

TERRA E-News

TERRA E-News is a quarterly electronic newsletter of the Transportation Engineering and Road Research Alliance. TERRA E-News brings you the latest research on pavement, materials, and related transportation engineering challenges, including issues related to cold climates.

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Welcome to TERRA E-News

This periodic electronic newsletter has been created by the Transportation Engineering and Road Research Alliance (TERRA) to share information about research, publications, and events with the members of TERRA and others interested in transportation research.

TERRA is a research governance structure formed in 2004 to foster a comprehensive road research program. Headquartered in Minnesota, TERRA brings together government, industry, and academia in a dynamic partnership to advance innovations in road engineering and construction. TERRA's partnering efforts reach beyond Minnesota to include transportation organizations in other states and in Europe.

To learn more about TERRA and its member organizations, visit www.terraroadalliance.org, where you can also [subscribe](#) to TERRA publications and read about the latest pavement research.

Member News

Member Profile: Michigan Department of Transportation

For the [Michigan Department of Transportation \(MDOT\)](#), the opportunity to build connections with the research community is a key benefit of TERRA membership. The state that constructed the first mile of concrete highway in 1909 sees definite advantages to working with other agencies and industry groups.

"We see TERRA as a catalyst for involvement with researchers—both within our state and on the national and international levels," said André Clover, administrative engineer in MDOT's Office of Research and National Best Practices. "Our office is a fairly new addition to the Michigan DOT, and TERRA's collaborative goals fit in well with our strategic plan."

The primary role of the Office of Research and National Best Practices (ORNBP) is to serve as a clearinghouse within MDOT for all transportation-related organizations with specific interests in research, Clover explained. In addition, the office administers MDOT's SPR-II research program and is responsible for gathering information on best practices related to all modes of transportation. The ORNBP's goal, said Clover, is to "re-ignite partnering and resource-sharing activities between MDOT and transportation stakeholders, in order to move Michigan further ahead in transportation research."

MDOT's involvement in TERRA was spurred by the interest and support of Larry Tibbits, the department's chief operations officer, and by the mission of the ORNBP. As a new member of TERRA, MDOT is interested in building connections with other state departments of transportation in the Midwest, as well as with other transportation stakeholders. The department's priorities include sharing ideas and pooling resources—particularly in the areas of public-private partnerships and pooled-fund research projects.

Among MDOT's materials-related research interests related to the state's 120,000 miles of paved roads are anti-icing, damage due to man-made and environmental factors, measurement and documentation of the physical properties of natural aggregates, and materials-related distress in portland cement concrete. Michigan recently joined the two pooled-fund research projects: TPF-5(129), a TERRA project

studying the performance of recycled unbound materials in granular base layers, and [TPF-5\(126\)](#) evaluating geocomposite capillary barrier drain systems for limiting moisture changes in pavements.

Projects and Initiatives

TERRA pooled-fund research funding nearly complete

TERRA's research program is built on the principle of collaboration to meet research needs. Research projects and initiatives administered by TERRA involve collaborations among agency, industry, and academic partners, including a series of pooled-fund projects initiated through the [Federal Highway Administration's Transportation Pooled Fund Program](#).

TERRA has proposed a number of pooled-fund projects using the MnROAD facility, involving approximately \$3.8 million, 15 states, the federal government, the Minnesota Local Road Research Board (LRRB), and private industry. Projects range from such topics as low-temperature cracking to recycled unbound materials and composite pavements.

"TERRA made a decision to develop pooled-fund proposals as one way to meet their research goals," said Keith Shannon, director of the Minnesota Department of Transportation's Office of Materials. "The Transportation Pooled Fund Program enables stakeholders to leverage their resources by working together on topics that have widespread interest."

Those goals are summed up in the priority research and implementation directions developed by the TERRA research committee, which include: develop and calibrate for both new and rehabilitated pavements (a design guide); develop technologies for bound and unbound materials (innovative construction); improve techniques to maintain our current pavement investments (preventive maintenance); use effectively throughout the pavement structure, including the use of taconite aggregates (recycled materials); develop and refine techniques for seasonal material classification/performance (rehabilitation); develop techniques for smooth, quiet, durable, and skid-resistant pavements (surface characteristics); and continue to support research in intelligent transportation systems (ITS), environmental issues, and other areas (non-pavement research).

To date, eight pooled-fund projects have been fully funded, with two others close to full funding. Final federal approval for these pooled-fund research projects is pending. Current pooled-fund research projects are listed below, with funding amounts and partners indicated:

Recycled Unbound Pavement Materials

Total funds: \$450,000

Status: fully funded

Partners: California, Michigan, Minnesota, Ohio, Texas, Wisconsin

PCC Surface Characteristics—Rehabilitation

Total funds: \$348,000

Status: fully funded

Partners: Minnesota, Texas, Industry In-Kind

Design and Construction Guidelines for Thermally Insulated Concrete Pavements

Total funds: \$455,000

Status: fully funded

Partners: California, Minnesota, Washington, Minnesota Local Road Research Board (LRRB), Federal Highway Administration (FHWA)

The Effects of Implements of Husbandry "Farm Equipment" on Pavement Performance

Total funds: \$433,000

Status: fully funded

Partners: Iowa, Illinois, Minnesota, Minnesota Local Road Research Board (LRRB), Professional Nutrient Applicators Association of Wisconsin

Optimal Timing for Preventive Maintenance for Addressing Environmental Aging in HMA Pavements

Total funds: \$410,000

Status: fully funded

Partners: Maryland, Minnesota, Ohio, Texas, Minnesota Local Road Research Board (LRRB)

Investigation of Low Temperature Cracking in Asphalt Pavements—Phase II

Total funds: \$400,000

Status: fully funded

Partners: Connecticut, Minnesota, New York, Wisconsin, Minnesota Local Road Research Board (LRRB)

Analysis of MnROAD Whitetopping Performance Data for a Module in the Design Guide

Total funds: \$360,000

Status: fully funded

Partners: Minnesota, Missouri, Mississippi, Pennsylvania, Texas, New York

HMA Surface Characteristics Related to Ride, Texture, Friction, Noise, Durability

Total funds: \$255,000

Status: fully funded

Partners: Minnesota, Washington, Minnesota Local Road Research Board (LRRB), Federal Highway Administration (FHWA)

PCC Surface Characteristics—Construction

Total funds: \$240,000
Status: partially funded
Partners: Minnesota, Texas

Recycled Asphalt Pavements

Total funds: \$325,000
Status: partially funded
Partners: Minnesota, Mississippi, Minnesota Local Road Research Board (LRRB)

MnROAD reconstruction set to begin in 2007

The [Minnesota Road Research Project](#), or MnROAD, was designed in the mid-1980s by the [Minnesota Department of Transportation \(MnDOT\)](#) as a test facility where extensive pavement and materials engineering research could be conducted over a long period of time under real traffic and environmental conditions.

Completed in 1994 at a total cost of roughly \$25 million, MnROAD began operations as the most sophisticated independently operated pavement test facility of its type in the world. It is one of only a handful of research facilities where scientists and engineers can carry out long-term research on materials and construction techniques under real-world conditions, including many related to Minnesota's climate.

The MnROAD facility is a key element in [TERRA's comprehensive road research strategy](#). TERRA's primary strategic focus is to take advantage of the MnROAD test facility and associated resources.

The creation of TERRA in 2004 coincided with the beginning of MnROAD's second phase of operations and the substantial reconstruction and augmentation of the facility's extensive sensor network. The work is necessary to maintain and enhance existing research capabilities as well as to accommodate new research.

Coordinating reconstruction of the MnROAD facility to suit planned and potential research projects and project partners has been a complex process. TERRA has provided the leadership necessary to identify projects, develop partnerships, and find resources to move the reconstruction process ahead.

"We have funding secured for reconstruction based upon initial TERRA priorities. The funding is from a combination of federal, state, and TERRA partners," MnDOT Office of Materials road research manager Maureen Jensen said. "The details of the total research and reconstruction plan are being developed."

Several MnROAD research projects, involving approximately \$3.8 million, 15 states, the federal government, the Minnesota Local Road Research Board (LRRB), and private industry, stem from participation in the [Federal Highway Administration's Transportation Pooled Fund Program](#). Projects range from such topics as low-temperature cracking to recycled unbound materials and composite pavements. Federal approval for the pooled-fund research, however, is still pending.

According to Jensen, some privately funded construction on portions of MnROAD's Low-Volume Roadway (LVR) is scheduled for 2007, but the bulk of the MnROAD reconstruction will take place in 2008. "The remaining projects are in various states of development and will be built either in late 2007 or in 2008. The research plan for all of Phase II is being developed for review by TERRA and FHWA. It will include all the pooled funds, state and LRRB projects, and other industry or TERRA partner projects," she said.

Jensen, rounding out the benefits of conducting research at the MnROAD facility, also stressed TERRA's commitment to pavement research. "It's an evolving process," she said, "and there's always room for more partners and more projects."

Among scheduled LVR research projects, one involves a field study with loaded equipment at the MnROAD test facility to specifically address pavement damage due to agricultural equipment. In another LVR project, several thermally insulated concrete pavements (TICP) sections will be constructed at MnROAD and their performance will be compared with the performance of adjacent concrete and asphalt pavements.

A third LVR project will evaluate the physical properties of base materials stabilized with high-carbon fly ash in comparison to recycled pavement materials and crushed stone. Testing will include aggregate characterization, construction, field testing, and long-term monitoring of the test cells. Another project on the LVR involves constructing a cell to investigate the performance of a fine-aggregate stone matrix asphalt (SMA) mixture using a blend of only coarse and fine taconite tailing aggregates.

Finally, on a 3-mile concrete section of old westbound I-94 that runs parallel to the mainline section with "live" traffic at MnROAD, researchers will be investigating diamond grinding techniques used for rehabilitating portland cement concrete pavements to optimize quietness, ride, texture and friction. In addition, other surface rehabilitation techniques eventually will be tested in contiguous segments.

Announcements

TERRA launches website

TERRA launched its website, featuring information on the organization and its activities. The site provides detailed information about partnering with TERRA, according to Fred Corrigan, co-chair of the organization's board of directors. Corrigan said TERRA is actively seeking to expand its research activities through partnerships with pavement stakeholders in both the public and the private sectors.

Developed by the University of Minnesota's Center for Transportation Studies (CTS), the new website will

play a key role in communicating the results of TERRA research projects to a broad audience of pavement stakeholders. As new research results and projects are generated, they will appear on the site.

The TERRA website contains descriptions of TERRA-initiated research projects and links to a wide range of research activities carried out by member and partner organizations.

The website was featured in TERRA's exhibit at the national Research Advisory Committee of the American Association of State Highway and Transportation Officials (AASHTO) in July. CTS associate director Laurie McGinnis was among those representing TERRA who traveled to Columbus, Ohio, for the meeting.

Minnesota Pavement Conference

The 11th Annual Minnesota Pavement Conference is scheduled for February 15 in St. Paul, Minnesota.

This one-day conference provides practical information to practitioners and others in pavement design, construction, and maintenance. The conference is intended for city engineers, county engineers, public works officials, maintenance superintendents, design engineers, consulting engineers, and others interested in pavement issues. The emphasis of the conference is new materials and methods that can assist decision makers in providing the most cost-effective strategies for building, repairing, and maintaining Minnesota roads.

Presentations will include: 50 years of the interstate in the north central region by former University of Minnesota civil engineering researcher Gene Skok; hot button issues in pavement preservation by *Better Roads* magazine contributing editor Tom Kuennen; new innovations in recycling asphalt by ASTEC Industries CEO Don Brock; and an update on transportation issues facing the Minnesota legislature in 2007 by MnDOT's government affairs director Betsy Parker. Other speakers include: University of Minnesota's Pavement Research Institute director Mike Darter, University civil engineering associate professors Mihai Marasteanu and Lev Khazanovich, Iowa State geotechnical engineering assistant professor David White, field services engineer Bob Horan with SaLUT, Inc., and Braun Intertec's Cameron Kruse.

TERRA E-News is produced quarterly by the Center for Transportation Studies at the University of Minnesota.

Comments?

We would like to hear what you think of *TERRA E-News*. Please e-mail us at mpmccarthy@umn.edu.

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