



# Implementation Plan for the MEPDG in PA

*ACPA 2008 Annual Conference  
Dan Dawood, P.E.  
Pennsylvania DOT*




## Pennsylvania's National Highway System

- NHS is over 5,500 miles of pavement
- 1250 of which are Interstate miles
- Entire network is over 40,000 miles
- **Safety** tied to pavement condition
- Customer/User expectations
  - Safer pavements
  - Smoother ride
  - Quieter pavements
  - Reduced delay & congestion



## Nationally Our aging highways

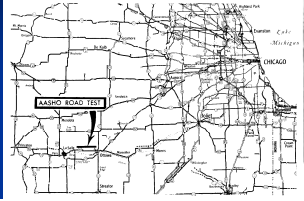

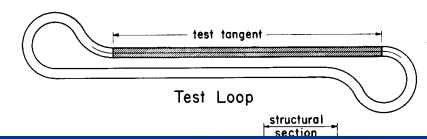
- Demand now often exceeds capacity
- Serving travelers for more than 35 years
- More than 11,000 miles of the highway system considered to be in **poor** condition

## Existing AASHTO Pavement Design Guide

- Empirical design methodology based on AASHTO Road Test in the late 1950s
- Several editions:
  - 1961 Interim Guide
  - 1972
  - 1986
    - Resilient modulus, rehabilitation, reliability
  - 1993
    - Improved rehabilitation
    - Current version

## AASHTO Road Test (late 1950s)

(AASHTO, 1961)

## 1950s Construction Methods...



Figure 37. Compacting subbase.




Figure 29. Simultaneous concrete construction.

(AASHTO, 1961)

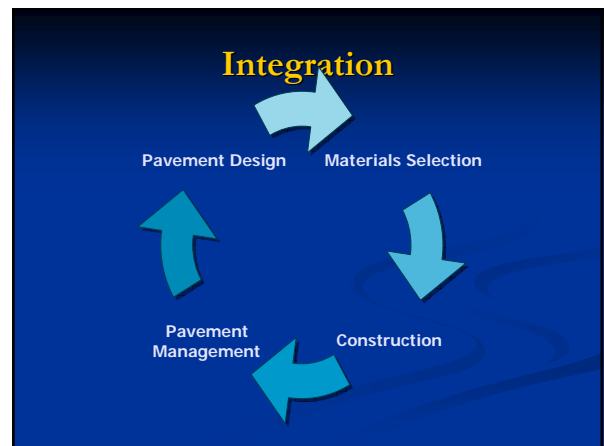


- ### Pavements Design System – Critical Elements of Success
- Reliability, Safety & Security
  - Long-Life Designs & Materials
  - Decision-making Tools
  - Management Systems
  - Rehabilitation Strategies
  - Preservation
  - Functional Improvements

- ### History of Development
- Process initiated by Joint Task Force on Pavements (Joint Technical Committee on Pavements)
    - Irvine, California : March 1996
  - Development of the Guide for Design of New and Rehabilitated Pavement Structures
    - NCHRP 1-37A
    - NCHRP 1-40 A-J

- ### History of Development
- #### NCHRP 1-37A Mechanistic Empirical Design Guide
- An improved design procedure advancing from empirical design principles to **mechanistic-empirical** design principles which incorporates:
- Knowledge from experimental investigations of nationwide test sections (LTPP)
  - Which studied effects of pavement design on performance
  - Improved traffic loading characterization

- ### History of Development
- Implementation of the MEPDG  
NCHRP 1-40 A-J
- Awarded to ARA in 2005
- Product Submitted : April 2007
  - Balloted Product – *Manual Of Practice*
  - Balloted and approved by SCOH  
October 2007



### Benefits

- Wide Range of Pavement Structures
  - New
  - Rehabilitated
- Direct Consideration of Major Factors
  - Traffic – Direct Consideration of Over-Weight Trucks
  - Climate
  - Materials – Different HMA,PCC, & Aggregate Materials
  - Support – Foundation & Existing Pavement
- Multiple Acceptance Criteria
  - Distress, smoothness

### Benefits

- Compatible with Superpave system
- Most Comprehensive Approach for Structural Design
- Provides Link Between -
  - Structural Design
  - Material Properties

### Benefits

- Models Calibrated Using LTPP Data
- Will include and require Local Calibration
- Will provide methods for local calibration in the *Local Calibration Guide*

### Local Calibration HMA

PennDOT has initiated data collection effort for HMA pavements in the SISSI (Superpave In-Situ Stress Strain Investigation) project

- 8 sites instrumented
- Stress/Strain gauges throughout all layers
- Some sites monitored continuously and others periodically with site visits for download
- Contract with Pennsylvania State University

### Local Calibration Concrete

- One Concrete research project, Rt. 22 in Western PA was instrumented in all layers
- Research is being performed by the University of Pittsburgh
- Scope of the testing involved many of the inputs needed in the rigid pavement design portion of the MEPDG

### Local Calibration Concrete

- The following tests were performed on the Rt. 22 Project :
  - Subgrade Resilient modulus (Mr)
  - 28 day break and 1 year break
  - Field cores and Lab cores were compared
  - Coefficient of Thermal Expansion
  - Temperature gradients

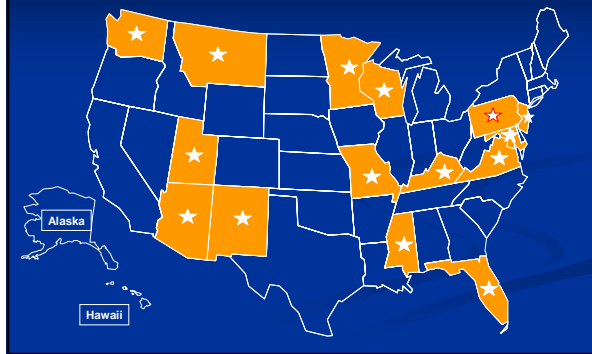
### Local Calibration Concrete

- New research effort is proposed and underway for Materials Characterization for concrete pavement inputs values in the MEPDG
- More sites will be sought including using all available opportunities
- Will evaluate and document various sources of aggregates and cements commonly used in PA
- Will evaluate Set Gradients and Temperatures

### Connection to Innovative Contracting

- Warranty
- Performance Related Contracts
- LCCA
- Design / Build
- Dispute Resolution Analysis

### Lead States Group



### How do we get started?

- Get Educated
- Get Involved
- Allocate Resources
- Encourage Cross Discipline Communication

### QUESTIONS ?

