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Welcome from Geotechnics TOC Chair

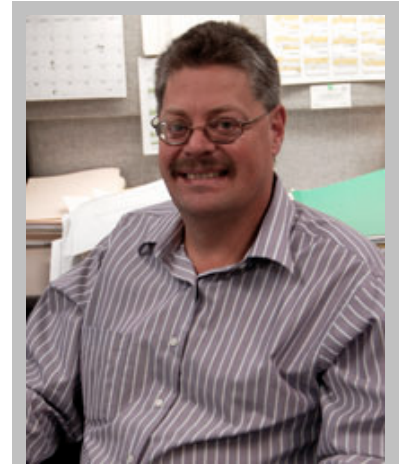
Welcome to WHRP E-News, a quarterly update on the work of the Wisconsin Highway Research Program. With this issue, we begin our second year of publication.

As supervisor of the new Foundation and Pavement Engineering Unit, which combines portions of the previous Pavement Section with the Geotechnical Section, I frequently draw on my experience with WHRP over the nine years I have chaired the Geotechnics Technical Oversight Committee.

Since 2002, WHRP has been studying many facets of mechanistic-empirical design in an effort to support WisDOT's adoption of the new AASHTO Mechanistic-Empirical Pavement Design Guide. This work has produced design inputs for hot-mix asphalt mixtures and for resilient modulus of representative state soils and coarse-grained subgrade aggregates.

WHRP research has led to refinement of testing practices, such as the adaptation of the Superpave Gyrotory Compactor for mechanistic evaluation of HMA, the use of the splitting tensile strength test for concrete mixes, and development of consistent direct shear testing procedures for granular backfill materials. Several more studies will be completed in the coming year, and these also will help WisDOT technical staff in the transition to new design methods.

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Program Update

Highlights from WHRP Steering Committee

The WHRP Steering Committee met on August 14 at Hill Farms to review Technical Oversight Committee activity and other policy issues. The new chair for the steering committee will be WisDOT Research Administrator Nikki Hatch, chief of the Research and Communication Services Section, replacing interim chair Jim McDonnell.

The committee approved investigators selected by the Data Integration TOC to carry out three new research projects (see **Data Integration TOC**, below), with the recommendation that project oversight committees include staff from the Bureau of Information Technology Services. BITS staff will help guide the research to fit WisDOT goals and ensure that consideration of department database standards is a requirement in the final work plan.

The committee reviewed and approved the report on *Research Outreach to WisDOT Regional Offices* (see **Regional Office Outreach**, below) and discussed the proposed WHRP Fall Workshop. WisDOT research staff and WHRP staff will follow up with DTSD Statewide Bureaus Director Rory Rhinesmith to look at scheduling options for the workshop and at potentially including regional office staff on the TOCs.

Discussion on implementation of research results included the following comments:

- Documenting the use of research findings is very important, including changes to specifications and guidance for construction activities.
- Research implementation has improved over the last several years.
- The WisDOT research project manager needs to guide implementation efforts along with other champions.

A new no-cost time extension policy for investigators was approved (see **WHRP Reshapes Policies**, below). WHRP staff members will develop a form for investigators to use when applying for a no-cost time extension. They will also develop a database of investigator performance and work to make principal investigators more aware of meeting dates for presenting draft final reports.

The next steering committee meeting will be December 11, 9 a.m. to noon. Review current and past meeting minutes on the WHRP [Web site](#). For more information, contact Steering Committee Chair [Nikki Hatch](#) or WHRP Program Manager [Andrew Hanz](#).

WHRP Reshapes Policies

WHRP staff met on August 10 with Technical Oversight Committee chairs, WisDOT Research Administrator Nikki Hatch and WHRP program analyst Peg Lafky to draft a pair of new policies, approved by the Steering Committee at its August 14 meeting.

Investigator selection

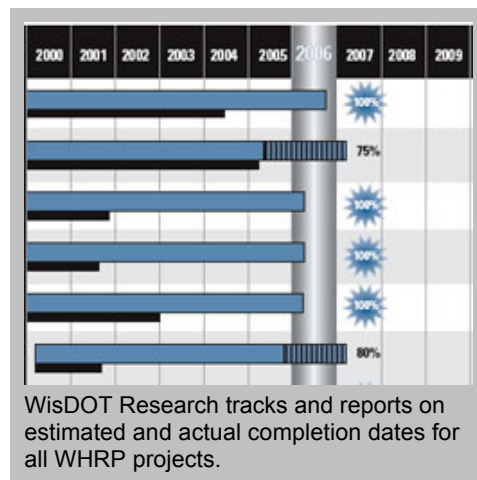
- A new proposal evaluation form was developed to break down evaluation into detailed categories for scoring.
- RFP guidelines will be adjusted to reflect criteria in the new proposal evaluation form.
- Timely completion of past research will be considered in evaluation of investigators.
- The new form is intended to aid in discussion and evaluation of the proposals.

No-cost time extension

- Contract start dates will be coordinated with investigator/academic schedules.
- End dates and presentations of final reports by investigators will be set to TOC meeting schedules.
- Request-for-extension forms will include information regarding investigator past performance, reasons for delay and signature of the principal investigator's supervisor.
- The new policy will be incorporated into new contracts.

The goal of the revised policies is to make the investigator selection process as fair and equitable as possible and to help assure that research results reach WisDOT practitioners in a timely manner.

For further information, contact program analyst [Peg Lafky](#) or WHRP Program Manager [Andrew Hanz](#).



Data Integration TOC Plans Peer Exchange and Chooses Researchers

At its August 10 meeting, the Data Integration Technical Oversight Committee discussed its planned peer exchange. The goal of the exchange is to learn from other states' experiences to increase efficiency and to save time and money spent coordinating access to data for research projects. Potential topic areas to be explored at the peer exchange include:

- Data access management
- Policies and security
- Database standards
- Data dissemination

The Data Integration TOC also selected principal investigators for its first three research projects, slated to begin in FFY 2008:

- *Data Integration and Partnership for Statewide Transportation Planning*
Jessica Guo, UW-Madison. This investigation will review various data sets available for transportation planning in Wisconsin, catalog their locations and uses, identify future data needs and recommend ways to improve data sharing within WisDOT.
- *Evaluation and Recommendations for Further Development of the WisDOT Pavement Information Files (PIF) Database*
Jagannath Mallela, Applied Research Associates, Inc. This study will help streamline access to the PIF database and suggest options for input to its roughness, serviceability and distress indices.
- *Development of a Database Framework and Implementation Plan for Integrating WisDOT Materials and Construction Databases*
Kelly Smith, Applied Research Associates, Inc. This research will recommend a common referencing system to integrate pavement management, construction and materials databases.

To review the RFPs, visit the WHRP [Web site](#). For more information, contact TOC Chair [Jim McDonnell](#) or WHRP Program Manager [Andrew Hanz](#).

Regional Office Outreach Effort to Raise Research Visibility

In February and April, WHRP and WisDOT's Research and Library Unit met with staff at six WisDOT offices in the five regions to provide background on WisDOT research, discuss needs and encourage involvement. A detailed report on the visits -- [Research Outreach to WisDOT Regional Offices](#) -- draws from completed surveys and comments and presents recommendations for future action.

Key findings of the visits include:

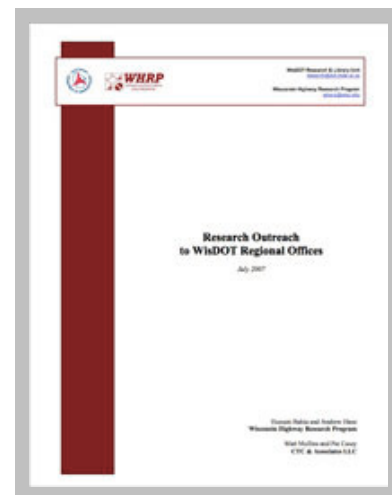
- 77 percent of respondents had heard of WHRP, but only 21 percent have used its research in their work.
- Just 38 percent of respondents had used WisDOT library services in their work.

Some recommendations are already being implemented, including the following:

- An annual WHRP Fall Workshop for regional office and statewide bureau staff is being planned for this year.
- Regional involvement in Technical Oversight Committees will be sought through appointment of regional staff to each TOC.
- Stepped-up efforts are under way to communicate research information directly to interested staff.

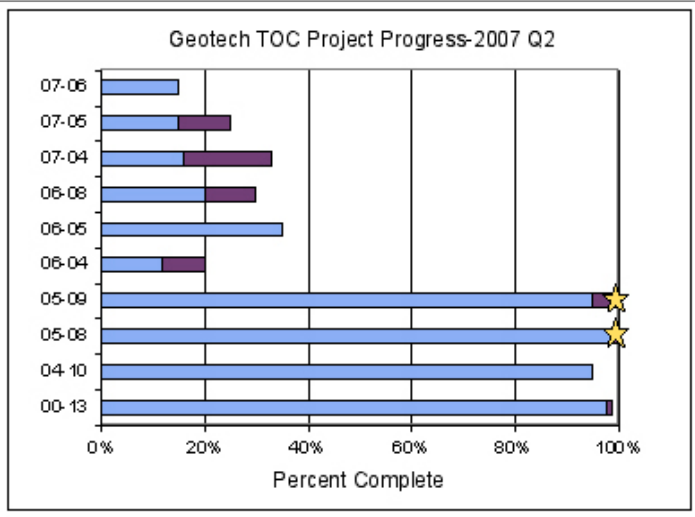
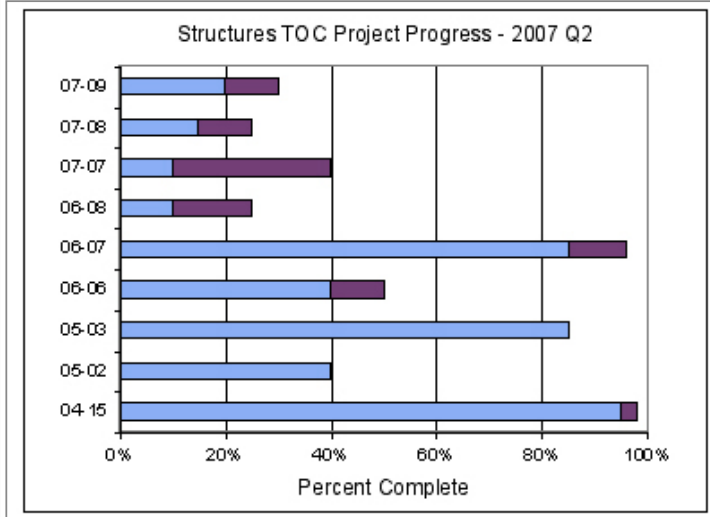
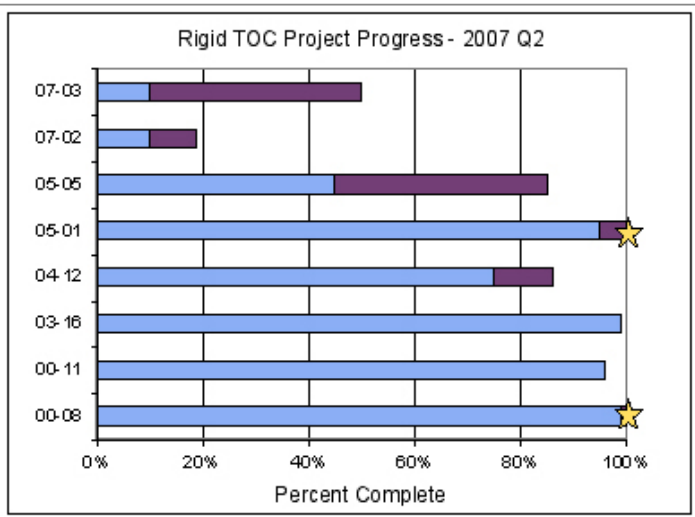
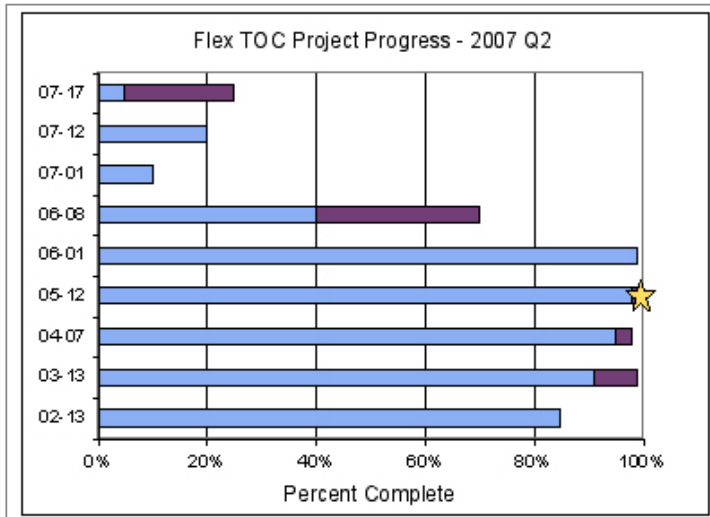
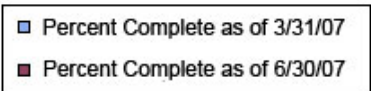
WHRP will continue to do all it can to encourage the identification of needed research and the implementation of findings for the benefit of WisDOT and the traveling public. These outreach meetings helped WHRP understand more clearly the workings of WisDOT in its regional offices. Staff members appreciated the hospitality and interest of all who attended the meetings.

For more information, contact WHRP Program Manager [Andrew Hanz](#).



Project Status at a Glance

As of June 30, 2007, there were 36 active WHRP projects. Five projects were completed during the last quarter.



Research in Focus

Innovative Method for Analyzing Air Voids in Hard Concrete

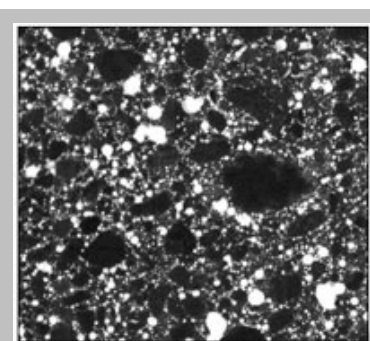
0092-03-16, *Evaluation of Methods for Characterizing Air-Void Systems in Wisconsin Paving Concrete*

Properly sized and spaced entrained air bubbles are known to protect concrete from cyclic freezing and thawing. As a result, air-entrained concrete is universally specified for concrete pavement construction in the upper Midwest, including Wisconsin.

The principal test method for measuring air entrainment in hardened concrete is ASTM C 457, *Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete*. However, high labor costs (eight person-hours per test) and inherent difficulties associated with conducting the test in a repeatable manner make it impractical for use as a routine quality control procedure.

In this WHRP research project, Larry Sutter and his team at Michigan Technological University found that flatbed scanners -- even simple office devices -- can be used effectively for automated assessments of air-void systems with much less labor required and much lower equipment costs. In addition, Sutter focused on streamlining the technique and simplifying the user interface to create a turnkey analysis tool.

As a result of this research, WisDOT may be able to move toward a less expensive, less time-consuming and more accurate characterization of air-void systems in hardened concrete. See the report and research brief on the project page of the WHRP [Web site](#).



Scanned image of hardened concrete permits automated quantification of air voids (in white).

Regional and National Collaboration

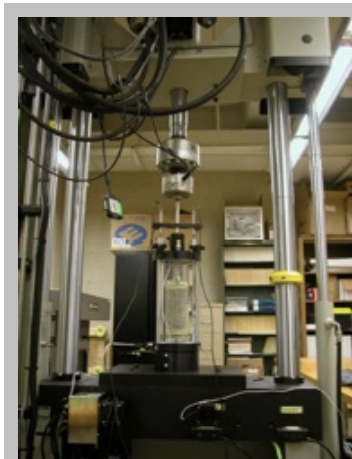
Frozen Four to Meet in Michigan, Dig into Resilient Modulus

The North Central Pavement Research Coordination Partnership -- a pooled fund research group with representatives from Illinois, Michigan, Minnesota and Wisconsin, also known as the Frozen Four -- will sponsor a resilient modulus workshop in Lansing, Mich., October 17.

University researchers and DOT engineers from each state will examine practices and methods for determining the resilient modulus of subgrades and using the values in pavement design. Information will be presented about:

- Data sets on modulus of subgrades
- Methods used to measure resilient modulus in labs
- Methods used to measure resilient modulus in the field
- Prediction of resilient modulus from routinely measured physical properties
- Ongoing and future research

Pooled fund members will work to develop a coordinated regional approach to sharing data, and measuring and predicting resilient modulus. A synthesis report on current resilient modulus research by partner states can be found on the Frozen Four [Web site](#).



Resilient modulus testing can be accomplished through the repeated load triaxial test setup (Instron 8802 dynamic materials test system).

UW-Madison Part of National Asphalt Research Consortium

Under a new cooperative agreement with FHWA, UW-Madison and four other research groups from around the nation are embarking on a coordinated, five-year study of asphalt pavement. The Asphalt Research Consortium, led by the Western Research Institute in Laramie, Wyoming, includes these research groups and focus areas:

- UW-Madison: Engineered materials (modified asphalts)
- Western Research Institute: Moisture damage and R&D validation
- Texas A& M University: Fatigue damage
- University of Nevada-Reno: Vehicle-pavement interaction
- Advanced Asphalt Technologies, LLC: Technology development and fast-tracking

UW-Madison's Professor Hussain Bahia has assembled a team of investigators to join him in this ambitious effort. Members of WHRP's Asphalt Pavement Technical Oversight Committee will receive regular updates about Consortium research developments and will be invited to coordinate efforts on technical issues where appropriate.

For more information, see the [Consortium Web site](#) or contact [Hussain Bahia](#).



Outreach

Survey Asks: What Specs Need Changing?

During construction, project engineers grapple with applying specifications to fieldwork. If the specifications are out of date, everyone's work is more difficult. So early in 2007, WHRP developed Web-based surveys about the need for research on WisDOT specifications related to both flexible and rigid pavements.

The surveys led users through relevant sections of the Standard Specifications, the Construction and Materials Manual, and the Facilities Development Manual. In roughly 20 minutes, survey takers can mark those sections they think would benefit from research and can add comments.

Some highlights follow of survey results to date:

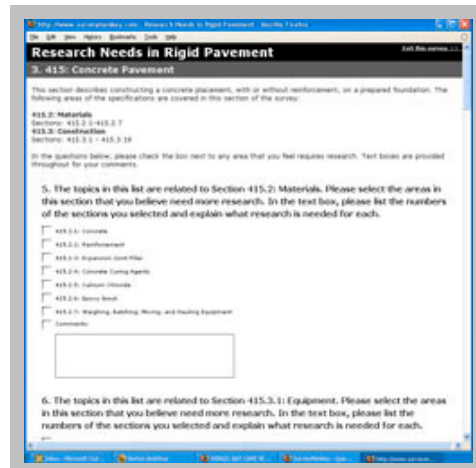
Flexible Pavement

- Twenty individuals responded, including 60 percent of WisDOT engineers approached.
- More than 50 percent of respondents identified the following as warranting research for possible modification:
 - Nuclear density testing and nuclear gauges in the CMM
 - Lot and test site locations in the CMM
 - Corrective action in quality management in the CMM
 - In the FDM, the design process and WisPave design software

Rigid Pavement

- Twenty-nine individuals responded, including 76 percent of WisDOT engineers approached.
- 50 percent of respondents would like to see research on concrete rubblization.
- One-third of respondents identified the following as warranting research for possible modification:
 - In the Standard Specs, the opening strength of concrete
 - Accelerated hardening in the Standard Specs
 - In the FDM, design thickness
 - FDM's design equation
 - Modulus of subgrade reaction in the FDM
 - Pavement rehabilitation guidelines

Reports on the surveys will soon be posted on the WHRP [Web site](#). For more information or to take the survey, contact WHRP Program Manager [Andrew Hanzl](#).



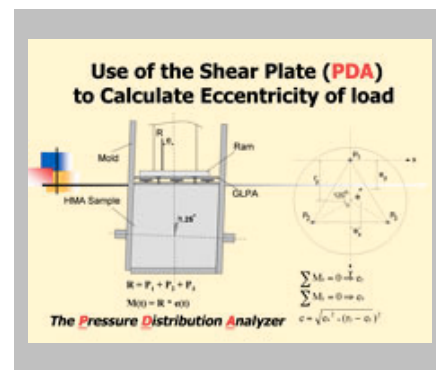
Implementation Report

Project Teaches Use of SGC to Anticipate Rutting in HMA

Implementation of 0092-01-02, Using the Gyratory Compactor to Measure Mechanical Stability of Asphalt Mixes

Pavement labs use the Superpave Gyratory Compactor regularly to test hot-mix asphalt mixtures, but traditional SGC use only evaluates volumetric properties. To adopt new mechanistic-empirical design methods, WisDOT requires methods for determining mechanical properties as well.

Researchers at UW-Madison are working with WisDOT's Judie Ryan to inform Wisconsin's asphalt community about the Pressure Distribution Analyzer for the SGC developed by WHRP and how it can provide information regarding the ability of a mix to resist permanent deformation. The new procedure allows lab technicians to:



- Run SGC tests to estimate a mixture's resistance to compactive force.
- Input compaction and volumetric data into a user-friendly spreadsheet developed as an implementation tool to determine the Traffic Densification Index.
- Compare TDI values for a given equivalent single axle load (ESAL) level to guidelines set by the research project and verified through implementation efforts.
- Correlate TDI to mechanistic-empirical design methods for predicting rutting performance.

The joint UW-WisDOT team will make presentations in the coming months to various conferences and workshops about using the SGC for mix characterization and mix acceptance.

Review this [implementation project](#) or the [original study](#). Contact WHRP Program Manager [Andrew Hanz](#) for the dates and locations of scheduled presentations.

About WHRP

www.whrp.org

The Wisconsin Highway Research Program was established in 1998 by the Wisconsin Department of Transportation to conduct research on highway materials and construction methods. WHRP is administered by the UW-Madison Department of Civil and Environmental Engineering. A Steering Committee chaired by the WisDOT Research Administrator provides policy direction to the WHRP Technical Director, Program Manager and five Technical Oversight Committees chaired by WisDOT engineers. The TOCs focus their work on Flexible Pavements, Rigid Pavements, Geotechnics, Structures and Data Integration. The Steering Committee and TOCs are composed of representatives from WisDOT, FHWA, academia and industry.

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