

## 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: American Concrete Pavement Association and Concrete Paving Association of Minnesota

The American Concrete Pavement Association (ACPA) and its affiliate, the Concrete Paving Association of Minnesota (CPAM), both established advocates in the concrete industry, have been moving research to the private sector through TERRA—a prime benefit of their partnership, both associations said.

"The real issue I think is getting things into practice," ACPA president Gerald Voigt said of the partnership. "There's less of a bias associated with one or the other parties." The two associations have been partners with TERRA since its inception three years ago.

"If we were to do research on our own, people could say, 'Well, that's a biased result,'" CPAM executive director Matt Zeller said.

Since its creation in 1963, ACPA has been backing its local affiliates like CPAM by providing technical support, funding local concrete initiatives, and lobbying for the concrete industry on a national level.

Voigt said ACPA became interested when the fledgling TERRA approached his association because ACPA officials wanted to support MnROAD and help ensure its long-term sustainability. "We see a lot of value in that facility," Voigt said. "We want to get information from MnROAD experiments and data."

Indeed, CPAM president Matt Zeller credited the partnership with TERRA for noteworthy discoveries about concrete based on unbiased research at MnROAD. Specifically, Zeller said that tests at MnROAD showed that concrete was more durable than previously thought and that transportation department standards for concrete thickness were perhaps too thick.

"We're here to promote the use of concrete pavement," Zeller explained, adding that concrete needs to be engineered to be a more efficient product, rather than over-designed and thus more expensive.

CPAM began in 1959 as a non-profit trade association of businesses with an interest in concrete paving. The organization's website lists goals and objectives for CPAM: help local, state, and federal authorities design concrete roads, streets, and airfields; disseminate concrete research; and maintain a quality product.

Voigt and Zeller both said the organizations are taking steps into making concrete a more sustainable



Gerald Voigt



Matt Zeller

and efficient product. "Sustainability is the next big thing," Voigt said.

For Zeller, an efficient product depends on sound research. "It's what the region needs and the country needs," he said of MnROAD. "It's a good use of funds—an efficient use of funds."

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## Member Highlights

The [Minnesota Department of Transportation \(MnDOT\)](#) Materials and Road Research group recently launched a redesigned [Minnesota Road Research Project \(MnROAD\) website](#). The site provides a comprehensive guide to MnROAD research activities and reports as well as links to a wealth of road-related online resources. In addition to current project summaries, the site describes in detail the facility's test cells, instrumentation, and database, which includes field performance data, information about traffic loadings, and laboratory material testing.



[Ready Mixed Concrete \(RMC\) Research and Education Foundation](#) announced publication of the revised version of its Pervious Concrete Research Compilation. The new version includes information on pervious concrete research studies completed and underway since the original compilation was published in June 2006. It now also includes abstracts of study findings as well as links to study information on the Internet where applicable. The foundation also announced the availability of the Model Performance Specification Phase II: Guide to Specifying Concrete Performance. The report is a follow up to Model Performance Specification Phase I: Preparation of a Performance-Based Specification for Cast-in-Place Concrete that was published in 2006. Both publications may be downloaded from the foundation's [website](#).

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## Projects and Initiatives

### TERRA Innovation Series: MnROAD open house features research, project site tours, and demonstrations

More than 175 visitors descended upon the Minnesota Road Research Project (MnROAD) facility near Albertville on July 30 for a daylong TERRA Innovation Series event. The event showcased how materials and pavement engineering innovations are developed, tested, and implemented on Minnesota roads at this one-of-a-kind, live transportation laboratory. Representatives from TERRA, MnDOT, local government, academia, and industry were on-hand to discuss TERRA-initiated research underway as part of the MnROAD Phase Two Research Initiative as well as the latest innovations in transportation engineering.



The event was the second in the TERRA Innovation Series, which began last fall with an open house featuring the reconstruction of Highway 36 through North St. Paul. The events have a technical focus and 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.

During a picnic lunch, TERRA board co-chair Tim Worke presented MnDOT commissioner Tom Sorel with an appreciation award for his commitment to the TERRA board and his leadership in guiding the TERRA Marketing and Communications Committee. Sorel was acknowledged especially for his dedication and support of TERRA as well as his recognition of the importance of partnerships. TERRA board members Fred Corrigan, executive director of the Aggregate and Ready Mix Association of Minnesota, and Mark Maloney, one of two Minnesota Local Road Research Board representatives, also spoke.

More than a dozen concurrent morning and afternoon sessions focused on topics ranging from innovative hot-mix asphalt (HMA) compaction methods to concrete overlays and composite pavements. Just outside the concurrent sessions, posters and equipment demonstrations shared the latest innovations in the industry. In addition, tour buses made loops through the MnROAD facility, stopping at various project locations under construction on the 2.5-mile low-volume road (LVR) test track and the 3.5-mile mainline test portion of Interstate 94. On the tour, project engineers described the history of the facility as well as details of several projects underway, including studies of full-depth reclamation, pervious pavements, the effects of farm implements, hard rock aggregate bases, pavement surface characteristics, and a variety of pavement designs.



Fred Corrigan, Tom Sorel

During both the morning and afternoon sessions, MnROAD operations engineer Ben Worel presented an overview of the road research facility, providing a summary of past projects and describing the current construction as well as future plans. He emphasized the importance of partnerships with other states and private industry driving the research, and he explained how the formation of TERRA has been critical to the second phase of operations at MnROAD and to road research not only in Minnesota but nationally, too.

At present, MnROAD is home to eight pooled-fund projects totaling \$3.8 million and involving the participation of 17 states, the Federal Highway Administration (FHWA), the Minnesota Local Road Research Board (LRRB), and industry. In addition, the facility has 15 Minnesota projects, supported by a mix of industry, LRRB, and MnDOT, with opportunities for further partnerships.

During the 2008 construction season (April to October) at MnROAD, 18 500-foot mainline test cells, plus the east and west transitions to and from the mainline, and eight 500-foot LVR test cells will be replaced at a cost of \$2.1 million, plus \$875,000 worth of instrumentation. Overall, the MnROAD reconstruction will cost about \$6 million, with \$4.3 million from FHWA, \$1 million from Minnesota state road construction funds, and about \$675,000 from industry partnerships.



During the event, the Aggregate and Ready Mix (ARM) Association of Minnesota Technical Committee met for an update on the pervious concrete placement that will be installed on the LVR this year as part of the reconstruction of MnROAD. The committee also received an update about the research planned as part of pervious concrete project, and they discussed national research on pervious concrete with Julie Garbini, executive director of the RMC Research and Education Foundation and a member of the TERRA board.

In other sessions at the event, Mike Darter from the Pavement Research Institute (PRI) discussed composite pavement designs in Europe, and MnDOT's Roger Olson gave a presentation highlighting the use of recycled materials such as shingles, portland cement concrete (PCC), and HMA.

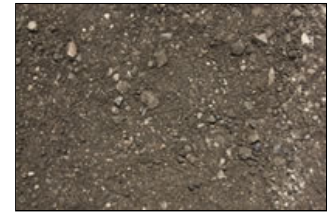
*Related resources:*

1. [TERRA Innovation Series event page](#)
2. [Minnesota Road Research Project \(MnROAD\) facility](#)
3. [MnROAD construction updates](#)
4. [MnROAD Phase Two Initiative projects](#)

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### Full-depth reclamation project promises to reach far beyond MnROAD

Full-depth reclamation (FDR) is a road and highway rehabilitation technique that processes existing base material on roads to create a stronger base—essentially recycling the road to make it stronger. During the process, a reclaimer pulverizes and blends the existing road base, creating a dirt-thin mix that is graded, compacted, rolled, and overlaid.



Three MnROAD mainline test cells are being constructed as part of the Phase Two Initiative to evaluate the properties and performance of three variations of FDR using asphalt emulsion stabilization. The results will be used to develop the best-cost design procedures to achieve the strength and flexibility needed for a pavement. TERRA member SemMaterials, a large asphalt producer in the United States and Mexico, is the primary project partner.

During sessions at the July 30 TERRA Innovation Series event at MnROAD, SemMaterials representatives discussed the FDR project in detail as well as the value of project partnerships through TERRA.

Just two days prior to the event, a contracted crew had performed full-depth reclamation stabilized with engineered emulsion on cells 2, 3, and 4 of the MnROAD mainline test portion of Interstate 94. Tests conducted on test cells 3 and 4 found that FDR with an emulsion engineered with high asphalt content creates a flexible and strong bituminous stabilized base that is resilient to thermal cracking, fatigue cracking, and moisture damage.

Todd Thomas, a product development engineer with SemMaterials, noted a recent project in Las Vegas that realized savings of 30 percent compared with typical road rehabilitation costs. "It's a pretty user-friendly process," he said. "You have a pretty uniform product when you're done."

Reclamation, Thomas added, is an environmentally friendly process because it utilizes existing materials instead of disposing them. "We expect the use of recycling to continue to grow," he said. "With (reclamation), there are tremendous energy savings on materials and construction."



Moreover, reclamation saves time—lots of it. Thomas said that the Las Vegas reclamation project took 40 days, cutting 80 days off of a typical road rehabilitation project. In fact, after compaction, traffic often may return to the road the same day.

As researchers continue to conduct FDR tests at MnROAD, they've also been closely following the reclaiming underway in Shoreview, Minnesota. Mark Maloney, a public works director for Shoreview and chair of the TERRA Research and Implementation Committee, said that his city's FDR program is a direct result from the connections made at TERRA. "I think there's a preconceived notion that this wouldn't be cost-effective on this scale, and we're demonstrating otherwise," he said. "There are going to be a lot of success stories associated with FDR."

Shoreview has been using an engineered emulsion in the sub-base, Maloney said. "We can turn things around contractually pretty quickly," he said. "Cities are just getting around to this, but I think there's a lot of inertia."

The MnDOT Materials and Road Research section, which operates MnROAD, also provided expertise and support to Shoreview for implementing an FDR project with stabilized base on some of its neighborhood roads during the 2007 construction season. The goal was to provide greater continuity of pavement structure thicknesses, equivalent or better pavement strengths, and improved resistance to moisture

issues.

*Related resources:*

1. [Full-Depth Reclamation \(FDR\) fact sheet](#)
2. [MnROAD Full-Depth Reclamation study](#)
3. [SemMaterials](#)

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### Concrete overlays may provide effective solution for damaged roadways

During the TERRA Innovation Series event at MnROAD, Dale Harrington from the National Concrete Pavement Technology Center discussed why concrete overlays are used, various types of overlays used to solve different problems, and the steps taken to evaluate pavement for the construction of concrete overlays.

According to Harrington, concrete overlays are an effective solution for many damaged roadways. The overlays do not require extensive repairs of existing pavement and can be constructed quickly and conveniently. Moreover, concrete overlays are high-performance and have a high load-carrying capacity, and, as a well-documented maintenance and rehabilitation method, they are easy to sustain.

"There are key issues that determine which type of concrete overlay should be used," Harrington said. Of two main types, bonded overlays are usually thinner and are used to eliminate surface distress, while unbonded overlays are thicker and are built primarily to add structural capacity to existing pavements that are deteriorating.

Evaluating pavement for the use of concrete overlays includes: a pavement history evaluation, an extensive visual examination, core analysis, a review of options, and preparation of a condition-assessment profile.

Concrete overlays are currently being examined at MnROAD as part of the Phase Two Initiative non-pooled-fund research.

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### Minnesota's Iron Range may help meet state and national aggregate needs

The Iron Range, along with the Lake Superior region and the Mesabi Range in Northern Minnesota, is home to a large supply of taconite. This hard dense rock, made up of mostly quartz and magnetite, may be an efficient, cost-effective solution for roadways. As national and statewide aggregate shortages become concerns, Minnesota's taconite supply could become more important than ever.

These areas combined generate up to 100 million tons of taconite per year, according to Natural Resources Research Institute (NRRI) researcher Larry Zanko. As part of the TERRA Innovation Series event at MnROAD, Zanko discussed the state's aggregate resources and how they can be put to use effectively in construction projects around the state and country.

"This country is approaching an infrastructure maintenance crisis and needs a recommitment," Zanko said. "Taconite aggregates are in the best position they've ever been in to help sustain roadways in the future."

Research on taconite aggregates is also part of the MnROAD Phase Two Initiative non-pooled fund research.

### Announcements

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#### TERRA publishes fact sheet about full-depth reclamation

TERRA published the third in its series of fact sheets in July, this time focusing on full-depth reclamation (FDR), a technique in which the full flexible pavement section and a predetermined portion of the underlying materials are uniformly crushed, pulverized, or blended, resulting in a stabilized base course. The new [Full-Depth Reclamation \(FDR\) fact sheet](#) provides an overview of the FDR process, research highlights, and several examples of how the pavement recycling technique has been implemented in Minnesota. In addition, the document lists more than a dozen resources for more information about FDR. The next fact sheet, to be published next month, will address the topic of pervious concrete pavement.



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#### TERRA board welcomes Arseneau as new MnDOT representative

TERRA welcomes Bernard (Bernie) Arseneau, division director for Policy, Safety, and Strategic Initiatives at the Minnesota Department of Transportation (MnDOT), to the TERRA board. Arseneau previously served as director of MnDOT's Office of Traffic, Safety, and Operations. Arseneau succeeds Richard (Rick) Arnebeck, who recently retired as division director for Engineering Services at MnDOT.



Bernie Arseneau

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](mailto:mpmccarthy@umn.edu).

#### Contacts for more information about TERRA

- Chris Kufner, Manager, Road Research Section, MnDOT Office of Materials, 651-366-5507, [chris.kufner@state.mn.us](mailto:chris.kufner@state.mn.us)
- Stephanie Malinoff, Director, Outreach Services, Center for Transportation Studies, University of Minnesota, 612-624-8398, [malinoff@umn.edu](mailto:malinoff@umn.edu)

**TERRA publications staff**

- Editor: Michael McCarthy, [mpmccarthy@umn.edu](mailto:mpmccarthy@umn.edu), 612-624-3645
- Contributing Editors: Christine Anderson, Pam Snopl

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