SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2010

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I. PROBLEM NUMBER

PM-10-05

II. PROBLEM TITLE

AASHTO DARWin-ME Cooperative Software Development Project

III. RESEARCH PROBLEM STATEMENT

ODOT is in the process of implementing the AASHTO Mechanistic Empirical Pavement Design Guide system developed recently. The current software is very cumbersome, sometimes locks up the computers, takes up to an hour to run, and includes some components that are not easily changed. In other words, the computer application which is actually research software is not readily useable for daily design applications that require several iterations.

IV. RESEARCH OBJECTIVES

ODOT's part in the research would be to participate in a pooled fund study that would develop the software to more efficiently and effectively perform pavement analysis using the Mechanistic Empirical Pavement Design Guide (MEPDG) process developed by AASHTO. MEPDG has a lot to offer in terms of analyzing our higher volume highways and provides us the basis to optimize our pavement designs resulting in significant project savings. Our participation would allow us to actively shape the outcome of the software and gain immediate access to changes as they are developed.

The advent of the new AASHTO Guide for Design of New and Rehabilitated Pavement Structures brings along an imperative need for AASHTO member agencies to have a sound and practical software package for the design of rigid and flexible pavements. AASHTO's overall objective is to provide the transportation community with a state-of-the art software tool for the design of new and rehabilitated pavement structures, based on mechanistic-empirical principles. This objective will be accomplished by developing a product consistent with the Mechanistic and Empirical Pavement Design Guide based on pavement-design procedures that use existing mechanistic-empirical technologies, including a methodology for calibration, validation, and adaptation to local conditions.

V. WORK TASKS, COST ESTIMATE AND DURATION

The request from AASHTO is for each state to contribute $100,000 over two years,

The DARWin-ME 2.0 software will include a number of enhancements identified by the Task Force and reviewed by NCHRP Panel 1-40. Some of these include:

· Increase computational speed;
· Ability to optimize for thickness design;
· Inclusion of backcalculation results for rehabilitation design;
· Ability to establish agency specific libraries (materials, traffic, climate); and
· Master default settings.

VI. IMPLEMENTATION

Participation in the project would allow us to immediately implement any changes and to better use the application in design.

VII. POTENTIAL BENEFITS

MEPDG provides the most value for state highways with high truck volumes like our interstates by allowing us to optimize the pavement thickness while our current software oftentimes over designs the pavement thickness. If we over designed the new asphalt concrete work sections, assuming an additional 2" of HMAC, with 20 lane miles of new work per year, that additional cost is about $150,000/lane-mile * 20 lane miles for $3M which justifies the use of the software.

The current cost to do a design is about 1 hour/run times 4 runs at $100/hour for $400 for the analysis (plus all of the time for the write-up, testing, etc.). If that time was reduced to 15 min/run at 4 runs the cost would be reduced to $100/analysis. We would have to do about 170 designs ($50,000 (proposed contribution of new version of software)/$300 savings per design) to break even. We do about 60 designs per year so it would take about 3 years to recover the cost if we used the MEPDG new software on all of our projects. Assuming that we only used the software on high truck volume facilities for about 20 projects, we would recover the costs in 170 designs/20 designs/year in about 8 1/2 years. If the software was truly streamlined, though, I think we would use it to optimize a wider range of pavement designs beyond new work along with special scenarios like rich binder bases.

VIII. SUBMITTED BY

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