Overview of Mechanistic-Empirical Pavement Design Guide Implementation Activities

Design Guide Implementation Team

Leslie Myers, Office of Pavement Technology
FHWA HQ  Washington DC
May 9, 2006
Design Guide Implementation Team

FHWA  DGIT

- Office of Pavement Technology
  - Gary Crawford – Concrete Team – Group Leader*
  - Leslie Myers – Asphalt Team

- Resource Center
  - Chris Wagner – TST Team

- Division Office
  - John Sullivan – Division Administrator – NC

- Turner-Fairbank Highway Research Center
  - Jim Sherwood – Advanced Models Team
  - Eric Weaver – LTPP Team
To **support & educate** State highway agencies and industry in development & implementation of Mechanistic-Empirical Pavement Design

*Facilitating Implementation of Mechanistic-Empirical Pavement Design*
Educating State DOT and Industry on M-E Pavement Design

1-day workshop on
Facilitating Implementation of Mechanistic-Empirical Pavement Design

Approximately 1000 people attended

2-day workshops on
Materials Characterization of Inputs to M-E Pavement Design

Participants from:
42 States
24 FHWA Division Offices
5 Local highway agencies
30 universities
HMA and PCC industry
Consultants
Educating State DOT and Industry on M-E Pavement Design

Advanced Technology for Workshops

DGIT webcast from Connecticut DOT URL server

1-day Intro workshop:
www.ct.gov/dot/pavement101

2-day Materials Inputs workshop:
www.ct.gov/dot/pavement102
Past Workshops
- Introduction to the DG – 8*
- Traffic – 2
- Materials – 11*

Current
- Climatic Inputs – 12
- Traffic – 3
- PMS Data Use - 1

Future
- Local Calibration

*Webcast available
Objective: Educate M/D engineers on how climatic effects are considered in mechanistic-empirical design

- Asphalt materials inputs
- Concrete materials inputs
- Soils/Unbound Granular materials inputs

Workshop and Software Modules
Webcast on September 19, 2006 at CT workshop
<table>
<thead>
<tr>
<th>Month</th>
<th>Location</th>
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<tbody>
<tr>
<td>February</td>
<td>Turner-Fairbank (Pilot)</td>
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<tr>
<td>March</td>
<td>Thornburg, VA</td>
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<tr>
<td>March</td>
<td>Nashville, TN</td>
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<td>April</td>
<td>Gainesville, FL</td>
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<td>Helena, MT</td>
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<td>May</td>
<td>Albuquerque, NM</td>
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<td>May</td>
<td>Oklahoma City, OK</td>
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<td>June</td>
<td>Columbus, OH</td>
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<td>August</td>
<td>Phoenix, AZ</td>
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<td>August</td>
<td>Fayetteville, AR</td>
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<tr>
<td>September</td>
<td>Minneapolis, MN</td>
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<tr>
<td>September 19</td>
<td>Rocky Hill, CT + webcast</td>
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Additional Workshops

Traffic Inputs for M-E PDG

- Three presented in 2006 by FHWA
- **Purpose**: educate Pavt Designers & Traffic Engineers in same forum on obtaining traffic inputs

- **Austin, TX** May 17-18
- **New Brunswick, NJ** late summer
- **Rocky Hill, CT + webcast** September 18
Use of PMS Data for M-E PDG

- One presented in 2006 by FHWA Office of Asset Management

- **Purpose**: educate Pavt Designers & Pavt Managers on best utilizing PMS data as MEPDG inputs

Rocky Hill, CT + webcast  September 20
Additional Workshops Planned

- Local Calibration for M-E PDG models
  - Awaiting deliverables from NCHRP 1-40 A,B
  - Planned for Spring 2007
  - **Purpose**: discuss Sensitivity of inputs & calibration, educate Pavt Designers & Pavement Managers
FHWA Internal Cooperation

DGIT & Office of Freight Management / Operations

Meetings & internal workshops
• Models in M-E PD that deal with truck size & weight
• Assessing impacts of raising weight limits
Analysis of New and Rehabilitated Pavement Performance with Mechanistic-Empirical Pavement Design Software

• Hands-on format with computers loaded with software
• Focus on user, not theory
• Objective is for audience to be capable of performing flexible, rigid, rehab designs

STATUS: awarded to Fugro BRE, University of Arkansas, & team
Technical Assistance

Mobile Labs/TFHRC

- Local Materials Characterization
  - Enables use of higher level inputs

- Equipment
  - Specification, Calibration, Use
Field & Laboratory Studies Related to M-E Design

Long-term Pavement Program (LTPP)
  • Database Enhancement with E* Data

Sensitivity Analysis of HMA E*
  • Field data from Mobile Asphalt Laboratory (MATL)
    • Testing both neat & polymer-modified Mix from 18 State projects
    • Evaluating both lab-blended mix design replicates & production samples
  • Relationship between volumetric/mix properties & E*

2006: New Jersey, Missouri, South Dakota, FL HVS
Evaluation Studies Related to M-E Design

- **Coefficient of Thermal Expansion**
  - TFHRC
    - Working on ruggedness and development of commercially available equipment
  - Mobile Concrete Laboratory
    - Continuing to collect CTE lab data from field State projects

- **TFHRC Models Team**
  - Investigating IRI models
  - Sensitivity Analysis: Concrete
    - Suggestions from Panel, Lead States group
Community of Practice NCHRP 1-40 User Comments Online Discussion Site

http://www.fhwa.dot.gov/pavement/dgit/dgitdata.cfm

- Established as NCHRP 1-40 User Comments Database
- Maintained by FHWA DGIT
  - Questions, technical issues raised forwarded to NCHRP
  - Success Stories also need positive
Lead States Group

- Publish “Status Surveys”
- Post State Implementation Plans
- Identify Sensitivity Analysis studies
  - Texas, Arkansas, Iowa, FHWA, etc.
- Develop & distribute Technical Briefs
- Participate in DGIT Workshops
- Provide clearinghouse for information
- “Lead by Example”
The Role of a Lead State
Each Lead State will further Mechanistic-Empirical Pavement Design by demonstrating the following attributes:
- Leads by example, as one of the first States to pursue implementation of the design guide and obtain upper management support.
- Champions implementation. Becomes an expert in the implementation process.
- Knows the political, funding, and internal hurdles that need to be addressed.
- Compares pavement design/analysis technologies to determine which is most advantageous for a given project.
- Focuses on advanced technologies and refinements.
- Shares results—both successes and challenges—with the highway community.
- Shares funding success stories.
- Develops short- and long-term plans for implementation.

The Role of FHWA
FHWA, through its Design Guide Implementation Team (DGIT), will provide:
- Full partnership with state members.
- Funding (including meeting and member travel) and technical support.
- Division office sponsorship of training and committee activities in the lead states.
- Central data repository.
- Newsletter and information posting on the web.
- Committee secretariat.
- Coordination with LTPP and other research efforts.

Focus of the Lead States Group
The Lead States will work together to:
- Provide an example of successful implementation and develop a model implementation plan.
- Serve as a liaison for NCHRP, AASHTO, FHWA, and industry activities.
- Identify gaps in the knowledge base and new research needs.
- Share information, utilize national lessons learned, and avoid duplication of effort.
- Provide a vehicle for working in cooperation across State lines.
- Serve as a resource for States at any stage of implementation.

Lead States and Points of Contact
FHWA DGIT, Leslie Myres, Gary Crawford, Chris Wegner, Jim Sherwood - digit@fhwa.dot.gov
NCHRP Liaison, Ed Harrigan - 202-334-3322
Arizona, Paul Burch - 602-712-9685
Florida, Bruce Clairich - 850-414-4371
Kentucky, Clark Graves - 859-251-4513, Paul Loomey - 502-256-3280
Maryland, Peter Stophanos - 410-321-3100, Tim Smith - 410-321-3110
Minnesota, Dave Van Deuren - 651-779-5564
Mississippi, Bill Barta - 601-359-7849
Missouri, Jay Beddome - 573-751-3824, John Donahue - 573-751-3002
Montana, Dan Hill - 406-444-3424, Jon Watson - 406-444-7960
New Jersey, Robert Boubker 609-480-3881, Tom Bennett - 732-445-2485
New Mexico, John Tradish - 505-827-9811, Bryon Simon - 505-827-5191
Pennsylvania, Dan Davidson - 717-697-9724, Clint Beck - 717-785-3246
Utah, Tim Bell - 801-968-4859
Virginia, Mohamed Elfinio - 804-338-3173, Thomas Tate - 804-338-3129
Washington, Linda Pierce (Chair) 360-709-6474, Jeff Uhrmeyer - 360-709-5485
Wisconsin, Laura Festey (Co-Chair) 608-244-3455
Pooled Fund Efforts

- Implementation Plans
  - Washington, California, Texas

- HMA Input Data Gathering
  - New York, Kansas

- Equipment Buy for States
  - Simple Performance Tester for obtaining HMA inputs
NCHRP Projects

- 1-41 Reflective Cracking in HMA (Texas A&M)
- 1-42A Top-Down Cracking in HMA (U.Florida)
- 9-38 Fatigue Endurance Limit in HMA (NCAT)
- 9-30A Calibration of Rutting Models (AAT, ARA)
- 1-40 Technical Assistance in MEPDG (ARA, ASU)
MEPDG Scheduled Releases

- **Version 0.8**
  - Increased Climate Data
  - Corrected HMA Rehabilitation analysis
  - December 2005

- **Version 0.9**
  - Fix identified errors in AC module
  - Recalibrated PCC & AC Models
  - Available May 2006

- **Version 1.0**
  - Professional AASHTOWare version
  - 2008 - 2009?
From Applied Research Associates:

www.ara-tracker.com/eicm version 3.1

- Allows user to import & evaluate MEPDG files in EICM stand-alone program version

- EICM source code open Summer 2006
  - Peer review & inclusion in other applications
AASHTO Implementation

Joint Technical Committee on Pavements

Subcommittee on Design & Materials

Full AASHTO Balloting

Interim Guide – after February 2007?
4 Stages of Implementation

1. Inform & Obtain Buy-In from Small Group
2. Build Consensus Among Organizations
3. Mass Implementation Effort
4. Planning for Future Change & Improvements
National Implementation Timeframe

- 1998: NCHRP 1-37a
- 1999: MEPDG Delivered
- 2000: NCHRP 1-40
- 2001: NHI Hands-on Courses
- 2002: MEPDG Enhancements: AASHTOWare, NCHRP
- 2003: AASHTO Balloting
- 2004: Implementation Activities by Several States

NHI Hands-on Courses
MEPDG Enhancements: AASHTOWare, NCHRP
AASHTO Balloting
Implementation Activities by Several States
What Can States Do Now?

Sensitivity Studies
- Universities (eg. University of Arkansas, KSU)
- Industry (eg. NCAT, ACPA)
- State DOTs (eg. Missouri, Pennsylvania, N.C.)

Forensic Analysis
- State DOTs (eg. “reconstruct” failed pavement cases, overweight truck impacts)
Summary

Partnership for Implementation

- Lead States Group, AASHTO JTC
  - Consensus, Specification, Use, Lead-by-Example

- NCHRP
  - Coordinated research efforts to enhance M-E Pavement Design software and supporting tests

FHWA
- Training, Coordination, Technical Support
How Do We Get Started?

- Get Educated
- Get Involved
- Allocate Resources
- Encourage Cross Discipline Communication
- Maintain Cross State DOT Communication?
Design Guide Implementation Team

dgit@fhwa.dot.gov

http://www.fhwa.dot.gov/pavement/dgit/index.cfm
Any Questions??

GO

GATORS