

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: Associated General Contractors of Minnesota (AGC)

The [Associated General Contractors of Minnesota \(AGC\)](#), formed in 1919, was the first recognized chapter of the Associated General Contractors of America. AGC is a nonprofit professional trade association that focuses on the highway and building sectors, including heavy and municipal utility construction.

The organization works as a training institution and representative for labor negotiations. The 450 members include general contractors, specialty contractors, and affiliated businesses.

Tim Worke, AGC transportation and highway division director, said AGC is a unique organization in TERRA because it deals with the service end of construction rather than the materials.

Since research is usually material-based, Worke said he hopes AGC's membership in TERRA will bring about different types of research that makes contract work more time- and cost-efficient.

"Through our affiliation with TERRA, we hope to be able to identify some future areas where the contracting services can be improved and efficiencies brought to that service," he said.

Worke said one of the challenges facing TERRA is finding ways to differentiate TERRA research from that of material companies marketing their results to contractors. Due to the nature of the business, material and machinery companies are constantly creating new innovations used by contractors.



Member Highlights

[Minnesota Department of Transportation \(MnDOT\)](#) research is part of a TechBrief on [Best Practices for Long-Life Concrete Pavements \(FHWA-HIF-07-030\)](#), which summarizes the long-life concrete pavement practices presented by the Illinois, Minnesota, Texas, and Washington State DOTs—practices that are representative of directions implemented by states that have strong concrete pavement construction programs. The publication follows up on material presented at the International Conference on Long-Life Concrete Pavements, held in Chicago in October 2006, as part of technology transfer activities for the [Concrete Pavement Technology Program \(CPTP\)](#), which operates within the [Federal Highway Administration \(FHWA\)](#).

[RMC Research and Education Foundation](#) announced the release of a study on [Crushed Returned Concrete as Aggregates for New Concrete](#) (1.1 MB PDF). The report evaluates the effects of the use of

crushed concrete aggregate (CCA) on fresh and hardened concrete properties by comparing these properties to concretes containing virgin aggregates. It is estimated that the ready mixed concrete industry could save approximately \$300 million annually through the use of crushed returned concrete as aggregates, and solve an important environmental issue at the same time.

New Members

The TERRA board includes representatives of pavement industry associations, transportation agencies, and university research organizations who collaborate to set directions for TERRA's research and outreach activities. TERRA provides a framework for unprecedented collaboration among diverse stakeholder groups. The TERRA approach encourages new ways of thinking about research problems—emphasizing partnership and cooperation to address the large-scale challenges before engineers and policymakers.

TERRA recently welcomed two new member organizations: Caterpillar and Michigan Tech. Larry Sutter, professor and director of [Michigan Tech Transportation Institute \(MTTI\)](#), and Tom VanDam, associate professor and director of materials in sustainable transportation infrastructure at Michigan Tech, and Dean Potts, engineering manager at Caterpillar, each will represent their organization on the TERRA board.

Caterpillar is a division of [Caterpillar, Inc.](#), the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines, and industrial gas turbines. Caterpillar is based in Peoria, Illinois.

[Michigan Tech \(Michigan Technological University\)](#), founded in 1885, is located in Houghton, Michigan. At its outset, the college trained mining and metallurgical engineers. Today, Michigan Tech offers certificates, minors, associate's, bachelor's, master's, or doctoral degrees in the arts and human sciences, business, computing, engineering, environmental studies, sciences, and technology.

Projects and Initiatives

Composite pavement project receives \$4 million SHRP 2 award

The [University of Minnesota's Department of Civil Engineering](#), the [Minnesota Department of Transportation \(MnDOT\)](#), and [MnROAD](#) will receive more than half of a \$4 million award over four years from the second Strategic Highway Research Program (SHRP 2). A number of Minnesota pavement research figures—and TERRA members—are leading the project or are named as a major component of the research, which will investigate the design and construction of new composite pavement systems.

The project proposal was spearheaded by the University of Minnesota's [Pavement Research Institute \(PRI\)](#), with PRI director Mike Darter instrumental in securing MnDOT's participation and featuring MnROAD in the response by placing field experiments at the core of the proposal. Darter, who is serving as principal investigator for the project, is a member of the TERRA Research Committee.



Mike Darter

The research will focus on two promising applications of composite pavement systems: an asphalt layer(s) over a portland cement concrete (PCC) layer, and a PCC surface over a PCC layer. Specifically, this effort is expected to determine the behavior and identify critical material and performance parameters; develop and validate mechanistic-empirical performance models and design procedures consistent with the Mechanistic-Empirical Pavement Design Guide (MEPDG); and recommend specifications, construction techniques, and quality management procedures.

SHRP 2 is a targeted, short-term research program created by Congress to address the challenges of moving people and goods efficiently and safely on the nation's highways. The program is carried out through competitively awarded contracts to qualified researchers in the academic, private, and public sectors.

TERRA moving ahead with new project ideas

This past year, TERRA initiated an annual process for collecting project ideas from partners and friends. So far, two project ideas have generated significant interest among board members. "Demonstrating the Asphalt Anti-Oxidant Benefits of Bio-Energy Co-Products" proposes to examine bio-energy co-products as an alternative to using crude-oil-based products in asphalt materials. "Stabilized Full-Depth Reclamation" seeks to develop stronger recycled base materials so roads can use a thinner bituminous overlay and, as a result, incur lower life-cycle costs.

Following a presentation about each in June, the TERRA board referred both to the Research Committee for further consideration. At a meeting earlier this month, the Research Committee satisfied the objectives of the "Stabilized Full-Depth Reclamation" project by adding it to an existing TERRA pooled-fund project. TERRA is continuing to explore "Asphalt Anti-Oxidant Benefits" as a separate project.

Project ideas may be shared with the TERRA board via the TERRA Project Proposal Form on the TERRA Projects Web page at www.terraroadalliance.org/research.

TERRA participates in CTRE's Mid-Continent Transportation Research Symposium

TERRA participated in the [Mid-Continent Transportation Research Symposium](#), hosted on August 16 and 17, 2007, in Ames, Iowa, by the Center for Transportation Research and Education (CTRE) at Iowa State University, a TERRA member. This year's theme was "Partnering to Build America's Transportation

System.” Conference topics covered a broad spectrum of transportation issues in the following areas: asphalt pavement, asset management, bridges and structures, pavements, planning, safety, traffic engineering and operations, intelligent transportation systems, human factors, environment, geotechnical engineering, and weather. Details about specific sessions, presentations, and special speakers are available [online](#).

TERRA board member Richard (Rick) Arnebeck, division director for Engineering Services at the [Minnesota Department of Transportation \(MnDOT\)](#), made a presentation about TERRA's mission and activities. “An Overview and Update on TERRA,” in the “pavements” category, was among more than 110 presentations scheduled for this sixth biennial event at Iowa State University.

In addition, TERRA board member Shashi Nambisan, CTRE director and professor of civil and environmental engineering, participated in safety presentations on continuous shoulder rumble strips and on seat belt usage.

Conference highlights included keynote addresses on future directions for surface transportation research by Steven Chase, chief scientist with the FHWA Office of Research, Development and Technology, and on 21st century transportation by Anthony Kane, director of engineering and technical services at AASHTO.



Richard Arnebeck



Shashi Nambisan

Intelligent Compaction promises improved road building

By Joe Thomas, P.E., MnDOT Assistant Grading and Base Engineer

Intelligent Compaction (IC) is a term typically associated with compaction rollers equipped with sensors (accelerometers, computer displays, etc). The sensors provide the operator with real-time



information regarding the response of the material under the drum to the compactive effort applied. The information obtained by the sensors is typically stored, thus allowing for further analysis of the data. MnDOT requires IC rollers to be equipped with a GPS (Global Positioning System) to provide a complete GIS (Geographic Information System) record of the project site.

Intelligent compaction offers three main benefits. First, IC should provide a more uniform compacted platform on which to place pavements, as well as provide less material density variation under pavements. As a result, overall pavement life should increase.

Second, the contractor uses IC for quality control, and this reduces the amount of quality assurance testing required. Most devices used for quality assurance testing (sand cone, nuclear gage, dynamic cone penetrometer, stiffness gauge) have low productivity. Thus, only a small portion of the compacted area is usually tested.

Third, IC can provide a record of the compactive effort on a site. The GPS tracks spatially where the compactive effort occurred. The tracking of the compactive effort and the response of the material provide the equipment operator information about areas that are over or undercompacted. Equipment operators can direct their efforts to those areas requiring attention. Roller efficiency, therefore, should increase as additional roller passes are directed to only those areas requiring them and not throughout the site.

MnDOT has had four pilot IC projects during the 2007 construction season: Trunk Highway 36 (TH36) in Maplewood and North St. Paul, TH10 in Detroit Lakes, TH10 in Staples, and TH60 in Bigelow. These four projects will provide MnDOT with a vast amount of information on what works and doesn't work with IC.

Related resources:

- [MnDOT Assistant Grading and Base Engineer Joe Thomas](#)
- [MnDOT Intelligent Compaction Web page](#)
- [Intelligent Compaction video](#)
- [Intelligent compaction: The next big thing?](#)

Announcements

Worke replaces Corrigan as TERRA co-chair

Tim Worke, director of the transportation and highway division at the [Associated General Contractors of Minnesota \(AGC\)](#), replaced Fred Corrigan as the industry co-chair of TERRA following the October board meeting. Corrigan agreed to chair the Center for Transportation Studies Executive Committee and will be focusing his time on that role.

The TERRA board appointed Worke to serve through FY2010. MnDOT's Julie Skallman will continue in her role as the other TERRA co-chair through FY2009.

Prior to his position with AGC, Worke was federal affairs director and then government

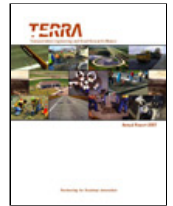


Tim Worke

relations director with MnDOT. Early in his career, he was a legislative and policy intern with the American Association of State Highway and Transportation Officials (AASHTO), and also a committee administrator for the Minnesota Senate Transportation Committee.

2007 TERRA Annual Report published

TERRA published its first annual report, the [2007 TERRA Annual Report](#) (924 KB PDF), in August. The report summarizes the highlights of TERRA efforts and activities during the past fiscal year (July 2006 through June 2007). In addition to providing details about TERRA members and how to get involved, the report outlines the research projects and initiatives launched by TERRA, which involve collaborations among agency, industry, and academic partners, including a series of pooled-fund projects. The report also describes TERRA's annual [process for collecting project ideas](#) from partners and friends.



TERRA Innovation Series: Highway 36 open house rescheduled for Nov. 1

TERRA, in cooperation with FHWA, FHWA Highways for LIFE, and MnDOT, has rescheduled an open house at the Trunk Highway 36 (TH36) reconstruction project for November 1, 2007, from 9:00 a.m. to 2:30 p.m., at the North St. Paul Community Center. The event, "[Transforming Highway 36 Through Innovation](#)," is the first in the new TERRA Innovation Series and will feature the innovative techniques used to rebuild TH36, such as complete closure and intelligent compaction. Panel sessions with federal, state, and industry speakers will address accelerated construction and communications, outreach, and market research. Following the open house program, TH36 project engineers will lead an optional work site tour. The event, originally scheduled in August, was postponed due to the I-35W bridge collapse. For more information about the Highway 36 open house, please visit the [TERRA website](#) or contact Stephanie Malinoff, malinoff@umn.edu, 612-624-8398.

TERRA among sponsors of upcoming pavement conference

TERRA is one of several sponsors for the 12th Annual Minnesota Pavement Conference, scheduled for February 14, 2008, 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.

For more information about the Minnesota Pavement Conference, contact Shirley Mueffelman at 612-624-4754, cceconf2@umn.edu.

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.

Contacts for more information about TERRA

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

TERRA publications staff

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

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