Federal Aviation Administration

Memorandum

Date: October 28, 2026

To: All Airports Regional Division Managers

From: Michael A.P. Meyers, P.E., Manager, Airports Engineering Division, AAS-100

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Subject: Engineering Brief No. 111, Solar Powered Taxiway Edge Lighting Systems

This Engineering Brief (EB) provides guidance and information on the design and installation of solar powered taxiway edge lights.

Attachment

FAA
Airports

ENGINEERING BRIEF #111

Solar Powered Taxiway Edge Lighting Systems

I Purpose.

This EB provides guidance and information on the design and installation of solar powered taxiway edge lights (L-861T(-)). For the purpose of this EB, a solar powered taxiway edge light is a taxiway light with embedded photovoltaic capability into its fixture. This EB is intended to supplement the guidance of Federal Aviation Administration (FAA) Advisory Circulars (AC) 150/5340-30, *Design and Installation Details for Airport Visual Aids,* and 150/5345-46, *Specification for Runway, Taxiway, Heliport, and Vertiport Light Fixtures*. For light-specific design criteria, such ACs must be followed.

Note, this EB will be subject to update as data, analysis, and operations develop in the future.

II Background.

ACs 150/5340-30 and 150/5345-46 provide guidance and specifications for the design and installation of visual aids and light fixtures used on airport runways, taxiways, heliports, and vertiports. Specifically, they establish the FAA standards and guidelines to ensure uniform application of electrical power distribution, backup electrical power, and electrical power control systems for projects funded with federal grant funds through Federal grant assistance programs such as the Airport Improvement Program (AIP) or with revenue from the Passenger Facility Charges (PFC) program.

Recent advances in light emitting diode (LED) and photovoltaic (solar-powered) systems technology have made solar-powered lights an effective and efficient option for many users. The electrical power efficiency inherent to LEDs is supported by a significantly lower power demand compared to traditional incandescent airfield lighting systems, enabling the use of smaller photovoltaic power systems. Coupled with technological advances in photovoltaic solar panels, and associated components including batteries and control systems, solar-powered LED lights may become an efficient option when connected to an electrical circuit (either in series or parallel) and to an alternate electrical power source (ex. commercial power, electrical generators, etc.). Photovoltaic systems provide the capability to use solar power as either a primary source or as backup power depending on the designed system architecture.

Commercial electrical power is commonly used as an airport's primary source of electrical power, while supplemental electrical power sources such as engine generators, battery backups, etc., are traditionally used as backup power.

The FAA recognizes that photovoltaic capability and the ability to receive electrical power from a stand-alone photovoltaic system exists for taxiway lights. This EB focuses on this application as supplemental guidance until ACs 150/5340-30 and 150/5345-46 are updated to consider solar powered systems.

III Application.

Use the standards and guidelines contained in this EB as additional guidance and specifications to AC 150/5340-30 and AC 150/5345-46 for recommended airfield lighting design and installation practices. This EB does not constitute a regulation, is not mandatory, and is not legally binding in its own right. Conformity with this EB is voluntary, and nonconformity will not affect rights and obligations under existing statutes and regulations, except for as described below:

1. The standards and guidelines contained in this EB are practices the FAA recommends for an acceptable level of safety, performance, and operation for solar powered taxiway edge lighting systems.
2. This EB provides one, but not the only, acceptable means of meeting the requirements of 14 CFR part 139, *Certification of Airports*.

IV Questions.

Contact Nelson Sanchez, Electronics Engineer, Airports Design and Construction Branch, AAS-110, at Nelson.Sanchez@faa.gov for any questions about this EB.

V Effective Date.

This EB becomes effective as of the date of signature by the Manager of the FAA Airports Engineering Division, AAS-100.

VI Reference Documents.

AC 150/5340-30, *Design and Installation Details for Airport Visual Aids.*

AC 150/5345-46, *Specification for Runway, Taxiway, Heliport, and Vertiport Light Fixtures.*

VII Design Considerations.

Whether solar power is used as a primary source of electrical power or used as a backup source, the system design must meet the applicable performance criteria defined in FAA ACs 150/5340-30, and 150/5345-46. In addition, solar-powered light manufacturers must ensure that, at a minimum, the following areas are evaluated when designing a solar powered taxiway edge light fixture:

1. Power Demand.

   Proper understanding of the system's power demand is critical in ensuring the reliability of the photovoltaic system, enhancing the ability to identify potential issues and optimize energy usage. The taxiway edge light's embedded photovoltaic system must be designed and capable of providing continuous electrical power to the light unit using solar energy. Alternate power must not be considered when assessing appropriate continuous power generation and distribution capability of the light fixture's embedded electrical power generation system. The photovoltaic system's

power generation and supply must be consistent with the taxiway edge light's electrical power needs to accommodate the operational and environmental conditions.

2. Battery Technology and Density.

   Batteries are the power source for the taxiway edge lights. Relative to obtaining longer runtimes and lighter equipment, appropriate battery choice is critical to the performance and efficiency of the system. For example, while Lithium (Li) - ion batteries may offer higher energy density, longer runtime, and lower self-discharge, Nickel Metal-hydride (NiMH) batteries may offer more stability and/or perform more efficiently in extreme temperature environments.

   To ensure appropriate battery capacity, it is recommended that a baseline of usable battery capacity be established as well as battery charging/discharging characteristics. This will help define other design parameters such as solar panel sizing and intended battery charging frequency/cycles.

3. Operating Environment.

   The location, environment, climate, and applicable seasonal variations where the system is intended to be installed and operated must be taken into consideration. To meet the taxiway light operational requirements, photovoltaic system performance tests must include evaluation against performance requirements considering the following:

   a. Hours per day the taxiway light is designed to operate.

   b. Solar insolation.

   c. Temperature range.

   d. Susceptibility to electromagnetic interference.

   e. Acceptable humidity and dust levels.

   It is recommended that performance tests are conducted using worst-case scenario assumptions of the given environment.

4. Panel Sizing.

   The taxiway edge light's embedded solar panel must be designed and capable of providing electrical power consistent with the light fixture's power needs and intended operational conditions. To estimate actual energy production, ensure evaluation of the overall system's energy consumption, the worst-case solar insolation assessment, the overall system's efficiency, and derating factors.

5. Electrical Power Control System.

   In addition to being capable of performing its intended functions when interfacing with other lighting circuit controllers described in AC 150/5340-30J, Chapter 13, the light fixture's control system must be capable of monitoring and controlling the photovoltaic power generation capability. Key areas to evaluate include:

   a. Battery charge control – The system must monitor and regulate power to the batteries, ensuring that the batteries are charged safely and maintain necessary

voltage and current levels. Charging and discharging cycles of the batteries must be monitored and controlled to avoid any overcharging or overdischarging.

b. Power Plant Control – In accordance with AC 150/5340-30, the light fixture must be able to receive and control electrical power from an alternate source. The system must monitor and control the aggregate power generation capacity. For example, the power received from an alternate source must be monitored and controlled to ensure proper integration with the photovoltaic power generation system. The intent is for the system to maintain necessary voltage, current, and frequency (if AC power) stability. In addition, it must be capable of monitoring and adjusting electrical power to set the light's power and intensity levels consistent with the lighting's circuit power and intensity control systems.

c. Photovoltaic Control – The system must monitor and regulate the electrical energy generated by the solar panels. The intent is for the system to maintain necessary voltage and current stability.

d. Power Unit Control – The system must monitor and control the output of power produced by the system to prevent any overload to the photovoltaic system.

6. Maintenance Considerations.

   In addition to the maintenance requirements stated in ACs 150/5340-30 and 150/5345-46, light fixture manufacturers must evaluate and establish any required maintenance actions specific to the taxiway light's photovoltaic system. Such required maintenance must also be provided to Airport Sponsors.

VIII Installation Considerations.

The installation of solar-powered taxiway lights is a process that requires thoughtful consideration to ensure optimal performance and long-term reliability. Proper planning and execution are essential to maximize the performance and reliability of the system. Airport Sponsors must ensure that at a minimum, the following areas are evaluated when installing a solar powered taxiway-edge light fixture:

1. Installation Location/Environment.

   Local weather at the proposed location directly affects the overall efficiency of the system. At a minimum, the following aspects must be evaluated and/or addressed for its intended operational environment:

   a. Available solar hours during all seasons for optimal energy storage.

   b. Average winter solar hours for optimal performance with most limited insolation.

   c. Panel orientation to maximize sunlight insolation.

   d. Installation locations free of shading by obstructions during peak solar insolation.

   e. Most demanding light fixture's utilization frequency, intensity used, and required electrical power.

2. Visual Impact.

3. In accordance with FAA policy, Federal Register :: Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports, (86 FRN 25801), dated May 11, 2021, the Airport Sponsor is responsible for evaluating the potential for ocular impact to the air traffic control tower, including glint and glare. The Airport Sponsor must file a Notice of Proposed Construction or Alteration, FAA Form 7460-1, including a statement that the project will not cause any adverse visual impact, and submit it to the FAA for review and approval. The Airport Sponsor must mitigate any impact discovered after construction or installation. Proponents must e-file FAA Form 7460-1 via the FAA's Obstruction Evaluation Airport Airspace Analysis (OE/AAA) website at https://oeaaa.faa.gov. For additional information/guidance on filing on-airport aeronautical studies reference AC 150/5300-20, *Submission of On-Airport Proposals for Aeronautical Study*.

   NOTE: Further individual light fixture changes won't require additional visual impact evaluation.

4. Integration.

   FAA guidance states that visual aids associated with facilities in the National Airspace System (NAS) must have a definite configuration for electrical power. When used in conjunction with other airport electrical power distribution infrastructure, the solar-powered taxiway lights must meet the applicable performance criteria defined in the guidance of AC 150/5340-30J, Chapters 9 and 13, for power distribution, control systems, and standby power.

5. Maintenance Considerations.

   In addition to the maintenance requirements stated in AC 150/5340-26, Airport Sponsors must include any required maintenance actions provided by the light manufacturer to their maintenance program.