

Period Covered: July 1, 2009 through September 30, 2009

KDOT Progress Report
for the

State Planning and Research Program

PROJECT TITLE: Implementation Of The 2002 AASHTO Design Guide For Pavement Structures

PROJECT MANAGER: Richard L. McReynolds, P.E., Admin. Contact Dr. Mustaque Hossain, KSU, PI	Project No: TPF-5(079) RE-0361-01	Project is: <input type="checkbox"/> PLANNING <input checked="" type="checkbox"/> RESEARCH & DEVELOPMENT
Annual Budget (active projects) FY04: \$100,000 FY05: \$60,000 FY06: \$50,000 FY07: \$250,000 FY08: \$150,000 FY09: \$100,000	Multi Year Project Budget \$710,000.00	

Progress: The objective of this research is to develop the calibration procedure for the NCHRP design guide (M-E PDG) models for both flexible and rigid pavement structures for this region and to assist the state highway agencies in region in the implementation of the new Guide for pavement design and surface selection practices.

The research efforts to date were concentrated on the development of the library of material characterization data for typical pavement materials and the identification of pavement test sections for which performance data may be available. The survey of literature has been conducted to identify existing material characterization data and pavement performance data collected already by the highway agencies and reported in internal documents. The testing program for measuring the dynamic resilient modulus of typical asphalt concrete mixes and the binder shear modulus and phase angle has commenced. Testing has been performed on more than 15 HMA mixes.

For all mixes tested, the measured dynamic moduli were compared with the moduli predicted by the Witczak equation and by the Hirsch model. The comparison revealed that, for all mixes, the measured moduli were 50 to 100 percents higher than the moduli predicted by the Witczak Equation. The Hirsh model severely under-predicted the dynamic modulus.

Two databases of needed input data for the 1-37A model were created in Access format for flexible and rigid pavement structures, to ease the assembly of pavement construction and performance data for both rigid and flexible pavements. The data collected will allow runs of the 1-37A software to calibrate the model to local conditions when sufficient performance data will be available.

The TrafLoad software has been used for axle load spectra extraction for the weight and classification stations that continuously recorded data for at least twelve continuous months, seven consecutive days in each month. The traffic data collected in 2004, 2005, 2006, 2007 and 2008 has been processed for all stations that had sufficient data.

A new Pavement Performance Program was initiated. Five pavement sections, constructed in 2005, will be included initially in the program. More sections will be added in the years to come. The work conducted in the last quarter focused on the of the dynamic complex modulus of the HMA mixes and the resilient modulus of unbound materials used in the construction of the experimental test sections on I-495 in Long Island were determined. Laboratory testing (dynamic modulus, Hamburg wheel loading, Tensile Strength Ratio (TSR)) was also performed for a WMA –HMA (warm mix vs. hot mix asphalt) comparison study.

The research work conducted in the last quarter focused on the evaluation of pavement response of a typical rigid pavement structure by 34 proposed truck/semi-trailer configurations and, on the development of recommendations for the appropriate legal load limits for these new vehicle configurations. To achieve these objectives, finite element modeling of a typical rigid pavement structure was done with the general purpose FEM software ABAQUS. FEM modeling was selected since it allows for modeling of moving loads. The truck damage factor for 34 truck-trailer configurations was determined. The results were compared with the damage factors obtained by the ME-PDG software for truck configurations in which the loads are equally distributed to all axles within the same axle group. The work in the past quarter also concentrated on the analysis of the traffic (classification and WIM) data collected in 2008.

A major new task has been added to the research plan. The objective is to develop/automate a pavement design procedure for flexible pavement structures based on the MEPDG that the local environment, materials, construction practices, soils and maintenance needs and to assist the NYSDOT pavement design personnel in the implementation of the Procedure in to the pavement design practice.

Dr. Mustaque Hossain is the new P.I. on the project. Dr. Stefan Romanoschi, the University of Texas at Arlington (UTA), is the subcontractor for this project.

SUMMARY OF ACTIVITIES EXPECTED TO BE PERFORMED NEXT QUARTER:

The FEM modeling of the response of flexible and rigid pavement sections will continue.

STATUS AND COMPLETION DATE

Percentage of work completed to date for total project is: 70%

X on schedule ___ behind schedule, explain **NEW TASK HAS BEEN ADDED**

Expected Completion Date: August 31, 2011