

MOVING FORWARD



“He who does not look ahead, remains behind.” (Spanish Proverb)

Ohio Department of Transportation, Office of Research and Development

Autumn 2004

Durability and Performance Characteristics of Hot Mix Asphalt Containing Polymer Additives: Phase I *By David Powers, P.E., Office of Materials Management*

History

How would you make a better widget? How do you take materials from Mother Nature that are used in road construction and make them better? How do you do this and not drive the cost of road construction so high that far fewer roads are built and repaired?

These questions have been asked about asphalt pavements for decades. Asphalt pavement consists of asphalt binder and aggregate. Aggregate quality and performance are fairly well understood and defined. Historically, asphalt binder quality and performance have not been.

For the last several decades, a variety of additives, treatments and methods have been tried to improve the life and performance of asphalt pavements. A particular type, styrene butadiene rubber (SBR) polymer, had an over 25 year history in Ohio of improving both pavement life and performance. SBR, as well as asphalt binder, come from crude oil refining. In the early 1990s ODOT began experimenting with other polymer types. Styrene butadiene styrene and similar types were tried.

Nationally, no satisfactory standard for testing and specifying polymers was available. ODOT nevertheless continued to place projects with various polymers and requirements. In 1995, the asphalt paving industry in Ohio recommended ODOT adopt polymers on a larger scale. This was a bit contentious due to differences in supplier opinion on the subject and lack of formal studies. FHWA even had reservations. Then in 1996 things became really interesting with the ODOT adoption of the national SHRP Performance Graded (PG) Binder specification. This specification for asphalt binders completely changed how asphalt binders were specified and tested.

However, it was believed the PG binder system did not adequately describe the life and performance benefits of polymers. Because of this, and due to the contentiousness of the subject, ODOT agreed to conduct a lab study of polymers looking at the PG binder system and other tests to validate ODOT's field performance experience.

The Study

Included in the study was the full complement of PG binder tests including the direct tension test. Also included were indirect tension, resilient modulus, unconfined creep with recovery, uni-axial compression tests with two strain rates, dynamic cyclic tests, water sensitivity, Loaded Wheel Test, and the low temperature Thermal Stress Restrained Specimen Test (TSRST).

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Technical Liaison Training

The Office of R&D has been conducting training for technical liaisons. So far, two sessions have been held with a total of thirty liaisons receiving training. The focus of the training is to familiarize the liaisons with the research process and clarify their role and responsibilities. Feedback from these sessions has been positive. Two more training sessions are scheduled for November 5th and December 10th. For more information on technical liaison training and instructions on how to register, visit our website at <http://www.dot.state.oh.us/divplan/research/announcements/announcements.htm>. Training designed for researchers and support staff will be offered at the next Cooperative Research Seminar in August 2007. Organizations can request specialized training at any time by contacting our office at research@dot.state.oh.us.

R&D Program Updates

The proposals submitted for FY2006 and FY2007 are currently being reviewed by the Office of R&D. The review of the sponsoring program offices and the Federal Highway Administration should begin in the near future. It is anticipated that selection of researchers by the Research Selection Committee may be finalized by February 2005. Check the R&D website for updates on proposed projects by clicking on the link to the left titled "active and proposed projects."

Check the Manual

Chapter 4, Section 2 of the manual discusses research contracts. Sections 4.2.1 and 4.2.2 provide the submission requirements for modifications to contracts, including requests for no-cost time extensions. Be sure to review the manual to ensure you are submitting requests in accordance with the guidelines. The manual can be viewed from our website at <http://www.dot.state.oh.us/divplan/research/manual/rd%20manual.htm>. To request a hard copy of the manual, send an email containing your mailing address to research@dot.state.oh.us.

Hot Asphalt Mix - Continued

To quote from the study abstract: “The test data showed significant improvements on the rutting and low temperature thermal cracking resistance due to the polymer modifiers.” However, the study also showed that the PG binder test series does not adequately show this benefit and thus auxiliary specifications were required.

In short, this study affirmed the field experience that a performance benefit is attained with polymer use. ODOT today specifies polymers by a combination of PG binder requirements and focused test procedures to assure that the desired polymer performance benefit occurs.

Performance Cost Benefit of Polymers

Experience shows polymers increase the service life of asphalt pavement by at least 2 years. This is about a 20-25% increase in service life, conservatively. This translates to at least 10 million extra dollars each year (based on ODOT 1997 estimates and construction program) available for other pavement needs. The cost increase for placed asphalt pavement with polymers is about 13%. This translates to no more than 4 million dollars in material price increase statewide each year. The cost/benefit ramifications are readily apparent. This does not include the savings for less maintenance when in service, nor the savings of not replacing prematurely failed pavement due to rutting as was more common in the past.

Polymer asphalt pavement shows improvement against rutting, decreased fatigue cracking, and low temperature deterioration. With about 75% of Ohio’s shipped goods (valued at \$1.3 trillion per year) traveling on Ohio’s roads by truck, and 93% of those roads being made with asphalt pavement, polymer asphalt is a smart choice. The study “Durability and Performance Characteristics of Hot Mix Asphalt Containing Polymer Additives – Phase I” backs up that assertion.

Calendar of Events

November - 2004

November 1-2 - National Household Travel Survey Conference: Understanding our Nation’s Travel - For more information visit <http://gulliver.trb.org/calendar/event.asp?id=125>

November 5 - Research Technical Liaison Training - For more information see page 2

November 18-20 -Conference for Research on Women’s Transportation Issues - For more information visit <http://www.trb.org/Conferences/Women/>

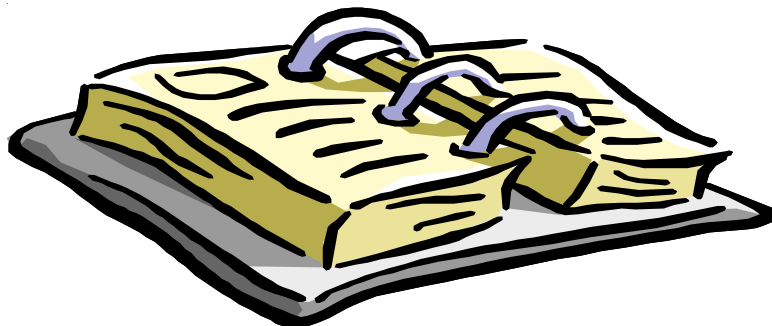
December - 2004

December 10 - Research Technical Liaison Training
For more information see page 2

December 31 - Quarterly reports due on all projects

January - 2004

January 9-13 - TRB 84th Annual Meeting - Washington, DC - For more information visit: <http://www.trb.org/meeting>



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If you have any suggestions, comments, or ideas for articles, please submit them to: research@dot.state.oh.us



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