AASHTO 2002 Design Guide MEPDG Implementation
2011 Southeastern Asphalt User Producer Group Savannah, GA November 16, 2011

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Outline

• National Involvement
• Implementation Framework
  – Subgrade & Unbound Aggregates
  – HMA
  – Drainage Layer
  – Climate
  – Truck Traffic Loading
• Organizational Shift
• “Been there, done that!”

Implementation Framework
Two – Phase Implementation Approach
• Phase I - SS No. 163 “Develop Mississippi DOT’s Plan to Implement the 2002 Design Guide”
• SS No. 170 “Implement the 2002 Design Guide for MDOT (Phase II)”

National Involvement
FHWA Lead States Group (DGIT)
NCHRP 1-40D “interested observer”
DARWin-ME task force
AASHTO Joint Technical Committee on Pavements
  “People to Pester”
  Judith Corley-Lay
  Lynn Irwin
  Linda Pierce
  Chris Wagner

Subgrade & Base Characterization (SS No. 170)
• Subcontractor - Burns, Cooley & Dennis Inc. (BCD)
• Performing M, testing of typical MS subgrade soils
• Unbound aggregates
• Testing cementitious stabilized soils
  – Lime
  – LFA
  – Cement
Subgrade & Base Characterization (SS No. 170)

- BCD coordinated with ARA to ensure proper test protocols were followed
- BCD coordinated with MDOT District Materials Engineers and Central Lab to identify typical subgrade soils and unbound aggregates in Mississippi
- Selected materials for laboratory testing that represent the range encountered in Mississippi

Selected Subgrades

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Selected Unbound Aggregates

Resilient Modulus Testing for Subgrade and Unbound Aggregate

- Harmonized test procedure resulting from NCHRP 1-28A
- Interlaken Soil and Asphalt Testing Machine

SS No. 166 “Hot Mix Asphalt (HMA) Characterization for the 2002 AASHTO Design Guide”

- Mississippi State University (MSU) study
  - Dr. Shane Buchanan
  - Dr. Tom White
- Characterize typical MDOT HMA mixes for Dynamic Modulus
- Test results included in Materials Library

Asphalt Test Matrix

- Aggregate Type – Gravel & Limestone/Gravel
- Binder PG – 67-22, 76-22, 82-22
- NMAS Gradation – 9.5mm, 12.5mm & 19.0mm
- N\textsubscript{design} – 50 (ST), 65 (MT), 85 (HT)
- Voids @ N\textsubscript{design} – 4% & 3%*

25 Combinations w/3 replicates of each
Dynamic Modulus Specimen Preparation

SS No 181 “Structural Characterization of Asphalt Drainage Course Layers”

• Dr. Allen Cooley with Burns Cooley & Dennis, Inc.
• MDOT Drainage layer:
  – #57 crushed limestone, sandstone, or granite
  – Crushed gravel and/or blended mixtures of crushed gravel, limestone, sandstone, granite or reclaimed concrete pavement
  – 2.5% PG 67-22

How do you test these materials?
• Aggregate base?
  – Resilient Modulus Test
  – Haversine loading
• Asphalt Mix?
  – Dynamic Modulus Test
  – Sinusoidal loading
• Resilient modulus test selected due to assumption that the drainage layer is located deep enough within the pavement that the traffic loading imparts a haversine load form to the drainage layer
Test Sample Size/Preparation

- 170 mm height by 150 mm diameter
  - couldn’t core test specimen from pile
- Compressive load used to compact specimen
  - Interlaken Servo-Hydraulic Load Frame
  - gyratory compacted specimens can not be trimmed
- 30% voids based on field tests of in-situ drainage layers

Traffic

- Develop MS-Atlas for Load Axle Spectra (SS 165 MSU & SS 188 ARA)
- Upgrade existing MS-Atlas program to produce traffic data in XML file format for import into DARWin-ME
- Enhance MS-ATLAS program to allow MDOT Planning Division to consider special loading conditions.
- Use DARWin-ME to evaluate impact of overloaded trucks on pavement performance

Developing MEPDG Climate Data Input Files for Mississippi

- Existing MEPDG climate files –
  - 12 weather stations
  - 10 counties
  - Only 7 stations with over 8 years of data
- New 40-year historic climate files for all 82 counties -
  - Used hourly data from 23 Automated Surface Observation System and Automated Weather Observation System sources
  - Daily data from over 100 Cooperative Observer Program sources
- Represents over 30 times more climate input data for MEPDG analyses in the state

“Living” Libraries

- OGFC
- SMA
- 4.75mm NMAS mixes
- Low Volume Thin Lifts
- WMA
- Preservation Treatments
- Whatever else is on the horizon!

Final Result

- ASOS/AWOS
- COOP

MDOT Organizational Shift

- AASHTO 72 Guide
  - Roadway Design houses Pavement Design and Research houses FWD Operations and Pavement Management
- MEPDG
  - Pavement Branch in Research to house Pavement Design, FWD Operations & Pavement Management for full “cradle to grave”
Learn from our mistakes and successes!

• How “reliable” can your agency be?
• Sensitivity? What really matters?
• Would an organizational shift help?
• What are your financial resources?
• Stay involved and tuned for more lessons learned!