Project Overview

1. Project Team
2. Project Objectives
3. Project Approach and Status
4. Preliminary Selection Criteria
Project Team

- **Prime - Applied Pavement Technology**
  - Katie Zimmerman, Principal Investigator
  - Tom Freeman, APTech Team Leader
  - Kurt Smith, Senior Engineer

- **Subcontractor – Stantec Consulting, Ltd.**
  - Khalad Galal, Stantec Team Leader

- **Subcontractor – Fugro Consultants, Inc.**
  - Mark Gardner, Fugro Team Leader

- **FHWA COTR – Nastaran Saadatmand**
Project Objectives

- Establish a framework for collecting and storing data needed for calibration
- Demonstrate the application of the framework in one state highway agency
- Document the framework
- Develop outreach tools to disseminate research results
Project Approach and Status

Phase 1
Develop the Framework
Oct 2007 to Dec 2009

Phase 2
Conduct Outreach Activities
Jan to Mar 2010
Project Tasks – Phase I

A: Literature Review
   Completed

B: Three State Selection
   On-going

C: Preliminary Framework Development
   Early 2008

D: Selection of a Single State
   Summer 2008
Project Tasks – Phase I (cont)

- **Final Framework Development**: Late 2008
- **Verification**: Summer 2009
- **Final Work Plan Implementation**: Fall 2009
- **Draft and Final Reports**: Late 2009
Preliminary Selection Criteria

- **Level of Commitment**
  - Plans to implement MEPDG
  - Degree of commitment to implementation
  - Evidence of calibration activity

- **Availability of Data**
  - Design and performance data for all pavement types
  - Materials, traffic, construction, climate, and environmental data at levels 1 and/or 2
Preliminary Selection Criteria

- **Data Quality**
  - Data format
  - State’s opinion of data quality

- **Required Level of Effort**
  - Level of data collection intensity
  - Anticipated IT work required
  - Extent of effort to acquire additional data
## Conceptual Approach

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Opportunity for state participation
Results should be beneficial to other agencies as they begin to calibrate their models
Making an Effective PMS for the MEPDG Implementation

Katie Zimmerman, P.E.
Applied Pavement Technology, Inc.

TRB 87th Annual Meeting
January 13, 2008
Issues
- Database issues
- Performance issues
- Organizational issues

Recommendations

Concluding Points
MEPDG requires detailed inputs:
- Traffic
- Material characteristics
- Subgrade properties
- Construction considerations
- Climatic conditions

Pavement management databases typically contain data used for network-level analysis:
- Inventory information
- Condition data
- Last treatment summary
- Traffic data (or surrogates)
Project Versus Network Issues

Number of Assets

Unreliable

Detailed Project Information

MEPDG

Infeasible

Level of Detail

Unreliable

PMS

Project Selection Information

Program Development

From Hudson et al. DTFH61-05-C-00011
Data used in pavement design are not always stored electronically.

As-built construction data are not typically stored in an electronic format that is easily accessible.

Maintenance and rehabilitation histories are not always available and may not be linked to historical performance data.
Some agencies have difficulty linking data because multiple referencing systems are used.

Performance data cannot always be matched to test results for layer thickness and material properties.

Maintenance data cannot always be linked to pavement management sections because of the way it’s reported.
Calibration efforts require data to be monitored over time

- Pavement management surveys may not be conducted frequently enough
Distress definitions and measurement units for the MEPDG models may not match pavement management condition survey definitions or approach

- MEPDG calibrated using LTPP Distress definitions
- Pavement management data may use different definitions
- Method of collection may impact results
- Survey approach may impact results
MEPDG models predict performance that can not easily be collected as part of a network-level pavement condition survey.

- Rutting in individual layers versus total rutting
- Top-down and bottom-up load-related cracking versus total load-related cracking
### Sample Comparison – Flexible

<table>
<thead>
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<th>MEPDG Distress Types</th>
<th>SDDOT Pavement Management Distress Types</th>
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<td>Fatigue Cracking</td>
<td>Fatigue Cracking</td>
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<tr>
<td>(top-down and bottom-up)</td>
<td>(assumed to be bottom-up)</td>
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<td>Thermal Cracking</td>
<td>Transverse Cracking</td>
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<td>Permanent Deformation</td>
<td>Rutting (total rutting)</td>
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<td>(rutting in AC layer and total)</td>
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There are other considerations that may limit the usefulness of network-level survey results for establishing links to design, construction, and material data.

- Surveys may be conducted in one lane only.
- Location of samples may not be linked to other data properties.
- Only aggregated data for a section may be stored in the pavement management system.
- Deflection measurements not available at a network level.
Pavement management typically uses family modeling approaches. Calibration activities will require individual performance histories matched to specific inputs.
Preservation treatments are not yet incorporated into the MEPDG models.

Predicted performance assumes preventive maintenance treatments are not applied.
Organizational Issues

- Breaking down stovepipes (organizational barriers)
- Closer coordination between pavement management and other agency functions
- Addressing referencing issues
Recommendations

- Establish a multi-disciplined implementation team
  - Stay abreast of new developments
  - Define responsibilities
  - Define implementation approach & schedule
  - Identify data needs
  - Match data needs to existing data sources
  - Develop a plan for acquiring missing data
Recommendations

- Evaluate data requirements carefully
  - Conduct a sensitivity analysis
  - Develop recommended input levels
  - Evaluate strategies for acquiring missing data
  - Strive for using Level 1 and 2 data as much as possible
Recommendations

- Start slowly
  - Calibrate MEPDG models for the most common designs first
  - Consider regional calibration of models if designs are similar enough
Recommendations

- Develop a calibration database
  - Monitor pavements designed with the new MEPDG
  - Input design and as-built information immediately
  - Monitor load-spectrum information over time
  - Must be linked to pavement management
  - Should NOT require duplicate entry of data
Agencies Will Be Able to Better:

- Understand performance characteristics influencing pavement performance
- Predict the effect of changes in traffic, material, design, or construction on pavement performance
- Respond to anticipated changes in HPMS requirements
- Coordinate pavement design and management activities