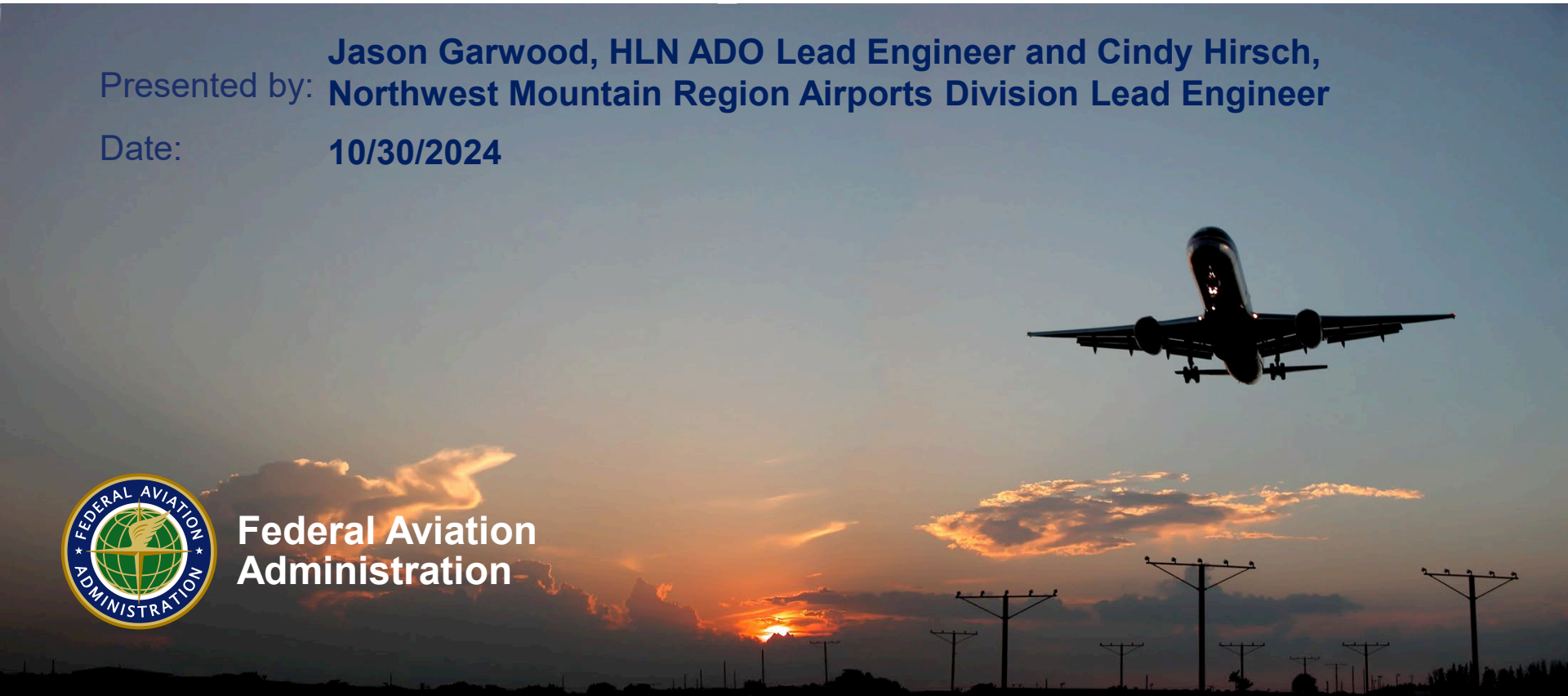
MAMA 2024
Engineering Topics



Presented by: Jason Garwood, HLN ADO Lead Engineer and Cindy Hirsch, Northwest Mountain Region Airports Division Lead Engineer

Date: 10/30/2024

Federal Aviation Administration

Agenda

- Sign Grounding; other field observations
- Pavement Strength Reporting Requirements
- EB 106 – Cement Industry Changes
- AC 150/5370-10J Specs, Draft - Update
- MOSs – Construction Specs & Design
- Problematic Taxiway Geometry
- AC 150/5300-13B Change 1 – Update
- Construction Management Plans
- Life Cycle Analysis (LCA)
- Training Resources

Airfield Sign Grounding

- **150/5340-30J, Design and Installation Details for Airport Visual Aids, Appendix E, E1.4 Equipment Grounding.**

E.1 Electrical Notes.

E.1.4 Equipment Grounding.

1. Ground all non-current-carrying metal parts of electrical equipment by using conductors sized and routed per NEC Handbook, Article 250.

3. Tops of ground rods must be 6 inches (152 mm) below grade.

Airfield Sign Grounding

- **150/5340-30J: Top of ground rods must be 6 inches below grade**
- **150/5300-13B Chg 1 and 139.309 Safety areas: RSA enhances the safety of aircraft that undershoot, overrun, or veer off the runway; no potentially hazardous surface variations**

Airfield Sign Grounding

- **AAS-110 guidance: set rod below grade to prevent tire puncture**
- **AAS-300 direction: for Part 139 airports, grounding rods must be at or below grade**

Asphalt pavement joint sealant range and temperature

- **AC 150/5370-10H, P-605-2.1 specifies use of a sealant meeting ASTM D6690, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.**
- **ASTM D6690 calls out four "types" of material**

an effective seal in moderate climates. The material is tested for low-temperature performance at –18 °C using 50 % extension.

4.2 *Type II*—A joint and crack sealant capable of maintaining an effective seal in most climates. Material is tested for low-temperature performance at –29 °C using 50 % extension.

4.3 *Type III*—A joint and crack sealant capable of maintaining an effective seal in most climates. Material is tested for low-temperature performance at –29 °C using 50 % extension.

4.4 *Type IV*—A joint and crack sealant capable of maintaining an effective seal in climates experiencing very cold temperatures. Material is tested for low-temperature performance at –29 °C using 200 % extension.

Seal coats and snow plows

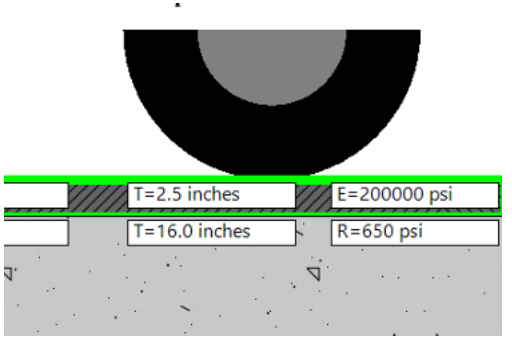
- **Surface Treatment research underway**
  - Not sure any product will be durable against routine steel blade snow plowing, though.

Implementation of PCR Reporting for Airport Pavement Strength

- **AC 150/5335-5D, Standardized Method of Reporting Airport Pavement Strength – PCR**
  Guidance for the reporting of runway, taxiway and apron pavement strength in accordance with standardized International Civil Aviation Organization (ICAO) methods.
- **Aircraft Classification Rating (ACR) gets compared to Pavement Classification Rating (PCR)**
- **PCI values are different – those are pavement condition values – see AC 150/5380-5B, Airport Pavement Management Program (PMP)**

Implementation of PCR Reporting for Airport Pavement Strength

- AC 150/5335-5D calculates pavement strength using the new ICAO ACR-PCR method and FAARFIELD 2.1.
- Replaces ACN-PCN method.



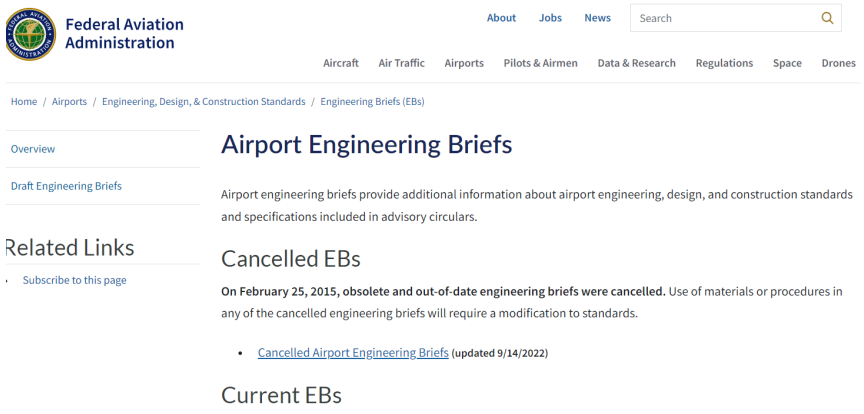
- Has requirements for public use airports to report PCR values in the Airport Master Record (AMR)/5010 in ADIP based upon the obligations the U.S. has under international agreement with ICAO
- Excludes pavements for aircraft less than 12,500 pounds
- AC still asks for reporting by gross weight and gear configuration

Implementation of PCR Reporting for Airport Pavement Strength

- **Part 139 runway: must report PCR by the updated date November 28, 2024**
- **AIP/PFC funded paving project: need to generate a PCR value with project; report runway values in AMR**
- **It is AIP eligible to generate PCRs in MPU and Pavement Management Program according to the AIP Handbook**
- **For more info and letter to sponsor go to AC home page: https://www.faa.gov/airports/resources/**
- **advisory_circulars/index.cfm/go/document.current/documentnumber/150_5335-5**

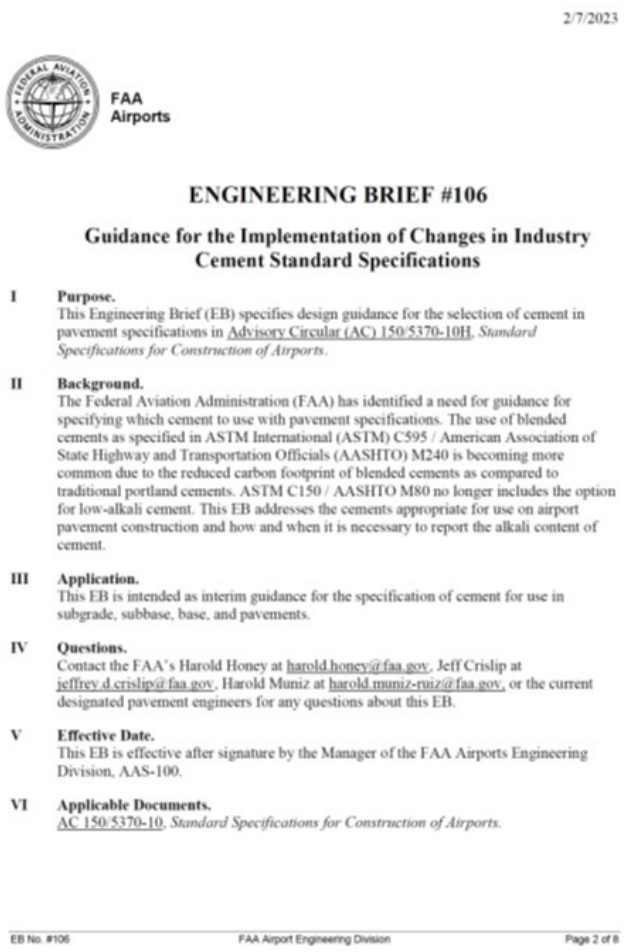
EB 106 – Changes in Industry Cement Standard Specifications

- **Updates the specification of cement for use in pavement subgrade, subbase, base, & surface course, and in structural concrete**
  - Which cements are appropriate for use on airfield
  - How and when it is necessary to report the alkali content of concrete
  - Edit P-153, P-207, P-220, P-307, P-501, P-610



EB 106 – Changes in Industry Cement Standard Specifications

- **Why the changes?**
  - Industry moving to use of limestone blended cements
  - ASTM C150 / AASHTO M80 no longer includes the option for low-alkali cement
  - ASTM C595 has added a special property designation, HE, for high-early strength.



2/7/2023

FAA
Airports

ENGINEERING BRIEF #106

Guidance for the Implementation of Changes in Industry Cement Standard Specifications

I **Purpose.**
This Engineering Brief (EB) specifies design guidance for the selection of cement in pavement specifications in Advisory Circular (AC) 150/5370-10H, *Standard Specifications for Construction of Airports*.

II **Background.**
The Federal Aviation Administration (FAA) has identified a need for guidance for specifying which cement to use with pavement specifications. The use of blended cements as specified in ASTM International (ASTM) C595 / American Association of State Highway and Transportation Officials (AASHTO) M240 is becoming more common due to the reduced carbon footprint of blended cements as compared to traditional portland cements. ASTM C150 / AASHTO M80 no longer includes the option for low-alkali cement. This EB addresses the cements appropriate for use on airport pavement construction and how and when it is necessary to report the alkali content of cement.

III **Application.**
This EB is intended as interim guidance for the specification of cement for use in subgrade, subbase, base, and pavements.

IV **Questions.**
Contact the FAA's Harold Honey at harold.honey@faa.gov, Jeff Crislip at jeffrey.d.crislip@faa.gov, Harold Muniz at harold.muniz-ruiz@faa.gov, or the current designated pavement engineers for any questions about this EB.

V **Effective Date.**
This EB is effective after signature by the Manager of the FAA Airports Engineering Division, AAS-100.

VI **Applicable Documents.**
AC 150/5370-10, *Standard Specifications for Construction of Airports*.

EB No. #106 FAA Airport Engineering Division Page 2 of 8

EB 106 – Use of Blended Cements

- **Industry transition from ASTM C150 cements to ASTM C595 blended cements**
- **FAA has allowed Type IL cement since 2014; the EB just clarifies the use of it.**
- **The engineer should verify the availability of cements in the project area; not all cements are available in all regions.**
- **Generally, blended cements are acceptable to use in place of ASTM C150 plain cements, on a 1:1 replacement.**

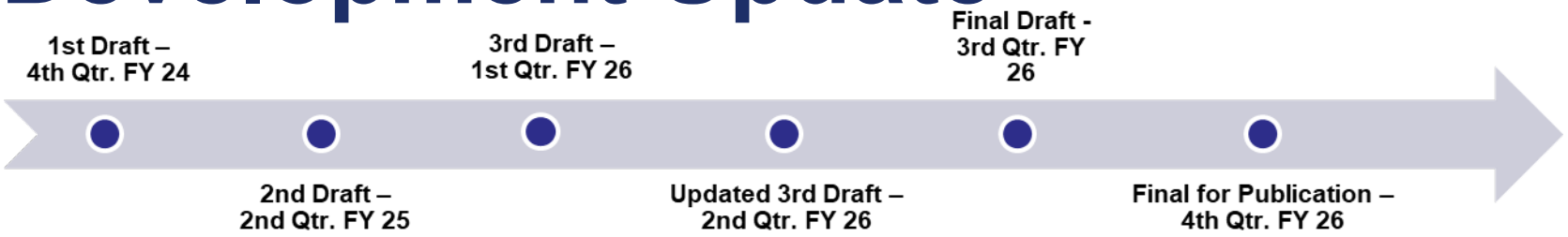
EB 106 – Alkali Loading

- **Earlier thinking - keeping alkali content of cement below certain level, alone, could limit alkali-silica reaction (ASR)**
- **Found that need to consider alkali content in cement and cement content of the concrete.**
- **In 2019, ASTM removed low alkali cement designation from C150 and C595**
  - manufacturer reports equivalent alkali content
  - EB 106 removes old reference to “low alkali cement” from language in P-501 & P-610

EB 106 – Alkali Loading

- **When to Limit Alkali Loading of Concrete Mixture?**
  - When either the fine or coarse aggregate to be used in P-501 or P-610 is potentially reactive (ASTM C1260), limit the alkali loading of the concrete mixture to be less than or equal to 3.0 lb/yd3
  - Contractor must compute cement alkali load as part of mix design
    - EB explains how to compute alkali load
    - If load is too high, they must reduce cement or replace with lower alkali cement

AC 150/5370-10J Standard Specs Development Update



- 1st Draft: internal FAA review & coordination with HQ, Regions, and other LOBs.
- 2nd Draft: provide to industry for review & comment
- 3rd Draft: submit to FAA legal (AGC) for initial review/comment
- Updated 3rd Draft: submit for QA/QC Review
- Final Draft: present to ARP management
- Final Package: prepare for signature & publication

AC 150/5370-10J Standard Specs Top Proposed Changes

Misc

- Provides individual specification files
- Removes smoothness requirement for testing subgrade, subbase, and base layers
- Provides a single Stabilized Drainable Base Course specification with options to stabilize with either cement or asphalt
- Adds Rubblized Concrete Pavement Base Course
- Deletes P-403
- Provides specification for construction safety items
- Clarifies and broadens use of state mix in P-610

AC 150/5370-10J Standard Specs Top Proposed Changes

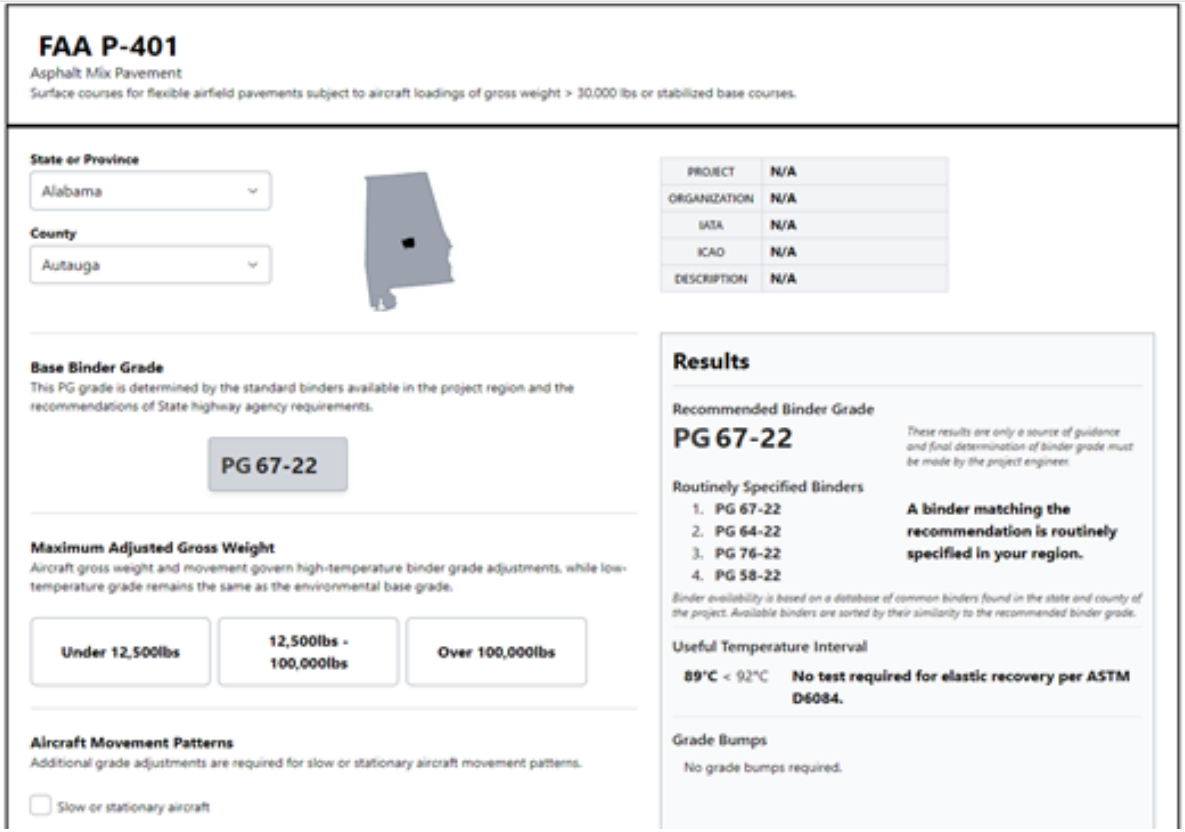
P-401:

- Incorporates language referencing asphalt binder selection tool developed under AAPTP
- Directs use of same binder for all lifts
- Requires QC to sample and test asphalt binder
- References only Superpave methodology for Job Mix Formula (AAPTP research)
- Provides a warm mix option
- Includes both Asphalt Pavement Analyzer (APA) and Hamburg Wheel Tracking Test
- No anticipated changes to the tolerance limits for PWL calcs (mat density, joint density & air voids)

AC 150/5370-10J Standard Specs Top Proposed Changes

Binder Tool:

https://www.airfieldasphaltbinder.org/



AC 150/5370-10J Standard Specs Top Proposed Changes

P-501:

- Removes requirement for ASTM C1260 Testing
- Revises design strength to be 90-day strength; acceptance strength based upon 14-day correlation.
- Clarifies when new mix design is required and what changes require either a new trial batch or a new mix design
- Adds QC tests for water-cement ratio and flexural strength
- Fly Ash: various incl removing replacement limits
- Incorporates guidance on referee testing

MOSs – Construction Specs

- **Upload supporting information:**
  - Design report & Geotech report
  - Related source materials (state specs, cut sheets)
  - Supporting details and plans
- **Provide track changes version of spec**
- **Provide cross walk document if complex**
  - Demonstrates covered everything from FAA spec
  - Provides justification for changes
  - Traces source material for changes/edits

Will entertain all reasonable requests/need for AIP projects

MOSs - Use of State Materials

Requesting a MOS/need ADO concurrence, include justification & provide the following:

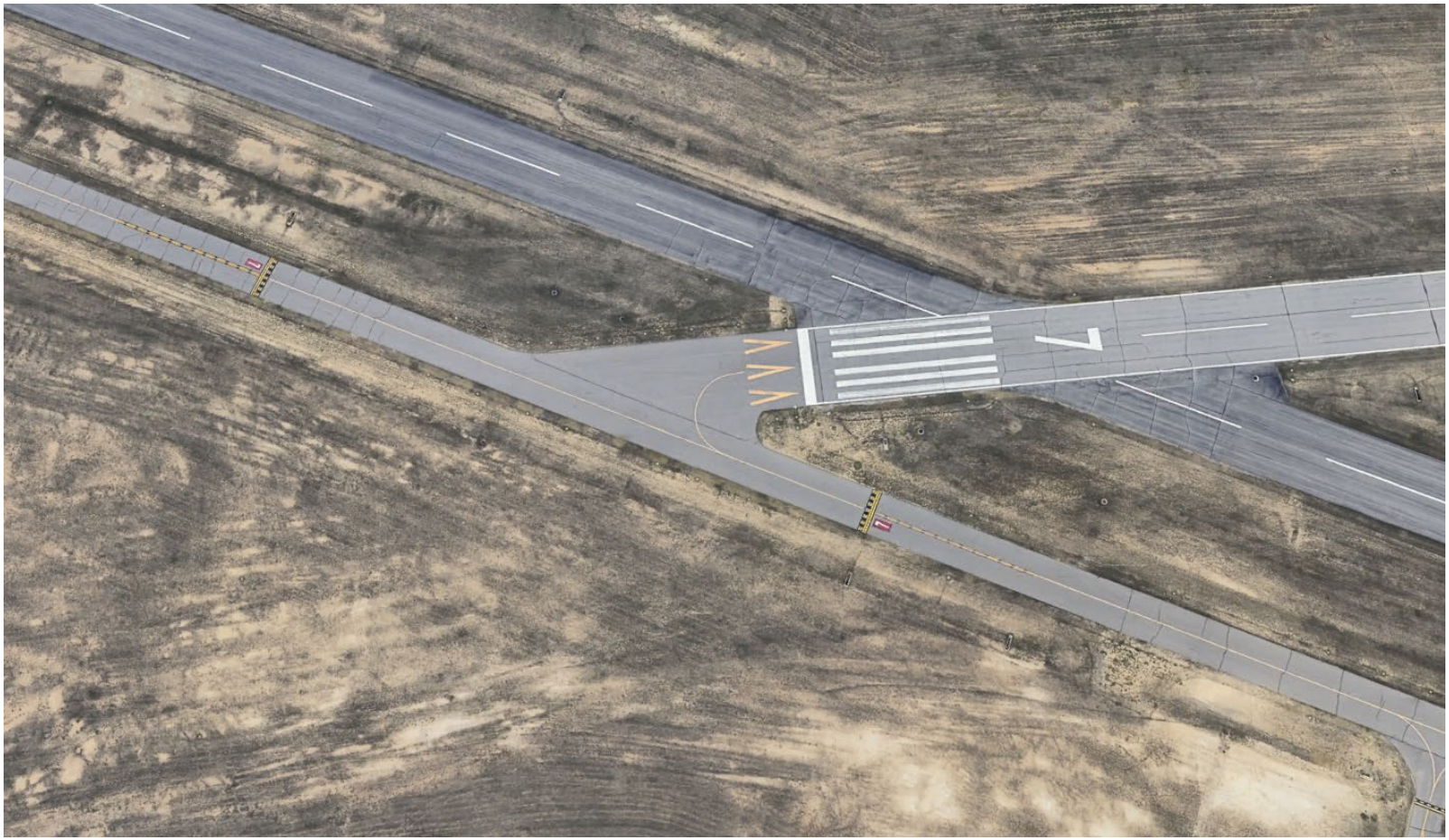
- Design report with pavement design
- Info re materials properties (modulus) derivation
- Specific considerations re high tire pressure aircraft
- Crosswalk of info in the spec to its sources
- Crosswalk to FAA sections if spec in different format
- Provide copies of State Standard Specifications sections that are referenced

MOSs – Design

- **Rehabilitation vs Reconstruction**
  - Not an automatic free pass on addressing a non-standard condition
  - Economy, durability, all considered
  - Need to demonstrate an “acceptable level of safety”
    - Includes layout/geometry
- **Need if not meeting full group (ADG or TDG)**
- **MOS for non-standard condition as part of an AIP funded project**
  - Requires time to coordinate with Flight Standards
  - Need Airspace case for the non-std condition
- **MOS is not permanent, not a waiver, not a permit**

Airport Design – Problematic Taxiway Geometry

Airport Design – Problematic Geometry



Airport Design –AC 150/5300-13B Change 1 – geometry resources

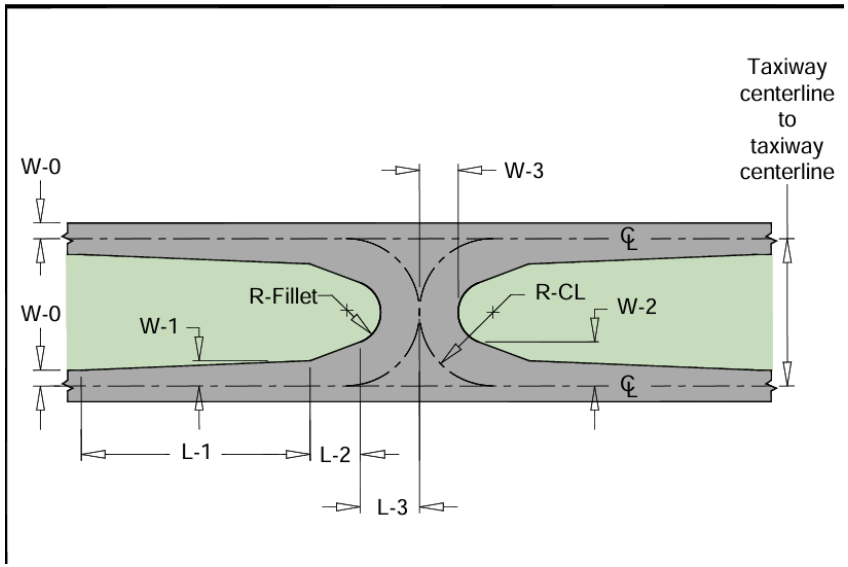
- **4.3 Taxiway and Taxilane Design Concepts and Considerations**
- **Appendix J Taxiway Additional Information**
  - Additional information and guidance on taxiway fillet design
  - Discussion and examples of taxiway geometries with elevated runway incursion and other safety risks.

Airport Design –AC 150/5300-13B Change 1 – geometry resources

- **RIM Tool in ADIP – incursion information for all towered airports**

Airport Design –AC 150/5300-13B Change 1 – other changes

- **Crossover taxiway with direction reversal – removed tables in Chapter 4**
  - Use full design group fillet – see Appendix J
  - Meet the gear track plus TESM (establish by running aircraft in both directions)
  - Fit best curve
  - Minimizing excess pavement.
  - Design review required but no MOS



Airport Design –AC 150/5300-13B Change 1 – other changes

- **Appendix J Taxiway**
  - Updated TDG Tables for Common Intersection Angles
  - Added a critical aircraft TOFA calculation

J.4.3 Example: Critical Aircraft TOFA Calculation.

If an airport or part of an airport is space-constrained, modifying the standard TOFA (or TLOFA) to accommodate a specific aircraft may be necessary. For example, calculating the TOFA for a B767-300 using the values in Table J-9:

1. B767-300 wingspan = 156.08 ft (47.6 m); or ½ wingspan = 78.04 ft (22.6 m)
2. This aircraft is an ADG IV aircraft, therefore:
   a. Lateral Deviation is 15 ft (4.6 m)
   b. Safety Buffer is 21 ft (6.4 m)
3. ½ TOFA for B767-300 = 78.04 ft (22.6 m) + 15 ft (4.6 m) + 21 ft (6.4 m) = 114.04 ft (34.8).
4. The resulting full TOFA dimension for a B767-300 is 228.1 ft (69.5 m).

Be mindful of rounding dimensions too early in the calculation, as the resultant TOFA dimension may not be sufficient. The TLOFA calculation process is the same as above, using the values in Table J-10.

Construction Management Program (CMP)

- **AIP Handbook Section 5-33**
  - Required when total pavement construction contract value is over $500,000
  - Total costs of the pavement structure include subgrade, base and subbase courses, and surface course
  - Must be submitted to the ADO prior to start of construction
  - ADO option to require a CMP for paving projects $500,000 or less

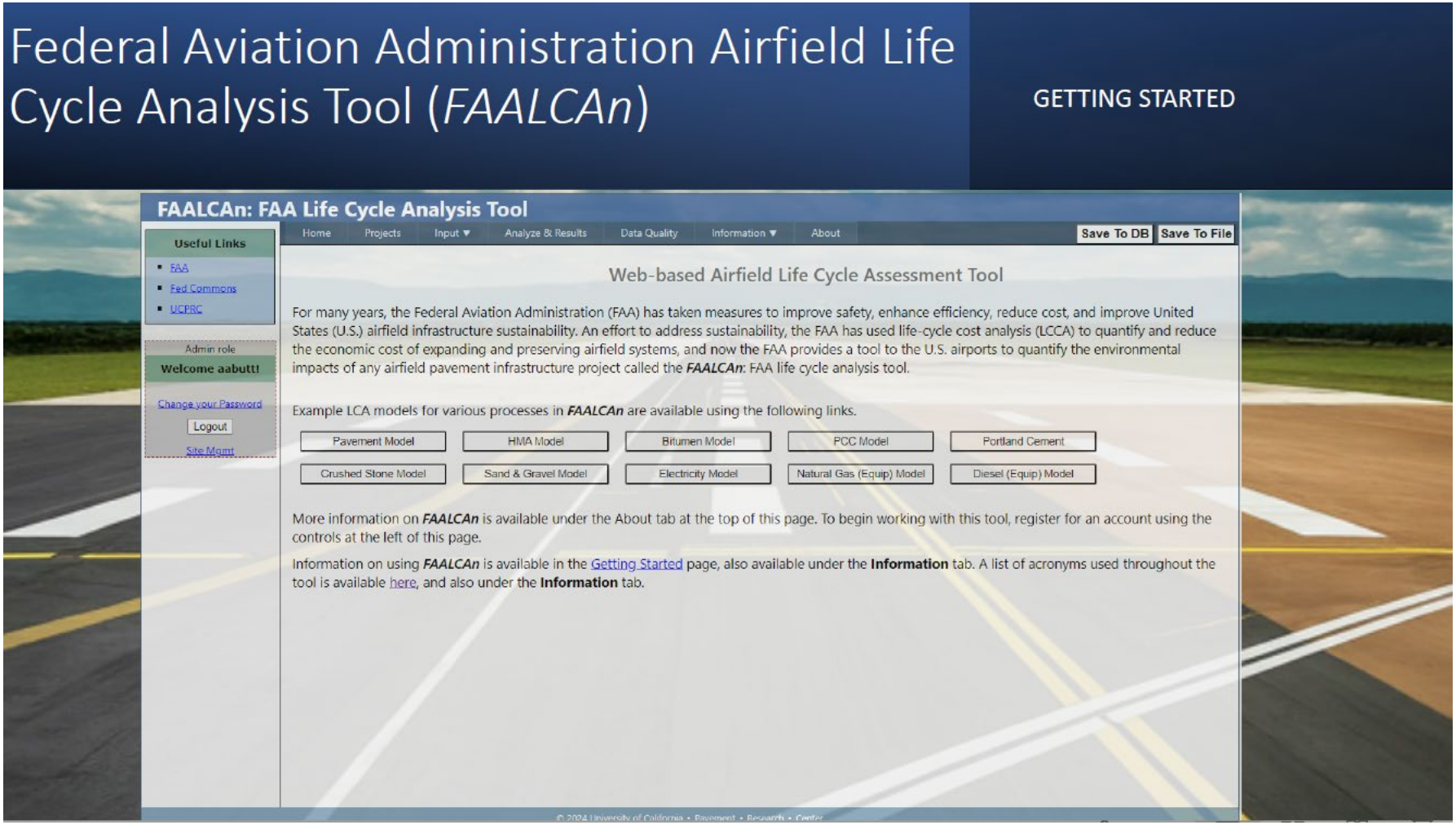
Construction Management Program (CMP)

- **AC 150/5370-12B, Quality Management for Federally Funded Airport Construction Projects**
  - CMP is a stand-alone document separate from the contractor's quality control program
  - Minimum requirements for a CMP provided in Appendix A
  - Sample CMP template: http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5370-12
  - Post Construction
    - Sponsor to provide summary of the quality assurance test results and disposition of any problem results

Life Cycle Assessment (LCA)

- **LCA = Life Cycle Assessment**
- **FAALCAn is a web-based airfield life cycle assessment (LCA) tool with the capability to model the life cycle of a pavement project.**
- **Material, construction equipment, and transportation vehicles modeled to assess environmental impacts and costs**
- **Currently, decisions regarding airfield infrastructure do not require using LCA**
- **Need pavement sections to test tool**

LCA Pavement Analysis Tool



Training Resources

- **Airport Design videos available on national FAA Airports Division website**
- **Airport Pavement FAARFIELD videos are available on FAA Airports Division website**
- **FAA participates in external mtgs including:**
  - American Concrete Pavement Association (ACPA) Best Practices in Airfield Paving Workshop, November 5-7, 2024 in Orlando
  - Asphalt Institute Airport Pavement Technical Workshop, December 3-5, 2024 in Indianapolis
  - Various Airport Consultants Council (ACC)