National Cooperative Highway Research Program (NCHRP)

Implementation of the Pavement Design Guide: NCHRP Related Activities

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NCHRP Contact: Amir N. Hanna (ahanna@nas.edu)
202/334-1892; 202/334-2006 FAX
NCHRP and The Guide

• NCHRP responds to state DOTs research needs as identified by the DOTs and AASHTO committees.

• Results of NCHRP work are often adopted by AASHTO, state DOTs, and other organizations.

• Development of the Guide was undertaken at a request by the AASHTO Joint Task Force on Pavements
The New Guide

- The new Guide provides an integrated analysis process for predicting pavement condition over a period of time, it accounts for the interaction among traffic, climate, and structure, and is presented on a user-oriented computational software.

- The new Guide recognizes the shortcomings of the current AASHTO Guide for Design of Pavement Structures (i.e., use of empirical equations based on limited structural designs and conditions) and allows for projections beyond the original data.
Principles in Guide Development

• Use of mechanistic-empirical principles

• Use of validated state-of-the-art technologies

• Use of common design parameters for the analysis of all pavement types (materials characterization, climate parameters, and traffic characterization)

• Use of a tiered approach for inputs to facilitate implementation
Other Guide Products

• Procedures for evaluating existing pavements
• Procedures for LCCA
• Procedures for refinement for regional/local conditions
• Guidance on developing agency-specific procedures/catalogs
• Training material
Pavement Types Covered in the Guide

• New and Reconstructed Pavements
  – Flexible: AC on granular base, AC on AC stabilized base
  – Rigid: JPCP and CRCP
  – Semi-Rigid: AC on cementitious base

• Rehabilitated Pavements
  – Flexible: AC overlay, concrete overlay, ultra-thin overlay
  – Rigid: AC overlay, unbonded concrete overlay, bonded concrete overlay, restoration
Facilitating Implementation of the Guide

- Activities to familiarize state DOTs personnel with the Guide (NCHRP Project 1-40)

- Research to improve models used in the Guide (NCHRP Projects 1-41 and 1-42)

- Other Research to enhance application (1-39)

- Support educational/training workshops for state DOTs personnel.
- Provide an independent assessment of short- and long-term needs for improvements.
- FHWA will develop and conduct NHI courses
- Support presentations to AASHTO committees and subcommittees
To select from current "state-of-the-art" models the most appropriate mechanistic-based model for reflective cracking in AC overlays. The model will be calibrated, validated, and incorporated into the framework and procedure (software) used in the new pavement design guide.
NCHRP Project 1-42, *Top-Down Fatigue Cracking of Hot-Mix Asphalt Layers*

- identify the mechanisms that govern the initiation and propagation of top-down fatigue cracking in HMA layers,
- identify or develop method(s) of laboratory testing HMA mixtures for determining susceptibility of the HMA surface layer to this cracking,
- determine the significant factors associated with the occurrence of top-down fatigue cracking, and
- identify promising models for predicting the initiation and propagation of top-down cracking.
NCHRP Project 1-39, *Traffic Data Collection, Analysis, and Forecasting for Mechanistic Pavement Design*

- Guidelines for Collecting Traffic Data
- Software for Traffic Forecasting (TrafLoad)
- Guidance on Equipment for Collecting Traffic Data
Other Related Research

- **Materials test methods**
  - Dynamic modulus for asphalt concrete mixtures
  - Resilient modulus for granular materials
  - Coefficient of thermal expansion of portland cement concrete
- **Materials screening tests (HMA)**
  - Simple performance test
  - Asphalt Pavement Analyzer
- **Materials screening tests (aggregates)**
  - For use in HMA, PCC, and unbound layers
  - From recycled asphalt and concrete
Status/Schedule

- Project deliverables are expected by the end of February 2004; distribution to AASHTO member departments and Joint Task Force on Pavements
- Convening training workshops; mechanism for receiving and providing feedback to the JTFP.
- Action by the JTFP and AASHTO committee regarding adoption.