

CATALOG OF MATERIAL PROPERTIES FOR MECHANISTIC-EMPIRICAL PAVEMENT DESIGN

Problem

The American Association of State Highway and Transportation Officials (AASHTO) has adopted a new pavement design methodology that is based on mechanistic-empirical principals that are expected to be used in parallel with, and eventually replace the current empirical pavement design procedures derived from the AASHTO Road Test conducted in the late 1950s. The new Mechanistic-Empirical Pavement Design Guide (MEPDG) requires greater quantities and quality of input data in four major categories: traffic; material characterization, environmental factors; and pavement performance (for local calibration/validation). Material characterization for the mechanistic-empirical approach, the focus of this study, is significantly more fundamental and extensive than in the current design guide.

Objective

A hierarchical input data scheme has been implemented in the MEPDG to permit varying levels of sophistication for specifying material properties, ranging from laboratory measured values (Level 1) to empirical correlations (Level 2) to default values (Level 3). It is expected that most states including Maryland, will begin implementation of the new design procedure using Level 3 default inputs or Level 2 correlations that are relevant to their local materials and condition and will, over time, supplement these with typical Level 1 measured data for their most common materials. To accomplish this, databases or libraries of typical material property inputs must be developed for the following categories: binder properties; HMA mechanical properties; PCC mechanical properties; unbound mechanical properties; and thermohydraulic properties.

The objective of this study was to develop this type of organized database of material properties for the most common paving materials used in Maryland.

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Description

The work plan for accomplishing the objective was organized into seven tasks:

- Task 1 – Database Design
- Task 2 – Binder Properties
- Task 3 – HMA Mechanical and Physical Properties
- Task 4 – PCC Mechanical and Physical Properties
- Task 5 – Unbound Mechanical and Physical Properties
- Task 6 – Thermohydraulic Properties
- Task 7 – Workshop and Final Report

Results

This project provides an essential prerequisite for an eventual full local calibration/validation of the MEPDG for Maryland conditions. As a result of the project a comprehensive material property database developed in Microsoft Access 2007 was developed and accompanies the final report. The database provides complete data management tools for adding future data as well as data display screens for MEPDG inputs that mirror the input screens in the MDPDG Version 1.100 software. These data display screens can be easily modified to mirror the DARWin-ME input screens, the next generation of AASHTO's pavement design software, once the DARWin-ME software is released to the public (scheduled for April 2011). All of the detailed testing recommendations for each of the specific materials are compiled in Chapter 4.4 of the report.

Report Information

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