

WisDOT RESEARCH PROGRAM



2010 ANNUAL REPORT



This is a report of research and technology transfer activities carried out by the Wisconsin Department of Transportation through the Part II research portion of the State Planning and Research Program of the Federal Highway Administration, U.S. Department of Transportation. The report describes activities during Federal Fiscal Year 2010, covering October 1, 2009, through September 30, 2010.

ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ARRA	American Recovery and Reinvestment Act (2009)
CFIRE	National Center for Freight & Infrastructure Research & Education
DBE	Disadvantaged Business Enterprise
DOT	Department of Transportation
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
HTCP	Highway Technician Certification Program
ISTEA	Intermodal Surface Transportation Efficiency Act (1991)
LRFD	Load and Resistance Factor Design
MTKN	Midwestern Transportation Knowledge Network
NCHRP	National Cooperative Highway Research Program
R&L UNIT	Research & Library Unit
RITA	Research and Innovative Technology Administration (FHWA)
RLAC	Research & Library Advisory Committee
RWIS	Road Weather Information System
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
SPR	State Planning and Research Program
TAC	Technical Advisory Committee
TEA-21	Transportation Equity Act for the 21st Century (1998)
TCCC	Transportation Curriculum Coordination Council
TFHRC	Turner-Fairbank Highway Research Center
TKN	Transportation Knowledge Network
TOC	Technical Oversight Committee
TPF	Transportation Pooled Fund
TRB	Transportation Research Board
UTC	University Transportation Center
UW	University of Wisconsin
WHRP	Wisconsin Highway Research Program
WisDOT	Wisconsin Department of Transportation

WisDOT
RESEARCH
· **PROGRAM** ·
2010
ANNUAL REPORT



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From the Research Administrator



To the transportation research community:

I am pleased to present to you the Wisconsin Department of Transportation's 2010 Annual Report on research activities. This report focuses on the programs and activities managed by the Research & Communication Services Section while also describing research accomplished through partnerships across the department, state and nation.

WisDOT undertakes a wide variety of research projects and activities. Research impacts all modes of transportation and all business areas in the department. Research examines aspects from planning and policy to delivery, maintenance and operations.

Over the past year and moving forward into the foreseeable future, the question of *how* research is conducted is just as important as *what* research is conducted. As research programs continue to be the beneficiary of public dollars, public agencies are justifiably demanding higher levels of accountability for the use of funds and solid evidence of research results being implemented. Very simply, the public wants to know what is being spent and what the benefits are to society.

This 2010 Annual Report, along with those from past years, strongly supports these demands for accountability and implementation. WisDOT is careful to account for all dollars used in research and seeks to ensure that all research points to an implementation step—a standard to be adopted, a material to be improved, or a process to be put into place. This report conveys these concepts in clear and concise language, providing useful and relevant information.

I encourage you to review this report, share its findings with your colleagues and continue your involvement with WisDOT's research activities. The department welcomes feedback and collaboration as we seek to remain accountable to the public and our partners.

Finally, on a personal note, I am happy to have completed my second full year with the research program. I have greatly enjoyed working even more closely with academic partners, consultants and national colleagues. I especially appreciate the efforts of the staff, managers and partners at WisDOT who have a great deal of expertise in managing this program and consistently meet the challenges of being accountable for our work. I look forward to another great year of research activities to improve transportation in Wisconsin and elsewhere.

Sincerely,

Daniel Yeh

Chief, Research & Communication Services Section



Research & Library Unit

The Research & Library Unit manages a multifaceted research program and one of the top DOT libraries in the country. The R&L Unit responds to research and information needs across the entire department and depends on agency-wide involvement in research to find better, safer, faster and cheaper ways to manage the transportation system.

The Research Program

WisDOT's mission is to "provide leadership in the development and operation of a safe and efficient transportation system." Key to supporting this mission is the R&L Unit's management of a \$5 million research program focused on applied research—developing usable solutions to specific problems across all modes, from planning to project delivery to operations. The unit balances its investment in research activities across five broad areas: need identification and program development, research in progress, oversight and evaluation, technology transfer, and implementation of results.

Managing the Research Process

The R&L Unit manages the research portion (Part II) of the State Planning and Research Program, provided for in the federal 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (currently extended beyond its September 30, 2009, expiration date). Research program management encompasses the entire cycle of research: identification of the highest-priority needs, selection of investigators, monitoring of research and financial progress, review and approval of deliverables, dissemination of results and support of implementation for beneficial change.

The unit responds to requests for research submitted by staff throughout the department in many ways:

- Funding research that meets WisDOT's strategic objectives;
- Gathering and synthesizing available information on research topics;
- Helping define research and information requests; and
- Forming and supporting project committees that scope and oversee the research.

Every year, the R&L Unit selects and funds applied research and implementation projects across a wide range of subject areas, from highway materials and construction to multimodal policy research. Research projects are funded on an annual basis, but requests are considered year round. Research projects are available to all WisDOT business areas.



Driving Innovation through Research

WisDOT's vision is "Dedicated people creating transportation solutions through innovation and exceptional service." To help generate this innovation, the R&L Unit oversees several formal research programs, provides quick-turnaround information services to WisDOT employees, and collaborates with other research organizations to solve problems of common concern. The five emphasis areas of the department's strategic plan guide the efforts of the research program:

- Value and develop employees;
- Anticipate and meet customers' needs;
- Continually improve processes and partnerships;
- Provide and operate a safe and secure transportation system; and
- Enhance opportunities for mobility and economic growth.

Encouraging Collaboration

Partnerships with other WisDOT staff, the Federal Highway Administration, industry, academic institutions and other agencies help the R&L Unit carry out needed research. Cooperation between WisDOT and university partners leverages limited resources while supporting worthwhile educational and training goals. Partnerships with private sector firms that offer specialized expertise and experience help WisDOT apply cutting-edge solutions to high-priority

problems. The R&L Unit also collaborates within the department by providing funding and administrative oversight for the Bureau of Technical Services, which conducts new product evaluations and certain technology transfer activities on behalf of staff in WisDOT's regional offices and prepares WisDOT's Product Acceptability List for erosion control products.

Communicating Results

The Research & Library staff, with the assistance of in-house consultants, provides literature searches, synthesis reports, research briefs, newsletters, surveys, peer exchanges and related services. At the problem identification stage these services aim to avoid duplication, leverage research already completed and identify successful practices already in place. At the dissemination stage the services aim to speed implementation of research findings and build support for a robust research program at WisDOT.

Measuring the Value of Research

This annual report is one of many efforts the R&L Unit engages in each year to measure the value of research activities and describe the impact of both the research program and individual projects on the day-to-day decisions of WisDOT employees. How has research made a difference? What are the savings in time or dollars from research that explores new ways of doing things? How have the lives of Wisconsin drivers, transit users, construction workers, pedestrians and cyclists been made safer through research?



WisDOT Library

Today's WisDOT Library and iCommons Learning Center is the result of a recently concluded three-year pilot to create an accessible physical and virtual learning center that offers information in a wide variety of formats. The library holds more than 40,000 items in its physical collection—one of the largest state DOT collections of books, reports, journals and other materials related to transportation research and practice. Materials include current and historical information from within Wisconsin as well as high-value materials from national and state institutions on many transportation disciplines.

Enhancing the physical collection is a library staff available to help customers find information from anywhere in the world that can help improve the state's transportation system. In addition to serving WisDOT staff, the library assists the general public, university professors and students, law firms, local government and consultants, with 50 percent of service requests now coming from these groups.



A Notable Library Collection

The significance of a library's collection is exemplified, in part, by the types of organizations that borrow materials from it. More than a third of the interlibrary loan requests filled by the WisDOT Library in 2010 came from academic and federal government libraries outside Wisconsin, including requests from prestigious organizations such as the Massachusetts Institute of Technology, the Centers for Disease Control and the Argonne National Laboratory. Libraries borrowing from the WisDOT Library are most interested in WisDOT's high-quality research reports covering all modes of transportation, the large collection of standards and specifications, and the technical documents detailing areas such as highway capacity and design, congestion and transportation safety.

Collaborating Regionally and Nationally

The WisDOT Library collaborates with other state DOT and academic transportation libraries in the Midwest as members of the Midwest Transportation Knowledge Network (www.mtkn.org). Founded in 2001 as the first of three Transportation Knowledge Networks, MTKN grew out of a vision to implement a decentralized, managed network of information centers in every region of the United States and at the federal level that work together to share their information resources and collaborate on improving information access. Serving as a model for a future National Transportation Knowledge Network, MTKN helped establish TKNs that serve the eastern and western states. Among MTKN's key initiatives is supporting the development of the Transportation Libraries Catalog, or TLCat—an online union catalog of national and regional transportation materials developed in cooperation with Online Computer Library Center Inc. TLCat (ntl.bts.gov/cgi-bin/fs.scr) helps transportation professionals access transportation research quickly and efficiently.

Reference Services—Timely and In-Depth

In 2010, WisDOT librarians continued to deliver more in-depth reference services, expanding access to department data, archival resources and other information that had not previously been available. Library staff provide reference and research services through a physical reference desk and Virtual Librarian Services on the department's intranet site. Ready reference services available to department staff and the public through the library's public Web pages offer quick facts and statistics about transportation in Wisconsin; references and links to a variety of statistics often used in the transportation field, including population, income and labor statistics; and a reference shelf of online glossaries, acronyms, handbooks and calculators currently in use in transportation.

Meeting Customers at the Point of Need

The library's move in 2007 to a more prominent location near the first-floor main entrance of WisDOT's central office continues to translate to more walk-in traffic by both WisDOT staff and the public. Much of the increase in library use by the public has been driven by the library's proximity to the Division of Motor Vehicles customer service center. DMV customers

can make a quick visit to the library when they need access to computers or printing services and complete their business with WisDOT—all under one roof.

National Networking and Leadership

Head Librarian John Cherney keeps WisDOT in the loop on important national trends through his active participation in several groups and committees related to transportation knowledge, including MTKN, the Transportation Library Connectivity and Development pooled fund study (see page 25), the TRB committee on Library and Information Science for Transportation, and the AASHTO Research Advisory Committee Transportation Knowledge Network Task Force.

Cherney is taking on a new leadership role as the 2011 chair of the Special Libraries Association (SLA) Transportation Division. SLA is the international professional association that represents more than 10,000 librarians in special libraries supporting government, industry, news, museums and medicine. During his chairmanship, Cherney hopes to promote the importance of collaboration among transportation librarians and information technology professionals in delivering crucial information to customers, regardless of access and format.



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WisDOT Research & Library Web site:

www.dot.wisconsin.gov/library

Research Program and Technology Transfer Consultant:

CTC & Associates LLC

info@ctcandassociates.com

Research & Library Unit Staff



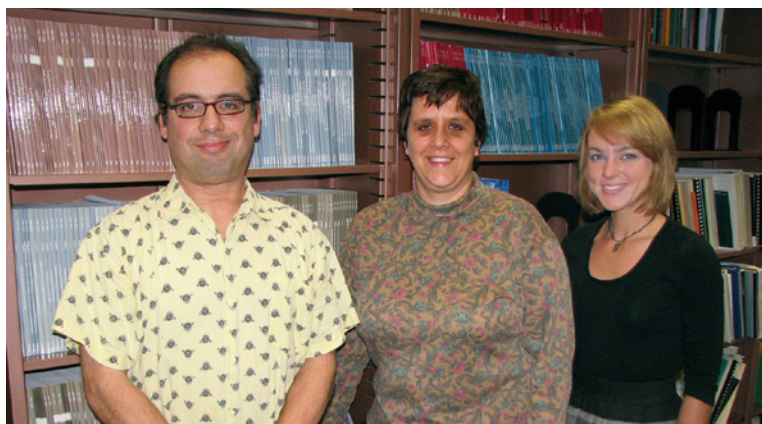
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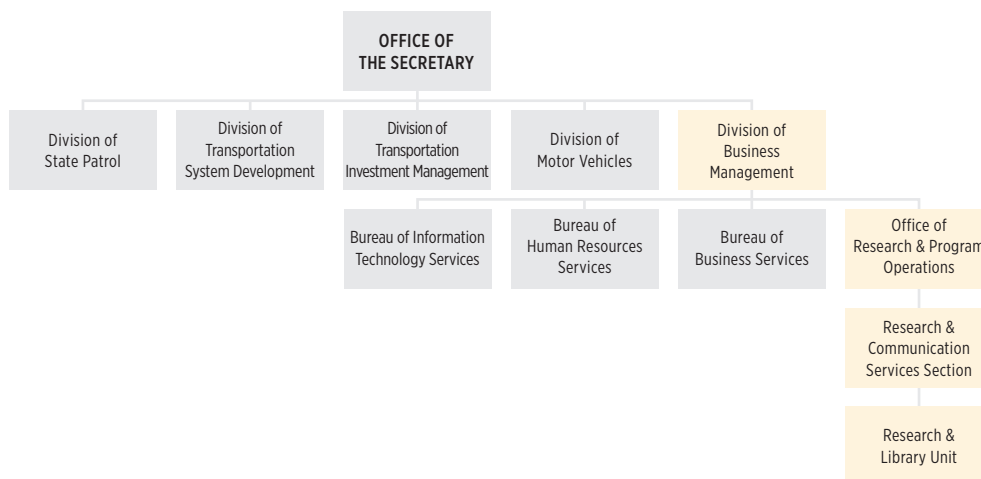


Peg Lafky, Program &
Policy Analyst



John Cherney (Head librarian), Wendy Brand (Librarian), and JonAnne Walters (Librarian)

In 2010, the R&L Unit began its fifth year as part of the Research & Communication Services Section within the Division of Business Management. The mission of the RCSS, which also includes visual design, multimedia and Web services, is to be “a department-wide resource for creative, cost-effective knowledge transfer essential to a safe and efficient transportation system.”



Research Program Administration

The R&L Unit guides the investment of approximately \$5 million each year to support a robust research program addressing department needs. The Annual Work Program, approved by FHWA–Wisconsin Division, directs funds to the development, oversight, technology transfer, implementation and evaluation of needed research activities. Federal Fiscal Year 2010 funding awards included projects in several established program areas (Wisconsin Highway Research Program, Policy Research Program, pooled fund studies) as well as investments in national transportation research (National Cooperative Highway Research Program and Transportation Research Board) and technology transfer of completed research.

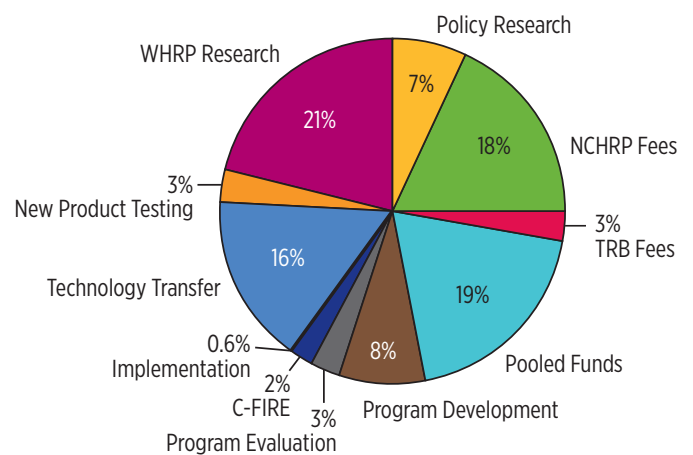
Specific program development and evaluation activities of the R&L Unit include soliciting research problem statements, selecting high-priority projects, publishing requests for proposals, selecting the best proposals to meet project objectives, contracting with investigator agencies, monitoring research progress, reviewing final reports, communicating results, encouraging implementation into practice, and evaluating benefits to the department.

Research Project Oversight

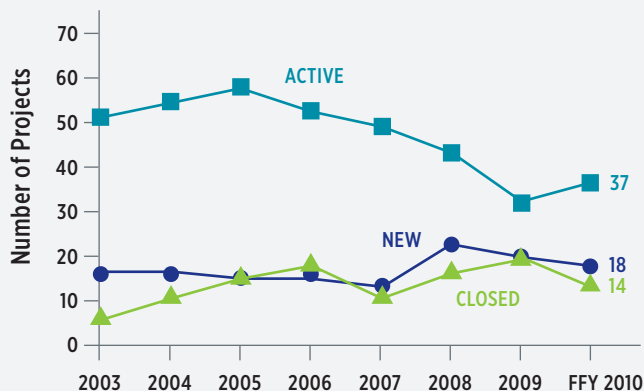
The R&L Unit oversaw almost 50 active research projects this year, with 18 new projects funded and 14 brought to completion. Summaries of completed projects and their impacts are given on pages 19 to 23 of this report, and details of all projects are in the Project Reference Guide. The unit continues to look for better ways to manage research and bring innovation to the department. Some of the R&L Unit's outreach and collaboration efforts in 2010 are highlighted on pages 12 to 14.

WisDOT participation in pooled fund studies continued to grow in FFY 2010, with the department participating in 54 projects. Research topics address pavements, structures, traffic management, work zone safety, knowledge management, winter maintenance and many other issues. Several pooled fund projects and their benefits are summarized on pages 26 to 29, with information on all currently funded projects provided in the Project Reference Guide.

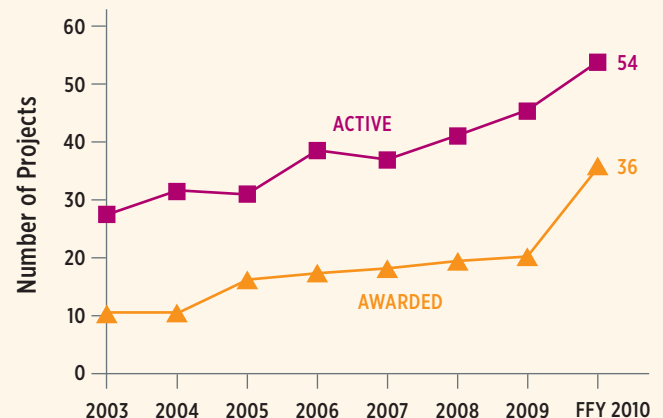
FFY 2010 Funding Awards



Wisconsin Research Projects



Pooled Fund Projects



2010 Highlights

In 2010 the R&L Unit continued efforts to encourage partnerships and participation across the department and beyond. Many of the unit's activities—from raising awareness of R&L Unit services and opportunities for partnerships to soliciting feedback on potential research projects and examining researcher performance—reinforced WisDOT's focus on accountability and supporting research that generates implementable results to move WisDOT forward in the future.



WisDOT Central Office Lobby Outreach Event

In early May 2010 the R&L Unit held an outreach event in the lobby of the Hill Farms central office to highlight the many ways in which WisDOT is bringing innovation to transportation. The event, designed to raise awareness of the variety of research and library services available to research partners and WisDOT staff, gave research program partners the opportunity to display recent relevant findings, highlight success stories and offer opportunities for input and involvement. Posters and one-on-one interactions delivered the R&L Unit's message—free research and information services, available to all WisDOT staff, can drive department innovation, save staff time, and help the department find better, safer, faster and cheaper ways to do business.

Training to Find Transportation Information Online

In 2010 the R&L Unit continued its class offerings for WisDOT staff in statewide bureaus and regional offices interested in finding transportation information on the Internet. New this year was a session customized for Wisconsin State Patrol staff at Fort McCoy. These three-hour training sessions provide classroom instruction and hands-on practice in finding technical information using three key sources: transportation Web sites, standard and customized search engines, and transportation databases. The course has proven effective for both beginners who have not previously used many of these transportation resources and experienced users interested in exploring advanced functions of the online sites. See the class handouts at on.dot.wi.gov/wisdotresearch/training.htm.

Transportation Research Ideas Workshop

In mid-August the R&L Unit hosted the 2010 Transportation Research Ideas Workshop with the goal of infusing WisDOT's research programs with new research ideas that could become part of the program in 2011, 2012 or 2013. Forty-five representatives from WisDOT, Wisconsin universities and industry gathered to discuss and prioritize more than 60 research ideas across a wide range of topics—from materials and construction to operations, rail, human resources and business management.

Participants worked with other transportation stakeholders to understand and shape submitted research ideas, evaluate and prioritize these ideas, and then begin to identify appropriate avenues for undertaking the research. Ideas that rose to the top because of their strong research potential and alignment with WisDOT needs will be evaluated by the appropriate WisDOT research program (Wisconsin Highway Research Program or Policy Research Program) for further development or submission to national research efforts. The workshop was an important step in the development of the R&L Unit's 2011 and 2012 research programs.

Video on Research Findings

WisDOT staff use research project videos to share and promote the results of research sponsored by the department. A complement to print Research Briefs for select projects (see page 30 of this report for more information about Research Briefs), the video format allows the R&L Unit to reach a segment of its audience that may have limited knowledge of technical issues with a presentation style that illustrates and explains complex transportation concepts in just a few minutes.

In 2010, the R&L Unit added a new video to its collection that highlights results from Project 0092-08-06 (see the June 2009 Research Brief at on.dot.wi.gov/wisdotresearch/database/briefs/08-06hmatestmepdg-b.pdf). Through interviews and demonstrations, researchers and WisDOT staff describe a sophisticated new test for hot-mix asphalt—the Asphalt Mixture Performance Tester—and how it can be used in conjunction with the AASHTO Mechanistic-Empirical Pavement Design Guide to improve WisDOT's asphalt mixes and produce longer-lasting roads.

Links to all research videos are available at on.dot.wi.gov/wisdotresearch/compvideos.htm.

WisDOT's research videos are also posted on the WisDOT channel on YouTube at www.youtube.com/wisdot.



WisDOT Digital Archive

A new WisDOT Library project is giving a permanent home to WisDOT's born-digital documents—such as highway project newsletters—that have no print counterpart. The electronic documents WisDOT is preserving become part of Wisconsin Digital Archives, a collection of select Web content produced by Wisconsin state agencies and coordinated by the Wisconsin Department of Public Instruction. Partners collaborating with the WisDOT Library in this effort include the Wisconsin Historical Society, the Wisconsin Legislative Reference Bureau, the University of Wisconsin–Madison, and the Wisconsin State Law Library. Once a WisDOT document is saved in the digital archive, the Wisconsin Digital Archives provides full-text permanent access in its own searchable database (www.wistatedocuments.org). The archived documents can also be accessed through WisCAT (www.wiscat.net), the statewide union catalog managed by the Wisconsin Department of Public Instruction.

Peer Exchange on Researcher Performance

Periodically the R&L Unit hosts a peer exchange to gather representatives from FHWA and other state DOTs to review the unit's research management efforts and share their own successes and challenges. From May 18 to 20, 2010, representatives from six state DOTs joined staff from WisDOT, UW–Madison and FHWA–Wisconsin Division to discuss four key topics related to tracking and enhancing researcher performance:

- Stakeholder involvement in the research process
- Accountability for research and administrative performance
- Quality of research deliverables
- Project performance evaluation

The two-and-a-half-day conference included presentations and round-table discussions aimed at highlighting shared practices and lessons learned. The discussions validated a number of outreach and research management practices already in place for WisDOT and provided new approaches for WisDOT to consider for ongoing program improvement.





Customized Web Search for Wisconsin Transportation

Finding your way through the magnitude of information available on the Internet can be challenging. The WisDOT Library has developed a new tool to make that task easier—a customized Google search that automatically limits a search to Wisconsin government, university and private sector Web sites. The Wisconsin Transportation Information Search, available at www.google.com/cse/home?cx=016923400724939679832%3Avmv2xow5buq, searches more than 60 Web sites that offer transportation research and related information for Wisconsin.

New Virtual Resources

In 2010 the WisDOT Library added to its growing collection of virtual resources. Developed in response to user needs, these new tools are available to any WisDOT employee on the Library and Information Commons intranet site.

WisDOT Acronyms Database

Find more than 5,000 transportation-related acronyms relating to all modes of transportation, including organizations and terminology important to WisDOT.

County Directories

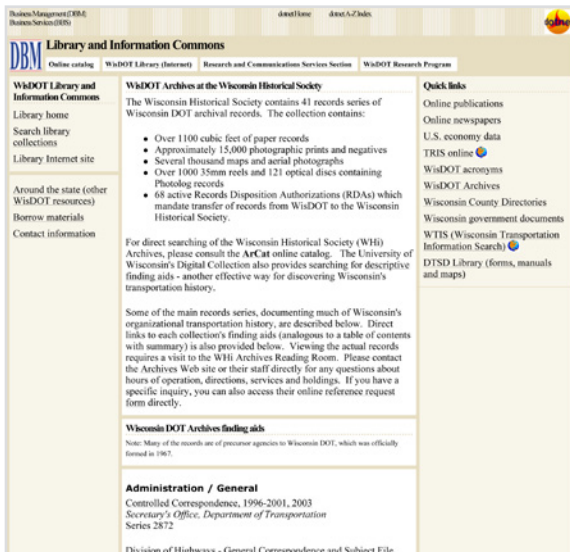
Printable versions of directories for Wisconsin's 72 counties are available to help department staff find key county contact information quickly and easily.

Vehicle Equipment Statutes and Administrative Code Archives

This intranet page in development augments online access to state statutes dating back to the late 1960s maintained by Wisconsin's Legislative Reference Bureau. To meet a need identified by the Wisconsin State Patrol, the WisDOT Library has begun digitizing statutes that predate the 1960s, which can be used by the State Patrol for vehicle inspection purposes.

WisDOT Archives at the Wisconsin Historical Society

The Wisconsin Historical Society retains a series of WisDOT archival records that document Wisconsin's transportation-related organizational history in many major topic areas. The WisDOT archival collection contains paper records, photographic prints and negatives, maps and aerial photographs, and 35-mm reels and optical discs, with some records dating back to the early 1900s. To encourage use of this archival collection, the WisDOT Library created an intranet page with links to a table of contents and summary for each series of records. The actual records are available for viewing in the Wisconsin Historical Society's Archives Reading Room.



WisDOT Research Programs

The R&L Unit oversees research activities and WisDOT participation in three major research programs: the Wisconsin Highway Research Program, the Policy Research Program and the Transportation Pooled Fund Program.

Wisconsin Highway Research Program

WHRP was formed in 1998 to perform materials and construction research for the department in four major areas:

- Flexible pavements;
- Rigid pavements;
- Structures; and
- Geotechnics.

WHRP is also involved in other areas of research, including implementation of the Mechanistic-Empirical Pavement Design Guide in Wisconsin.

Policy Research Program

The R&L Unit's Policy Research Program brings a department-wide focus to research needs beyond materials and construction. Based on the Transportation Research Board "policy research" definition, the WisDOT program accomplishes the following:

- Evaluates the technical merits of current department policies;
- Assesses the potential effects of policy alternatives; and
- Measures the impacts of specific research programs and projects.

Research is geared to the information needs of WisDOT managers. Research ideas, accepted any time throughout the year, cover all transportation modes and address topics such as safety, economic impacts and the environment.

Transportation Pooled Fund Program

In operation for more than 25 years, the Transportation Pooled Fund Program is sponsored by FHWA in cooperation with AASHTO and TRB to provide state, federal and local transportation agencies and other organizations with the opportunity to pool their funds and collaborate in solving transportation-related problems of common interest. TPF studies must be sponsored and led by either a state DOT or FHWA. Each agency that contributes funds to a pooled fund study designates a technical representative to serve on the project's Technical Advisory Committee. The TAC is responsible for overseeing the project—from drafting project goals to reviewing the researchers' final report and disseminating results.



WHRP Steering Committee

Daniel Yeh, Chair
WisDOT Research and Communication
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Jack Arseneau
Wisconsin Earthmovers Association

Todd Becker
American Council of Engineering
Companies of Wisconsin

Beth Cannestra
WisDOT Bureau of Structures

James Crovetti
Marquette University (academic
representative; rotates biannually)

Matt Grove
Wisconsin Transportation Builders
Association

Dwight McComb
FHWA Wisconsin Division Office

Dan McGuire
WisDOT Bureau of Technical Services

Kevin McMullen
Wisconsin Concrete Pavement Association

Don Miller
WisDOT Bureau of Project Development

Mike Oliva
National Center for Freight & Infrastructure
Research & Education

Rory Rhinesmith
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Alan Rommel
WisDOT Northeast Region

Scot Schwandt
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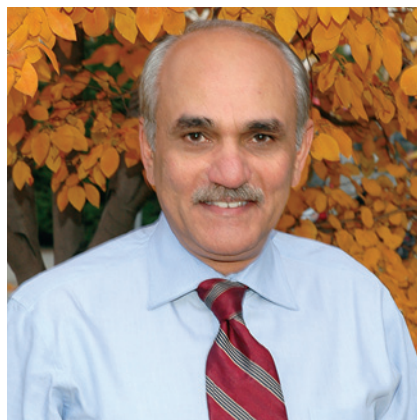
William Jason Weiss
Purdue University, NEXTRANS Center

Wisconsin Highway Research Program

www.whrp.org

WHRP's mission—to improve the return on investment in Wisconsin roads by delivering timely and implementable research products—is accomplished through a unique collaboration of DOT staff, academia, industry, consulting engineers and contractors, and FHWA. A multipartnered steering committee and technical oversight committees guide the direction of research and oversee the implementation of results. Managed by the UW–Madison, WHRP uses the expertise of university professors and students and consulting engineers throughout the state and nationally to carry out applied research for WisDOT.

Since WHRP's inception in 1998, 80 research projects have been completed. WHRP research has had a significant impact on WisDOT, with more than half of all completed research projects resulting in known outcomes (specification changes, a validation of current practice or a determination that the results cannot be implemented).



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Andrew Hanz

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Geotechnics

Jeff Horsfall
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Annual Project Selection

An annual schedule directs WHRP's solicitation and oversight of research projects. From June through September, WHRP solicits research ideas from WisDOT staff in statewide bureaus and regional offices, and through outreach to industry and other interested parties. In 2010, this outreach took the form of a workshop. (See *Transportation Research Ideas Workshop* on page 12 of this report.) In prior years, potential research ideas were gathered through surveys and an examination of past practices for each TOC (Flexible Pavements, Rigid Pavements, Structures and Geotechnics). Project ideas are submitted to the appropriate TOC chair using the problem statement form available at www.whrp.org/research-areas/downloads/problem-statement-format.pdf.

In late fall after the research ideas are submitted, the TOCs consider potential projects, prioritize them and develop requests for proposals. Previous research efforts are considered as projects are prioritized.

By the end of January, the TOC chairs present the RFPs to the Steering Committee for approval, and proposal solicitation for approved projects begins in February. The TOCs evaluate the proposals received and recommend researcher selections to the Steering Committee for approval in the spring. Work plan development begins in June, contracts are finalized by early fall, and new projects typically begin in October, at the start of the federal fiscal year.

In 2010, WHRP developed a draft strategic plan that will guide its efforts during the next five years. WHRP's draft plan, which includes emphasis areas that are tied to WisDOT's strategic plan, is expected to be finalized in FFY 2011.

"The relationship built through WHRP among academia, the public sector and the private sector continues to be a significant asset for all of us at WisDOT."

Daniel Grasser,
WisDOT North Central Region Director

A Focus on Implementation

One measure of WHRP's ability to provide practical research results to WisDOT is the degree to which research project results are implemented in the field. Using the results of a 2006 pilot implementation program, WHRP developed an analytical approach—unique among state DOT research programs—to monitor project outcomes and used that information to promote implementation of research results. Every year, as the TOCs plan for new research, completed projects are examined for opportunities to implement findings, which may include additional research, pilot projects or other technology transfer activities. Since its inception, WHRP's analytical approach to tracking implementation has resulted in fewer projects that require further action to move from research results to implementation. In 2010, only 15 percent of completed projects required further action.

"Any time we can participate in WHRP training and research, it is a plus for staff and ultimately for the customer, the motoring public."

Don Gutkowski,
WisDOT Northwest Region Director

Outreach and Collaboration

WHRP uses a variety of formats to communicate the results of its research and implementation activities and collaborate with other researchers on shared transportation concerns.

- **Project closeout webinars** use Web conferencing technology to share research results from completed projects with WisDOT regional engineers throughout the state without requiring travel. These streaming videos serve as important technical resources that accompany and further illustrate a project's final report. Webinars for select projects are on WHRP's Web site. Look for the *Closeout Webinar* link under *Additional Documents/Data* on completed project pages.
- **Video briefs** are another way WHRP communicates research results, using project footage and interviews with researchers and practitioners to describe the successful implementation of selected WHRP research. Video briefs are available at www.whrp.org/news-and-outreach/video-briefs.html.
- **Multistate partnerships** offer opportunities for WHRP to collaborate with other state DOTs, universities and FHWA through participation in a number of pooled fund studies and other cooperative activities. One example of such a collaboration is WisDOT's membership in the Transportation Engineering and Road Research Alliance (www.terraroalliance.org/), managed by the University of Minnesota. Transferring the lessons learned from the now-completed North Central Pavement (or "Frozen Four") pooled fund to the new TERRA pooled fund, WHRP participants can consult and collaborate with states in the region on areas of common interest, including research on pavement and materials and issues related to cold climates.



SPOTLIGHT on Intelligent Compaction

Intelligent compaction is used by some state DOTs to enhance the consistency of compaction of hot-mix asphalt. By equipping a traditional HMA compactor with an array of sensors, including pavement stiffness gauges and surface thermometers, an operator can monitor the state of a pavement throughout the compaction process, identify problem areas and make adjustments in real time. Global positioning systems are used to create detailed maps from the data.

In early May 2010, FHWA conducted a field demonstration of intelligent compaction as part of the series of demonstrations sponsored by the Transportation Pooled Fund Intelligent Compaction Project research team (www.intelligentcompaction.com/index.php?q=node/109). FHWA worked closely with members of WHRP's Flexible Pavements and Geotechnics TOCs to rubblize an existing segment of portland cement concrete pavement along five miles of a two-lane stretch of U.S. 51 near

Mosinee and lay an HMA overlay using intelligent compaction.

The field demonstration was followed in mid-May by an open house jointly sponsored by FHWA and the pooled fund research team, and hosted by American Asphalt of Wisconsin in Mosinee. The open house brought together almost 70 state, federal, industry and academia representatives to learn more about intelligent compaction technology and its potential benefits. The day's agenda included presentations of intelligent compaction technologies, preliminary findings by the FHWA/pooled fund research team, and vendors presenting intelligent compaction rollers and GPSs.

WHRP wrapped up the day's agenda with a presentation on the recently concluded WHRP Research Project 0092-08-07, which evaluated the use of intelligent compaction for WisDOT's HMA pavements. (See page 19 of this report for more information about this project.)

WHRP Project Impacts

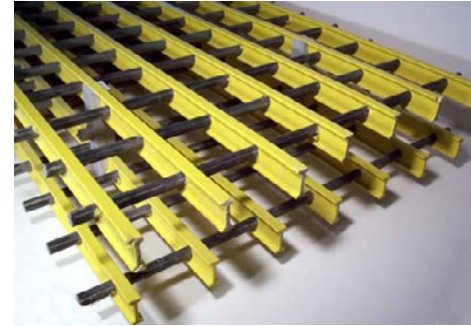
Six of the 12 WHRP projects completed in 2010 are highlighted below. Researchers addressed topics including the effectiveness of specific elements of bridge design, intelligent compaction as a way to improve pavement density, whitetopping of asphalt pavements, and the performance of open-graded base course.

0092-05-02 – In-Situ Monitoring and Testing of IBRC Bridges in Wisconsin

Final report and brief:

www.whrp.org/research-areas/structures/structures_0092-05-02.html

Designers expect bridges to last 75 years or more. Occasionally, however, they do not. Most concrete bridge decks experience some cracking, but when water carrying road salt seeps in, some of these cracks widen into fissures and hasten corrosion of steel reinforcement. This damage can impact driver safety and shortens bridge life. Early overlays or even replacement may be required for these structures.



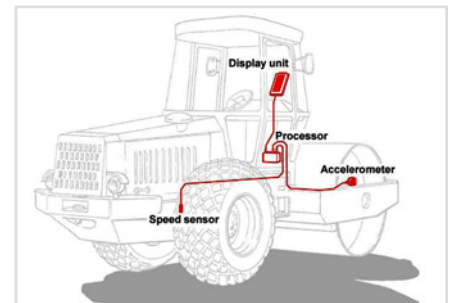
Impact: Fiber-reinforced polymer bars and grids appeal to designers as an alternative reinforcement material because they do not corrode. Two Wisconsin bridges built in 2003 and 2004 with FRP reinforcement were paired with two steel-reinforced bridges of the same design. Investigators analyzed these structures over a five-year performance period and found FRP to be a viable steel alternative. The FRP bridges distribute loads well, resist damage and show promise as a long-term reinforcement option.

0092-08-07 – Evaluation of Intelligent Compaction Technology for Densification of Roadway Subgrades and Structural Layers

Final report and brief:

www.whrp.org/research-areas/flex/flex_0092-08-07.html

To make pavement layers strong enough to support traffic, construction personnel use rollers to compact them to a predetermined density. Because soil variability and other factors can make this process difficult, WisDOT was interested in evaluating a technology for improving the process called intelligent compaction, in which rollers are equipped with sensors that monitor layer stiffness during the compaction process itself.



Impact: Researchers evaluated the accuracy of intelligent compaction on three projects in Wisconsin. They found that for soils, it is an effective technology for mapping the stiffness of layers, identifying weakly compacted areas, and determining the best rolling patterns and number of passes. However, interpreting intelligent compaction data is complex, and further research is needed before its use by contractors is required.



0092-08-10 – Performance Assessment of Wisconsin’s Whitetopping and Ultra-Thin Whitetopping Projects

Final report and brief:

www.whrp.org/research-areas/rigid/rigid_0092-08-10.html

As asphalt pavements age, they are subject to rutting, cracking and other deterioration. To rehabilitate these roads, WisDOT uses low-cost maintenance techniques such as whitetopping, in which a layer of concrete is placed over an asphalt pavement. Because whitetopping is a relatively new method, research was needed to optimize its design and evaluate its performance in Wisconsin.

“This is the first time that the performance of Wisconsin whitetopping pavements has been evaluated, and results may lead to adjustments to WisDOT procedures for concrete overlays.”

Jim Parry,
WisDOT Bureau of Technical Services

Impact: Researchers monitored the performance of whitetopping on 17 projects in Wisconsin and found that it shows great promise if designs are improved to assume heavier loads and an unbonded condition between asphalt and concrete layers. Results will help agencies determine the most cost-effective rehabilitation technique for a given project, and with further research may lead to adjustments to WisDOT’s concrete overlay procedures and manuals.

0092-08-13 – Friction Coefficients for Stainless Steel (PTFE) Teflon Bearings

Final report and brief:

www.whrp.org/research-areas/structures/structures_0092-08-13.html

Bridge bearings allow decks to slide over bridge substructures during loading and freeze-thaw cycles. This reduces structural strain and damage. Highly polished stainless steel has been the WisDOT standard for bearing material, but it is expensive and can be difficult to find. It also scratches eventually due to grit, weather and other environmental conditions, losing its performance value.

Impact: Researchers evaluated less polished stainless and food-processing-grade steel finishes in combination with polytetrafluoroethylene (Teflon) surfaces for bridge bearings. After subjecting the test bearings to long friction cycles in slide-path resistance tests, investigators found that the cheaper, less polished steel worked very well. WisDOT can now use bearings made of this material, reducing costs associated with bridge construction and bearing replacement.



0092-09-03 – Performance Evaluation of Open Graded Base Course with Doweled and Nondoweled Transverse Joints on U.S.H. 18/151 and S.T.H. 29

Final report and brief:

www.whrp.org/research-areas/rigid/rigid_0092-09-03.html

In Wisconsin, the typical 9-inch or 10-inch concrete pavement stands over an 8-inch, dense-graded aggregate base course. These bases compact tightly and sometimes drain poorly. Heavy loading and freeze-thaw damage then lead to cracking, spalling and surface damage that makes driving unpleasant and triggers rehabilitation or resurfacing earlier in the 20- to 30-year service life than WisDOT prefers.



Impact: Open-graded base courses compact less tightly and presumably drain better, but cost an extra \$100,000 per mile to use. Investigators evaluated 25 Wisconsin pavement sections with doweled and undoweled pavement, various drainage structures, and various combinations of dense-graded and open-graded bases. Though many OGBC sections outperformed dense-graded sections, the performance difference was not great enough to justify the increased cost of OGBC in most situations.

0092-09-06 - Concrete Cracking in New Bridge Decks and Overlays

Final report and brief:

www.whrp.org/research-areas/structures/structures_0092-09-06.html

Cracking in bridge decks accelerates the penetration of corrosive agents, which can damage the steel reinforcement and eventually deteriorate the whole concrete structure. Recently built bridges in Wisconsin are developing early-age cracks in their concrete overlays, leading to increased maintenance and repair costs. WisDOT needed to understand the extent of this problem and identify possible solutions.

Impact: Researchers quickly focused on concrete shrinkage during curing as the source of early-age cracking. They completed one of the first detailed, quantified computer models of the internal stress effects of the curing process and found that rapid development of concrete strength is a likely source of early-age cracking. Following analysis of post-pour concrete from two new bridges to corroborate the computer analysis, researchers recommended several methods to reduce cure rates and minimize concrete shrinkage.

“This project is really the beginning of a new phase of looking closely at early-onset cracking in concrete overlays and how to alleviate the problem.”

Travis McDaniel,
WisDOT Bureau of Structures



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Policy Research Program

WisDOT's Policy Research Program addresses policy issues that affect the entire department, including functions not part of most state DOTs: the Division of Motor Vehicles and the State Patrol. Research projects address all transportation modes and span planning, operations, safety, economic impacts and the environment.

The Research & Library Advisory Committee, composed of representatives from all five divisions and the executive offices, provides ongoing guidance and decision making for the program. RLAC identifies department needs, recommends project champions, and reviews and approves research problem statements.

Flexible Research Selection Cycle

The Policy Research Program formally solicits research projects annually, in conjunction with WHP's research solicitation, but the program remains responsive to the evolving research needs in the department. Projects can be funded at any time throughout the year with an eye on those projects that address an important issue for multiple divisions.

The 2010 Transportation Research Ideas Workshop highlighted on page 12 of this report is a new effort to identify and prioritize critical research needs for all research programs. Twenty-one policy research ideas were discussed at this year's event related to finance, business management, public information, operations, safety, motor carriers and freight. Projects prioritized by RLAC and selected for funding out of this process will form the foundation of the 2011 and 2012 Policy Research Program.

"It's very important from a policy perspective that we not try to solve problems in a vacuum and that we actually take the time to do the thorough analysis that is warranted."

Daniel Yeh,
WisDOT Bureau of Business Management

SPOTLIGHT on Department-wide Collaboration

The R&L unit initiated two projects in 2010 aimed at addressing pressing issues for multiple divisions. The unit worked with representatives across the department to scope these collaborative research efforts. The RCSS Chief serves as champion for both projects and works closely with project oversight committees that include the varying perspectives of all involved work areas.

Best Practices of Mega and ARRA-Funded Projects

Since 2004, WisDOT has developed a number of new techniques, methods, processes and procedures for management of two new types of transportation projects: "megaprojects" and projects funded through the American Recovery and Reinvestment Act of 2009. This research project will identify procedures, standards, and programs used in these projects, evaluate their effectiveness, determine if they have benefits for future use and determine how they could be adopted by the department.

Mobility Issues for an Aging Population

In the United States, the elderly population is forecast to more than double between 2000 and 2050. This demographic shift could have significant implications for transportation policy. To help WisDOT best prioritize activities to make the best use of existing resources, this study will review elderly mobility services, process gaps, and expected future needs through a demographic analysis, a survey of elderly residents and a review of best practices from other agencies.

Policy Research Project Impacts

Two policy projects were completed in 2010: an examination of Internet driver education and a study of the resiliency of the I-90/I-94 corridor, which is considered the backbone for both freight and passenger mobility in Wisconsin, Illinois and Minnesota.

0092-09-17 – Internet Driver Education Study

Final report: on.dot.wi.gov/wisdotresearch/database/reports/09-17internetdrivereducation-f.pdf

Research brief: on.dot.wi.gov/wisdotresearch/database/briefs/09-17internetdrivereducation-b.pdf

There is growing interest around the country in using online driver education courses to prepare students for the written portion of their driver's license examination. WisDOT—one of three agencies in Wisconsin that regulates driver's education—does not currently permit the use of online DE. This study sought to provide information regarding the quality of instruction, costs, benefits and outcomes of online versus traditional classroom-based courses.

Impact: The limited research available suggests that student success is similar whether students learn in the classroom or online. Interviews with program coordinators, instructors and students familiar with online DE identified perceived benefits—improved flexibility and convenience—and potential concerns including security, material comprehension and student motivation. WisDOT will use the results of this study to help determine whether to move forward in allowing increased use of online DE in Wisconsin.

“This project successfully demonstrated an effective and understandable technique for quantifying and analytically evaluating Interstate highway resiliency.”

John Corbin,
WisDOT Bureau of Traffic Operations

0092-09-10 - Operational Resiliency of Beloit-Hudson Interstate Highway Corridor

Operational resiliency is a highway system's ability to recover from a disruption and to continue moving traffic in an uninhibited manner. In light of several recent events, including excessive rains that led to flooding and a snowstorm that dumped 13 inches of snow and ice on the highways, WisDOT, in partnership with the National Center for Freight and Infrastructure Research and Education, conducted a study of the operational resiliency of the I-90/I-94 corridor.

Impact: WisDOT is reviewing this data to further develop mitigating strategies for the corridor segments identified by this study as being at higher risk. Investigators suggested that research could be extended to include recommended strategies for directing traffic onto alternate routes as well as proactively developing effective response plans through strategic partnering with local governments and businesses.



Image taken from a highway traffic camera

Transportation Pooled Fund Program

As an integral part of its overall research effort, WisDOT partners with other states to fund larger research projects of common interest through the national Transportation Pooled Fund Program. In a pooled fund study, a committee of technical representatives from each partner organization develops the project scope and oversees the research. WisDOT currently has 39 project technical representatives who help make sure WisDOT is getting the most out of its research investment.

Annual Project Selection

Each spring, the R&L Unit coordinates an open solicitation among all department employees to determine interest in participating in individual pooled fund projects. WisDOT can also initiate new pooled fund projects on any topic at any time. All projects that need partners or are already in progress are listed at www.pooledfund.org.

Determining WisDOT's participation in pooled fund projects each year takes two tracks:

- *New projects.* To nominate a new project, department staff describe the expected benefits and provide a recommended funding amount for the fiscal year of the request.
- *Continuing projects.* WisDOT technical representatives on pooled fund projects that require additional funding are asked to assess whether the study is reaping sufficient benefits for WisDOT to warrant continued funding in the upcoming fiscal year.

The R&L Unit then works with WisDOT bureau managers and division administrators to review and rank all projects and prepare the annual program of pooled fund projects and funding commitments.

Coordinating the pooled fund annual solicitation is just the beginning for the R&L Unit, which also:

- Assists the project nominator in identifying a technical representative for new projects.
- Provides training for new technical representatives.
- Oversees distribution of funding (for partner studies) or receipt of funding (for studies led by WisDOT).
- Conducts closeout meetings with WisDOT's technical representatives to discuss how results will be implemented when a pooled fund project concludes.

WisDOT's Participation

Fifteen new pooled fund projects, nominated by department staff, were funded in FFY 2010. The projects cover a range of research topics, including safety, preventive maintenance, construction materials, bridge design and environmental impacts. Funding continued in 2010 for 21 pooled fund projects that WisDOT already supports in the areas of winter operations, pavements, traffic, safety and structures.

The solicitation cycle for FFY 2011 is complete, and seven new pooled fund projects have been selected for funding on topics such as traffic, bridge design and intelligent compaction. WisDOT will also provide continuing funding in FFY 2011 for 32 pooled fund projects that the department already supports. See on.dot.wi.gov/wisdotresearch/pfres.htm for more information.

SPOTLIGHT on Passing the Baton

Transportation Library Connectivity TPF-5(105)

www.libraryconnectivity.org

WisDOT championed formation of the Transportation Library Connectivity pooled fund study in 2005 and served as lead state throughout the study's five years, concluding with the final annual meeting in September 2010. Membership during this time grew from 11 to 25, including 22 states from all regions of the country. Activities of the study have resulted in several major accomplishments, including the creation of a prototype national infrastructure for transportation libraries; publication of the *Transportation Librarian's Toolkit*; increased awareness of the value of library and information services; professional development opportunities for member librarians; resolution of individual problems and challenges through technical assistance; and, for some members, payment of library network subscription fees.

The final report for the study is available at www.libraryconnectivity.org/about.html. A new pooled fund study, Transportation Library Connectivity and Development, TPF-5(237), is being formed under the leadership of Missouri DOT to continue working toward development of effective Transportation Knowledge Networks throughout the country.



Clear Roads TPF-5(092)

www.clearroads.org

WisDOT took on leadership of the Clear Roads pooled fund project in early 2004 in response to a need for practical research in the field of winter highway operations. This ongoing research program attracted 20 member states by 2010 while focusing on rigorous testing of winter maintenance materials, equipment and methods for use by highway maintenance crews. Clear Roads projects have produced usable results in areas such as:

- Deicing standards, materials and procedures;
- Calibration of ground speed controllers;
- Carbide blade wear and performance;
- Interface specifications for mobile data platforms; and
- Parameters for liquid-only plow routes.

In addition, the pooled fund has initiated several national partnership projects with FHWA, AASHTO and other winter maintenance pooled fund programs. The group has collaborated to develop a national winter safety campaign, organize a national, biannual peer exchange on winter maintenance research needs, support ongoing development of computer-based training modules for winter maintenance field personnel, and coordinate field testing of multiple blade snowplow prototypes.

WisDOT passed leadership of this successful pooled fund in 2010 to the Minnesota Department of Transportation under TPF-5(218).

Impacts of Pooled Fund Projects

WisDOT participated in 54 projects during FFY 2010. Nine of these projects are highlighted below.



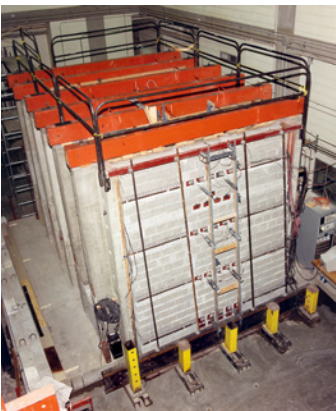
Aurora Program, SPR-3(042)

Study link: www.pooledfund.org/projectdetails.asp?id=189&status=4

With the goal of collaborative research, development and deployment in the field of road weather information systems (RWIS), this consortium of public agencies focuses on improving the efficiency of winter highway maintenance operations and distributing effective real-time information to travelers. Aurora initiatives support technological advancement and improvement of existing RWIS, significantly reducing the adverse impacts of inclement weather on mobility and public safety.

Impact: There are two recent Aurora projects that have benefited WisDOT:

- An evaluation of new noninvasive sensor technology for which WisDOT served as the project champion. WisDOT's Bureau of Highway Operations worked with a vendor and two research organizations to develop test procedures and evaluate results. The evaluation proved that the new technology was effective, and WisDOT has begun integrating it into new RWIS installations.
- The R&L Unit worked with Michigan DOT and WisDOT's Bureau of Highway Operations to develop and distribute a nationwide survey on the status of RWIS training. Survey results were used to focus an Aurora project to develop enhanced RWIS training for state DOTs.



Strength and Deformation Analysis of MSE Walls at Working Loads, SPR-3(072)

Study link: www.pooledfund.org/projectdetails.asp?id=225&status=4

The goal of this project is to develop a design procedure for the internal stability of mechanically stabilized earth (MSE) walls, especially those reinforced with fabrics. The study consists of six phases, four of which are complete; the last two phases involve constructing and testing full-scale walls and will be complete by the end of 2010.

Impact: Researchers developed an improved method for the internal stability design of MSE retaining walls—the K-Stiffness method—which appears to produce a more cost-effective design for MSE walls as compared to the AASHTO Simplified Method. Validation of the K-Stiffness method for marginal quality backfill materials and monitoring of full-scale walls is necessary before the new method will be incorporated into the AASHTO Load and Resistance Factor Design specifications.

Soil Mixing Methods for Highway Applications, TPF-5(001)

Study link: www.pooledfund.org/projectdetails.asp?id=125&status=4

This study is developing improved design and construction control methods for the use of soil mixing techniques on highway projects where conventional foundation support and ground retention methods are either too expensive or inappropriate due to soil or site conditions.



Impact: Because this technology is not commonly used in Wisconsin, this study gives WisDOT a chance to learn more about a methodology to which staff otherwise might not have been exposed. This pooled fund has also developed the Deep Mixing for Embankment and Foundation Support design manual and a series of reports on deep mixing.

Transportation Curriculum Coordination Council Training Management and Development, TPF-5(046)

Study link: www.pooledfund.org/projectdetails.asp?id=299&status=4

The Transportation Curriculum Coordination Council (TCCC) is a partnership between FHWA, state DOTs and the highway transportation industry that helps reduce duplication of efforts while revising and developing core training materials and short courses that address national needs. The TCCC also promotes uniformity in training content and qualification requirements, advocates the dissemination of information among regional and industrial training and certifying organizations, and encourages the development and improvement of AASHTO standards while maximizing their use in training development.

Impact: This pooled fund effort continues to grow in value to the Wisconsin Highway Technician Certification Program. In the past, the TCCC has been a source for filling spot-training material needs for the HTCP. Currently, the TCCC plays a bigger role by providing access to professional training developers and an ever-expanding library of free, copyright-cleared source materials. As the HTCP moves to add blended training with its online component, the TCCC will be a key cost-effective resource for these online training modules.

The screenshot shows the TCCC website interface. At the top, there's a navigation bar with links like 'Home', 'Training Resources', 'About TCCC', 'Request TCCC', 'Meetings & Events', 'Contact Us', and 'Contribute Work Items'. Below this, the 'Core Curriculum Matrix Development' section is visible. It includes a 'Competency Matrices' section with a list of subject areas: Personal Safety, Workplace Safety - General Industry, Construction Safety, Vehicles & Heavy Equipment, Workzone Operations, Workzone Services, Workzone Materials, Traffic Control Devices, Signals, Materials, Traffic Systems, Roadway Safety Assessments, Safety Statistics, and Other Safety Competencies. Below this is a table titled 'Personal Safety' showing competencies by skill levels (Level I, Level II, Level III, Level IV) for various disciplines.

Disciplines	Competencies by Skill Levels			
	Level I	Level II	Level III	Level IV
Emergencies	Handles emergency situations following the organization's protocols	Demonstrates the basic rules and procedures of first aid	Identifies missing supplies and training needs	Optional certification in CPR
First Aid	Describes the basic rules and procedures of First Aid, Medical Services and CPR	Uses proper supplies and procedures	Shares information on BP program	Ensures compliance with BP program
Bloodborne Pathogens	Avoids and practices self against bloodborne pathogens	Executes program procedure when exposure occurs	Understands the organization's BP program and policies	Ensures compliance with BP program
Fitness for Duty	Describes the basic rules for duty rules including fatigue, stress, preparation, drugs and alcohol	Explains the value of individual and group wellness	Evaluates or supervises the fitness for duty of others	Ensures compliance with Fitness for Duty requirements
Good Health & Injury Prevention	Describes the basic work safe procedures for lifting, climbing and walking	Practices basic work safe procedures	Defines Ergonomics as it relates to the workplace	Supervises health and injury prevention programs and activities
Risk Management	Recognizes situations, materials, and equipment requiring special training, handling, or safety procedures	Performs and documents safety inspections	Investigates and collects data and evidence from accidents, crashes and incidents	Prepares safety plans and accident prevention training programs
	Alert to work environment, movement and potential hazards	Conducts safety audits	Performs operations reviews and risk analysis	Conducts safety meetings
	Asks questions related to personal safety		Reminds and motivates others	

Guidelines for Designing Bridge Piers and Abutments for Vehicle Collisions, TPF-5(106)

Study link: www.pooledfund.org/projectdetails.asp?id=338&status=6

When large trucks run off the road and collide with bridge piers, they can cause catastrophic structural failure, sometimes leading to bridge collapse. While the current AASHTO LRFD Bridge Design Specifications provide guidance for the placement and design force of piers, this guidance needed to be refined using new data and methodologies.

Impact: Researchers performed structural analyses on piers impacted in accidents by large tractor-trailers. Using computer simulations to calculate the forces involved in collisions, researchers established a method for determining which highway segments are most at risk for collisions. A full-scale crash test tested the methodology. Results showed that the design force for piers needed to be increased, leading WisDOT to modify its standard specifications for bridges.

Refinement and Field Validation of Mix Design Criteria for 4.75-mm Superpave Mixes, TPF-5(107)

Study link: www.pooledfund.org/projectdetails.asp?id=339&status=24

The objective of this study was to refine and validate design criteria for Superpave mixes using 4.75-mm aggregate, including developing guidelines for the production, construction and use of this type of mix. The load-bearing capabilities of 4.75-mm mixtures had not previously been well understood, and not many agencies were using them.

“The combined advantage of more efficient use of by-product materials and stretched quantities will result in added performance value for WisDOT.”

Judie Ryan,
WisDOT Bureau of Technical Services

Impact: This study yielded a final report that will inform and expand Wisconsin’s use of 4.75-mm aggregate. The potential benefits of this aggregate mixture include:

- Efficient use of materials and potential cost savings (since this stone size is a by-product for the industry).
- Its usefulness for patching in urban environments, allowing existing utilities and curb/gutter lines to be more easily matched.
- Its ability to be used as a thin overlay rehabilitation tool. It is also useful under bridge structures, since its small size minimizes its impact on height clearances.

Updates to WisDOT standard specifications and test methods reflect the information gathered from this pooled fund study.



The Effects of Implements of Husbandry “Farm Equipment” on Pavement Performance (MnROAD Study), TPF-5(148)

Study link: www.pooledfund.org/projectdetails.asp?id=375&status=4

The aim of this study is to determine pavement responses to selected farm equipment, which has seen significant increases in size and weight due to shifts in farm size and manure application techniques. This study conducted testing to determine the pavement response under various types of agricultural equipment (including the impacts of different tires and additional axles) and to compare this response to that under a typical five-axle tractor-trailer.

Impact: The results of this research will allow policy and design decisions to be driven by direct experimental results rather than by models that may not have been calibrated for the types of loadings and tire configurations of current and evolving agricultural equipment. WisDOT participated with a relatively small contribution and received considerable value by getting a voice in the direction of this research.

2009 National Asset Management Conference, TPF-5(196)

Study link: www.pooledfund.org/projectdetails.asp?id=421&status=4

DOTs must regularly make informed decisions about where to allocate limited resources—balancing available funding against the needs of the public. Doing so requires a thorough knowledge of the existing condition of transportation infrastructure and methods for forecasting future needs. Consequently, state and local transportation agencies have been increasingly interested in transportation asset management, a systematic process for managing transportation infrastructure.

Impact: Wisconsin and six other states pooled resources to share information about a wide range of emerging issues in the field during the 8th National Conference on Transportation Asset Management, held in Portland, Ore., October 19-21, 2009. In a series of presentations, interactive workshops and case studies of state implementation efforts, 239 participants shared and documented best practices, and identified research and collaboration opportunities.

Investigation of Jointed Plain Concrete Pavement Deterioration at Joints and the Potential Contribution of Deicing Chemicals, TPF-5(224)

Study link: www.pooledfund.org/projectdetails.asp?id=452&status=4

During the last several years, states where deicing chemicals are routinely used have noted severe deterioration of concrete joints on many pavements. The goal of this research project is to investigate the causes of this joint deterioration and quantify any contributions to joint deterioration related to deicing chemicals. In addition to developing estimates of service reduction and life-cycle costs, researchers will develop recommendations for minimizing future joint deterioration.

Impact: Study results will help WisDOT's pavement designers build new concrete pavements that are more resistant to deterioration from the effects of today's concentrated deicing chemicals. Damage to existing concrete pavements can be minimized by applying researchers' recommendations for possible repair methodologies and preventive measures.

“This pooled fund study provided an excellent opportunity for WisDOT attendees to engage in peer exchange and identify research opportunities.”

Scott Bush,
WisDOT Bureau of Highway Maintenance



Information Products & Services

The R&L Unit has long recognized the importance of communicating research results and their potential significance to the department, and has developed a variety of ways to deliver this critical information.

The need to communicate the value of research is recognized nationally, and is well documented in the 2009 NCHRP publication **Communication Matters: Communicating the Value of Transportation Research Guidebook** (onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_610.pdf).

“Communicating the right information to the right audience not only affects the acceptance of your research, it also maximizes your time and your communication dollars.”

NCHRP REPORT 610,
Communication Matters: Communicating
the Value of Transportation Research
Guidebook

The guidebook’s tools and techniques are designed to help research managers successfully convey the value of research in a continual communication process—from planning and executing communication campaigns to speaking to specific audiences. As the guidebook notes, “the time is long past when the value of the research will simply sell itself with no additional effort.”

The R&L Unit’s suite of information products and services reflects the best advice of the NCHRP guidebook. Tailored to specific purposes and audiences, the unit’s range of short-term and long-term research and information services address the cycle of research from beginning to end.

- **On the front end**—Identify completed research and practices to reduce duplication and leverage other research.
- **On the back end**—Communicate results and new technologies.
- **Ongoing**—Explain the value of research.

Research Briefs

The R&L Unit produced eight research briefs in 2010 on projects completed through WHRP and the Policy Research Program. These two-page summaries outline research objectives, findings and recommendations, and plans for implementation. Briefs are available online, organized by topic area and year, at on.dot.wi.gov/wisdotresearch/compresprojs.htm.

Impact: Research briefs save time for WisDOT staff and investigators in reviewing completed research, provide an easy way for project managers to share results with staff in other areas, and capture the views of both investigators and project managers. In an annual survey of readers of research briefs, 31 of 38 respondents rated the briefs a 4 or 5 (5 = extremely effective) on their overall effectiveness at “providing a concise, easy-to-understand summary” of the research. Thirty-three of 38 respondents said that research briefs are helpful in summarizing key objectives, research results and the value of projects.

Distributing Other States’ Research

WisDOT receives hard copies of state DOT research reports from around the country in all subject areas—from pavements, bridges and soils to maintenance, traffic operations and environmental issues. These reports are added to the WisDOT Library collection. To make sure reports reach WisDOT employees who work in related areas, the R&L Unit routes new reports to appropriate staff members as the reports are received.

Impact: This service is another way to keep WisDOT staff members informed of the latest research in their fields, and helps ensure that the department doesn’t duplicate work already performed

at other agencies. Responses to the service for 2010 were very positive. Eighty-three percent of respondents said that the state reports they reviewed were helpful and that the research was applicable to WisDOT.

Research & Library E-Newsletter

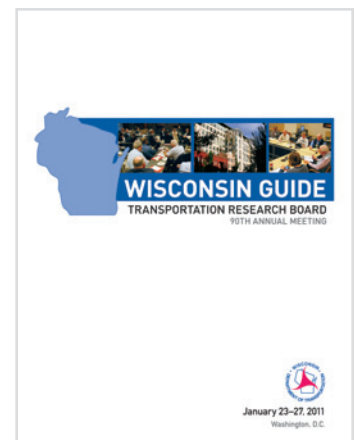
The Research & Library E-News is published biannually to update WisDOT staff and stakeholders on recent R&L activities. Each issue features program updates, project impacts, outreach activities, and research and library services. Past issues of the newsletter are available online at on.dot.wi.gov/wisdotresearch/news.htm.

Impact: Providing current information on WisDOT research activities promotes involvement in the research process from across the department and encourages use of research results. The “success stories” of staff experiences with R&L services help raise awareness and demonstrate the services’ value to customers.

Wisconsin TRB Guide

The Wisconsin Guide to the Transportation Research Board (TRB) Annual Meeting highlights the contributions of WisDOT staff and Wisconsin university researchers who authored technical papers and served as presenters and session leaders. TRB committee and panel members are also listed.

Impact: The annual TRB Guide showcases the breadth and depth of Wisconsin transportation research for state, national and international audiences. The guide helps staff attendees find Wisconsin sessions easily and facilitates dialogue among WisDOT, academic and private-sector transportation professionals about the state’s growing research expertise. At the January 2011 meeting, more than 80 representatives of Wisconsin institutions made presentations on their latest transportation research findings. See the guide at <http://on.dot.wi.gov/wisdotresearch/database/reports/trbguide2011.pdf>.



Making the Most of the TRB Annual Meeting

The R&L Unit works with department staff to make sure that WisDOT gets the most out of the TRB Annual Meeting. To prepare for each annual meeting, R&L Unit staff coordinates session attendance among WisDOT representatives. R&L Unit staff supplement other department participation by attending high-value sessions at WisDOT managers’ request and bringing back information for the department. After the meeting, key takeaways are summarized based on forms completed by WisDOT staff attending the sessions.

Impact: An annual report documents the participation of WisDOT representatives attending sessions covering a wide range of subject areas. The report, available to all WisDOT staff on the department’s intranet site, captures the technology transfer that will put information and technology into practice and contribute to quality improvements at WisDOT.

WHRP E-Newsletter

The quarterly WHRP E-News features articles on recently completed research, implementation of completed projects and an update on current project status. The newsletter also highlights the regional and national activities of WHRP and its representatives, including participation in pooled fund studies, advisory groups and conferences.

Impact: The e-newsletter provides information about WHRP’s research and outreach activities to a wide audience, including WisDOT staff, university and private-sector investigators, contractors, consultants and policymakers. The projects and initiatives described in the newsletter underscore the value of WisDOT’s investment in WHRP. Recent issues have kept readers informed about TRB publications related to WHRP research, proposed projects for FFY 2011, and how WHRP research results are applied by WisDOT Technology Teams. WHRP E-News is available at www.whrpnews.org.

Literature Searches

R&L staff prepares literature searches on topics requested by WisDOT managers and technical staff. These targeted keyword searches identify a representative bibliography of studies available on the requested topics. The R&L Unit produced 22 literature searches in FFY 2010.

Impact: WisDOT staff uses literature searches to scope research proposals and work plans, avoid duplicating research, and identify investigators and organizations with specialized expertise in a subject area. Each citation includes the title, author, date and source for obtaining the full document online, in the WisDOT Library or through interlibrary loan.

Transportation Synthesis Reports

Transportation Synthesis Reports (TSRs) are annotated, quick-response reports requested by WisDOT technical staff and managers from every business area of the department. Based on Internet, library and telephone research, TSRs provide pertinent research and practices compiled and organized in a concise, readable format. In FFY 2010, the R&L Unit produced 23 TSRs, 12 of which are available at on.dot.wi.gov/wisdotresearch/comptsr.htm, along with many TSRs from previous years.

Business Management	<ul style="list-style-type: none"> • Knowledge Management in the Transportation Sector
Concrete	<ul style="list-style-type: none"> • Concrete Pavement Rubblization: A Survey of State Practice and Related Research • Concrete Bridge Approach Pavements: A Survey of State Practices
Policy	<ul style="list-style-type: none"> • Limited English Proficiency in Wisconsin
Roadways	<ul style="list-style-type: none"> • Sound-Absorbing Retaining Walls • Material Spreader Use in Winter Maintenance Operations: A Survey of State Practice • LiDAR Applications for Transportation Agencies • Road Weather Information System Training Programs: A Survey of Current Practice • Expansion Joints in Concrete Barriers
Safety and Mobility	<ul style="list-style-type: none"> • State Requirements for Licensing of Ambulance Drivers • HAWK Pedestrian Signals: A Survey of National Guidance, State Practice, & Related Research
Structures	<ul style="list-style-type: none"> • Effect of Heat Straightening on Girders Subjected to Multiple Repairs

Impact: TSRs allow WisDOT staff to learn from the experiences of other state DOTs, avoid duplicating research, identify new technologies and practices that save time or money or enhance safety, make better investment decisions, and monitor federal guidelines and key transportation trends. In the 2010 R&L survey of TSR customers:

- Ninety-one percent of respondents indicated “they would not have had the time or resources to conduct the research themselves.”
- Ninety-one percent of respondents indicated that they had “applied or anticipated applying information in the TSR to improve processes, make decisions, implement technology or make other changes.”

- All respondents rated the TSRs a 4 or 5 (5 = extremely well) on how well they met information needs.

Peer Exchanges

Peer exchanges are available to the entire department to help managers make decisions related to current challenges and priority projects. These two- to four-day conferences held in Madison and hosted by WisDOT bring together WisDOT staff, peers from five to seven other states and FHWA to examine key transportation topics with the use of presentations and round-table discussions. The R&L Unit hosted two peer exchanges in 2010 on the topics of privacy and the management of real estate programs.

The exchange was extremely worthwhile and very well organized.”

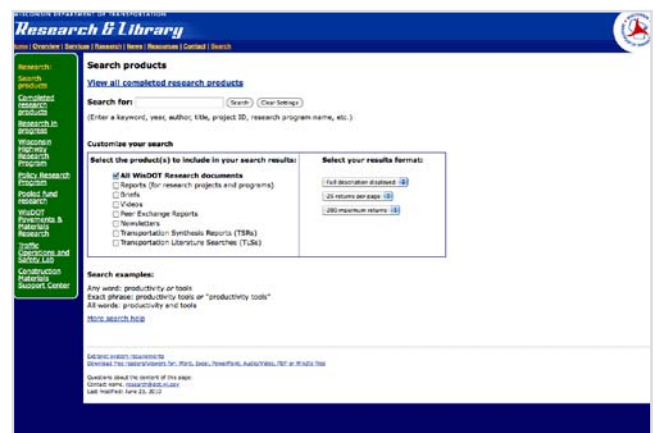
Ken Wickham,
WisDOT North Central Region

Impact: Peer exchanges provide an opportunity for WisDOT staff to learn about the experiences of other states, federal agencies and academic institutions to identify best practices that will advance WisDOT’s mission. The R&L Unit provides planning and logistical support, travel expenses and reporting services. Planning takes about four months, and the exchanges can happen any time of year. Reports for WisDOT’s peer exchanges are available at on.dot.wi.gov/wisdotresearch/comppeerexchanges.htm.

WisDOT Web Site

WisDOT’s searchable Web site provides access for department employees, other stakeholders and the public to all completed and in-progress research projects, and all technology transfer products such as research briefs, literature searches, TSRs, newsletters and videos.

Impact: By distributing research results electronically through the department’s Web site, research results are broadly available to those who can benefit—both staff within WisDOT and other researchers pursuing related topics. In 2010, the R&L Unit’s Web pages recorded more than 70,000 site visits. Eighty-one percent of these visits were to the site’s searchable database of research-related materials, with final research reports and TSRs the most popular types of materials accessed. Search WisDOT’s research products at on.dot.wi.gov/wisdotresearch/search.htm.



Physical and Virtual Reference and Research Services

WisDOT’s iCommons vision encourages knowledge transfer through the use of both physical and virtual collaborative spaces. True to this vision, the WisDOT Library provides reference and research services at a physical information desk and through the WisDOT Library and Information Commons, a virtual reference service that resides on the department’s intranet.

Impact: The WisDOT Library’s reference and research services help department staff make informed decisions and save time in their daily work. For WisDOT staff interested in learning on their own, more than 40 pages on the department’s intranet site provide access to finding aids and other resources. A series of one-page finding aids are a print companion to these online resources and help library users retrieve full-text articles from online databases, use custom library search engines, and learn how to access standards and specifications.

National Partners in Transportation Research

Working in concert with three national transportation organizations—the U.S. Department of Transportation, the American Association of State Highway and Transportation Officials and the Transportation Research Board—WisDOT’s Research Program reaps the benefits of independent and collaborative research efforts that seek to address the shared research needs of the transportation community.



U.S. Department of Transportation

Of the three national transportation organizations most critically involved in research, only the U.S. DOT is a government entity. Funding for Wisconsin research comes largely from the U.S. DOT. WisDOT in turn helps support two nonprofit organizations—AASHTO and TRB—that, with the U.S. DOT, state DOTs and other stakeholders, identify needed research and carry it out.

Research is a vital part of each of the U.S. DOT’s nine major administrations. A few of the research efforts of two of these administrations—FHWA and the Research and Innovative Technology Administration (RITA)—are highlighted below.

FHWA is a primary partner with WisDOT in carrying out research, and provides major funding for research efforts through the State Planning and Research program. The R&L Unit works closely with FHWA–Wisconsin Division in the administration of the research program. In addition, individual FHWA staff members contribute their expertise as members of policy and project oversight committees and other research work groups. Nationally, expert FHWA staff members work on advanced highway technologies in more than 40 different laboratories and testing facilities at the Turner-Fairbank Highway Research Center in McLean, Va., and other locations.

RITA’s mission—to identify and facilitate solutions to the challenges and opportunities facing America’s transportation system—is accomplished with a focus on promoting transportation research that will foster the use of innovative technology. Among the programs and initiatives managed by RITA are the National Transportation Library and the University Transportation Centers (UTC) program.

The UTC program, initiated in 1987, establishes centers of excellence at universities across the country to advance technology and expertise across a wide range of transportation issues. The R&L Unit partners with a UTC established at UW–Madison in 2007—the National Center for Freight and Infrastructure Research and Education—on policy research projects related to freight, infrastructure and traffic operations. WisDOT is also a member of the advisory council of NEXTRANS, a UTC based at Purdue University that is working to identify integrated solutions for mobility, safety and infrastructure renewal.

American Association of State Highway and Transportation Officials

AASHTO is a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia and Puerto Rico. It represents all five transportation modes: air, highways, public transportation, rail and water. Its primary goal is to foster the development, operation and maintenance of an integrated national transportation system.

The association is frequently called upon by Congress to conduct surveys, provide data and testify on transportation legislation. Through AASHTO's policy development activities, member departments often address federal programs and provide guidance.

WisDOT benefits from the many programs, services and products of AASHTO, such as the Center for Environmental Excellence, the Materials Reference Laboratory, the Product Evaluation Program, AASHTOWare software products and its many published standards, specifications, manuals and guidelines. The R&L Unit relies on information generated by AASHTO in preparation of literature searches, synthesis reports and other support provided to WisDOT staff.

Much of AASHTO's work is done by committees composed exclusively of staff from member DOTs who serve voluntarily. **AASHTO's standing committees** cover 11 key areas—aviation, the environment, finance and administration, highway traffic safety, highways, performance management, planning, public transportation, rail transportation, research, and water transportation. Subcommittees undertake targeted efforts on such broad-ranging topics as information systems, right of way and utilities, and traffic engineering. Through membership on AASHTO's standing committees and subcommittees, WisDOT has the opportunity to help shape the national research agenda.

The interrelationship of the national transportation organizations is most visible in the collaboration of AASHTO's committees with research programs sponsored by TRB. Members of **AASHTO's Standing Committee on Research (SCOR)** solicit research problem statements from the state DOTs and other AASHTO committees, prioritize them and recommend an annual research program to the AASHTO Board of Directors. This research is then carried out under the direction of TRB through its National Cooperative Highway Research Program. SCOR also works with other AASHTO committees to define research emphasis areas, recommend appropriate funding levels and advocate for highway and other transportation research on behalf of the association and member departments. Other AASHTO standing committees may request quick-response research to assist in meeting committee responsibilities.

The **Research Advisory Committee (RAC)** to SCOR is composed of one or more representatives from each of the state DOT research programs. The RCSS Chief is WisDOT's primary representative. RAC participates in selecting the projects to be undertaken each year by NCHRP, facilitates the identification of ongoing and planned state-only projects, and provides advice on transportation research matters to SCOR and the AASHTO Executive Committee.

AASHTO Standing Committees

Aviation

Environment

Finance and Administration

Highway Traffic Safety

Highways

Performance Management

Planning

Public Transportation

Rail Transportation

Research

Water Transportation



Keck Center of the National Academies

Transportation Research Board

TRB is one of six major divisions of the National Research Council—a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The National Research Council is jointly administered by the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine. TRB's mission is to promote innovation and progress in transportation by stimulating and conducting research, facilitating the dissemination of information, and encouraging the implementation of research results.

Every business area of WisDOT benefits from TRB's multimillion-dollar annual research program, with many of the research projects arising from AASHTO committee requests. The continuous stream of research products generated from TRB programs offer immediate and usable solutions to transportation practitioners.

TRB funds its operations with dues paid by state DOTs and funding from FHWA and other sources. In the second of two annual TRB funding commitments, WisDOT joins with other states to cooperatively fund one TRB research program—the **National Cooperative Highway Research Program**—at a level of approximately \$40 million per year. NCHRP is an applied research program focused on operational problems of transportation engineers and administrators, covering a broad range of highway-related research areas. WisDOT has an opportunity to guide project selection and oversee individual projects by serving on NCHRP project panels.

TRB manages or sponsors other **cooperative research programs** that address transit, air, freight and hazardous materials. TRB's **synthesis programs** employ technical panels composed of state DOT and other experts to advise consultants in preparing reports of current knowledge and practices. Focused on the needs of practitioners as well as researchers, these compact, user-friendly reports assemble and organize relevant information, practices and research for problems related to highways, airports and transit. Other research supported by TRB includes programs that investigate promising but sometimes unproven innovations for all transportation modes, and quick-response research for AASHTO standing committees.

More than 200 **TRB standing committees and task forces** address all aspects and modes of transportation. With almost 4,000 members drawn from state DOTs, academia and the private sector, all serving in a voluntary capacity, these committees are tasked with identifying research needs, reviewing papers for presentation at the TRB Annual Meeting and for publication, encouraging the implementation of research findings, and developing programs, conferences and workshops.

Standing committees and task forces are organized into 11 groups. Almost 150 of the more than 200 committees are convened under six of the groups—policy and organization, systems planning and environment, design and construction, operations and maintenance, system users, and legal resources. These committees address functional aspects of transportation, with a focus on highways. The remaining five groups concentrate on specific transportation modes—public transportation, freight, rail, aviation and marine.

Research Funding Opportunities

The R&L Unit alerts department staff throughout the year to research funding opportunities beyond those offered through WisDOT programs. Contact the unit for help in proposing research ideas for national programs, many of which are listed below with the approximate time for submitting problem statements. Detailed information about these and other national programs is available at www.trb.org/ResearchFunding/Public/ResearchFunding.aspx.

Deadlines for Proposal Submission

National Research Programs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
National Cooperative Highway Research Program – Synthesis		*										
Innovations Deserving Exploratory Analysis			*						*		*	
Transit Cooperative Research Program – Synthesis			*									
Surface Transportation Environment and Planning Cooperative Research Program			*								*	
Commercial Truck and Bus Safety Program – Synthesis					*							
Airport Cooperative Research Program				*						*		
Transit Cooperative Research Program						*						
Exploratory Advanced Research Program						*						
National Cooperative Freight Research Program							*					
National Cooperative Highway Research Program									*			
Airport Cooperative Research Program – Synthesis										*		
National Cooperative Highway Research Program – Domestic Scans											*	
Hazardous Materials Cooperative Research Program	*	*	*	*	*	*	*	*	*	*	*	*

WisDOT
RESEARCH
· **PROGRAM** ·

2010

PROJECT REFERENCE GUIDE



Wisconsin Department of Transportation
research@dot.wi.gov

Active Pooled Fund Research Projects During FFY 2010

Research Category	Project ID	PROJECT TITLE	WisDOT Pledge thru 2010	WisDOT Contact
Asphalt	TPF-5(021)	Base Funding for the North Central Superpave Center	\$240,000	Tom Brokaw
Asphalt	TPF-5(132)	Investigation of Low Temperature Cracking in Asphalt Pavements – Phase II (MnROAD Study)	\$60,000	Leonard Makowski
Asphalt	TPF-5(153)	Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements (MnROAD Study)	\$15,000	Tom Brokaw
Asphalt	TPF-5(178)	Implementation of the Asphalt Mixture Performance Tester for Superpave Validation	\$105,000	Tom Brokaw
Asphalt	TPF-5(213)	Performance of Recycled Asphalt Shingles in Hot Mix Asphalt	\$42,500	Judith Ryan
Asphalt	TPF-5(229)	Characterization of Drainage Layer Properties for MEPDG	\$30,000	Laura Fenley
Concrete	TPF-5(117)	Development of Performance Properties of Ternary Mixes	\$60,000	James Parry
Concrete	TPF-5(139)	PCC Surface Characteristics: Tire-Pavement Noise Part 3 – Innovative Solutions and Current Practices	\$45,000	James Parry
Concrete	TPF-5(150)	Extending the Season for Concrete Construction and Repair – Phase III	\$20,000	James Parry
Concrete	TPF-5(159)	Technology Transfer Concrete Consortium	\$15,000	James Parry
Concrete	TPF-5(174)	Construction of Crack-Free Bridge Decks – Phase II	\$25,000	Laura Shadewald
Concrete	TPF-5(179)	Evaluation of Test Methods for Permeability and Development of Performance Guidelines for Durability	\$30,000	James Parry
Concrete	TPF-5(183)	Improving the Foundation Layers for Concrete Pavements	\$35,000	Jeff Horsfall
Concrete	TPF-5(188)	Evaluation of Fiber Reinforced Composite Dowel Bars and Stainless Steel Dowel Bars	\$10,800	Barry Paye
Concrete	TPF-5(205)	Implementation of Pavement Mixture Design and Analysis Track of Concrete Pavement Road Map	\$20,000	James Parry
Concrete	TPF-5(224)	Investigation of Jointed Plain Concrete Pavement Deterioration at Joints and the Potential Contribution of Deicing Chemicals	\$15,000	James Parry
Environment	TPF-5(170)	Mobile Source Air Toxics (MSAT) From Major Highways	\$35,000	Patricia Trainer
Environment	TPF-5(186)	Updating U.S. Precipitation Frequency Estimates for Michigan and Wisconsin	\$113,436	Najoua Ksontini
Environment	TPF-5(199)	Recycled Materials Resource Center	\$60,000	Ken Nwankwo
Geotechnics	SPR-3(072)	Strength and Deformation Analysis of Mechanically Stabilized Earth Walls at Working Loads	\$10,000	Jeff Horsfall
Geotechnics	TPF-5(001)	Soil Mixing Methods for Highway Application	\$60,000	Robert Arndorfer
Geotechnics	TPF-5(128)	Accelerated Implementation of Intelligent Compaction Technology	\$50,000	Robert Arndorfer
Geotechnics	TPF-5(129)	Recycled Unbound Pavement Materials (MnROAD Study)	\$60,000	Tom Brokaw
Geotechnics	TPF-5(177)	Improving Resilient Modulus Test Procedures for Unbound Materials	\$40,000	Tom Brokaw
Operations	SPR-2(207)	Transportation Management Center Pooled Fund Study	\$195,000	Chris Quesnell
Operations	SPR-3(042)	Aurora	\$125,000	Mike Adams
Operations	TPF-5(063)	Improving the Quality of Pavement Profiler Measurement	\$95,000	Bill Duckert
Operations	TPF-5(065)	Traffic Control Device Consortium	\$175,000	Tom Notbohm
Operations	TPF-5(081)	Smart Work Zone Deployment Initiative	\$492,780	Tom Notbohm
Operations	TPF-5(092)	Clear Roads (Test and Evaluation of Materials, Equipment and Methods for Winter Highway Maintenance)	\$150,000	Mike Sproul

Active Pooled Fund Research Projects During FFY 2010 *(continued)*

Research Category	Project ID	PROJECT TITLE	WisDOT Pledge thru 2009	WisDOT Contact
Operations	TPF-5(120)	Deer Vehicle Crash Information and Research Center	\$50,000	Jim Merriman
Operations	TPF-5(176)	Traffic Analysis and Simulation	\$100,000	John Shaw
Operations	TPF-5(190)	Northwest Passage – Phase III	\$25,000	Bob Frey
Operations	TPF-5(218)	Clear Roads Winter Highway Operations Pooled Fund (continued from TPF-5(092))	\$25,000	Mike Sproul
Operations	TPF-5(225)	Validation and Implementation of Hot-Poured Crack Sealant	\$25,000	Paulette Hanna
Policy	TPF-5(036)	Transportation Asset Management Research Program	\$1,160,000	Daniel Yeh
Policy	TPF-5(105)	Transportation Library Connectivity	\$250,000	John Cherney
Policy	TPF-5(161)	Transportation Security and Emergency Preparedness Professional Capacity Building	\$100,000	Paul Keltner
Policy	TPF-5(215)	Transportation Engineering and Road Research Alliance	\$20,000	Steve Krebs
Safety	TPF-5(099)	Evaluation of Low Cost Safety Improvements	\$10,000	John Bridwell
Safety	TPF-5(172)	An Analytical Review of Child Mobility Assessments for School Site Programs	\$10,000	Renee Callaway
Safety	TPF-5(193)	Midwest States Pooled Fund Crash Test Program	\$823,470	Erik Emerson
Structures	TPF-5(005)	FHWA Curved Steel Bridge Test	\$30,000	Scot Becker
Structures	TPF-5(068)	Long-Term Maintenance of Bridge Load Resistance Factor Design Specifications	\$100,000	Scot Becker
Structures	TPF-5(106)	Guidelines for Designing Bridge Piers and Abutments for Vehicle Collisions	\$50,000	Scot Becker
Structures	TPF-5(110)	Validation of Numerical Modeling and Analysis of Steel Bridge Towers Subjected to Blast Loadings	\$45,000	Scot Becker
Structures	TPF-5(116)	Investigation of the Fatigue Life of Steel Base Plate to Pole Connections for Traffic Structures	\$50,000	Kent Bahler
Structures	TPF-5(131)	Underwater Inspection of Bridge Substructures Using Underwater Imaging Technology	\$40,000	Dave Babler
Structures	TPF-5(148)	The Effects of Implements of Husbandry "Farm Equipment" on Pavement Performance (MnROAD Study)	\$5,000	Laura Fenley
Structures	TPF-5(164)	Fish Passage in Large Culverts with Low Flows	\$15,000	Rodney Taylor
Structures	TPF-5(169)	Investigation of Curved Girder Bridges with Integral Abutments	\$7,500	Dave Kiebusch
Structures	TPF-5(189)	Enhancement of Welded Steel Bridge Girders Susceptible to Distortion-Induced Fatigue	\$30,000	Craig Wehrle
Structures	TPF-5(202)	HY-8 Culvert Analysis Program – Phase Three of Development Efforts	\$10,000	Rodney Taylor
Structures	TPF-5(210)	In-Situ Scour Testing Device	\$15,000	Najoua Ksontini

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WisDOT RESEARCH · PROGRAM ·

2010 PROJECT REFERENCE GUIDE

New Project Awards for FFY 2011

Program	Research Category	Project ID	WISCONSIN PROJECTS	FFY 2011 Award	WisDOT Contact
WHRP	Asphalt	0092-11-01	Investigation and Development of a Non-Destructive System to Evaluate Wisconsin Asphalt Pavement Compaction Efforts and Properties	\$120,000	Judith Ryan
WHRP	Asphalt	0092-11-02	Base Compaction Specification Feasibility Analysis	\$92,000	Judith Ryan
WHRP	Concrete	0092-11-05	Laboratory Study of High Performance Curing Compounds for Concrete Pavement	\$102,000	Barry Paye
WHRP	Concrete	0092-11-06	Field Study of Air Content Stability in the Slip Form Paving Process	\$80,000	Barry Paye
WHRP	Geotechnics	0092-08-11	Effective Depth of Soil Compaction in Relation to Applied Compactive Energy	\$49,000	Robert Arndorfer
WHRP	Geotechnics	0092-11-03	Evaluating the Methodology and Performance of Jetting and Flooding Granular Backfill Materials	\$74,000	Jeff Horsfall
WHRP	Geotechnics	0092-11-04	Analysis of Trends/Correlations of Historical WisDOT Soil Lab Test Results Through Development of an Electronic Database	\$64,000	Jeff Horsfall
WHRP	Structures	0092-11-07	Aesthetic Coatings for Bridge Components	\$120,000	Travis McDaniel
WHRP	Structures	0092-11-08	Repair and Strengthening of Bridge Substructures	\$77,000	Travis McDaniel
TOTAL				\$778,000	

For project details and quarterly reports, see on.dot.wi.gov/wisdotresearch/index.htm or www.whrp.org.

NOTE: Table shows awards for new research projects only, not for all research activities. Additional awards may be made during the year.

Research Category	Project ID	POOLED FUND PROJECTS	FFY 2011 Award	WisDOT Contact
Asphalt	TPF-5(021)	Base Funding for the North Central Superpave Center	\$25,000	Tom Brokaw
Asphalt	TPF-5(132)	Investigation of Low Temperature Cracking in Asphalt Pavements – Phase II (MnROAD Study)	\$20,000	Leonard Makowski
Asphalt	TPF-5(153)	Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements (MnROAD Study)	\$15,000	Tom Brokaw
Asphalt	TPF-5(213)	Performance of Recycled Asphalt Shingles in Hot Mix Asphalt	\$42,500	Judith Ryan
Asphalt	TPF-5(229)	Characterization of Drainage Layer Properties for MEPDG	\$30,000	Laura Fenley
Concrete	TPF-5(117)	Development of Performance Properties of Ternary Mixes	\$15,000	James Parry
Concrete	TPF-5(159)	Technology Transfer Concrete Consortium	\$5,000	James Parry
Concrete	TPF-5(179)	Evaluation of Test Methods for Permeability and Development of Performance Guidelines for Durability	\$15,000	James Parry
Concrete	TPF-5(183)	Improving the Foundation Layers for Concrete Pavements	\$35,000	Jeff Horsfall
Concrete	TPF-5(205)	Implementation of Pavement Mixture Design and Analysis Track of Concrete Pavement Road Map	\$10,000	James Parry

New Project Awards for FFY 2011

Research Category	Project ID	POOLED FUND PROJECTS <i>(continued)</i>	FFY 2011 Award	WisDOT Contact
Concrete	TPF-5(224)	Investigation of Jointed Plain Concrete Pavement Deterioration at Joints and the Potential Contribution of Deicing Chemicals	\$15,000	James Parry
Concrete	TPF-5(225)	Validation and Implementation of Hot-Poured Crack Sealant	\$25,000	Paulette Hanna
Environment	TPF-5(170)	Mobile Source Air Toxics (MSAT) From Major Highways	\$35,000	Patricia Trainer
Environment	TPF-5(199)	Recycled Materials Resource Center	\$30,000	Ken Nwankwo
Geotechnics	TPF-5(128)	Accelerated Implementation of Intelligent Compaction Technology	\$25,000	Robert Arndorfer
Geotechnics	TPF-5(129)	Recycled Unbound Pavement Materials (MnROAD Study)	\$15,000	Tom Brokaw
Geotechnics	TPF-5(227)	Continued Advancements in Load and Resistance Factor Design (LRFD) for Foundations, Substructures and Other Geotechnical Features	\$20,000	Jeff Horsfall
Operations	1260	Traffic and Data Preparation for AASHTO MEPDG Analysis and Design	\$16,667	Laura Fenley
Operations	SPR-2(207)	Transportation Management Center Pooled Fund Study	\$50,000	Chris Quesnell
Operations	SPR-3(042)	Aurora	\$25,000	Mike Adams
Operations	TPF-5(063)	Improving the Quality of Pavement Profiler Measurement	\$15,000	Bill Duckert
Operations	TPF-5(065)	Traffic Control Device Consortium	\$20,000	Tom Notbohm
Operations	TPF-5(081)	Smart Work Zone Deployment Initiative	\$40,000	Tom Notbohm
Operations	TPF-5(176)	Traffic Analysis and Simulation	\$50,000	John Shaw
Operations	TPF-5(218)	Clear Roads Winter Highway Operations Pooled Fund (continued from TPF-5(092))	\$25,000	Mike Sproul
Operations	TPF-5(233)	Technology Transfer Intelligent Compaction Consortium (TTICC)	\$9,000	Judith Ryan
Policy	TPF-5(237)	Transportation Library Connectivity and Development	\$12,000	John Cherney
Safety	1221	Support of the Motorcycle Crash Causation Study	\$15,000	Greg Patzer
Safety	TPF-5(099)	Evaluation of Low Cost Safety Improvements	\$5,000	John Bridwell
Safety	TPF-5(172)	An Analytical Review of Child Mobility Assessments for School Site Programs	\$10,000	Renee Callaway
Safety	TPF-5(193)	Midwest States Pooled Fund Crash Test Program	\$66,000	Erik Emerson
Structures	TPF-5(238)	Design and Fabrication Standards to Eliminate Fracture Critical Concerns in Two Girder Bridge Systems	\$20,000	Scot Becker
Structures	TPF-5(164)	Fish Passage in Large Culverts with Low Flows	\$15,000	Rodney Taylor
Structures	TPF-5(169)	Investigation of Curved Girder Bridges with Integral Abutments	\$7,500	Dave Kiebusch
Structures	TPF-5(189)	Enhancement of Welded Steel Bridge Girders Susceptible to Distortion-Induced Fatigue	\$15,000	Craig Wehrle
Structures	TPF-5(202)	HY-8 Culvert Analysis Program – Phase Three of Development Efforts	\$5,000	Rodney Taylor
Structures	TPF-5(210)	In-Situ Scour Testing Device	\$15,000	Najoua Ksontini
Structures	TPF-5(219)	Structural Health Monitoring System	\$30,000	Scot Becker
Structures	TPF-5(232)	Study of the Impacts of Implements of Husbandry on Bridges	\$15,000	Travis McDaniel
TOTAL			\$858,667	

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