136. Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8"). Two captive bolts disengage top electrical cover for easy access to LED drivers, surge protection, and terminal block. IP66 rated LED modules, IP65 electrical assembly per IEC60068-2-3. Luminaire is UL 1598 safety listed to 40C, wet locations. Luminaire electrical and optical housing ship complete in one carton facilitating installation and minimizing carton disposal at jobsite.

Electrical

Quick disconnect connectors for ease of installation and maintenance. Surge protection meets 10KV/5KA per ANSI/IEEEC62.41. Driver meets maximum total harmonic distortion (THD) of 20% and is ROHS compliant. A three stage terminal block is standard for ease of installation.

Optical

Multi die LED chip on board (COB) technology, Color temperature options of 4000K and 5000K with CRI of 70 minimum. Borosilicate prismatic glass optics ensure longevity and minimize dirt depreciation. Zero uplight optics reduce sky glow and meets Dark Sky requirements. Prismatic glass optics provide overlapping pattern on application space eliminating dark spots. Prismatic glass optics minimize direct view of LED, reducing glare. Rotatable optic assembly provides alignment of asymmetric distributions to roadway.

Controls

Controls options include the **P3, P5, and P7** locking style photocontrol receptacles. The P5 and P7 receptacle options are factory pre-wired to dimming leads of drivers.
PCSS - Premium solid state locking style photocontrol (10 year rated life)
PCL1 - Extreme long life solid state locking-style photocontrol (20 year rated life)
Field Adjustable Output (AO) module - An onboard device that adjusts the light output and input wattage to meet site specific requirements, allowing a single fixture configuration to be flexibly applied in many different applications. The AO module is pre-set at the factory to position number 8.

Operating Characteristics (AN Optics)

LED Qty	CCT	Lumens	Input Watts	LPW	Input Amps						L83 @ 25C	Driver Life @ 25C
					120V	208V	240V	277V	347V	480V		
6	4000K	31,419	252	125	2.10	1.20	1.00	0.90	0.70	0.50	100,000 hrs	>100,000 hrs
9	4000K	46,675	376	124	3.10	1.80	1.60	1.40	1.10	0.80		
12	4000K	60,990	500	122	4.10	2.40	2.10	1.80	1.40	1.00		

Testing Compliance

See Holophane HMAO-LED Validation Test Specification - Luminaire conforms to following standards: ANSI/IEEE C62.41:2002 - Surge protection. ANSI C82.77:2002 - Harmonic distortion. ANSIC136.31:2001- Luminaire vibration. ASTM B 117:2003 - Salt spray test. FCC title 47 CFR Part 18 - Federal Communications Commission. IEC 60068 - Environmental testing. IEC 60529:1999 - Degrees of protection provided by enclosure (IP)IEC 61000 - Electromagnetic Compatibility testing (EMC). IEEE 519 - Harmonic control in Electrical Power systems. UL-1598, 40C, Wet Location - Safety listing.

Manufacturing

Manufactured in Crawfordsville, Indiana. ARRA compliant. Test 100% electrical of all luminaires before shipment. No less than five (5) years experience in manufacturing LED- based products.

Warranty

Five Year Limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note

Actual performance may differ as a result of end-user environment and application.
Actual wattage may differ by +/- 8% when operating between 120-480V +/-10%.
Specifications subject to change without notice.

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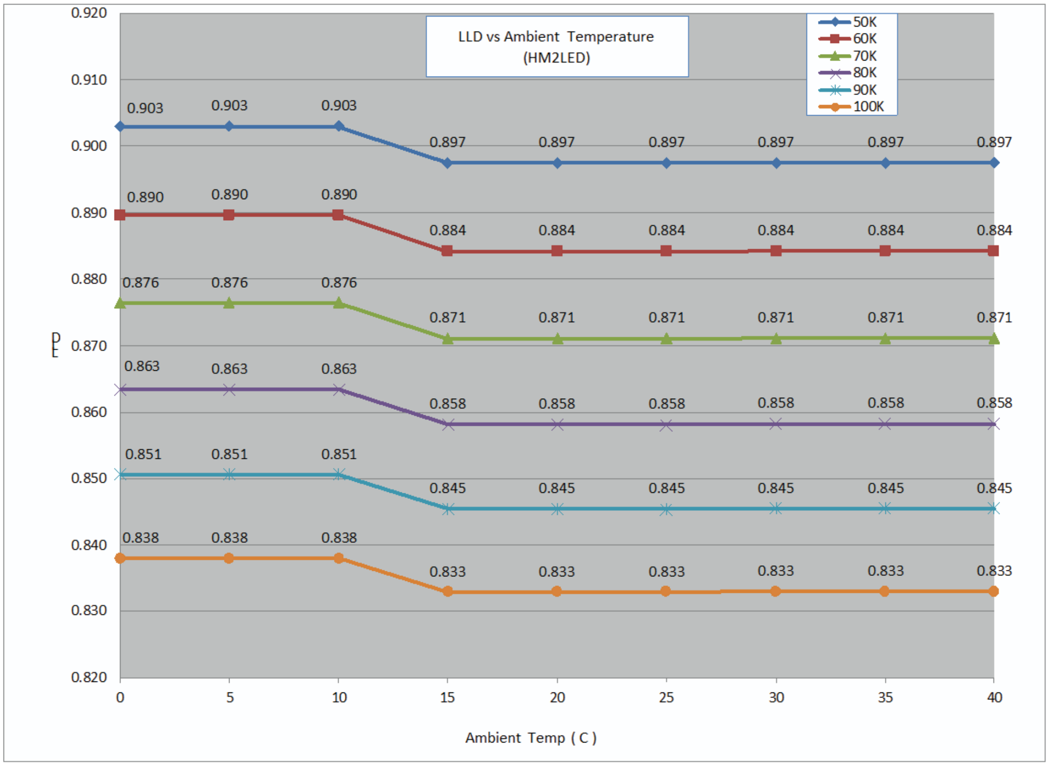
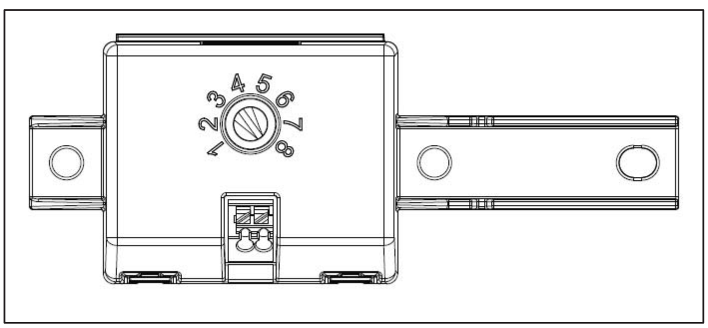
ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

Lumen Depreciation Chart



The Field Adjustable Output (AO) module



Configuration	AO Position	Lumens %	Wattage %
HMLED2-06,09,12	8	100%	100%
HMLED2-06,09,12	7	100%	100%
HMLED2-06,09,12	6	100%	100%
HMLED2-06,09,12	5	90%	85%
HMLED2-06,09,12	4	80%	73%
HMLED2-06,09,12	3	68%	60%
HMLED2-06,09,12	2	57%	49%
HMLED2-06,09,12	1	41%	34%

HMLED2™
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ORDER #:
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DRAWN: ERM
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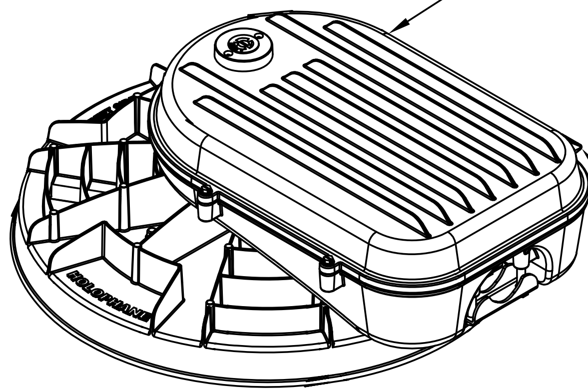
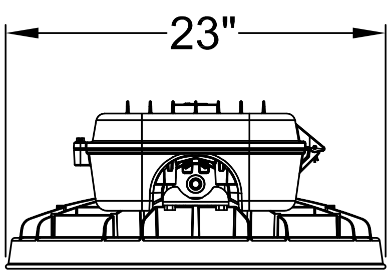
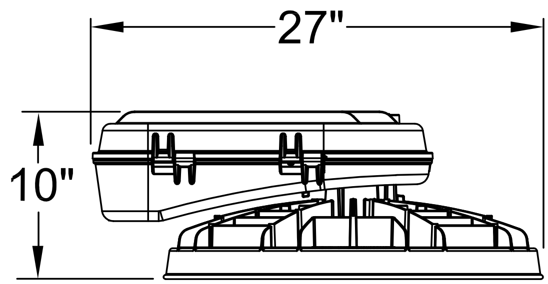
DWG #: LUM_HMLED2

Weight = 52lbs
EPA =1.30 sq. ft
UL1598, 40C, Wet location

HMLED2 12 4K AH G F P7 RFD211069







HMLED2™

LED High Mast Lighting

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An Acuity Brands Company

ORDERING INFORMATION:

HMLED2	12	4K	AH
Series	Number of LED Modules	Color Temperature	Voltage
HMLED2	06 = 06 Modules 09 = 09 Modules 12 = 12 Modules	4K = 4,000K CCT +/-250K 5K = 5,000K CCT +/-250K	AS = Auto-Sensing Voltage (120 - 277 V) AH = Auto-Sensing Voltage (347 - 480 V)

G	F	P7 RFD211068	
Housing Color	Optical	Options	Accessories
A = As Specified G = Gray H = Graphite K = Black Z = Bronze W =White	M = Medium, Asymmetric N= Narrow, Asymmetric F = Forward Throw, Asymmetric AN = Area Narrow AW = Area Wide	AO = Field Adjustable Output DM = 0-10v Dimming FD1 = Single Fusible Disconnect FD2 = Double Fusible Disconnect P3 = 3 Pin NEMA Receptacle P5 = 5 Pin NEMA Receptacle P7 = 7 Pin NEMA Receptacle PCSS = DTL Solid-State Lighting Photocontol 120-277V PCL1 = DTL DLL Photocontrol for 120-277V PCL3 = DTL Twist-off Photocontrol for 347V PCL4 = DTL Twist-off Photocontrol for 480V PSC= Shorting Cap	F1 = Single Fusing Accessory F2 = Double Fusing Accessory HMLED2D90 = 90 Degree Shield HMLED2D120 = 120 Degree Shield HMLED2D180 = 180 Degree Shield

PRODUCT ENGINEERED TO LIMIT INRUSH TO 100A PER CUSTOMERS SPEC

ORDER #:
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Specifications

General Construction

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Electrical

Quick disconnect connectors for ease of installation and maintenance. Surge protection meets 10KV/5KA per ANSI/IEEEC62.41. Driver meets maximum total harmonic distortion (THD) of 20% and is ROHS compliant. A three stage terminal block is standard for ease of installation.

Optical

Multi die LED chip on board (COB) technology, Color temperature options of 4000K and 5000K with CRI of 70 minimum. Borosilicate prismatic glass optics ensure longevity and minimize dirt depreciation. Zero uplight optics reduce sky glow and meets Dark Sky requirements. Prismatic glass optics provide overlapping pattern on application space eliminating dark spots. Prismatic glass optics minimize direct view of LED, reducing glare. Rotatable optic assembly provides alignment of asymmetric distributions to roadway.

Controls

Controls options include the **P3, P5, and P7** locking style photocontrol receptacles. The P5 and P7 receptacle options are factory pre-wired to dimming leads of drivers.

PCSS - Premium solid state locking style photocontrol (10 year rated life)

PCL1 - Extreme long life solid state locking-style photocontrol (20 year rated life)

Field Adjustable Output (AO) module - An onboard device that adjusts the light output and input wattage to meet site specific requirements, allowing a single fixture configuration to be flexibly applied in many different applications. The AO module is pre-set at the factory to position number 8.

Operating Characteristics (AN Optics)

LED Qty	CCT	Lumens	Input Watts	LPW	Input Amps						L83 @ 25C	Driver Life @ 25C
					120V	208V	240V	277V	347V	480V		
6	4000K	31,419	252	125	2.10	1.20	1.00	0.90	0.70	0.50	100,000 hrs	>100,000 hrs
9	4000K	46,675	376	124	3.10	1.80	1.60	1.40	1.10	0.80		
12	4000K	60,990	500	122	4.10	2.40	2.10	1.80	1.40	1.00		

Testing Compliance

See Holophane HMAO-LED Validation Test Specification - Luminaire conforms to following standards: ANSI/IEEE C62.41:2002 - Surge protection. ANSI C82.77:2002 - Harmonic distortion. ANSIC136.31:2001- Luminaire vibration. ASTM B 117:2003 - Salt spray test. FCC title 47 CFR Part 18 - Federal Communications Commission. IEC 60068 - Environmental testing. IEC 60529:1999 - Degrees of protection provided by enclosure (IP)IEC 61000 - Electromagnetic Compatibility testing (EMC). IEEE 519 - Harmonic control in Electrical Power systems. UL-1598, 40C, Wet Location - Safety listing.

Manufacturing

Manufactured in Crawfordsville, Indiana. ARRA compliant. Test 100% electrical of all luminaires before shipment. No less than five (5) years experience in manufacturing LED- based products.

Warranty

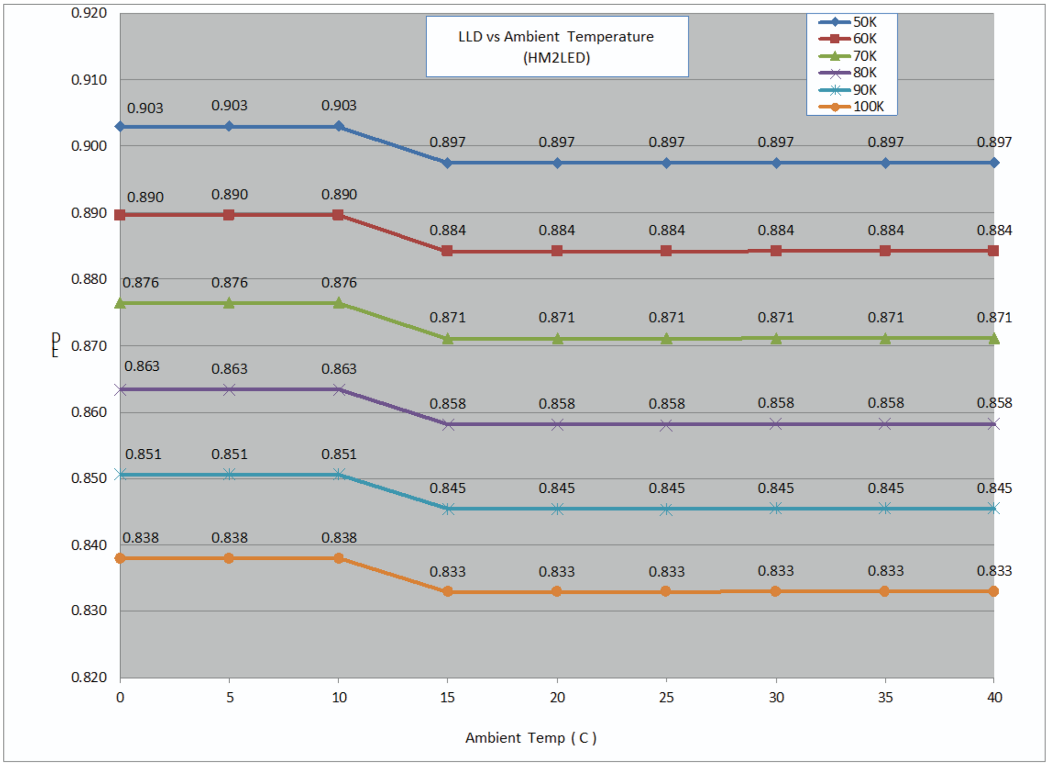
Five Year Limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note

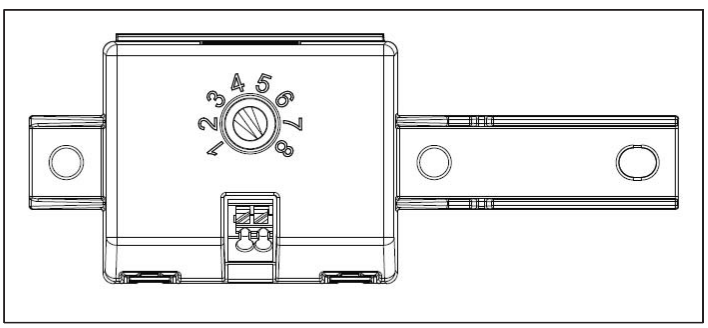
Actual performance may differ as a result of end-user environment and application.
Actual wattage may differ by +/- 8% when operating between 120-480V +/-10%.
Specifications subject to change without notice.

ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

Lumen Depreciation Chart



The Field Adjustable Output (AO) module



Configuration	AO Position	Lumens %	Wattage %
HMLED2-06,09,12	8	100%	100%
HMLED2-06,09,12	7	100%	100%
HMLED2-06,09,12	6	100%	100%
HMLED2-06,09,12	5	90%	85%
HMLED2-06,09,12	4	80%	73%
HMLED2-06,09,12	3	68%	60%
HMLED2-06,09,12	2	57%	49%
HMLED2-06,09,12	1	41%	34%

HMLED2™
LED High Mast Lighting

Infrastructure
Specialty

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS
An AcuityBrands Company

ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

PRECISION P2 PARAGON
EFFICIENCY. ECONOMY. SUSTAINABILITY.

LLW
LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

SPECIFICATIONS

Features
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2' and 4' lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

Construction
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic. Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

Electrical
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions
- NEC/CEC compliant ballast disconnect is standard.
- Optional emergency battery pack

Certifications
- CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
- Luminaires bear appropriate listing labels.
- Emergency-equipped fixtures labeled UL 924.
- Adheres to LM79, LM80 and TM21 industry standards.
- DesignLights Consortium® (DLC) qualified.
- Please refer to the DLC website for specific product qualifications at www.designlights.org.

Application
- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Retail
  - Schools
  - Hallways
  - Closets

Warranty
- Five-year warranty. (Terms and Conditions Apply)

CERTIFICATION

C SP US DLC

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW – _____ – _____ **U** – _____

MODEL	SIZE	COLOR TEMP	LUMEN OUTPUT	DRIVER OUTPUT	DRIVER VOLTAGE	OPTIONS
LLW LED Low Profile Wrap	**2** 1x2 Nominal **4** 1x4 Nominal	**35** 3500K **40** 4000K	**LW** Low **ML** Medium	**E** Fixed **ESD** Bi-Level[1] **ED** 0-10V Dimming[2]	**U** Universal 120/277 VAC	**ELL14** Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)

S18 18" Stem

FOOTNOTES

[1] Bi-Level driver must be controlled by sensor or A/B switching.
[2] Must be used in conjunction with lighting controls.
[3] Only available in 4 ft.

PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW2-40LW-EU** **LED Low Profile Wrap**
Ballast	**D150CQ25UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**2455**
Watts	**25**
Mounting	**Surface**
Shielding Angle	**N.A.**
Spacing Criterion	**0° = 1.19 90° = 1.09**
Luminous Opening in feet	**Length: 1.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
30	7785	7381	6945	6543	6414
40	6827	6305	5641	5062	4932
45	6037	5534	4834	4361	4250
50	5099	4616	4006	3722	3690
55	4170	3685	3239	3202	3198
60	3397	2930	2587	2794	2786
65	2656	2434	2174	2505	2440
70	2077	2161	1989	2325	2234
75	1754	1963	1939	2227	2138
80	1595	1837	1930	2213	2170
85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

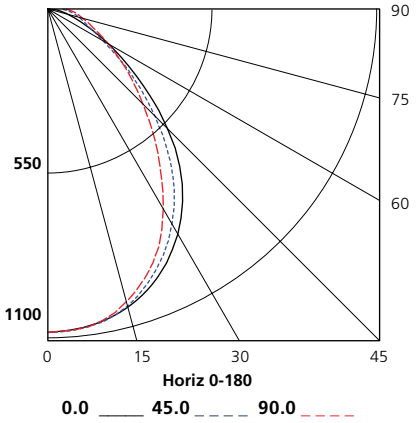
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW4-35ML-EU** **LED Low Profile Wrap**
Ballast	**D310CQ50UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**4693**
Watts	**52**
Mounting	**Surface**
Shielding Angle	**0° = 90 90° = 90**
Spacing Criterion	**0° = 1.19 90° = 1.10**
Luminous Opening in feet	**Length: 3.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8335	8335	8335	8335	8335
30	7587	7112	6697	6348	6203
40	6714	6148	5583	5031	4812
45	5897	5411	4827	4295	4098
50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

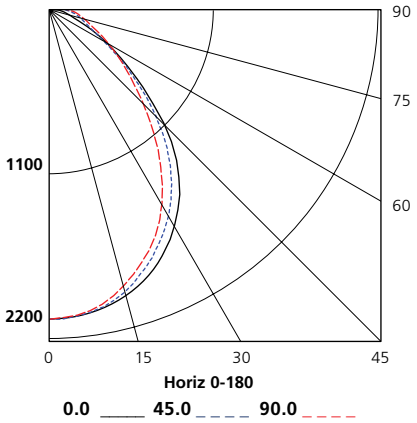
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

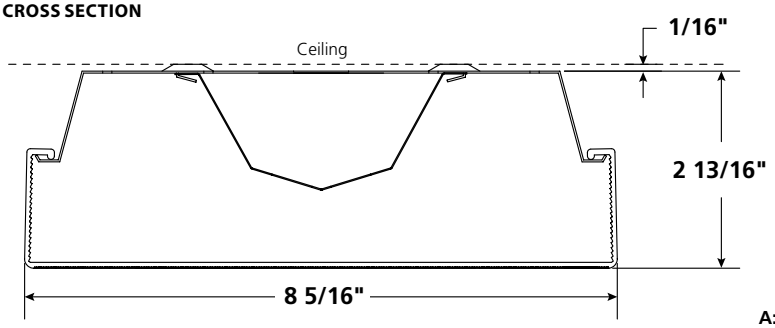
RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



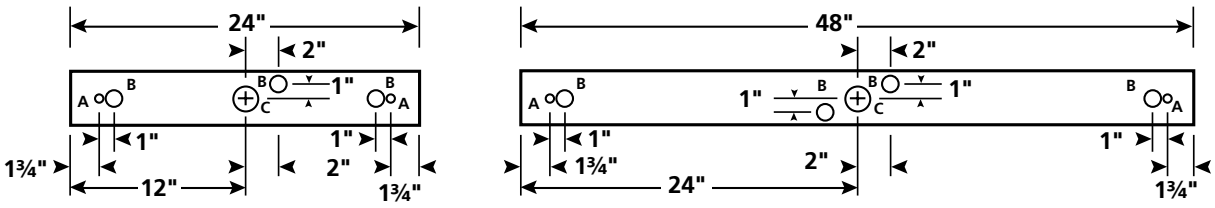
FIXTURE DIMENSIONS

CROSS SECTION



A: 5/16" Diameter Mounting Holes
B: 7/8" Diameter Knockouts
C: 2" Diameter Knockouts

TOP VIEW



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	**CRI**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

Application Notes

1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.
2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.
3. Optional emergency battery equipped units have a minimum temperature of 10°C.
4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.

PRECISION P2 PARAGON
EFFICIENCY. ECONOMY. SUSTAINABILITY.

LLW
LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

SPECIFICATIONS

Features
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2' and 4' lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

Construction
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic. Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

Electrical
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions
- NEC/CEC compliant ballast disconnect is standard.
- Optional emergency battery pack

Certifications
- CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
- Luminaires bear appropriate listing labels.
- Emergency-equipped fixtures labeled UL 924.
- Adheres to LM79, LM80 and TM21 industry standards.
- DesignLights Consortium® (DLC) qualified.
- Please refer to the DLC website for specific product qualifications at www.designlights.org.

Application
- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Retail
  - Schools
  - Hallways
  - Closets

Warranty
- Five-year warranty. (Terms and Conditions Apply)

CERTIFICATION

C SP US DLC

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW – – **U** –

MODEL	SIZE	COLOR TEMP	LUMEN OUTPUT	DRIVER OUTPUT	DRIVER VOLTAGE	OPTIONS
LLW LED Low Profile Wrap	**2** 1x2 Nominal **4** 1x4 Nominal	**35** 3500K **40** 4000K	**LW** Low **ML** Medium	**E** Fixed **ESD** Bi-Level[1] **ED** 0-10V Dimming[2]	**U** Universal 120/277 VAC	**ELL14** Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)

S18 18" Stem

FOOTNOTES

[1] Bi-Level driver must be controlled by sensor or A/B switching.
[2] Must be used in conjunction with lighting controls.
[3] Only available in 4 ft.

PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW2-40LW-EU** **LED Low Profile Wrap**
Ballast	**D150CQ25UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**2455**
Watts	**25**
Mounting	**Surface**
Shielding Angle	**N.A.**
Spacing Criterion	**0° = 1.19 90° = 1.09**
Luminous Opening in feet	**Length: 1.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
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40	6827	6305	5641	5062	4932
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85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

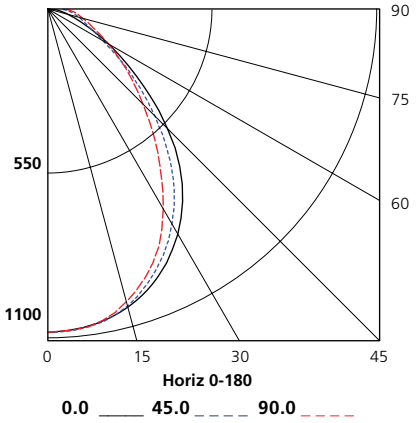
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW4-35ML-EU** **LED Low Profile Wrap**
Ballast	**D310CQ50UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**4693**
Watts	**52**
Mounting	**Surface**
Shielding Angle	**0° = 90 90° = 90**
Spacing Criterion	**0° = 1.19 90° = 1.10**
Luminous Opening in feet	**Length: 3.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
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50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

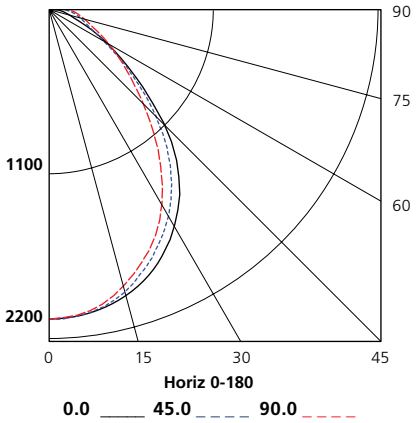
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

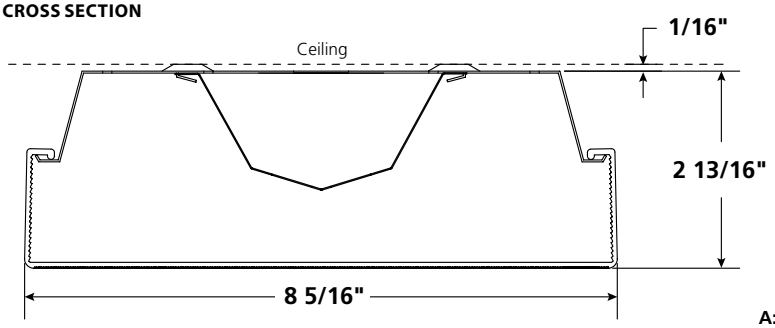
RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



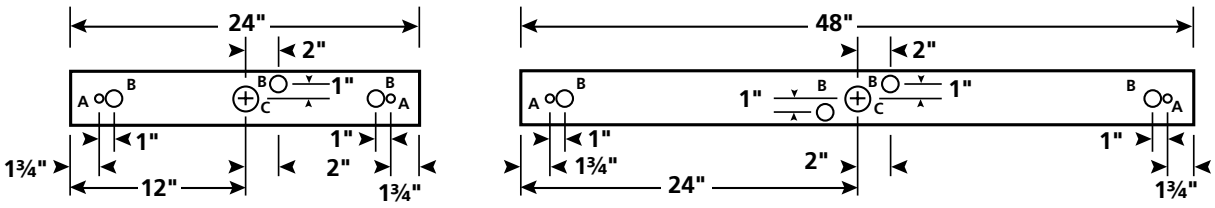
FIXTURE DIMENSIONS

CROSS SECTION



A: 5/16" Diameter Mounting Holes
B: 7/8" Diameter Knockouts
C: 2" Diameter Knockouts

TOP VIEW



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	**CRI**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

Application Notes

1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.
2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.
3. Optional emergency battery equipped units have a minimum temperature of 10°C.
4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.

PKG-304-SL-DM

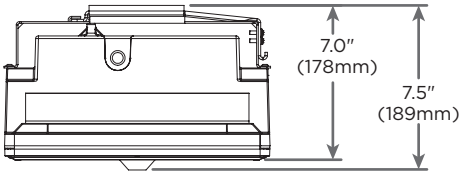
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

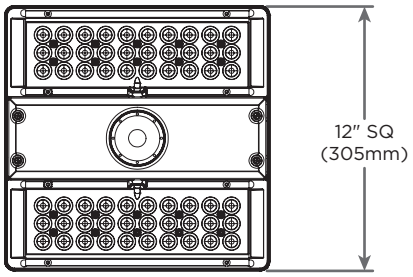
Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over exisiting single gang and octagonal junction boxes for direct mount.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish





Ordering Information

Example: PKG-304-SL-DM-04-E-UL-SV-350-OPTIONS

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K** 4000K Color Temperature - Color temperature per fixture **DIM** 0–10V Dimming - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F** Fuse - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML** Multi-Level - Refer to multi-level spec sheet for availability and additional information **J** Alternate Junction Box mounting

† See www.cree.com/lighting/products/warranty for warranty terms

See www.cree.com/lighting for warranty terms

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weathertight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

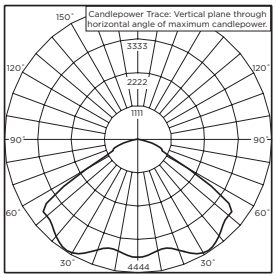
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

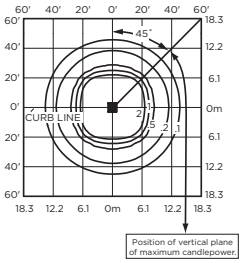
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Pending product qualification on the DesignLights Consortium ("DLC") Qualified Products List ("QPL")
- RoHS Compliant
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.





ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707

PKG-304-SL-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Sparkle Petroleum Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	5,243	B2 U0 G1	5,048	B2 U0 G1	46	0.39	0.24	0.22	0.21	0.15	0.12	94%
06	7,803	B3 U0 G1	7,514	B3 U0 G1	69	0.57	0.34	0.30	0.27	0.21	0.16	
525mA @ 25˚C (77˚F)												
04	7,340	B2 U0 G1	7,068	B2 U0 G1	71	0.59	0.35	0.31	0.28	0.21	0.16	93%
06	10,924	B3 U0 G1	10,519	B3 U0 G1	101	0.84	0.49	0.43	0.38	0.30	0.22	
700mA @ 25˚C (77˚F)												
04	8,912	B3 U0 G1	8,582	B3 U0 G1	94	0.79	0.46	0.40	0.36	0.28	0.21	91%
06	13,264	B3 U0 G1	12,773	B3 U0 G1	135	1.14	0.65	0.57	0.50	0.40	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing: > 150,000 hours.

PKG-304-SL-DM

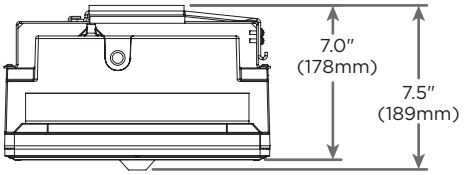
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

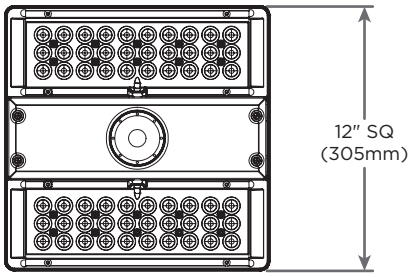
Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over exisiting single gang and octagonal junction boxes for direct mount.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish





Ordering Information

Example: PKG-304-SL-DM-04-E-UL-SV-350-OPTIONS

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K** 4000K Color Temperature - Color temperature per fixture **DIM** 0–10V Dimming - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F** Fuse - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML** Multi-Level - Refer to multi-level spec sheet for availability and additional information **J** Alternate Junction Box mounting

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Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weathertight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
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ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Pending product qualification on the DesignLights Consortium ("DLC") Qualified Products List ("QPL")
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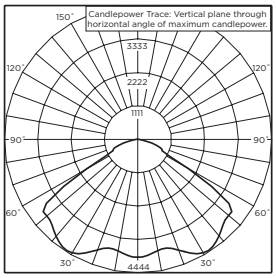

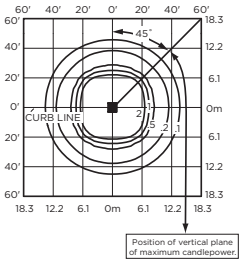

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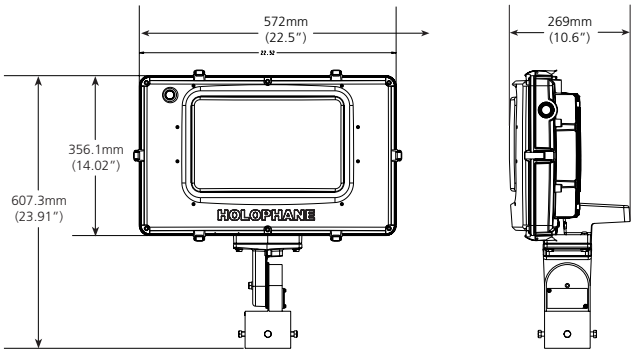
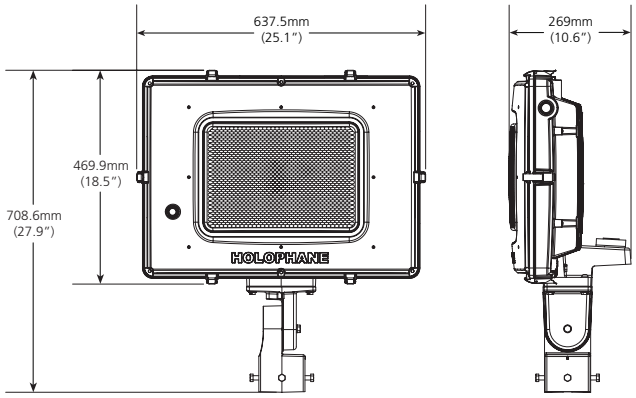
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing: > 150,000 hours.

Ordering Information

Dimensional Details



PMLED
Maximum weight: 40lbs (18kg) Knuckle
Maximum weight: 47lbs (21kg) Yoke
Maximum E.P.A.: 3.1 sq. ft.



PLLED
Maximum weight: 54lbs (24kg) Knuckle
Maximum weight: 65lbs (29kg) Yoke
Maximum E.P.A.: 3.8 sq. ft.

Performance Specifications

Optical
Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product. The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

Electrical
Long Life: LED light engines are rated > 100,000 hours at 25C, L70. Electronic driver has a rated life of 100,000 hour at a 25C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

Mechanical
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

Controls
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria

Warranty & Standards
Rated for -40C to 35C ambient
UL 1598 A wet location, UL 1598A Marine

Preferred Selections:

Most Frequently Ordered Catalog Numbers

PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z

PMLED	6	5K	10A	AH	44	1	K	BP
1	6	3	4	5	6	7	8	9
Luminaire	LED Modules	Color Temp	Drive Current	Voltage	Beam Pattern	Mounting	UL Category	Color
PMLED PLLED	4 7 5 8 6 9	3K 4K 5K	10A	AS AH	44 45 55 65 66	1 3 4	K	BP GP HP WP ZP

Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: Luminaire

PMLED	Predator LED Medium
PLLED	Predator LED Large

STEP 2: LED Modules

4[1]	4 Modules	**6**[1]	6 Modules
5[1]	5 Modules	**7**[2]	7 Modules
		8[2]	8 Modules
		9[2]	9 Modules

STEP 3: Color Temp

3K	3,000K
4K	4,000K
5K	5,000K

STEP 4: Drive Current

10A	1050mA Driver

STEP 5: Voltage

AS	Auto-sensing voltage (120-277V)
AH	Auto-sensing voltage (347-480V)

STEP 6: Beam Pattern

44	4x4 (Prismatic glass)
45	4x5 (Prismatic glass)
55	5x5 (Prismatic glass)
65	6x5 (Prismatic glass)
66	6x6 (Prismatic glass)

STEP 7: Mounting

1	Tenon slipfitter-knuckle
3	Yoke Stainless Steel
4	Yoke galvanized

STEP 8: UL Category

K	Wet locations
L[9]	Marine Outside

STEP 9: Color

BP	Black Super durable with epoxy primer
GP	Gray Super durable with epoxy primer
HP	Graphite Super durable with epoxy primer
WP	White Super durable with epoxy primer
ZP	Bronze Super durable with epoxy primer

*Colors are just a representation.
Custom colors are available upon request

STEP 10: Cord Length Option

04	4' cord length	**12**	12' cord length
05	5' cord length	**15**	15' cord length
06	6' cord length	**20**	20' cord length
08	8' cord length	**25**	25' cord length
10	10' cord length	**30**	30' cord length

STEP 11: Cord Type

63	16 gage, 3 conductor
43	14 gage, 3 conductor
23	12 gage, 3 conductor

STEP 12: Options

DM[4]	0V-10V Dimmable driver
F1[9]	Single fusing
F2[9]	Double fusing
NL	NEMA label
PCL1[3]	DLL 120V-277V Photocontrol
PCL3[3]	DLL 347V Photocontrol
PCL4[3]	DLL 480V Photocontrol
PCSS[3]	DSS 120-277V Photocontrol
P3[4]	ANSI standard locking style receptacle that accepts 3 pin controls for on/off operation

STEP 12: Options (Continued)

P5[5,9]	ANSI standard locking style 5-pin receptacle
P7[5,9]	ANSI standard locking style 7-pin receptacle
SH[3]	Shorting cap
TL	Tool-less entry with latches

STEP 12: Accessories

PMLED FV-XX Full visor super durable paint with epoxy primer
PMLED UBV-XX Upper/bottom visor super durable paint with epoxy primer
PMLED VG Vandal guard
PMLED WG Wire guard
08657-XX[6] Yoke to 2.375" OD tenon adaptor, super durable paint with epoxy primer
08775-XX[6] Yoke to 2.375" OD tenon adaptor with photocontrol receptacle, super durable paint with epoxy primer

1. Available with PMLED only
2. Available with PLLED only
3. Must be used with P3 or P5
5. Not available with P5 option
4. Not available with P3 option
5. Available with mounting 3 and 4 only
7. PMLED Not Available with PMLEDF1, PMLEDF2
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.

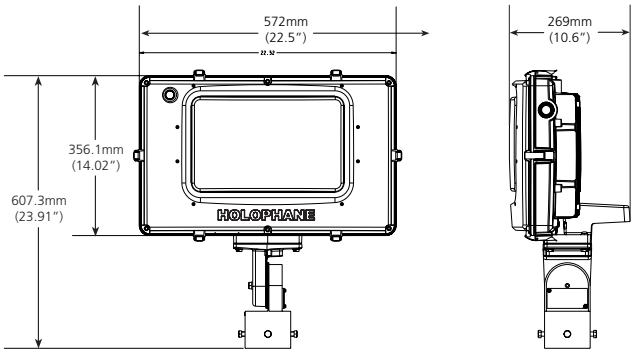
Operating Characteristics

The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

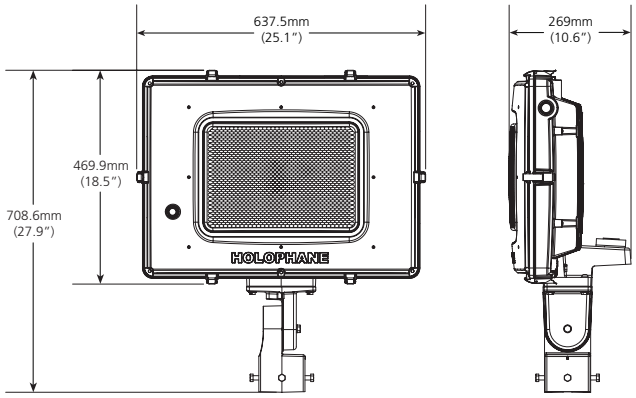
Replacement	HID Wattage CWA Type	Modules	Lumens	LED Wattage	LPW	Savings
PLLED 1000 HPS	1100	9 COB/10A	48,000	391	123	64%
PMLED 1000 MH	1070	6 COB/10A	32,000	261	123	75%
PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

Ordering Information

Dimensional Details



PMLED
Maximum weight: 40lbs (18kg) Knuckle
Maximum weight: 47lbs (21kg) Yoke
Maximum E.P.A.: 3.1 sq. ft.



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Maximum weight: 54lbs (24kg) Knuckle
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Performance Specifications

Optical
Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product. The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

Electrical
Long Life: LED light engines are rated > 100,000 hours at 25C, L70. Electronic driver has a rated life of 100,000 hour at a 25C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

Mechanical
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

Controls
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria

Warranty & Standards
Rated for -40C to 35C ambient
UL 1598 A wet location, UL 1598A Marine

Preferred Selections:

Most Frequently Ordered Catalog Numbers

PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z

PMLED	6	5K	10A	AH	44	1	K	BP
1	6	3	4	5	6	7	8	9
Luminaire	LED Modules	Color Temp	Drive Current	Voltage	Beam Pattern	Mounting	UL Category	Color
PMLED PLLED	4 7 5 8 6 9	3K 4K 5K	10A	AS AH	44 45 55 65 66	1 3 4	K	BP GP HP WP ZP

Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: Luminaire

PMLED	Predator LED Medium
PLLED	Predator LED Large

STEP 2: LED Modules

4[1]	4 Modules	**6**[1]	6 Modules
5[1]	5 Modules	**7**[2]	7 Modules
		8[2]	8 Modules
		9[2]	9 Modules

STEP 3: Color Temp

3K	3,000K
4K	4,000K
5K	5,000K

STEP 4: Drive Current

10A	1050mA Driver

STEP 5: Voltage

AS	Auto-sensing voltage (120-277V)
AH	Auto-sensing voltage (347-480V)

STEP 6: Beam Pattern

44	4x4 (Prismatic glass)
45	4x5 (Prismatic glass)
55	5x5 (Prismatic glass)
65	6x5 (Prismatic glass)
66	6x6 (Prismatic glass)

STEP 7: Mounting

1	Tenon slipfitter-knuckle
3	Yoke Stainless Steel
4	Yoke galvanized

STEP 8: UL Category

K	Wet locations
L[9]	Marine Outside

STEP 9: Color

BP	Black Super durable with epoxy primer
GP	Gray Super durable with epoxy primer
HP	Graphite Super durable with epoxy primer
WP	White Super durable with epoxy primer
ZP	Bronze Super durable with epoxy primer

*Colors are just a representation.
Custom colors are available upon request

STEP 10: Cord Length Option

04	4' cord length	**12**	12' cord length
05	5' cord length	**15**	15' cord length
06	6' cord length	**20**	20' cord length
08	8' cord length	**25**	25' cord length
10	10' cord length	**30**	30' cord length

STEP 11: Cord Type

63	16 gage, 3 conductor
43	14 gage, 3 conductor
23	12 gage, 3 conductor

STEP 12: Options

DM[4]	0V-10V Dimmable driver
F1[9]	Single fusing
F2[9]	Double fusing
NL	NEMA label
PCL1[3]	DLL 120V-277V Photocontrol
PCL3[3]	DLL 347V Photocontrol
PCL4[3]	DLL 480V Photocontrol
PCSS[3]	DSS 120-277V Photocontrol
P3[4]	ANSI standard locking style receptacle that accepts 3 pin controls for on/off operation

STEP 12: Options (Continued)

P5[5,9]	ANSI standard locking style 5-pin receptacle
P7[5,9]	ANSI standard locking style 7-pin receptacle
SH[3]	Shorting cap
TL	Tool-less entry with latches

STEP 12: Accessories

PMLED FV-XX Full visor super durable paint with epoxy primer
PMLED UBV-XX Upper/bottom visor super durable paint with epoxy primer
PMLED VG Vandal guard
PMLED WG Wire guard
08657-XX[6] Yoke to 2.375" OD tenon adaptor, super durable paint with epoxy primer
08775-XX[6] Yoke to 2.375" OD tenon adaptor with photocontrol receptacle, super durable paint with epoxy primer

1. Available with PMLED only
2. Available with PLLED only
3. Must be used with P3 or P5
5. Not available with P5 option
4. Not available with P3 option
5. Available with mounting 3 and 4 only
7. PMLED Not Available with PMLEDF1, PMLEDF2
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.

Operating Characteristics

The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

Replacement	HID Wattage CWA Type	Modules	Lumens	LED Wattage	LPW	Savings
PLLED 1000 HPS	1100	9 COB/10A	48,000	391	123	64%
PMLED 1000 MH	1070	6 COB/10A	32,000	261	123	75%
PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

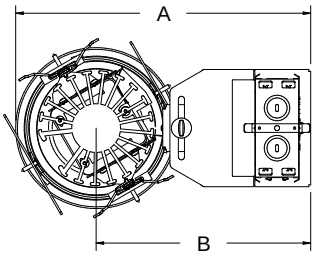
FIRM NAME:

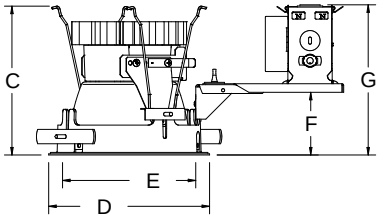
PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale





*Dimensions shown are for range of adjustability.

APPLICATIONS:

LiteFrame Retroficient RLF6LED is a 6" specification grade Retrofit LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

HOUSING:

All components are made from quality die cast aluminum or galvaneal steel. Pre-wired j-box with snap-on cover for easy access. Snap-in- connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

INSTALLATION:

All installation can be performed from below the ceiling without removing existing fixture.

REFLECTOR:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

LED LIGHT ENGINE:

The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>50,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

LED DRIVER:

The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DLM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V-277V. Optional Lutron Series A driver is also available.

DIMMING:

Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

CERTIFICATIONS:

CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

WARRANTY:

5 year warranty. See www.prescolite.com for details.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

ALTERNATIVE DIMMING TO 1%

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4**	❑ **120**	❑ **HDM**[3] Lutron 3-wire Eco System to 1%
❑ **RLF6LED6G4**	❑ **277**	❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only)
❑ **RLF6LED7G4**		❑ **DM1**[3] 0-10V dimming to 1%
		❑ **SD**[1] Small Diameter

NOTES

1 See housing capability guide on page 3

2 Requires WT option also

3 For HDM, DM1, & 2DM options, housing output must match trim output

prescolite

A Division of Hubbell Lighting, Inc.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.

Web: **www.prescolite.com** • Tech Support: **(888) 777-4832**

PHOTOMETRIC DATA

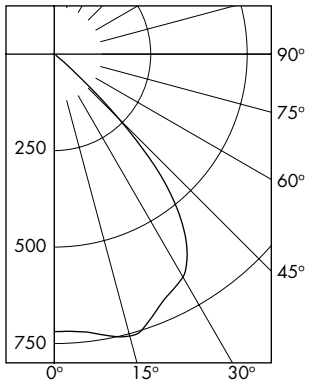
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
Fixture Delivered Lumens: 1157
Fixture Efficacy: 80.0
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	719	
5	722	69
15	756	212
25	692	321
35	597	365
45	236	181
55	4	8
65	0	0
75	0	0
85	0	0
90	0	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

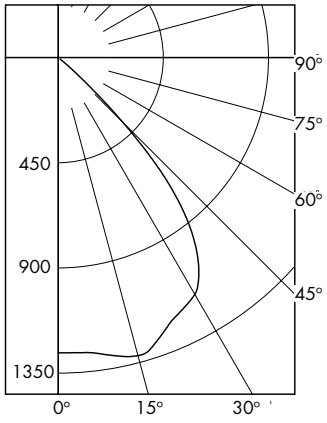
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K — Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	1263	
5	1267	122
15	1320	370
25	1212	561
35	1041	637
45	391	306
55	9	15
65	2	2
75	0	0
85	0	0
90	0	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

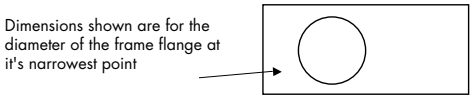
Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K — Test No. 8459

PHOTOMETRIC DATA

Retroficient - 6" RLF6LEDG4 Downlight

Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8



Central Inverters

For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. (Note: Not for use with integral EM option). For more information on LiteGear go to www.dual-lite.com/resources/litegear_luminaire_loading_chart/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

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701 Millennium Boulevard • Greenville, SC 29607 U.S.A. • Phone (864) 678-1000

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PRECISION P2 PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

www.P-2.com

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(352) 692-5900 FL

SIL - Standard LED Strip

The SIL, LED strip, brings together an economical price point and High performance

- Strips are everywhere so what sets us apart?
- Multiple configurations to meet your project's needs.
- Integrated Occupancy Sensors
- Adaptable to multiple control strategies: Dimming, Bi-level, High Frequency Sensors and more.

SIL LED Fixtures Deliver...

- Contoured lens and aesthetic look.
- Latest in LED efficiency, 92-98 lumens per watt.
- High color rendering (80+)
- TM-21 reported L70 of over 51,000 hours.

Why P2? It's Simple, Our Experience

- We have seen that due to the poor lumen maintenance and low CRI inherent to F96T12 light sources, you can often do a better re-lighting job with fewer design lumens.
- Contact the factory for photometric support to get the most out of your delivered lumens.

SIL - Solid State Strip

Application

SIL – 1x4 – ML – F – UL – 40K – SH – C8

SIL	1x4	ML	F	UL	40K	SH	C8
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Occ. Sensor	Cord Plug

Fixture Series
SIL = LED Strip Fixture

Fixture Size
1x4 = 1x4 Nominal
1x8 = 1x8 Nominal

Lumen Output
XL = Extra Low Wattage, 31W
LW = Low Wattage, High Efficiency, 51W
ML = Medium Lumen Output, 74W
HL = High Lumen Output, 96W

Notes
(1) Must be ordered in conjunction with lighting controls. Contact factory for asistance.
(2) Bi-level driver must be controlled by occupancy sensor or A/B switching. Contact factory for ordering assistance.

Driver Output
F = Fixed Output
DM = 0-10V Dimming (1)
BL = Bi-Level (2)v

Voltage
UL = Universal 120-277

Color Temperature
35K = 3500K
40K = 4000K
50K = 5000K

Occupancy Sensor
SH = 360 View Hi-Bay Sensor

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Other
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | lighting facts Pending

PRECISION P² PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

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SIL - Standard LED Strip

Want Fluorescent?

Consider our...

RWS

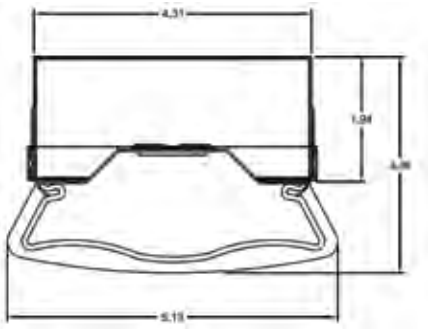
SIH

SIS

with Long Life Lamps and PS Ballasts

Fixture Construction

- Heavy Duty .032 White Aluminum cover with 22GA steel 4.25" channel
- Linear Frosted Acrylic Diffuser.
- Class 2 Driver
- Suitable for end-to-end row lighting
- Made in the USA.



Existing System

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Lamp Source Quantity & Type		CRI	CCT	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
SIL-1X4-XL	1	1X4 XL Engine	>80	4500K	1.00	1.00	2,900	31	94
SIL-1X4-LW	1	1X4 LW Engine	>80	4500K	1.00	1.00	5,019	51	98
SIL-1X4-ML	1	1X4 ML Engine	>80	4500K	1.00	1.00	6,872	72	95
SIL-1X4-HL	1	1X4 HL Engine	>80	4500K	1.00	1.00	8,781	95	92
SIL-1X8-XL	1	1X8 XL Engine	>80	4500K	1.00	1.00	5,800	62	94
SIL-1X8-LW	1	1X8 LW Engine	>80	4500K	1.00	1.00	10,038	102	98
SIL-1X8-ML	1	1X8 ML Engine	>80	4500K	1.00	1.00	17,562	190	92
SIL-1X8-HL	1	1X8 HL Engine	>80	4500K	1.00	1.00	11,600	124	94

General Notes

- Lamp/ballast system values shown are a general reference intended to supply a quick comparison of several common lamp/ballast systems, the associated energy consumption, and net lumen output.
- Fixture efficiencies and layout are not comprehended in the table, but will determine the usefulness of the system.
- Values shown are based on normal operating temperatures and at 277 volts.
- There are many operating variables that affect system output, in addition to rating variances from brand to brand.
- All T8 electronic ballast values shown are based on Ultra Efficient (aka 3rd Generation) T8 ballasts.
- All T5 and T8 lamp values shown are for basic grade lamps. Extended life and higher lumen lamps types are available.
- In addition to those shown there are a wide variety of systems to choose from, each with distinct features and cost points.
- Please consult the lamp/ballast manufacturer's catalogs for the detailed information required to model your system.

PRECISION P2 PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

www.P-2.com

(714) 386-5550 CA
(715) 381-2971 WI
(352) 692-5900 FL

SIL - Standard LED Strip

The SIL, LED strip, brings together an economical price point and High performance

- Strips are everywhere so what sets us apart?
- Multiple configurations to meet your project's needs.
- Integrated Occupancy Sensors
- Adaptable to multiple control strategies: Dimming, Bi-level, High Frequency Sensors and more.

SIL LED Fixtures Deliver...

- Contoured lens and aesthetic look.
- Latest in LED efficiency, 92-98 lumens per watt.
- High color rendering (80+)
- TM-21 reported L70 of over 51,000 hours.

Why P2? It's Simple, Our Experience

- We have seen that due to the poor lumen maintenance and low CRI inherent to F96T12 light sources, you can often do a better re-lighting job with fewer design lumens.
- Contact the factory for photometric support to get the most out of your delivered lumens.

SIL - Solid State Strip

Application

SIL – 1x4 – ML – F – UL – 40K – SH – C8

SIL	1x4	ML	F	UL	40K	SH	C8
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Occ. Sensor	Cord Plug

Fixture Series
SIL = LED Strip Fixture

Fixture Size
1x4 = 1x4 Nominal
1x8 = 1x8 Nominal

Lumen Output
XL = Extra Low Wattage, 31W
LW = Low Wattage, High Efficiency, 51W
ML = Medium Lumen Output, 74W
HL = High Lumen Output, 96W

Notes
(1) Must be ordered in conjunction with lighting controls. Contact factory for asistance.
(2) Bi-level driver must be controlled by occupancy sensor or A/B switching. Contact factory for ordering assistance.

Driver Output
F = Fixed Output
DM = 0-10V Dimming (1)
BL = Bi-Level (2)v

Voltage
UL = Universal 120-277

Color Temperature
35K = 3500K
40K = 4000K
50K = 5000K

Occupancy Sensor
SH = 360 View Hi-Bay Sensor

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Other
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | lighting facts Pending

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SIL - Standard LED Strip

Want Fluorescent?

Consider our...

RWS

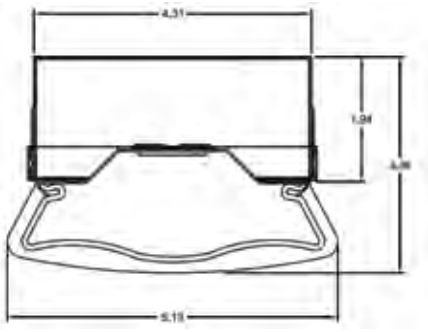
SIH

SIS

with Long Life Lamps and PS Ballasts

Fixture Construction

- Heavy Duty .032 White Aluminum cover with 22GA steel 4.25" channel
- Linear Frosted Acrylic Diffuser.
- Class 2 Driver
- Suitable for end-to-end row lighting
- Made in the USA.



Existing System

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Lamp Source Quantity & Type		CRI	CCT	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
SIL-1X4-XL	1	1X4 XL Engine	>80	4500K	1.00	1.00	2,900	31	94
SIL-1X4-LW	1	1X4 LW Engine	>80	4500K	1.00	1.00	5,019	51	98
SIL-1X4-ML	1	1X4 ML Engine	>80	4500K	1.00	1.00	6,872	72	95
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SIL-1X8-LW	1	1X8 LW Engine	>80	4500K	1.00	1.00	10,038	102	98
SIL-1X8-ML	1	1X8 ML Engine	>80	4500K	1.00	1.00	17,562	190	92
SIL-1X8-HL	1	1X8 HL Engine	>80	4500K	1.00	1.00	11,600	124	94

General Notes

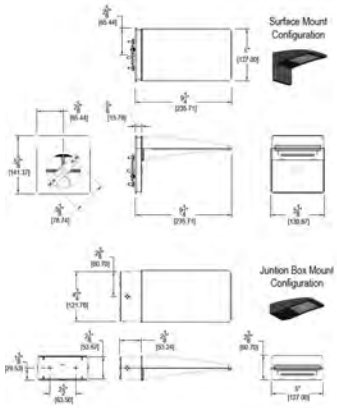
- Lamp/ballast system values shown are a general reference intended to supply a quick comparison of several common lamp/ballast systems, the associated energy consumption, and net lumen output.
- Fixture efficiencies and layout are not comprehended in the table, but will determine the usefulness of the system.
- Values shown are based on normal operating temperatures and at 277 volts.
- There are many operating variables that affect system output, in addition to rating variances from brand to brand.
- All T8 electronic ballast values shown are based on Ultra Efficient (aka 3rd Generation) T8 ballasts.
- All T5 and T8 lamp values shown are for basic grade lamps. Extended life and higher lumen lamps types are available.
- In addition to those shown there are a wide variety of systems to choose from, each with distinct features and cost points.
- Please consult the lamp/ballast manufacturer's catalogs for the detailed information required to model your system.

WPLED13N/PC2

LED 10W & 13 Wallpacks. 3 cutoff options. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 3.3 lbs



LED Info

Watts:	13W
Color Temp:	4000K (Neutral)
Color Accuracy:	86
L70 Lifespan:	100000
LM79 Lumens:	673
Efficacy:	45 LPW

Driver Info

Type:	Constant Current
120V:	N/A
208V:	0.08A
240V:	0.07A
277V:	0.06A
Input Watts:	15W
Efficiency:	87%

Technical Specifications

Photocell:
277V Photocell Included. Photocell is compatible with 208V-277V.

UL LISTING:
Suitable for Wet Locations as a Downlight. Suitable for Damp Locations as an Uplight. Wall Mount only. Suitable for Mounting within 4ft. of ground.

Lumen Maintenance:
The LED will deliver 70% of its initial lumens at 100,000 hours of operation.

Cold Weather Starting:
The minimum starting temperature is -40°F/-40°C.

Ambient Temperature:
Suitable for use in 50°C (122°F) ambient temperatures.

Driver:
Multi-chip 13W high output long life LED Driver Constant Current, Class 2 100V - 277V, 50/60 Hz.

Surge Protection:
4KV

Color Temperature (Nominal CCT):
4000K

Fixture Efficacy:
44.6 Lumens per Watt

Color Accuracy:
86 CRI

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Color Consistency:
3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:
RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2008.

Green Technology:
RAB LEDs are Mercury and UV free.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

For use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:
The design of the LPACK is protected by U.S. Pat. D604,004 and patents pending in Canada, China and Taiwan.

IESNA LM-79 & IESNA LM-80 Testing:
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Gaskets:
High Temperature Silicone.

Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. See our full warranty .

Equivalency:
The WPLED13 is Equivalent in delivered lumens to a 100W Metal Halide Wallpack.

HID Replacement Range:
The WPLED13 can be used to replace 70-150W Metal Halide Wallpacks based on delivered lumens.

Country of Origin:
Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:
This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:
Suitable in accordance with FAR Subpart 25.4.

WPLED3T78N/PCS2

LED 78W Wallpacks. 3 cutoff options. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze Weight: 34.8 lbs

Project:	Type:
Prepared By:	Date:

Driver Info

Type:	Constant Current
120V:	N/A
208V:	0.41A
240V:	0.35A
277V:	0.30A
Input Watts:	75W
Efficiency:	N/A

LED Info

Watts:	78W
Color Temp:	4000K
Color Accuracy:	72 CRI
L70 Lifespan:	100000
Lumens:	8941
Efficacy:	118 LPW

Technical Specifications

Electrical

Photocell:

277V Swivel Photocell Included. Photocell is compatible with 208V-277V.

Driver:

Constant Current, Class 2, 2000mA, 100-277V, 50-60Hz, 1.1A, Power Factor 99%

THD:

5.2% at 120V, 13.6% at 277V

Surge Protection:

6kV

Listings

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.
DLC Product Code: P000017AL

UL Listing:

Suitable for wet locations as a downlight.

IESNA LM-79 & IESNA LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Dark Sky Approved:

The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

LED Characteristics

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

LEDs:

Six (6) multi-chip, 13W, high-output, long-life LEDs.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Temperature (Nominal CCT):

4100K.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Replacement:

Replaces 400W Metal Halide.

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water

Ambient Temperature:

SuitableFor use in 40°C (104°F) ambient temperatures.

Cold Weather Starting:

Minimum starting temperature is -40°C (-40°F)

Housing:

Die cast aluminum housing, lens frame and mounting arm.

Reflector:

Specular vacuum-metallized polycarbonate

Gaskets:

High temperature silicone gaskets.

Finish:

Formulated for high-durability and long lasting color.

Green Technology:

Mercury and UV free. RoHS compliant components. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

For use on LEED Buildings:

IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Optical

Specification Grade Optics:

The Type III distribution is ideal for roadway, general parking, and other area lighting applications where a larger pool of lighting is required. It is intended to be located near the side of the area, allowing the light to project outward and fill the area.

BUG Rating:

B1 U0 G2

Technical Specifications (continued)

Other

California Title 24:

WPLED3T78/PCS2 complies with 2013 California Title 24 building and electrical codes as a commercial outdoor pole-mounted fixture > 30 Watts mounted at height greater than 24 feet. For mounting heights < 24 feet see WPLED3T78/BL with bi-level operation; additional component requirements will be listed in the Title 24 section under technical specifications on the product page.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

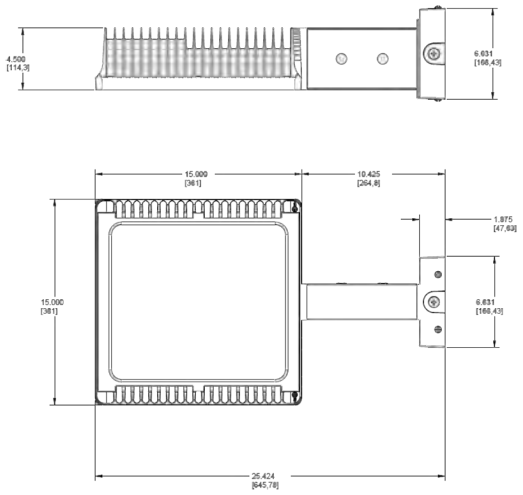
Patents:

The WPLED design is protected by patents pending in the U.S., Canada, China, Taiwan and Mexico.

Buy American Act Compliance:

RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

Dimensions



Features

- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- Replaces 400W MH
- 100 up to 277 Volts
- 5-year warranty

WPLED3T78N/PCS2

Ordering Matrix

Family	Distribution	Watts	Color Temp	Mount	Finish	Voltage	Photocell	Dimming	Sensor	Bi-Level
WPLED										
	2T = Type II **3T** = Type III **4T** = Type IV	**78** = 78W	**Blank** = 5000K (Cool) **Y** = 3000K (Warm) **N** = 4000K (Neutral)	**Blank** = Standard **FX** = Flat Wall	**Blank** = Bronze **W** = White	**Blank** = 120-277V **/480** = 480V	**Blank** = No Photocell **/PC** = 120V Button **/PC2** = 277 Button **/PCS** = 120V Swivel **/PCS2** = 277V Swivel **/PCS4** = 480V Swivel	**Blank** = No Dimming **/D10** = Dimmable	**/WS2** = Multi-Level Motion Sensor (Only available for 120-277V with /D10 for 50W)	**Blank** = No Bi-Level **/BL** = Bi-Level

Johnson Controls

Lighting Material Manuals

Port Allen Harbor

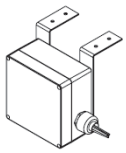
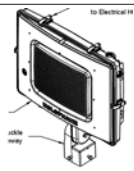
HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031

Johnson Controls
INGENUITY WELCOME

TABLE OF CONTENTS

Catalog

Part Name	Image	Additional Description
ELWG0CXXGC		GE - LIGHTGRID GATEWAY
ELWK0A5		GE - LIGHTGRID NODE BOX ASSY 277V
ELWM0CXV		GE - LIGHTGRID CELLULAR MODEM
ELWN0A5		GE - LIGHTGRID NODE 277V
RAB WPLED18NPC2		WPLED18N/PC2
RAB WPLED26NPC2		WPLED26N/PC2
Holo PMLED 06 4K-277V		PMLED-06-4K-07A-AS-66-1-L-ZP PMLED FV-ZP
Precision LLW-4-40-LW-E-U		LLW-4-40-LW-E-U
CREE PKG-304		PKG-304-PD-06-E-UL-SV-700-PML

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Catalog

Part Name	Image	Additional Description
Precision VTL-1X4-XL		VTL-1X4-XL-F-UL-40K
Precision VTL-1X8-XL		VTL-1X8-XL-F-UL-40K-C8

ELWG-0-C-XX-G-C

GE
Lighting

LightGrid™ Gateway

Outdoor Wireless Control System

Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features

- GPS module in every gateway
- Automatic gateway registration and display in MAP view
- Real-time update of the status of all the fixtures
- Self-forming & self-restoring mesh network
- Addressable via IPv6
- Nodes, gateway can be spaced up to 500m apart (Clear line of sight)
- Reliable and Secure Encrypted Communications

Applications

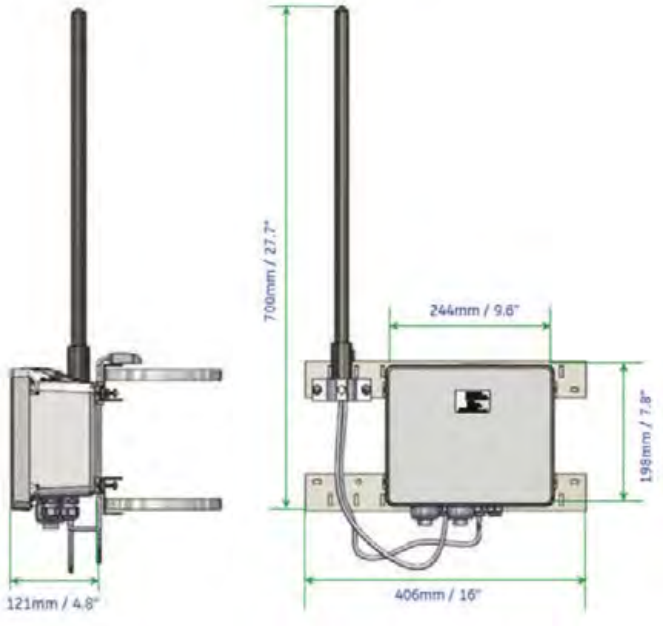
- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

Product Specifications

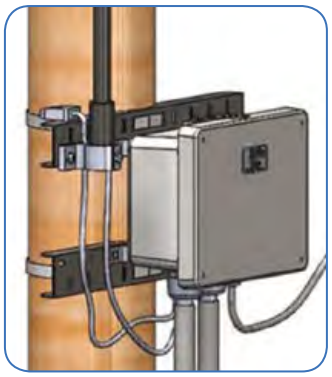
- Input Voltage: 120-277V, 347V—480V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power Consumption: < 3W
- Frequency: 915 MHz ISM Band
- GPS: Accuracy 3m (clear open sky)
- Addressing: IPv6
- Security: AES Encryption, Certificate Based
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Backhaul Communication: Ethernet or Cell (with modem)
- Complies with FCC Part 15 Required Sub Sections
- Complies with UL 916
- Weight: 7 lbs.
- Warranty: 3 years

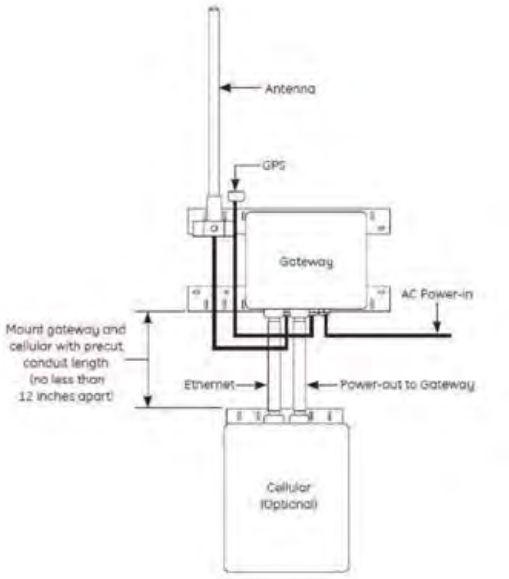
Product Dimensions



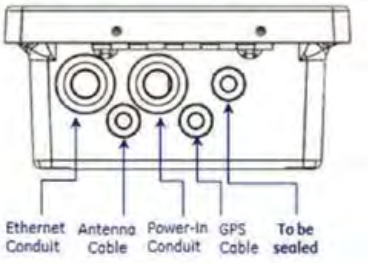
Installation

Gateway will contain two ¾" liquid-tight conduit fittings, and three liquid-tight glands to accommodate customer installation flexibility according to the diagram below, which may require customer to cap or seal unused fittings during installation.

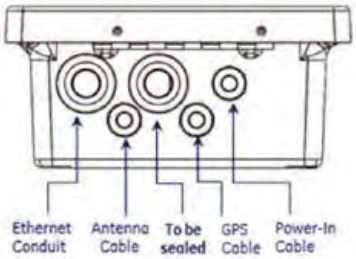




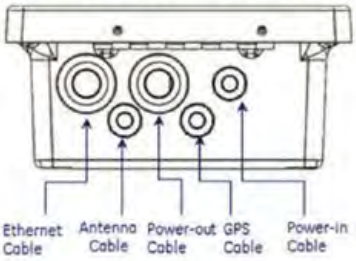
OPTION 1: Power & Ethernet input using conduit (**NO** power-out to external device)



OPTION 2: Power-in via cable. Ethernet in via conduit (**NO** power-out to external device)



OPTION 3: Power-in via cable; Power & Ethernet out to cellular modem via conduit



Packaging

- 1 Gateway Enclosure
- Conduit fittings (2 pcs mounted to enclosure)
- Gland fittings (3 pcs mounted to enclosure)
- GPS module and cable (1 pcs mounted to gland)
- Antenna Cable (1 pc mounted to gland)
- Antenna Pole (1 pc to be installed)
- Pole Mounting Bracket (2 pcs mounted to enclosure)

Ordering Number Logic

E L WG – – **C** – – **G** – **C** – –

PRODUCT ID	VOLTAGE (UL)	ANTENNA	COUNTRY/POLE	GPS	IP COMMUNICATION	NETWORK CONFIGURATION
E L W G	**0** = 120/277 **H** = 480* * 480V Gateway = 120-277V Gateway + 480V to 277V Step Down Transformer	**C** = Standard 18"	**XX** = Default (US) **AR** = Argentina **BR** = Brazil **EL** = El Salvador	**G** = GPS Capability	**C** = Cat 5 Cable Only	**B** = Network B **None** = Default

www.gelighting.com

CTRL002 (Rev 06/10/15)

GE
Lighting

LightGrid™ Cell Modem

Outdoor Wireless Control System

Description

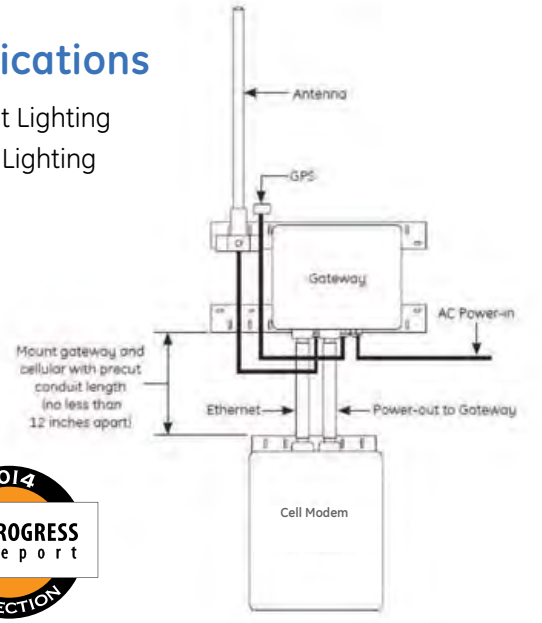
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Specifications

- Input Voltage: 120-277V, 347V—480V
- Weight: 8 lbs
- Dimensions: 15 in. x 13 in. x 7 in
- Mounting Height: 27 ft.–40 ft.
- Warranty: 3 years

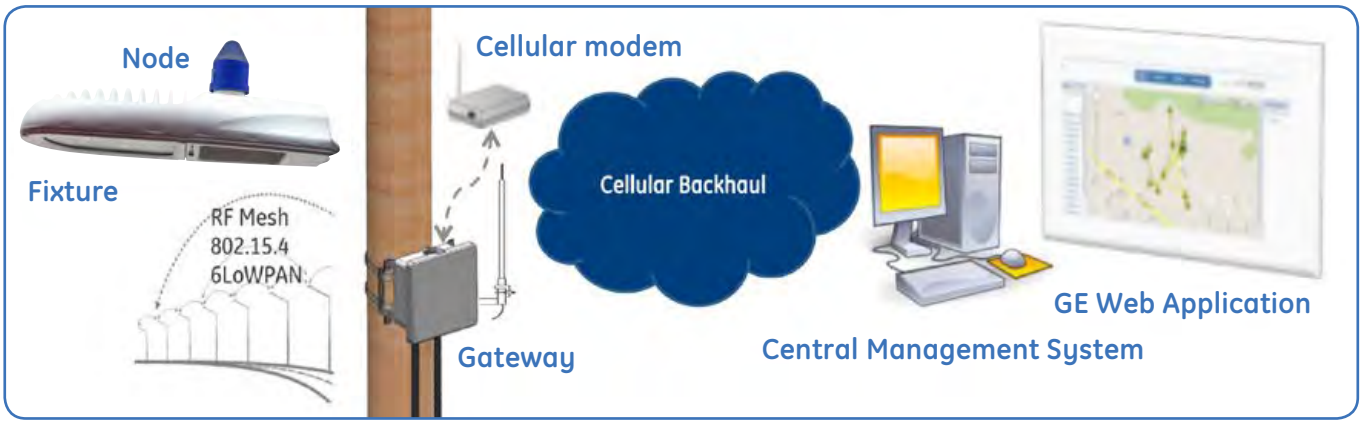
Applications

- Street Lighting
- Area Lighting



2014 PROGRESS Report SELECTION

Cell Based Network



Packaging

- Cellular enclosure (1pc)
- Conduit fitting (2pcs, mounted to enclosure)
- Flexible conduit (2pc)
- Power cable, stripped ends (1pc)
- Ethernet cable (1pc)
- Pole mounting bracket (2pcs, mounted to enclosure)

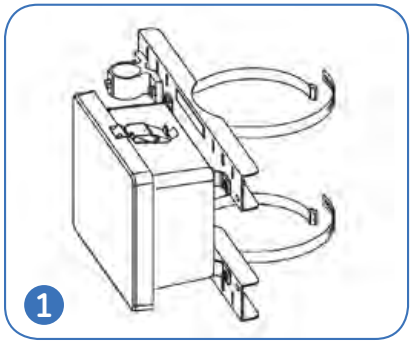
Ordering Number Logic

E L W M — O — C — X — _

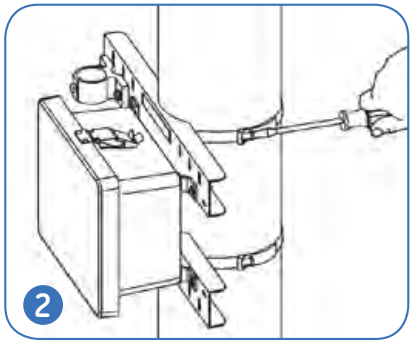
PRODUCT ID	VOLTAGE	IP COMMUNICATION	FUTURE USE	PROVIDER
E L W M	0 = 120-277	C = CAT 5 Cable only	X	V = Verizon R = Rogers X = Future Use

Mounting Gateway and Cellular

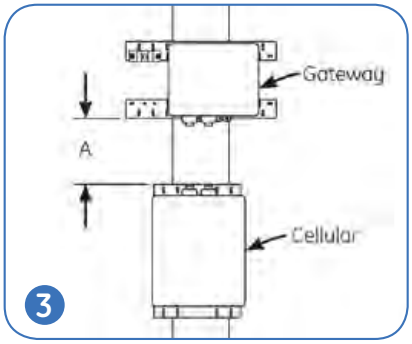
Carefully unpack unit from its packaging. Properly inspect for defects before installing.



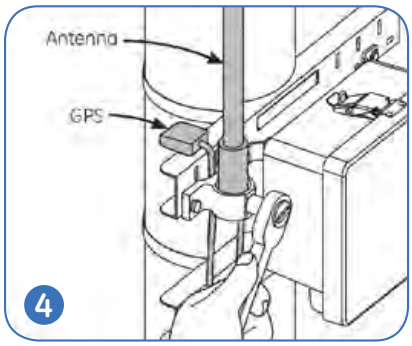
Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.



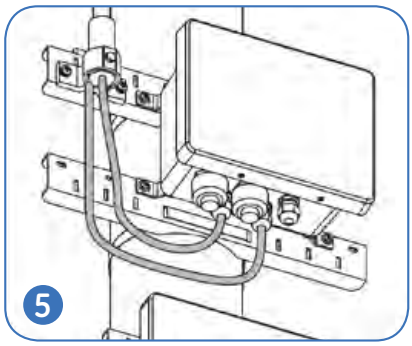
Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.



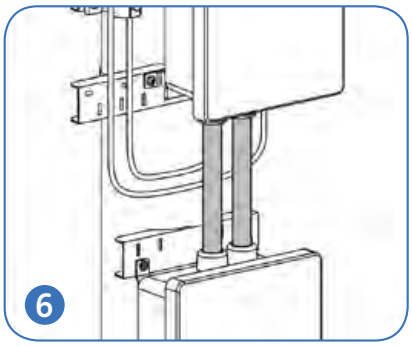
Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power-in/out cable.



Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).



Insert GPS and antenna wires through two glands in bottom of gateway enclosure.



Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.

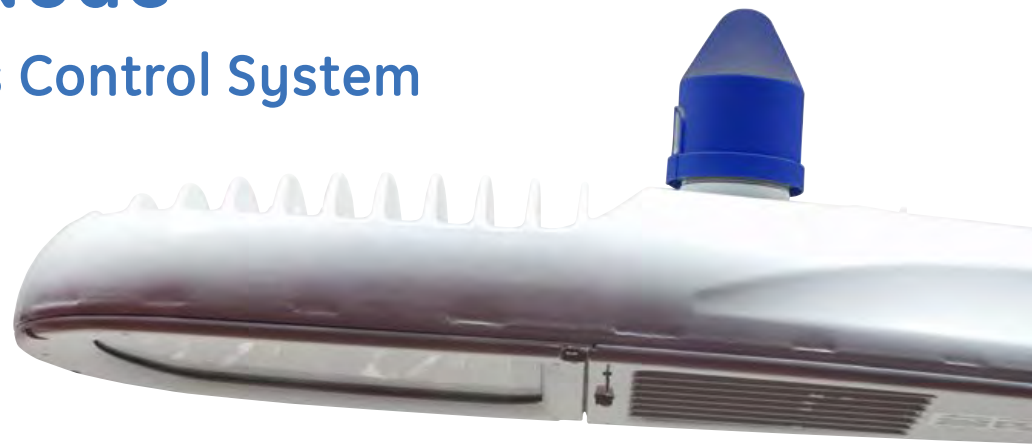
www.gelighting.com

CTRL009 (Rev 06/10/15)

GE
Lighting

LightGrid™ Node

Outdoor Wireless Control System



Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Applications

- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

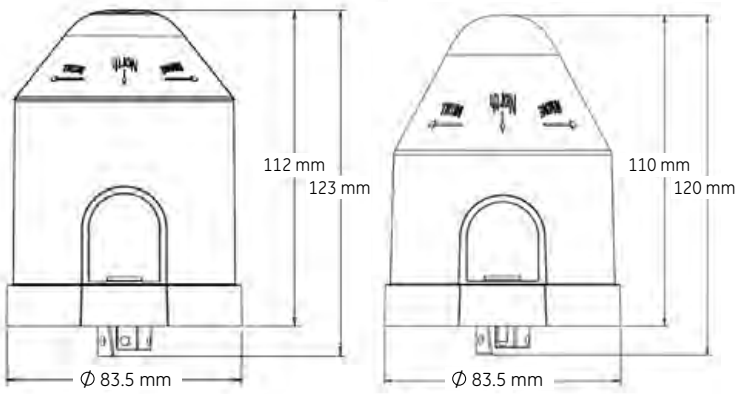
Product Features

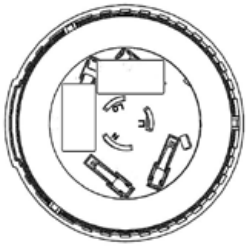
- Utility Grade Measurement up to 0.5% Accuracy
- Self-forming & self-restoring mesh network
- Static IPV6 data addressing and routing
- Reliable and Secure Encrypted Communications
- Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
- Utility grade 15 minute time of use Energy consumption reporting
- Full Autonomous Photocell Functionality (No wireless network required)
- Time Based Lighting schedules to maximize energy savings
- Integrated GPS in each node for Real time Asset Reporting
- Dynamic Lumen Output Level Control
- Real time measurement and storage of Voltage, Current, Wattage, Power Factor, and Hours of operation

Product Specifications

- Input Voltage: 120-277V, 347V and 480V
- Radio Frequency: 915 MHz ISM Band
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Addressing: IPv6
- Dimming: 0-10V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power consumption i.e. <2W 120-277V, < 3W 347 and 480V
- Photocell: Complies with ANSI C136.10-2006
- GPS: Accuracy 3m (clear open sky)
- Security: AES Encryption and Certificate based authentication
- Utility Grade Energy Measurement: Complies with relevant sections of ANSI C12.20
- Complies with FCC Part 15 required sub sections
- Complies with UL 773, Wet Rated, Type 2 Outdoor
- Complies with ANSI C136.41-2013 (ANSI Dimming)
- Warranty: 5 yrs Standard. 10 yrs Extended Warranty Available

Product Dimensions





ANSI Dimming

GE Dimming

Ordering Number Logic

E L W N _ _ _ _ **5** _ _ **G** _ **5** _ _ _

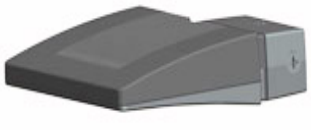
PRODUCT ID	VOLTAGE	PIN CONFIGURATION	PINS	METERING	GPS	MAX WATTAGE	NETWORK CONFIGURATION	COUNTRY/POLE
E L W N	**0** = 120/277 **5** = 480	**D** = GE Dimming **A** = ANSI Dimming	**5** = 5 Pin	**R** = 2% Revenue Grade **U** = 0.5% Utility Grade	**G** = GPS Capability	**5** = 450 Watts	**S** = Stand Alone **B** = Network B **None** = Default	**None** = Default (US)

www.gelighting.com

CTRL001 (Rev 06/10/15)

WPLED® 18W INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com



Junction Box

Surface Mount

IMPORTANT

READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.

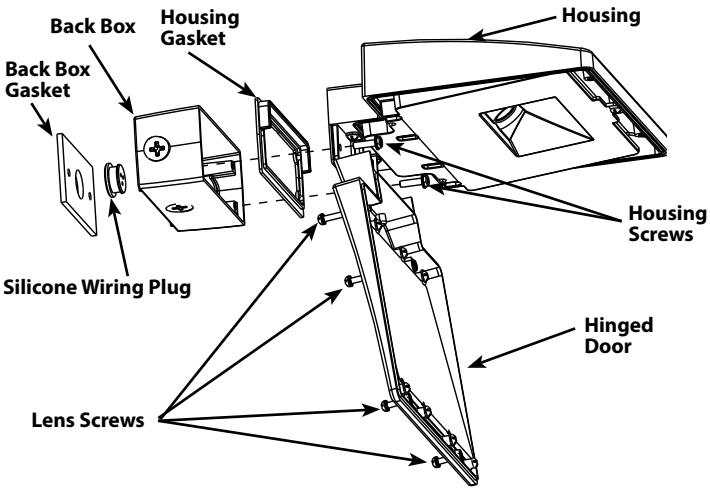
WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

CAUTION: For proper weatherproof function all gaskets must be seated properly and all screws inserted and tightened firmly. Apply weatherproof silicone sealant around the edge of the Back Box and/or Junction Box. This is especially important with an uneven wall surface. Silicone all plugs and unused conduit entries.

JUNCTION BOX MOUNT FOR CONDUIT

For use on applications where conduit wiring is needed.

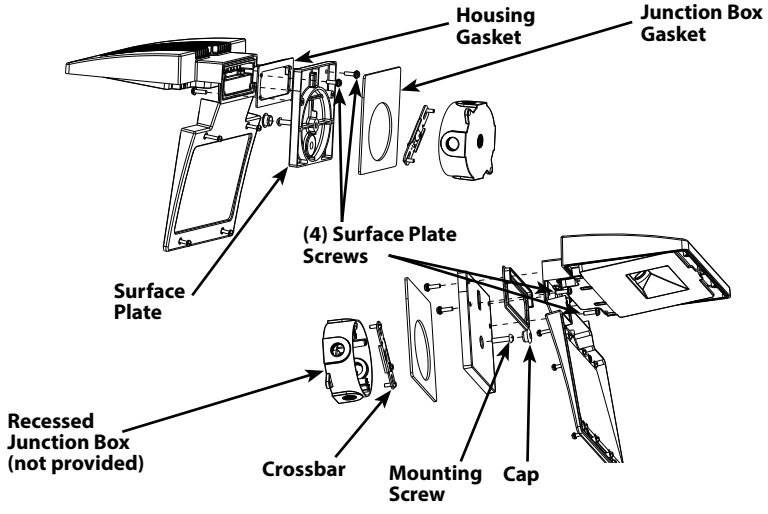
1. Loosen (4) **Lens Screws** and swing open **Hinged Door**. Screws will remain in place with O-Rings.
2. Loosen and remove (2) **Housing Screws**. Remove **Housing** from **Back Box**. Keep **Housing Gasket** intact for re-assembly.
3. Feed wires into **Back Box** through **Silicone Wiring Plug**, if not using conduit/ connectors.
4. Secure **Back Box** to the mounting surface using hardware appropriate for that mounting surface. Silicone around the edge of **Back Box Gasket** (self adhesive) and/ or junction box.
5. Wire the fixture using UL listed wire connectors according to NEC and local codes. Apply sealant to all unused conduit entry points.
6. Place **Gasket** between **Back Box** and **Housing**. Re-mount **Housing** to **Back Box**. Check **Housing Gasket** seal all around the **Back Box**.
7. Re-mount **Door** to **Housing**. Tighten (4) **Lens Screws.** Check door gasket (not shown) seal.
8. Fixture is UL Listed for down and up lighting and may be mounted in either position. Fixture may not melt heavy snow accumulation in an uplight position.



SURFACE MOUNT FOR RECESSED JUNCTION BOX

For use with recessed junction box and wiring.

1. Mount **Surface Plate** to fixture with (4) **Surface Plate Screws**. There are two screws from the front and two screws from the back. Make sure **Housing Gasket** makes complete seal all the way around.
2. Use supplied crossbar. Mount **Crossbar** to recessed junction box with (2) screws.
3. Place **Junction Box Gasket** on back of the fixture. Gasket should create seal against mounting surface.
4. Wire fixture to supply wires in recessed junction box according to wiring section.
5. Use 1/4 x 20 stainless steel **Mounting Screw** to attach fixture to Crossbar. Tighten **Mounting Screw**.
6. Cover screw with **Cap,** provided.
7. Fixture is UL Listed for down and up lighting and may be mounted in either position. Fixture may not melt heavy snow accumulation in an uplight position.

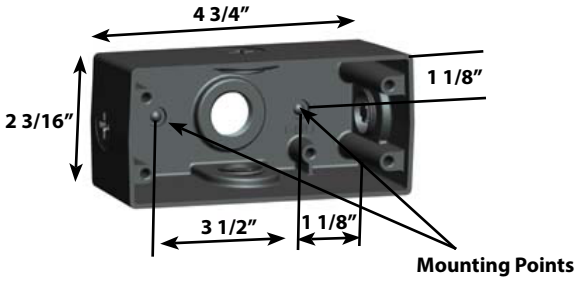


WPLED® 18W INSTALLATION INSTRUCTIONS

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We'd like to hear your comments. Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

JUNCTION BOX

1. The Junction box has (4) conduit entry points on the center of each side and (1) in the center back.
2. **Mounting Points** are dimensioned below.



ON-OFF WIRING

Universal voltage driver permits operation at 100V to 277VAC, 50 or 60Hz except fixtures factory ordered with a 120V photocell (/PC) and 277V photocell (/PC2).

1. Connect the black fixture lead to the (+) LINE supply lead.
2. Connect the white fixture lead to the (-) COMMON supply lead.
3. Connect the bare copper Ground wire from fixture to supply ground.

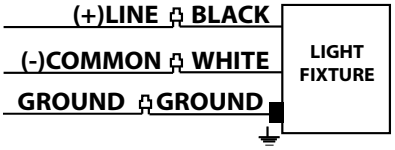


Fig. 1

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

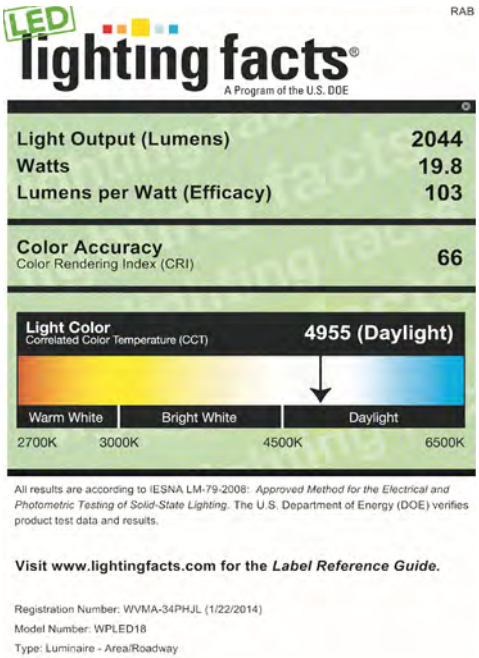
1. Clean glass lens with non-abrasive glass cleaning solution.
2. Do not open fixture to clean the LED. Do not touch the LED.

TROUBLESHOOTING

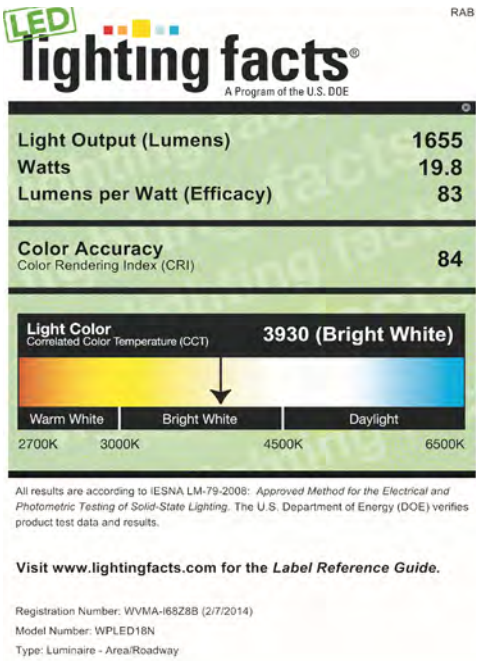
1. Check that the line voltage at fixture is correct. Refer to wiring directions.
2. Is the fixture is grounded properly?
3. Be sure the photocell, if used, is functioning properly.

PATENTS: US: pat. D634,878, **CN:** ZL201030679778.2

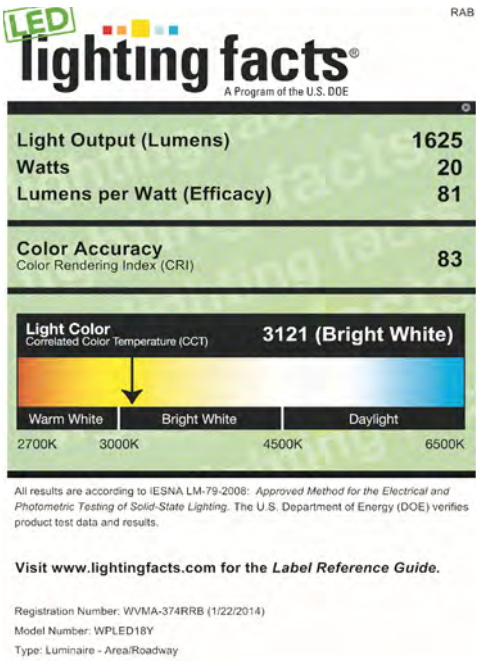
WPLED18 Cool



WPLED18N Neutral



WPLED18Y Warm



Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance.

WPLED18-IN 0214 Rev. 1

Easy Installation & Product Help

Tech Help Line
Call our experts 888 RAB-1000

rabweb.com
Visit our website for product info

email
Answered promptly sales@rabweb.com

WPLED26N/PC2

LED 26W Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 7.5 lbs

Project:	Type:
Prepared By:	Date:

Driver Info		LED Info	
Type:	Constant Current	Watts:	26W
120V:	N/A	Color Temp:	4000K (Neutral)
208V:	0.16A	Color Accuracy:	83 CRI
240V:	0.14A	L70 Lifespan:	100,000
277V:	0.12A	Lumens:	2,415
Input Watts:	30W	Efficacy:	81 LPW
Efficiency:	88%		

Technical Specifications

Other

WPLED26 with Photocell:

277V Button Photocell Included. Photocell is compatible with 208V-277V.

California Title 24:

WPLED26/PC2 complies with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture < 30 Watts.

Equivalency:

The WPLED26 is Equivalent in delivered lumens to a 175W Metal Halide Wallpack.

HID Replacement Range:

The WPLED26 can be used to replace 150 - 200W Metal Halide Wallpacks based on delivered lumens.

Patents:

The WPLED design is protected by U.S. Pat. D634878, Canada Pat 134878, China Pat. CN301649064S.

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.

Listings

UL LISTING:

Suitable for wet locations. Suitable for mounting within 1.2m (4ft) of the ground.

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

Dark Sky Approved:

The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

LED Characteristics

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water.

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Ambient Temperature:

Suitable for use in 40°C ambient temperatures.

Cold Weather Starting:

The minimum starting temperature is -40°F/-40°C.

Thermal Management:

Cast aluminum Thermal Management system for optimal heat sinking. The LPACK is designed for cool operation, most efficient output and maximum LED life by minimizing LED junction temperature.

Green Technology:

RAB LEDs are Mercury, Arsenic and UV free.

For use on LEED Buildings:

IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Electrical

Driver:

Multi-chip 26W high output long life LED Driver Constant Current, 720mA, Class 2, 6kV Surge Protection, 100V-277V, 50-60 Hz, 100-240V.4 Amps.

THD:

8.4% at 120V, 10.7% at 277V

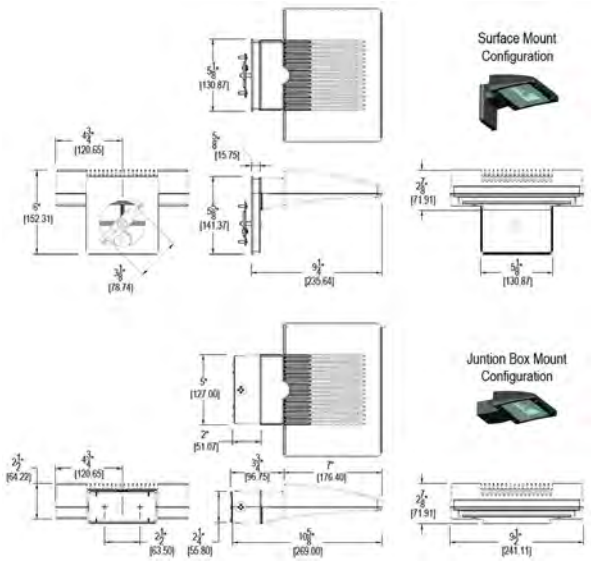
Technical Specifications (continued)

Optical

BUG Rating:

B1 U0 G0

Dimensions



Features

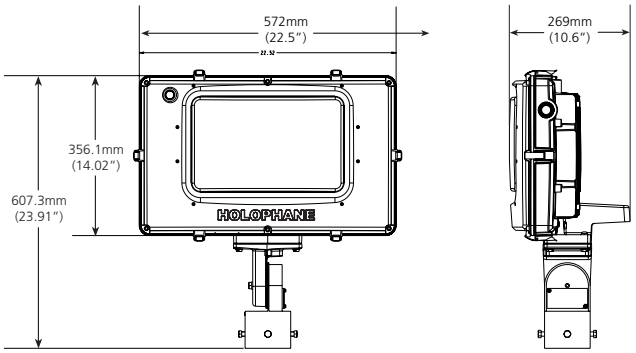
- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- 100 up to 277 Volts
- 5-year warranty

Ordering Matrix

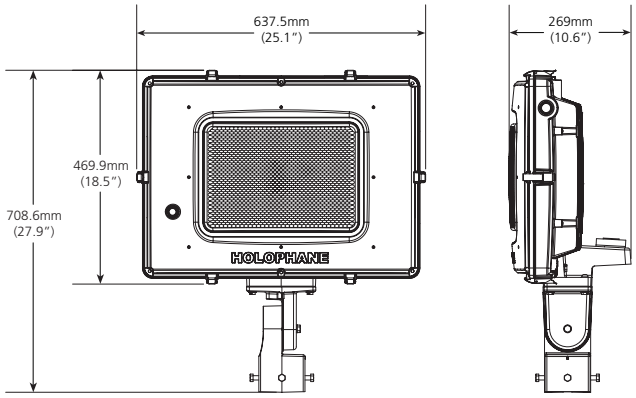
Family	Watts	Color Temp	Sensor	Surface Plate	Finish	Photocell	Dimming
WPLED							
	26 = 26W	= Cool **Y** = Warm **N** = Neutral	= No Sensor **MS** = Mini Sensor	= No Surface Plate **S** = Surface Plate	= Bronze **W** = White	= No Photocell **/PC** = 120V Button **/PCS** = 120V Swivel **/PC2** = 277V Button	= No Dimming **/D10** = Dimmable

Ordering Information

Dimensional Details



PMLED
Maximum weight: 40lbs (18kg) Knuckle
Maximum weight: 47lbs (21kg) Yoke
Maximum E.P.A.: 3.1 sq. ft.



PLLED
Maximum weight: 54lbs (24kg) Knuckle
Maximum weight: 65lbs (29kg) Yoke
Maximum E.P.A.: 3.8 sq. ft.

Performance Specifications

Optical
Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product. The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

Electrical
Long Life: LED light engines are rated > 100,000 hours at 25C, L70. Electronic driver has a rated life of 100,000 hour at a 25C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

Mechanical
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

Controls
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria

Warranty & Standards
Rated for -40C to 35C ambient
UL 1598 A wet location, UL 1598A Marine

Preferred Selections:

Most Frequently Ordered Catalog Numbers

PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z

PMLED	6	5K	10A	AH	44	1	K	BP
1	6	3	4	5	6	7	8	9
Luminaire	LED Modules	Color Temp	Drive Current	Voltage	Beam Pattern	Mounting	UL Category	Color
PMLED PLLED	4 7 5 8 6 9	3K 4K 5K	10A	AS AH	44 45 55 65 66	1 3 4	K	BP GP HP WP ZP

Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: Luminaire

PMLED	Predator LED Medium
PLLED	Predator LED Large

STEP 2: LED Modules

4[1]	4 Modules	**6**[1]	6 Modules
5[1]	5 Modules	**7**[2]	7 Modules
		8[2]	8 Modules
		9[2]	9 Modules

STEP 3: Color Temp

3K	3,000K
4K	4,000K
5K	5,000K

STEP 4: Drive Current

10A	1050mA Driver

STEP 5: Voltage

AS	Auto-sensing voltage (120-277V)
AH	Auto-sensing voltage (347-480V)

STEP 6: Beam Pattern

44	4x4 (Prismatic glass)
45	4x5 (Prismatic glass)
55	5x5 (Prismatic glass)
65	6x5 (Prismatic glass)
66	6x6 (Prismatic glass)

STEP 7: Mounting

1	Tenon slipfitter-knuckle
3	Yoke Stainless Steel
4	Yoke galvanized

STEP 8: UL Category

K	Wet locations
L[9]	Marine Outside

STEP 9: Color

BP	Black Super durable with epoxy primer
GP	Gray Super durable with epoxy primer
HP	Graphite Super durable with epoxy primer
WP	White Super durable with epoxy primer
ZP	Bronze Super durable with epoxy primer

*Colors are just a representation.
Custom colors are available upon request

STEP 10: Cord Length Option

04	4' cord length	**12**	12' cord length
05	5' cord length	**15**	15' cord length
06	6' cord length	**20**	20' cord length
08	8' cord length	**25**	25' cord length
10	10' cord length	**30**	30' cord length

STEP 11: Cord Type

63	16 gage, 3 conductor
43	14 gage, 3 conductor
23	12 gage, 3 conductor

STEP 12: Options

DM[4]	0V-10V Dimmable driver
F1[9]	Single fusing
F2[9]	Double fusing
NL	NEMA label
PCL1[3]	DLL 120V-277V Photocontrol
PCL3[3]	DLL 347V Photocontrol
PCL4[3]	DLL 480V Photocontrol
PCSS[3]	DSS 120-277V Photocontrol
P3[4]	ANSI standard locking style receptacle that accepts 3 pin controls for on/off operation

STEP 12: Options (Continued)

P5[5,9]	ANSI standard locking style 5-pin receptacle
P7[5,9]	ANSI standard locking style 7-pin receptacle
SH[3]	Shorting cap
TL	Tool-less entry with latches

STEP 12: Accessories

PMLED FV-XX Full visor super durable paint with epoxy primer
PMLED UBV-XX Upper/bottom visor super durable paint with epoxy primer
PMLED VG Vandal guard
PMLED WG Wire guard
08657-XX[6] Yoke to 2.375" OD tenon adaptor, super durable paint with epoxy primer
08775-XX[6] Yoke to 2.375" OD tenon adaptor with photocontrol receptacle, super durable paint with epoxy primer

1. Available with PMLED only
2. Available with PLLED only
3. Must be used with P3 or P5
5. Not available with P5 option
4. Not available with P3 option
5. Available with mounting 3 and 4 only
7. PMLED Not Available with PMLEDF1, PMLEDF2
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.

Operating Characteristics

The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

Replacement	HID Wattage CWA Type	Modules	Lumens	LED Wattage	LPW	Savings
PLLED 1000 HPS	1100	9 COB/10A	48,000	391	123	64%
PMLED 1000 MH	1070	6 COB/10A	32,000	261	123	75%
PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

PRECISION P2 PARAGON
EFFICIENCY. ECONOMY. SUSTAINABILITY.

LLW
LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

SPECIFICATIONS

Features
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2' and 4' lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

Construction
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic. Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

Electrical
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions
- NEC/CEC compliant ballast disconnect is standard.
- Optional emergency battery pack

Certifications
- CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
- Luminaires bear appropriate listing labels.
- Emergency-equipped fixtures labeled UL 924.
- Adheres to LM79, LM80 and TM21 industry standards.
- DesignLights Consortium® (DLC) qualified.
- Please refer to the DLC website for specific product qualifications at www.designlights.org.

Application
- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Retail
  - Schools
  - Hallways
  - Closets

Warranty
- Five-year warranty. (Terms and Conditions Apply)

CERTIFICATION

C SP US DLC

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW	–			–		U	–	
MODEL	**SIZE**	**COLOR TEMP**	**LUMEN OUTPUT**		**DRIVER OUTPUT**	**DRIVER VOLTAGE**		**OPTIONS**
LLW LED Low Profile Wrap	**2** 1x2 Nominal **4** 1x4 Nominal	**35** 3500K **40** 4000K	**LW** Low **ML** Medium		**E** Fixed **ESD** Bi-Level[1] **ED** 0-10V Dimming[2]	**U** Universal 120/277 VAC		**ELL14** Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)

S18 18" Stem

FOOTNOTES

[1] Bi-Level driver must be controlled by sensor or A/B switching.
[2] Must be used in conjunction with lighting controls.
[3] Only available in 4 ft.

PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW2-40LW-EU** **LED Low Profile Wrap**
Ballast	**D150CQ25UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**2455**
Watts	**25**
Mounting	**Surface**
Shielding Angle	**N.A.**
Spacing Criterion	**0° = 1.19 90° = 1.09**
Luminous Opening in feet	**Length: 1.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
30	7785	7381	6945	6543	6414
40	6827	6305	5641	5062	4932
45	6037	5534	4834	4361	4250
50	5099	4616	4006	3722	3690
55	4170	3685	3239	3202	3198
60	3397	2930	2587	2794	2786
65	2656	2434	2174	2505	2440
70	2077	2161	1989	2325	2234
75	1754	1963	1939	2227	2138
80	1595	1837	1930	2213	2170
85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

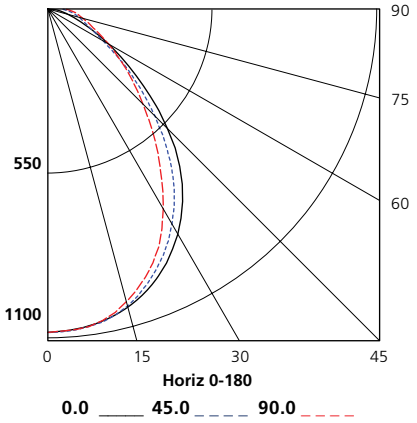
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE DATA

Luminaire	**LLW4-35ML-EU** **LED Low Profile Wrap**
Ballast	**D310CQ50UNVA-A**
Ballast Factor	**1.00**
Lamp	**LED**
Fixture Lumens	**4693**
Watts	**52**
Mounting	**Surface**
Shielding Angle	**0° = 90 90° = 90**
Spacing Criterion	**0° = 1.19 90° = 1.10**
Luminous Opening in feet	**Length: 3.99** **Width: 0.67** **Height: 0.14**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8335	8335	8335	8335	8335
30	7587	7112	6697	6348	6203
40	6714	6148	5583	5031	4812
45	5897	5411	4827	4295	4098
50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

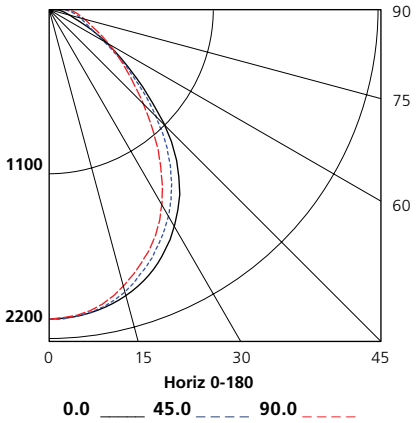
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR \ RC	80				70				50			0
RW	70	50	30	10	70	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	107	107	107	93
1	109	103	99	96	104	100	97	94	95	92	89	79
2	99	92	85	80	96	89	83	79	85	80	76	68
3	91	82	74	68	88	80	73	67	76	70	65	59
4	84	73	65	59	81	71	64	58	68	62	57	52
5	78	66	58	52	75	65	57	51	62	55	50	46
6	72	60	52	46	70	59	51	45	56	50	44	41
7	67	55	47	41	65	54	46	41	52	45	40	36
8	63	50	42	37	61	49	42	37	48	41	36	33
9	59	46	39	34	57	46	38	33	44	37	33	30
10	56	43	36	31	54	42	35	30	41	34	30	27

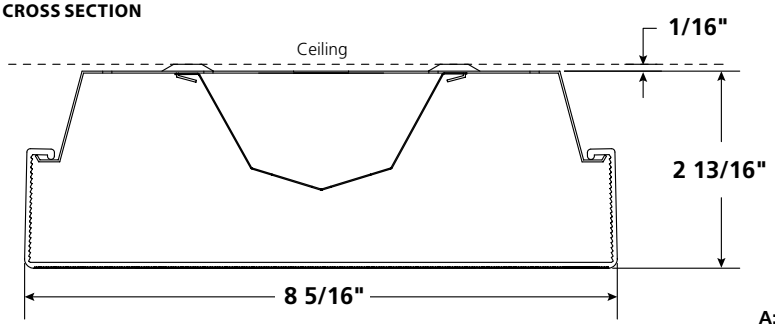
RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



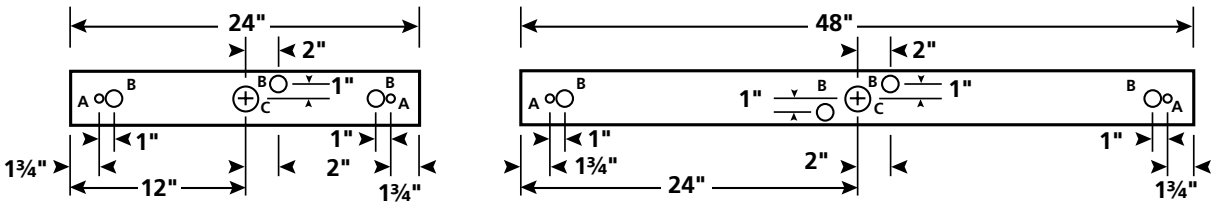
FIXTURE DIMENSIONS

CROSS SECTION



A: 5/16" Diameter Mounting Holes
B: 7/8" Diameter Knockouts
C: 2" Diameter Knockouts

TOP VIEW



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	**CRI**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**	**CCT**	**Lumens Per Fixture**	**Input Watts**	**Lumens Per Watt**
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

Application Notes

1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.
2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.
3. Optional emergency battery equipped units have a minimum temperature of 10°C.
4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.

PKG-304-SL-DM

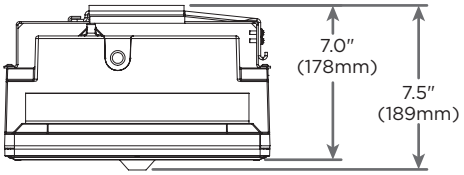
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

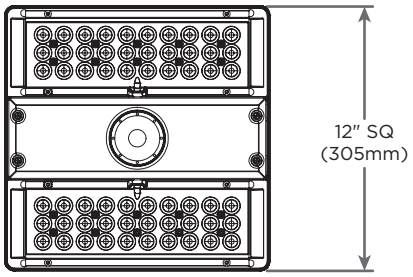
Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over exisiting single gang and octagonal junction boxes for direct mount.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish





Ordering Information

Example: PKG-304-SL-DM-04-E-UL-SV-350-OPTIONS

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K** 4000K Color Temperature - Color temperature per fixture **DIM** 0–10V Dimming - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F** Fuse - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML** Multi-Level - Refer to multi-level spec sheet for availability and additional information **J** Alternate Junction Box mounting

† See www.cree.com/lighting/products/warranty for warranty terms

See www.cree.com/lighting for warranty terms

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weathertight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

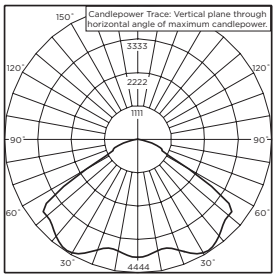
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

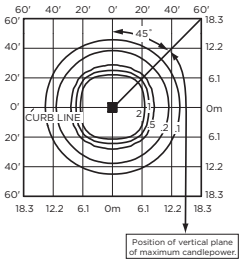
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Pending product qualification on the DesignLights Consortium ("DLC") Qualified Products List ("QPL")
- RoHS Compliant
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.





ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707

PKG-304-SL-**-06-E-UL-700-40K
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Sparkle Petroleum Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	5,243	B2 U0 G1	5,048	B2 U0 G1	46	0.39	0.24	0.22	0.21	0.15	0.12	94%
06	7,803	B3 U0 G1	7,514	B3 U0 G1	69	0.57	0.34	0.30	0.27	0.21	0.16	
525mA @ 25˚C (77˚F)												
04	7,340	B2 U0 G1	7,068	B2 U0 G1	71	0.59	0.35	0.31	0.28	0.21	0.16	93%
06	10,924	B3 U0 G1	10,519	B3 U0 G1	101	0.84	0.49	0.43	0.38	0.30	0.22	
700mA @ 25˚C (77˚F)												
04	8,912	B3 U0 G1	8,582	B3 U0 G1	94	0.79	0.46	0.40	0.36	0.28	0.21	91%
06	13,264	B3 U0 G1	12,773	B3 U0 G1	135	1.14	0.65	0.57	0.50	0.40	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing: > 150,000 hours.

PRECISION P2 PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

www.P-2.com

(714) 386-5550 CA
(715) 381-2971 WI
(352) 692-5900 FL

VTL - LED Vaportight

Same Classic Housing, New Technology

- The VTL uses the latest in solid state technology
- Proven IP65 rated housing platform
- Efficacy between 97 and 101 Lumens/Watt depending on model
- Reported L70 over 51,000 Hours Calculated at 65,000 hours via TM-21

Suitable for a variety of applications

- Outdoor Canopies…
- Wet Locations…
- Parking Garages
- Industrial Areas…
- Commercial Areas…

Why P2? With 18 CLMC's our staff has the expertise you need to make your project a success.

- Lean on our industry experts to provide you with application support and help to specify the right product for your project.
- We've assembled our team from all areas of the lighting industry; from installation, project and energy management to manufacturing and distribution. If you have a challenge, chances are we've been there too and can guide you to a solution.

VTL - LED Vapor Tight

Application

VTL – 1x8 – ML – BL – UL – 40K – C8 – WH – LSP

VTL	1x8	ML	BL	UL	40K	C8	WH	LSP
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Cord Plug	Occ Sensor	Other

Fixture Series
VTL = LED Vaportight

Fixture Size
1x4 = 1x4 Nominal
1x8 = 1x8 Nominal

Lumen Output
XL = Extra Low Wattage, 31W
LW = Low Wattage, High Efficiency, 51W
ML = Medium Lumen Output, 74W
HL = High Lumen Output, 96W

Notes
(1) Must be ordered in conjunction with lighting controls. Contact factory for asistance.
(2) Bi-Level driver must be controlled by sensor or A/B switching
(3) Bracket standard with all fixtures.

Driver Output
F = Fixed Output
DM = 0-10V Dimming (1)
BL = Bi-Level (2)

Voltage
UL = Universal 120-277

Color Temperature
40K = 4000K
50K = 5000K

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Occupancy Sensor
WH = Wet Location 360 View Hi-Bay Sensor
WL = Wet Location 360 View Lo-Bay Sensor

Other Options
VSB = VTL Surface/Hanging Bracket (3)
VAB = VTL Angled Bracket
SSL = Stainless Steel Latches
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | lighting facts Pending

PRECISION PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

www.P-2.com

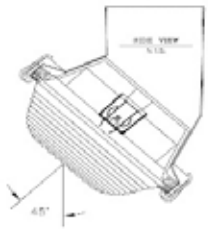
(714) 386-5550 CA
(715) 381-2971 WI
(352) 692-5900 FL

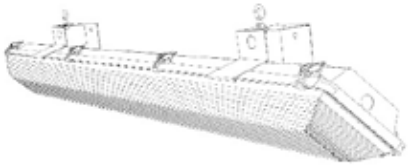
VTL - LED Vaportight

Fixture Construction

- Impact Resistant Fiberglass housing.
- Aluminum Gear Tray
- Frosted Linear Ribbed Diffuser
- Poured in place gasket.
- Class 2 Driver

VTL Mounted to 45° Mounting Brackets

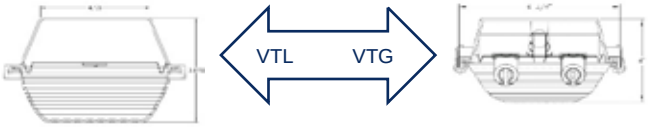




VTL Eye-Bolt Mounting with 45° Bracket
(Order Separately)

Want Fluorescent?

Consider our fluorescent VTG with long life lamps and PS ballast.



Existing System

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Light Source Quantity & Type		CRI	CCT	Driver Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
VTL-1X4-XL	1	1X4 XL Engine	>80	4000K	1.00	1.00	3,100	31	100
VTL-1X4-LW	1	1X4 LW Engine	>80	4000K	1.00	1.00	5,274	51	103
VTL-1X4-ML	1	1X4 ML Engine	>80	4000K	1.00	1.00	7,474	74	101
VTL-1X4-HL	1	1X4 HL Engine	>80	4000K	1.00	1.00	9,351	96	97
VTL-1X8-XL	1	1X8 XL Engine	>80	4000K	1.00	1.00	6,200	62	100
VTL-1X8-LW	1	1X8 LW Engine	>80	4000K	1.00	1.00	10,548	102	103
VTL-1X8-ML	1	1X8 ML Engine	>80	4000K	1.00	1.00	14,948	148	101
VTL-1X8-HL	1	1X8 HL Engine	>80	4000K	1.00	1.00	18,702	192	97

General Notes

- Lamp/ballast system values shown are a general reference intended to supply a quick comparison of several common lamp/ballast systems, the associated energy consumption, and net lumen output.
- Values shown are based on normal operating temperatures and at 277 volts.
- There are many operating variables that affect system output, in addition to rating variances from brand to brand.
- All T8 electronic ballast values shown are based on Ultra Efficient (aka 3rd Generation) T8 ballasts.
- All T5 and T8 lamp values shown are for basic grade lamps. Extended life and higher lumen lamps types are available.
- In addition to those shown there are a wide variety of systems to choose from, each with distinct features and cost points.
- Please consult the lamp/ballast manufacturer's catalogs for the detailed information required to model your system.

VTL-1X8-XL-F-UL-40K-C8

PRECISION P2 PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

www.P-2.com

(714) 386-5550 CA
(715) 381-2971 WI
(352) 692-5900 FL

VTL - LED Vaportight

Same Classic Housing, New Technology

- The VTL uses the latest in solid state technology
- Proven IP65 rated housing platform
- Efficacy between 97 and 101 Lumens/Watt depending on model
- Reported L70 over 51,000 Hours Calculated at 65,000 hours via TM-21

Suitable for a variety of applications

- Outdoor Canopies…
- Wet Locations…
- Parking Garages
- Industrial Areas…
- Commercial Areas…

Why P2? With 18 CLMC's our staff has the expertise you need to make your project a success.

- Lean on our industry experts to provide you with application support and help to specify the right product for your project.
- We've assembled our team from all areas of the lighting industry; from installation, project and energy management to manufacturing and distribution. If you have a challenge, chances are we've been there too and can guide you to a solution.

VTL - LED Vapor Tight

Application

VTL – 1x8 – ML – BL – UL – 40K – C8 – WH – LSP

VTL	1x8	ML	BL	UL	40K	C8	WH	LSP
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Cord Plug	Occ Sensor	Other

Fixture Series
VTL = LED Vaportight

Fixture Size
1x4 = 1x4 Nominal
1x8 = 1x8 Nominal

Lumen Output
XL = Extra Low Wattage, 31W
LW = Low Wattage, High Efficiency, 51W
ML = Medium Lumen Output, 74W
HL = High Lumen Output, 96W

Notes
(1) Must be ordered in conjunction with lighting controls. Contact factory for asistance.
(2) Bi-Level driver must be controlled by sensor or A/B switching
(3) Bracket standard with all fixtures.

Driver Output
F = Fixed Output
DM = 0-10V Dimming (1)
BL = Bi-Level (2)

Voltage
UL = Universal 120-277

Color Temperature
40K = 4000K
50K = 5000K

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Occupancy Sensor
WH = Wet Location 360 View Hi-Bay Sensor
WL = Wet Location 360 View Lo-Bay Sensor

Other Options
VSB = VTL Surface/Hanging Bracket (3)
VAB = VTL Angled Bracket
SSL = Stainless Steel Latches
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | lighting facts Pending

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www.P-2.com

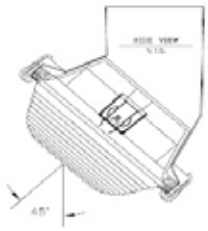
(714) 386-5550 CA
(715) 381-2971 WI
(352) 692-5900 FL

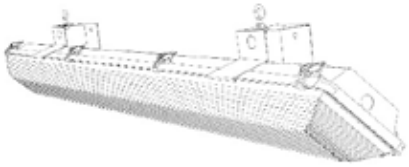
VTL - LED Vaportight

Fixture Construction

- Impact Resistant Fiberglass housing.
- Aluminum Gear Tray
- Frosted Linear Ribbed Diffuser
- Poured in place gasket.
- Class 2 Driver

VTL Mounted to 45° Mounting Brackets

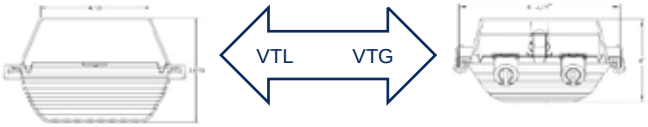




VTL Eye-Bolt Mounting with 45° Bracket
(Order Separately)

Want Fluorescent?

Consider our fluorescent VTG with long life lamps and PS ballast.



Existing System

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Light Source Quantity & Type		CRI	CCT	Driver Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
VTL-1X4-XL	1	1X4 XL Engine	>80	4000K	1.00	1.00	3,100	31	100
VTL-1X4-LW	1	1X4 LW Engine	>80	4000K	1.00	1.00	5,274	51	103
VTL-1X4-ML	1	1X4 ML Engine	>80	4000K	1.00	1.00	7,474	74	101
VTL-1X4-HL	1	1X4 HL Engine	>80	4000K	1.00	1.00	9,351	96	97
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VTL-1X8-LW	1	1X8 LW Engine	>80	4000K	1.00	1.00	10,548	102	103
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HDOT Phase 1

LIH – Lihue Airport
Solar Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

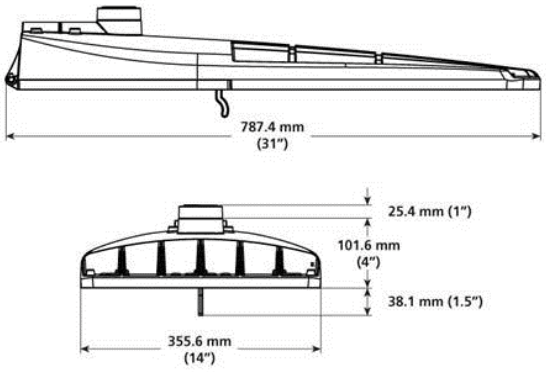
LIHUE AIRPORT - SOLAR	
PART NUMBER	**DESCRIPTION**
ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type II optics, 40B chips; w/ EG-340 Off Grid Solar LED
ATB2 40BLEDE70 120 R4 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type IV optics, 40B chips; w/ EG-340 Off Grid Solar LED
ATB2 40BLEDE70 120 R5 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type V optics, 40B chips; w/ EG-340 Off Grid Solar LED

PRODUCT OVERVIEW

Applications:

- Roadways
- Off ramps
- Residental streets
- Parking lots

DIMENSIONS



Effective Projected Area (EPA): The EPA for the ATB2 is .78 sq. ft.
Approx. Wt. = 21 lbs.

Features:

OPTICAL

Same Light: Performance is comparable to 200-400W HPS roadway luminaires.

White Light: Correlated color temperature - standard 4000K, 70 CRI minimum or optional 5000K, 65 CRI minimum.

Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing.

Available in Type II, III, IV, & V roadway distributions.

ELECTRICAL

Expected Life: LED light engines are rated >100,000 hours at 25°C, L70. Electronic driver has an expected life of 100,000 hours at a 20°C ambient.

Lower Energy: Saves an average of 40-50% over comparable HPS platforms.

Robust Surge Protection: Acuity's proprietary SPD provides IEEE/ANSI C62.41 Category C (10kV/5kA) level of protection.

MECHANICAL

Easy to Maintain: Includes standard AEL lineman-friendly features such as tool-less entry, tool-less NEMA photocontrol receptacle, terminal block and quick disconnects. Bubble level located inside the electrical compartment for easy leveling at installation.

Rugged die-cast aluminum housing is polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 1000 hours exposure to salt fog chamber (operated per ASTM B117) Optional Enhanced Corrosion Resistant finish (CR) increases the salt spray exposure to 5000 hours.

Four-bolt mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8" O.D.) diameter and provides a 3G vibration rating per ANSI C136.

Wildlife shield is cast into the housing (not a separate piece).

Die-cast trigger latch on doorframe allows for tool-less entry and enables easy and secure opening with one hand.

CONTROLS

NEMA photocontrol receptacle is standard; tool-less "lift and turn" receptacle.

Dimming version (available with DE and VE option) uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM® smart controls system (sold separately).

Photocontrol for solid-state lighting (available with PCSS option) meets ANSI C136.10 criteria.

WARRANTY & STANDARDS

5 year limited warranty. Full warranty terms located at http://www.acuitybrands.com/Libraries/Terms_and_Conds/ABL_LED_Commerical_Outdoor.sflb.ashx

Rated for -40°C to 40°C ambient.

CSA Certified to U.S. and Canadian standards

Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

Note: Specifications subject to change without notice. Acutal performance may differ as a result of end-user environment and application.

Autobahn Series ATB2
Roadway Lighting

ORDERING INFORMATION

Example: ATB2 40BLEDE70 MVOLT R2

Series	Performance Packages	Voltage	Optics
ATB2 Autobahn LED Roadway, Large	40BLEDE53 40B Chips, 525 mA Driver 40BLEDE70 40B Chips, 700 mA Driver 40BLEDE10 40B Chips, 1000 mA Driver 60BLEDE53 60B Chips, 525 mA Driver 60BLEDE70 60B Chips, 700 mA Driver 60BLEDE10 60B Chips, 1000 mA Driver 80BLEDE53 80B Chips, 525 mA Driver 80BLEDE70 80B Chips, 700 mA Driver 80BLEDE10 80B Chips, 1000 mA Driver	120 120V MVOLT Multi-volt, 120-277V 347 347V 480 480V	R2 Roadway Type II R3 Roadway Type III R4 Roadway Type IV R5 Roadway Type V

Options

Color Temperature (CCT)
(blank) 4000K (standard)
5K 5000K

Mounting
(blank) 4-bolt Internal (standard)

Paint
(blank) Gray (standard)
GI Graphite
BK Black
BZ Bronze
DDB Dark Bronze
WH White
UP Unpainted

Terminal Block
(blank) Terminal Block (standard)
T2 Wired to L1 and L2 Position

Misc.
HS House-Side Shield
BL External Bubble
CR Enhanced Corrosion Resistant Finish
NL Nema Label

Controls
(blank) NEMA Photocontrol Receptacle (standard)
NR No Photocontrol Receptacle
PCSS Solid State Lighting Photocontrol (120-277V)
SH Shorting Cap
DE[1] ROAM CONCIERGE Dimming Control (Not CSA certified at 347 and 480 volts)
VE[1] ROAMVIEW Dimming control (Not CSA certified at 347 and 480 volts)
DM DM 0V - 10V dimmable driver (controls provided by others)

Notes:
1 Specifies a ROAM dimming enabled fixture with a dimming control module factory installed. NEMA photocontrol receptacle required. Addtional hardware and services required ROAM deployment must be purchased seperately

Note: Specifications subject to change without notice. Acutal performance may differ as a result of end-user environment and application.

American Electric Lighting
Acuity Brands Lighting, Inc.
3825 Columbus Rd, S.w.,Granville, OH 43023
Phone: 800-537-5710 Fax: 740-587-6114
www.americanelectriclighting.com

DESIGN DATA

Performance Package	Drive Current (mA)	Input Watts	Optic	4000K CCT	
				Delivered Lumens	Efficacy (LPW)
40B	525	69	R2	6680	97
	700	91		8772	96
	1000	140		11133	80
	525	69	R3	6803	99
	700	91		8972	98
	1000	140		12287	88
	525	69	R4	7034	102
	700	91		8888	98
	1000	140		11678	83
	525	69	R5	7062	102
	700	91		8918	98
	1000	140		11620	83
60B	525	100	R2	10014	100
	700	135		12790	95
	1000	213		17009	80
	525	100	R3	10260	103
	700	135		12950	96
	1000	213		17360	82
	525	100	R4	10407	104
	700	135		13156	97
	1000	213		17758	83
	525	100	R5	10000	100
	700	135		12825	95
	1000	213		17679	83
80B	525	137	R2	13145	96
	700	183		16504	90
	1000	280		22503	80
	525	137	R3	13302	97
	700	183		16778	92
	1000	280		22842	82
	525	137	R4	13757	100
	700	183		17290	94
	1000	280		23148	83
	525	137	R5	13152	96
	700	183		16470	90
	1000	280		23240	83

Note: Specifications subject to change without notice. Acutal performance may differ as a result of end-user environment and application.

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carmanah®
we put solar to work

EG300 SERIES

OFF-GRID SOLAR LED LIGHTING

Carmanah EG300-Series Off-Grid Solar LED Lighting System

The EG300 is ideal for …

Highways and public roadways, parking lots, perimeter lighting and many other general lighting applications

New facilities where:

- Access to the electrical grid requires extensive trenching
- Grid connection is difficult or impossible
- Underground checks and/or permits are costly

Existing facilities where:

- Access to the electrical grid requires extensive trenching or environmental disruption
- Disruption of site will result in loss of business
- Underground wiring / conduit is nearing end of life
- Copper theft and vandalism is a concern

The Carmanah Difference:

- Reduced project cost when compared to other solar LED lighting systems: a result of superior uniformity and lumen output
- Adaptive lighting allows user to determine how light is applied
- Pole-top integrated design for easy installation and theft prevention
- Recyclable batteries & components
- Reliable, year-round performance

Capabilities:

- BetaLED™ LEDway™ fixture
- Up to two fixtures per unit
- Adaptive lighting (operating profiles)
- Standard IES distributions (Type II, III, IV, V)
- 6000K and 4300K colour temperature options
- CIE 115:2010 M2 - M6 classification

BetaLED™ Fixtures

The EG300 series features the BetaLED LEDway fixture. With superior uniformity and light performance, BetaLED fixtures allow Carmanah solar lighting systems to illuminate a given area with fewer systems than other solar solutions, providing significant savings in overall project cost.

Adaptive Lighting

Adaptive lighting allows for different light levels during the course of the night, based on vehicle and pedestrian activity. A choice of operating profiles permits the light to be dimmed or turned off completely when facility usage is reduced.

By dimming or turning the system off when light is not needed energy is conserved and light levels during peak hours are maximized. This allows for brighter illumination, smaller system size and lower system cost.

Energy Management System

The Energy Management System (EMS) is a critical part of the EG300 system providing bright, reliable light output and healthy, high-functioning lighting systems for years of autonomous operation.

The EMS provides:

- Efficient transfer and dynamic management of energy
- Seven operating profile options
- Smaller sized systems with greater lumen output

REPRESENTED IN YOUR REGION BY:

Carmanah Technologies Corp. • Web: carmanah.com • Email: info@carmanah.com • Telephone: 1.250.380.0052 • Fax: 1.250.380.0062 •

EG300 SERIES

OFF-GRID SOLAR LED LIGHTING

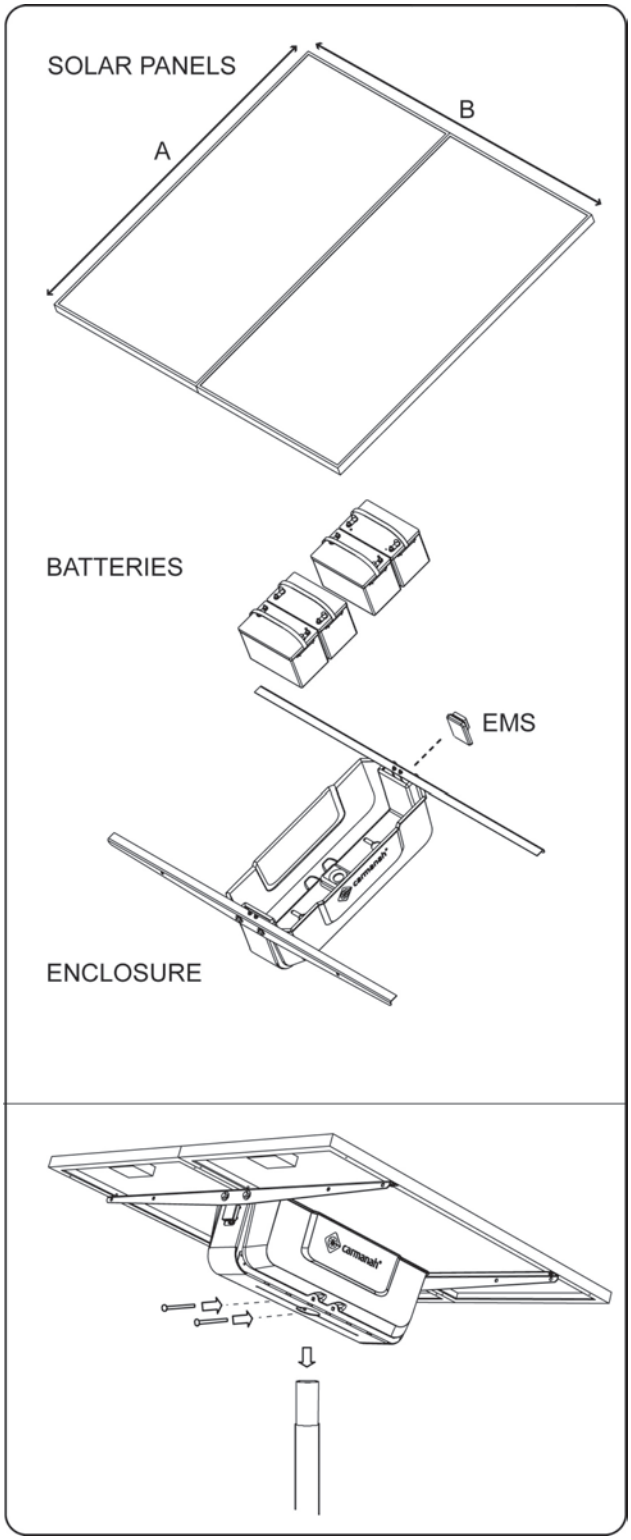
SOLAR ENGINE	EG320	EG340
EPA*	0.69 m² (7.45 ft²)	1.32 m² (14.17 ft²)
APA	0.53 m² (5.73 ft²)	1.01 m² (10.90 ft²)
Weight (without batteries)	39 kg (85 lb)	59 kg (130 lb)
Weight (with batteries)	95 kg (210 lb)	175 kg (385 lb)
Dimension A	157.5 cm (62 in)	157.5 cm (62 in)
Dimension B	82.6 cm (32.5 in)	165.2 cm (65 in)
Watts	>170	>340
BATTERIES		
Type	2 x group 27 absorbent glass mat (AGM)	4 x group 27 absorbent glass mat (AGM)
Rating	4,000 cycles to 20% depth of discharge at 20° C (68° F)	
FIXTURE		
LEDway™	20 – 120 LEDs single fix. 20 – 60 LEDs/fix. dual fix.	
MOUNTING		
Solar Engine	Top of pole, round tenon 8.9 cm (3.5 in) OD X 15.2 cm (6.0 in) long	
LEDway™	Horizontal tenon 4.25 cm (1.675 in) or 6 cm (2.375 in) OD	
Wind Load Rating	250 kph (155 mph)**	
ENERGY MANAGEMENT SYSTEM (EMS)		
Optional Operating Profiles	Dusk-to-Dawn Fixed Night, 6hr Fixed Night, 8hr	
	Split Night 5hr, 25%, 2hr Split Night 5hr, 25%, 4hr Split Night 7hr, 25%, 2hr Split Night 7hr, 25%, 4hr	
Day/night transitioning	Via solar panels	
Status Indicators	Day/night transition, battery connection, low/high voltage disconnect	
PHOTOMETRICS		
Fixture Efficacy	Up to 85 lumens/watt	
IES Light Distributions	Type II, Type III, Type IV, Type V, (backlight control available)	
Other	International Dark-Sky Association (IDA) approved, measured for performance using IESNA standards including IES BUG rating system	
Photometry	Certified photometry per IESNA LM-79-2008 & LM-80-2008	
Typical Applications	Streets, roadways, parking lots, general site lighting	

Photometric performance depends on the solar environment of location and specified operating profile. Contact a Carmanah representative for exact lumen output and specifications for your application.

CLASSIFICATIONS		
CIE	M4 -M6	M2 - M4
Mexico	Secondary residential Type A roadways or lower	Primary and collector ways or higher
Brazil	A3, B, C1 – C3 (L, M)	A3, B, C1 – C3 (L, M, I)
Chile	M4 – M5, P3 – P6, C4 – C5	M2 – M4, P1 – P3, C2 – C4
Colombia	M4 - M5	M2 - M4
Peru	III - V	II - III
Venezuela	E	C-D
CERTIFICATIONS		
CE 2004-108-CE, EN 55015, EN 61547 for emissions and immunity		

* Effective Projected Area (EPA) calculated as the Actual Projected Area (APA) muliplied by a drag coefficient of 1.3. EPA of engine only: does not include fixture EPA.

** 3 second gust as per AASHTO 2001



HDOT Phase 1

LIH – Lihue Airport
Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

72866 - F28T8/XLSPX41ECO

GE Ecolux® UltraMax™ Starcoat® T8

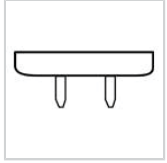
• Passes TCLP, which can lower disposal costs.

High Color Rendering
Energy Savings

Reduced Wattage

Photo
Not Available

Circle E



GENERAL CHARACTERISTICS

Lamp Type	Linear Fluorescent - Straight Linear
Bulb	T8
Base	Medium Bi-Pin (G13)
Rated Life	45000.0 hrs
Rated Life (instant start) @ Time	24000 h @ 3 h 34000 h @ 12 h
Rated Life (rapid start) @ Time	45000.0 @ 3.0/50000.0 @ 12.0 h
Bulb Material	Soda lime
Starting Temperature (MIN)	15.0 °C
LEED-EB MR Credit	26 picograms Hg per mean lumen hour
Additional Info	TCLP compliant
Primary Application	Energy Saving

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	2675.0
Mean Lumens	2515.0
Nominal Initial Lumens per Watt	95
Color Temperature	4100.0 K
Color Rendering Index (CRI)	82.0
S/P Ratio (Scotopic/Photopic Ratio)	1.8

ELECTRICAL CHARACTERISTICS

Wattage	28.0
Voltage	115.0
Open Circuit Voltage (instant start) Min @ Temperature	550 V @ 15 nV
Cathode Resistance Ratio - Rh/Rc (MIN)	4.25
Cathode Resistance Ratio - Rh/Rc (MAX)	6.5
Lamp Current	275.0 mA
Current Crest Factor (MAX)	1.7

DIMENSIONS

Maximum Overall Length (MOL)	48.0000 in(1219.2 mm)
Minimum Overall Length	47.7800 in(1213.6 mm)
Nominal Length	48.000 in(1219.2 mm)
Bulb Diameter (DIA) (MIN)	0.940 in(23.9 mm)
Bulb Diameter (DIA) (MAX)	1.100 in(27.9 mm)
Bulb Diameter (DIA)	1.000 in(25.4 mm)
Max Base Face to Base Face (A)	47.220 in(1199.4 mm)
Face to End of Opposing Pin (B) (MIN)	47.400 in(1204.0 mm)
Face to End of Opposing Pin (B) (MAX)	47.500 in(1206.5 mm)
End of Base Pin to End of Opposite Pin End (C)	47.670 in(1210.8 mm)

PRODUCT INFORMATION

Product Code	72866
Description	F28T8/XLSPX41ECO
Standard Package	Case
Standard Package GTIN	10043168728666
Standard Package Quantity	36
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	36
UPC	043168728669

GE
Lighting

brighten

The bright white radiance of GE's LED commercial indoor/outdoor PAR38 lamps isn't just something you see, it's something you feel.

LED commercial indoor/outdoor PAR38 lamps

For indoor and outdoor applications, GE offers a multitude of wattage options with a high light output.

LOW-COST OPERATION
- For example, using only 26 watts of energy, save over $517 in energy costs over the rated life of the lamp versus a standard 120-watt halogen lamp based on $0.11 per kWh
- Energy efficiency and long life mean fewer lamp replacements versus standard incandescent and halogen light sources
- Ideal for both indoor and outdoor applications
- UL wet rated for outdoor applications

EXCELLENT COLOR RENDERING
- Available with a CRI of 82 - 84

COLOR TEMPERATURE
- Halogen-like color
- Available in 2700K, 3000K, 3500K, 4000K and 5000K

LONG LIFE
- Up to 25,000 hours rated life (L70)

DIMMABLE
- Dims from 100% to 10%

BEAM PATTERNS
- Available in 12˚, 15˚, 25˚, 35˚ and 40˚ beam patterns

ENVIRONMENTALLY CONSCIOUS
- These lamps are energy efficient and contain no lead or mercury

GE QUALITY AND RELIABILITY
- 3-year limited warranty

To learn more about saving money and energy, go to: **gelighting.com/ThinkLED**

When you Think LED lighting, Think GE.

ecomagination℠

imagination at work

LED commercial indoor/outdoor PAR38 lamps

Directional Lamps (PAR)

Bulb Shape	Base Type	Watts	Order Code	Description	Volts	Case Qty**	MOL (In)	Lumens Initial	CBCP	Initial Color Temp	CRI	Wattage Equivalent	*Rated Life L70 (Hrs)	Dimmable	ENERGY STAR® Status	#Location Rating	Additional Information
Commercial PAR38 (Indoor/Outdoor)																	
PAR38	MED	12	66111	LED12DP38S830/12	120	6	5.31	700	10000	3000	82	70W	25,000	Yes	★	Damp	Spot, 12˚ beam, Silver
			66114	LED12DP38S827/12	120	6	5.31	660	10000	2700	82	70W	25,000	Yes	★	Damp	Spot, 12˚ beam, Silver
			90150	LED12DP382W83025	120	6	5.12	950	4400	3000	84	85W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90151	LED12DP382W83035	120	6	5.12	950	2700	3000	84	85W	25,000	Yes	★	Wet	Flood, 35˚ beam, White
			90132	LED12DP382W82725	120	6	5.12	850	4000	2700	84	85W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90133	LED12DP382W82735	120	6	5.12	850	2500	2700	84	85W	25,000	Yes	★	Wet	Flood, 35˚ beam, White
		18	90159	LED18DP38W830/25	120	6	5.12	1300	7600	3000	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90160	LED18DP38W830/40	120	6	5.12	1300	2400	3000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			90154	LED18DP38W827/25	120	6	5.12	1200	7000	2700	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			94453	LED18DP38W827/40	120	6	5.12	1200	2200	2700	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			90162	LED18DP38W840/25	120	6	5.12	1400	8200	4000	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90163	LED18DP38W840/40	120	6	5.12	1400	2600	4000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			22235	LED18DP38FL5K/TP	120	3	5.12	1500	3200	5000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
		20	68197	LED20DP38V827/12	120	6	5.1	1000	14000	2700	82	100W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
			68200	LED20DP38V840/12	120	6	5.1	1200	17000	4000	82	100W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
	MED	26	68183	LED26DP38S830/12	120	6	5.31	1500	24000	3000	82	130W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
			68184	LED26DP38S830/25	120	6	5.31	1500	6800	3000	82	130W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, Silver
			68185	LED26DP38S830/40	120	6	5.31	1500	3100	3000	82	120W	25,000	Yes	★	Wet	Flood, 40˚ beam, Silver
			68182	LED26DP38S840/40	120	6	5.31	1650	3200	4000	82	120W	25,000	Yes	★	Wet	Flood, 40˚ beam, Silver
			33647	LED26DP38S835/12	120	6	5.31	1900	31,000	3500	82	160W	25,000	Yes		Wet	Spot, 12˚ beam, Silver
			70591	LED26DP38S835/40	120	6	5.31	1900	4,000	3500	82	160W	25,000	Yes		Wet	Flood, 40˚ beam, Silver
			15139	LED28P38S830/15	120	6	5.31	2400	20,000	3000	82	130W	25,000	-		Dry	Spot, 15˚ beam, Silver

Get more information at
GELighting.com/ThinkLED

Information provided is subject to change without notice. Please verify all details with GE. All values are design or typical values when measured under laboratory conditions, and GE makes no warranty or guarantee, expressed or implied, that such performance will be obtained under end-use conditions.

* The life rating is based on the hours of operation the lamp will provide before reaching 70% of its original rating (L70)
★ ENERGY STAR® status: Certified as meeting ENERGY STAR® guidelines.
UL 1993 Environmental Requirements for LED LAMPS
Location, damp – Exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to, electrical equipment, and includes partially protected locations.
Location, dry – Location not normally subject to dampness, may include a location subject to temporary dampness, i.e., building under construction, provided ventilation is adequate to prevent an accumulation of moisture.
Location, wet – Location in which water or other liquid can drip, splash, or flow on or against electrical equipment.
^ Incandescent or Halogen wattage equivalencies based on ENERGY STAR® guidelines using lumens or CBCP according to lamp type

ecomagination℠

Product is compliant with material restriction requirements of RoHS

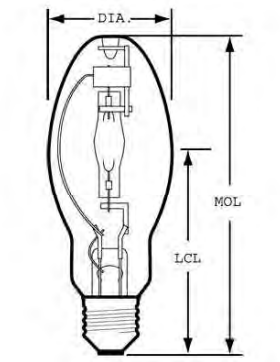
ENERGY STAR® and the ENERGY STAR® logo are registered U.S. marks

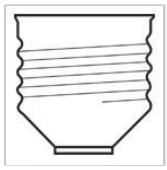
www.gelighting.com

63555 (Rev 9/17/14)

10361 - MXR50/U/MED

GE Multi-Vapor® PulseArc® Quartz Metal Halide BD17





CAUTIONS & WARNINGS

R- WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urburns.html

Caution

- Lamp may shatter and cause injury if broken
  - Dispose of lamp in a closed container.
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning

- A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.
- Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
- Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
- Risk of Fire
  - Keep combustible materials away from lamp.
  - Use in fixture rated for this product.
- Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn lamp off at least once for 15 minutes per week.
  - Use in enclosed fixture rated for this product.
  - Use only properly rated ballast.

GRAPHS & CHARTS

Graphs_Spectral Power Distribution

GENERAL CHARACTERISTICS

Lamp Type	High Intensity Discharge - Quartz Metal Halide
Bulb	BD17
Base	Medium Screw (E26)
Bulb Finish	Clear
Rated Life	10000.0 hrs
Bulb Material	Hard glass
Lamp Enclosure Type (LET)	Enclosed fixtures only
Base Temperature (MAX)	190.0 °C
Bulb Temperature (MAX)	400.0 °C
LEED-EB MR Credit	261 picograms Hg per mean lumen hour

PHOTOMETRIC CHARACTERISTICS

Initial Lumens	3200.0
Mean Lumens	2100.0
Nominal Initial Lumens per Watt	64
Color Temperature	3700.0 K
Color Rendering Index (CRI)	60.0

ELECTRICAL CHARACTERISTICS

Wattage	50.0
Burn Position	Universal burning position
Warm Up Time to 90% (MIN)	2.0 min
Warm Up Time to 90% (MAX)	5.0 min
Hot Restart Time to 90% (MIN)	10.0 min
Hot Restart Time to 90% (MAX)	15.0 min

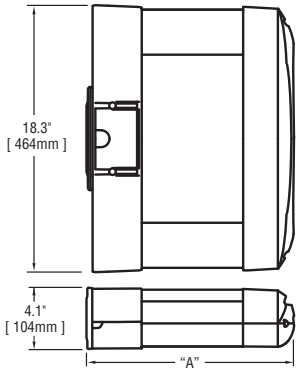
DIMENSIONS

Maximum Overall Length (MOL)	5.4300 in(137.9 mm)
Bulb Diameter (DIA)	2.125 in(54.0 mm)
Light Center Length (LCL)	3.430 in(87.1 mm)

PRODUCT INFORMATION

Product Code	10361
Description	MXR50/U/MED
ANSI Code	M110
Standard Package	Case
Standard Package GTIN	10043168103616
Standard Package Quantity	6
Sales Unit	Unit
No Of Items Per Sales Unit	1
No Of Items Per Standard Package	6
UPC	043168103619

SEC-EDG-3M-WM — THE EDGE® LED Wall Pack — Rev. Date: 2/21/12



# of LEDs	Dim. "A"
20	11.91" [303mm]
40	11.91" [303mm]
60	13.91" [353mm]
80	15.91" [404mm]
100	17.91" [455mm]
120	19.91" [505mm]

Notes:

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current (Not Field Adjustable)	Factory-Installed Options (Please type additional options in manually on the lines provided above.)
SEC	EDG	☐ 3M[1] ☐ 3MB[2]	WM[3]	☐ 02 ☐ 04 ☐ 06 ☐ 08 ☐ 10 ☐ 12	D	☐ UL Universal 120–277V ☐ UH Universal 347–480V ☐ 12 120V ☐ 24 240V ☐ 27 277V ☐ 34 347V	☐ SV Silver (Standard) ☐ BK Black ☐ BZ Bronze ☐ PB Platinum Bronze ☐ WH White	☐ 350 350mA ☐ 525[4] 525mA ☐ 700[5] 700mA	☐ 40K 4000K Color Temperature[6] ☐ DIM 0–10V Dimming[7,8,9] ☐ F Fuse[10,11,12] ☐ P Photocell[11,12] ☐ ML Multi-Level (75/525)[13]

Footnotes

1. IESNA Type III Medium distribution
2. IESNA Type III Medium distribution w/ backlight control
3. Wall mount
4. Available on fixtures with 20–80 LEDs
5. Available on fixtures with 20–60 LEDs
6. Color temperature per fixture; 5700K standard; minimum 70 CRI
7. Control by others
8. Refer to dimming spec sheet for availability and additional information
9. Not available when UH voltage is selected
10. When code dictates fusing use time delay fuse
11. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
12. Must specify voltage other than UL or UH
13. Refer to multi-level spec sheet for availability and additional information

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type III Medium @ 5700K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium with Backlight Control @ 5700K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium @ 4000K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium with Backlight Control @ 4000K	B	U	G	Rating**	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
350mA Fixture Operating at 25° C (77° F)																												
20	1,814 (02)	1	1	1		1,342 (02)	0	1	1		1,672 (02)	1	1	1		1,237 (02)	0	1	1		26	0.20	0.11	0.10	0.09	0.07	>150,000	
40	3,628 (04)	1	1	1		2,683 (04)	1	1	1		3,343 (04)	1	1	1		2,473 (04)	0	1	1		47	0.40	0.21	0.19	0.15	0.12	>150,000	
60	5,371 (06)	2	2	2		3,973 (06)	1	2	1		4,950 (06)	2	2	2		3,662 (06)	1	2	1		68	0.58	0.30	0.26	0.20	0.16	>150,000	93%
80	7,161 (08)	2	2	2		5,298 (08)	1	2	2		6,600 (08)	2	2	2		4,882 (08)	1	2	1		90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	8,929 (10)	3	3	3		6,605 (10)	1	3	2		8,230 (10)	2	2	2		6,088 (10)	1	2	2		111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	10,715 (12)	3	3	3		7,926 (12)	1	3	2		9,876 (12)	3	3	3		7,305 (12)	1	3	2		132	1.15	0.56	0.50	0.38	0.28	>150,000	
525mA Fixture Operating at 25° C (77° F)																												
20	2,539 (02)	1	1	1		1,878 (02)	0	1	1		2,340 (02)	1	1	1		1,731 (02)	0	1	1		37	0.31	0.17	0.16	0.12	0.10	136,000	
40	5,079 (04)	2	2	2		3,757 (04)	1	2	1		4,681 (04)	2	2	2		3,462 (04)	1	2	1		70	0.57	0.29	0.26	0.21	0.16	136,000	92%
60	7,520 (06)	2	2	2		5,562 (06)	1	2	2		6,930 (06)	2	2	2		5,127 (06)	1	2	1		102	0.87	0.44	0.39	0.30	0.22	129,000	
80	10,026 (08)	3	3	3		7,417 (08)	1	3	2		9,240 (08)	3	3	3		6,835 (08)	1	3	2		133	1.14	0.56	0.49	0.39	0.29	129,000	
700mA Fixture Operating at 25° C (77° F)																												
20	3,102 (02)	1	1	1		2,281 (02)	0	1	1		2,858 (02)	1	1	1		2,102 (02)	0	1	1		50	0.42	0.22	0.20	0.15	0.12	111,000	
40	6,203 (04)	2	2	2		4,562 (04)	1	2	1		5,717 (04)	2	2	2		4,204 (04)	1	2	1		93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60	9,185 (06)	3	3	3		6,754 (06)	1	3	2		8,465 (06)	2	3	2		6,225 (06)	1	2	2		137	1.18	0.59	0.51	0.39	0.29	111,000	

* For recommended lumen maintenance factor data see TD-13

** For more information on the IES BUG (Backlight-Uplight-Glare) Ratin visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

9201 Washington Ave • Racine, WI 53406-3772 • 800-236-6800 • www.BetaLED.com

Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

SEC-EDG-3M-WM THE EDGE® LED Wall Pack Rev. Date: 2/21/12

General Description

Slim, low profile design. Fixture sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED applications. Housing is rugged aluminum. Furnished with low copper, lightweight mounting box designed for installation over standard and mud ring single gang J boxes. Secures to wall with four (4) 3/16" (4.8mm) screws (by others). Conduit entry from top, bottom, sides and rear. Allows mounting for uplight or downlight. Designed and approved for easy through-wiring. Includes leaf/debris guard. Five year limited warranty on fixture.

Electrical

Modular design accommodates varied lighting output from high power, white, 5700K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4000K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Integral weather-tight J-box with leads (wire nuts) for easy power hook-up. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations and enclosure rsted IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly. IDA Approved. RoHS compliant.

Product qualified on the Design Lights Consortium ("DLC") Qualified Products List ("QPL") when ordered without backlight control shield.

Finish

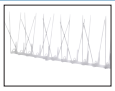
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Fixture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents

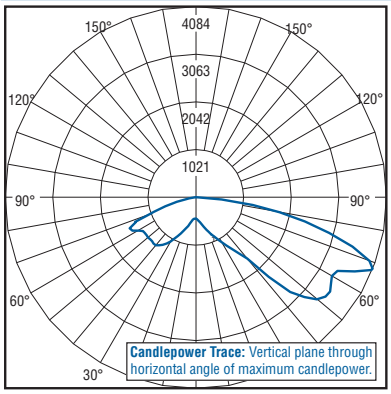
U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

Field-Installed Accessories

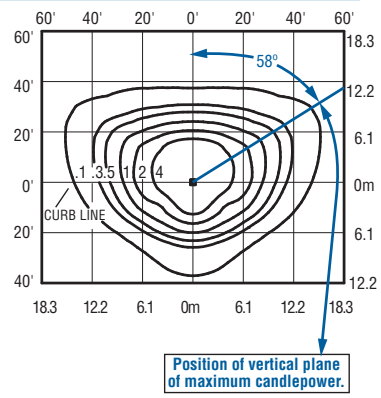


Bird Spikes
☐XA-BRDSPK

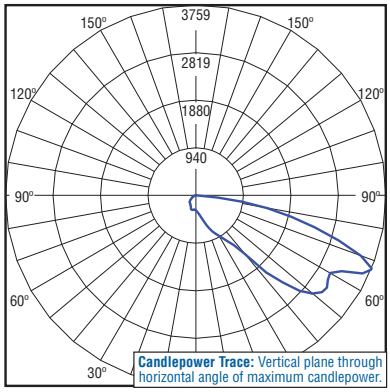
Photometrics



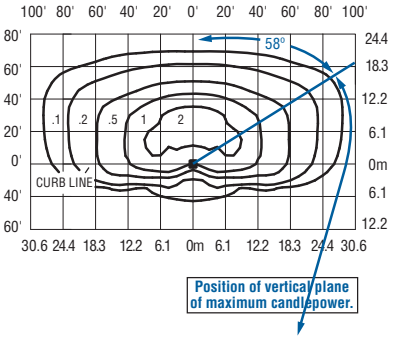
Independent Testing Laboratories certified test. Report No. ITL70203. Candlepower trace of 4000K, 60 LED Type III Medium security EDGE luminaire with 8,812 initial delivered lumens operating at 700mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4000K, 60 LED Type III Medium security EDGE luminaire at 10' (3m) A.F.G. Luminaire with 8,465 initial delivered lumens operating at 700mA. Initial FC at grade.



Independent Testing Laboratories certified test. Report No. ITL68539. Candlepower trace of 4300K, 40 LED Type III Medium w/ backlight control area luminaire with 5,084 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4000K, 80 LED Type III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 6,835 initial delivered lumens operating at 525mA. Initial FC at grade.

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

304 Series™ PKG-304-5M-PD

Parking Structure Luminaire – Type V Medium – Pendant Mount

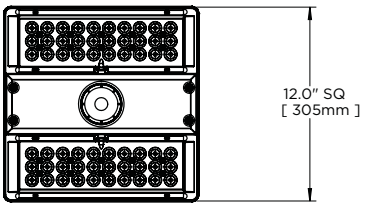
PKG-304-5M-PD-04-D-UL-SV-350-ML-40K

Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Pendant mount includes 36" (914mm) cord out of luminaire and is intended to be mounted by 3/4 IP pendant (by others).

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+/- 500K) Standard, 4000K (+/- 300K)
- **Warranty:** 10 years on luminaire/10 years on Colorfast DeltaGuard® finish†



Field Installed Accessories

XA-PNDTLVL
Leveler - for 0–13˚ sloped ceilings

XA-PS12KIT
12" (305mm) Pendant Kit
Pendant height from ceiling surface to bottom of luminaire; mounting accessory surface boxes will add overall height

XA-PS18KIT
18" (457mm) Pendant Kit
Pendant height from ceiling surface to bottom luminaire; mounting accessory or surface boxes will add overall height

XA-PS22KIT
22" (559mm) Pendant Kit
Pendant height from ceiling surface to bottom luminaire; mounting accessory or surface boxes will add overall height

XA-PSFTG
Pendant Fitting

XA-XCPBRDGRD
Bird Guard

Ordering Information

Example: PKG-304-5M-PD-04-D-UL-SV-350-OPTIONS

PKG-304	5M	PD	04	D	UL	SV	350	ML-40K
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**5M** Type V Medium	**PD** Pendant Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K 4000K Color Temperature** - Color temperature per fixture **DIM 0–10V Dimming** - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F Fuse** - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML Multi-Level** - Refer to multi-level spec sheet for availability and additional information

† See www.cree.com/lighting for warranty terms.

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weather-tight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Pendant mount includes 36" (419mm) cord out of the luminaire and is intended to be mounted by 3/4 IP pendant (by others)
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

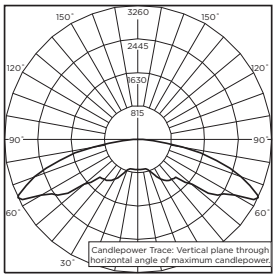
REGULATORY & VOLUNTARY QUALIFICATIONS

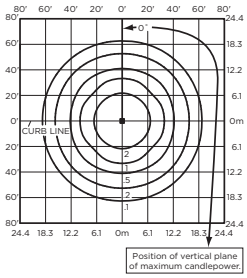
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- RoHS Compliant
- Dark Sky Friendly. IDA Approved
- Meets Buy American requirements within ARRA

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.





ITL Test Report #: 66638
CAN-304-5M-**-06-D-UL-700
Initial Delivered Lumens: 10,893

CAN-304-5M-**-06-D-UL-700
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 10,384
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Type V Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,113	B3 U0 G1	3,791	B2 U0 G1	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,126	B3 U0 G2	5,646	B3 U0 G2	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	5,758	B3 U0 G2	5,307	B3 U0 G2	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	8,576	B3 U0 G2	7,904	B3 U0 G2	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	6,992	B3 U0 G2	6,444	B3 U0 G2	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	10,414	B4 U0 G2	9,598	B3 U0 G2	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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304 Series™ PKG-304-PS-DM

Parking Structure Luminaire – Petroleum Symmetric – Direct Mount

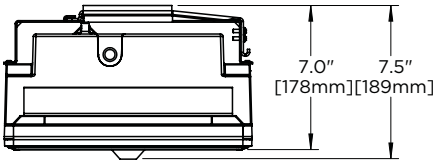
PKG-304-PS-DM-04-D-UL-SV-700-40K-ML

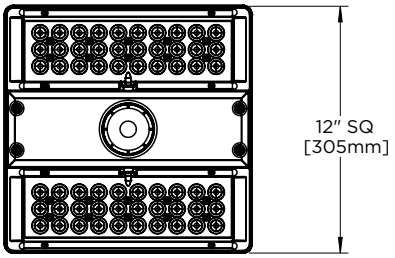
Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over exisiting single gang and octagonal junction boxes for direct mount.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+/- 500K) Standard, 4000K (+/- 300K)
- **Warranty:** 5 years on luminaire/10 years on Colorfast DeltaGuard® finish†





Ordering Information

Example: PKG-304-PS-DM-04-D-UL-SV-350-OPTIONS

PKG-304	PS	DM	04	D	UL	SV	700	40K-ML
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**PS** Petroleum Symmetric	**DM** Direct Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K** 4000K Color Temperature - Color temperature per fixture **DIM** 0–10V Dimming - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F** Fuse - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML** Multi-Level - Refer to multi-level spec sheet for availability and additional information **J** Alternate Junction Box mounting

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weather-tight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

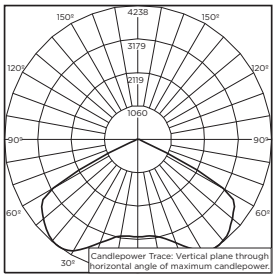
REGULATORY & VOLUNTARY QUALIFICATIONS

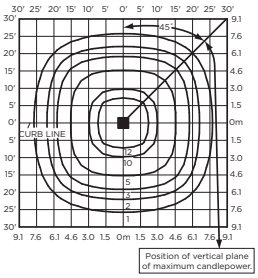
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- RoHS Compliant
- Dark Sky Friendly. IDA Approved
- Meets Buy American requirements within ARRA

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.





ITL Test Report #: 66685
CAN-304-PS-**-06-D-UL-700
Initial Delivered Lumens: 12,214

CAN-304-PS-**-06-D-UL-700
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 11,794
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Petroleum Symmetric Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,671	B2 U0 G0	4,305	B2 U0 G0	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,958	B2 U0 G0	6,413	B2 U0 G0	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	6,540	B2 U0 G0	6,028	B2 U0 G0	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	9,741	B3 U0 G0	8,977	B3 U0 G0	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	7,942	B3 U0 G0	7,319	B3 U0 G0	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	11,828	B3 U0 G0	10,902	B3 U0 G0	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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304 Series™ PKG-304-5M-DM

Parking Structure Luminaire – Type V Medium – Direct Mount

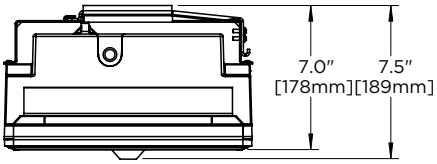
PKG-304-5M-DM-04-D-UL-SV-700-40K-ML

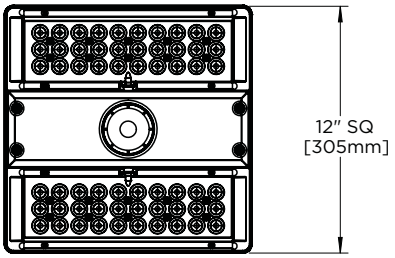
Product Description

Slim, low profile design. Lumianire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over exisiting single gang and octagonal junction boxes for direct mount.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+/- 500K) Standard, 4000K (+/- 300K)
- **Warranty:** 5 years on luminaire/10 years on Colorfast DeltaGuard® finish†





Ordering Information

Example: PKG-304-5M-DM-04-D-UL-SV-350-OPTIONS

PKG-304	5M	DM	04	D	UL	SV	700	40K-ML
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**5M** Type V Medium	**DM** Direct Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**40K 4000K Color Temperature** - Color temperature per fixture **DIM 0–10V Dimming** - Control by others - Refer to dimming spec sheet for availability and additional information - Can't exceed specified drive current **F Fuse** - When code dictates fusing use time delay fuse - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information **ML Multi-Level** - Refer to multi-level spec sheet for availability and additional information **J Alternate Junction Box mounting**

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is a sealed weather-tight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

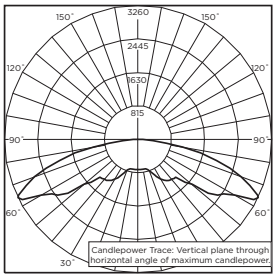
REGULATORY & VOLUNTARY QUALIFICATIONS

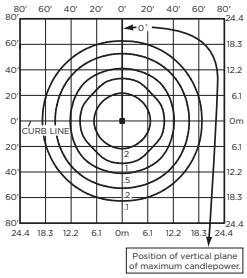
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- RoHS Compliant
- Dark Sky Friendly. IDA Approved
- Meets Buy American requirements within ARRA

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.





ITL Test Report #: 66638
CAN-304-5M-**-06-D-UL-700
Initial Delivered Lumens: 10,893

CAN-304-5M-**-06-D-UL-700
Mounting Height: 15' (4.6m)
Initial Delivered Lumens: 10,384
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Type V Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,113	B3 U0 G1	3,791	B2 U0 G1	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,126	B3 U0 G2	5,646	B3 U0 G2	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	5,758	B3 U0 G2	5,307	B3 U0 G2	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	8,576	B3 U0 G2	7,904	B3 U0 G2	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	6,992	B3 U0 G2	6,444	B3 U0 G2	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	10,414	B4 U0 G2	9,598	B3 U0 G2	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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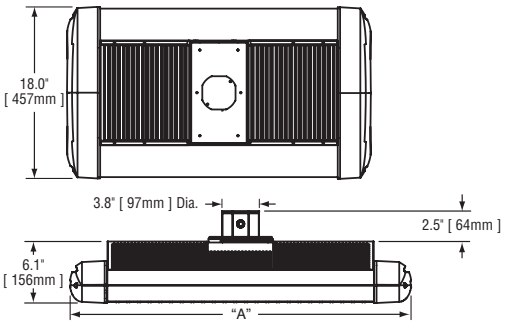
CAN-EDG-5M-DM THE EDGE® LED Canopy Light – Type V Medium

Rev. Date:9/22/11

Notes:



# of LEDs	Dim. "A"
40	16.06"
60	18.06"
80	16.06"
100	18.06"
120	20.06"
140	22.06"
160	24.06"
200	28.06"
240	32.06"

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current Not Field Adjustable	Factory-Installed Options Please type additional options in manually on the lines provided above.
CAN	EDG	5M[1]	DM[2]	☐ 04[3] ☐ 06[4] ☐ 08 ☐ 10 ☐ 12 ☐ 14 ☐ 16 ☐ 20 ☐ 24	D	☐ UL Universal 120–277V ☐ UH Universal 347–480V ☐ 12 120V ☐ 24 240V ☐ 27 277V ☐ 34 347V	☐ SV Silver ☐ BK Black ☐ BZ Bronze ☐ PB Platinum Bronze ☐ WH White	☐ 350 350mA ☐ 525[5] 525mA ☐ 700[6] 700mA	☐ 43K 4300K Color Temperature[7] ☐ DIM 0–10V Dimming[8,9] ☐ F Fuse[10,11,12] ☐ HL Hi/Low (175/350/525, dual circuit input)[13] ☐ P Photocell[12,14,15] ☐ ML Multi-Level (75/525)[13]

Footnotes

1. Type V Medium distribution
2. Direct mount
3. Uses 80 LED size with two blanks in outside positions
4. Uses 100 LED size with two blanks in outside positions
5. Available on fixtures with 40–160 LEDs
6. Available on fixtures with 40–60 LEDs
7. Color temperature per luminaire; 6000K standard; minimum 70 CRI
8. Control by others
9. Refer to dimming spec sheet for availability and additional information
10. When code dictates fusing use time delay fuse
11. Not available when UH voltage is selected
12. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
13. Refer to multi-level spec sheet for availability and additional information
14. Must specify voltage other than UL or UH
15. 120 LED maximum when 34 voltage is selected

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type V Medium @ 6000K	B U G Rating**	Initial Delivered Lumens – Type V Medium @ 4300K	B U G Rating**	System Watts 120–480V	Total Current @ 120V	Total Current @ 230V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
350mA Fixture Operating at 25° C (77° F)												
40[3]	4,025 (04)	2 1 1	3,710 (04)	2 1 1	47	0.40	0.21	0.19	0.15	0.12	>150,000	
60[4]	5,960 (06)	3 2 1	5,493 (06)	3 2 1	68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	7,946 (08)	3 2 2	7,324 (08)	3 2 2	90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	9,908 (10)	4 3 2	9,131 (10)	3 3 2	111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	11,889 (12)	4 3 2	10,958 (12)	4 3 2	132	1.15	0.56	0.50	0.38	0.28	>150,000	93%
140	13,808 (14)	4 3 2	12,726 (14)	4 3 2	157	1.34	0.67	0.61	0.47	0.35	149,000	
160	15,781 (16)	4 3 2	14,544 (16)	4 3 2	179	1.54	0.76	0.68	0.53	0.39	149,000	
200	19,726 (20)	4 3 2	18,180 (20)	4 3 2	221	1.92	0.95	0.84	0.65	0.48	149,000	
240	23,671 (24)	5 3 3	21,816 (24)	5 3 3	264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)												
40[3]	5,635 (04)	3 2 1	5,194 (04)	3 2 1	70	0.57	0.29	0.26	0.21	0.16	136,000	
60[4]	8,344 (06)	3 2 2	7,690 (06)	3 2 2	102	0.87	0.44	0.39	0.30	0.22	129,000	
80	11,125 (08)	4 3 2	10,253 (08)	4 3 2	133	1.14	0.56	0.49	0.39	0.29	129,000	
100	13,871 (10)	4 3 2	12,784 (10)	4 3 2	172	1.47	0.75	0.67	0.51	0.38	128,000	92%
120	16,645 (12)	4 3 2	15,341 (12)	4 3 2	204	1.76	0.88	0.78	0.60	0.44	128,000	
140	19,331 (14)	4 3 2	17,817 (14)	4 3 2	233	2.01	0.99	0.87	0.69	0.51	123,000	
160	22,092 (16)	5 3 3	20,362 (16)	5 3 3	265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)												
40[3]	6,883 (04)	3 2 1	6,344 (04)	3 2 1	93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60[4]	10,191 (06)	4 3 2	9,393 (06)	3 3 2	137	1.18	0.59	0.51	0.39	0.29	111,000	

* For recommended lumen maintenance factor data see TD-13

** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

9201 Washington Ave • Racine, WI 53406-3772 • 800-236-6800 • www.betaLED.com

Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

CAN-EDG-5M-DM THE EDGE® LED Canopy Light – Type V Medium

Rev. Date: 9/22/11

General Description

Slim, low profile, easy mounting below deck design. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED lighting application, J-Box sized to fit through existing 4-inch (102mm) diameter mount holes and is designed for through wiring and wet location installations. Luminaire mounts directly to canopy with lag bolts (by others). When mounting to solid surfaces, Adaptor Plate Kit accessory is required. Mating surface is gasketed to prevent water leak through. Includes bug/bird guard. Five year limited warranty on fixture.

Electrical

Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations and enclosure rating IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly. IDA Approved. RoHS compliant.

Finish

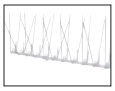
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Fixture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents

U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

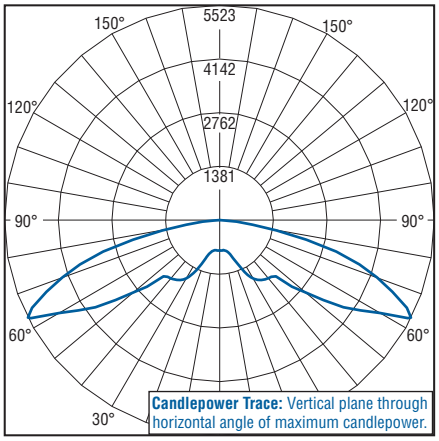
Field-Installed Accessories



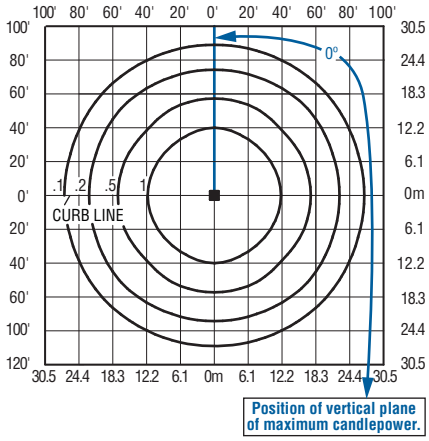
☐ **Bird Spikes**
XA-BRDSPK

☐ **Adaptor Plate Kit**
XA-CLSB16
For use when mounting fixture to solid surfaces.

Photometrics



Independent Testing Laboratories certified test. Report No. ITL68282. Candlepower trace of 4300K, 120 LED Type V Medium area luminaire with 16,029 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4300K, 120 LED Type V Medium canopy luminaire at 25' (7.6m) A.F.G. Luminaire with 15,341 initial delivered lumens operating at 525mA. Initial FC at grade.

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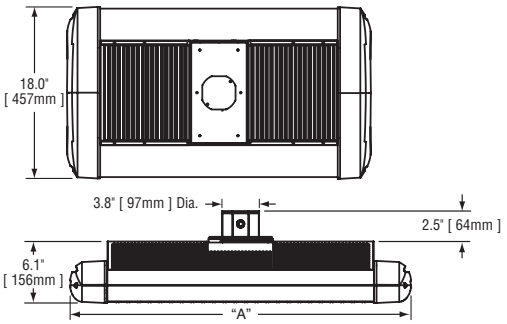
Meets Buy American requirements within the ARRA.

CAN-EDG-5S-DM THE EDGE® LED Canopy Light – Type V Short

Rev. Date:9/22/11



# of LEDs	Dim. "A"
40	16.06"
60	18.06"
80	16.06"
100	18.06"
120	20.06"
140	22.06"
160	24.06"
200	28.06"
240	32.06"

Notes:

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current Not Field Adjustable	Factory-Installed Options Please type additional options in manually on the lines provided above.
CAN	EDG	5S[1]	DM[2]	☐ **04**[3] ☐ **06**[4] ☐ **08** ☐ **10** ☐ **12** ☐ **14** ☐ **16** ☐ **20** ☐ **24**	D	☐ **UL** Universal 120–277V ☐ **UH** Universal 347–480V ☐ **12** 120V ☐ **24** 240V ☐ **27** 277V ☐ **34** 347V	☐ **SV** Silver ☐ **BK** Black ☐ **BZ** Bronze ☐ **PB** Platinum Bronze ☐ **WH** White	☐ **350** 350mA ☐ **525**[5] 525mA ☐ **700**[6] 700mA	☐ **43K** 4300K Color Temperature[7] ☐ **DIM** 0–10V Dimming[8,9] ☐ **F** Fuse[10,11,12] ☐ **HL** Hi/Low (175/350/525, dual circuit input)[13] ☐ **P** Photocell[12,14,15] ☐ **ML** Multi-Level (75/525)[13]

Footnotes

1. Type V Short distribution
2. Direct mount
3. Uses 80 LED size with two blanks in outside positions
4. Uses 100 LED size with two blanks in outside positions
5. Available on fixtures with 40–160 LEDs
6. Available on fixtures with 40–60 LEDs
7. Color temperature per luminaire; 6000K standard; minimum 70 CRI
8. Control by others
9. Refer to dimming spec sheet for availability and additional information
10. When code dictates fusing use time delay fuse
11. Not available when UH voltage is selected
12. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
13. Refer to multi-level spec sheet for availability and additional information
14. Must specify voltage other than UL or UH
15. 120 LED maximum when 34 voltage is selected

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type V Short @ 6000K	B	U	G	Initial Delivered Lumens – Type V Short @ 4300K	B	U	G	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
		Rating**				Rating**										
350mA Fixture Operating at 25° C (77° F)																
40[3]	4,472 (04)	2	1	1	4,122 (04)	2	1	1	47	0.40	0.21	0.19	0.15	0.12	>150,000	
60[4]	6,622 (06)	3	1	1	6,103 (06)	3	1	1	68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	8,829 (08)	3	1	1	8,137 (08)	3	1	1	90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	11,009 (10)	3	1	2	10,146 (10)	3	1	2	111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	13,210 (12)	4	1	2	12,175 (12)	3	1	2	132	1.15	0.56	0.50	0.38	0.28	>150,000	93%
140	15,342 (14)	4	1	2	14,140 (14)	4	1	2	157	1.34	0.67	0.61	0.47	0.35	149,000	
160	17,534 (16)	4	2	2	16,160 (16)	4	1	2	179	1.54	0.76	0.68	0.53	0.39	149,000	
200	21,918 (20)	4	2	2	20,200 (20)	4	2	2	221	1.92	0.95	0.84	0.65	0.48	149,000	
240	26,301 (24)	5	2	3	24,240 (24)	4	2	2	264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)																
40[3]	6,261 (04)	3	1	1	5,771 (04)	3	1	1	70	0.57	0.29	0.26	0.21	0.16	136,000	
60[4]	9,271 (06)	3	1	2	8,544 (06)	3	1	1	102	0.87	0.44	0.39	0.30	0.22	129,000	
80	12,361 (08)	4	2	2	11,392 (08)	3	1	2	133	1.14	0.56	0.49	0.39	0.29	129,000	
100	15,412 (10)	4	1	2	14,205 (10)	4	1	2	172	1.47	0.75	0.67	0.51	0.38	128,000	92%
120	18,495 (12)	4	2	2	17,045 (12)	4	1	2	204	1.76	0.88	0.78	0.60	0.44	128,000	
140	21,479 (14)	4	2	2	19,796 (14)	4	2	2	233	2.01	0.99	0.87	0.69	0.51	123,000	
160	24,548 (16)	4	2	2	22,624 (16)	4	2	2	265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)																
40[3]	7,648 (04)	3	1	1	7,048 (04)	3	1	1	93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60[4]	11,323 (06)	3	1	2	10,436 (06)	3	1	2	137	1.18	0.59	0.51	0.39	0.29	111,000	

*For recommended lumen maintenance factor data see TD-13

**For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

CAN-EDG-5S-DM THE EDGE® LED Canopy Light – Type V Short

Rev. Date: 9/22/11

General Description

Slim, low profile, easy mounting below deck design. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED lighting application, J-Box sized to fit through existing 4-inch (102mm) diameter mount holes and is designed for through wiring and wet location installations. Luminaire mounts directly to canopy with lag bolts (by others). When mounting to solid surfaces, Adaptor Plate Kit accessory is required. Mating surface is gasketed to prevent water leak through. Includes bug/bird guard. Five year limited warranty on fixture.

Electrical

Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations and enclosure rating IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly. IDA Approved. RoHS compliant.

Finish

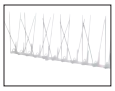
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Fixture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents

U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

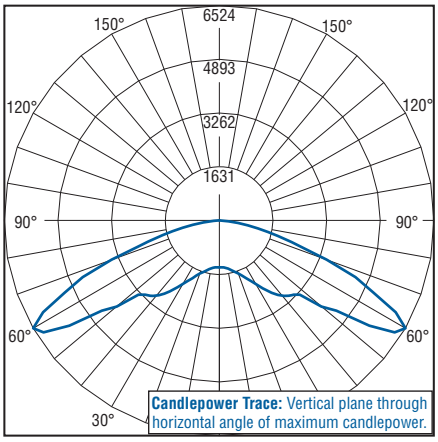
Field-Installed Accessories



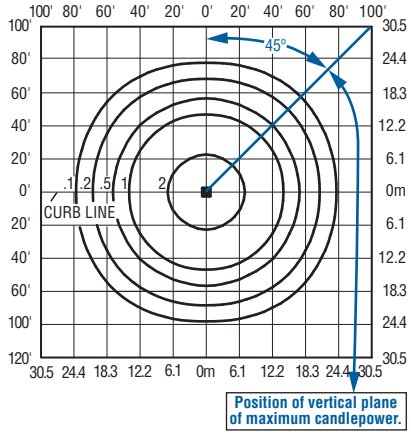
☐ **Bird Spikes**
XA-BRDSPK

☐ **Adaptor Plate Kit**
XA-CLSB16
For use when mounting fixture to solid surfaces.

Photometrics



Independent Testing Laboratories certified test. Report No. ITL68092 Candlepower trace of 4300K, 120 LED Type V Short area luminaire with 17,059 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4300K, 120 LED Type V Short area luminaire at 25' (7.6m) A.F.G. Luminaire with 17,045 initial delivered lumens operating at 525mA. Initial FC at grade.

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

THE EDGE® FLD-EDG-70-AA

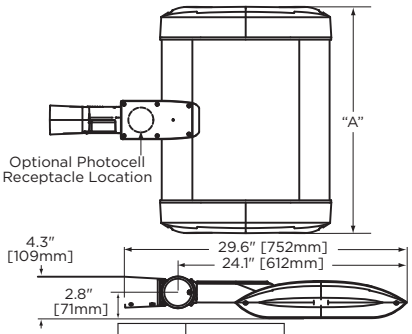
Flood Luminaire – 70˚ Flood – Adjustable Arm Mount

Product Description

Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2" (51mm) IP (2.375" [60mm] O.D.) tenon. Includes leaf/debris guard.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+/- 500K) Standard, 4000K (+/- 300K)
- **Warranty:** 5 years on luminaire/10 years on Colorfast DeltaGuard® finish
- **EPA and Weight:** Reference EPA and Weight spec sheet



LED Count (x10)	Dim. "A"
02	12.1" [306mm]
04	12.1" [306mm]
06	14.1" [357mm]
08	16.1" [408mm]
10	18.1" [459mm]
12	20.1" [510mm]
14	22.1" [560mm]
16	24.1" [611mm]
20	28.1" [713mm]
24	32.1" [814mm]

Accessories

Field Installed Accessories
XA-BRDSPK Bird Spikes

Ordering Information

Example: FLD-EDG-70-AA-02-D-UL-SV-350-OPTIONS

FLD-EDG	70	AA		D				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Version**	**Voltage**	**Color Options**	**Drive Current**	**Options**
FLD-EDG	**70** 70˚ Flood	**AA** Adjustable Arm	**02** **04** **06** **08** **10** **12** **14** **16** **20** **24**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350** 350mA **525*** 525mA **700**** 700mA	**40K 4000K Color Temperature** - Color temperature per luminaire **DIM 0–10V Dimming** - Control by others - Refer to dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - When code dictates fusing, use time delay fuse - Not available with all ML options. Refer to ML spec sheet for availability with ML options **HL Hi/Low (175/350/525 Dual Circuit Input)** - Refer to ML spec sheet for details - Sensor not included **P Photocell** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Must specify voltage other than UH **R NEMA Photocell Receptacle** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Intended for horizontal mounting - Photocell by others **ML Multi-Level** - Refer to ML spec sheet for details

* Available on luminaires with 20–160 LEDs
** Available on luminaires with 20–60 LEDs

Rev. Date: 8/14/2012

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weather-tight LED driver compartments and high performance heat sinks
- Adjustable mounting arm is rugged die cast aluminum and mounts to 2" (51mm) IP (2.375" [60mm] O.D.) tenon
- Includes leaf/debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weather-tight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS

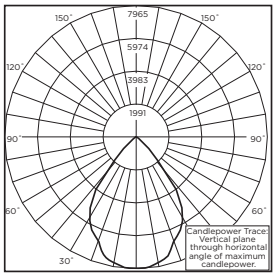
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium (“DLC”) Qualified Products List (“QPL”) when ordered without the backlight control shield
- RoHS Compliant
- Meets Buy American requirements within ARRA

PATENTS

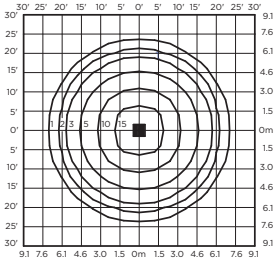
- Visit website for patents that cover these products: Patents http://www.cree.com/patents

Photometry

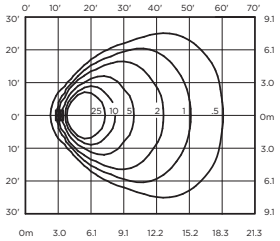
All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.



ITL Test Report #: 71844
FLD-EDG-70-**-06-D-UL-700-40K
Initial Delivered Lumens: 10,384



FLD-EDG-70-**-06-D-UL-700
Mounting Height: 20′ (6.1m) A.F.G.
Initial Delivered Lumens: 10,317
0˚ Tilt
Initial FC at grade



FLD-EDG-70-**-06-D-UL-700
Mounting Height: 10′ (3.0) A.F.G.
Initial Delivered Lumens: 10,317
60˚ Tilt
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

70˚ Flood Distribution										
LED Count (x10)	5700K Initial Delivered Lumens	4000K Initial Delivered Lumens	System Watts 120–480V	TOTAL CURRENT 120V	208V	240V	277V	347V	480V	50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)*
350mA @ 25˚C (77˚F)										
02	2,037	1,878	26	0.20	0.13	0.11	0.10	0.09	0.07	93%
04	4,075	3,755	47	0.40	0.24	0.21	0.19	0.15	0.12	
06	6,033	5,561	68	0.58	0.34	0.30	0.26	0.20	0.16	
08	8,044	7,414	90	0.77	0.44	0.38	0.34	0.26	0.20	
10	10,030	9,244	111	0.95	0.55	0.47	0.42	0.32	0.24	
12	12,036	11,093	132	1.15	0.66	0.56	0.50	0.38	0.28	
14	13,979	12,883	157	1.34	0.78	0.67	0.61	0.47	0.35	
16	15,975	14,724	179	1.54	0.89	0.76	0.68	0.53	0.39	
20	19,969	18,405	221	1.92	1.10	0.95	0.84	0.65	0.48	
24	23,963	22,086	264	2.30	1.31	1.12	1.00	0.77	0.56	
525mA @ 25˚C (77˚F)										
02	2,852	2,629	37	0.31	0.19	0.17	0.16	0.12	0.10	92%
04	5,705	5,258	70	0.57	0.33	0.29	0.26	0.21	0.16	
06	8,447	7,785	102	0.87	0.50	0.44	0.39	0.30	0.22	
08	11,262	10,380	133	1.14	0.65	0.56	0.49	0.39	0.29	
10	14,042	12,942	172	1.47	0.85	0.75	0.67	0.51	0.38	
12	16,851	15,530	204	1.76	1.01	0.88	0.78	0.60	0.44	
14	19,570	18,037	233	2.01	1.14	0.99	0.87	0.69	0.51	
16	22,366	20,613	265	2.29	1.29	1.11	0.98	0.78	0.57	
700mA @ 25˚C (77˚F)										
02	3,484	3,211	50	0.42	0.25	0.22	0.20	0.15	0.12	90%
04	6,968	6,422	93	0.79	0.45	0.40	0.35	0.27	0.20	
06	10,317	9,508	137	1.18	0.67	0.59	0.51	0.39	0.29	

* Projected L_{70} (10K) Hours: > 60,000. For recommended lumen maintenance factor data see TD-13

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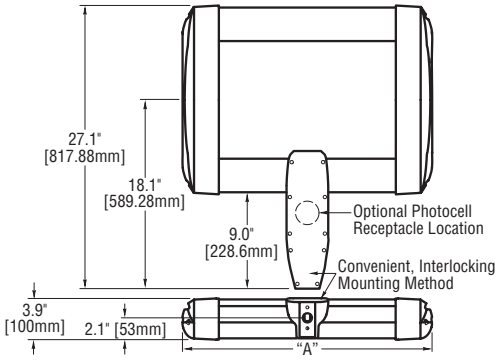
ARE-EDG-3M-DA THE EDGE® LED Area Light – Type III Medium

Rev. Date: 8/23/11

Reset

Notes:



# of LEDs	Dim. "A"
20	12.06" [306mm]
40	12.06" [306mm]
60	14.06" [357mm]
80	16.06" [408mm]
100	18.06" [459mm]
120	20.06" [510mm]
140	22.06" [560mm]
160	24.06" [611mm]
200	28.06" [713mm]
240	32.06" [814mm]

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current Not Field Adjustable	Factory-Installed Options Please type additional options in manually on the lines provided above.
ARE	**EDG**	**3M**[1]	**DA**[3]	**02**	**D**	**UL**	**SV**	**350**	**43K** 4300K Color Temperature[6]
		3MB[2]		04		Universal	Silver	350mA	**DIM** 0–10V Dimming[7,8,9]
				06		120–277V	**BK**	**525**[4]	**F** Fuse[10,11,12]
				08		**UH**	Black	525mA	**HL** Hi/Low (175/350/525, dual circuit input)[13]
				10		Universal	**BZ**	**700**[5]	**P** Photocell[12,14]
				12		347–480V	Bronze	700mA	**R** NEMA Photocell Receptacle[12,15,16]
				14		**34**	**PB**		**ML** Multi-Level (75/525)[13]
				16		347V	Platinum		
				20			Bronze		
				24			**WH**		
							White		

Footnotes

1. IESNA Type III Medium distribution
2. IESNA Type III Medium distribution w/ backlight control
3. Direct mounting arm for use with 3–6" (76–152mm) square or round pole
4. Available on fixtures with 20–160 LEDs
5. Available on fixtures with 20–60 LEDs
6. Color temperature per fixture; 6000K standard; minimum 70 CRI
7. Control by others
8. Refer to dimming spec sheet for availability and additional information
9. Not available when UH voltage is selected
10. When code dictates fusing use time delay fuse
11. Not available with all multi-level options. Refer to the multi-level spec sheet for availability and additional information
12. Refer to multi-level spec sheet for availability and additional information
13. Must specify voltage other than UH
14. Intended for horizontal mounting
15. Photocell by others

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type III Medium @ 6000K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium w/ backlight control @ 6000K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium @ 4300K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium w/ backlight control @ 4300K	B	U	G	Rating**	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
350mA Fixture Operating at 25° C (77° F)																												
20	1,814 (02)	1	1	1		1,342 (02)	0	1	1		1,672 (02)	1	1	1		1,237 (02)	0	1	1		26	0.20	0.11	0.10	0.09	0.07	>150,000	
40	3,628 (04)	1	1	1		2,683 (04)	1	1	1		3,343 (04)	1	1	1		2,473 (04)	0	1	1		47	0.40	0.21	0.19	0.15	0.12	>150,000	
60	5,371 (06)	2	2	2		3,973 (06)	1	2	1		4,950 (06)	2	2	2		3,662 (06)	1	2	1		68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	7,161 (08)	2	2	2		5,298 (08)	1	2	2		6,600 (08)	2	2	2		4,882 (08)	1	2	1		90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	8,929 (10)	3	3	3		6,605 (10)	1	3	2		8,230 (10)	2	2	2		6,088 (10)	1	2	2		111	0.95	0.47	0.42	0.32	0.24	>150,000	93%
120	10,715 (12)	3	3	3		7,926 (12)	1	3	2		9,876 (12)	3	3	3		7,305 (12)	1	3	2		132	1.15	0.56	0.50	0.38	0.28	>150,000	
140	12,444 (14)	3	3	3		9,205 (14)	1	3	2		11,469 (14)	3	3	3		8,484 (14)	1	3	2		157	1.34	0.67	0.61	0.47	0.35	149,000	
160	14,222 (16)	3	3	3		10,520 (16)	1	3	2		13,108 (16)	3	3	3		9,696 (16)	1	3	2		179	1.54	0.76	0.68	0.53	0.39	149,000	
200	17,778 (20)	3	3	3		13,151 (20)	2	3	3		16,385 (20)	3	3	3		12,120 (20)	1	3	2		221	1.92	0.95	0.84	0.65	0.48	149,000	
240	21,333 (24)	3	3	3		15,781 (22)	2	3	3		19,662 (24)	3	3	3		14,544 (24)	2	3	3		264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)																												
20	2,539 (02)	1	1	1		1,878 (02)	0	1	1		2,340 (02)	1	1	1		1,731 (02)	0	1	1		37	0.31	0.17	0.16	0.12	0.10	136,000	
40	5,079 (04)	2	2	2		3,757 (04)	1	2	1		4,681 (04)	2	2	2		3,462 (04)	1	2	1		70	0.57	0.29	0.26	0.21	0.16	136,000	
60	7,520 (06)	2	2	2		5,562 (06)	1	2	2		6,930 (06)	2	2	2		5,127 (06)	1	2	1		102	0.87	0.44	0.39	0.30	0.22	129,000	
80	10,026 (08)	3	3	3		7,417 (08)	1	3	2		9,240 (08)	3	3	3		6,835 (08)	1	3	2		133	1.14	0.56	0.49	0.39	0.29	129,000	92%
100	12,501 (10)	3	3	3		9,247 (10)	1	3	2		11,521 (10)	3	3	3		8,523 (10)	1	3	2		172	1.47	0.75	0.67	0.51	0.38	128,000	
120	15,001 (12)	3	3	3		11,097 (12)	1	3	2		13,826 (12)	3	3	3		10,227 (12)	1	3	2		204	1.76	0.88	0.78	0.60	0.44	128,000	
140	17,422 (14)	3	3	3		12,888 (14)	2	3	2		16,057 (14)	3	3	3		11,878 (14)	1	3	2		233	2.01	0.99	0.87	0.69	0.51	123,000	
160	19,911 (16)	3	3	3		14,729 (16)	2	3	2		18,351 (16)	3	3	3		13,575 (16)	2	3	3		265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)																												
20	3,102 (02)	1	1	1		2,281 (02)	0	1	1		2,858 (02)	1	1	1		2,102 (02)	0	1	1		50	0.42	0.22	0.20	0.15	0.12	111,000	
40	6,203 (04)	2	2	2		4,562 (04)	1	2	1		5,717 (04)	2	2	2		4,204 (04)	1	2	1		93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60	9,185 (06)	3	3	3		6,754 (06)	1	3	2		8,465 (06)	2	3	2		6,225 (06)	1	2	2		137	1.18	0.59	0.51	0.39	0.29	111,000	

* For recommended lumen maintenance factor data see TD-13

** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

NOTE: All data subject to change without notice.

Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

ARE-EDG-3M-DA THE EDGE® LED Area Light – Type III Medium

Rev. Date: 8/23/11

General Description

Slim, low profile design minimizes wind load requirements. Fixture sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6" (76–152mm) square or round pole. Fixture is secured by two (2) 5/16-18 UNC bolts spaced on 2" (51mm) centers. Includes leaf/debris guard. Five year limited warranty on fixture.

Electrical

Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Units provided with integral 10kV surge suppression protection standard. Integral weather-tight electrical box with terminal strips (12Ga - 20Ga) for easy power hook-up. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations and enclosure rated IP66 per IEC 60529 when ordered without P or R options. Consult factory for CE Certified products. Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards.
Dark Sky Friendly. IDA Approved. RoHS Compliant.

Product qualified on the Design Lights Consortium ("DLC") Qualified Products List ("QPL") when ordered without backlight control shield.

Finish

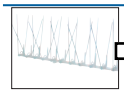
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Fixture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents

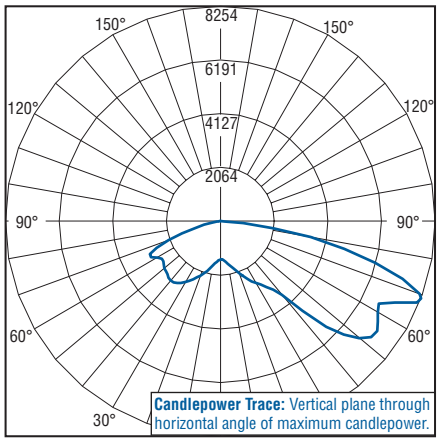
U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

Field-Installed Accessories

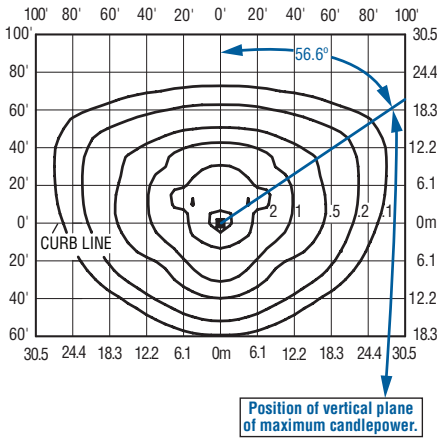


Bird Spikes
☐XA-BRDSPK

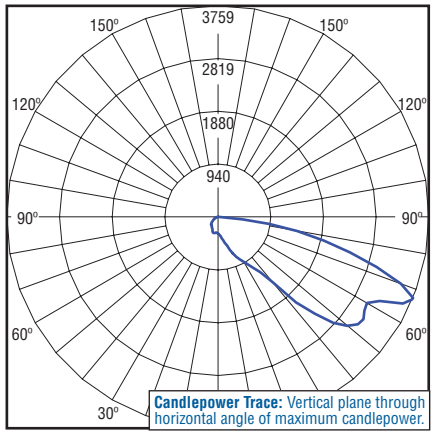
Photometrics



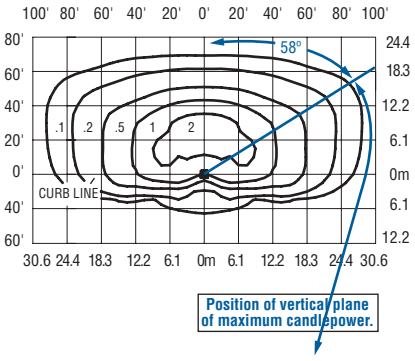
Independent Testing Laboratories certified test. Report No. ITL67871. Candlepower trace of 4300K, 160 LED Type III Medium area luminaire with 18,862 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4300K, 120 LED Type III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 13,826 initial delivered lumens operating at 525mA. Initial FC at grade.



Independent Testing Laboratories certified test. Report No. ITL68539. Candlepower trace of 4300K, 40 LED Type III Medium w/ backlight control area luminaire with 5,084 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4300K, 120 LED Type III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 10,227 initial delivered lumens operating at 525mA. Initial FC at grade.

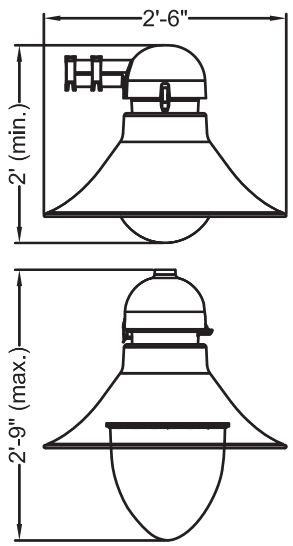
THE EDGE® EPA & Weight Calculations

# of LEDs	Approximate Weight 120–480V[1]	Single	2@ 180°	2@ 90°	3@ 90	4@ 90°
Fixed Arm Mount						
20	21.0 lbs. (9.5kg)	0.60	1.20	0.87	1.47	1.75
40	23.7 lbs. (10.8g)	0.60	1.20	0.87	1.47	1.75
60	27.0 lbs. (12.3kg)	0.60	1.20	0.92	1.51	1.83
80	28.1 lbs. (12.8kg)	0.60	1.20	0.96	1.55	1.91
100	32.3 lbs. (14.7kg)	0.60	1.20	1.00	1.60	2.00
120	33.5 lbs. (15.2kg)	0.60	1.20	1.04	1.64	2.08
140	36.9 lbs. (16.7kg)	0.60	1.20	1.08	1.68	2.16
160	41.4 lbs. (18.8kg)	0.60	1.20	1.12	1.72	2.24
200	43.3 lbs. (19.6kg)	0.61	1.21	n/a[2]	n/a[2]	n/a[2]
240	47.8 lbs. (21.7kg)	0.69	1.38	n/a[2]	n/a[2]	n/a[2]

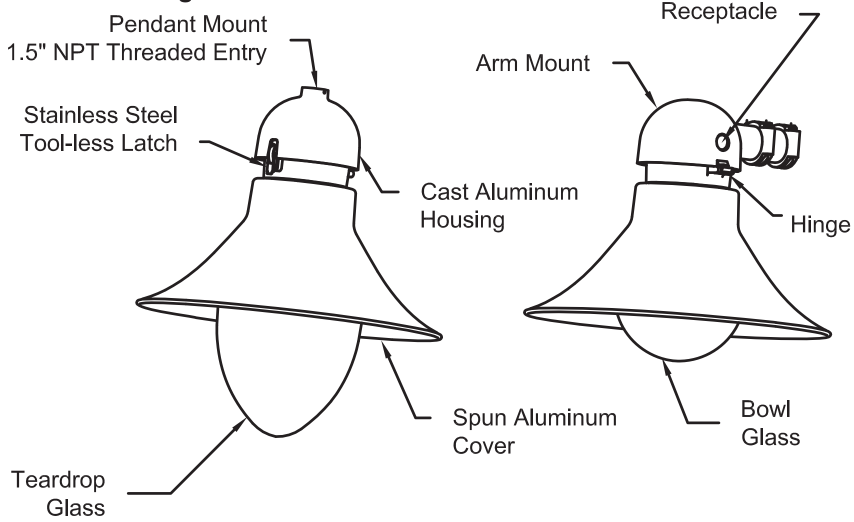
1. Add 5 lbs. (2.3kg) for transformer in 347–480V fixtures when multi-level options are selected.
2. For applications requiring 200 or more LEDs at 90 degrees refer to the DL mount version of our spec sheet.

NOTE: All data subject to change without notice.

Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.



Maximum Effective Projected Area - 1.6 ft²
Maximum Weight - 53 lbs.



ORDERING INFORMATION:

GPLB 050 4K AS 2 B 3

COVER TYPE
GPLB = Prague

SOURCE & WATTAGE
050 = 50W 350mA DRIVER
070 = 70W 350mA DRIVER
100 = 100W 350mA DRIVER

COLOR TEMP.
4K = 4000K
5K = 5000K
6K = 6000K

VOLTAGE
AS = AUTO-SENSING 120-277V
AH = AUTO-SENSING 347-480V

MOUNTING STYLE
1 = ARM
2 = PENDANT 1.5 NPT
3 = PENDANT 1.25 NPT

COLOR
A = AS SPECIFIED
B = BLACK
N = GREEN
Z = BRONZE
W - WHITE

OPTICS
3 = 4173 ASYMMETRIC BOWL GLASS
4 = 4094 ASYMMETRIC TEARDROP GLASS (NOT AVAILABLE WITH 6K CCT)
5 = 4175 SYMMETRIC BOWL GLASS

OPTIONS:
D = ROAM 0-10V DIMMING CONTROL
B = BI-LEVEL 0-10V DIMMING CONTROL
H = NEMA TWISTLOCK PHOTOCONTROL RECEPTACLE ONLY
DM = 0-10V DIMMING
PCS = DTL TWISTLOCK PHOTOCONTROL 120-277 VOLT
P34 = DTL TWISTLOCK PHOTOCONTROL 347V
P48 = DTL TWISTLOCK PHOTOCONTROL 480 VOLT
PSC = SHORTING CAP
L03 = 3 FEET OF PREWIRED LEADS
L10 = 10 FEET OF PREWIRED LEADS
L20 = 20 FEET OF PREWIRED LEADS
L25 = 25 FEET OF PREWIRED LEADS
L30 = 30 FEET OF PREWIRED LEADS

ACCESSORIES:
SPDPLUGIN = REPLACEMENT SURGE PROTECTOR 120-277V
SPDPLUGIN-48 = REPLACEMENT SURGE PROTECTOR 347-480V

GlasWerks® LED
Prague®

DESIGNER
OUTDOOR

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS
An AcuityBrands Company

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED. THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

ORDER #:
TYPE:
DRAWN: KRW
DATE: 10/25/11
DWG #: LUM_GPLB

1 of 2

Specifications

GENERAL DESCRIPTION
The Euro styled luminaire consists of a borosiliate glass optical assembly shielded by a decorative formed reflector and a top mounted cast aluminum electrical assembly with a circumferential 1-1/2 inch reveal.

OPTICAL ASSEMBLY
The optical assembly consists of a thermal resistant prismatic glass lens mechanically held in a formed aluminum door frame. The door frame is attached to the spun cover with screws. Light from the LED module is distributed by precisely molded optical interface to maximize utilization, uniformity and luminaire spacing. Multiple boards are available for symmetrical or asymmetric distribution with various wattages.

ELECTRICAL ASSEMBLY
The cast aluminum electrical housing, has a smooth domed contour. A terminal block is provided with a quick disconnect receptacle. The electrical housing is hinged with a tool-less latch to provide easy access to the gear assembly. The unitized electrical assembly, containing the electronic driver and other electrical components, plugs into the quick disconnect receptacle. The pendant mount version has a 1-1/2 inch circumferential reveal. This housing has an integral 1-1/2 inch NPT threaded entry with stainless steel set screw. The arm mount version is provided with two U-bolts with washers and nuts and two leveling set screws that lock the housing to a 2 inch nominal (2-3/8" O.D.) horizontal arm and allow a +/- 5 degree adjustment from horizontal to the cover.

ELECTRICAL DRIVER
(Refer to the drive specification sheet for operating characteristics)

FINISH
The luminaire is finished with polyester powder paint to insure maximum durability.

LISTING
The luminaire is CSA listed as suitable for wet locations up to 40° C ambient temperature. IP rated.

WARRANTY
Limmited warranty located at
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

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

Actual wattage may differ by +11% / -6% when operating between 120-480V +/- 10%.

Specification subject to change without notice.

GlasWerks® LED
Prague®

DESIGNER
OUTDOOR

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS
An AcuityBrands Company

ORDER #:
TYPE:
DRAWN: KRW
DATE: 10/25/11
DWG #: LUM_GPLB

6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

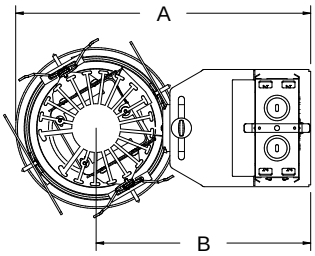
FIRM NAME:

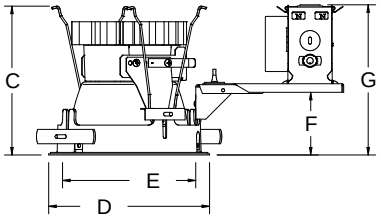
PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale





*Dimensions shown are for range of adjustability.

APPLICATIONS:

LiteFrame Retroficient RLF6LED is a 6" specification grade Retrofit LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

HOUSING:

All components are made from quality die cast aluminum or galvaneal steel. Pre-wired j-box with snap-on cover for easy access. Snap-in- connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

INSTALLATION:

All installation can be performed from below the ceiling without removing existing fixture.

REFLECTOR:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

LED LIGHT ENGINE:

The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>50,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

LED DRIVER:

The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DLM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V-277V. Optional Lutron Series A driver is also available.

DIMMING:

Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

CERTIFICATIONS:

CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

WARRANTY:

5 year warranty. See www.prescolite.com for details.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

ALTERNATIVE DIMMING TO 1%

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4** ❑ **RLF6LED6G4** ❑ **RLF6LED7G4**	❑ **120** ❑ **277**	❑ **HDM**[3] Lutron 3-wire Eco System to 1% ❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only) ❑ **DM1**[3] 0-10V dimming to 1% ❑ **SD**[1] Small Diameter

NOTES

1 See housing capability guide on page 3

2 Requires WT option also

3 For HDM, DM1, & 2DM options, housing output must match trim output

prescolite

A Division of Hubbell Lighting, Inc.

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.

Web: **www.prescolite.com** Tech Support: **(888) 777-4832**

RTF-014

PHOTOMETRIC DATA

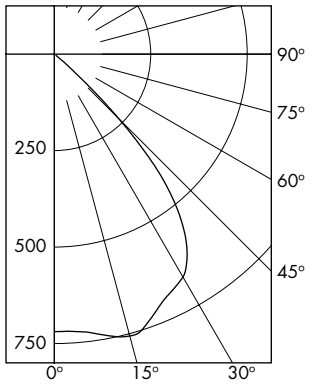
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
Fixture Delivered Lumens: 1157
Fixture Efficacy: 80.0
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	719	
5	722	69
15	756	212
25	692	321
35	597	365
45	236	181
55	4	8
65	0	0
75	0	0
85	0	0
90	0	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

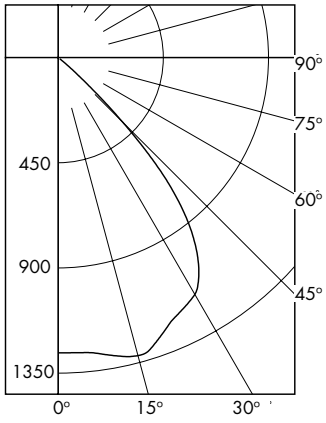
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K — Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	1263	
5	1267	122
15	1320	370
25	1212	561
35	1041	637
45	391	306
55	9	15
65	2	2
75	0	0
85	0	0
90	0	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

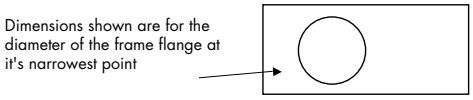
Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K — Test No. 8459

Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8



Central Inverters

For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. (Note: Not for use with integral EM option). For more information on LiteGear go to www.dual-lite.com/resources/litegear_luminaire_loading_chart/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

HDOT Phase 2

LIH – Lihue Airport

Proposed Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

PHILIPS

LED

InstantFit Lamps

Easily upgrade to LED from fluorescent.

Philips InstantFit LED T8 and 4-pin long compact lamps are an ideal energy saving choice for existing fluorescent fixtures.

Perfect for a wide range of applications

- Full light output in spaces with temperatures down to -4˚F (-20˚C)
- Perfect for applications with frequent “on/off” switching cycles
- Buildings that desire to be mercury free

Easy to experience

- Compatible with a wide range of ballasts that include instant-start and programmed-start; select models are compatible with dimming ballasts[1]
- Fits into existing linear fixtures
- Eliminates the need for rewiring and allows the fixture to maintain original UL and CSA compliance[2]

Energy savings

- 50% energy savings vs F32T8 electronic instant start systems[3]

Sustainable lighting solution

- No mercury allowing for non-hazardous waste disposal
- Emits virtually no UV rays or IR
- NSF Certified for use in food areas and refrigerated food displays
- 5-year limited warranty[4]

Footnotes on the page 3.

Philips InstantFit LED T8 Lamps

Ordering, Electrical and Technical Data (Subject to change without notice)

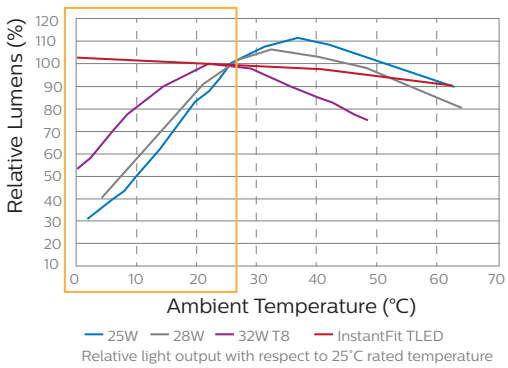
	Product No.	Model No.	Ordering Code	Volts (Depending on Ballast)	Base	CRI	Color Temp. (K)	Pkg Qty	Rated Avg. Life[5]	MOL (In.)	Beam Angle
	LED InstantFit T8 - 4'										
	45358-9	9290011239	12T8/48-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	48	160°
●	45359-7	9290011240	12T8/48-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	48	160°
●	45360-5	9290011241	12T8/48-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	48	160°
●	45361-3	9290011242	12T8/48-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	48	160°
	LED InstantFit T8 - 4' Dimmable[1] High Output										
●	45689-7	9290011585	15T8/48-3000 IF DIM 10/1	120-277, 347	G13	82	3000	10	50,000	48	160°
●	45690-5	9290011586	15T8/48-3500 IF DIM 10/1	120-277, 347	G13	82	3500	10	50,000	48	160°
●	45691-3	9290011587	15T8/48-4000 IF DIM 10/1	120-277, 347	G13	82	4000	10	50,000	48	160°
●	45692-1	9290011588	15T8/48-5000 IF DIM 10/1	120-277, 347	G13	82	5000	10	50,000	48	160°
	LED InstantFit T8 - 4' Ultra High Output										
●	46313-3	9290012267	16.5T8 LED/48-3500 IF 10/1 UHO	120-277, 347	G13	82	3500	10	70,000	48	160°
●	46314-1	9290012268	16.5T8 LED/48-4000 IF 10/1 UHO	120-277, 347	G13	82	4000	10	70,000	48	160°
●	46315-8	9290012269	16.5T8 LED/48-5000 IF 10/1 UHO	120-277, 347	G13	82	5000	10	70,000	48	160°
	LED InstantFit T8 - 4' Glass										
	45656-6	9290011511	17T8/48-4000 IFG 10/1	120-277, 347	G13	82	4000	10	36,000	48	240°
	45657-4	9290011512	17T8/48-5000 IFG 10/1	120-277, 347	G13	82	5000	10	36,000	48	240°
	LED InstantFit T8 - 3'										
	45205-2	9290011183	10.5T8/36-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	36	160°
	45206-0	9290011184	10.5T8/36-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	36	160°
	45207-8	9290011185	10.5T8/36-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	36	160°
	45208-6	9290011186	10.5T8/36-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	36	160°
	LED InstantFit T8 - 2' High Output										
	45201-1	9290011179	8.5T8/24-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	24	160°
●	45202-9	9290011180	8.5T8/24-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	24	160°
●	45203-7	9290011181	8.5T8/24-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	24	160°
●	45204-5	9290011182	8.5T8/24-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	24	160°
	LED InstantFit T8 U-Bent - 6" High Output										
	45266-4	9290011196	16.5T8/24-3000 IF-6U 10/1	120-277, 347	G13	82	3000	10	50,000	22.5	160°
	45267-2	9290011197	16.5T8/24-3500 IF-6U 10/1	120-277, 347	G13	82	3500	10	50,000	22.5	160°
	45268-0	9290011198	16.5T8/24-4000 IF-6U 10/1	120-277, 347	G13	82	4000	10	50,000	22.5	160°
	45269-8	9290011199	16.5T8/24-5000 IF-6U 10/1	120-277, 347	G13	82	5000	10	50,000	22.5	160°
	LED InstantFit 4-Pin long compact - 2' High Output										
	45663-2	9290011513	16.5PL-LED/24-3000 IF 10/1	120-277	2G11	82	3000	10	40,000	22.5	160°
	45664-0	9290011514	16.5PL-LED/24-3500 IF 10/1	120-277	2G11	82	3500	10	40,000	22.5	160°
	45665-7	9290011515	16.5PL-LED/24-4000 IF 10/1	120-277	2G11	82	4000	10	40,000	22.5	160°

Ballast Compatibility Guide

Please refer to www.philips.com/instantfit for instant start ballasts details and the latest ballast compatibility guide.

Relative Light Output vs. Ambient Temperature

4' T8 Lamps - 0.88 BF Ballast



Relative light output with respect to 25°C rated temperature

Suitable for use in fixtures where ambient temperature is between -4°F (-20°C) and 113°F (45°C).

Warning: Philips LED T8 InstantFit lamps will only operate properly on compatible Instant-start and Programmed-start ballasts. Please refer to the Philips LED T8 InstantFit Installation Guide, which can be obtained through your local Philips Sales Representative, or visit www.philips.com/instantfit

FCC Note: This device complies with Part 18 of the FCC Rules.

Philips InstantFit LED T8 Lamps

Ordering, Electrical and Technical Data (Subject to change without notice)

Product No.	Bare Lamp Watts (W)	Average System Watts (W)			Initial Lumens[6]		
		Low Ballast Factor (0.78)	Normal Ballast Factor (0.88)	High Ballast Factor (1.18)	Low Ballast Factor (0.78)	Normal Ballast Factor (0.88)	High Ballast Factor (1.18)
LED InstantFit T8 - 4'							
45358-9	12	12.5	14.5	18.5	1300	1500	1700
45359-7	12	12.5	14.5	18.5	1300	1500	1800
45360-5	12	12.5	14.5	18.5	1400	1600	1850
45361-3	12	12.5	14.5	18.5	1450	1600	2000
LED InstantFit T8 - 4' Dimmable[1] High Output							
45689-7	15	16	18	26.5	1800	2000	2700
45690-5	15	16	18	26.5	1800	2000	2700
45691-3	15	16	18	26.5	1900	2100	2800
45692-1	15	16	18	26.5	1900	2100	2800
LED InstantFit T8 - 4' Ultra High Output							
46313-3	16.5	18	20	27	2200	2400	2950
46314-1	16.5	18	20	27	2250	2500	3050
46315-8	16.5	18	20	27	2250	2500	3050
LED InstantFit T8 - 4' Glass							
45656-6	17	18.0	20.0	26.5	1850	2100	2450
45657-4	17	18.0	20.0	26.5	1850	2100	2450
LED InstantFit T8 - 3'							
45205-2	10.5	12.5	13	17	1000	1100	1330
45206-0	10.5	12.5	13	17	1050	1160	1400
45207-8	10.5	12.5	13	17	1080	1200	1440
45208-6	10.5	12.5	13	17	1150	1270	1550
LED InstantFit T8 - 2' High Output							
45201-1	8.5	10	10.5	14.5	860	950	1110
45202-9	8.5	10	10.5	14.5	900	1040	1170
45203-7	8.5	10	10.5	14.5	930	1050	1200
45204-5	8.5	10	10.5	14.5	1000	1100	1290
LED InstantFit T8 U-Bent - 6" High Output							
45266-4	16.5	17.5	19	25.5	1800	2000	2700
45267-2	16.5	17.5	19	25.5	1800	2000	2700
45268-0	16.5	17.5	19	25.5	1900	2100	2800
45269-8	16.5	17.5	19	25.5	1950	2150	2900
LED InstantFit 4-Pin long compact (PL-L) - 2' High Output							
45663-2	17	N/A	21	N/A	N/A	1900	N/A
45664-0	17	N/A	21	N/A	N/A	2000	N/A
45665-7	17	N/A	21	N/A	N/A	2100	N/A

1. Please refer to the InstantFit ballast compatibility guide @ www.philips.com/instantfit. Compatibility subject to change as additional ballasts are tested. If you do not see your ballast on the compatibility list please contact your local Philips Lighting representative.
2. Must follow guidelines for installation from Philips Quick Installation Guide included with lamp shipment.
3. (2) Lamp F32T8 Electronic Instant Start System with 0.88 Ballast Factor= 58 System Watts; (2) Philips LED T8 InstantFit =29 System Watts; 58 - 29 = 29 System Watts Saved; 29/58 = 50% Energy Saved.
4. See warranty for terms and conditions at www.philips.com/warranties.
5. Tested to B50 L70 requirements with a ballast whose ballast factor is ≤ 0.88.
6. Photometric testing consistent with IES LM-79.

● This lamp is DLC qualified.

System Power Compatibility Guide

This chart shows the measured system wattage of the Philips InstantFit TLED versus a comparable linear fluorescent lamp when used with the reference ballast.

	Reference Ballast	ICN-1P32-N	ICN-2P32-N	ICN-3P32-N	ICN-4P32-N
	Ballast Factor	0.88	0.88	0.88	0.88
	Number of Lamps	1	2	3	4

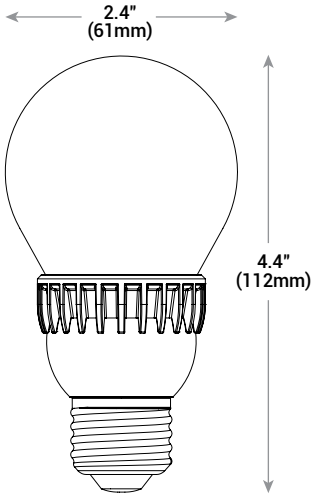
	Lamp Type	System Power (W)*			
Specification	F32T8	31	59	85	112
	InstantFit 12 W	12.5	27.5	40	58
	InstantFit 15 W	24	35.5	46	63

* Variance <10%

A19
LED Bulbs

Product Description

The Cree® LED A19 bulbs deliver up to 1100 lumens of warm 2700K light or cool 5000K light, while consuming at least 84% less energy than the incandescent bulbs they replace. These lamps feature a consistent and balanced omnidirectional light source within a real glass bulb, turn on instantly, and are compatible with most standard incandescent dimmers. Powered by Cree® LED Filament Tower™ Technology, the Cree® LED A19 bulbs are ENERGY STAR® qualified and are designed to last 25,000 hours.



Performance Summary

- Utilizes Cree LED Filament Tower™ Technology
- Made in the U.S.A. of U.S. and imported parts
- **Lamp Delivered Light Output:** 450 lumens (40W eq); 800 lumens (60W eq); 1,100 lumens (75W eq)
- **Input Power :** 6 watts (40W eq)
  9.5 watts (60W 2700K eq)
  9 watts (60W 5000K eq)
  13.5 watts (75W eq)
- **CRI:** 80
- **CCT:** 2700K, 5000K*
- **Limited Warranty†:** 3 years
- **Lifetime:** Designed to last at least 25,000 hours
- **Dimming:** Dimmable to 5% with select dimmers**
- Must order in multiples of master carton (MC) quantities

Ordering Information

Example: A19-60W-27K-T24

Click below to select Quick Ship products

QUICKSHIP™ A19-60W-27K-B1

For full list of Cree Quick Ship products visit www.cree.com/lighting/quickship

A19						
Product	**Watt Equivalent**	**CCT**	**Voltage**	**Base**	**CRI**	**Packaging Options**
A19	**40W** 40 Watt (450 lumens) **60W** 60 Watt (800 lumens) **75W** 75 Watt (1100 lumens)	**27K** 2700 Kelvin **50K*** 5000 Kelvin	**Blank** 120 Volt	**Blank** E26 (screw base)	**Blank** 80 CRI	**B1** (6) Blister Pack bulbs in master carton (MC=6) **T24 - 40W & 60W Equivalent** (24) Tray Pack bulbs in master carton (Bulk Pack) **T12 - 75W Equivalent** (12) Tray Pack bulbs in master carton (Bulk Pack)

† See www.cree.com/lighting/products/warranty for warranty terms
* Not available for A19 40W equivalent
**Reference www.cree.com/lighting for recommended dimming controls

Product Specifications

CONSTRUCTION & MATERIALS

- A-type bulb design weighs less than 4 ounces (113g) and uses a standard E26 screw base
- Silicon coated globe for increased safety
- Bulb meets ANSI standards for A19 dimensions
- Mercury free

OPTICAL SYSTEM

- Proprietary Cree LED Filament Tower™ creates perfect omnidirectional light distribution
- Glass globe offers increased optical spread

ELECTRICAL SYSTEM

- **Power Factor:** > 0.9 nominal
- **Input Voltage:** 120V
- Dimming: Dimmable to 5% with select dimmers
- Suitable for use in operating environments between -25˚C and +45˚C (-13˚F and +113˚F)

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for damp locations; not for use where exposed directly to weather or water
- Suitable for use in enclosed light fixtures
- **ENERGY STAR® qualified:**
  Please refer to http://www.energystar.gov/productfinder/product/certified-light-bulbs/results for most current information
  A19 40W (27K): BA19-04527OMF-12DE26-2U100
  A19 60W (27K): BA19-08027OMF-12DE26-2U100
  A19 60W (50K): BA19-08050OMF-12DE26-2U100
  A19 75W (27K): BA19-11027OMF-12DE26-1U100
  A19 75W (50K): BA19-11050OMF-12DE26-1U100

A19 B1
(6) Blister Pack bulbs in master carton (MC = 6)

A19 T24 - 40W & 60W Equivalents
(24) Tray Pack bulbs in master carton (Bulk Pack)

A19 T12 - 75W Equivalents
(12) Tray Pack bulbs in master carton (Bulk Pack)

Product Number	UPC	Description	Bulb Type	Watts	CCT	Lamps per Master Carton	Pallet Qty	CRI	Lumens	Rated Life (Hrs)
A19-40W-27K-B1*	810048028092	40W Warm White A19 Equivalent	A19	6W	2700K	6	480	80	450	25,000
A19-60W-27K-B1*	810048028108	60W Warm White A19 Equivalent	A19	9.5W	2700K	6	480	80	800	25,000
A19-60W-50K-B1*	810048028115	60W Daylight A19 Equivalent	A19	9W	5000K	6	480	80	800	25,000
A19-75W-27K-B1*	849665001133	75W Warm White A19 Equivalent	A19	13.5W	2700K	6	480	80	1,100	25,000
A19-75W-50K-B1*	849665001140	75W Daylight A19 Equivalent	A19	13.5W	5000K	6	480	80	1,100	25,000
A19-40W-27K-T24	810048028283	40W Warm White A19 Equivalent	A19	6W	2700K	24	1,296	80	450	25,000
A19-60W-27K-T24	810048028290	60W Warm White A19 Equivalent	A19	9.5W	2700K	24	1,296	80	800	25,000
A19-60W-50K-T24	810048028306	60W Daylight A19 Equivalent	A19	9W	5000K	24	1,296	80	800	25,000
A19-75W-27K-T12	849665001171	75W Warm White A19 Equivalent	A19	13.5W	2700K	12	130	80	1,100	25,000
A19-75W-50K-T12	849665001188	75W Daylight A19 Equivalent	A19	13.5W	5000K	12	130	80	1,100	25,000

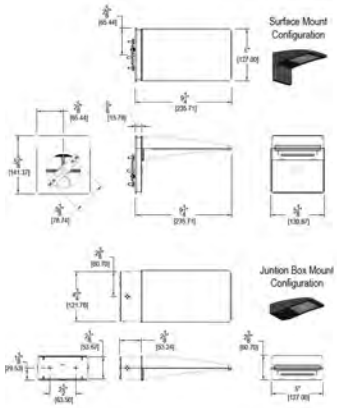
+ Must be ordered in quantities of 6

WPLED13N

LED 10W & 13 Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 3.3 lbs



LED Info

Watts:	13W
Color Temp:	4000K (Neutral)
Color Accuracy:	86
L70 Lifespan:	100000
LM79 Lumens:	673
Efficacy:	45 LPW

Driver Info

Type:	Constant Current
120V:	0.13A
208V:	0.08A
240V:	0.07A
277V:	0.06A
Input Watts:	15W
Efficiency:	87%

Technical Specifications

UL Listing:
Suitable for Wet Locations as a Downlight. Suitable for Damp Locations as an Uplight. Wall Mount only. Suitable for Mounting within 4ft. of ground.

Lumen Maintenance:
The LED will deliver 70% of its initial lumens at 100,000 hours of operation.

Cold Weather Starting:
The minimum starting temperature is -40°F/-40°C.

Ambient Temperature:
Suitable for use in 50°C (122°F) ambient temperatures.

Driver:
Multi-chip 13W high output long life LED Driver Constant Current, Class 2 100V - 277V, 50/60 Hz.

Surge Protection:
4KV

Color Temperature (Nominal CCT):
4000K

Fixture Efficacy:
44.6 Lumens per Watt

Color Accuracy:
86 CRI

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Color Consistency:
3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:
RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2008.

Green Technology:
RAB LEDs are Mercury and UV free.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

For use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:
The design of the LPACK is protected by U.S. Pat. D604,004 and patents pending in Canada, China and Taiwan.

California Title 24:
See WPLED13/PC for a 2013 California Title 24 compliant model.

IESNA LM-79 & IESNA LM-80 Testing:
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Gaskets:
High Temperature Silicone.

Tech Help Line: 888 RAB-1000 **Email:** sales@rabweb.com **On the web at:** www.rabweb.com

Note: Specifications are subject to change without notice

Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Equivalency:
The WPLED13 is Equivalent in delivered lumens to a 100W Metal Halide Wallpack.

HID Replacement Range:
The WPLED13 can be used to replace 70-150W Metal Halide Wallpacks based on delivered lumens.

Country of Origin:
Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:
This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:
Suitable in accordance with FAR Subpart 25.4.

WPLED18N

Ultra-high efficiency LED 18W wallpack. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 7.5 lbs

Project:	Type:
Prepared By:	Date:

Driver Info		LED Info	
Type:	Constant Current	Watts:	18W
120V:	0.17A	Color Temp:	4000K (Neutral)
208V:	0.11A	Color Accuracy:	84 CRI
240V:	0.09A	L70 Lifespan:	100,000
277V:	0.08A	Lumens:	1,655
Input Watts:	20W	Efficacy:	84 LPW
Efficiency:	91%		

Technical Specifications

Listings

UL Listing:

Suitable for wet locations. Suitable for mounting within 1.2m (4ft) of the ground.

IESNA LM-79 & LM-80 Testing:

RAB LED luminaries have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80, and have received the Department of Energy "Lighting Facts" label.

Dark Sky Approved:

The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

LED Characteristics

Lifespan:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

LED:

Multi-chip, high-output, long-life LED

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2011.

Electrical

Driver:

Constant Current, Class 2, 100-277V, 50/60 Hz, 4 kV surge protection, 500mA, 100-240VAC: 0.3-0.15A, 277VAC: 0.15A, Power Factor: 99%

THD:

9.8% at 120V

Construction

Ambient Temperature:

Suitable for use in 40°C (104°F) ambient temperatures.

Cold Weather Starting:

The minimum starting temperature is -40°F/-40°C.

Thermal Management:

Superior heat sinking with external Air-Flow fins

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contain no VOC or toxic heavy metals.

Reflector:

Semi-specular, vacuum-metalized polycarbonate

Gaskets:

High-temperature silicone gaskets

Housing:

Die-cast aluminum housing, lens frame and mounting arm

Mounting:

Heavy-duty mounting arm with "O" ring seal & stainless steel screws

Green Technology:

Mercury and UV free, and RoHS compliant. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

Optical

Replacement:

The WPLED18 replaces 150W Metal Halide Wallpacks.

BUG Rating:

B1 U0 G0

Other

California Title 24:

WPLED18 with available photocell options comply with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture ≤ 30 Watts. Add /PC, /PC2, /PCS or /PCS2 to RAB catalog number to add a photocell.

For Use on LEED Buildings:

IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:

The design of WPLED18 is protected by US patent D608,040, Canada patent 138280, and China patent CN301649064S.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Technical Specifications (continued)

Other

Country of Origin:

Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:

This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).

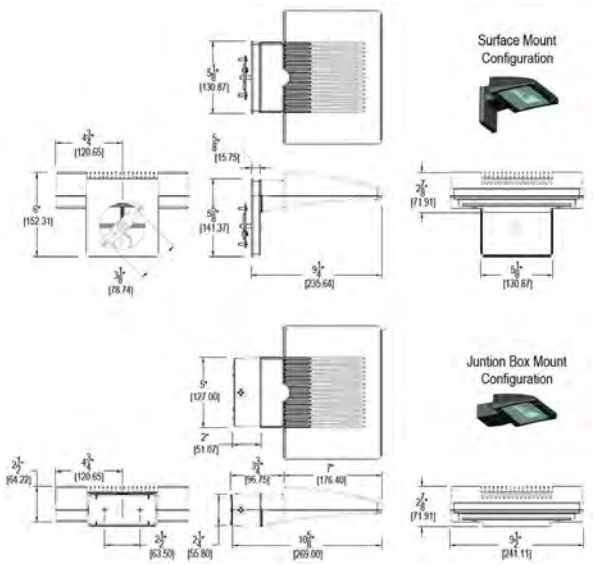
Trade Agreements Act Compliant:

This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:

Suitable in accordance with FAR Subpart 25.4.

Dimensions



Features

- Ultra-high efficiency LED 18 Watt wallpack
- Replaces 150W Metal Halide Wallpacks
- 100,00-Hour LED Lifespan
- 5-Year Warranty

Ordering Matrix

Family	Watts	Color Temp	Finish	Photocell
WPLED				
	18 = 18W	= Cool **Y** = Warm **N** = Neutral	= Bronze **W** = White	= No Photocell **/PC** = 120V Button **/PC2** = 277V Button

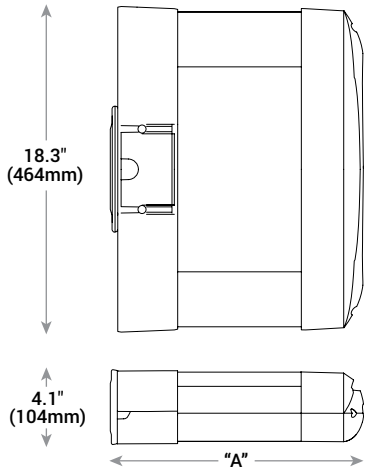
Cree Edge™ Series

LED Security Wall Pack Luminaire

Product Description

The Cree Edge™ wall mount luminaire has a slim, low profile design. The luminaire end caps are made from rugged die cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks specifically designed for LED applications. Housing is rugged aluminum. Includes a lightweight mounting box for installation over standard and mud ring single gang J-Boxes. Secures to wall with four 3/16" (5mm) screws (by others). Conduit entry from top, bottom, sides and rear. Allows mounting for uplight or downlight. Designed and approved for easy through-wiring. Includes leaf/debris guard.

Applications: General area and security lighting



Performance Summary

- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 4000K (+/- 300K), 5700K (+/- 500K) standard
- **Limited Warranty†:** 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

† See www.cree.com/lighting/products/warranty for warranty terms

Accessories

Field-Installed	
Bird Spikes XA-BRDSPK	**Hand-Held Remote** XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

LED Count (x10)	Dim. "A"	Weight
02	9.9" (251mm)	20 lbs. (9.1kg)
04	11.9" (303mm)	22 lbs. (10.0kg)
06	13.9" (353mm)	25 lbs. (11.3kg)
08	15.9" (404mm)	27 lbs. (12.2kg)
10	17.9" (455mm)	31 lbs. (14.1kg)
12	19.9" (505mm)	32 lbs. (14.5kg)

Ordering Information

Example: SEC-EDG-2M-WM-06-E-UL-SV-700

SEC-EDG		WM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
SEC-EDG	**2M** Type II Medium **2MB** Type II Medium w/BLS **2S** Type II Short **2SB** Type II Short w/BLS **3M** Type III Medium **3MB** Type III Medium w/BLS **4M** Type IV Medium **4MB** Type IV Medium w/BLS	**WM** Wall Mount	**02** **04** **06** **08** **10** **12**	**E**	**UL** Universal 120-277V **UH** Universal 347-480V **34** 347V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**350** 350mA **525** 525mA -Available with 20-80 LEDs **700** 700mA -Available with 20-60 LEDs	**DIM 0-10V Dimming** - Control by others - Refer to Dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - Refer to ML spec sheet for availability with ML options - Available with UL voltage only - When code dictates fusing, use time delay fuse **ML Multi-Level** - Refer to ML spec sheet for details - Intended for downlight applications of 0° tilt **P Photocell** - Refer to ML spec sheet for availability with ML options - Must specify UL or 34 voltage **PML Programmable Multi-Level** - Refer to PML spec sheet for details - Intended for downlight applications of 0° tilt **40K 4000K Color Temperature** - Minimum 70 CRI - Color temperature per luminaire

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartment and high performance aluminum heat sinks specifically designed for LED applications
- Housing is rugged aluminum
- Furnished with low copper, light weight mounting box designed for installation over standard and mud ring single gang J-Boxes
- Luminaire can also be direct mounted to a wall and surface wired
- Secures to wall with four 3/16" (5mm) screws (by others)
- Conduit entry from top, bottom, sides, and rear
- Allows mounting for uplight or downlight
- Designed and approved for easy through-wiring
- Includes leaf/debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Black, bronze, silver and white are available
- **Weight:** See Dimensions and Weight Chart on page 1

ELECTRICAL SYSTEM

- **Input Voltage:** 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight J-Box with leads (wire nuts) for easy power hook up
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used
- **Maximum 10V Source Current:** 20 LED (350mA): 10mA; 20LED (525 & 700 mA) and 40-120 LED: 0.15mA

REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Meets FCC Part 15 standards for conducted and radiated emissions
- Enclosure rated IP66 per IEC 60529 when ordered without P, PML or ML options
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- DLC qualified. Exceptions apply when ordered with full backlight control. Please refer to www.designlights.org/QPL for most current information
- Dark Sky Friendly, IDA Approved. Please refer to www.darksky.org/ for most current information
- Meets Buy American requirements within ARRA

Electrical Data*

LED Count (x10)	System Watts 120-480V	Total Current					
		120V	208V	240V	277V	347V	480V
350mA							
02	25	0.21	0.13	0.11	0.10	0.08	0.07
04	46	0.36	0.23	0.21	0.20	0.15	0.12
06	66	0.52	0.31	0.28	0.26	0.20	0.15
08	90	0.75	0.44	0.38	0.34	0.26	0.20
10	110	0.92	0.53	0.47	0.41	0.32	0.24
12	130	1.10	0.63	0.55	0.48	0.38	0.28
525mA							
02	37	0.30	0.19	0.17	0.16	0.12	0.10
04	70	0.58	0.34	0.31	0.28	0.21	0.16
06	101	0.84	0.49	0.43	0.38	0.30	0.22
08	133	1.13	0.66	0.58	0.51	0.39	0.28
700mA							
02	50	0.41	0.25	0.22	0.20	0.15	0.12
04	93	0.78	0.46	0.40	0.36	0.27	0.20
06	134	1.14	0.65	0.57	0.50	0.39	0.29

* Electrical data at 25˚C (77˚F)

Recommended Cree Edge™ Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
5˚C (41˚F)	1.04	0.99	0.97	0.95	0.93
10˚C (50˚F)	1.03	0.98	0.96	0.94	0.92
15˚C (59˚F)	1.02	0.97	0.95	0.93	0.91
20˚C (68˚F)	1.01	0.96	0.94	0.92	0.90
25˚C (77˚F)	1.00	0.95	0.93	0.91	0.89

[1] Lumen maintenance values at 25˚C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
[2] In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)
[3] In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing ((DUT) i.e. the packaged LED chip)

ARE-EDG-3M-DA

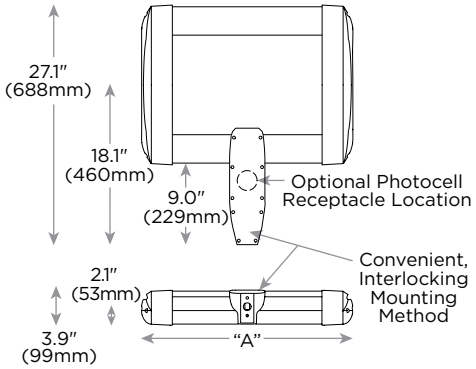
Cree Edge™ Area Luminaire – Type III Medium – Direct Arm Mount

Product Description

Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6" (76–152mm) square or round pole. Luminaire is secured by two 5/16-18 UNC bolts spaced on 2" (51mm) centers.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish
- **EPA and Weight:** Reference EPA and Weight spec sheet



LED Count (x10)	Dim. "A"
04	12.1" (306mm)
06	14.1" (357mm)
08	16.1" (408mm)
10	18.1" (459mm)
12	20.1" (510mm)
14	22.1" (560mm)
16	24.1" (611mm)
20	28.1" (713mm)
24	32.1" (814mm)

Accessories

Field Installed Accessories
XA-BRDSPK Bird Spikes

Ordering Information

Example: ARE-EDG-3M-DA-04-E-UL-SV-350-OPTIONS

ARE-EDG	3M	DA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	3M Type III Medium	DA Direct Arm	04 06 08 10 12 14 16 20 24 2	E	UL Universal 120–277V UH Universal 347–480V 34 347V	SV Silver (Standard) BK Black BZ Bronze PB Platinum Bronze WH White	350* 350mA 525** 525mA 700*** 700mA	40K 4000K Color Temperature - Color temperature per luminaire DIM 0–10V Dimming - Control by others - Refer to dimming spec sheet for details - Can't exceed specified drive current F Fuse - When code dictates fusing, use time delay fuse - Not available with all ML options. Refer to ML spec sheet for availability with ML options HL Hi / Low (175 / 350 / 525 Dual Circuit Input) - Refer to ML spec sheet for details - Sensor not included P Photocell - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Must specify voltage other than UH R NEMA Photocell Receptacle - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Photocell by others ML Multi-Level - Refer to ML spec sheet for details

† See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartments and high performance heat sinks
- Convenient interlocking mounting method. Mounting housing is rugged die cast aluminum mounting to 3–6" (76–152mm) square or round pole, secured by two 5 / 16-18 UNC bolts spaced on 2" (51mm) centers
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

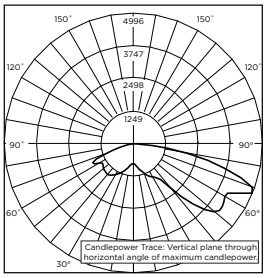
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

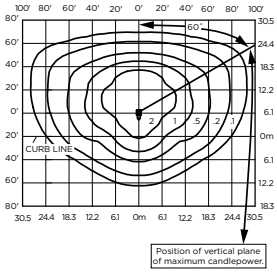
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ ("DLC") Qualified Products List ("QPL") when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.





CSA Test Report #: 6401
ARE-EDG-3M-**-06-E-UL-700-40K
Initial Delivered Lumens: 10,657

ARE-EDG-3M-**-12-E-UL-525-40K
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 16,790
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type III Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15°C (59°F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25°C (77°F)												
06	6,242	B2 U0 G2	6,011	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,323	B2 U0 G2	8,015	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,379	B3 U0 G3	9,994	B3 U0 G3	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	12,454	B3 U0 G3	11,993	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	14,438	B3 U0 G3	13,903	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	16,501	B3 U0 G3	15,889	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	20,626	B3 U0 G3	19,862	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	24,751	B4 U0 G4	23,834	B4 U0 G4	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25°C (77°F)												
04	5,893	B2 U0 G2	5,675	B2 U0 G2	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	8,739	B2 U0 G2	8,415	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	11,652	B3 U0 G3	11,220	B3 U0 G3	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	14,530	B3 U0 G3	13,992	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	17,436	B3 U0 G3	16,790	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	20,213	B3 U0 G3	19,465	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	23,101	B3 U0 G3	22,245	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25°C (77°F)												
04	7,198	B2 U0 G2	6,932	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	10,674	B3 U0 G3	10,279	B3 U0 G3	134	1.14	0.65	0.57	0.50	0.39	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 150,000 hours.

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

ARE-EDG-3M-AA

Cree Edge™ Area Luminaire – Type III Medium – Adjustable Arm Mount

Product Description

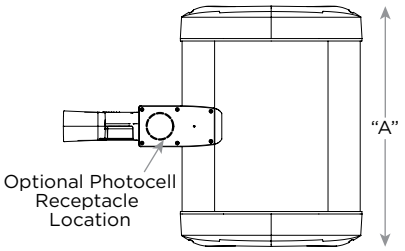
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2" (51mm) IP, 2.375" (60mm) O.D. tenon. Includes leaf / debris guard.

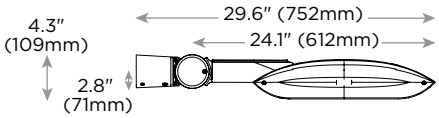
Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish
- **EPA and Weight:** Reference EPA and Weight spec sheet

Accessories

Field Installed Accessories
XA-BRDSPK Bird Spikes





LED Count (x10)	Dim. "A"
04	12.1" (306mm)
06	14.1" (357mm)
08	16.1" (408mm)
10	18.1" (459mm)
12	20.1" (510mm)
14	22.1" (560mm)
16	24.1" (611mm)
20	28.1" (713mm)
24	32.1" (814mm)

Ordering Information

Example: ARE-EDG-3M-AA-04-E-UL-SV-350-OPTIONS

ARE-EDG	3M	AA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	**3M** Type III Medium	**AA** Adjustable Arm	**04** **06** **08** **10** **12** **14** **16** **20** **24**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350*** 350mA **525**** 525mA **700***** 700mA	**40K 4000K Color Temperature** - Color temperature per luminaire **DIM 0–10V Dimming** - Control by others - Refer to dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - When code dictates fusing, use time delay fuse - Not available with all ML options. Refer to ML spec sheet for availability with ML options **HL Hi / Low (175 / 350 / 525 Dual Circuit Input)** - Refer to ML spec sheet for details - Sensor not included **P Photocell** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Must specify voltage other than UH **R NEMA Photocell Receptacle** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Intended for downlight applications at 0˚ tilt - Photocell by others **ML Multi-Level** - Refer to ML spec sheet for details

† See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartments and high performance heat sinks
- Adjustable mounting arm is rugged die cast aluminum and mounts to 2" (51mm) IP, 2.375" (60mm) O.D. tenon
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

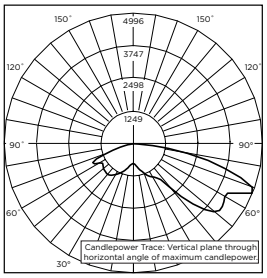
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

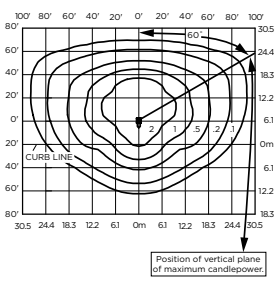
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ ("DLC") Qualified Products List ("QPL") when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.





CSA Test Report #: 6401
ARE-EDG-3M-**-06-E-UL-700-40K
Initial Delivered Lumens: 10,657

ARE-EDG-3M-**-12-E-UL-525-40K
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 16,790
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type III Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
06	6,242	B2 U0 G2	6,011	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,323	B2 U0 G2	8,015	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,379	B3 U0 G3	9,994	B3 U0 G3	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	12,454	B3 U0 G3	11,993	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	14,438	B3 U0 G3	13,903	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	16,501	B3 U0 G3	15,889	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	20,626	B3 U0 G3	19,862	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	24,751	B4 U0 G4	23,834	B4 U0 G4	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25˚C (77˚F)												
04	5,893	B2 U0 G2	5,675	B2 U0 G2	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	8,739	B2 U0 G2	8,415	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	11,652	B3 U0 G3	11,220	B3 U0 G3	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	14,530	B3 U0 G3	13,992	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	17,436	B3 U0 G3	16,790	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	20,213	B3 U0 G3	19,465	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	23,101	B3 U0 G3	22,245	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25˚C (77˚F)												
04	7,198	B2 U0 G2	6,932	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	10,674	B3 U0 G3	10,279	B3 U0 G3	134	1.14	0.65	0.57	0.50	0.39	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf. Vaild with no tilt.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 150,000 hours.

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

ARE-EDG-4M-DA

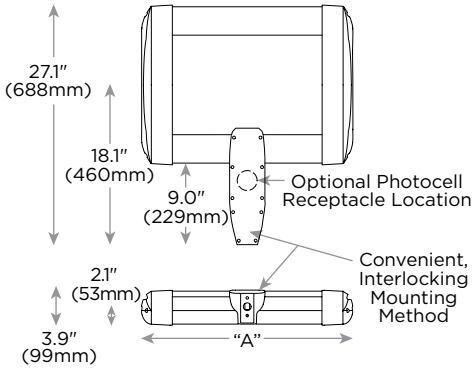
Cree Edge™ Area Luminaire – Type IV Medium – Direct Arm Mount

Product Description

Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6" (76–152mm) square or round pole. Luminaire is secured by two 5/16-18 UNC bolts spaced on 2" (51mm) centers.

Performance Summary

- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- **CRI:** Minimum 70 CRI
- **CCT:** 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
- **Limited Warranty†:** 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish
- **EPA and Weight:** Reference EPA and Weight spec sheet



LED Count (x10)	Dim. "A"
04	12.1" (306mm)
06	14.1" (357mm)
08	16.1" (408mm)
10	18.1" (459mm)
12	20.1" (510mm)
14	22.1" (560mm)
16	24.1" (611mm)
20	28.1" (713mm)
24	32.1" (814mm)

Accessories

Field Installed Accessories
XA-BRDSPK Bird Spikes

Ordering Information

Example: ARE-EDG-4M-DA-04-E-UL-SV-350-OPTIONS

ARE-EDG	4M	DA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	**4M** Type IV Medium	**DA** Direct Arm	**04** **06** **08** **10** **12** **14** **16** **20** **24**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350*** 350mA **525**** 525mA **700***** 700mA	**40K 4000K Color Temperature** - Color temperature per luminaire **DIM 0–10V Dimming** - Control by others - Refer to dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - When code dictates fusing, use time delay fuse - Not available with all ML options. Refer to ML spec sheet for availability with ML options **HL Hi / Low (175 / 350 / 525 Dual Circuit Input)** - Refer to ML spec sheet for details - Sensor not included **P Photocell** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Must specify voltage other than UH **R NEMA Photocell Receptacle** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Photocell by others **ML Multi-Level** - Refer to ML spec sheet for details

† See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartments and high performance heat sinks
- Convenient interlocking mounting method. Mounting housing is rugged die cast aluminum mounting to 3–6" (76–152mm) square or round pole, secured by two 5 / 16-18 UNC bolts spaced on 2" (51mm) centers
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM

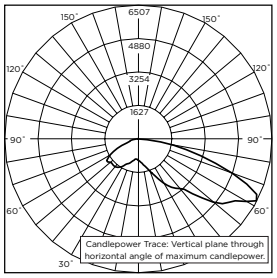
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

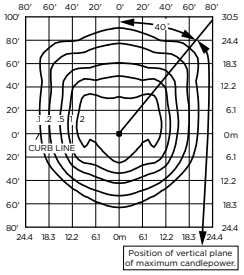
REGULATORY & VOLUNTARY QUALIFICATIONS

- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ ("DLC") Qualified Products List ("QPL") when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.





CSA Test Report #: 6438
ARE-EDG-4M-**-06-E-UL-700-40K
Initial Delivered Lumens: 11,367

ARE-EDG-4M-**-12-E-UL-525-40K
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 17,710
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type IV Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
06	6,584	B2 U0 G2	6,340	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,779	B2 U0 G2	8,454	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,947	B2 U0 G2	10,542	B2 U0 G2	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	13,137	B3 U0 G3	12,650	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	15,229	B3 U0 G3	14,665	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	17,405	B3 U0 G3	16,760	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	21,756	B3 U0 G3	20,950	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	26,107	B4 U0 G3	25,140	B4 U0 G3	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25˚C (77˚F)												
04	6,216	B2 U0 G2	5,986	B2 U0 G1	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	9,218	B2 U0 G2	8,876	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	12,290	B3 U0 G3	11,835	B3 U0 G2	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	15,326	B3 U0 G3	14,759	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	18,391	B3 U0 G3	17,710	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	21,321	B3 U0 G3	20,531	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	24,367	B4 U0 G3	23,464	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25˚C (77˚F)												
04	7,593	B2 U0 G2	7,311	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	11,259	B2 U0 G2	10,842	B2 U0 G2	134	1.14	0.65	0.57	0.50	0.39	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 150,000 hours.

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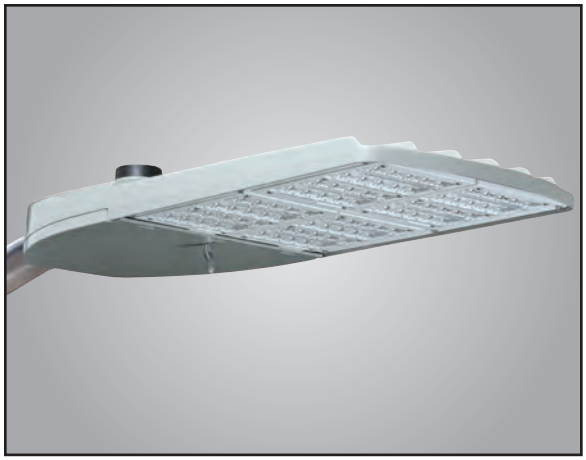
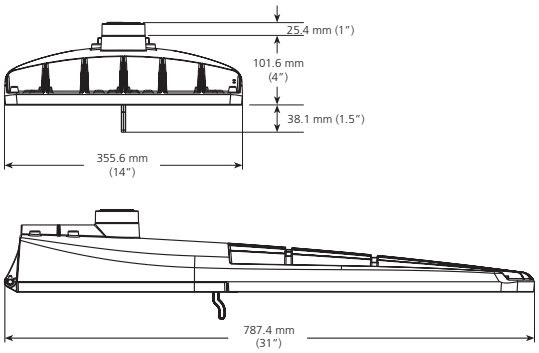
PRODUCT OVERVIEW



Applications:

Roadways
Off ramps
Residential streets
Parking lots

DIMENSIONS



Effective Projected Area (EPA)
The EPA for the ATB2 is 0.78 sq. ft.,
Approx. Wt. = 21 lbs. (9.53 kg)

Features:

OPTICAL

Same Light: Performance is comparable to 250-400W HPS roadway luminaires.

White Light: Correlated color temperature - standard 4000K, 70 CRI minimum or optional 5000K, 70 CRI minimum.

Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing.

Available in Type II, III, IV, & V roadway distributions.

ELECTRICAL

Expected Life: LED light engines are rated >100,000 hours at 25°C, L70. Electronic driver has an expected life of 100,000 hours at a 25°C ambient.

Lower Energy: Saves an average of 40-60% over comparable HPS platforms.

Robust Surge Protection: Three different surge protection options provide a minimum of IEEE/ANSI C62.41 Category C (10kV/5kA) protection. 20kV/10kA protection is also available.

MECHANICAL

Easy to Maintain: Includes standard AEL lineman-friendly features such as tool-less entry, 3 station terminal block and quick disconnects. Bubble level located inside the electrical compartment for easy leveling at installation.

Rugged die-cast aluminum housing is polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 1000 hours exposure to salt fog chamber (operated per ASTM B117) Optional Enhanced Corrosion Resistant finish (CR) increases the salt spray exposure to 5000 hours.

Four-bolt mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8" O.D.) diameter and provides a 3G vibration rating per ANSI C136.

Wildlife shield is cast into the housing (not a separate piece).

CONTROLS

NEMA 3 Pin photocontrol receptacle is standard, with the Acuity designed ANSI 5 Pin and 7 Pin receptacles optionally available.

Premium solid state locking sale photocontrol - PCSS (10 year rated life). Extreme long life sold state locking style photocontrol - PCLL (20 year rated life).

Mulit-level dimming available to provide scheduled dimming as specified by the customer.

Optional onboard Adjustable Output module allows the light output and input wattage to be modified to meet site specific requirements, and can also allow a single fixture to be flexibly applied in many different applications.

STANDARDS

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

Rated for -40°C to 40°C ambient.

CSA Certified to U.S. and Canadian standards

Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

ORDERING INFORMATION

Example: ATB2 40LEDE70 MVOLT R2

Series

ATB2 Autobahn LED Roadway

Performance Packages

40BLEDE70	40B Chips, 700mA Driver
40BLEDE10	40B Chips, 1050mA Driver
40BLEDE13	40B Chips, 1300mA Driver
40BLEDE15[1]	40B Chips, 1500mA Driver
60BLEDE70	60B Chips, 700mA Driver
60BLEDE85	60B Chips, 850mA Driver
60BLEDE10	60B Chips, 1050mA Driver
60BLEDE13	60B Chips, 1300mA Driver
80BLEDE70	80B Chips, 700mA Driver
80BLEDE85	80B Chips, 850mA Driver
80BLEDE10	80B Chips, 1050mA Driver

Voltage

MVOLT	Multi-volt, 120-277V
347	347V
480	480V

Optics

R2	Roadway Type II
R3	Roadway Type III
R4	Roadway Type IV
R5	Roadway Type V

Options

Color Temperature (CCT)

(Blank)	4000K CCT, 70 CRI Min. (Standard)
5K	5000K CCT, 70 CRI Min.

Paint

(Blank)	Gray (Standard)
BK	Black
BZ	Bronze
DDB	Dark Bronze
GI	Graphite
WH	White

Surge Protection

Blank	Standard 10kV/5kA SPD
20	20kV/10KA SPD
MP[1]	MOV Pack
IL[1]	SPD with Indicator Light

Terminal Block

(Blank)	Terminal Block (Standard)
T2	Wired to L1 & L2 Positions

Misc.

BL	External Bubble Level
CR	Enhanced Corrosion Resistant Finish
HS	House-Side Shield
NL	Nema Label
XL	Not CSA Certified
HK	Hingekeepers

Controls

(Blank)	3 Pin NEMA Photocontrol Receptacle (Standard)
P5[2]	5 Pin Photocontrol Receptacle (Dimmable Driver Included)
P7[2]	7 Pin Photocontrol Receptacle (Dimmable Driver Included)
NR	No Photocontrol Receptacle
AO[2]	Field Adjustable Output
DM	0V-10V Dimmable Driver (Controls by others)
ML[3,4]	Multi-Level Dimming
PCSS[1]	Solid State Lighting Photocontrol (120-277V)
PCLL	Solid State Long Life Photocontrol
SH	Shorting Cap

Packaging

(Blank)	Single Unit (Standard)
JP	Job Pack (24/Pallet)

Notes

1. Not available in 347 or 480V.
2. Not available with DM or ML options.
3. Not available with AO, DM, P5 or P7 options.
4. Dimming schedule and light level information required from the customer in order to configure product. Contact Infrastructure Technical Support to proceed.

Warranty Five-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx
Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Please contact your sales representative for the latest product information.

PERFORMANCE PACKAGE

Performance Package	Drive Current (mA)	Input Watts	Optic	4000K CCT		LLD @ 25°C	
				Delivered Lumens	Efficacy (LPW)	50k Hours	100k Hours
40B	700	91	R2	11266	124	0.98	0.96
	1000	138		15685	114	0.95	0.90
	1300	177		18277	103	0.94	0.88
	1500	204		20590	101	0.91	0.85
	700	91	R3	11160	123	0.98	0.96
	1000	138		15520	112	0.95	0.90
	1300	177		18050	102	0.94	0.88
	1500	204		20036	98	0.91	0.85
	700	91	R4	10775	118	0.98	0.96
	1000	138		15015	109	0.95	0.90
	1300	177		17341	98	0.94	0.88
	1500	204		19458	95	0.91	0.85
	700	91	R5	12097	133	0.98	0.96
	1000	138		16729	121	0.95	0.90
	1300	177		19564	111	0.94	0.88
	1500	204		21678	106	0.91	0.85
60B	700	133	R2	16986	128	0.98	0.96
	850	173		19966	115	0.95	0.90
	1000	208		23710	114	0.95	0.90
	1300	260		27308	105	0.94	0.88
	700	133	R3	17128	129	0.98	0.96
	850	173		20105	116	0.95	0.90
	1000	208		23250	112	0.95	0.90
	1300	260		27477	106	0.94	0.88
	700	133	R4	16516	124	0.98	0.96
	850	173		19429	112	0.95	0.90
	1000	208		22718	109	0.95	0.90
	1300	260		26400	102	0.94	0.88
	700	133	R5	17882	134	0.98	0.96
	850	173		21000	121	0.95	0.90
	1000	208		24673	119	0.95	0.90
	1300	260		28838	111	0.94	0.88
80B	700	180	R2	22528	125	0.98	0.96
	850	224		26394	118	0.95	0.90
	1000	274		30998	113	0.95	0.90
	700	180	R3	22127	123	0.98	0.96
	850	224		25955	116	0.95	0.90
	1000	274		30491	111	0.95	0.90
	700	180	R4	21701	121	0.98	0.96
	850	224		25350	113	0.95	0.90
	1000	274		29567	108	0.95	0.90
	700	180	R5	23799	132	0.98	0.96
	850	224		27851	124	0.95	0.90
	1000	274		32391	118	0.95	0.90

Note: Information shown above is based on nominal system data. Individual fixture performance may vary. Specifications subject to change without notice.

ATB2 LLD Multiplier	15°C	20°C	25°C	30°C	35°C	40°C
	1.02	1.01	1	0.99	0.97	0.96

To calculate the LLD for a temperature other than 25°C, multiply the LLD @ 25°C (shown in the performance package table) by the LLD multiplier for the selected temperature.

Warranty Five-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx
Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

Please contact your sales representative for the latest product information.

FIRSTLIGHT TECHNOLOGIES

Making Solar Lighting Simple™

PLB Series

Solar Powered LED Bollard

Project:

Type: Quantity:

The PLB series solar powered LED bollard is an ideal choice for low level architectural and commercial pathway and landscape lighting applications. Visual appeal combined with high quality construction and unequalled solar power performance make the PLB series an excellent fit where quality low level lighting is required.

Utilizing solar power and LED lighting the PLB bollards are fully self contained and offer significant benefits over typical wired bollards:

- Low installed costs and minimal site impacts with no trenching, cabling or wiring
- Minimal ongoing costs with no electricity bills or bulbs to change
- Immune from power outages
- Provide a visibly green statement with no ongoing carbon emissions

The performance of the PLB Series Solar LED Bollard is maximized through the use of proprietary Energy Management System (EMS) technology that allows the luminaire to function in harmony with its environment.

The EMS ensures that regardless of low-solar weather patterns or unusual charging conditions such as shading, the bollard continues to provide useable light that enhances the appeal and safety of the night time environment.

TECHNICAL SPECIFICATIONS

Solar Module:
- High impact, UV resistant, polycarbonate encapsulation
- High-efficiency mono-crystalline cells
- Integrated into bollard housing
- Used for day/night detection (no photocell required)

Energy Management System (EMS):
- High efficiency Maximum Power Point Tracking (MPPT) charge controller
- Micro-controller based technology
- Includes high-efficiency LED driver
- Integrated into bollard housing
- Designed to automatically manage lighting performance based on environmental conditions and lighting requirements
- Patent pending

Battery:
- Pure lead, spiral wound, absorbed glass mat (AGM)
- Superior cyclic performance
- High temperature tolerance
- 10 year design life
- Contained within bollard post
- Simple battery changes when required

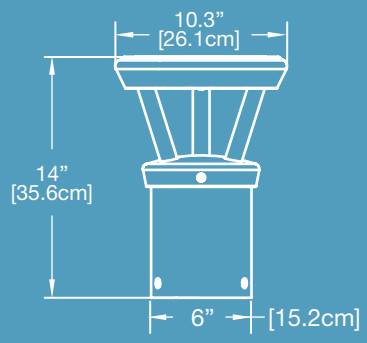
LEDs and Optics:
- Three high-output Cree LEDs
- 50,000 hour L70 lifetime
- Warm (3000K), neutral (4300K), cool (5500K) color temperatures available
- Type III and Type V high efficiency, cut-off optics
- Typical lumen output of 130 lumens

Mechanical Construction:
- Cast, low copper aluminum housing
- Extruded, low copper aluminum post
- Stainless fasteners with security fastener option
- High strength mounting plate
- Architectural grade, super durable, TGIC powder coat with Alodine undercoat
- Four standard colors with custom colors available

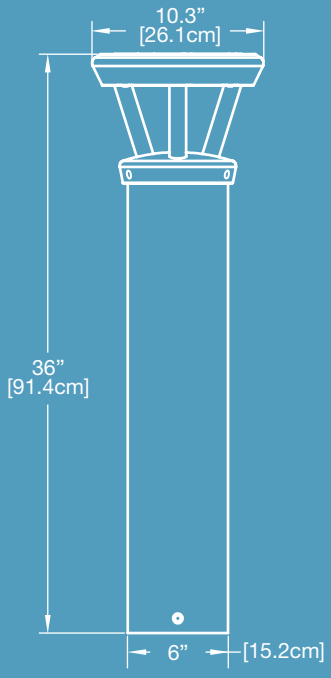
Factory Set Lighting Profiles:
- On at dusk off at dawn
- On at dusk, turn off after 6 hours
- On at dusk, dim to 30% after 6 hours till dawn
- On at dusk, off after 5 hours, on 1 hour before dawn
- On at dusk, dim to 30% after 5 hours, on 1 hour before dawn

FIRSTLIGHT TECHNOLOGIES
Making Solar Lighting Simple™

PLB Series
Solar Powered LED Bollard

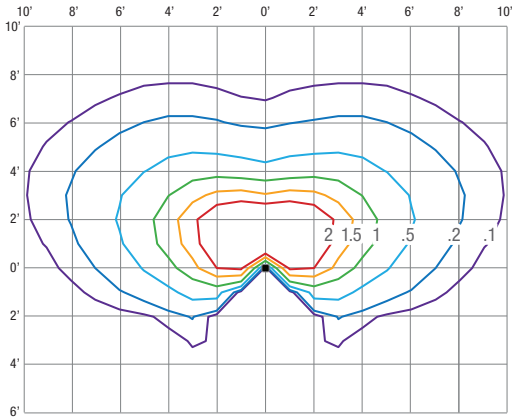


PLB – 101

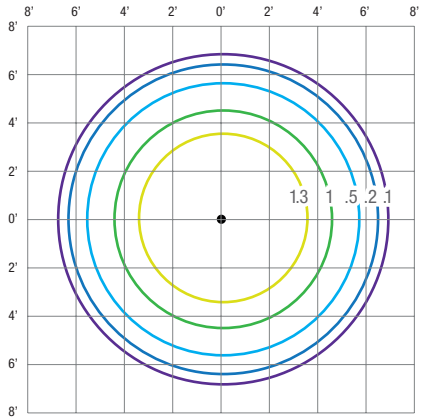


PLB – 102

PHOTOMETRICS



PLB - 102 Type III



PLB - 102 Type V

ORDER MATRIX

Series	Height	Finish	Distribution	LED Color	Lighting Profile	Options
PLB	**101** - 14”	**BK** - Black	**ASM** - Type III	**30K** - 3000K	**00** - Dusk till dawn	**WOB** - Ship Without Battery
	102 - 36”	**BZ** - Bronze	**SYM** - Type V	**43K** - 4300K	**01** - Dark +6 hours then off	**SEC** - Security Fasteners
		SV - Silver		**55K** - 5500K	**02** - Dark +6 hours then 30% (DEFAULT)	
		WH - White		**AMB** - Amber	**03** - Dark +5 hours, off, Dawn -1 hour	
		CC - Custom			**04** - Dark +5 hours, 30%, Dawn -1 hour	

Notes:
- Specifications subject to change without notice
- All light levels in foot candles (fc) with 4300K color temperature and 130 lumen output
- To convert to lux multiply light level by 10.7

6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

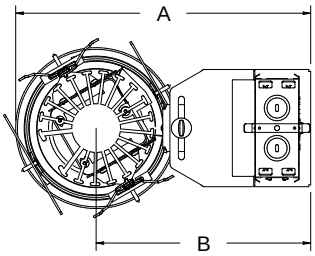
FIRM NAME:

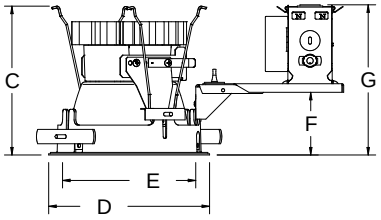
PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale





*Dimensions shown are for range of adjustability.

APPLICATIONS:

LiteFrame Retroficient RLF6LED is a 6" specification grade Retrofit LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

HOUSING:

All components are made from quality die cast aluminum or galvaneal steel. Pre-wired j-box with snap-on cover for easy access. Snap-in- connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

INSTALLATION:

All installation can be performed from below the ceiling without removing existing fixture.

REFLECTOR:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

LED LIGHT ENGINE:

The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>50,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

LED DRIVER:

The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DLM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V-277V. Optional Lutron Series A driver is also available.

DIMMING:

Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

CERTIFICATIONS:

CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

WARRANTY:

5 year warranty. See www.prescolite.com for details.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

ALTERNATIVE DIMMING TO 1%

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4**	❑ **120**	❑ **HDM**[3] Lutron 3-wire Eco System to 1%
❑ **RLF6LED6G4**	❑ **277**	❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only)
❑ **RLF6LED7G4**		❑ **DM1**[3] 0-10V dimming to 1%
		❑ **SD**[1] Small Diameter

NOTES

1 See housing capability guide on page 3

2 Requires WT option also

3 For HDM, DM1, & 2DM options, housing output must match trim output

prescolite

A Division of Hubbell Lighting, Inc.

PHOTOMETRIC DATA

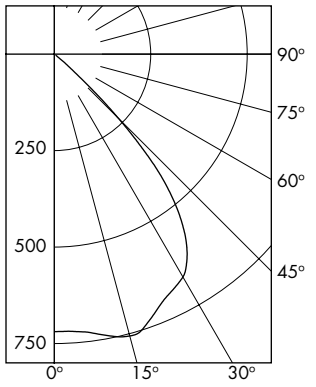
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
Fixture Delivered Lumens: 1157
Fixture Efficacy: 80.0
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	719	
5	722	69
15	756	212
25	692	321
35	597	365
45	236	181
55	4	8
65	0	0
75	0	0
85	0	0
90	0	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

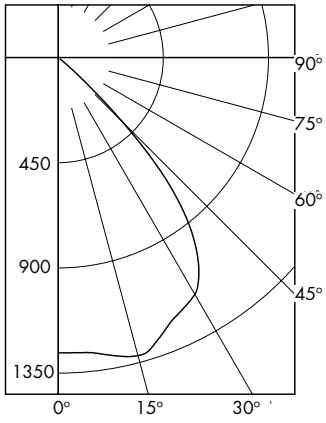
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K — Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
Spacing Criteria: 1.2



CANDELA DISTRIBUTION

DEG	CANDELA	LUMENS
0	1263	
5	1267	122
15	1320	370
25	1212	561
35	1041	637
45	391	306
55	9	15
65	2	2
75	0	0
85	0	0
90	0	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

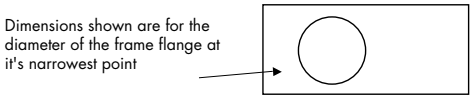
COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance: 80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K — Test No. 8459

Specifications subject to change without notice. • Printed in U.S.A. • RTF-014 • 6/4/15

Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8



Central Inverters

For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. (Note: Not for use with integral EM option). For more information on LiteGear go to www.dual-lite.com/resources/litegear_luminaire_loading_chart/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

FL57 SOLAR LED SIGN LIGHT SYSTEM (2 OR 3 FIXTURES)

BRAND: SOLAR ILLUMINATIONS

PRODUCT CODE: FL57

AVAILABILITY:

IN STOCK

AVAILABLE OPTIONS

*** Light Fixture Options:**

- ◯ 2 Lamp System
- ◯ 3 Lamp System .

*** Solar Panel Power:**

◯ **45 Watt**

◯ **70 Watt**

◯ **90 Watt**

◯ **100 Watt**

◯ **140 Watt**

*** Solar Charge Controller:**

◯ **12/24V PWM 10A**

◯ **12/24V MPPT 10A**

DESCRIPTION

This sign light system is supplied with two LED sign light fixtures supplied with a built-on 9" extension arm and adjustable lamp. Ideal for various types of signs requiring lighting from above. Illumination can be set for dusk to dawn or timed mode. Supplied as a complete system including all necessary components such as solar panel, battery, and charge controller.

This system consists of two light fixtures which are fitted with an adjustable lamp which provides up to 30 degrees of movement. The lamp has 18 LEDs which emit 150 Lumens of warm white light. This system is designed to typically operate from dusk till dawn each night using two lights, and up to 12 hours using three. For installations in locations that experience harsh winter weather, or low sun levels, a higher powered solar panel and/or an MPPT charge controller may be required. Fully automatic activation at dusk. The installer can set the programmable charge controller to switch the system off after a chosen amount of hours or enable it to run from dusk to dawn. Several programmable timed options are available. An MPPT charge controller can be purchased as an optional upgrade. The MPPT charge controller improves solar charging efficiency, and offers addition light control features including a dual timer setting. Supplied with a 45W solar panel which can be installed on the sign structure or nearby. A weatherproof battery box is included to facilitate the sealed battery which is recharged daily via the solar panel. The light fixture simply plugs into the battery box and comes pre-wired with plenty of cord and fitted with simple connections. Color of the light fixture is silver. Color of other parts of the system are gray. Color of light output is warm white.

POPULAR USES

This light is perfect for illuminating various types of signs from above. Our solar LED sign light systems are perfect for sites where electricity is unavailable or where it would be too difficult or costly to install an electric supply. They are also suitable for retro-fit applications where electrically powered lights are being removed in an effort to save money and no longer use the utility supply.

TECHNICAL SPECIFICATIONS

Performance
Manufactured in an ISO9001:2008 'Quality Assured' facility.
Each lamp can illuminate a sign up to 4' x 4' (1.2m x 1.2m).
This system can typically operate dusk to dawn each night with two light fixtures, and up to 12 hours using three.
Up to 3 days of autonomy (subject to time length of night time illumination and other factors).

Light Fixture
Two or three light fixtures are included in this system.
The light is fitted with 18 SMD/LEDs.
Each light emits 150 Lumens.
LED beam angle is approx. 60 degrees.
Warm white LED color temperature approx. 2700k.
The light is fitted with approximately 10' 10" (3m) of pre-wired cable which is pre-plugged ready for easy connection to the battery box.
Additional extension cable is available (upon request) as an option.
The light fixture is weather rated to I.P 65.
Lamp section dimensions 13.5" long x .5" wide (34cm x 1.5cm).
The extension arm is 9" long and 1.5" wide (23cm x 14cm).

Battery
Two 12 Volt 12 Amp-Hr sealed lead acid batteries are supplied.
Battery type is AGM. Gel battery is available by special order.

Battery Box
A plastic weatherproof battery box is supplied to accommodate the battery.
The battery box has a removable front which is lockable (padlock not included).
The battery box also houses the charge controller.
The battery box is approx. 10.5" x 8" x 5" (27cm x 20cm x 12cm) LxWxD.

Solar Panel
High quality, aluminium framed, powerful 45 Watt solar panel is included.
Higher powered solar panel options may be available. For help determining whether a solar panel upgrade is

necessary, please contact our customer service department.
Solar panel is supplied with approximately 18' (5.5m) of cable/cord. Additional cord is available as an optional extra.
The solar panel cord connects directly to the battery box.
The solar panel support is supplied with a fold-out 'U' shape bracket which can be used to mount it to a suitable surface.
The 45W solar panel dimensions approx. 34.25" x 20.13" x 1.5" (86.8cm x 51cm x 3.5cm) LxWxD.

Control Module
This system includes a programmable control module which regulates and manages the solar panel power, battery power, and illumination time.
The compact control module has LED indicators to display status, and houses connections for solar panel, batteries, and lamp.
User programmable illumination time of up to 1 to 12 hours or dusk-to-dawn setting (where conditions permit).
User or installer can set the control module to run from dusk and then shut off after a certain amount of hours.
Default setting is typically dusk to dawn.
Instructions are supplied should the user or installer need to program or re-program the module*.
An option to upgrade to an MPPT charge controller is available.
The MPPT charge controller improves solar charging efficiency by up to 30%.
The MPPT charge controller also offers the most advanced load control options and intelligent battery life management.

Installation
All connections are simply plug & play.

REMARKS

20 year solar panel warranty, 5 year warranty on all other components (excluding batteries). Batteries are covered by the manufacturer.* Warranty registration is required (after purchase), otherwise a base one year warranty will apply. Go to www.solarilluminations.com/registration to register your warranty.
Lifetime unlimited technical support.

Please Note: This product is a special order and is non-returnable except in the event of a fault (during its warranty period) when the product, once returned will be repaired or replaced.

The solar panel must be installed in a location where it can receive full direct sunshine (when available) and usually set facing South at an appropriate angle (where adjustment options allow). The solar panel must not be installed in a shaded or part shaded location and never indoors. The standard specifications of the system (particularly the solar panel Wattage and battery capacity) may need to be adjusted. These components are determined by your geographic location, power consumption (LED Wattage) and the total amount of hours of illumination time required. Such changes to the standard specifications may increase or decrease the cost shown. Please contact us for more information or assistance. The illumination time is estimated and subject to various factors including (but not limited to) geographic location, seasons, temperature, weather conditions & location of product etc. The illumination time of most solar lights can reduce during winter months when the

weather is poor and the days are shorter. During this time insolation hours decrease accordingly. Shorter illumination time due to one or more of the above factors does not define the product as being ‘defective’ or ‘not as described’. All solar lights must be used in a completely dark location at night time otherwise they may not illuminate. Nearby strong lighting sources or ambient lighting may affect the operation of a solar light. This does not define the product as being 'defective' or 'not as described'. Please note, if you do not install or use this product for several months the battery may discharge naturally on its own. By allowing a battery to deep discharge it may cause irreversible damage as the battery may then lose the ability to recharge or hold a full charge. Although unlikely, we reserve the right to supply this product with any minor alterations or minor changes to the specifications (shown above by text description or by photographs) due to different supplies or product batches received, incorporating such product changes made by the manufacturer, without further notice. Descriptions, specifications and photographs are updated regularly but may not be current when minor changes to a product have only recently been made.
* View our Terms, Conditions and Polices (including our Returns Policy) for further information.

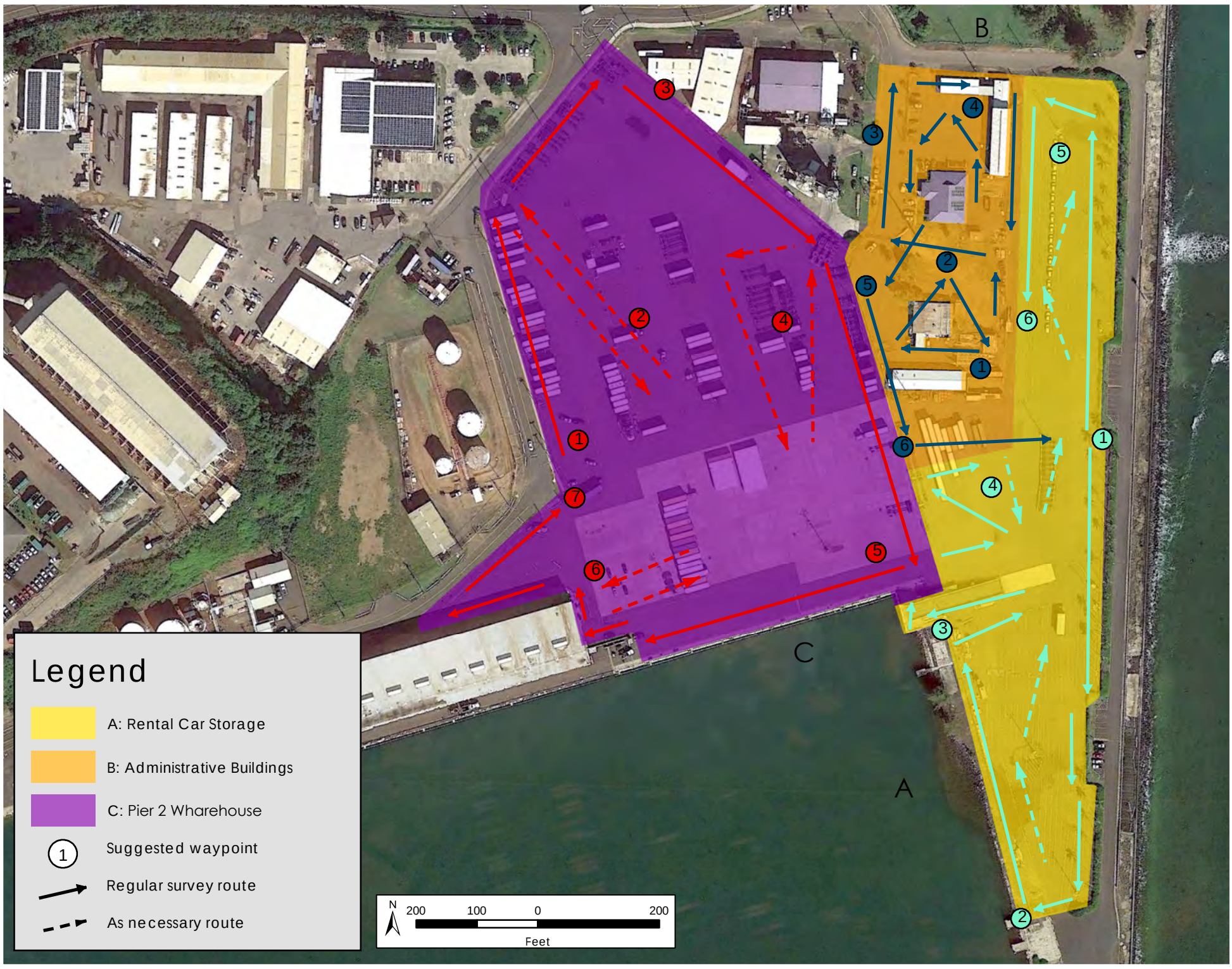
SPECIFICATION

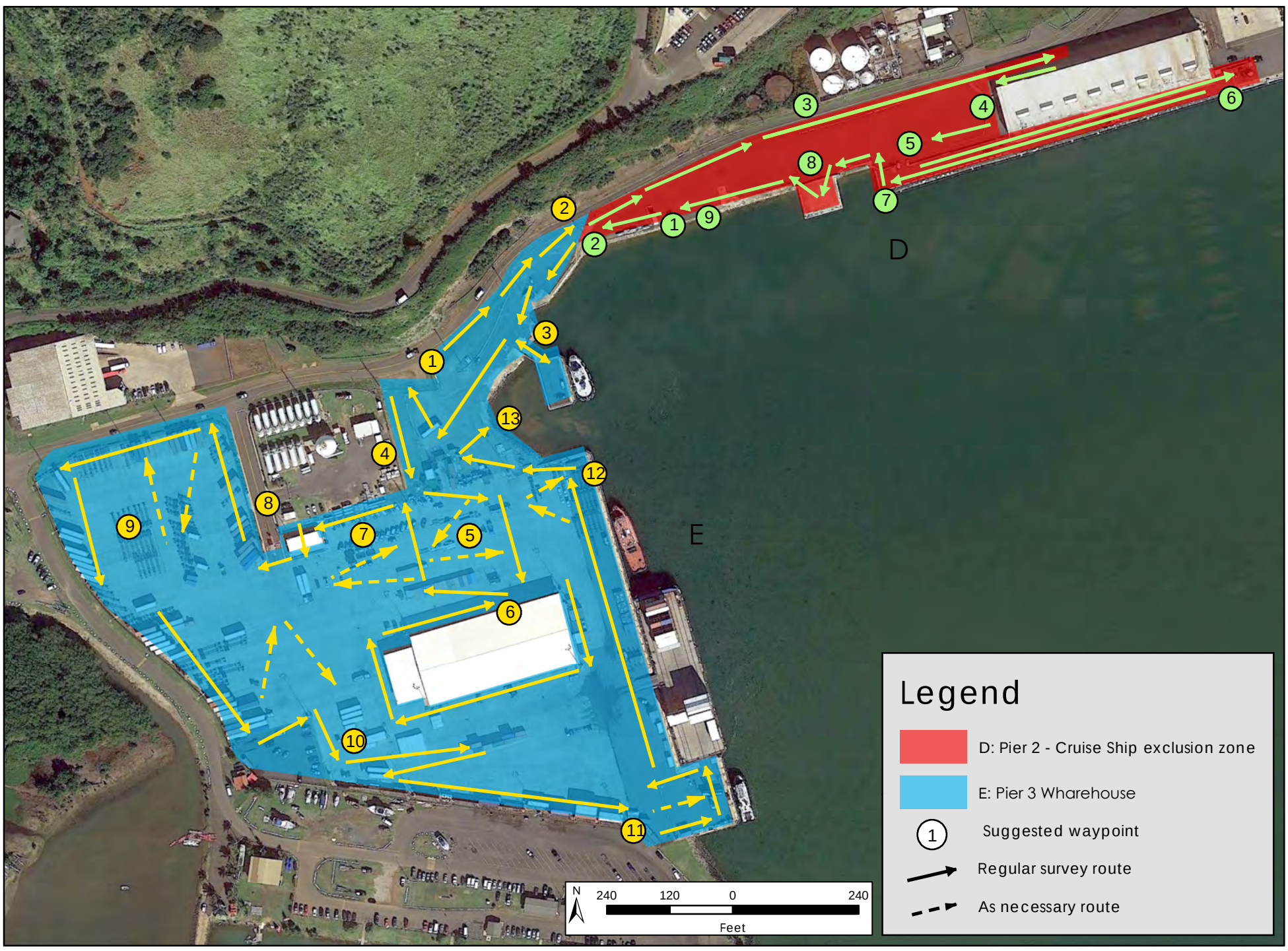
SOLAR LIGHTS DATA	
.	.
Lumen Output	150 Lumens per lamp.
Equivalent Incandescent Wattage	Approx. 25 Watts per lamp.
Approximate Illumination Time	Typically dusk to dawn.
Approximate Sign SIze	Up to 4' x 4' (1.2m x 1.2m).
Solar Panel Wattage	From 45 Watts.
Programable Controller	Yes.

TAGS:

Tags: FL57, Sign Light, Above Sign

Appendix B. Details of Monitoring Protocol, Data Collection Sheets, Instructions, and Maps of Survey Routes for the KSHCP Seabird Monitoring Program at Nawiliwili Harbor, Port Allen Harbor, and Lihue Airport.





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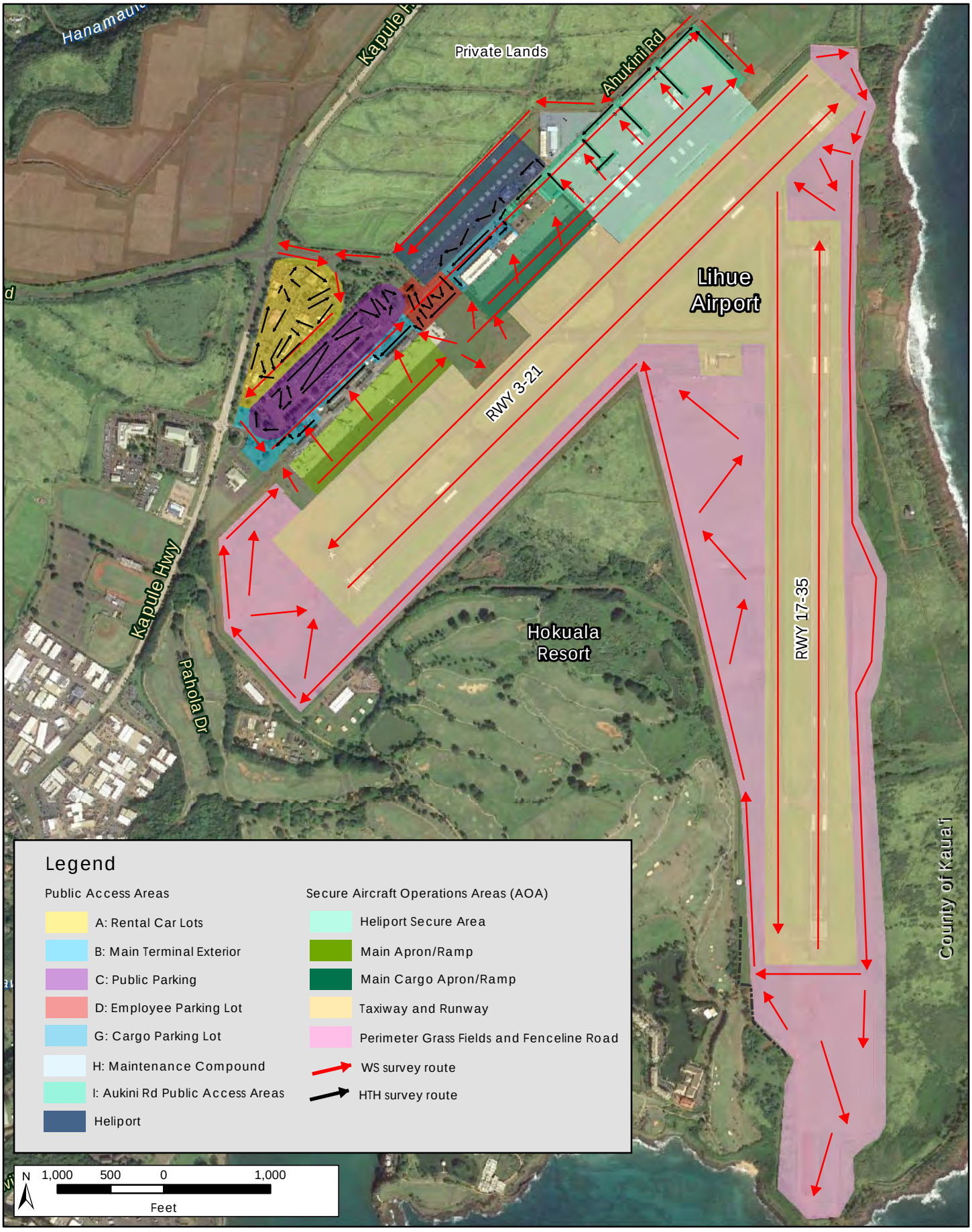
Nawiliwili Harbor Seabird Monitoring Survey Routes 4065-02

December 2018


Port Allen Survey Routes
N
A
B
C
D
A: Main Parking
B: Storage Area
C: Makai Pier
D: Mauka Pier – (DoD Restricted)
Suggested waypoint
Regular survey route
As necessary route



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Seabird Monitoring Routes in Public Access and Secure Areas of Lihue Airport

Lihue Airport (4065-01)

December 2018

Seabird Monitoring – Primary Data Form
Hawaii Department of Transportation

Please complete ALL fields on this data sheet during each monitoring period. Additional comments and descriptive information MUST be entered on the Supplemental Information Form.

Survey Location _____

Date _____ **Start Time** _____ **End Time** _____

Observer Name _____

Weather conditions _____

ID #	Species	GPS Coordinates		Time of discovery	Condition	Distance	Type
		Latitude	Longitude				

ID#: This will be the observer's initials followed by date and number in sequence of specimens discovered (example: **GS100217-01** corresponding with "your initials", October 2, 2017 number 1).

Survey Location: Lihue Airport (LIH), Nawiliwili Harbor (NAW), Port Allen Harbor (PA), Kahului Airport (OGG), Kahului Harbor (KAH), and Lanai Airport (LAN).

Weather conditions MUST include wind speed and direction, percent cloud cover, and precipitation (none, drizzle, continuous or intermittent rain).

Condition: Alive (A), Injured (I), Dead (D); **Distance**: The linear distance (in meters) to the nearest source of artificial light, overhead structure, or significant feature; **Type**: Overhead light including the number of lamps (e.g. **OL-6**), shipping container (**SC**), building (**B**), fence (**Fe**), powerline (**PL**), or other (**OTH**) and include a description on the Supplemental Information Form.

HDOT 2017 Downed Wildlife Incident

Reporting Form

Date	
Type of Discovery (circle one)	Routine Search Incidental
Discovered by	
Affiliation	
Species (common name)	
Time Discovered	
Time Initially Reported to Agencies	
Time Agency Responders Arrive/Advise	
Location Description	
GPS Coordinates	
Distance of bird to base of nearest light (m)	
Bearing from base of nearest light (deg)	
Ground Type (paved, grass, shrub, other)	
Wind Direction and Speed (mph)	
Cloud Cover (%)	
Cloud Deck (estimated magl)	
Precipitation	
Temperature (^{o}F if known)	
Photos taken[1] (circle one)	Yes No

[1] All photos are assigned an ID# and are recorded in the Photo Log.

Descriptive Information

Condition of Bird:
Probable Cause of Grounding and Supporting Evidence:
Sequence of Response Measures:

Additional Comments

Attach 2-3 photos to this report.

Seabird Monitoring – Supplemental Information Form

Hawaii Department of Transportation

Survey Location _____ Date _____

Observer Name _____

ID #	Description of conditions where a grounded bird is discovered, presence of cats or mongoose, number of photos, actions taken, other relevant information.

All photos MUST be entered in the Photo Log.

Seabird Monitoring – Species Names and Acronym Codes
Hawaii Department of Transportation

Please use the following codes for grounded bird species recorded on the Primary Data Form. If a species is encountered which does not occur on this list, please record the common name.

Common Name	Species Code
Hawaiian Petrel	HAPE
Newell‘s Shearwater	NESH
Wedge-tailed Shearwater	WTSH
Band-rumped Storm-Petrel	BRSP
Bulwer‘s Petrel	BUPE
Christmas Shearwater	CHSH
Sooty Tern	SOTE
White-tailed Tropicbird	WTTR
Red-tailed Tropicbird	RTTR
Red-footed Booby	RFBO
Brown Booby	BRBO
Brown Noddy	BRNO
Black Noddy	BLNO
Unknown	UNK

Fraction of the Moon Illuminated, 2017 at Midnight
Hawaii-Aleutian Standard Time (*Source*: U.S. Naval Observatory, Naval Oceanography Portal at usno.navy.mil).

September		**October**		**November**	
Date	Fraction	Date	Fraction	Date	Fraction
1	0.78	1	0.80	1	0.90
2	0.85	2	0.87	2	0.95
3	0.91	3	0.93	3	0.99
4	0.96	4	0.98	4	1.00
5	0.99	5	1.00	5	0.98
6	1.00	6	0.99	6	0.93
7	0.98	7	0.96	7	0.86
8	0.95	8	0.91	8	0.77
9	0.89	9	0.83	9	0.66
10	0.80	10	0.73	10	0.55
11	0.71	11	0.63	11	0.44
12	0.60	12	0.51	12	0.33
13	0.48	13	0.40	13	0.24
14	0.37	14	0.29	14	0.16
15	0.26	15	0.20	15	0.09
16	0.17	16	0.12	16	0.04
17	0.09	17	0.06	17	0.01
18	0.04	18	0.02	18	0.00
19	0.01	19	0.00	19	0.01
20	0.00	20	0.01	20	0.04
21	0.02	21	0.03	21	0.08
22	0.05	22	0.07	22	0.13
23	0.11	23	0.12	23	0.20
24	0.18	24	0.19	24	0.29
25	0.26	25	0.27	25	0.38
26	0.34	26	0.36	26	0.47
27	0.43	27	0.45	27	0.57
28	0.53	28	0.55	28	0.67
29	0.62	29	0.64	29	0.77
30	0.71	30	0.74	30	0.85
		31	0.82		

Appendix C. Results of Searcher Efficiency Trials at Nawiliwili Harbor and Port Allen Harbor, Kauai, 2017

Searcher Efficiency Trials at Nawiliwili Harbor and Port Allen Harbor, Kauai.

Sampling structure and results of detection efficiency trials conducted at Nawiliwili Harbor and Port Allen, Kauai, in December 2017

All carcasses retrieved at the conclusion of trials were delivered to the Kauai Humane Society and Save Our Shearwaters program for stroage and later disposal.

Prepared by H. T. Harvey & Associates. Preliminary results, subject to further analysis and reporting.

Port Allen

Carcass ID	Map Point	Date	Coordinates		Trial #	Finder 1	Finder 2	Found Y/N	Comments
PA-SEEF-2017-01	1	10-Dec	21.90005	-159.587609	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-02	2	10-Dec	21.900063	-159.588182	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-03	3	10-Dec	21.900162	-159.588028	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-04	4	10-Dec	21.8995	-159.589567	2	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-05	5	12-Dec	21.90019	-159.587842	4	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-06	6	12-Dec	21.899912	-159.588171	4	PUB		Y	Charter operator found and called in; delivered to Hanapepe
PA-SEEF-2017-07	7	15-Dec	21.900258	-159.587909	5	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-08	8	15-Dec	21.899537	-159.589451	5	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-09	9	21-Dec	21.90015	-159.588237	6			N	Not reported; recovered by HTH, delivered to SOS
PA-SEEF-2017-10	10	21-Dec	21.900176	-159.588192	6			N	Not reported; missing
PA-SEEF-2017-11	11	21-Dec	21.899429	-159.589705	6	PUB		Y	Charter operator found and reported to HTH; HTH delivered to SOS
PA-SEEF-2017-12	12	21-Dec	21.900216	-159.588292	6			N	Not reported; recovered by HTH and deposited SOS
PA-SEEF-2017-13	13	23-Dec	21.899616	-159.589192	7	PUB		Y	Charter operator found and reported to HTH; KESRP facilitates SOS delivery
PA-SEEF-2017-14	14	23-Dec	21.89996	-159.587479	7			N	Not reported; recovered by HTH and delivered to SOS
PA-SEEF-2017-15	15	23-Dec	21.900214	-159.587517	7			N	Not reported; recovered by HTH and delivered to SOS

Summary of Findings	Date	# carcasess	# found	discov	% detection
PUB and HTH	**10-15 Dec**	**8**	**8**	**1.00**	**100%**
PUB OVERALL	**10-23 Dec**	**15**	**6**	**0.40**	**40%**

Nawiliwili Harbor

Carcass ID	Map Point		Coordinates		Trial Number	Finder 1	Finder 2	Found Y/N	Comments
NAW-SEEF-2017-01	1	9-Dec	21.953461	-159.358987	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-02	2	9-Dec	21.95523	-159.355459	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-03	3	9-Dec	21.955823	-159.354779	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-04	4	9-Dec	21.956931	-159.352877	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-05	5	10-Dec	21.952335	-159.359586	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-06	6	10-Dec	21.952444	-159.359747	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-07	7	10-Dec	21.955327	-159.354609	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-08	8	10-Dec	21.953915	-159.35306	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-09	9	11-Dec	21.954676	-159.356554	3	DOT		Y	Security found in morning; picked up by SOS; not found by HTH
NAW-SEEF-2017-10	10	11-Dec	21.95277	-159.359522	3	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-11	11	11-Dec	21.951353	-159.359032	3			N	Not reported; missing. Young Brothers yard not searchable by HTH due to operations.
NAW-SEEF-2017-12	12	11-Dec	21.956127	-159.354013	3	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-13	13	12-Dec	21.95552	-159.355203	4	HTH	DOT	Y	Found by HTH and left in place; found by Security; placed in NAW Aid Station, picked up by SOS
NAW-SEEF-2017-14	14	15-Dec	21.954205	-159.357523	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-15	15	15-Dec	21.957086	-159.355042	5			N	Not reported; missing.
NAW-SEEF-2017-16	16	15-Dec	21.955275	-159.355279	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-17	17	15-Dec	21.955775	-159.354851	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-18	18	21-Dec	21.957185	-159.353456	6	DOT		Y	Security found; picked up by HTH and delivered at SOS; carcasses were previously used, frozen, and reused (NAW-07, PA-05 and PA-06)
NAW-SEEF-2017-19	19	21-Dec	21.951449	-159.358828	6	DOT		Y	Security found; picked up by HTH and delivered at SOS
NAW-SEEF-2017-20	20	21-Dec	21.95668	-159.353553	6	DOT		Y	Security found; picked up by HTH and delivered at SOS

Summary of Findings	Date	# carcasess	# found	Discov	% Detected
DOT and HTH	9-15 Dec	17	15	0.88	88%
DOT OVERALL	9-23 Dec	20	18	0.90	90%

Appendix D. Summary of 2017 Seabird Monitoring Results at Hawaii Department of Transportation Facilities on Kauai

Summary of Seabird Monitoring Results at Hawaii Department of Transportation Facilities, Kauai, 2017

Period Covered: September 24, 2017 - December 15, 2017

Prepared by H. T. Harvey & Associates

Lihue Airport				
Date	Location	Species	Time	Condition
13-Oct	LIH	NESH	19:45	A
26-Oct	LIH	NESH	6:00	D
26-Oct	LIH	NESH	7:40	A
4-Nov	LIH	NESH *	21:25	D
13-Nov	LIH	WTSH	11:00	A
16-Nov	LIH	WTSH	19:30	A

Nawiliwili Harbor				
Date	Location	Species	Time	Condition
12-Oct	NAW	NESH	21:15	A
12-Nov	NAW	WTSH	20:10	A
13-Nov	NAW	WTSH	20:50	A
15-Nov	NAW	WTSH	18:50	A
16-Nov	NAW	WTSH	21:20	D
16-Nov	NAW	STPE †	16:21	D
19-Nov	NAW	HAPE	21:15	A
20-Nov	NAW	WTSH	20:15	A
1-Dec	NAW	WTSH	20:40	A

Port Allen				
Date	Location	Species	Time	Condition
No downed birds discovered				

* Presumed NESH; only part of wing and a few loose feathers found (post-scavenging).

† Heavy salt encrusting on carcass suggests bird was exposed to spray aboard the Pride of America prior to deposition at Nawiliwili Harbor and not attributed to HDOT; possibly Band-rumped storm petrel.

Appendix E. FallOut Records for Covered Seabirds at Hawaii Department of Transportation Facilities on Kauai, 2013-2017

SOS Fall Out Records for Covered Seabirds at Hawaii Department of Transportation Facilities on Kauai, 2013-2016

ID	LogDate	LogType	Species	Status	PermBand	LocationFound	AidStation	Section	AgeClass	Port Allen HDOT	Nawiliwili HDOT	LIH HDOT
MLP011	10/12/2013	Aid Station	NESH	REL	1054-27392	Taxiway A @ Taxiway L intersection (airport)	Lihue Airport	11	HY			NESH
JMG010	10/15/2013	Aid Station	NESH	REL	1064-00594	Matson, vicinity of gate 14 located in the young brothers shipyard. Bird found sitting on the pavement.	Matson	13	HY		NESH	
JMO018	10/30/2013	Aid Station	NESH	REL	1054-27461	Nawiliwili Harbor	Lihue Fire Station	13	HY		NESH	
MLP026	10/31/2013	Aid Station	NESH	REL	1054-31632	Between commuter terminal and grassy area near storm drain. Airport	Lihue Airport	11	HY			NESH
MK409	10/16/2014	Aid Station	NESH	REL	1064-00757	Port Allen Pier	Hanapepe Fire Station	21	HY	NESH		
CMD032	10/28/2014	Aid Station	NESH	REL	1064-00934	Found outside Terminal Building	Matson	13	HY		NESH	
ELC025	11/16/2014	Secondary Pickup	NESH	DOA		"Young Brothers, Pier 3, #15 pole, 11/15/2014, (Matson)"	OTHER	13	U		NESH	
MJ183	10/7/2015	Aid Station	NESH	REL	1064-01072	Hanapepe Harbor, near pier	Kalaheo Fire Station	21	HY	NESH		
JS002	10/10/2015	Aid Station	NESH	REL	1064-01185	Port Allen Pier roadside, 3:30 pm	Hanapepe Fire Station	21	HY	NESH		
TA423	10/13/2015	Aid Station	NESH	REL	1064-01076	Front of Matson Building, 3rd door @ 20:30	Matson	13	HY		NESH	
NS012	10/14/2015	Aid Station	NESH	REL	1064-01096	"Port Allen on the pier 8:15"	Kalaheo Fire Station	21	HY	NESH		
NS020	10/19/2015	Aid Station	NESH	REL	1064-01172	"Port Allen DOT pier"	Hanapepe Fire Station	21	HY	NESH		
NS024	10/20/2015	Aid Station	NESH	REL	0864-06001	"Port Allen pier"	Kalaheo Fire Station	21	HY	NESH		
TA432	10/22/2015	Aid Station	NESH	REL	0864-06014	Tiger Pier @ 9pm 10/21/15	Matson	13	HY		NESH	
UMP170	10/28/2016	Aid Station	NESH	REL	1064-02129	Holo Holo Charters, Port Allen Commercial Pier 17:20 10/27	Hanapepe Fire Station	21-PA	HY	NESH		

ID	LogDate	LogType	Species	Status	PermBand	LocationFound	AidStation	Section	AgeClass	Port Allen HDOT	Nawiliwili HDOT	LIH HDOT
HDOT Monitoring Program Results for 2017												
HTHarvey	10/12/2017	Monitoring	NESH	Alive	?	Nawiliwili Harbor	?	13	HY		NESH	
HTHarvey	10/13/2017	Monitoring	NESH	Alive	?	Lihue Airport	?	11	HY			NESH
HTHarvey	10/26/2017	Monitoring	NESH	Dead	?	Lihue Airport	?	11	HY			NESH
HTHarvey	10/26/2017	Monitoring	NESH	Alive	?	Lihue Airport	?	11	HY			NESH
HTHarvey	11/4/2017	Monitoring	NESH	Dead	?	Lihue Airport	?	11	U			NESH
HTHarvey	11/19/2017	Monitoring	HAPE	Alive	?	Nawiliwili Harbor	?	13	HY		HAPE	
SOS Monitoring Results (New) for 2017												
SOS New	11/17/2017	11-Lihue-Airport Area	NESH			Lihue Airport		11				NESH
SOS New	11/17/2017	11-Lihue-Airport Area	NESH			Lihue Airport		11				NESH
SOS New	10/14/2017	13-Matson/ Nawiliwili Harbor	NESH			Matson Container near wht tent area @ 2357 10/13		13			NESH	
SOS New	10/26/2017	13-Matson/ Nawiliwili Harbor	NESH			Pier 1 Apron @ 816 on 10/26		13			NESH	
SOS New	10/14/2017	21-Port Allen	NESH			Port Allen Pier		21		NESH		
SOS New	10/22/2017	21-Port Allen	NESH			Port Allen Pier		21		NESH		
SOS New	10/23/2017	21-Port Allen	NESH			Port Allen Pier about 0830. Found struggling in water by Holo Holo trying to get onto pier.		21		NESH		
						Total Period 2013 - 2017 - NESH				10	9	8
						Total Period 2013 - 2017 - HAPE				0	1	0
						Annual Average 2013-2017 - NESH				2	1.8	1.6

15 Year HAPE Fallout Records

HAPE Fallout Record 2003^	1
HAPE Fallout Record 2004	1
HAPE Fallout Record 2007	1

HAPE Fallout Record 2008^	1	
HAPE Fallout Record 2012		1
HAPE Fallout Record 2017	1	
15 year total (2003-2017)	3	3
15 year Annual Average (2003-2017)	0.2	0.2

^Note: Assume the HAPE fallout in 2003, 2008 occurred at Nawiliwili, pending further data

15 Year BRSP Fallout Records

BSRP Fallout Record 2007	1
15 year total (2003-2017)	1
15 year average (2003-2017)	0.07