

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: September 30, 2007

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Materials Characterization and Analysis of the Marquette Interchange Project	Project ID: MRUTC 08-08 (0092-07-13)
Administrative Contact: Jason Bittner	Sponsor: MRUTC
WisDOT Technical Contact: Leonard Makowski	Approved Starting Date: May 1, 2007
Approved by COR/Steering Committee: \$60,000	Approved Ending Date: August 31, 2008
Project Investigator (agency & contact): Marquette University, Dr. James A. Crovetti	

Description: The objectives of this study are to characterize the materials used to construct the HMA perpetual pavement within the Marquette Interchange project and to analyze the collected pavement response data to investigate the interactions between materials, environment, and traffic loadings. This study will require a detailed examination of the predictive equations and sub-routines which are part of the mechanistic-empirical design procedures developed under NCHRP Project 1-37A to determine how well these reflect the actual response measures. The conclusions of this study should provide guidance for the Wisconsin Department of Transportation to perform mechanistic-empirical pavement designs which are validated for local conditions.

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date	Percent Complete
\$60,000	\$15,000	\$2,664.74	\$2,664.74	20%

Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

A kick-off meeting with the established Project Advisory Board was held at the Truax Lab in Madison on August 15, 2007. The proposed scope of work was discussed and approved for implementation without modification. The most recent version of the Mechanistic-Empirical Pavement Design Guide (MEPDG), Version 1.003 was downloaded and installed for usage. The September 2006 Research Results Digest "*Changes to the Mechanistic-Empirical Pavement Design Guide Software Through Version 0.900, July 2006*" was obtained and reviewed to identify important software modifications that may affect the analysis of HMA pavement systems.

Pavement construction materials which were obtained during construction of the North Leg of the Marquette Interchange Project were transferred to the University of Wisconsin-Milwaukee (UWM) and to Iowa State University (ISU) for laboratory testing. Unbound materials, including the native subgrade soil, the select crushed material, the dense graded aggregate base and the open graded aggregate base were transferred to UWM for characterization and resilient modulus testing. To date, mechanical sieve analyses, moisture analyses, specific gravity tests and resilient modulus testing have been completed for the native soils, the dense graded aggregate base and the open graded aggregate base. In addition to these tests, a hydrometer analysis, Atterberg limits test and a Proctor density test were completed on the native soils.

Sampled HMA materials were transferred to the ISU labs for characterization testing. To date, characterization of the asphalt binder has been completed, including rotational viscosity, dynamic shear rheometer, and bending beam rheometer testing. Some of these test results are used in the M-E PDG, and others are for grading the asphalt binder. Paving records were obtained from Payne & Dolan and analyzed to determine the range of in-place air voids existing after construction for each HMA layer. This data was used to establish target densities for compaction of HMA specimens for dynamic modulus testing.

Work Next Quarter:

Work for the next quarter will include making HMA specimens at ISU for dynamic modulus testing at three temperatures and the development of master curves. The master curves fully describe the material behavior over a range of temperatures and rates of loading. Characterization tests for the select crushed material will be conducted at UWM. After all laboratory testing is completed, inputs for the MEPDG software will be established to provide comparative measures for the North Leg pavement performance analysis. Traffic data obtained from WHP Project 0092-06-01 "*Perpetual Pavement Instrumentation for the Marquette Interchange Project*" will be analyzed to develop appropriate inputs for MEPDG software analysis. These data will be supplemented, where possible, with traffic classification data being collected by WisDOT at selected locations within/near the Marquette Interchange.

