

**State of Wisconsin/Department of Transportation**  
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: December 31, 2005

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title:</b> Testing Wisconsin Asphalt Mixtures for the AASHTO 2002 Mechanistic Design Procedure	<b>Project ID:</b> 0092-04-07
<b>Administrative Contact:</b> Nina McLawhorn	<b>Sponsor:</b> WHRP
<b>WisDOT Technical Contact:</b> Len Makowski	<b>Approved Starting Date:</b> 4/2/2004
<b>Approved by COR/Steering Committee:</b> \$125,000	<b>Approved Ending Date:</b> 10/2/2005
<b>Project Investigator (agency &amp; contact):</b> Iowa State University, R. Christopher Williams, 482A Town Engineering Building, Ames IA 50011, Ph. 515-294-4419, Fax 515-294-7424	

**Percent Complete:**

At the conclusion of this quarter MTU/ISU is approximately 65% of the way completed with this project.

**Project Description:**

The Wisconsin Department of Transportation (WisDOT) currently uses the AASHTO 1972 Interim Guide for the Design of Pavement Structures for hot mix asphalt. This pavement design procedure is a strictly empirical pavement design approach, however with the latest research and available computer capabilities, mechanistic pavement design procedures have become more feasible. The AASHTO 2002 Guide for Design of New and Rehabilitated Pavement Structures and associated software has been built on the mechanical properties of the pavement layers while still using functions to predict pavement life, thus making it a mechanistic-empirical pavement design approach. This pavement design procedure also allows for default values of the mechanical properties to be used, which is based on previous measurements of these properties.

The intent of this project is to examine typical hot mix asphalt (HMA) pavements that are constructed in the state of Wisconsin. The analysis will compare the suggested pavement structures based on the current (1972) pavement design guide and that of the new (2002) pavement design guide. In order to develop the pavement structure as outlined by the AASHTO 2002 Pavement Design Guide the mechanical properties of the HMA layers must be measured. These properties include Dynamic Modulus and Flow Number, which have been found to be significant predictors of rutting and fatigue by Witczak et. al. (2002). Properties of the other layers in the system have been obtained from the WisDOT pavement design inputs.

A cross-section of typical HMA pavements has been formulated into a research project matrix, for the greatest benefit for the WisDOT. Michigan Technological University (MTU) will sample these mixtures during the 2004 paving season. These mixtures will then tested in accordance with the AASHTO 2002 Design Guide for the aforementioned testing procedures and compiled into a library of values for the WisDOT.

**Progress This Quarter:**

**Literature Review:**

The literature review has been continually updated as new research has/is being published from this years' TRB, AAPT, and ASTM publications.

Currently this portion of the project is 100% complete.

**Laboratory Testing:**

Nineteen of the nineteen jobs that have been sampled have been compacted; sawed/cored, and tested to data.

Currently this portion of the project is 100% complete.

**AASHTO Design Guide Simulation:**

MTU has begun to run simulations on three 19.0mm and one 12.5mm jobs that have been tested. These jobs include an E-1, E-3, and E-30 trafficking levels. Information for the flexible pavements have been furnished by Laura Fenley of WisDOT, however, several assumptions had to be made in the analysis process. These assumptions include hourly traffic distributions, subgrade modulus, subgrade physical properties, etc. The AASHTO Pavement Design Guide software was found to be rather problematic at times, especially for composite pavements and at the current time MTU is trying to resolve these issues through discussions with Ed Harrigan at FHWA. What the preliminary results are showing from the simulations is that the current pavement thicknesses that are being stipulated by WisDOT may be ¼ to ½” underdesigned for the flexible pavement layers, but does require further analysis.

Currently this portion of the project is 20% complete.

**Development of Library of Values:**

As the testing data from the dynamic modulus and flow number tests becomes available it is being inputted into the Microsoft Access database that has been created for this project.

Currently this portion of the project is 100% complete.

**Meetings:**

There were no meetings this quarter.

**Work Next Quarter:**

During this time, the test data will be inputted into the database and checked to ensure no data entry nor testing errors have occurred. Simulations of the pavement design guide will be conducted using the binder and dynamic modulus test data as well as the pavement characteristics. Statistical means testing of the dynamic modulus and flow number test data will be done to compare the characteristics of varying mixture types. Some work will be done on the final report.

**Circumstances Affecting Progress/Budget:**

The contract for this project took until mid December to close out at Michigan Tech and will be restarted at Iowa State University for the remaining amount of \$40,656 in the upcoming quarter. There should not be any cost implications to the project.

