Spring 2012

Research Division

2012 MDOT Research Needs Workshop

by Marta Charria

On March 7 of 2012 the Mississippi Department of Transportation, (MDOT) held the Research Needs Workshop at the Mississippi State University, Starkville campus. The workshop had the participation from FHWA, private sector, government agencies and academia. It consisted of eight sections in areas listed below:

- Environmental
- Construction/Materials
- Structures/Geotechnical
- Traffic/Safety/ITS
- Maintenance/Materials
- Intermodal Transportation
- Roadway, ROW & Hydraulics/Hydrology
- Professional & Economic Development

Half a day was dedicated to each area, with one moderator per session to help the participants to express their needs and suggestions. By the end of each section the needs and suggestions were summarized, and then, participants rated them in order to prioritize the needs that would have a potential as future research projects, the prioritized list would be published by the end of May of 2012.

MDOT wishes to thank Dr. Dennis Truax and his staff from Mississippi State University who made the workshop a complete success.

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High RAP Content in Pavement Surface Layers

The scope of this research was a laboratory investigation to evaluate the feasibility of using recycled asphalt mixtures containing up to 50% RAP in conjunction with warm mix additives for highway surface applications; three RAP sources and two warm mix technologies (Sasobit® and Evothem were tested). Currently MDOT allows the use of up to 15% RAP in asphalt mixtures for surface applications; therefore the focus of this study was on mixtures containing 25% RAP or more as these types of mixtures are not currently in use on the surface of MDOT roadways. While this study was not specifically restricted to either new construction or to maintenance applications of surface mixtures, the focus of this study was targeted toward maintenance overlay applications, especially in the selection of control mixtures. Surface mixes in Mississippi can be either 9.5 mm or 12.5 mm; this study focused exclusively on 9.5 mm nominal maximum aggregate size (NMAS) aggregate gradations.

The study developed regression equations to estimate the amount of absorbed asphalt present in a given RAP source using the MDOT mix design database. It was shown that traditional methods of determining asphalt absorption of RAP are questionable in many situations. Durability was measured on the dense graded mixtures by the Cantabaro test, which is not a typical use of the test. Results did not indicate significant durability problems of the high RAP-WMA mixes, though they were shown to be less durable in some conditions. Mixture stiffness measured by the Bending Beam Rheometer (BBR) was used in comparison to control mixes to evaluate crack resistance and produced varying results with test temperature, though no major problems were identified with the high RAP-WMA. Rutting was shown to be on par with PG 76-22 control mixes in some instances. Moisture damage was found to be a potential problem using loaded wheel testing under water.

Overall, the study concluded that 25% RAP WMA was feasible, mixes between 25% and 50% RAP with warm mix technologies may be prone to moisture damage than the currently used control mixtures tested in this report. And that 50% RAP WMA may be feasible for use in surface layers, but their stiffness measured by the BBR prevented more compelling statements being made without additional investigation.

For more information contact **James Watkins at 601.359.7650 or email to: jwatkins@mdot.state.ms.us**

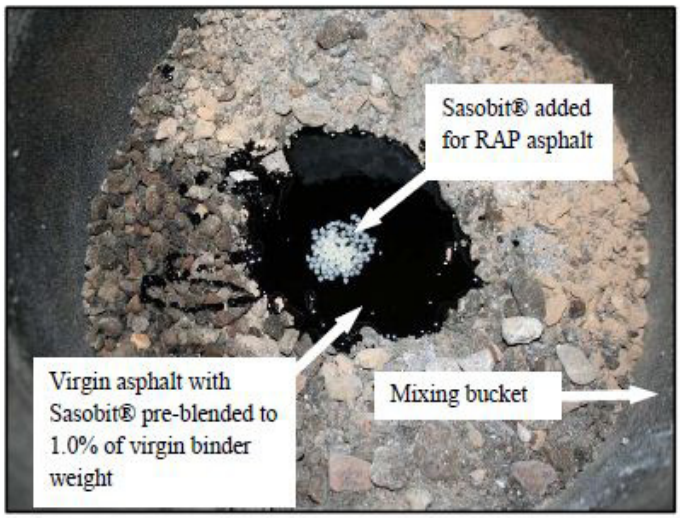

Figure 3.3 Addition of Sasobit® for RAP to Mixture

Addition of Sasobit ® pre-blended to 1.0 % of virgin binder weight

Shrinkage and Durability Study of Bridge Deck Concrete

The Mississippi Department of Transportation is incorporating changes to material specifications and construction procedures for bridge decks in an effort to reduce shrinkage cracking. These changes are currently being implemented into a limited number of projects to evaluate MDOT's new Class BD concrete. This class of concrete was modeled after Kansas Department of Transportation's special provision for low cracking, high performance concrete which was based on studies conducted by the University of Kansas. While Class BD concrete is based on recommendations of the research performed at the University of Kansas, there was limited data available for MDOT engineers to evaluate shrinkage characteristics of concrete made with gravel and cementitious materials available in Mississippi. The study generated shrinkage and permeability data for thirty mixtures developed with readily available materials in Mississippi.

The research concluded that the increase of supplementary cementing materials, SCMs, in mixtures increases concrete's ability to resist chloride ion penetration and reduce the length change (shrinkage) of concrete materials. The study recommends to MDOT to re-evaluate the usefulness of fly ash class C or class F in reducing shirnkage and permeability of concrete for bridges decks. The study also recommended considering the use of natural grading of Mississippi gravels aggregates that can produce mixtures with good workability and low shrinkage characteristics without using aggregate gradation optimization.

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Sampling Gravel Aggregate Source No 1

MDOT Implementation Plan for GPS Technology in Planning, Design, and Construction Delivery

Global Positioning System (GPS) technology offers advantages to transportation agencies in the planning, design and construction stages of project delivery. This research study developed a guide for Mississippi Department of Transportation (MDOT) implementation of GPS technology, both internally and externally, assisting the agency in the areas of construction specifications, quality control, business policies and procedures, and cost budgeting. This study will resulted in the delivery of a report that includes recommendations for specification language regarding contractor use of GPS for automated machine grading (AMG) and the sharing of MDOT electronic data. Workshops were held with the participation of MDOT personnel and construction company representatives centered on the GPS Guidance Specification and Implementation Plan to facilitate their adoption.

AMG is being implemented at MDOT on certain projects. A recent presentation at MDOT's Construction Conference by Project Engineer Jordan Whittington revealed that AMG saved approximately 20-30% on earthwork costs and time and achieved greater accuracy and efficiency. MDOT is moving toward 3D design model delivery.

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Calendar of Events		
May 30 to June 1, 2012	MDOT Statewide Maintenance Meeting https://www.regonline.com/maintenance2012	Vicksburg, MS
July 22-26, 2012	2012 AASHTO Research Advisory Committed and TRB State Representatives Annual Meeting http://www.cvent.com/events/2012-aashto-research-advisory-committee-and-trb-state-representatives-annual-meeting/custom-17-895e865f9c2c4fbbac93e6294608a25a.aspx	Burlington, VT
August 5- 10, 2012	2012 AASHTO Subcommittee on Materials Meeting http://www.transportation.org/meetings/360.aspx	Biloxi, MS
August 25- 29, 2012	SASHTO 2012 http://www.sashto2012.org/	Charleston , SC
August 27-30, 2012	National Pavement Preservation Conference http://nationalpavement2012.org/	Nashville, TN
September 25-28, 2012	24th RPUG Meeting http://www.rpug.org/	Minneapolis ST-Paul, MN

For more information , you can find us at

http://sp.gomdot.com/Research/Pages/Newsletters.aspx

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