CAPTG 2005 Workshop

Pavement Layout and Design Issues with New Aircraft

Presentation to CAPTG Annual Airfield Pavements Workshop
September 11, 2005
by

George Nowak, P. Eng.
Deputy Practice Manager, Canada

Hatch Mott MacDonald

Topics

- New Aircraft Types
- New Aircraft Geometry
- Ground Maneuvering Issues
- New Aircraft Loading and Tracks
- Old Joints/New Aircraft
- Future Pavement Design Technology

New Aircraft Types

- A340-600 (now) Code E
- B777-300ER/200LR (now) Code E
- A380-800/F (2006/7) Code F
- B787-3/8/9 (2008/10) Code D/E
- A350-800/900 (2010) Code E

New Aircraft Geometry

Aircraft	Wheel Base (m) (To widest track)	Track width (m) (C/C))	Track width (m) (Outside wheels)
B 747- 400	24.07 m	11.0 m	12.5 m
A340- 600	32.889 m	10.684 m	12.081 m
B777- 200 LR B777- 300 ER	25.89 m 31.22 m	10.97 m 10.97 m	12.90 m 12.90 m
A380- 800 (Body gear – tridem)	28.606 m	12.456 m 5.264 m	14.336 m 7.344 m
B787- 8	23 m +/-	10 m +/-	11.5 m +/-

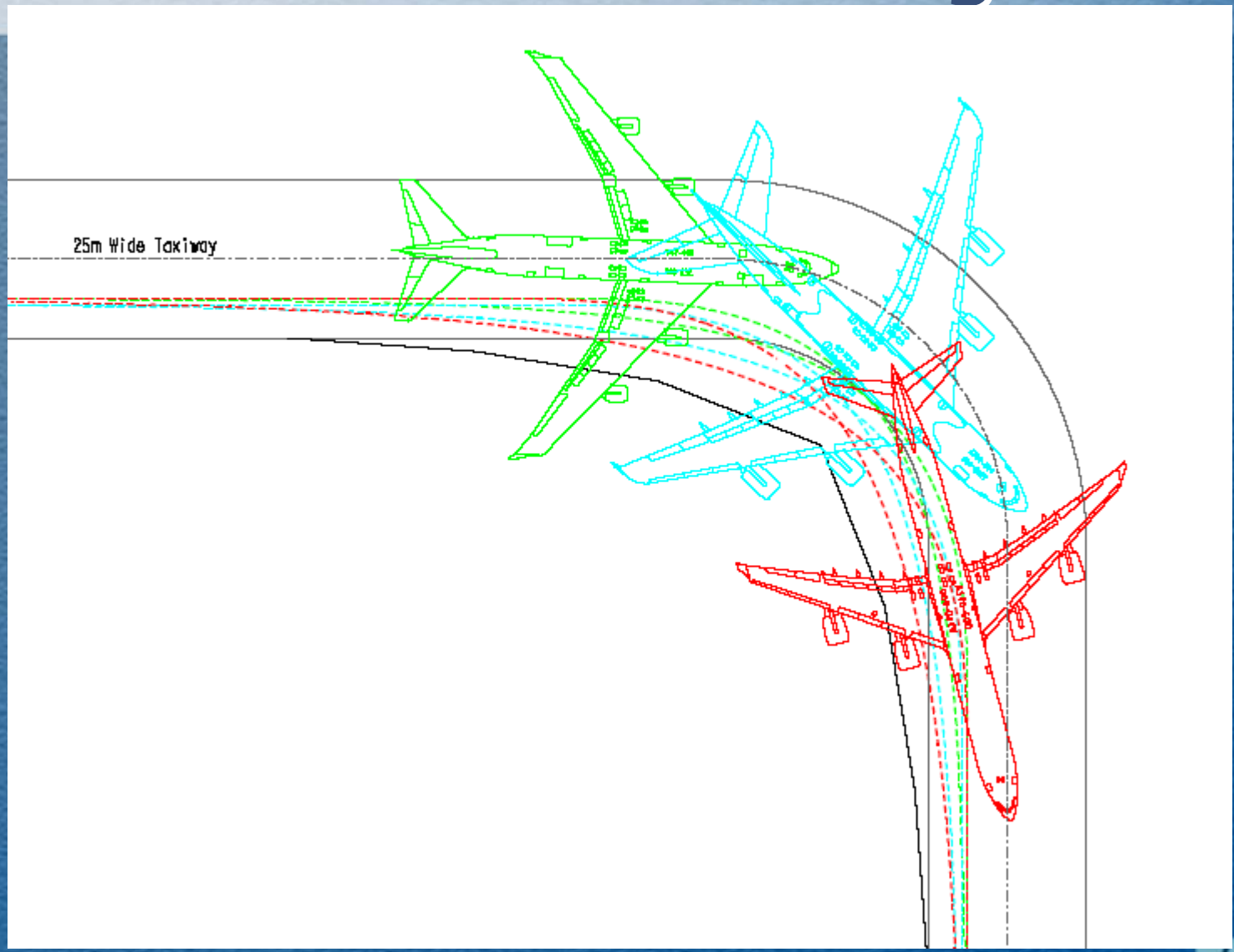
Geometric Pavement Impacts

- Code F Runways (60 m)
  - Canada OK for Runway Width
  - Shoulders 7.5m
- Code F Taxiways (25m)
  - Fillets
- Code F Taxiway Shoulders (17.5m)
  - Outboard Engines/Signs and Jet Blast
  - Ditches

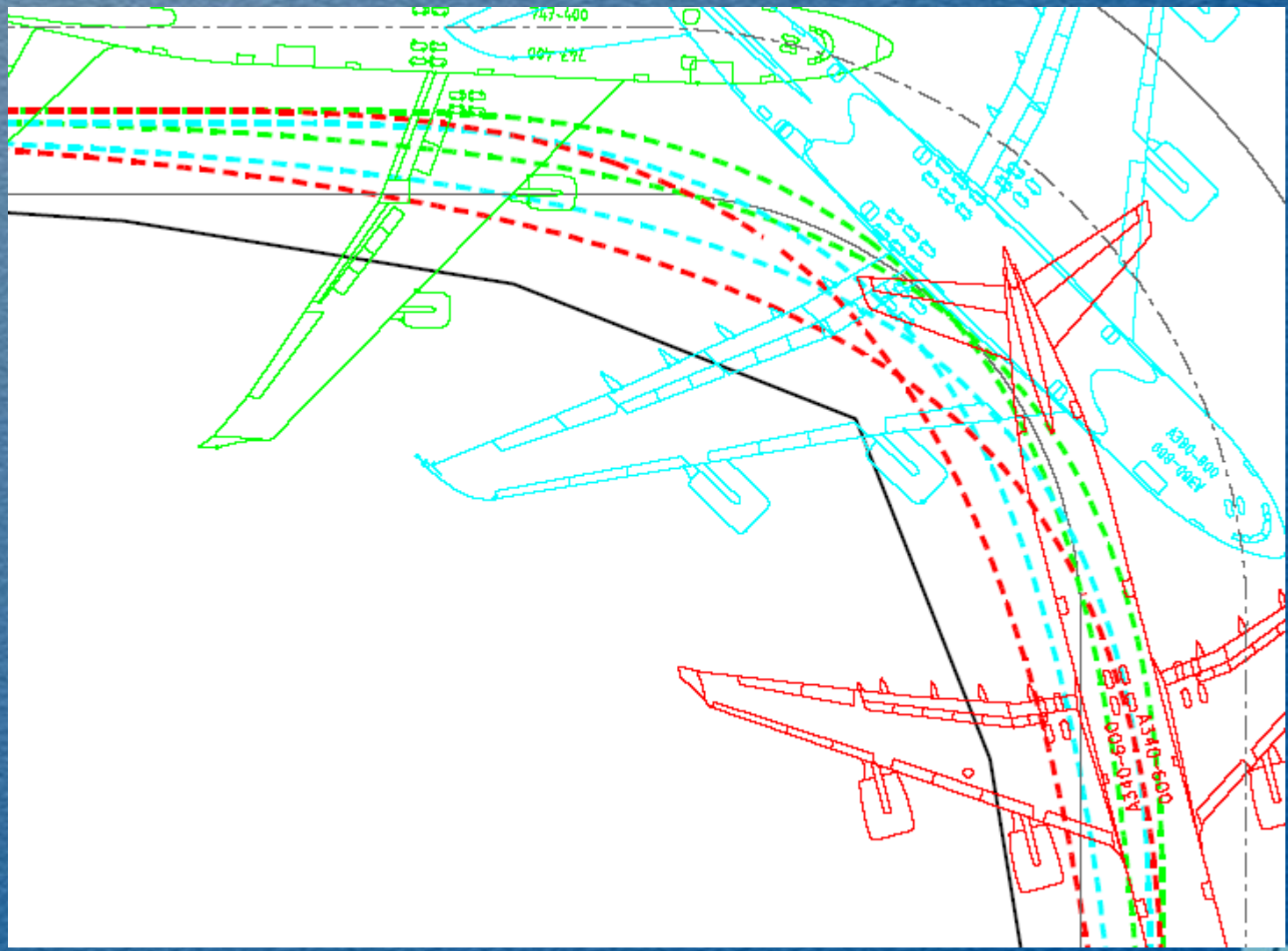
Taxiways and Fillets

- Taxiway Width
  - A380 violation of 4.5m edge clearance with pilot over centreline on 23m taxiway (not significant)
- Taxiway Fillets
  - Bigger Problem – Not Just Code F

Ground Maneuvering



Ground Maneuvering



New Aircraft Loadings

- New Aircraft Gear Geometry (Triple Tandem – Tridem)
  - Design Methodology (ASG-19, FAA)
  - Load Distribution Weak Subgrade
  - Joints
- New Aircraft Gear Loads
  - Higher, more in ALR 12-13 range

COMPARISON OF DESIGN GEAR (STRUT) LOADS AND INDIVIDUAL WHEEL LOADS (MGTOW)

Aircraft/Standard Gear Loading	Gear (Strut) Load (kg)	Main Gear Type	Load Per Wheel (kg)
SGL 13	141,010 (1380 kN)	Dual Tandem	35,252
SGL 12	114,443 (1120 kN)	Dual Tandem	28,610
B747-400 (max ALR 11.4)	97,090 93,000	Dual Tandem Dual Tandem	24,272 23,250
A340-600 (max ALR 11.8)	(121,020) 109,720	Dual Tandem	(30,255) 27,430
B777-300ER (max ALR 12.8)	162,915	Triple Tandem	27,152
A380-800 (max ALR 11.3/12.2)	107,072 160,670	Dual Tandem (WG) Triple Tandem (BG)	26,678 26,678
B787-9	107,730*	Dual Tandem	26,932*

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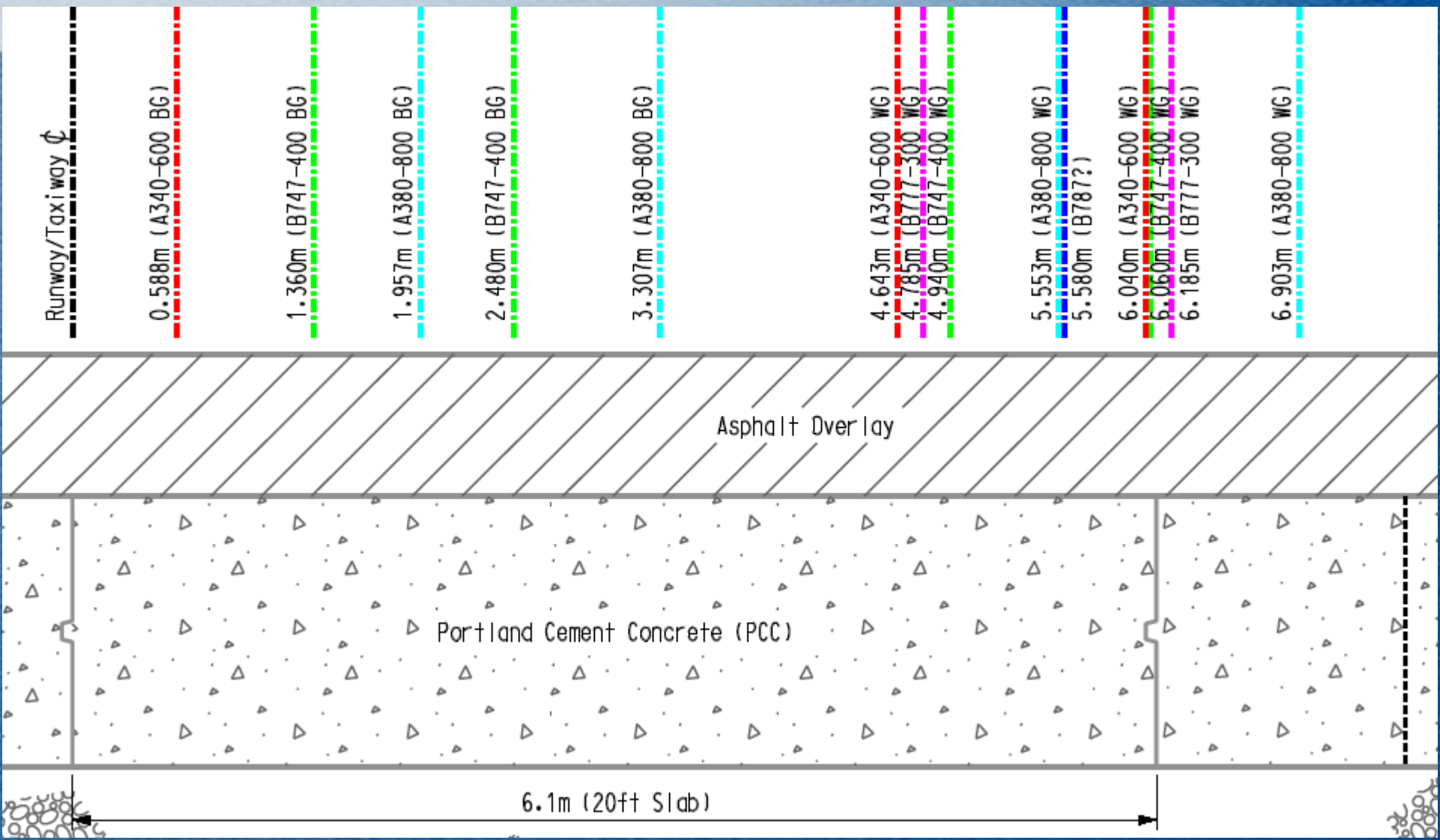
Overlays and Composites

- Old Subsurface Pavements
- Joint Spacing (20ft – 6.1 m)
- Keys
  - Breakage
  - Rounding
- No Stabilization of Base Courses

New Aircraft Tracks

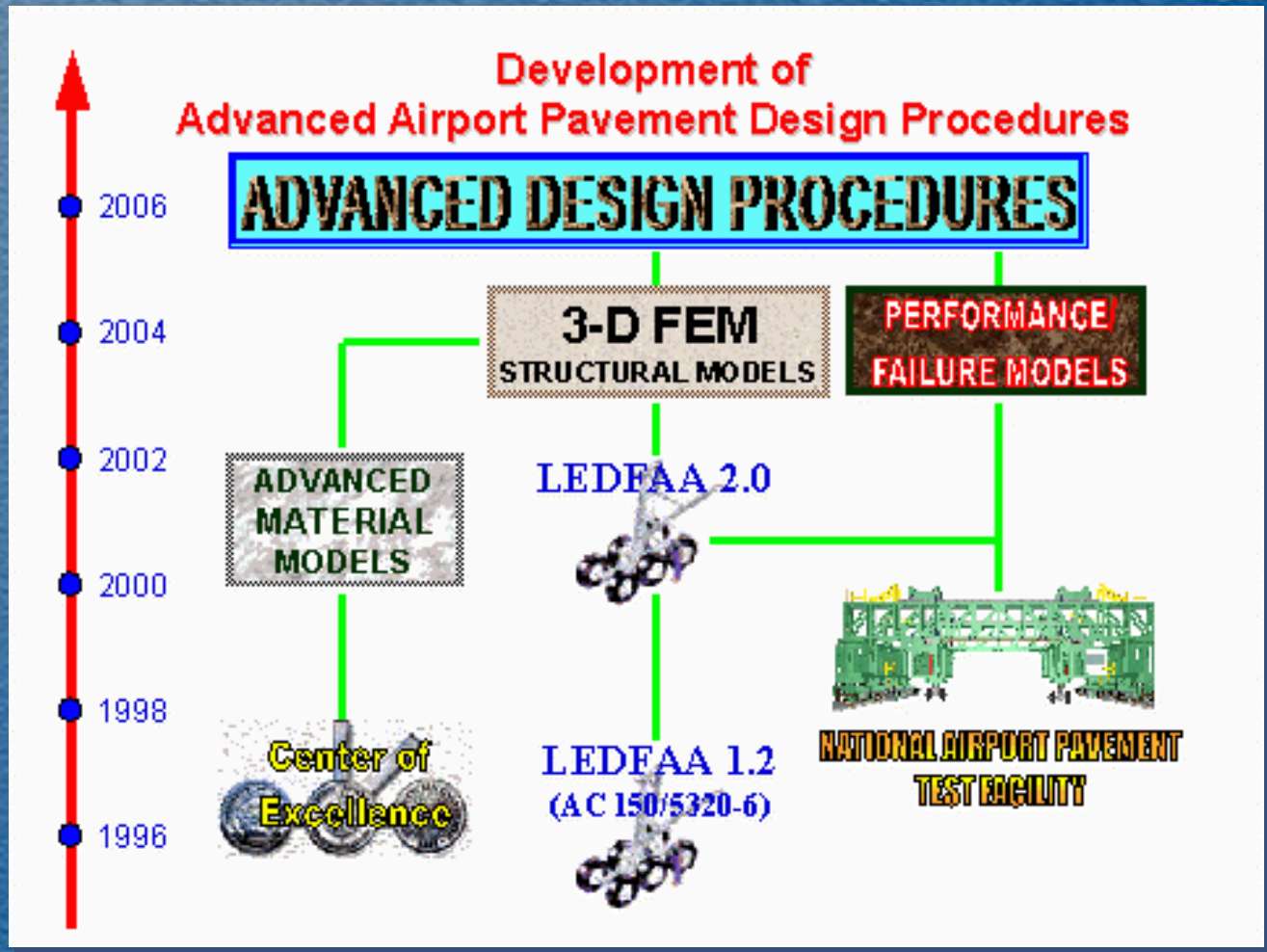
- Joints and New Geometry
  - Old Concrete (20 ft slabs and keys)
  - Load Transfer
  - Dowels



Pavement Design Research

- TC and PWGSC?
  - Funding?
- FAA and National Airport Pavement Test Facility (NAPTF)

FAA Future Design Program



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Future Pavement Design

- Future Best Practices
  - Practical Applications in Canada
    - Binders (Rutting/Thermal/Modifiers)
    - Concrete (Cement Association/ACPA)
  - Fundamental Research and Applications in USA
    - FAA Finite Element/Layered Elastic 2006/7 (LEDFAA 1.3 Beta version in release)
    - Boeing/FAA Test Facility Confirmation (National Airport Pavement Testing Facility (NAPTF) in New Jersey
    - Pavement Sensors Input
  - ASG-19 Update?

HMAC Apron Construction

It's the "Mixer" that Counts

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THANK YOU

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