Development of a Flexible Pavement Database for Local Calibration of MEPDG

Project Number: NM08MSC-02
Research Category: Materials Science

Problem Statement:

Current national pavement design procedures are outdated and are typically conservative. Recently, the American Association of State Highway and Transportation Officials (AASHTO) has developed a new design procedure documented in the *Mechanistic Empirical Pavement Design Guide*. This procedure has several advantages over conventional methods, including: optimized designs, better performance predictions, local materials incorporation, and improved forensic investigation over the traditional design methods. However, the input parameters and calibration coefficients addressing the conditions prevalent in New Mexico for ensuring an accurate design using the MEPDG are unknown. Implementation of the MEPDG in New Mexico requires: 1) the development of design input parameters that are been required for the procedure currently used by NMDOT designers; and 2) the determination of the calibration coefficients (transfer functions, coefficients, and failure criteria) for New Mexico conditions.

Objective:

Implementation of the Mechanistic-Empirical Pavement Design Guide as a means to improve pavement performance in New Mexico while optimizing design and lowering construction and maintenance costs.

Background:

The results of this research will enable the NMDOT to provide pavement design professionals with appropriate tools and a better understanding of how the new MEPDG will allow for optimization of materials, evaluate and incorporate new materials into designs, and evaluate the impacts of anticipated heavier loads and new axle configurations on pavement performance in New Mexico. With the existing method, pavement life is not correlated with the mode of failure. MEPDG design methodology is expected to allow the NMDOT to establish the anticipated failure mode, and level of distress at the end of the design life (e.g. rutting, bottom-up cracking or top-down cracking), resulting in cost efficiency comparisons and optimizations.

Action Items:

Step One: Perform a thorough literature review to determine the current state-of-the-art in MEPDG.

Step Two: Identify required MEPDG input and output variables, determine the optimal database structure, and develop a database capable of manipulating, storing and processing the data as required by the MEPDG design software.

Step Three: Initiate and populate the database with the objective of carrying out local calibration of the new MEPDG.

Step Four: Devise an effective means of interaction between the MEPDG database and existing databases maintained by NMDOT for network-level applications.

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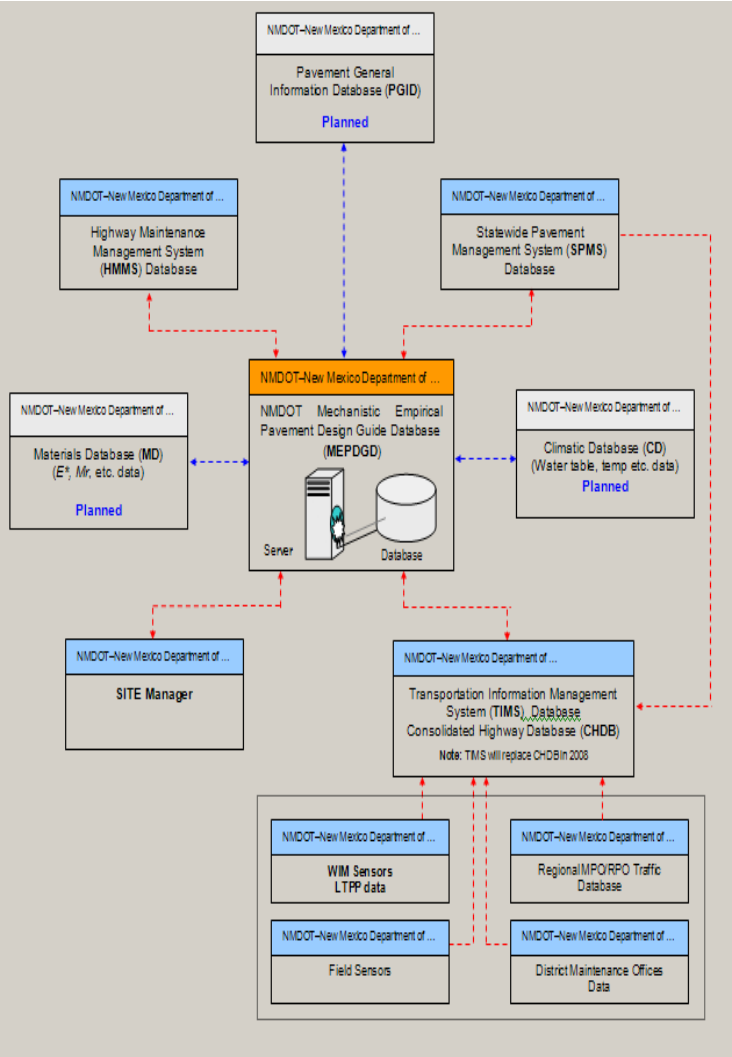

Desired Results:

Improvement in design, construction, serviceability and durability of New Mexico pavements.

Product or Service to be delivered:

1) Development of a comprehensive database sufficient to store all required variables for the effective statewide implementation of MEPDG.

2) Development of distress model coefficients and MEPDG inputs for designing NMDOT Pavements.

3) Interim and final reports documenting findings and recommendations.

4) Initial values of inputs and default coefficients for designing pavements using MEPDG.

5) A practical pavement design using MEPDG concepts on a test project.

Tool to Measure Impact:

Future use of this methodology in the design of New Mexico pavements.

Standards of Success:

Implementation of policy for using this technology.

Time Frame: 48 months

Project Funding: $839,564.00

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