0-6658: Collection of Materials and Performance Data for Texas Flexible Pavements and Overlays

Background

Proper calibration of mechanistic-empirical (M-E) design and rehabilitation performance models to meet Texas conditions is essential for cost-effective flexible pavement designs. Such a calibration effort would require a reliable source of pavement material properties and performance data collected on a sustained basis.

In this study, the researchers developed a comprehensive data storage system (DSS) containing material properties and performance data for flexible pavement and overlaid test sections in Texas. A minimum of 100 flexible pavement and overlay sections across Texas were monitored, and data were collected for subsequent population of the DSS to:

- Serve as a data source for the calibration of the Texas M-E models and design software, such as the Texas M-E pavement design system (TxME).
- Serve as an ongoing reference data source and diagnostic tool for Texas Department of Transportation (TxDOT) engineers and other transportation professionals.

What the Researchers Did

The research team:

- Collected and analyzed materials and performance data from 112 test sections across Texas (Figure 1).
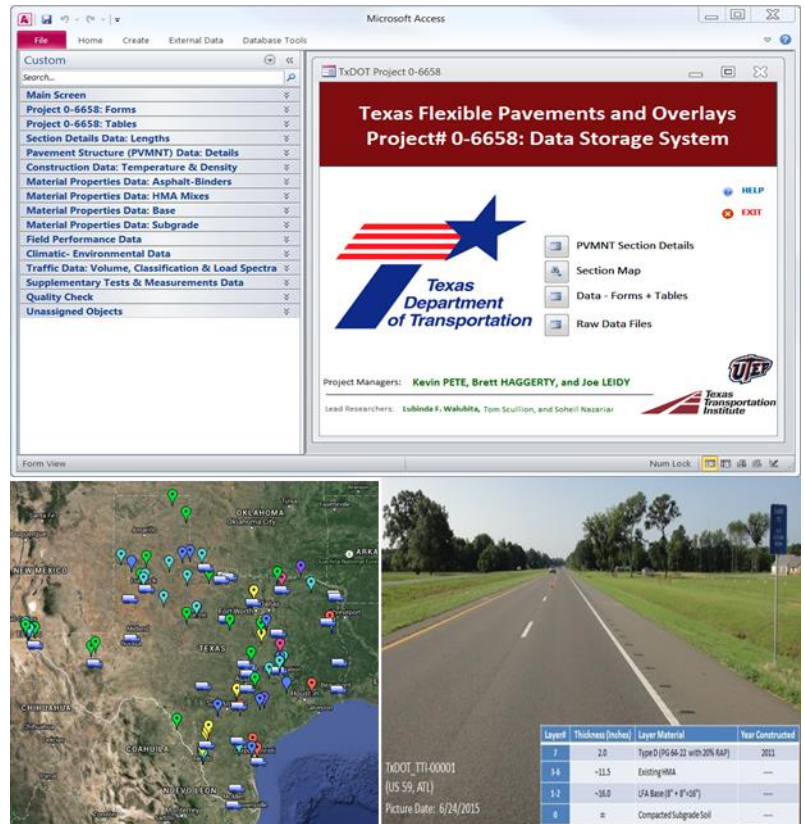
**Figure 1. Top: The DSS Main Pane.
Bottom Left: Project Test Section Location Map.
Bottom Right: Picture of Highway Section in the DSS.**

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- Conducted extensive laboratory tests for material property characterization and field tests and measurements for performance, traffic, and climatic data characterization.
- Developed and managed a data repository system consisting of:
  - DSS: processed data (in Microsoft® Access®) (Figure 1).
  - Raw data storage system: unprocessed raw data.
- Preliminarily calibrated some of the Texas M-E models and software.

What They Found

The research team found that:

- The collected typical pavement material properties can be used as an aid for new pavement design or rehabilitation activities.
- The collected pavement performance data provide rationale performance predictions over time, traffic loading, and climatic changes.
- Texas M-E model calibrations result in more accurate designs and performance predictions that ultimately optimize pavement designs and reduce maintenance and rehabilitation activities/costs to TxDOT.

- The collected data are useful for developing new M-E models (i.e., relating material properties to actual field performance) that are tailored to the Texas local conditions, optimizing future pavement designs.
- The developed DSS helps monitor and evaluate the changes in material properties and performance as a function of pavement structure, traffic loading, and climatic conditions.

What This Means

Well-calibrated pavement design models help TxDOT efficiently spend billions of dollars of roadway investment. The DSS will bring in the following benefits:

- Serve as a supportive data source for proper calibration and validation of Texas M-E models and design software, optimizing pavement designs.
- Serve as an effective tool to help TxDOT districts and engineers make better decisions for design- and rehabilitation-related issues.
- Aid in improved pavement performance and reduced maintenance costs due to optimum designs and efficient field monitoring.