



Proposed
Structural Study at the
NCAT Test Track

Background

- Mechanistic-Empirical Design is becoming more common
 - NCHRP 1-37A
 - 2002 Guide
- M-E Design represents significant changes in pavement design
 - Materials
 - Traffic
 - Performance Predictions
 - Environmental effects
- M-E Design is powerful but requires calibration and validation

Background

- LTPP initial calibration / validation
 - NCHRP 9-30
 - Excluded:
 - Validation of fatigue resistant HMA layers
 - Validation of polymer-modified binders
 - Surface-initiated cracking
 - Surface layer rutting

Research Needs

- Evaluate performance equations
 - Different types of distress
 - Surface rutting (current Test Track)
 - Top-down cracking (current Test Track?)
 - Fatigue cracking
 - Structural rutting
- Validate structural models
 - Layered elastic analysis (analytical)
 - Non-linear, elastic-plastic (FEM)

Objectives

- Develop an experimental plan to validate and confirm mechanisms in the 2002 Guide
- Implement plan at NCAT Test Track

Scope

- Design experiment to incorporate a number of sections into structural study
- Coordinate with other 2002 efforts
- Maintain current efforts toward evaluation of HMAC rutting performance at Track
- Select materials/designs to be representative of Southeast region

Preliminary Plan

- Design/Evaluate sections according to 2002 Guide
- Experimental Variables
 - Layer thicknesses as a function of traffic level
 - Include granular base, stabilized base
 - Binders
 - Modified vs. Unmodified
 - Load configuration and environment consistent between sections

Proposed Test Sections

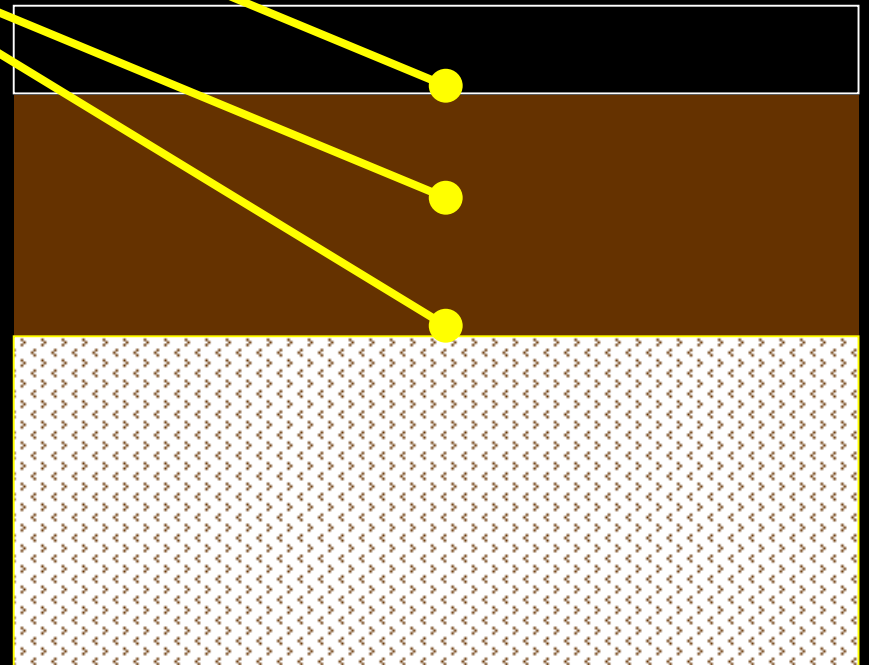
- 2 Full Depth (HMAC on Subgrade)
 - Modified and Unmodified (~9")
- 4 Aggregate Base
 - Modified and Unmodified (~7.5")
 - Common aggregate base (~9")
- 4 Stabilized Base
 - Modified and Unmodified (~6.5")
 - Common stabilized base (~7")

Testing and Performance Evaluation

- Material Properties
 - Laboratory
 - Field
- Performance Evaluations
 - Surface Profile
 - Visual surveys
 - Forensic pits
 - Continue with other performance testing

Instrumentation

- Mechanistic pavement response
 - Strain gauges
 - Pressure cells
- In situ conditions
 - Moisture
 - Temperature



Data Analysis

- Compare predicted vs. measured pavement response
 - Calibrate performance equations
- Use performance data to evaluate existing performance equations
 - Sections must exhibit distress
 - Design for different types of distress

Expected Results

- Evaluation & local calibration of performance equations
- Confirmation of distress predictions in specific layers
- Full-scale proving ground for the new design method

Summary

- 2002 Guide requires validation & confirmation
- NCAT Test track offers unique opportunity
 - Full scale testing
- Need to combine current research efforts at Track with research toward implementation of M-E design