Office of Airport Safety and Standards Update

To: IESALC

November 7,2023

By: Robert Bassey

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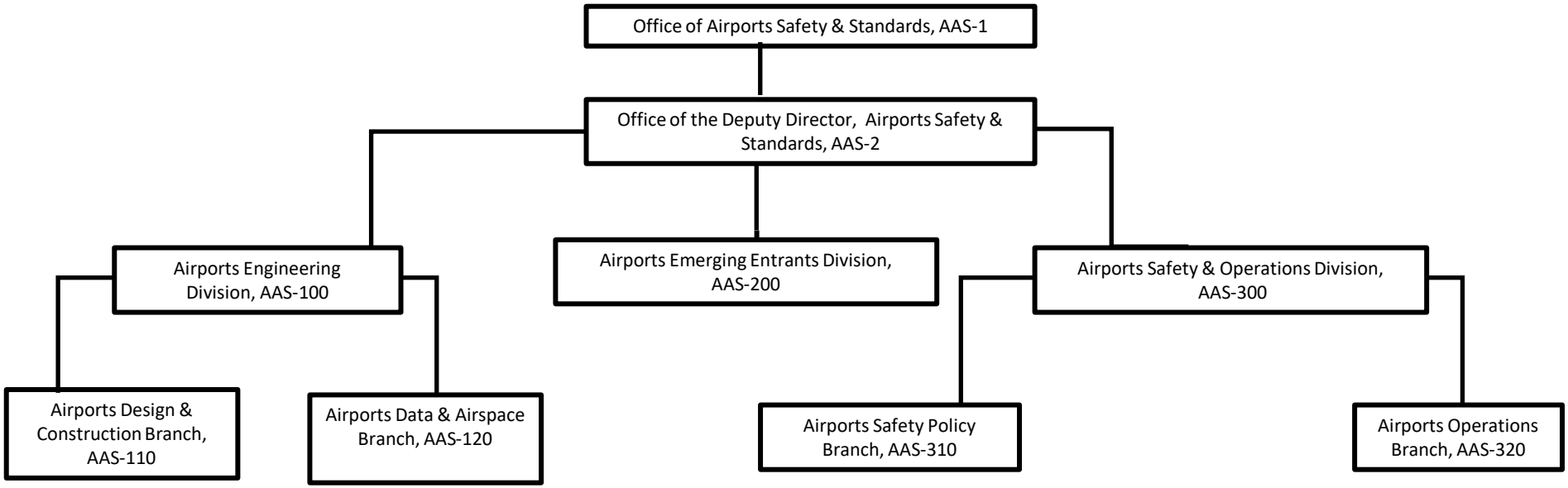

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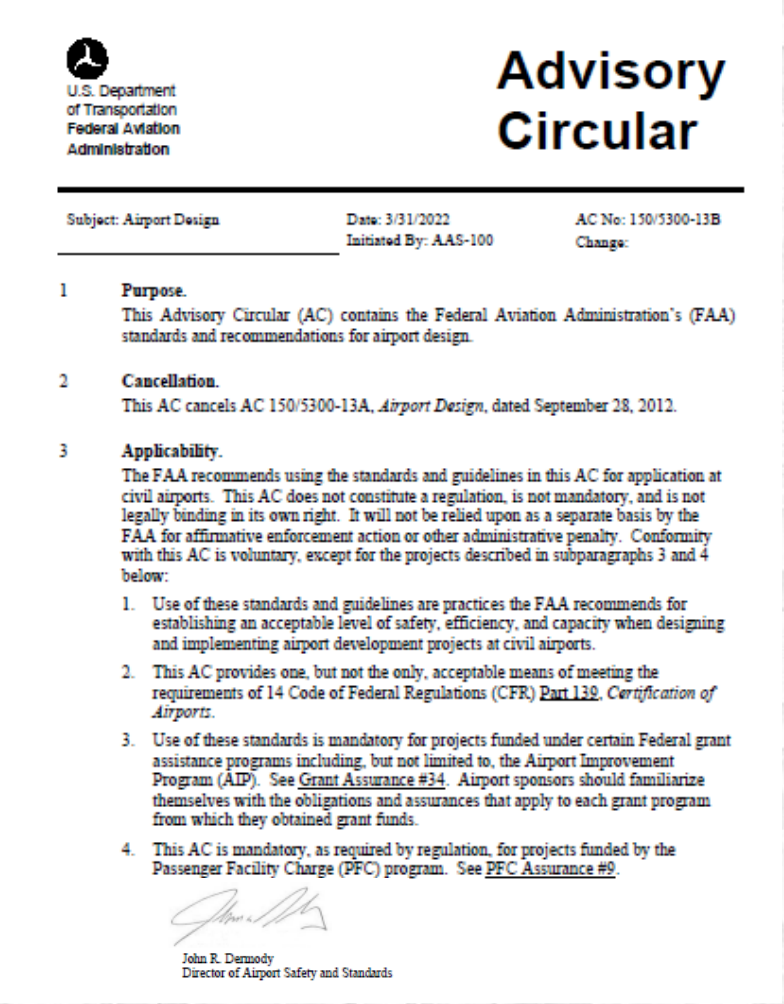
AAS-100 Publications

- Advisory Circulars
- Engineering Briefs
- Orders



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Airport Design | Date: 3/31/2022 | Initiated By: AAS-100 | AC No: 150/5300-13B | Change:

1 **Purpose.**
This Advisory Circular (AC) contains the Federal Aviation Administration's (FAA) standards and recommendations for airport design.

2 **Cancellation.**
This AC cancels AC 150/5300-13A, *Airport Design*, dated September 28, 2012.

3 **Applicability.**
The FAA recommends using the standards and guidelines in this AC for application at civil airports. This AC does not constitute a regulation, is not mandatory, and is not legally binding in its own right. It will not be relied upon as a separate basis by the FAA for affirmative enforcement action or other administrative penalty. Conformity with this AC is voluntary, except for the projects described in subparagraphs 3 and 4 below:

1. Use of these standards and guidelines are practices the FAA recommends for establishing an acceptable level of safety, efficiency, and capacity when designing and implementing airport development projects at civil airports.
2. This AC provides one, but not the only, acceptable means of meeting the requirements of 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*.
3. Use of these standards is mandatory for projects funded under certain Federal grant assistance programs including, but not limited to, the Airport Improvement Program (AIP). See Grant Assurance #34. Airport sponsors should familiarize themselves with the obligations and assurances that apply to each grant program from which they obtained grant funds.
4. This AC is mandatory, as required by regulation, for projects funded by the Passenger Facility Charge (PFC) program. See PFC Assurance #9.

John R. Dermody
Director of Airport Safety and Standards

More than publications:

Engineering tools and videos

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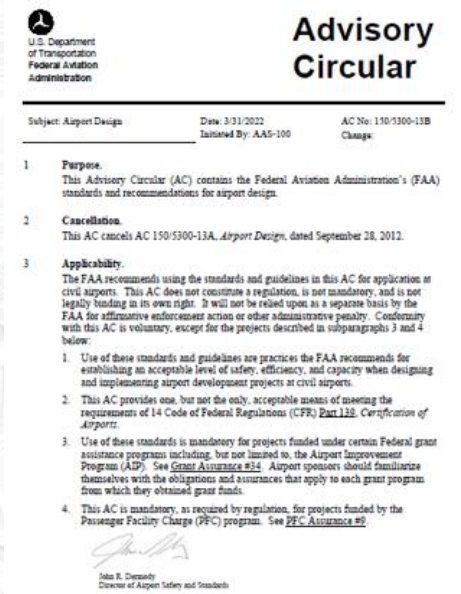
When , How, What, triggers AC updates

- Changes in Aircraft performance/characteristics;
- Progress in technology (AI/Machine Learning);
- Research performed by/ at the Tech Center (ATR);
- Feedback received from:
  - Part 139 ACSIs & State Agencies
  - Region/ADOs
  - Industry (MOS, AC comments etc)
- Can it be addressed in:
  - Errata;
  - Change Set ie change 1; or
  - Engineering Brief



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AAS-100 Publications

- First Phase – The draft is prepared and submitted for internal coordination and discussion (HQ, RO, ADO, and other LOBs)

- 2nd Phase – The updated draft is posted on the FAA website for Industry Review and Comments

- 3rd Phase – The updated draft (QA/QC Review) is submitted to AGC (Legal)
  - They are looking for no over-reaching regulatory authority.
  - "Must" versus "should"
  - "Requirement" versus" recommended", or even" best practice"
- Final "Final" Sr. Management discussion: presented to (AAS-1 & AAS-2) and sometimes to ARP-1 & ARP-2

- Final Version/Package is prepared for AAS-1 signature, website publication and industry notification.

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Advisory Circular Updates

- AC 150/5300-13B, *Airport Design*
  - Published in March 2022
- AC 150/5335-5D, *Standardized Method of Reporting Airport Pavement Strength – PCR*
  - Published in April 2022
- AC 150/5390-2D, *Heliport Design*
  - Published in January 2023
- AC 150/5220-26, *Airport Ground Vehicle Automatic Dependent Surveillance Broadcast (ADS-B) Out Squitter Equipment*
  - Published in March 2023
- AC 150/5300-20 *(New), Submission of On-Airport Proposals for Aeronautical Study*
  - Published in April 2023

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Advisory Circulars “In The Works” (150 Series)

- **5300-18D** - General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards Document Information
- **5345-42K** - Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
- **5345-44L** – Specifications of Runway and Taxiway Signs**5345-46F** - Specification for Runway, Taxiway, Heliport, and Vertiport Light Fixtures (Legal Review)

Advisory Circulars
"Proposed Revision"

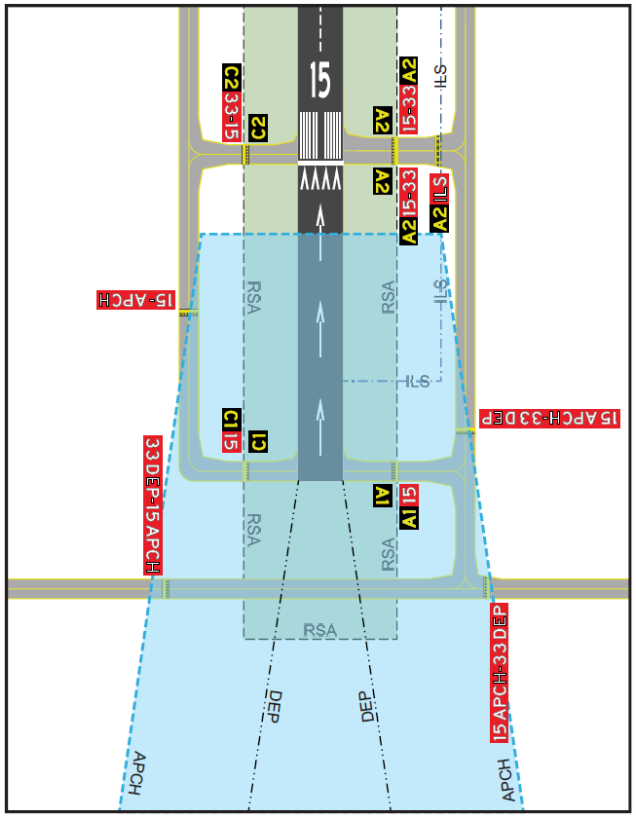
- **5340-1N** Standards for Airport Markings
  - Enhancement of graphics
  - Optimizing of content organization
    - Move images from back to applicable paragraph
  - Uniform heading structure
    - Purpose/Application/Location/Color/Characteristics
  - Character spacing tolerance for surface painted signs

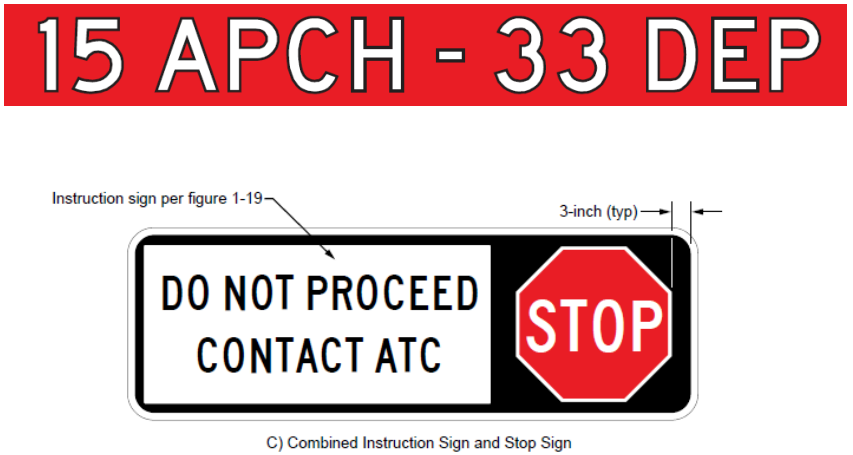
Advisory Circulars
"Proposed Revision"

- **5340-18G, Chg. 2** Airport Sign Systems
  - Enhanced graphics
  - Incorporate EB 89A taxiway naming content
  - Approach/Departure sign guidance
  - Destination signs
  - Vehicle Roadway signs
  - Sign location guidelines

Advisory Circulars
"Proposed Revision"

- **5340-18G, Chg. 2** Airport Sign Systems





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Engineering Briefs “Recently Published

- **EB 103**, EMAS Retroreflective Markers
- **EB 89A**, Taxiway Nomenclature Convention
- **EB 105**, Vertiport Design

Engineering Briefs “In The Works”

- **EB 104**, Supplemental Guidance to AC 5345-44K, Specification for Runway and Taxiway Signs
- **EB XXX**, Low Current Airfield Lighting Architecture (LCALA)
- **EB XXX**, Specifying Blended Cements to Address Carbon Reduction
- **EB-XXX**, Aeronautical Surveys of Heliports
- EB-XXX, Aeronautical Surveys of Vertiports

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Solar Powered Lighting at Casa Grande Municipal Airport

Components

- Airfield Components (total of 46):
  - L-861 Runway Edge/Threshold Lights
  - L-861T Taxiway Edge Lights
  - L-810 Obstruction Lights
  - Elevated Runway Guard Lights
  - Wind Cones
  - Airfield Guidance Signs
- Each component is “decentralized” i.e. each component has its own solar panel and battery charging system
- Two manufacturers
  - SPX
  - AvLite

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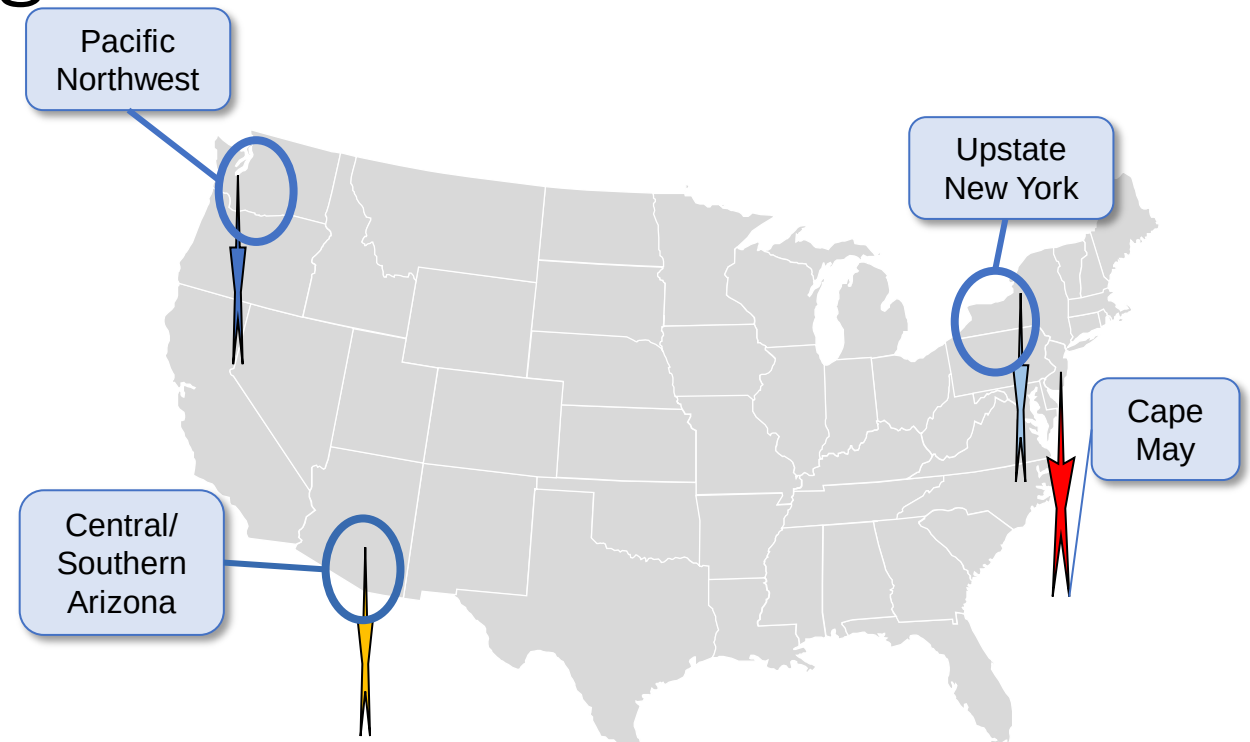
Solar Test Regions and Sites

1. **Cape May (WWD)**
2. Central Upstate New York
   - **Penn Yan (PEO)**
3. Central Arizona
   - **Casa Grande (CGZ)**
4. Pacific Northwest
   - **Olympia (OLM)**



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Operational Update

Cape May 9/1/22 to 8/31/23 (365 Days)				
	B10	B30	B100	Total
Activations	2390	1512	1441	5343
Hours	501	540	520	1561

Penn Yan 9/1/22 to 8/31/23 (365 Days)				
	B10	B30	B100	Total
Activations	2008	1733	1657	5398
Hours	620	509	572	1702

Casa Grande 4/1/23 to 9/30/23 (183 Days)				
	B10	B30	B100	Total
Activations	1040	1102	728	2870
Hours	279	354	260	893

Casa Grande Municipal Airport (CGZ)

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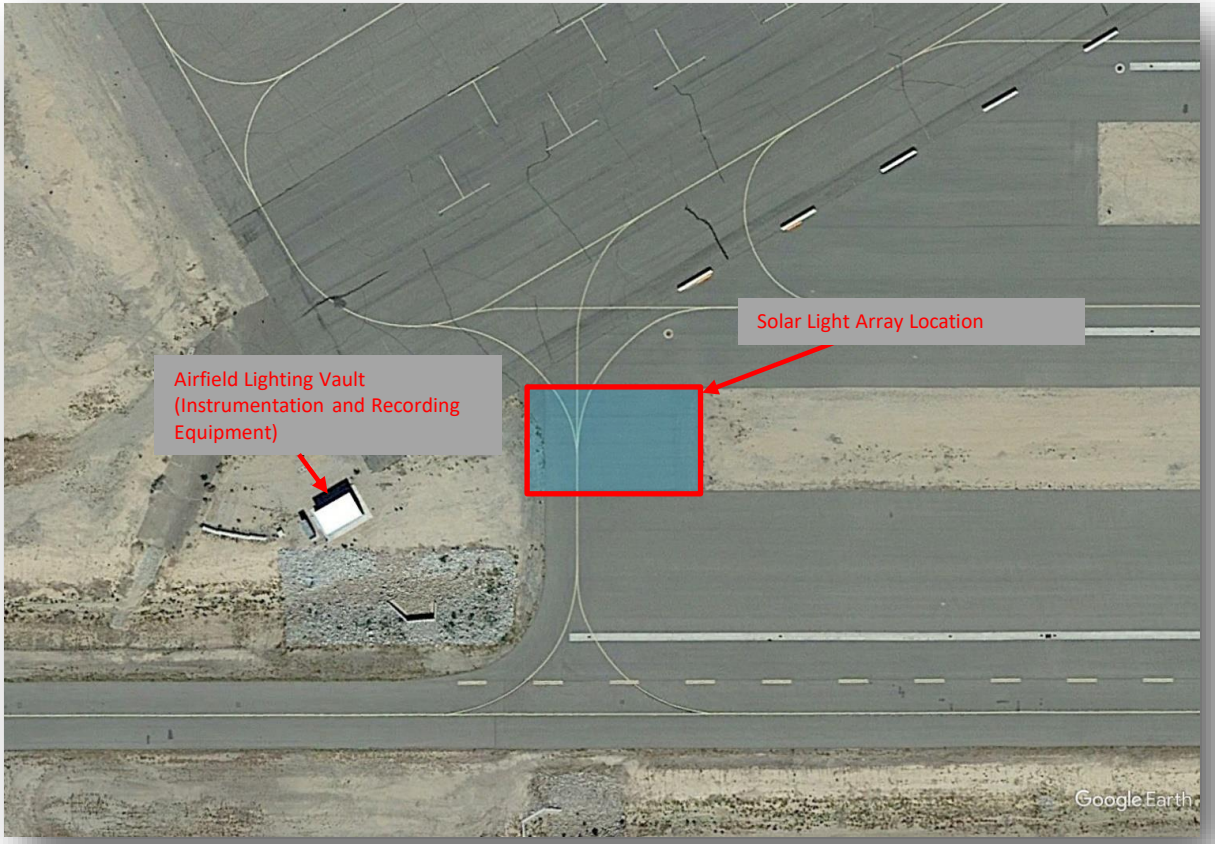
Solar Test Array Location



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Solar Test Array, Casa Grande, AZ

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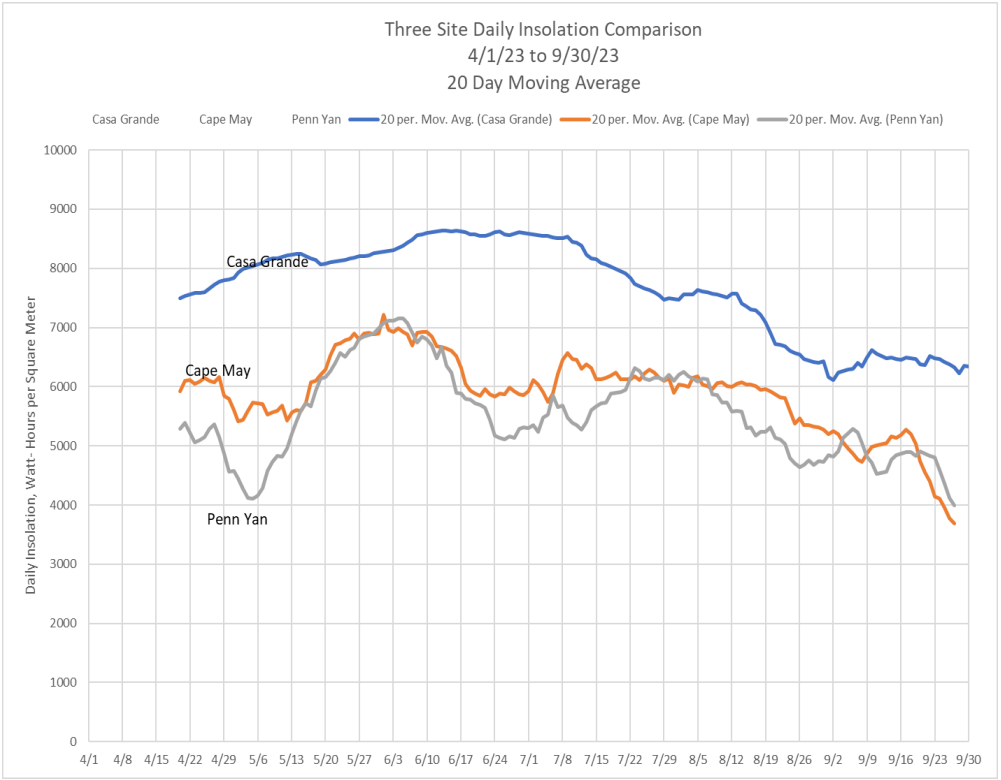
Operations at Casa Grande

- Average Insolation available in Casa Grande is between 1000 and 3000 Watt-Hours per day more than Cape May and Penn Yan for this period
- Temperature peaked at about 113° F but did not seem to impact operation
- Much Less variability in daily insolation levels
- Less energy for battery storage for Cape May and Penn Yan



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Current Observations

- Battery performance appears to be somewhat inconsistent in the two eastern sites (WWD and PEO).
- So far, the lights in Casa Grande have performed well even during high utilization testing (High intensity and Dusk to Dawn operations) but thus far that has been during the sunniest 6 months of the year.
- In some cases, a light of the same type and battery capacity have experienced failed batteries, while the identical light continues to operate long term.
- Taxiway Edge Lights and L810 Obstruction Lights perform more reliably than some of the Runway Lights. This is due to the lower energy draw of these lights as well as a more optimized battery/photovoltaic charging system partnership.

Lighted X Runway Closure Marker NIST Validation

ATR Research

- AAS tasked the Airport Technology Research and Development (ATR) Branch with the following tasks
  - Evaluate NIST findings in a live setting in both daytime and nighttime conditions
  - Investigate the effectiveness of variations to the standard Lighted X method and novel lighting systems to indicate temporary runway closure
- ATR Planned Approach
  - Evaluate NIST results
    - Ground-based testing to identify likely intensities and eliminate unlikely intensities, evaluate the two size form factors, and gather information regarding ideal flash rates
    - Live flight testing is planned to follow the ground-based testing, leveraging the initial findings
- Test Categories
  - Intensity Evaluation (Can you recognize the X shape?)
  - Size Comparison 20-ft and 28-ft (Does the larger X make it more recognizable?)
  - Incandescent and LED RCMs qualitative comparison (How do the two light source technologies differ in perception to pilots?)
  - Flash rate (Is the current 2.5s on – 2.5s off the ideal flash rate?)

NAWCAD Lakehurst Test Site

Intensity Evaluations

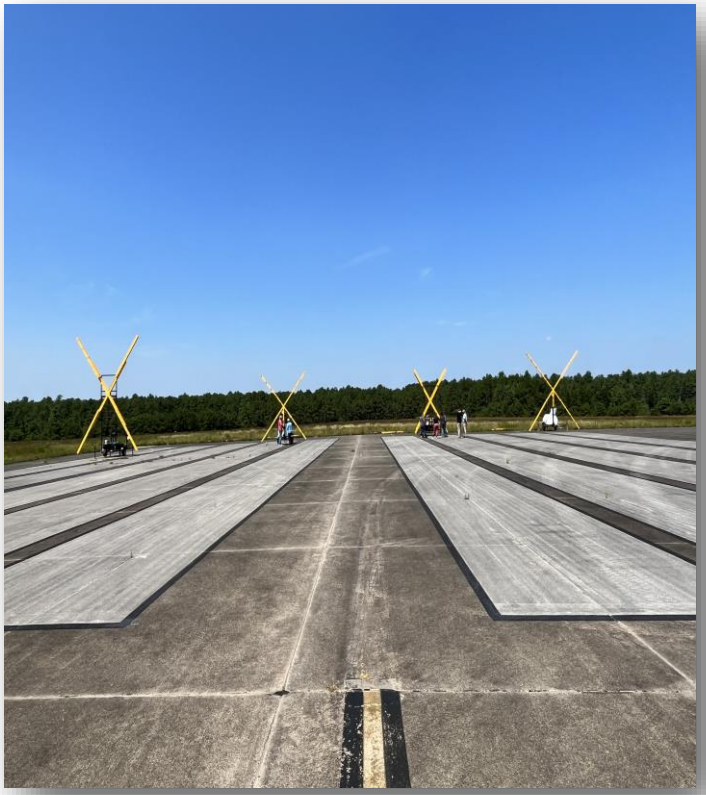
- ✓ **Intensities evaluated**
  - ✓ **70,000cd, 35,000cd, 17,500cd, and 7,000cd**
- ✓ **Intensity Testing Day time**
  - For all LX configurations, 35,000cd and 70,000cd had very good recognition
  - 7,000cd was unfavored across the board between LED/Incandescent and 20ft/28ft
- ✓ **Intensities evaluated**
  - ✓ **200cd, 500cd, 1,000cd, 2,000cd**
- ✓ **Intensity Testing Night time**
  - For all LX configurations, 1,000cd and 2,000cd had very good recognition
  - LED had better visibility at all intensities when compared to Incandescent
  - At 200 cd the recognizability of LX RCMs was average (most RCM) to poor (LED-LX20). These results are inconsistent with those obtained by NIST.

Size Comparison

- ✓ **Evaluation of 20ft vs 28ft Lighted X**
  - ✓ **Pilots were asked two questions**
    - ✓ **Which LX is clearly seen? (both can be chosen)**
    - ✓ **Which LX is more recognizable? (discern the "X" shape)**
- ✓ **Size Comparison Day time**
  - In response to question 1, most observers agree that both LX RCM sizes (20 and 28) were clearly visible at 35k cd and 70k CD.
  - In response to question 2, for Incandescent LX RCMs, LX20 was unanimously voted more recognizable as an "X" with different light intensities during the day.
- ✓ **Size Comparison Night time**
  - In response to question 1, most observers agreed that LX28 was clearly visible across all intensities.
  - In response to question 2, both types of LX28 were unanimously voted more recognizable as X when compared to LX20 across all intensities

Qualitative Comparison

- ✓ **Observers were asked to compare the LED and Incandescent LX of the same size and intensity to evaluate the perceived difference in brightness**
  - ✓ LED LX's intensity was modulated up or down until the observer agreed that the brightness of both LXs are the same.
- ✓ **Of the 12 test cases, 6 were found to be inconclusive. The following results were found:**
  - ✓ Incandescent-LX20 at 17,500 cd has similar brightness as LED-LX20 at 14,994 cd.
  - ✓ Incandescent-LX28 at 17,500 cd has similar brightness as LED-LX28 at 15,425 cd.
  - ✓ Incandescent-LX28 at 35,000 cd has similar brightness as LED-LX28 at 31,125 cd.
  - ✓ Incandescent-LX28 at 70,000 cd has similar brightness as LED-LX28 at 61,525 cd.
  - ✓ Incandescent-LX28 at 1,000 cd has similar brightness as LED-LX28 at 500 cd.
  - ✓ Incandescent-LX28 at 500 cd required no modulation to have similar brightness.



Flash Rate Evaluations

- ✓ **Flash rates evaluated**
  - ✓ **2s/2s, 1.5s/1.5s, 3s/3s, 1s/0.5s, 2.5s/1s, 3s/1.5s**
- ✓ Incandescent LX were set to flash at the standard 2.5s/2.5s for comparison with the variable LED Flash rate
- ✓ Lower intensity values of 200cd (night) and 7000cd (day) were discarded from this analysis.
- ✓ The following Flash rates were found to be most desired
  - ✓ 2.5s/1s
  - ✓ 1s/0.5s
  - ✓ 1.5s/1.5s

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Questions?