Prep-ME Software Implementation and Enhancement

INTRODUCTION

Pavement ME Design (previously MEPDG/DARWin-ME) is a significant advancement in pavement design, though requiring more inputs from various sources. Through efforts by the Louisiana Transportation Research Center (LTRC) and Federal Highway Administration (FHWA), the Louisiana Department of Transportation and Development (DOTD) initiated a state pooled-fund study TPF-5(242) with nine participating agencies to expand the functions of the originally developed Prep-ME software program. The Prep-ME software produced from Phase II project is capable of pre-processing, importing, checking the quality of raw Weigh-In-Motion (WIM) traffic data, and generating three levels of traffic data inputs with built-in clustering analysis methods for Pavement ME Design.

Most participating state DOTs plan to use Prep-ME software for the implementation and local calibration of Pavement ME Design. Although several face-to-face group meetings were held in Phase II, such training was targeted for a wide range of audience primarily on reporting of project progress and gaining feedback for future directions. This training may not be sufficient and effective to train state engineers on how to implement the Prep-ME software for their daily operation and usage. Therefore, hands-on training and continuing support is desired for the full implementation of Prep-ME software. Software training, testing and support of the Prep-ME software becomes the focus of this project, Phase III of TPF-5(242). This process ensures that defects in Prep-ME are recognized during Prep-ME implementation and that software enhancements are developed.

OBJECTIVE & SCOPE

The objective of this project was to assist participating state DOTs on the full implementation of Prep-ME software for traffic data collection and Pavement ME Design as well as delivering new generation of Prep-ME software with enhanced and customized features for each individual state. The scope was to assist TPF-5(242) participating state DOTs in the data preparation for the Pavement ME Design and improve the management and workflow for more accessible ME Design input data sets with high quality. In addition, technical support is provided to individual states during their daily implementation of Prep-ME.

METHODOLOGY

With the remaining funds from the Phase II of project TPF-5(242), a survey was conducted among participating states and FHWA and the following four tasks were determined for this project:

Task 1 - Provide on-site and webinar training for participating states,
Task 2 - Develop portable version of Prep-ME for field data collection and WIM calibration,
Task 3 - Enhance existing traffic module in Prep-ME, and
Task 4 - Provide technical support to meet state needs.

RESULTS

The following results have been achieved in this project to assist participating state DOTs on the full implementation of Prep-ME software:

- A new generation of the Prep-ME software is developed with many enhancements and the capability to import WIM data based on both TMG 2001 and TMG 2013 format. Since the release of TMG 2013, several participating states have been collecting WIM data in accordance with the TMG 2013 format. This new capability has been tested with sample TMG 2013 WIM data from Kentucky, Wisconsin, and Michigan. In addition, site-specific traffic parameters, such as AADTT, percentage of truck in design lane, percentage of traffic in design direction etc., for Level 1 output, have been developed.

- The research team has worked closely with each participating state and provided on-site and/or webinar instruction on how to implement the Prep-ME software for their Pavement ME Design, traffic data collection, and analysis. Six states, including Nevada, Kentucky, North Carolina, Michigan, Wisconsin, and Louisiana, have received on-site training. Online webinar instruction was provided for all participating states and other users. Engineers from pavement, traffic, and other relevant areas attended the on-site training or webinar. State WIM data were requested and used during each instruction session to demonstrate the software functionality that can be utilized by pavement design and traffic engineers to improve operation productivities. Desired software enhancements were discussed at every session and 21 rounds of software updates were released based on comments from participating states.

- The team has been providing technical support on an as-needed basis in a timely manner to help states implement Prep-ME for daily traffic data collection and ME based pavement design. Several bugs were fixed and improvements made during the execution of this project. In addition, several new features requested by participating states were added to enhance the existing capabilities in Prep-ME.

- A portable version of Prep-ME has been developed to assist field traffic data collection. This tool may help traffic data collection engineers to identify data issues immediately in the field and perform correction activities on-site, which could save participating states' time and costs, and assist in collecting high quality traffic data for Pavement ME Design.

IMPLEMENTATION STATUS

Through this project, the ready-to-implement Prep-ME software has been delivered to the participating states for the preparation of inputs for Pavement ME Design. This software also provides assistance in collecting more robust traffic data for other potential applications. This tool serves as the companion tool that can seamlessly communicate with Pavement ME Design in a full production environment for the local calibration and implementation. In particular, the Prep-ME software can be used by state highway agencies:

- Help state traffic data collection engineers to conduct effective QC/QA on traffic data collected for various applications, such as pavement design, HPMS reporting, traffic planning, bridge design, etc.
- Help state pavement design engineers to analyze the traffic loading data collected through the WIM technology and select the best load spectra for pavement design purpose among WIMs, national, and local defaults.
- Improve the productivity of above tasks operation.