

Mechanistic – Empirical Design Guide:

June 19-22, 2005

Status and Implementation

2005 Southeastern Pavement

Management & Design Conference

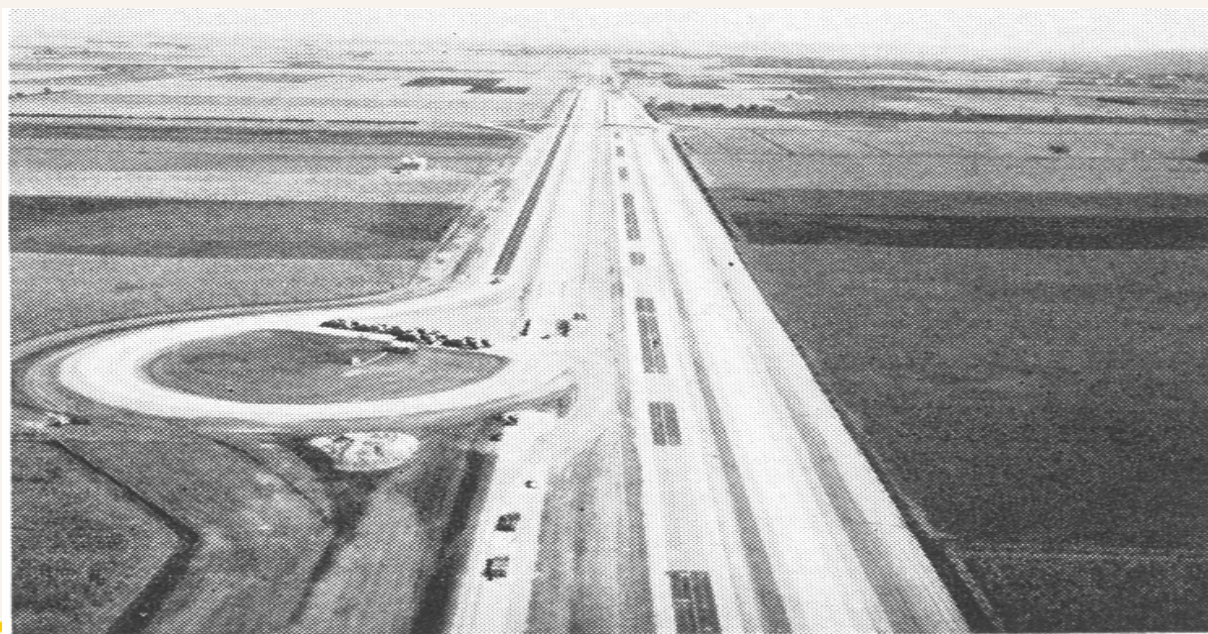
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Overview

- **Where have we been**
- **Where are we now**
- **Where are we going**
- **How are we getting there**

1972 AASHTO Interim Guide for the Design of Pavement Structures

“While the Guides were under evaluation, AASHTO initiated research studies within NCHRP for the purpose of developing a more theoretical or “rational” method for structural design of highway pavements.”



The “Rational Method” gets a push

- Process initiated by Joint Task Force on Pavements
 - Irvine, California : March 1996
- Development of the 2002 Guide for Design of New and Rehabilitated Pavement Structures
 - NCHRP 1-37A
 - Awarded to ARA : February 1998
 - Product Submitted : February 2004

State of Confusion

- M-E Design Guide
- NCHRP 1-37A Guide
- 2002 Design Guide
- New Design Guide
- Guide for M-E Design



All describe the same product

NOT the AASHTO Design Guide!!

Where do I get it?

<http://www.trb.org/mepdg/>

- Software and Manual Available
- Need to be online to use
- Manual Cannot be Printed



Major Efforts Underway

- NCHRP Enhancement Projects
- Design Guide Implementation Team (DGIT)
- Lead States Initiative
- NHI courses
- State Implementation Activities

NCHRP Associated Projects

- o NCHRP 1-40: Independent Review
- o NCHRP 1-42: Top-Down Fatigue Cracking (Active)
- o NCHRP 1-41: Reflection Cracking of Hot-Mix Asphalt Overlays (Active)
- o NCHRP 9-30a: Calibration of Rutting Models (Pending)
- o NCHRP 9-38: Endurance Limit of HMA (Active)

<http://www4.trb.org/trb/crp.nsf>

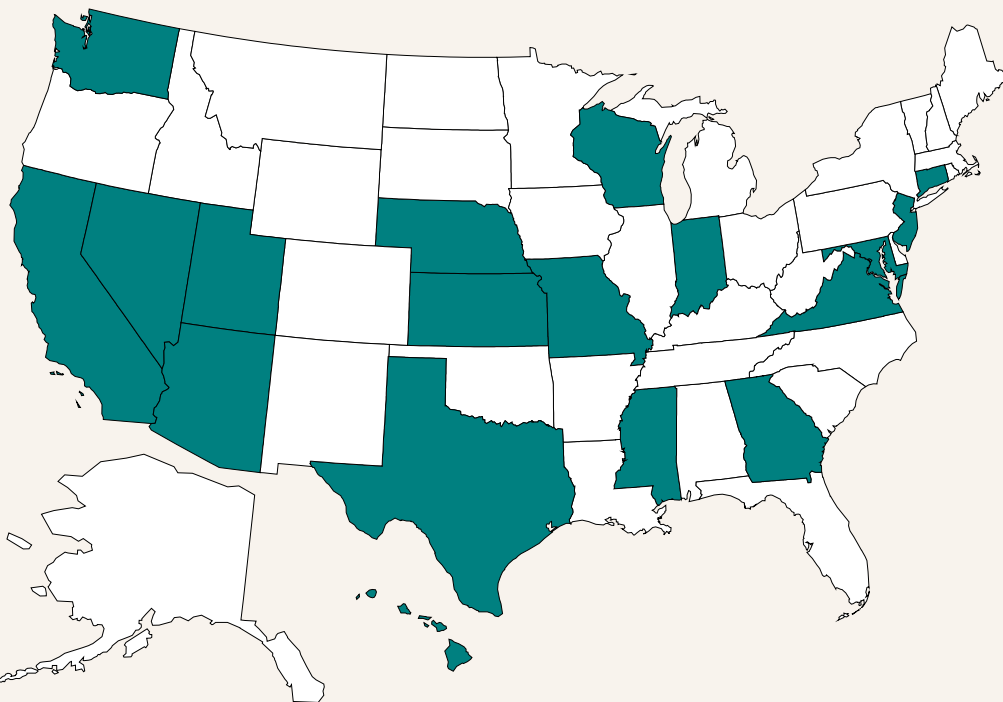
DGIT Activities

- Traffic in ME Design Workshop(s)
- Introduction to ME Design Workshop(s)
- Materials Inputs to ME Design Workshop(s)
- EICM (In Development)
- Community of Practice Website
- Evaluation of the Rigid Pavement Design Procedure

www.fhwa.dot.gov/pavement/dgit/htm

www.ct.gov/dot/pavement101

DGIT Activities



- 19 states
- 1,200+ participants
- 300+ web participants
- China
- Canada
- Europe
- India
- South and Central America

www.fhwa.dot.gov/pavement/dgit/htm

Community of Practice Website

Discussion

Reference

Works In Progress

Directory

next page ► ◀ previous page collapse ✕ expand ◄

► Create Discussion Topic

[Re: CBR - Mr formula --- 1/26/2005 --- Anonymous](#)

[Re: CBR - Mr formula --- 1/27/2005 --- Anonymous](#)

[**Traffic \(1 response\) 10/03/2004 --- Hasan**](#)

[Re: Traffic --- 12/29/2004 --- Harold L. Von Quintus](#)

[**Subgrade ModulusDesign \(6 responses\) 9/25/2004 --- Alberto**](#)

[Re: Subgrade ModulusDesign --- 10/04/2004 --- Kevin D. Hall](#)

[Re: Subgrade ModulusDesign --- 11/05/2004 --- Bruce Vandre](#)

[Re: Subgrade ModulusDesign --- 11/05/2004 --- Michael Darter](#)

[Re: Subgrade ModulusDesign --- 11/18/2004 --- Anonymous](#)

[Re: Subgrade ModulusDesign --- 11/22/2004 --- Michael Darter](#)

[Re: Subgrade ModulusDesign --- 12/29/2004 --- Harold L. Von Quintus](#)

NHI Courses

- NHI #131064 – Introduction to Mechanistic Design
(Available)
- NHI #131109 - Using Mechanistic-Empirical Pavement Design Guide Software (In Development)
- NHI #132040 – Geotechnical Aspects of Pavements
(Available)
- NHI #151018 – Application of Traffic Monitoring Guide
(Available)

Lead States Initiative

- 15 states
- Implementation Plans
- Knowledge base
- Expert Task Group
- CEO Involvement/Education
- Status Surveys

www.fhwa.dot.gov/pavement/leadstates/index.cfm

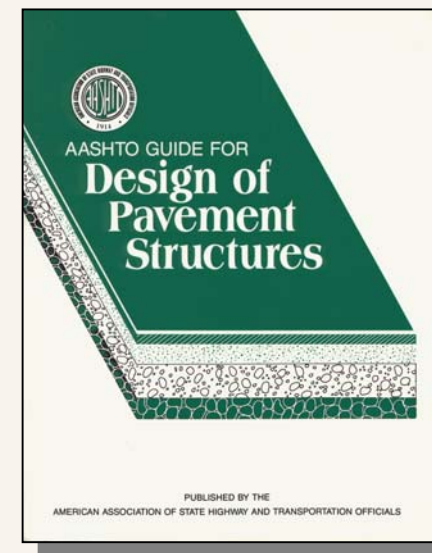
State Implementation Activities

- Sensitivity Analysis
- Materials Characterization
- Local Calibration Efforts
- Education Efforts

Input Requirements

1993 AASHTO Design Guide

- 5 flexible inputs
- 10 rigid inputs



M-E Design Guide

- 100+ Total Inputs
- 35+ Flexible
- 25+ PCC

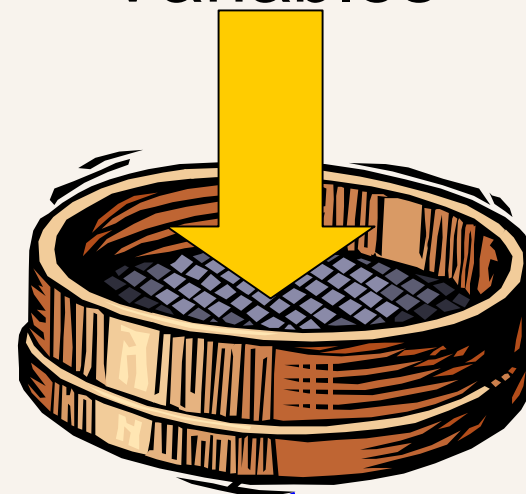


What's Sensitive?

It Depends!!

- Pavement Thickness
- Your Climate
- Distress Type

50 +
Variables



CTE
MR **E***
Air Voids

Sensitivity Analysis

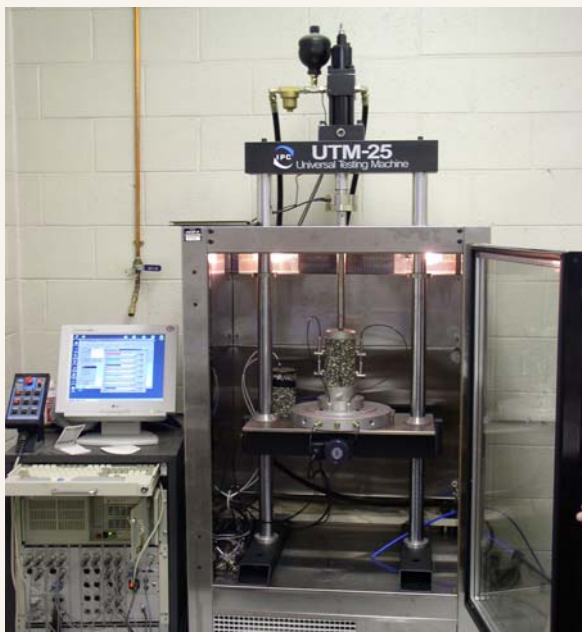
Dependent Variables vs. Independent Variables

- University of Arkansas
- DGIT
- State DOT's
- NCHRP 1-37a documentation

Batch Mode Coming Soon!!

Materials Characterization

Project Level
In-House

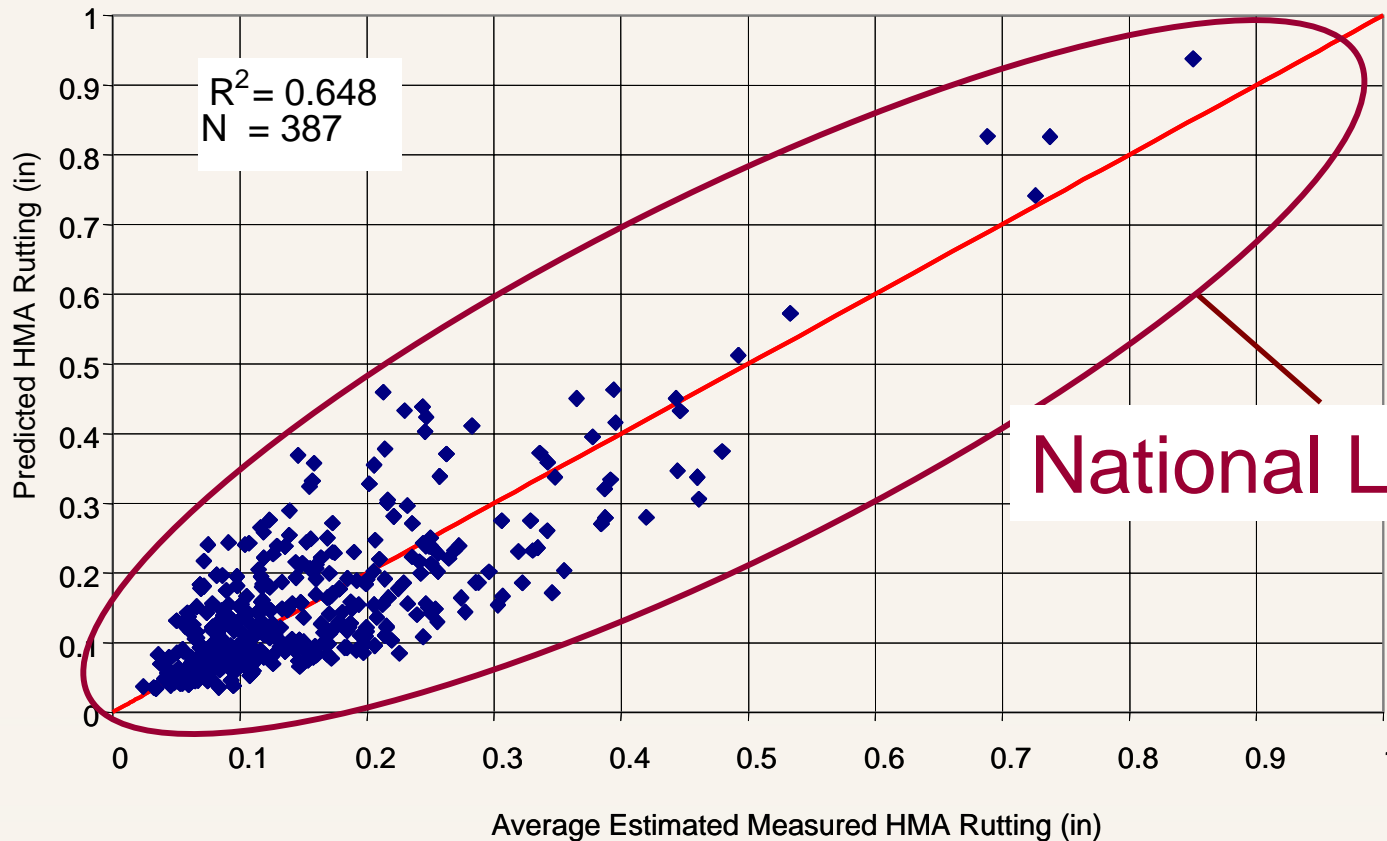


Materials Catalog
Contracted Out



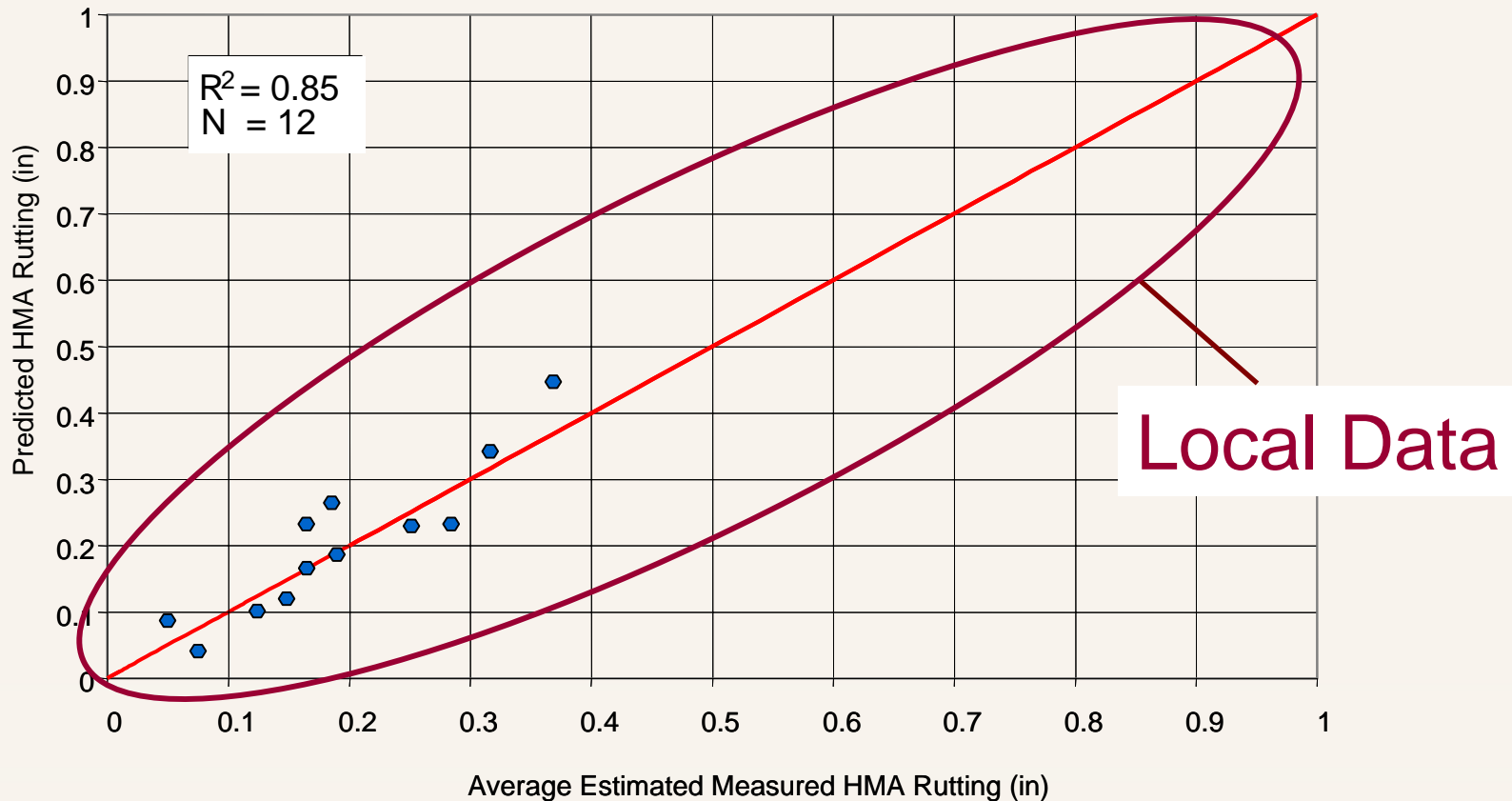
National Calibration

$$\frac{\varepsilon_p}{\varepsilon_r} = k_1 * 10^{-3.4488} T^{1.5606} N^{0.479244}$$



Local Calibration

$$\frac{\epsilon_p}{\epsilon_r} = \beta_{r1} k_1 * 10^{-3.4488} T^{1.5606} \beta_{r2} N^{0.479244} \beta_{r3}$$



Local Calibration

- Accelerated Testing facilities
 - NCAT Test Track
 - MN Road
- LTPP SPS Sections
- Experimental Sections
 - SSSI
- Pavement Management Systems

Perspective

- **1960 – Completion of Road Test Experiment**
- **1961-62 AASHO Interim Guide for the Design of Rigid and Flexible Pavements**
- **1972 AASHTO Interim Guide**
- **1981 Revised Chapter III on Portland Cement Concrete Pavement Design**
- **1986 Guide for the Design of Pavement Structures**
- **1993 Revised Overlay Design Procedures**
- **1998 Supplement to Concrete Design Procedures**

Working Together

Implement

Enhance

Educate

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