



RESEARCH PROJECT CAPSULE [12-1PF]

October 2011

TECHNOLOGY TRANSFER PROGRAM

Traffic and Data Preparation for AASHTO MEPDG Analysis and Designs

JUST THE FACTS:

Start Date:
September 1, 2011

Duration:
36 months

End Date:
August 30, 2014

Funding:
SPR

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Sponsored jointly by the Louisiana
Department of Transportation and
Development and Louisiana State
University

POINTS OF INTEREST:

*Problem Addressed / Objective of
Research / Methodology Used
Implementation Potential*

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PROBLEM

The Mechanistic Empirical Pavement Design Guide (MEPDG) and the subsequent AASHTO product DARWin-ME are significant advancements in pavement design. However, they are substantially more complex than the 1993 AASHTO Guide, which is currently used in many states. The new systems require significantly more inputs from designers. Among them are many parameters with which today's pavement designers are not familiar. In addition, MEPDG/DARWin-ME provides methodologies for the analysis and performance prediction of different types of flexible and rigid pavements for specific climatic and traffic conditions. However, the models were developed using available Long Term Pavement Performance (LTPP) national wide data sets. These models require local calibration before MEPDG can be used by highway agencies efficiently. Therefore, many data sets need to be pre-processed before their use for MEPDG/DARWin-ME. This process needs to be automated and assisted with software.

Prep-ME was initially designed and made to achieve the purpose of data preparation, data quality control, and database development for MEPDG with a primary module to qualify truck traffic data from weigh-in-motion (WIM) stations. The first version of Prep-ME was tailored for Arkansas Department of Transportation by a research team led by Dr. Kelvin Wang and Dr. Kevin Hall at the University of Arkansas. In mid-2011, through efforts by the Louisiana Transportation Research Center (LTRC) and Federal Highway Administration (FHWA), a pooled-fund project with eight participating federal and state departments of transportation (DOTs) was initiated for a three-year study to make Prep-ME a production worthy program for DARWin-ME for the participating agencies. The pooled-fund contributing agencies are DOTD, FHWA, and state DOTs of Hawaii, Kentucky, Maryland, North Carolina, New Hampshire, and Wisconsin. It is anticipated that more state and private agencies will join the study throughout the course of the three-year period.

OBJECTIVE

The objective of the new version of the Prep-ME software is to assist participating state DOTs the data preparation and improve the management and workflow of the DARWin-ME input data to make the DARWin-ME software more accessible and easier to use. Additionally, Prep-ME can be used as an important tool for calibrating and implementing the DARWin-ME for individual

participating agencies. For production use, the existing features in the Prep-ME software need to be enhanced to improve speed, usability, functionality and stability, and compatibility with the DARWin-ME software.

A critical task in the pooled-fund study is to improve the quality control algorithms and their implementations for truck traffic data from WIM stations in state DOTs. An expert sub-group has been formed and is led by North Carolina DOT to advise and guide the implementation of the truck traffic data analysis and quality control. A substantial effort in the study includes the development of database capabilities in Prep-ME that are compatible with the server based SQL data structures that are implemented in DARWin-ME.

METHODOLOGY

For all project objectives to be fully satisfied, the following tasks must be successfully accomplished:

- **Task 1:** Improve the speed of executing the most time consuming numerical engines, including the raw traffic data importing/updating and user's data interpolation functions.
- **Task 2:** Add more features based on a consensus basis of participating states, including the algorithms and their implementations of quality control of WIM truck traffic data.
- **Task 3:** Improve user friendliness/usability of Prep-ME.
- **Task 4:** Test stability and conduct testing of Prep-ME.
- **Task 5:** Report and give documentation of Prep-ME.
- **Task 6:** Conduct training.

IMPLEMENTATION POTENTIAL

The primary final product of the proposed research is the Prep-ME software version 2.0, central database suitable for use with DARWin-ME, and documentation. This research will also provide roadway designers insight into the criticality of specific inputs required in the

new pavement design guide, including key truck traffic characteristics. In addition, the participating highway agencies can use the new version of Prep-ME by WIM field data crews to check traffic data quality of WIM equipment in the field.

Learn More

The pooled-fund project solicitation can be found online at: <http://www.pooledfund.org/Details/Solicitation/1260>

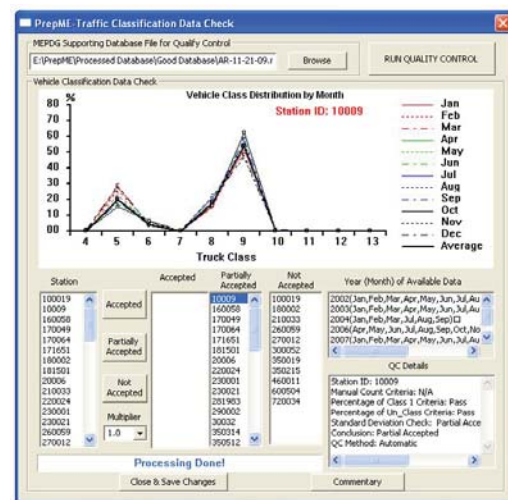


Figure 1
Main screen shot of traffic classification quality control in Prep-ME

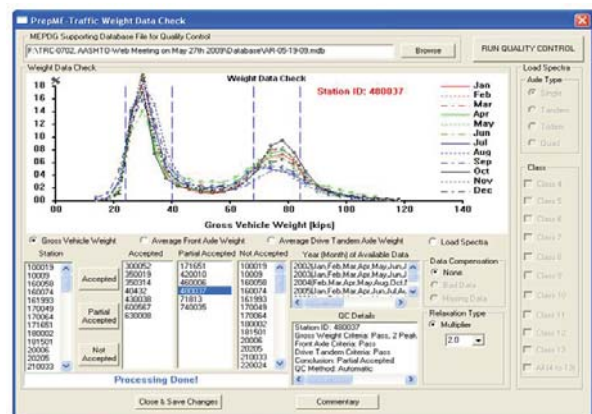


Figure 2
Main screen shot of traffic weight data check in Prep-ME