July 2004

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Subject Areas: IIB Pavement Design, Management, and Performance
IIIB Materials and Construction

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Research Results Digest 290

RECOMMENDED MECHANISTIC-EMPIRICAL PAVEMENT DESIGN GUIDE AND SOFTWARE: *Available for Evaluation*

This digest announces the availability of key products from NCHRP Project 1-37A, "Development of the 2002 Guide for the Design of New and Rehabilitated Pavement Structures: Phase II," for evaluation. Project 1-37A was conducted by the ERES Consultants (Division of Applied Research Associates, Inc.); its subcontractors Arizona State University and Fugro Consultants LP; and numerous individual consultants.

Introduction

In 1996, the AASHTO Joint Task Force on Pavements (JTFP) proposed development of a mechanistic-empirical design guide for new and rehabilitated pavements. The present (1993) edition of the *AASHTO Guide for Design of Pavement Structures* is based on empirical equations derived from the AASHO Road Test. That test was conducted between 1958 and 1960—with a limited number of structural sections at one location, Ottawa, Illinois—and with modest traffic levels compared with those of the present day. As such, designs accomplished with the 1993 AASHTO guide are well outside the inference space of the original data. The JTFP thus proposed development of a recommended pavement design guide based on mechanistic-empirical principles with numerical models calibrated with pavement-performance data from the Long-Term Pavement Performance (LTPP) program. The decision was made to use only validated state-of-the-art technologies in this development program. The research was conducted as NCHRP Project 1-37A under the oversight of an NCHRP technical panel with membership drawn from state DOTs representing the JTFP, the hot mix asphalt (HMA) and portland cement concrete paving industries, academia, and FHWA.

The recommended pavement design guide developed in Project 1-37A includes (1) a Guide for Mechanistic-Empirical Design and Analysis, (2) companion software with documentation and a user manual, (3) an extensive series of supporting technical documents, and (4) implementation and training materials. The recommended design guide uses mechanistic-empirical numerical models to analyze input data for traffic, climate, materials, and proposed structure and to estimate damage accumulation over service life. It is applicable to designs for new, reconstructed, and rehabilitated flexible, rigid, and semi-rigid pavements. Performance predictions are made in terms of distress and smoothness. The predicted distresses for flexible pavement designs are longitudinal cracking, alligator cracking, transverse cracking, and rutting, and for rigid pavement designs, faulting, cracking, and continuously reinforced concrete pavement (CRCP) punch-outs. Design performance values can be compared with threshold values, or comparisons of per-

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formance may be made for alternate designs with varying traffic, structure, and materials.

This recommended design guide provides significant potential benefits over the 1993 AASHTO guide in achieving cost-effective pavement designs and rehabilitation strategies. The most important benefits are that its user-oriented computational software (1) implements an integrated analysis approach for predicting pavement condition over time that accounts for the interaction of traffic, climate, and pavement structure; (2) allows consideration of special loadings with multiple tires or axles; and (3) provides a means for evaluating design variability and reliability. The recommended guide will allow pavement designers to make better-informed decisions and take cost-effective advantage of new materials and features. The software can also serve as a forensic tool for analyzing the condition of existing pavements and pinpointing deficiencies in past designs.

Beginning in mid-2004, NCHRP Project 1-40 will conduct an independent, third-party review to test the design guide's underlying assumptions, evaluate its engineering reasonableness and design reliability, and identify opportunities for its implementation in day-to-day design production work. The review is planned for completion in early 2005 and is one of the first steps in a full program of technical, training, and marketing activities to advance the guide to a final product worthy of AASHTO adoption. Comments on the research versions of the design guide and software announced by this *Research Results Digest* will be provided to the review team for its use in arriving at its findings and recommendations to NCHRP.

Availability of the Design Guide and Software

The recommended Mechanistic-Empirical Pavement Design Guide and its companion software are available online at http://www.trb.org/mepdg/. These research versions of the guide and software are made available in the interest of information exchange, and for the purposes of introducing the design guide and software to the pavement design and engineering community and encouraging thorough evaluation by a wide range of potential end users in the public and private sectors.

The pavement design guide is provided in an Adobe PDF format that is read-only, non-saveable, non-printable, and non-editable. The software can be downloaded for installation on a local drive in executable form, but its copy-protection feature requires access to the Internet to check for a specific file on a web server of the Transportation Research Board at each use. The supporting technical reports are available online in an unrestricted PDF format.

These versions will expire when the guide and software are available from AASHTO or at another time determined by NCHRP. NCHRP may revise them as necessary and provide updates on the Internet.

Comments and suggestions on the design guide and software are welcomed and encouraged; these may be sent to NCHRP, by e-mail to pavement-guide@nas.edu or by fax to (202) 334-2006.

These digests are issued in order to increase awareness of research results emanating from projects in the Cooperative Research Programs (CRP). Persons wanting to pursue the project subject matter in greater depth should contact the CRP Staff, Transportation Research Board of the National Academies, 500 Fifth Street, NW, Washington, DC 20001

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