

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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Member News

Member Profile: Aggregate and Ready Mix Association of Minnesota

Partnerships between the public sector and private industry are a cornerstone of TERRA's vision for the future of pavement research. Among industry stakeholders bringing their ideas to the table at TERRA are two leading concrete associations: the [Aggregate and Ready Mix Association of Minnesota \(ARM\)](#) and the national [RMC Research and Education Foundation](#), with which ARM of Minnesota has shared its second TERRA board seat.

Founded in 1950, the Aggregate and Ready Mix Association of Minnesota brings together aggregate suppliers and ready-mix concrete businesses statewide, supporting the needs of its members through education, technical resources, and participation in legislative and regulatory processes. ARM of Minnesota is represented on the TERRA board by executive director Fred Corrigan, who serves as TERRA's co-chair.

The RMC Research and Education Foundation was created in 1991 with the goal of improving the national concrete industry by combining the resources of industry leaders across the country. Today, the foundation has an ambitious national agenda focused on improving concrete materials and techniques. Julie Luther Garbini, the foundation's executive director, represents the organization on the TERRA Board.

The two organizations share many research priorities and challenges for the future, and work together on the TERRA board to help craft a research agenda that meets the needs of their industry.

"Ready-mix concrete today is not your father's concrete," Corrigan says. Techniques and materials are rapidly advancing in order to meet the needs of demanding new construction projects, making research a bigger priority today than in the past.

Garbini describes her organization's primary goals as enhancing and improving the industry through research and education, rather than advocacy. "We don't sell or promote concrete," she says. Instead, the foundation promotes information sharing and efficiency by helping members across the country avoid duplicating their efforts.

The pooled-fund research process, Garbini says, is especially attractive to a national industry organization because it helps promote buy-in from agencies and professionals in different jurisdictions and geographic locales. The result, she says, is broader applicability of research findings and products.

Among the TERRA research initiatives most keenly supported by the concrete industry is a new study of

pervious concrete. Pervious pavements allow storm water to pass through to the ground beneath, rather than running off. This relatively new construction technique offers the potential for important environmental benefits, but research is needed to make pervious concrete applicable in cold climates and other demanding settings.

Both organizations see increasing efficiency as one of the primary challenges facing the concrete industry in the coming years. "State transportation agencies are demanding greater efficiency, both in terms of speeding up the construction process and prolonging pavement life," Garbini says. By bringing together industry representatives, government agencies, and academic researchers, TERRA is well-positioned to help its members deliver on these expectations.

Other benefits of working with TERRA, Corrigan says, include building connections with state engineers and university researchers. "Two-way communication is important," he says, "because the give and take helps us identify new opportunities. We're seeing today that government and private industry need to work together in order to move forward."

Member Highlights

[TERRA board members](#) met with high-ranking Federal Highway Administration (FHWA) officials in January during the annual Transportation Research Board meeting in Washington, D.C., to provide an update on TERRA activities and to explore opportunities for collaboration on road research. We had the opportunity to describe the membership and activities of TERRA, with particular emphasis on the reconstruction plans for the MnROAD test facility, said TERRA co-chair Julie Skallman. We all agreed that it was a useful meeting and plan to meet again to expand on the conversations that we started.

[RMC Research and Education Foundation](#) announced the release of three pervious concrete studies. The reports were researched and prepared by the Stormwater Management Academy at the University of Central Florida and funded by the RMC Research and Education Foundation, the Florida State Department of Transportation, and Rinker Materials. Titles are: *Construction and Maintenance Assessment of Pervious Concrete*, *Hydraulic Performance Assessment of Pervious Concrete Pavements for Stormwater Management Credit*, and *Compressive Strength of Pervious Concrete Pavements*. The foundation also announced publication of the Spanish version of the [National Ready Mixed Concrete Association's \(NRMCA\) Concrete Delivery Professional \(CDP\) Program Study Guide](#), the second of two Spanish-language translations of popular NRMCA training materials. The first, the Spanish version of NRMCA's *Truck Mixer Driver's Manual*, was published in January. Copies of the Spanish *Concrete Delivery Program Study Guide* are available through the NRMCA.

University of Minnesota civil engineering associate professor [Mihai Marasteanu](#) was featured on a University radio segment about potholes. The 90-second feature is part of the free daily radio features service *U of M Moment*, which highlights University experts and is distributed to radio stations throughout Minnesota. Marasteanu said this past winter's abundance of freeze-thaw cycles is to blame for a pothole outbreak that some experts are calling the worst in years. [Listen](#).

Projects and Initiatives

TERRA is seeking project ideas

As another step toward providing a comprehensive program for research on pavement, materials, and related transportation engineering challenges, TERRA has initiated an annual process for collecting project ideas from partners and friends.

TERRA works closely with government, industry, and academia in a dynamic partnership to advance innovations in road engineering and construction. This new annual process is a mechanism for TERRA to gather project ideas from partners and friends. In addition, [TERRA Members](#), as a benefit of membership, may also offer ideas at quarterly board meetings or use the online project proposal form.

Each spring, the TERRA board and committees will initiate a review of the year's accumulated project ideas to facilitate opportunities for collaboration among those with similar interests, needs, and resources. Through its screening process, TERRA hopes to build project partnerships sufficiently funded through the combined resources of the participants to move important projects forward.

To share a project idea with the TERRA board, please complete the [TERRA Project Proposal Form](#) on the [TERRA Projects Web page](#) at any time during the year. The deadline for submitting project ideas for review this year is May 25 . For more information or assistance with submissions, please contact Stephanie Jackson at 612-624-8398 or sjackson@umn.edu.

TERRA launches Innovation Series

TERRA is launching a series of transportation engineering and road research events, held throughout the year, to communicate TERRA activities, innovations, and products through knowledge transfer, exchange, and demonstration. The TERRA Innovation Series will have a technical focus and will address research results, trends that affect or improve productivity, innovative partnering and contracting models, and hot topics that may lead to new research related to TERRA priorities.

TERRA members will identify topics for the Innovation Series events. The format of each event will vary, depending on the topic. Formats may include panel discussions with practitioners and contractors, research demonstrations, and interactive dialogue with a point-counterpoint approach. Three or four events, of two to four hours in length, will be held each year.

TERRA members, partners, and friends will be invited to attend each event, held in Minnesota and other

TERRA member's states. The events will be advertised on the TERRA website, in the TERRA E-News, and through electronic announcements.

The first TERRA Innovation Series event, planned for this summer, will highlight innovations used on the Minnesota Trunk Highway 36 rebuilding project.

TERRA cosponsors Minnesota Pavement Conference

TERRA, along with a number of other organizations, including [Minnesota Department of Transportation \(MnDOT\)](#), the [Minnesota Local Road Research Board \(LRRB\)](#), and University of Minnesota's [Pavement Research Institute \(PRI\)](#) and [Department of Civil Engineering](#), cosponsored the 11th Annual Minnesota Pavement Conference, held February 15, in St. Paul. Summaries of conference presentations about PRI, MnROAD, intelligent compaction, low-temperature cracking, and pavement preservation may be of interest to TERRA members, partners, and friends.

Pavement Research Institute

"Pavement engineering touches everybody's lives, whether they drive or not," said PRI director [Mike Darter](#) during the opening plenary session of the conference. He was one of several presenters.

Pavement conditions affect more than ride comfort and safety—they also influence economic development, timely movement of products, and public safety and defense, he said.

Darter shared some background about the institute and its plans for the future. "Our job is to grow pavement research," he said. The institute was established in 2003 by the University's Department of Civil Engineering and the Center for Transportation Studies (CTS), along with MnDOT and the Minnesota Local Road Research Board (LRRB).

"Budgets are far less than required to maintain the pavement network at current conditions," Darter said. "Improved design, materials, equipment, and construction are greatly needed to reverse the trend."

MnROAD update

In a later session, Ben Worel of MnDOT presented current benefits and future directions for the [MnROAD pavement research facility](#). Many findings from the first phase of MnROAD have been implemented, such as revised seasonal load limits, improved design methods, and improved construction. According to Worel, Minnesota is estimated to save \$33 million annually from these findings.

Phase 2 will include reconstruction of some of the facility's test sections and pooled-fund research under the umbrella of TERRA. A major goal for TERRA and MnROAD is to join in more pooled-fund projects. One current example is a \$665,000 contract for a study of low-temperature cracking in asphalt pavements that involves 12 partnering agencies. MnDOT is leading the project, which is intended to develop asphalt binder and mixture testing procedures that will ultimately lead to nationally accepted specifications.

Future MnROAD research, Worel said, will include studies of the effects of farm implements on roadways, full-depth reclamation, binder modification, and portland cement concrete grinding.

Intelligent compaction

Also at the conference, [David J. White](#), assistant professor of [civil engineering at Iowa State University](#), discussed his research in measuring soil compaction by monitoring the power needed to move a roller through soil. White has researched soil compaction with a focus on achieving uniformity of compaction in subgrade and base soils.

White said the component of machine power associated with increasing soil compaction can be isolated from the power needed to overcome gravity and other factors. He went on to show that, in both cohesive and non-cohesive soils, there is a high correlation between the machine power and material compaction, measured in terms of density, strength, and stiffness.

Low-temperature cracking

[Mihai Marasteanu](#), associate professor of [civil engineering at the University of Minnesota](#), shared preliminary findings from one recent project, a national pool-fund study led by MnDOT. Much has been learned about low-temperature cracking in asphalt pavements through research conducted at the MnROAD facility.

The purpose of the first phase of the pooled-fund study—[Investigation of Low-Temperature Cracking in Asphalt Pavements, Phase I](#)—is to develop asphalt binder and mixture testing procedures that will ultimately lead to nationally accepted specifications. Investigation of Low-Temperature Cracking in Asphalt Pavements, Phase II (a TERRA-initiated project) aims to validate the laboratory test procedures, models, and pavement design procedures developed in Phase I.

The ultimate goal of this research is the elimination of low-temperature cracking in both new and rehabilitated hot-mix asphalt (HMA) pavements. Low-temperature cracking is the main cause of pavement roughness and reduced service life in northern climates. In the pooled-fund study, the researchers discovered the important factors that affect low-temperature cracking and developed and updated testing methods.

Pavement preservation

[Better Roads](#) contributing editor Tom Kuennen's conference presentation, titled "Hot Button Issues in Pavement Preservation," discussed the history of pavement preservation, as well as the stubborn obstacle presented by many politicians and citizens that money should be spent on the worst pavements

first. Kuennen also showcased two exemplary agencies—one large and one small—that have embraced pavement preservation practices, and he cited a recent NCHRP study showing that state, county, and local agencies across the country are using hard pavement management systems (PMS) data to win dollars for pavement preservation.

Kuennen defined pavement preservation as a group of methods “intended to prolong pavement life, avoiding high future costs...through the expenditure of much lower amounts of money at critical points in a pavement’s life.” He listed crack sealing; fog, chip, and thin cold-mix seals; surface recycling; and thin hot-mix asphalt overlays as the most common pavement preservation methods. He also claimed that spending a dollar on pavement preservation “can eliminate or delay spending six to ten dollars on future rehabilitation or construction costs.”

[Kuennen’s website](#) provides one-stop shopping for all kinds of information about surface transportation, including history, research, current practice, the latest equipment, and politics.

A complete summary of this year’s Minnesota Pavement Conference is available for download from the [Minnesota Local Technical Assistance Program \(LTAP\) website](#).

MnROAD Lessons Learned: A history of innovative pavement research

Now in its 13th year of operations, the [Minnesota Road Research Facility \(MnROAD\)](#) has made important contributions to the understanding of pavement design and performance. *MnROAD Lessons Learned* (916 KB PDF), a new report from the Minnesota Department of Transportation on one of the first TERRA-initiated research projects, highlights many of these contributions. At the 2007 Pavement Conference, MnROAD engineer Tom Burnham provided an overview of significant findings over the years.

MnROAD Lessons Learned was prepared by civil engineering associate professor [Lev Khazanovich](#), a leading pavement researcher who has directed numerous innovative research projects focusing on portland cement concrete and hot-mix asphalt, and Derek Tompkins, associate director of the University of Minnesota’s [Pavement Research Institute](#).

Joint sealing, thin and ultra-thin whitetopping, and the effects of temperature on cracking and wear have proven to be among the most fruitful areas for MnROAD research. Findings in these areas continue to contribute to pavement management practices in Minnesota and beyond the state’s borders.

In addition, engineers and pavement researchers working at MnROAD have gained a wealth of knowledge about how to successfully instrument and monitor pavement sections for long-term data gathering. Methods developed at MnROAD, Burnham said, have influenced pavement research projects at other facilities.

MnROAD is currently preparing for significant reconstruction and upgrades that will position it to continue as a leading facility for pavement research. Also, TERRA will be developing Research Fact Sheets to disseminate additional information about the lessons learned at the facility. Indeed, with a vital role in pavement research and support from MnDOT, the University of Minnesota, and pooled-fund researchers, MnROAD’s future looks bright.

TERRA pooled-fund update

Research projects and initiatives administered by TERRA involve collaborations between agency, industry, and academic partners, including a series of pooled-fund projects initiated through the [Federal Highway Administration’s Transportation Pooled Fund program](#).

Two pooled-funds research projects will be proceeding with construction at the MnROAD facility this summer. Two new test cells will be built to test effects produced by agricultural equipment, and existing concrete cells will be diamond ground using several configurations for the surface characteristics.

The Effects of Implements of Husbandry "Farm Equipment" on Pavement Performance, whose partners include Iowa, Illinois, Minnesota, Minnesota Local Road Research Board (LRRB), and Professional Nutrient Applicators Association of Wisconsin, involves a field study with loaded equipment at the MnROAD test facility to specifically address pavement damage due to agricultural equipment. Many states in the Upper Midwest share similar concerns about heavy farm equipment. This project studies the effects produced by a variety of current heavy farm vehicles. The capabilities of MnROAD make the facility ideal as a national center for testing overweight vehicles from farming and a number of other industries.

PCC Surface Characteristics—Rehabilitation, a project which partners Minnesota and Texas, and includes "in-kind" industry contributions, will investigate 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. Testing will use MnROAD’s 3-mile concrete section of old westbound I-94 that runs parallel to the mainline section with "live" traffic.

Announcements

SemMaterials joins TERRA

[SemMaterials](#), a subsidiary of SemGroup, L.P., has joined TERRA. As one of the largest asphalt producers and marketers in the United States and Mexico, SemMaterials is backed by a world-class technical organization and regional technologists who formulate products.

The company’s diverse line of asphalts, polymer-modified asphalts, and asphalt emulsions provides

solutions for specific paving needs, application specifications, and customer performance expectations. All the company's materials are formulated with carefully selected raw materials to meet both local specifications and customers' expectations for performance. As a result, the asphalt emulsions and polymer-modified asphalt emulsions are used for virtually every type of paving need, including surface treatments, cold mixes, tack coats, and recycling. SemMaterials's asphalts meet Superpave or other applicable specifications.

Dan Wegman, of SemMaterials's technical marketing department, will represent the company on the TERRA board.

TERRA board welcomes new member representatives

TERRA welcomes Richard (Rick) Arnebeck, division director for Engineering Services at the [Minnesota Department of Transportation \(MnDOT\)](#), to the TERRA board. Arnebeck replaces former TERRA co-chair Dick Stehr, who retired. Arnebeck has a background in maintenance research as well as recent involvement in intelligent transportation systems (ITS) efforts. Earlier in his career, he served as the Winona County engineer. "His broad background will be very valuable to TERRA efforts," said TERRA co-chair Julie Skallman.

TERRA also welcomes Shashi Nambisan, the new director of the [Center for Transportation Research and Education \(CTRE\)](#) at Iowa State University. Nambisan, a professor of civil and environmental engineering, had been director of the [Transportation Research Center at the University of Nevada in Las Vegas](#). Lowell Greimann, who served as CTRE's interim director, had represented CTRE on the TERRA board.

TERRA presents at CTS Transportation Research Conference in May

TERRA co-chair Julie Skallman, division director for [State Aid](#) at the [Minnesota Department of Transportation \(MnDOT\)](#), moderated a concurrent session titled "TERRA—An Evolving Partnership" at the [Center for Transportation Studies' Eighteenth Annual Transportation Research Conference](#) on May 1 in Saint Paul. During the panel presentation, TERRA co-chair Fred Corrigan, executive director of the Aggregate and Ready Mix Association of Minnesota, provided an update about TERRA activities. In addition, MnDOT's Ben Worel gave an update about reconstruction at the MnROAD research facility.

The two-day conference addressed a wide range of transportation-related topics, including discussions about transportation finance, featuring James Whitty, manager of the [Office of Innovative Partnerships and Alternative Funding](#) with the [Oregon Department of Transportation](#), as well as a panel of Minnesota leaders. Concurrent sessions touched on topics ranging from transitways to biofuels. A selection of projects were also on display as posters during the morning and afternoon breaks on May 1.

Also as part of the conference, the 2007 Bridge Workshop was held May 2, focusing on bridge load ratings.

Mid-Continent Transportation Symposium scheduled for August

The [Center for Transportation Research and Education \(CTRE\)](#) at Iowa State University will host the Mid-Continent Transportation Symposium, on August 16 and 17, 2007, in Ames, Iowa. This TRB-style research symposium, hosted in alternating years by either CTRE or the [Midwest Regional University Transportation Center \(MRUTC\)](#) at the University of Wisconsin—Madison, features more than 100 presentations during several sessions. This year's theme is "Partnering to Build America's Transportation System." Also at the conference, a representative from the TERRA board will make a presentation about TERRA's mission and activities. The symposium lasts a day and a half with a banquet the first evening. Details about specific sessions, presentations, and special speakers are available [online](#).

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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