Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 09/09/2016  PROJECT AREA: Pavements

TITLE: Evaluating Pavement Distress with Revised Arkansas Truck Loadings

PROBLEM STATEMENT:
The Mechanistic-Empirical Pavement Design Guide (MEPDG), requires loading condition input in the form of normalized axle load spectra (NALS), truck axle configuration, and axle spacing. The NALS represents the expected frequency of an axle within a load range for a given vehicle classification and axle type (single, tandem, tridem, or quad).

During the “Bridge Load Posting Based on Actual Arkansas Truck Traffic” project conducted in fiscal year (FY) 2017, WIM data is being evaluated to determine critical trucks using Arkansas highways. This research needs statements proposes using the compiled filtered data from the FY 2017 project to investigate pavement performance and distress considering newly compiled Arkansas truck traffic intrinsic to Arkansas.

OBJECTIVES:
The data from “Bridge Load Posting Based on Actual Arkansas Truck Traffic” will be statistically analyzed at two levels, at the statewide level and at the regional level. At the statewide level, all WIM sites are used to develop average values for axle load defaults. Conversely, regional values will be developed using WIM data within specific regional areas, AHTD districts. Regional values will better define local truck axle loads and truck flow patterns characteristic to each of the AHTD districts. The WIM data will be used to calculate normalized axle load spectra (NALS). The NALS will be prepared as input for the Mechanistic Pavement Design Guide (MEPDG) software. The NALS will be statistically derived using the hierarchical clustering technique.

MEPDG results using the NALS will be compared with previous pavement structure design results to evaluate the significance of the new truck loads. Significance will be measured as a ½” increase in top layer thickness for a given design life or a 20% increase in design life for a given pavement structure configuration.

A sensitivity analysis will be conducted to investigate the sensitivity of:
* pavement thickness for a given design life and
* pavement design life for a given pavement structure configuration.

FORM OF RESEARCH IMPLEMENTATION:
The study results will provide AHTD with documentation to decide if new truck loadings should be considered in AHTD pavement structure design. The study will enable AHTD to incorporate truck loads intrinsic to Arkansas into their pavement analysis/design protocol.

REVIEWER: Bryan Signorelli  Estimated Project Duration: 12 mo.

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