FAA Airfield Lighting Update

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Agenda

- FAA Airfield Lighting Equipment Advisory Circulars (AC's) in FY 2016
- FAA Airfield Lighting Equipment Draft AC's & EB's for FY 2017
- LED Topics
- Q & A

ALECP ELIGIBLE PRODUCT TYPES

- L-801 Beacons,Medium Intensity (AC 150/5345-12)
- L-802 Beacons, High Intensity (AC 150/5345-12)
- L-804 Light, Holding Position Edge (AC 150/5345-46)
- L-806 Wind Cones, Frangible (AC 150/5345-27)
- L-807 Wind Cones, Rigid (AC 150/5345-27)
- L-810 Lights, Obstruction (AC 150/5345-43)
- L-821 Panel, Airport Lighting Control (AC 150/5345-3)
- L-823 Connectors, Cable (AC 150/5345-26)
- L-824 Underground Electrical Cable for Airport Lighting Circuits (AC 150/5345-7)
- L-827 Monitors, Regulator (AC 150/5345-10)
- L-828 Regulators, Constant Current (AC 150/5345-10)
- L-829 Regulators, Monitored Constant Current (AC 150/5345-10)
- L-830 Isolation Transformers, 60Hz (AC 150/5345-47)
- L-831 Isolation Transformers, 50Hz (AC 150/5345-47)
- L-841 Cabinet, Auxiliary Relay (AC 150/5345-13)
- L-847 Switch, Circuit Selector (AC 150/5345-5)
- L-849 Lights, Runway End Identification (AC 150/5345-51)
- L-850 Lights, Runway, Inpavement (AC 150/5345-46)
- L-852 Lights, Taxiway, Inpavement (AC 150/5345-46)
- L-853 Markers, Retroreflective (AC 150/5345-39)
- L-854 Radio Controls (AC 150/5345-49)
- L-856 Lights, Obstruction, High Intensity,White, 40 FPM (AC 150/5345-43)
- L-857 Lights, Obstruction, High Intensity,White, 60 FPM (AC 150/5345-43)
- L-858 Signs, Runway and Taxiway (AC 150/5345-44)
- L-859 Lights, Flashing, Omnidirectional (AC 150/5345-51)
- L-860 Lights, Runway Edge, Low Intensity (AC 150/5345-46)
- L-861 Lights, Runway & Taxiway Edge, Medium Intensity (AC 150/5345-46)
- L-862 Lights, Runway Edge, High Intensity (AC 150/5345-46)
- L-863 Lights, Portable Runway (AC 150/5345-50)
- L-864 Lights, Obstruction, Red, 20-40 FPM (AC 150/5345-43)
- L-865 Lights, Obstruction, Medium Intensity, White, 40 FPM (AC 150/5345-43)
- L-866 Lights, Obstruction, Medium Intensity, White, 60 FPM (AC 150/5345-43)
- L-867 Light Base, Non-Load Bearing (AC 150/5345-42)
- L-868 Light Base, Load Bearing (AC 150/5345-42)
- L-880 Precision Approach Path Indicator (AC 150-5345-28)
- L-881 Abbreviated Precision Approach Path Indicator (AC 150/5345-28)
- L-882 Generic Visual Approach Descent Indicator (AC 150/5345-52)
- L-883 Generic Visual Approach Descent Indicator (AC 150/5345-52)
- L-884 Power and Control Unit for Land and Hold Short Lighting Systems (AC 150/5345-54)
- L-885 Lights, Obstruction (AC 150/5345-43)
- L-890 Airport Lighting Control and Monitoring Systems (AC 150/5345-56)
- L-891 Frangible Support Structure (lower to service) (AC 150/5345-45)
- L-892 Frangible Support Structure (lower to service) mounted on a rigid steel tower (AC 150/5345-45)
- L-893 Lighted Visual Aid to indicate runway closure (AC 150/5345-55)
- L-894 & L-895 (AC 150/5345-42)

AC's (150's Series) Published In FY 2016

- AC 5345-46E, Specification for Runway and Taxiway Light Fixtures (3/2/16)
- AC 5345-42H, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories (11/6/15)
- AC 150/5345-43H, Specification For Obstruction Lighting Equipment (9/28/16)
- AC 5345-44K, Specification for Runway and Taxiway Signs (10/8/15)
- AC 5345-53C Airport Lighting Equipment Certification Program (Addendum is updated monthly)

Background for 150/5345-46E, and 150-5345-42G

Previously, per the FAA AC 150/5345-46D, Specification for Runway and Taxiway Light Fixtures, elevated light baseplates were certified as part of the light fixture.

However, baseplates did not have their own “L” designation like other similar equipment found in FAA AC 150/5345-42G, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories .

When elevated lights were certified, they were done so with a particular baseplate.

150/5345-46E, Specification for Runway and Taxiway Light Fixtures (3/2/16) - Principal Changes

- Para 3.4.1.2d is changed to allow deeper throat projection of light fixtures. This solves potential issues with light fixtures not fitting through the bottom flange cutout of existing extensions and sectional light bases.
- Para 3.4.2.2, Base Mounting, Elevated light fixture base mountings are removed from the AC and placed in AC 150/5345-42H, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories, to consolidate all light bases into a common document.
- Para 3.4.2.3, Stake Mounting, Elevated light stake mountings are removed from the AC and placed in AC 150/5345-42H
- Para 3.10.1.1 is rewritten to clarify the requirement for light fixture internal hardware. The requirement for black oxide coatings is removed. A note is added about in-pavement light fixture bolts and bolt torque requirements.

150/5345-42H, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories (11/6/15) - Principal Changes

- L-894 for elevated light covers & L-895 for elevated light mounting stakes were introduced.
- Paragraph 3.1 – a **Note** is added to explain light base modifications.
- Paragraph 3.1.3.5.2 was added to describe elevated light cover plate requirements
- Elevated light base plates are removed from AC 150/5345-46, Specification for Runway and Taxiway Light Fixtures, and added to this AC to facilitate common hardware in one AC.
- Para 3.2.3.1.1 through 3.2.3.1.4 are added to describe elevated light base plate requirements.
- Para 3.2.3.2 is added to include elevated light fixture mounting stakes with common hardware.
- Para 3.2.3.2.1 through 3.2.3.2.6 are added to describe elevated light mounting stake requirements.
- Para 4.2.8 is a added to provide test procedures for elevated light base plates.

AC 150/5345-43H, Specification For Obstruction Lighting Equipment (9/28/16)

Flashing L-810 Requirements Background

- FAA Technical Note “Evaluation of New Obstruction Lighting Techniques to Reduce Avian Fatalities”, May 2012

- Flashing L-810 requirements in AC 70/7460-1L, Obstruction Marking and Lighting (12/4/15**)**

  - Apply to the intermediate levels only on Poles, Towers, and Similar Skeletal Structures between 151ft to 350ft (Para 5.4.2.b)
  - Flashing Lights (L-810). For structures exceeding 151 feet (46 m) but not more than 350 feet (107 m) at intermediate levels, two or more flashing (L-810) lights should be mounted outside at diagonally opposite positions of intermediate levels. These lights should be configured to flash simultaneously with the L-864 flashing light on the top of the structure at a rate of 30 flashes per minute (fpm) (± 3 fpm).
  - Configuration A1 (Figure A-6)
  - Configuration E1 (Figure A-10)
  - Wind Turbines above 699ft (Fig A-23 & A-24)
  - 10.3.2. Flash Sequence and Duration

AC 150/5345-43H, Specification For Obstruction Lighting Equipment - Principal Changes

- Long paragraphs in various sections are split up into separate list items to facilitate better comprehension.
- Paragraph 1.2 – L810(F) light is added.
- Chapter 2 updates all Internet links for referenced documents.
- Paragraph 3.3.4 is added for obstruction light mounting provisions.
- Paragraph 3.3.4.2 is added to better describe L-810 and L-810(F) mountings.
- Paragraph 3.3.5.2(4) is modified to describe requirements for L-810(F) and L-864 lights with a control unit.
- Paragraph 3.3.5.2 adds a NOTE to state L-810 lights do not need to be certified with a control unit.
- Paragraph 3.4.1.2.1 is added to include a new flashing L-810(F) light to this AC.
- Table 3-4 is modified to include L-810(F) flash characteristics. Manufacturers should note change to 30 fpm ((± 3 FPM) for L-864 lights. Also note change to flash duration for L-864.
- Paragraph 3.4.3.1 – L-810(F) lights are added to Simultaneous Flashing Systems.
- Paragraph 4.2.10(6) – L-810(F) flashing lights are added to the system operational test requirements.

AC 150/5345-43H, Specification For Obstruction Lighting Equipment - Principal Changes

1.2 **Equipment Classification.**

Type	Description
L-810	Steady-burning red obstruction light
L-810 (F)	Flashing red obstruction light, 30 Flashes Per Minute (FPM)
L-856 (FPM)	High intensity flashing white obstruction light, 40 Flashes Per Minute
L-857	High intensity flashing white obstruction light, 60 FPM
L-864	Flashing red obstruction light, 30 FPM
L-865	Medium intensity flashing white obstruction light, 40 FPM
L-866	Medium intensity flashing white

AC 150/5345-43H - Principal Changes (Cont.)

3.3.4 Mounting Provisions.

3.3.4.1 Aiming (for L-856 and L-857).

Light units must have a method for adjustment of the vertical aiming angle between 0 and +8 degrees. A spirit level or other device must be provided as part of each light unit for setting the vertical aiming angle of the light beam with an accuracy of one degree.

3.3.4.2 Mounting (for L-810 and L-810(F)).
The mechanical interface for L-810 and L-810(F) installation must be either ¾ or 1 inch National Pipe Thread (NPT) on the light unit side and/or bottom

AC 150/5345-43H - Principal Changes (Cont.)

- 3.3.5.2 **Flashing Red Obstruction Lights.**
- 1. The control unit must set the system flash rate and flash sequence.
- 2. Failure of the flashing circuit must cause the light units to energize and operate as steady burning lights.
- 3. An override switch must be mounted on the control unit to manually control the lights during maintenance or in the absence of a photoelectric control signal.
- 4. To ensure proper operation, all flashing red obstruction lights (L-864 or L-810(F)) inclusive of any associated system of steady burning red lights, must be certified with a control unit whether internal or external to the lighting unit.
- **Note:** Steady burning L-810 red obstruction lights do not need to be certified with a control unit.

AC 150/5345-43H - Principal Changes (Cont.)

- 3.4.1.2.1 Flashing L-810 (F) Light Unit.

  1. The light unit must flash simultaneously with the L-864 flashing light at a rate of 30 flashes per minute (FPM) (± 3 FPM).

  2. The center of the vertical beam spread must be between +4 and +20 degrees.

  3. With a minimum vertical beam spread of 10 degrees and at all radials throughout 360 degrees, there must be a minimum intensity of 32.5 candelas equivalent to steady burning mode. The minimum effective intensity will be half of this value, but is not calculated for this application.

AC 150/5345-43H, Specification For Obstruction Lighting Equipment - Principal Changes

- 3.4.3 System Flashing Requirements.

  3.4.3.1 **Simultaneous Flashing Systems.**

  All obstruction lights in systems composed of either L-810(F), L-864, L-856, or L-865 light units must flash within 1/60 of a second of each other.

AC 150/5345-43H- Principal Changes (Cont.)

Table 3-4. Flash Characteristics for Obstruction Lights.

Type	Intensity Step	Flash Rate [1]	Flash Duration [2]
L-810(F)	Single	30 FPM (± 3 FPM)	1/2 to 2/3 of flash period if incandescent lighting [3], and between 100 and 1333 ms inclusive if other lighting sources.
L-856	Day & Twilight	40 FPM	Less than 100 ms
L-856	Night	40 FPM	Between 100 and 250 milliseconds (ms) inclusive
L-857	Day & Twilight	60 FPM	Less than 100 ms
L-857	Night	60 FPM	Between 100 and 250 ms inclusive
L-864	Single	30 FPM (± 3 FPM)	1/2 to 2/3 of flash period if incandescent lighting [3], and between 100 and 1333 ms inclusive if other lighting sources.
L-865	Day & Twilight	40 FPM	Less than 100 ms
L-865	Night	40 FPM	Between 100 and 1000 ms inclusive
L-866	Day & Twilight	60 FPM	Less than 100 ms
L-866	Night	60-FPM	Between 100 and 250 ms inclusive
L-885	Single	60 FPM	1/2 to 2/3 of flash period if incandescent lighting [3], and between 100 and 670 ms inclusive if other lighting sources.

NOTES:

(1) Flash rates have a tolerance of ±5 percent except L810(F) and L-864

(2) When the effective flash duration is achieved by a group of short flashes, the short flashes must be emitted at a rate of not less than 50 Hz.

(3) The light intensity during the "off" period must be less than 10 percent of the peak effective intensity. The "off" period must be at least 1/3 of the flash period.

AC 150/5345-44K, Specification for Runway and Taxiway Signs (10/8/15)- Principal Changes

- Paragraph 1.1, reference to dot matrix signs removed.
- Paragraph 1.2.1, the Note about a black outline for the letter “M” is removed from and moved to Appendix I, Figure 19.
- Paragraph 1.2.4e – sign shipping and storage temperature requirements are removed because they are stated in paragraph 3.2.1, Sign Temperature Requirements.
- Paragraph 1.2.6 – message array, sign array, and sign frame definitions are added.
- Paragraph 3.2.1 – a reference to the appropriate testing paragraph is added. Sign temperature requirements are modified to accommodate LEDs.
- Paragraph 3.2.5.1 – stake mounted signs are deleted within lighted sign requirements.
- Paragraph 3.2.5.2 – message element spacing is added for sign sizes.
- Paragraph 3.2.5.4b & 3.2.6.2 are updated to be inclusive of all applicable requirements in the ASTM 4956, Standard Specification for Retroreflective Sheeting for Traffic Control.

AC 150/5345-44K - Principal Changes (Cont.)

- Paragraph 3.2.6.11 Sign maintenance instructions are added
- Paragraph 4.1.1.2, Note 4 is updated to better define testing requirements for curved sign faces.
- Paragraph 4.1.1.3.3, L-858B and L858H signs are removed from photometry tests.
- Paragraph 4.1.1.9 is updated for power factor test conditions that are consistent with other ACs.
- Section 6, Dot Matrix Signage, is removed along with all references throughout the AC.
- Figure 17, an additional note is added to clarify the sign face.
- All references and any associated Uniform Resource Locators (URLs) are updated.

Proposed FY17 AC's (150's Series) & EB's

- AC 5345-49D, Specification L-854, Radio Control Equipment
- AC 5340-18G, Standards for Airport Sign Systems
- AC 5340-30J, Design and Installation Details for Airport Visual Aids
- EB No. 92A, Light Spacing Guidance for New Taxiway Fillet Geometry (Part of Draft 5340-30J)
- AC 5345-42H, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
- AC 5345-46E, Specification for Runway and Taxiway Light Fixtures
- EB No. xx PAPI
- Industry Inputs

LED Topics

- **FAA LED Significant Safety Issues (SSI) Project(s)**
- **LED High Intensity Runway Edge Light with IR, L-862 (L-IR), Project**
- **Light Intensity “upper” limit project**

FAA LED Significant Safety Issues (SSI) Background

- FAA Administrator's Strategic Initiative
- In FY15, FAA LOBs/Staff Offices (FAA SSI Team) established a formal, repeatable process to identify FAA cross-organizational Significant Safety Issues (SSIs); and developed a prioritized list of 10 FAA-level SSIs.
- "LED Lighting of Airfields, Obstacles, and Aircraft", or FAA LED SSI, is #1 of the top 10 list for full SRM

Hazards that will be further studied

- FY15_SSI_LEDPHA_01: LED-lit Obstacle Detection (with NVGs)
- FY15_SSI_LEDPHA_02: Brightness Effect on HUD
- FY15_SSI_LEDPHA_03: See and Avoid (with NVGs)
- FY15_SSI_LEDPHA_04: Ice & Snow formation on obstruction lighting – Non-Airport Property
- FY15_SSI_LEDPHA_05: Stroboscopic Effect
- FY15_SSI_LEDPHA_06: Loss of Sight of LED Airport Lighting

FAA LED SSI Project Summary

- There were three phases to this effort.
- The first was the preliminary hazard analysis, where hazards were 11 identified but not assessed.
- Second phase assessed risk, resulting in four yellow hazards and 8 green.
- The third phase developed mitigations for the yellow hazards and a monitoring plan, which was captured in the addendum.

LED HIRL IR Project- Objectives

- Develop IR requirement based on legacy L-862 incandescent fixture measurement, and use visual light requirements from FAA AC 150/5345-46 (current version), and FAA EB 67D.

- Perform IR measurements (IR power output in watts per steradian, and IR beam pattern) on the legacy tungsten-halogen FAA L-862 (HIRL), which current EFVS system's utilizes, to determine current IR output.

Q &A

Thank You!