2016 ACC Airports Technical Workshop: Permeable Bases

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#AirportsTechnical
Overview – Permeable Bases

• Why are they needed?
• When are they needed?
• Where are they needed?
• Evolution of permeable base design and construction
• What is the FAA history with use of drainable layers?
• What are possible emerging drainage layer technologies?
• Summary
Permeable Bases – Why?

- What are the three top reasons pavements fail?
  - Water !
  - Water !!
  - Water !!!

Through permeable surface

From edge

Vapor movements

Capillary movement from water table

Water table
Permeable Bases – When?

• USA Climatic Zones
  • Wet – Freeze
  • Wet – Nonfreeze
  • Dry – Freeze
  • Dry – Nonfreeze

• Review Local Historical Weather Data
Permeable Bases – When?

• Water Table Depth

• Natural Drainage Characteristics
  • Fill and subgrade soil gradations
  • Topographic elevations and slopes

• Geology
  • Rock layers
  • Perched water
Permeable Bases – Where?

- FAA AC 150/5320-5D, Appendix G
Permeable Bases – Where?

• Another Hub Airport
Permeable Base - Design Evolution

• FAA AC 150/5320-5D, Appendix G
  • **Permeable Base** - An open-graded, granular material with most of the fines removed (< 10% percent passing # 16 sieve) to provide high permeability (> 1,000 ft/day).

  • **Open Grade Material** (OGM) - A granular material having a very high permeability (> 5,000 ft/day) which may be used for a drainage layer. Such a material will *normally require stabilization* for construction stability or for structural strength to serve as a base in a flexible pavement.

• Designs have moved to much lower permeability – reducing erosion potential

• Tradeoff between higher permeability and decreased strength/durability
FAA Drainage Layer History

• If Required, Design Relies on Unbound Granular Layer Permeability
  • P-209 and P-209
  • Percentage of fines may be greater than 5 percent passing #200 sieve

• Innovative Pavement Research Foundation (IPRF)
  • Joint sponsorship by FAA and ACPA to produce applied research products
  • 2005 Design and Construction Guide for Stabilized and Drainable Base for Rigid Pavement
  • No current P-Spec for stabilized drainable base in AC 150/5370-10G
    • Modification to Standard
    • 10H may include Stabilized Base Permeable Base P-Spec addition
Emerging Technologies

- Two-layers with Two Permeability Rates
  - AC Section Key Benefit – Rutting Resistance (Hamburg Wheel Tested)
  - PCC Section Key Benefit – Drainage above and below both permeable bases
Emerging Technologies

• Fabric Drainage Layer Between PCC and Stabilized Base
  • Approximately $\frac{1}{4}$ inch thick, often used as a bond-breaker
  • Folds into subsurface edge drains
Emerging Technologies

Fabric Drainage Layer
Questions?
Questions?

Thank you
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