

Pavement Selection Task Force Project Updates

Pavement Design

*Minnesota Department of Transportation
Office of Materials*

March 1, 2004



- **Resources of other states**
- **What are other states doing?**
- **Simplicity and usability are key**



Outline of Presentation

- Background
- Current Efforts
- Implementation
- Future



Acknowledgements



Motivation

- **Why change to a new design procedure?**
 - ◆ Our current procedures cannot adequately address issues facing us today



Current Design Procedures

- Predominantly empirical
- Depend on conditions remaining the same
- Limited failure modes
- Primary focus on design for new or re-construction
 - ◆ Pavement evaluation for rehab is difficult, if not impossible



Mechanistic-Empirical Design

■ Potential of M-E methods:

- ◆ Ability to adapt to different distress modes
- ◆ Allow better materials tests and characterization
 - ☞ Quantify and show benefit of improved materials and specifications
- ◆ Traffic
 - ☞ Adapt to changing load limits and configurations
 - ☞ Seasonal variation
- ◆ Achieve agreement between structural and materials design



Task Force Charge

- **Evaluate the standard Mn/DOT Pavement Designs after the new AASHTO Pavement Design Guide has been distributed and calibrated in Minnesota**
 - ◆ Anticipated to be available the spring of 2004 and will require approximately one year to calibrate.
- **After Mn/DOT standards have been revised all projects will go through the formal process for a period of time**



Efforts to Date

- **Implementation plan was prepared**
 - ◆ Identifies general steps that need to be taken, Mn/DOT readiness and personnel involvement, etc.
- **Pavement Design Unit submitted a problem statement to CTS in Sep-03**
 - ◆ Objective is to calibrate the Design Guide for both flexible and rigid pavement in Minnesota
 - ◆ Not intended to initiate new or basic research
- **U of Mn responded with a proposed two-year study**



Status, cont.

- **Technical Advisory Panel (TAP) has been assembled**

- ◆ Members are primarily practitioners, in addition to researchers
- ◆ Local agency representative (LRRB)
- ◆ Several meetings have been held, most recent was Feb 23, 2004

- **Project can begin soon**

- ◆ Workplan approval and signatures required



TAP Members

- **Districts**

- ◆ Graig Gilbertson, District Materials Engineer, Bemidji
- ◆ Aamir Turk, District Soils Engineer, Metro

- **LRRB representative**

- ◆ TBD, County Engineer

- **Office of Transportation and Data Analysis**

- ◆ George Cepress

- **Office of Materials**

- ◆ Curt Turgeon, Pavement Section
- ◆ Dave Van Deusen, Pavement Section
- ◆ Matt Oman, Pavement Section
- ◆ Maureen Jensen, Pavement Section
- ◆ Shongtao Dai, Research Section
- ◆ Tom Burnham, Research Section
- ◆ Bruce Chadbourn, Research Section



Inputs

- **Three levels of detail**

- ◆ Level 1 – highest level of detail and reliability
Levels 2 and 3 have successively lower reliability

- **Materials**

- **Traffic**

- **Climate**

- **Mn/DOT efforts will be required to survey and gather available data**



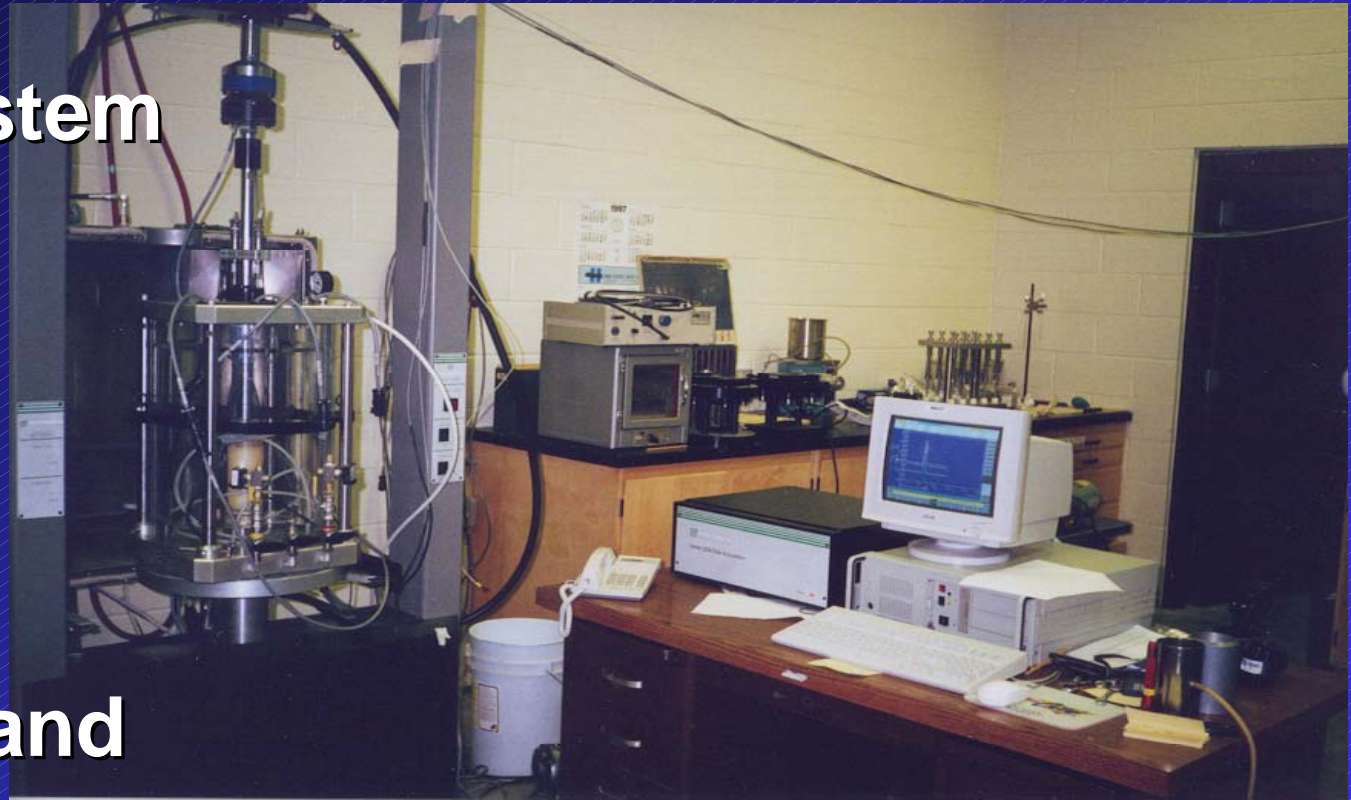
Materials testing

- The Design Guide presents changes in the way materials are characterized for pavement design
- Mn/DOT currently owns the necessary equipment and has considerable experience in performing these tests
- Current studies are in progress to refine the procedures for subgrade soils and aggregate base and to implement the test for HMA



Triaxial Testing Systems

- Research system purchased 1990
- Production systems purchased 2003 – Soils and Trial Mix



Traffic Forecasting

- The Design Guide also presents a change in the way traffic is characterized for pavement design
- Mn/DOT TDA and Materials offices have already begun preparation for this transition
- Further refinements will occur through the course of this project.



Subgrade design

- Issue raised at subcommittee meetings
- The subcommittee discussed the possibility of incorporating grading costs in the pavement selection process
- It was decided to postpone this to coincide with evaluation of the 2002 Design Guide
- Mn/DOT estimating has suggested that this is possible



Subgrade design - Current

HMA

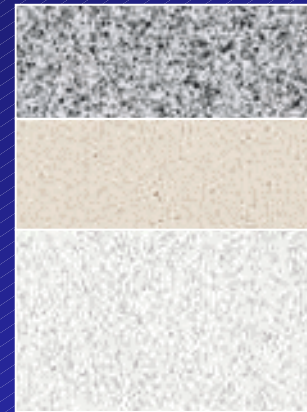


Surface

Base

Subbase

PCC



Subgrade design - Proposed

HMA



Surface

Base

Subbase

Compacted
Subgrade
soils

PCC



Time frame

Task Title	Budget	Quarter							
		1	2	3	4	5	6	7	8
Task 1. Collect Design and Performance Data	\$30,000	■	■						
Task 2. Evaluate Typical Inputs	\$12,000		■						
Task 3. Testing*	\$0 *			■	■	■	■	■	■
Task 4. Develop Performance Threshold Values	\$5,000			■	■	■			
Task 5. Predict Sensitivity	\$30,000			■	■	■			
Task 6. Evaluate Performance*	\$11,000 *					■	■	■	
Task 7. Re-Calibrate 2002 Design Guide*	\$14,000 *					■	■	■	
Task 8. Develop Catalog of Initial Designs	\$10,000						■	■	■
Task 9. Revise Training Materials*	\$9,000 *						■	■	■
Task 10. Final report*	\$5,000 *								■



Time frame, cont.

- The software delivery date appears to be a moving target
- Final software will be delivered to the project manager by end of February
- Date for delivery to the states is unknown (rumors point to June 2004)
- HMA portion of the software may present some problems in terms of run time
- PI informs us that steps have been taken to optimize the software



Summary

- Updated and improved pavement design is needed in Minnesota
- Calibration project is in place and Mn/DOT is well-prepared
- Project time frame

