

## 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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[Current Issue](#) | [Previous Issues](#) | [Subscribe](#)

*In this issue:*

### Member News

- [Member Profile: Minnesota Asphalt Pavement Association](#)
- [Member Highlights](#)
  - [MnROAD to celebrate 20th anniversary by planning Phase Three Initiative](#)
  - [WisDOT adds concrete engineer](#)
  - [Minnesota LRRB selects 2014 research projects](#)
  - [WisDOT video documents use of self-propelled modular transporter](#)
  - [MnROAD concrete research earns ACPA technical achievement award for MnDOT](#)
  - [Collaborative effort produces video addressing frost damage in pavement](#)
  - [Minnesota legislators tour MnROAD as part of pavement research briefing](#)

### Projects and Initiatives

- [Highway agencies weigh cost to mitigate delays during construction with funding more lane miles](#)
- [Peer exchange explores implementation of pavement design guide](#)

### Announcements

- [TERRA Pavement Conference set for Feb. 5](#)
- [TERRA publishes 2013 highlights](#)
- [TERRA publishes fact sheet about pavement preservation](#)
- [Annual geotechnical engineering conference, Feb. 28](#)
- [FHWA revising course on new highway materials engineering](#)
- [MAPA upcoming events](#)
- [CPAM upcoming event](#)

## Member News

### Member Profile: Minnesota Asphalt Pavement Association

The [Minnesota Asphalt Pavement Association \(MAPA\)](#) is a founding member of TERRA, which began in 2004. MAPA executive director Jill Thomas represents MAPA on the TERRA general assembly and is the TERRA chair for FY14.

According to Thomas, MAPA became involved with TERRA because of the opportunity to network with other members and learn more about pavement-related research in the Midwest.

MAPA, incorporated in 1953, represents about 96 percent of the Minnesota asphalt industry—approximately 23 asphalt producers along with 9 asphalt non-producers and approximately 100 associate members affiliated with the asphalt pavement industry. The association represents member interests regarding items involving transportation, the environment, and legislation.

MAPA members are committed to the state and its overall quality of life. The asphalt pavement industry comprises companies ranging from small driveway-paving operations to diverse larger construction companies that produce and/or place asphalt pavement on roads, airports, parking lots, and recreational and other facilities.

"It is MAPA's mission to be leaders within the transportation industry, serving MAPA members to the benefit of their customers," Thomas said. "We strive to accomplish this mission with our technical staff by providing technical assistance, training, and consultation."

Research on pavements in the Midwest continues to be a focus for MAPA as well as for TERRA. This research includes thin overlays, stone-matrix asphalt, warm-mix asphalt, rubblization of



Jill Thomas

deteriorated concrete pavements, and more.

"TERRA offers a unique opportunity for proven research to be shared and possibly implemented among states in the freeze-thaw climate," Thomas said.

In addition, the recent TERRA reorganization has produced a renewed focus on implementing proven research, which members hope will lead to even more opportunities.

"We are very excited to be involved with the dynamic group of agency, industry, and academia representatives," Thomas added. "Limited highway funding continues to be a challenge for those responsible for our infrastructure, and MAPA feels that TERRA can help to find ways to do more with less funding available."

*Profiles of most TERRA member organizations, previously published here, remain available through the [TERRA E-News archives](#).*

### **Member Highlights**

#### **MnROAD to celebrate 20th anniversary by planning Phase Three Initiative**

The [Minnesota Department of Transportation](#) will celebrate the 20th anniversary of MnROAD on August 4, 2014. As the international road research facility continues to collect data on more than 50 concrete and asphalt test cells, researchers are finishing up a number of local and national research studies based on its Phase Two Initiative research cells constructed in 2007–2008. Over the years, researchers at MnROAD have produced implementable research results yielding many benefits for research partners.



The MnROAD Phase Three Initiative construction, planned for 2016, will again rely on TERRA members as well as other government agencies, academia, and industry to develop and fund research efforts using new MnROAD test sections. The initiative likely will focus on maintenance and rehabilitation. Research members are prioritizing research and construction ideas to solicit needed funding. In April 2014, MnDOT will hold a national peer exchange with public and private stakeholders to gain their input and funding options. To get involved in planning the future of [MnROAD](#), please contact MnROAD operations engineer Ben Worel ([ben.worel@state.mn.us](mailto:ben.worel@state.mn.us), 651-366-5522).

#### **WisDOT adds concrete engineer**

The materials section of the [Wisconsin Department of Transportation \(WisDOT\)](#) hired a new concrete engineer, [Mark Lloyd](#). "This position will provide support for all things concrete," said chief materials engineer Steven Krebs. "We are very excited to bring more resources to bear on a significant portion of our program." Lloyd plans to participate in many regional and national initiatives.

#### **Minnesota LRRB selects 2014 research projects**

The [Minnesota Local Road Research Board \(LRRB\)](#) and the [Minnesota Department of Transportation](#) met in early December to hear proposals and select a research program for 2014. The selected 24 projects will address a range of transportation issues, such as determining the optimal recycled asphalt pavement (RAP) content for Minnesota gravel roads, comparing portland cement concrete (PCC) pavement thickness with observed pavement distress, evaluating bio-fog seal, and using traffic signal data to predict crashes. Researchers from [Iowa State](#) and the [University of Minnesota](#), both TERRA members, will conduct the research.

- [Read more](#)

#### **WisDOT video documents use of self-propelled modular transporter**

The Wisconsin Department of Transportation (WisDOT) recently prepared a video documenting the use of a self-propelled modular transporter (SPMT) in the replacement of the Rawson Avenue bridge over I-94 in Oak Creek, Wisconsin, just south of Milwaukee. The video details the construction process, the benefits to the community, and lessons learned by WisDOT for applying the technology to future projects.

- [Watch the video on Youtube.](#)

#### **MnROAD concrete research earns ACPA technical achievement award for MnDOT**

The [American Concrete Pavement Association](#) in December awarded the 2013 Marlin J. Knutson Award for Technical Achievement to the [Minnesota Department of Transportation](#) for concrete research at MnROAD. The award is presented annually to an individual or group making significant contributions to advance the development and implementation of innovative technical and best practice approaches in the design and construction of concrete pavements. "MnROAD is helping to make roads last longer, perform better, cost less, construct faster, and have minimal impact on the environment," said ACPA president and CEO Gerald Voigt. "It is a model for other agencies to follow."

#### **Collaborative effort produces video addressing frost damage in pavement**

An updated video of the original U.S. Army Corps of Engineers Cold Regions Research Engineering Lab (CRREL) video on frost damage in pavement was completed and made available to the public in October. The new video is a joint effort by the Alaska Department of Transportation and Public Facilities, Alaska University Transportation Center, ASCE's Technical Council on Cold Regions Engineering, [Minnesota Department of Transportation](#), [Minnesota Local Road Research Board \(LRRB\)](#), and USACE's CRREL. The updated video covers seasonal effects and how frost action damages roads, soil types and conditions that are more susceptible to frost damage, impact of frost action on other structures, and design methods for avoiding frost damage. Watch the [full video](#) or a [shorter summary version](#) on YouTube. To

obtain a DVD copy, please contact [Shirley Sherkow](#) at MnDOT.

### **Minnesota legislators tour MnROAD as part of pavement research briefing**

The [Minnesota Department of Transportation](#) hosted an open house in October at MnROAD for the Minnesota State Senate Transportation Committee. TERRA members—the [Aggregate & Ready Mix Association of Minnesota](#), the [Minnesota Asphalt Pavement Association \(MAPA\)](#), and the [Concrete Paving Association of Minnesota](#)—also participated. The open house, which included a site tour, is part of a broader effort to engage legislators by sharing the latest research on materials and road research.

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## **Projects and Initiatives**

### **Highway agencies weigh cost to mitigate delays during construction with funding more lane miles**

Though initial construction of the interstate system in the 1950s and '60s was fraught with engineering challenges, it was mostly void of traffic accommodation considerations. But with today's lifestyles and economy dependent on the system, rebuilding the interstate while mitigating delays presents a significant challenge to highway agencies.

The Wisconsin Department of Transportation (WisDOT) recently completed an 8.9-mile-long pavement replacement project on a four-lane section of I-94 south of Eau Claire for a total cost of \$34 million. During the planning phases of the project, engineers had determined two lanes of travel could serve travel demand with only occasional queuing before Memorial Day and after Labor Day, but would create 5-mile Friday queues, and 9-mile Sunday queues every summer weekend. The delay would be greater for the three major summer holidays.



These queue projections might also have been optimistic, according to WisDOT Northwest Region chief operations engineer Gary Brunner. The projections assumed the department could achieve a 15 percent diversion factor by aggressively advertising the availability of the closest parallel state trunk highway route to interstate motorists. "Motorists would have had to endure a long, frustrating work zone with this traditional approach," Brunner said.

After analyzing a variety of options, WisDOT selected and implemented an approach that created no delay during peak travel season by using temporary lanes constructed in the center 5 miles of the project length. Four travel lanes were provided for the public during the peak summer travel months, and by alternating the travel direction on the temporary lanes in the center 5 miles, the contractor was able to perform complete removal and replacement work on the unused lanes between the Memorial Day and Labor Day holiday weekends. The approach required two construction seasons to complete and added an estimated \$6 million—an 18 percent increase—to the project cost.



But WisDOT's challenge was not one of how to accommodate traffic, or even in determining how much traffic needed to be accommodated to avoid undue delay, Brunner said. The skills needed to perform these calculations and examine a multitude of methods of pushing vehicles through and around work zones are already in place within state highway agencies.

"Agencies can—and do—assess the queues and delays that will be created throughout the day, week, month, and year for almost any lane configuration that can be conceived, engineered, constructed, and deconstructed within a planned work zone," he added. "Developing alternatives is not the challenge."

Instead, the primary challenge faced by WisDOT and other DOTs is in determining the right investment balance between "soft" traffic mitigation demands and "hard" long-term infrastructure needs, Brunner said. As costs go up to mitigate delay, the ability to rehabilitate additional miles of poor pavement or congested roadways (as well as unsafe roadways) declines.

"Since the impact of 'underinvestment' in either area is so visible and significant to today's lifestyles and economy," Brunner concluded, "the process of determining proper balance must be an appropriately public discussion for both individual projects and on a policy basis."

*Photos courtesy of the Minnesota Department of Transportation*

*Related resources:*

- [Wisconsin Department of Transportation](#)
- [WisDOT Plans and Projects, Northwest Transportation Region](#)
- [WisDOT Design and Construction](#)

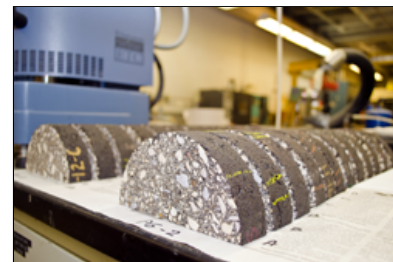
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### **Peer exchange explores implementation of pavement design guide**

In September 2013, the Wisconsin Department of Transportation hosted a peer exchange event with transportation officials from 10 states to examine how to properly implement the *Mechanistic-Empirical Pavement Design Guide* (MEPDG) into state DOT processes. The event centered five key aspects of implementation: calibration, materials testing, traffic data, design acceptance, and deployment.

Peer exchange participants each shared the affect of the MEPDG in their state and discussed how to mirror successes and avoid mistakes in states that don't currently implement the procedures.

Developed by the National Cooperative Highway Research Program in the early 2000s, MEPDG is a comprehensive approach to pavement design that provides data to analyze physical distress and guidelines for designing flexible, rigid, and composite pavements. The approach utilizes a series of performance indicators that reflect projected impact of physical stress over time. Some performance indicators include rutting, fatigue, and thermal cracking in asphalt, and transverse cracking and faulting in concrete, as well as international roughness index (IRI) data for both asphalt and concrete pavements.



Asphalt core samples

The exchange welcomed members of the American Association of State Highway and Transportation Officials from ten participating Midwest states, including Iowa, Michigan, Minnesota, and Wisconsin—all TERRA members. Representatives from the Federal Highway Administration also attended as did a representative from Applied Research Associates (ARA), who developed software and guidance supporting MEPDG.



Throughout nearly three days of meetings, participants found that state DOTs were generally moving forward with MEPDG implementation, but the progress between individual states varied. The group found that most states that had not already adopted MEPDG intend to do so by the end of 2015.

One of the main components of MEPDG is calibrating distresses with observed pavement performance in a way that is appropriate for local conditions. The peer exchange found verification, validation, calibration, and revalidation important to the process and that each state agency should go through the process.

The peer exchange also found that states are carefully developing local traffic data to feed software that accompanies MEPDG. Participants found traffic inputs can be improved through increased availability of weigh-in-motion data and other local traffic generators.

Overall, participants found that officials from DOTs can learn from each other's experiences to repeat successes and avoid mistakes. The peer exchange also determined that more state-by-state information would be useful to assess states' progress and to shape individual customization of MEPDG to fit the needs of individual DOTs.



Material sample testing

In addition, peer exchange participants agreed that additional information-sharing about MEPDG deployment through reports, training, and events would be useful as states implement the process for the first time or continue to make refinements and improvements over long-term usage. In particular, FHWA representatives discussed a desire to periodically hold regional forums on MEPDG implementation.

*Related resources:*

- [MEPDG peer exchange final report](#)
- [Mechanistic-Empirical Pavement Design Guide website](#)

## Announcements

### TERRA Pavement Conference set for Feb. 5

The one-day conference, in a new location this year, is a collaborative effort with the Road Dust Institute and will include sessions that examine current practices and implementation of new pavement research and technology. National and local trends and innovations will be examined to expand attendee understanding of pavement challenges and solutions. This year, the [TERRA Pavement Conference](#) will be held in conjunction with the Road Dust Institute's 3rd Road Dust Best Management Practices Conference, scheduled for February 4, 2014, at the Earle Brown Heritage Center in Brooklyn Center, Minnesota. Participation in both events is encouraged, and special rates are available for individuals attending both conferences. The joint events will also include a vendor show and reception. The conferences are intended for city engineers, county engineers, public works officials, street superintendents, maintenance superintendents, managers, design engineers, consulting engineers, contractors, and others interested in pavement issues. Registration information is available on the [TERRA Pavement Conference](#) event page.



### TERRA publishes 2013 highlights

TERRA has published a two-page report highlighting the organization's activities and accomplishments during the past year. The document provides a brief overview of research and implementation, engagement, and communications activities, crediting the committed service of the TERRA general assembly, a new structure to coordinate research and implementation activities, and new ad hoc task forces intended to be the workhorses of the organization. *TERRA 2013 Highlights* and other TERRA publications are available for download from the [TERRA website](#).

### **TERRA publishes fact sheet about pavement preservation**

TERRA has published a new fact sheet, [Research Shows Benefits of Pavement Preservation Techniques](#). Ways to extend pavement life are becoming increasingly important as the cost of building new roads continues to rise. Innovative pavement preservation techniques offer tools for the effective and cost-efficient management of the pavement life cycle. The fact sheet summarizes selected pavement preservation techniques from a variety of research projects at MnROAD. It also lists resources for further information. All [TERRA fact sheets](#) are available for download from the TERRA website.

### **Annual geotechnical engineering conference, Feb. 28**

The [University of Minnesota 62nd Annual Geotechnical Engineering Conference](#) is scheduled February 28, 2014, at the Continuing Education and Conference Center on the St. Paul Campus of the University of Minnesota. Topics at the conference will cover the recent advances in slope stability assessment, analytical element method for groundwater modeling, inflow rates in tunnels, transient seepage, deep foundations for slope stability, anchored earth retention, and recent case histories. The conference is a forum to interact with peers, meet specialty contractors, and hear researchers and practitioners discuss theory and application of geomechanics.

### **FHWA revising course on new highway materials engineering**

The Federal Highway Administration (FHWA) is revising its course on new highway materials engineering to update the technical content and add new content areas. FHWA has presented the course for the past 20 years as the Highway Materials Engineering Academy, which offered an opportunity for transportation agency personnel to gain the knowledge needed to develop materials specifications and guidance; make effective project acceptance decisions; and design, construct, and maintain assets to achieve a long service life. The new Highway Materials Engineering course will feature an orientation session and eight modules. Approximately six weeks of training will be delivered through a combination of instructor-led, classroom sessions; web-based training; independent study; web conferences; and laboratory and field experiences. The course will be held at the American Association of State Highway and Transportation Officials Materials Reference Library in Frederick, Maryland. The pilot session for the revised course will be held in the first quarter of 2015. No tuition will be charged for the pilot course. FHWA will announce the schedule for accepting applications for the pilot session in summer 2014. For more information on the [Highway Materials Engineering Course](#), contact Michael Rafalowski at FHWA ([michael.rafalowski@dot.gov](mailto:michael.rafalowski@dot.gov), 202-366-1571).

### **Minnesota Asphalt Pavement Association (MAPA) upcoming events**

The [Minnesota Asphalt Pavement Association \(MAPA\)](#) calendar includes these upcoming events:

- [NAPA 59th Annual Membership Meeting](#), February 2-5, 2014  
Boca Raton Resort & Club, Boca Raton, Florida
- [CONEXPO-CON/AGG 2014](#), March 4-8, 2014  
Las Vegas Convention Center, Las Vegas, Nevada
- [58th Annual Asphalt Contractors' Workshop](#), March 12, 2014  
Earle Brown Heritage Center, Brooklyn Center, Minnesota  
Info: [info@mnapa.org](mailto:info@mnapa.org)
- [AAPT 89th Annual Meeting](#), March 16-19, 2014  
Hyatt Regency Atlanta, Atlanta, Georgia  
Info: [aaptinfo@gmail.com](mailto:aaptinfo@gmail.com)

### **CPAM upcoming events**

The [Concrete Paving Association of Minnesota \(CPAM\)](#) calendar includes:

- [CPAM Annual Concrete Paving Workshop](#), March 20-21, 2014  
Alexandria, Minnesota

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*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).

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