Airport Concrete Pavement Technology Program

IOWA STATE UNIVERSITY
Institute for Transportation

ACPTP
Airport Concrete Pavement Technology Program

National Concrete Pavement Technology Center
Tech Center

Background

The objectives of the Agreement are:

- To identify airport pavement issues and problems
- To solve problems
- To pursue the technology transfer of new solutions and practices

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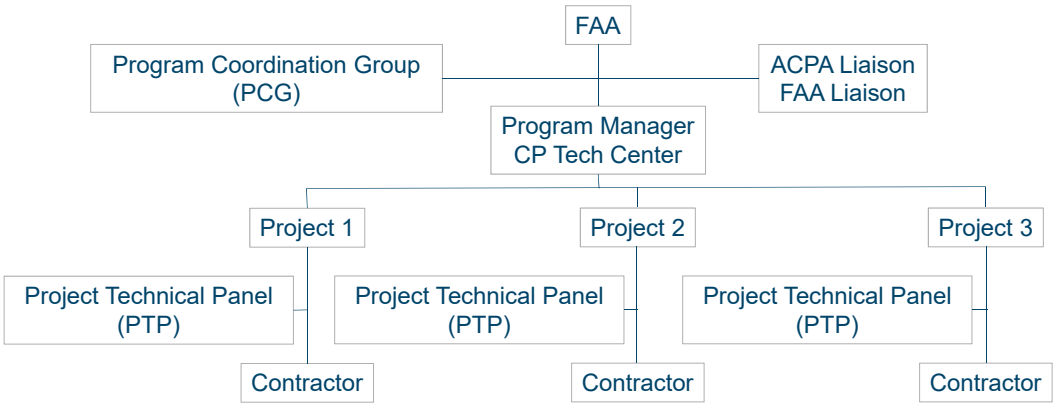
Structure



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Role of PCG

- Identify airport pavement issues and problems
- To recommend priorities
- Review findings of the program and recommend
  - Avenues of further research
  - Technology transfer for implementation
- Direct course corrections

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PCG

• Brian Olsen	National Association of State Aviation Officials
• Jack Christine	American Association of Airport Executives
• Christopher Oswald	ACI—NA
• Arthur (JJ) Morton	Airport Consultant Council
• Martin Holt	American Concrete Pavement Association
• Priyanka Sarkar	Boeing
• Craig Rutland	Air Force and Tri-Services
• Anthony Cochran	FAA
• Harold Honey	FAA Liaison
• David Brill	FAA
• Gary Mitchell	ACPA Liaison

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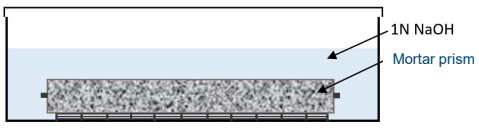
1: Mitigation Procedures for ASR

Background

- ASR was significant in 1990's-2000's
- New deicers did not help
- Class F fly ash has helped, but is becoming hard to find
- Test protocols are not ideal



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1: Mitigation Procedures for ASR

Needed:

- Test methods /Guidance to assess acceptability / risk of a given aggregate
  - Constraints
    - Fast
    - Reliable
    - Cost effective
- Guidance on preventative actions

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1: Mitigation Procedures for ASR

- 10 proposals received
- Contract signed with Oregon State University
- 39 Months

Oregon State University

TEXAS The University of Texas at Austin

UNB EST. 1785 UNIVERSITY OF NEW BRUNSWICK

RJ LEE GROUP DELIVERING SCIENTIFIC RESOLUTION

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2: Performance Engineered Mixtures

Background

- Research is on-going for performance engineered mixtures for highway pavements.
- Needs for mixture design for highways and airfield are different.
- These differences need to be evaluated, understood, and cataloged.
- Procedures and best practices for concrete mixture optimization for airfield pavement needs to be developed and included in airfield concrete specifications

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2: Performance Engineered Mixtures

Needed:

- Define critical needs
- Identify tests and limits
- Proportioning tools
  - ACI 211
  - Void ratio
  - others

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2: Performance Engineered Mixtures

- 9 proposals received
- Contract in place with Oklahoma State University, Tyler Ley
- 39 Months

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3: Rapid Repair and Rehabilitation

Background

- Last guide on Accelerated Airfield Concrete Pavement Rehabilitation and Reconstruction published in 2002
- Closures must be minimized
- New materials and processes are available
- Research is needed to develop best practices for rapid rehabilitation using current technologies

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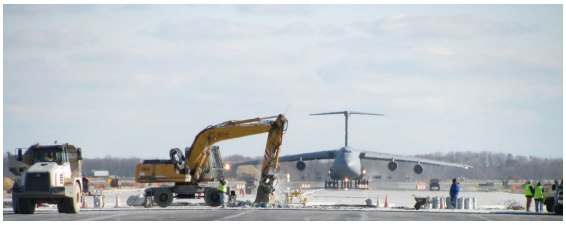
3: Rapid Repair and Rehabilitation

Constraints
- Closure time – opening to traffic
- Traffic
- Connections

Guidance needed
- Selection criteria
- Full depth design and detailing
- Materials and mixtures
- Construction practices



ARA

3: Rapid Repair and Rehabilitation

- 6 proposals received
- Contract in place with ARA, Scott Murrell
- 39 Months

ARA

Kiewit

Senseney Engineering, LLC

4: Quality Control and Quality Acceptance

Background

- 2019 FAA Updated AC 150/5370-10 and added a section and pay item for Quality Control
- Quality Control/Acceptance still misunderstood
- Sources of dispute (e.g., beams, placing & consolidation, finishing & curing, CF/WF requirements, etc.)
- Quality Control plan requirements

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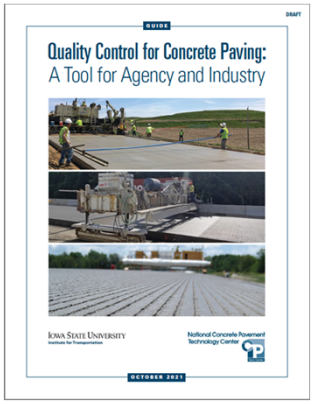
4: Quality Control and Quality Acceptance

- Define and document Quality Control parameters
  - Workability
  - Aggregate stability
  - Potential durability
  - Shrinkage
  - Cold weather resistance
  - Others?
- Distinguish and Separate Quality Control from Quality Acceptance?
- Implementation guidance —Quality Control Manual



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4: Quality Control and Quality Acceptance

- 5 Proposals received
- Contract in place with University of North Carolina - Charlotte, Tara Cavalline

UNIVERSITY OF NORTH CAROLINA CHARLOTTE | SQUARE ONE PAVEMENT CONSULTING LLC | NCE | HI WAY PAVING | *Doug Johnson, Consultant* | TIGERBRAIN ENGINEERING

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5: Rubber Removal Best Practices

Background

- Rubber builds up quickly on airfield pavement
- Impacts runway friction
- Runways much be shut down to remove rubber
- Must use high water pressure or chemicals which damage pavement
- No standard specification

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5: Rubber Removal Best Practices

- When is action needed?
- How is rubber best removed?
- How much removal is enough?
- What about damage to the pavement?

Honey

5: Rubber Removal Best Practices

- 2 Proposals received
- Contract in place with ARA, Aaron Pullen

6: Effects of Diamond Grinding

Background:

- What should be the limitations on grinding?
- Grind vs remove and replace?
- Thickness reduction impacts
- Friction impacts
- Durability
- Other concerns

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6: Effects of Diamond Grinding

- 5 Proposals received
- Contract in place with NCE, Tom Van Dam

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7: Design and Performance of Thin Concrete Airfield Pavement

Background:

FAA Advisory Circular (AC) 150/5320-6G has a minimum thickness of 6”. Thinner sections and smaller panels may be acceptable for GA airports.

The overall goal of this project is to examine performance of GA airfield concrete pavements less than nine inches thick

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7: Design and Performance of Thin Concrete Airfield Pavement

- 4 Proposals received and under review

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8: Paving Continuity

Background:

- Consistent paver speed contributes to improved:
  - Smoothness
  - Consolidation
  - Air void system
  - Others?
- Response to delivery inconsistencies is up for debate:
  - How slow is too slow?
  - Is it better to slow paver speed, or stop
  - Should vibrator speed be linked to paver speed?

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8: Paving Continuity

RFP Being developed

Considering building a test section and monitoring effects of:

- Stopping and starting
- Too fast
- Too slow
- Vibrator speed

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9: Resilience

- Flooding is increasingly likely
- How do we design to:
  - Minimize impacts
  - Rapidly return to service
- Retrofitting?
- Considering instrumenting an at-risk airfield…
- Panel being assembled

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Coming Up…

- Fatigue/stress measurement
- What we did right
- Curing Practices
- Bond breakers
- Innovative materials (external)

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Coming Up…

- Tech transfer products in development
  - Limestone cements
  - Strength measurements
  - Admixtures
  - Sustainability – reduced carbon footprint
    - EPD primer/life cycle analysis
    - Current technologies
    - Clinker reduction
    - Electric vehicles
    - Recycled concrete aggregates

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Coming Up…

- The good news:
  - 41 proposal received
- The challenge:
  - Staying on top of it all
  - Herding the panels
- More to come!
  - Ideas?

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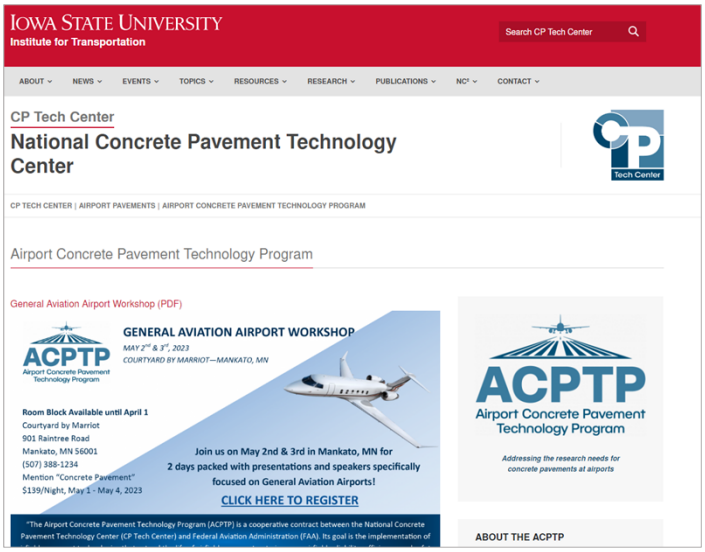
Web Site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Join us on May 2nd & 3rd in Mankato, MN for
2 days packed with presentations and speakers specifically
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"The Airport Concrete Pavement Technology Program (ACPTP) is a cooperative contract between the National Concrete Pavement Technology Center (CP Tech Center) and Federal Aviation Administration (FAA). Its goal is the implementation of
ACPTP
Airport Concrete Pavement Technology Program
Addressing the research needs for concrete pavements at airports
ABOUT THE ACPTP

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