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## New additions to Stanley L. Ring Memorial Library

The Stan Ring Memorial Library is one of the country's most well-stocked technical LTAP libraries, carrying over 1,500 publications, 620 videotapes, over 400 DVDs, 100 CD-ROMs, and 16 sets of slide presentations.

Located at the Institute for Transportation in the Iowa State University Research Park in Ames, Iowa, the library's mission is to share information about the latest transportation-related technology with local transportation professionals. Users may order publications, videos, and other library materials online.

Recently, the Stan Ring Memorial Library has expanded its collection by adding two databases, including an online video library and a webinar library.

The Iowa LTAP Technical Training Coordinator, Paul Albritton, manages the Stan Ring Memorial Library and all its materials.

### Online video library

"We wanted to provide local transportation agency staff with as many options as possible,"

says Albritton. "Instead of a physical DVD, the online video library is there for them to use as well."

With the list constantly being updated, Albritton will add videos as more become available. He added that he is always looking for guidance and input regarding additional materials, and asks users to contact him with suggestions.

For questions regarding workzone safety, Albritton suggested viewing the Temporary Traffic Control (Part 1 & 2) videos in the online video library, as it is the most current information available.

The online video library can be found at [www.iowaltap.iastate.edu/library/VideoLibrary/](http://www.iowaltap.iastate.edu/library/VideoLibrary/).

### Webinar library

"This was our goal all along," says Albritton. "We wanted to share the ideas and instruction that others have already done with Iowa's local transportation agencies."

*Library continued on page 4*

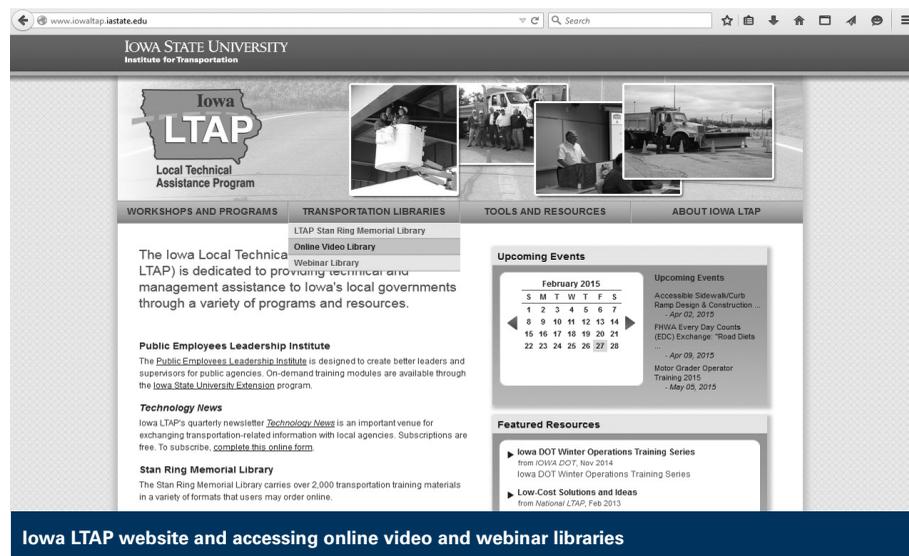
### Iowa Local Technical Assistance Program

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[www.intrans.iastate.edu/ltap](http://www.intrans.iastate.edu/ltap)

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The screenshot shows the Iowa LTAP website interface. At the top, there is a search bar and navigation icons. Below the header, the main content area is divided into several sections. On the left, there is a sidebar with navigation tabs: "WORKSHOPS AND PROGRAMS", "TRANSPORTATION LIBRARIES", "TOOLS AND RESOURCES", and "ABOUT IOWA LTAP". The "TRANSPORTATION LIBRARIES" tab is selected, showing sub-sections for "Online Video Library" and "Webinar Library". The main content area features a "Public Employees Leadership Institute" section, a "Technology News" section, and a "Stan Ring Memorial Library" section. On the right side, there is an "Upcoming Events" calendar for February 2015, showing dates from 1 to 28. Below the calendar, there is a "Featured Resources" section with links to "Iowa DOT Winter Operations Training Series" and "Low-Cost Solutions and Ideas".

Iowa LTAP website and accessing online video and webinar libraries

## Acronyms and Abbreviations in *Technology News*

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
FHWA	Federal Highway Administration
IHRB	Iowa Highway Research Board
InTrans	Institute for Transportation (at ISU)
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of County Engineers
TRB	Transportation Research Board



U.S. Department of Transportation  
Federal Highway Administration



Iowa Department  
of Transportation

### About LTAP

LTAP is a national program of the FHWA. Iowa LTAP, which produces *Technology News*, is financed by the FHWA and the Iowa DOT and administered by the Institute for Transportation at Iowa State University:

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Printed with soy ink



## From the director: Our Newsletter

I have a few updates about what is happening here at Iowa LTAP. Our new staff continues to get their feet under them. They are learning the processes that we use at LTAP to provide the service we do to our clients/customers at the levels they have come to expect. No doubt there will be a few stumbles along the way, and so we appreciate your patience as we go through this process. We are also in the final stages of the Safety Circuit Rider interviews and hope to have the position filled shortly. These changes, combined with some funding adjustments that will occur in 2015, will bring our staffing back to where we were to a little over a year ago (but we'll also have a little more). There may initially be a down turn in some of the offerings we do, but when we get rolling again at full speed we hope, as I've noted more than once, to "keep doing what we have been doing well and also introduce some new efforts."

We are also taking a little different approach with our newsletter this quarter. And, we plan to continue to explore and pilot a few other ideas this year. For this quarter, we are sending just an electronic version of the newsletter to our DOT subscribers. If you are one of those people and would like to continue to get a hard copy please let us know. We are also interested in the opinion of the local agencies on our subscription list.

We could try to provide an electronic version to everyone or just a sample. We would need a good email for everyone of course; or, which is where I tend to fall in this discussion, we could offer it electronically to those that want it and send the rest a hard copy version. This hybrid approach sends the newsletter out to people in the form

that they want and find most helpful. I'd also be interested in whether you think sharing this type of information through some social media venues might make sense.

As a reminder, registration for our Motor Grader Operator Training is currently available. We are also offering a Federal Highway Administration Every Day Counts (EDC) webinar or exchange on road diets (four-lane undivided to three-lane conversions) on April 9, 2015. More curb ramp design/construction training is also being provided due to an additional grant we received. We aren't offering excavation safety this year, but hope to bring it back. Another bridge inspection refresher training will be offered in the fall and we are in the process of planning an additional course sometime in early 2016 (it is just not set yet). Finally, we are working a MUTCD signing review course and hope to offer it soon.

To close, I'm now approaching five years as the Iowa LTAP Director. The last year or so has been challenging in many ways. It's now time to plan out the next five years for LTAP – where we are and what do we want to focus on in the future. While I'd like to do "everything for everyone," we all know that just isn't possible. We'll be asking for input on this new plan from our Advisory Board and you are also always welcome to call or email me directly to provide input. ■

Keith

# County Engineers Research Focus Group 2011–2015

Each year the Iowa DOT and LTAP co-sponsor an annual County Engineers Research Focus Group (CERFG) meeting in Ames, Iowa, for Iowa county engineers, assistants, and technicians.

The goal of these meetings is to serve as a forum for county engineers to share their day-to-day challenges, share low-cost innovations to meet those challenges, and to brainstorm and prioritize research/outreach ideas for consideration by the Iowa Highway Research Board (IHRB).

The following briefly summarizes accomplishments made from CERFG meetings over the past four years. Additional information and meeting summaries can be found at [www.iowadot.gov/research/countyfocusgroup.html](http://www.iowadot.gov/research/countyfocusgroup.html).

## CERFG Meeting—2011

Dave Carney, the county engineer from Monona County, spoke on “How to Recover from a Disaster.” Using the example of a tornado that struck the area on Saturday April 9, 2011, he shared how Monona County Secondary Roads Department responded to this disaster. About 10 employees, including himself, came and supplied front-end loaders/operators to clear streets, supplied barricades, and assisted with the setup of the emergency shelter.

He added some “things to do” in case other counties experience a similar situation:

- Have accurate inventory of all tools, equipment, and supplies
- Take photos
- Review facility and equipment lists and values with your insurance company

## CERFG Meeting—2012

The Secondary Road Research Engineer in the Iowa DOT, Vanessa Goetz, presented on the IHRB project Geo-Infrastructure Damage Assessment, Repair, and Mitigation Strategies. This research was conducted by David White, D. K. Miller, and Pavana Vennapusa of Iowa State University.

The focus of this research was to investigate the damage related to the Missouri River flooding that occurred in western Iowa in 2011. In addition to the damage caused

on the primary road system, this damage also occurred in a number of counties and impacted hundreds of secondary roadway miles.

The goals of this research were to assess the damage to the geo-infrastructure along selected segments of these roadways, propose repair and mitigation strategies and emergency response criteria, and produce a guide for flood damage assessment.

This research provides a useful tool to decision makers who need to prioritize roadway repairs, and select appropriate assessment technologies and repair strategies.

A report of their findings can be found at [www.intrans.iastate.edu/research/documents/research-reports/western\\_iowa\\_flood\\_damage\\_w\\_cvr.pdf](http://www.intrans.iastate.edu/research/documents/research-reports/western_iowa_flood_damage_w_cvr.pdf).

## CERFG Meeting—2013

Leighton Christiansen, the Iowa DOT librarian, presented about the services the Iowa DOT library can provide to county engineers in Iowa.

The Iowa DOT library provides professional research and reference assistance, custom literature searches, interlibrary loans, and historical or archival research services. Additionally, Christiansen will pursue documents and send them directly to those requesting the information and assist with or provide guidance to individuals doing personal searches of transportation reference databases. Many periodicals are also available digitally and the DOT library can assist individuals who would like to access these subscriptions.

The library can be reached at [dot.library@dot.iowa.gov](mailto:dot.library@dot.iowa.gov) or 515-239-1200.

## CERFG Meeting—2014

Vanessa Goetz summarized some of the IHRB or federally funded projects that have been funded as a result of the CERFG including the following:

- Short Span Bridge Standards (TR-663)
- Low Cost Rural Road Surface Alternatives (TR-632) and ongoing Low Cost Rural Surface Alternatives: Demonstration Project in Hamilton County (TR-664)
- Analysis of Subbase Stabilization Techniques for Gravel Roadways
- Update of RCB Culverts Standards to LRFD Specifications (TR-620)

## CERFG Meeting—2015

The 2015 focus group was held January 29, 2015, at the Holiday Inn Conference Center in Ames. Research topics were prioritized by those in attendance and submitted to the IHRB for consideration during its February meeting for the fiscal year 2016 research program. The 2016 meeting will focus on research implementation and developing implementation plans for projects that are of value to the county engineers.

## For more information

If you have any questions about the CERFG, contact Vanessa Goetz, [vanessa.goetz@dot.iowa.gov](mailto:vanessa.goetz@dot.iowa.gov). ■

**Personal Search Assistance or Lessons**

TRID  
the TRIS and ITRD database

IHRB  
IOWA HIGHWAY RESEARCH BOARD

Research in Progress

Transportation Research Thesaurus

Search Transportation Libraries and beyond

Search Iowa Department of Transportation and beyond

State DOT Search Engine

Transportation Meta Search

Iowa DOT Library Services

Online Transportation Research Thesaurus, a service of the Iowa DOT library

## Iowa LTAP Mission

To foster a safe, efficient, and environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, thus improving the quality of life for Iowans.

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*Library continued from page 1*

Albritton says that with the new online system, webinars can be easily broadcast at a meeting or even during on-site workshops.

The webinar library can be found at [www.iowaltap.iastate.edu/library/WebinarLibrary/](http://www.iowaltap.iastate.edu/library/WebinarLibrary/).

Following are two webinars recommended by Albritton:

### **Webinar – Temporary Traffic Control Measures on Gravel Roads**

The 3T Group Manager, Bruce Drewes, discusses workzone traffic control on unpaved gravel roads. This 20-minute webinar focuses on the understanding of the “work area” of a traffic control zone on unpaved roads, discusses the need to warn the traveling population even on a low-volume road, and reviews the safety devices used on equipment when working on this type of road.

### **Webinar – Best Practices in Maintaining Unpaved Roads**

The program manager for the SD Local Transportation Assistance Program (SDLTAP) at South Dakota State University, Ken Skorseth, discusses the best practices in maintaining unpaved roads. This 34-minute webinar focuses on primary gravel road issues, including establishing roadway shape, obtaining good surface gravel, and key maintenance challenges.

## DVDs

Following are two seasonal DVDs recommended by Albritton:

### **DVD 417 – Chain Saw Safety Maintenance and Operation**

Stihl Incorporated has produced a video that presents over an hour of chain saw basics appropriate for any chainsaw and designed for the beginning user. Multiple chapters include chain saw features, maintenance, saw chain sharpening, protective apparel, and proper operation.

### **DVD 416 – Excavation and Trenching**

There are many hazards associated with excavation and trench work. This 15-minute video addresses the major areas needed to comply with the standard, including hazards, competent person, soil analysis, protective systems, safety precautions, access & egress, excavated materials (spoil, confined spaces, mobile equipment, and surface crossings). ■

## Three ways to order LTAP library materials

- Use the online catalog, [www.iowaltap.iastate.edu/library/stan-ring-library/search/](http://www.iowaltap.iastate.edu/library/stan-ring-library/search/)
- Contact Paul Albritton, [palbritt@iastate.edu](mailto:palbritt@iastate.edu), 515-294-1231
- Mail or fax the order form on the back cover of this *Technology News*

Note about delivery of materials: The library sends orders through the United States Postal Service. If you have an urgent need for library materials, let us know when you place your order and we will arrange faster delivery.

# Boone County Expo stabilization tech research

In the October–December edition of *Technology News*, Center for Earthworks Engineering Research (CEER) Assistant Director, Pavana Vennapusa introduced two of the foundation stabilization technologies (subgrade stabilization using geosynthetics and high-energy impact compaction) being conducted at the Central Iowa Expo site in Boone, Iowa.

The project began in May 2012 and is ongoing for the next two years, with support from the Iowa DOT and the Federal Highway Administration.

The goal of the project was to increase the range of stabilization technologies to be considered for future pavement foundation design. In brief, the project included 16 different 700-foot-long test sections over 4.8 miles of roadway using the following foundation stabilization technologies: woven and non-woven geosynthetics, chemical stabilization of subgrade, portland cement stabilization with fiber reinforcement of subbase, mechanical stabilization, and high-energy impact compaction. New stiffness based measurement technologies including intelligent compaction and falling weight deflectometer were used in evaluating the freeze-thaw performance of the test sections.

Following are key findings for two additional foundation stabilization technologies.

## Chemical stabilization of subgrade and subbase – portland cement (PC)

Iowa subgrade soils rate generally from fair to poor and can exhibit low-bearing strength, high volumetric instability, and freeze/thaw durability problems. Chemical stabilization offers opportunities to improve these soil conditions.

The use of portland cement (PC) as a chemical admixture in subgrade and subbase layers in this study was to investigate the use of PC stabilization to optimize pavement foundation design.

The test section with A-6 subgrade PC stabilization was constructed by mixing a target 10 percent PC into 12 inches of subgrade and moisture-conditioning the

materials with a soil reclaimer by injecting water into the mixing drum, and compacting the stabilized subgrade layer with a vibratory pad drum roller immediately behind the reclaimer.

The test section with subbase PC stabilization was constructed by mixing 5 percent PC into 6 inches of reclaimed subbase materials (reclaimed from original test sections) and placed over the new subgrade using a similar process as above.

In situ testing with dynamic cone penetrometer (DCP) and falling weight deflectometer (FWD) indicated that DCP-California bearing ratio (CBR) and FWD moduli of the stabilized layers achieved peak values about three months after construction. On average, CBR and moduli values in the PC-stabilized subgrade test section were generally higher compared to the PC-stabilized subbase layer test section. Testing during the thawing period yielded the lowest CBR and FWD modulus values. These results showed weakening of the overlying unstabilized subbase during the spring thaw. The subbase layers were visibly wet during testing. The underlying stabilized subbase and subgrade were also weaker, but the CBR values remained high (> 50).

## Chemical stabilization of subgrade – fly ash (FA)

Some of the reported benefits of using self-cementing fly ash (FA) include environmental incentives in terms of using a waste product, cost savings relative to other chemical stabilizers, and availability at several power plants across Iowa.

Because FA stabilization is not used currently to improve the strength/stiffness of pavement foundations, this study set out to investigate its application for pavement thickness design optimization. This investigation required studying the in situ engineering properties over an extended duration with special focus on freeze/thaw performance.

In situ testing was conducted using DCP and FWD. DCP-CBR of the subbase layers achieved peak values at about three months after construction, while the CBR of FA-stabi-

lized subgrade layers achieved peak values at about two or three months after construction. FWD modulus of subbase layers achieved peak values at about three months after construction. Testing during the thawing period showed the lowest CBR and FWD modulus values. These results show a significant weakening during the spring thaw and warrant additional investigation and monitoring.

## Mechanical stabilization

Performance of a mechanically-stabilized layer constructed by mixing on-site reclaimed granular subbase material with the subgrade soil was evaluated in this study.

The construction procedure involved the following: 1) scarify and excavate the existing subbase layer down to the subgrade elevation, 2) place about 6 inches of the reclaimed granular subbase back onto the subgrade, 3) mix the reclaimed subbase with the underlying 12 inches of subgrade using a soil reclaimer, 4) compact the mixed layer with a vibratory smooth drum roller equipped with roller-integrated, and 5) compact a nominal 6 inches thick layer of crushed limestone-modified subbase.

Results indicated that the CBR of the modified subbase layer and the FWD modulus at the surface decreased considerably during April 2013 testing compared to the values obtained after the construction in July and October 2012. However, the CBR values of the mechanically-stabilized subgrade layer were higher in April 2013 than the values obtained during and after construction, which indicates that although the modified subbase layer was thawed in April 2013, the underlying layers were not fully thawed. Tests conducted in May 2013 showed the lowest CBR values for all layers. In May 2013, the average CBR of the stabilized subgrade layer (8.6) was about 2.5 times greater than the average CBR of the underlying unstabilized subgrade layer (3.4).

## For more information

Missed the last articles in *Technology News*? Find them at [www.iowaltap.iastate.edu/resources/technology-news/](http://www.iowaltap.iastate.edu/resources/technology-news/). ■

# UI study accesses scour monitoring using RFIDs

A study was conducted by the IIHR—Hydroscience & Engineering (IIHR) team at the University of Iowa to develop a comprehensive field detection method for the safe and reliable monitoring, inspection, and life estimation of bridge infrastructure affected by scour.

## The study

Biannual assessment of a bridge's scour condition is typically performed by physically probing the scour hole. However, this physical probing is a time-intensive process with low accuracy and limited applicability, often due to high-flow, debris-laden, or icy conditions. Sonar, sound reflectometer, and TDRs have been used to measure bridge scour. Despite their advantage over physical probing, these methods are costly while still providing limited applicability.

Recently completed in March 2014, this study was funded by the IHRB (TR-617) and the Iowa DOT. Although now professor and Henry Goodrich Chair of Excellence of the Department of Civil and Environmental Engineering at the University of Tennessee, Thanos Papanicolaou led this study as a part of the IIHR unit at the University of Iowa in early 2012.

The main objective of the study was to utilize motion-sensing radio transponders or radio frequency identification (RFID) on fully adaptive bridge monitoring to minimize problems inherent in human inspections of bridges.

The IIHR researchers accomplished this by integrating the RFIDs with sensing architecture for in-situ scour monitoring and multi-scale modeling to provide real-time condition assessments.

“We developed a semi-automated system to monitor the progress of bridges with critical scour conditions,” says Papanicolaou. “When bridge foundations have been eroded, their piers have the potential to be displaced.”

In this study, a low frequency (134.2 kHz), passive RFID system was developed, which consisted of three main parts: the reader, antenna, and transponder. The system was installed and tested at a bridge site in

Coralville, Iowa.

The custom-made antenna and waterproof, passive transponders were optimized to obtain a maximum detection distance in different river bed sediments.

“First, we developed a system that can relate radio signal strength with distance,” says Papanicolaou. “Second, we established a software that can give you how far the microchips that we’ve used for the measurements are located with respect to the bridge.”

The RFID technology utilized radio waves as a means of information transfer between a base station and a sensor in order to facilitate the collection of data remotely and provide information regarding scour hole development and depth that cannot be collected efficiently by other methods. RFID utilizes radio waves to transfer information between a base station (i.e., the reader) and a sensor (i.e., the transponder) via an excitation antenna.

## Benefits

Local scour of river bed sediment near a bridge pier or abutment is due to complex interactions between the approaching streamflow and the bridge structure. Excessive scour can expose the bridge foundations and thus compromise stability.

As a result, scour can cause significant economic impacts and potentially catastrophic consequences on the safety of the traveling public.

The FWHHA estimates that more than 150,000 bridges across the United States are vulnerable to scour.

A remote but cost-effective means of monitoring scour is highly desired by DOTs across the country, because it will provide real-time condition assessment that can be used in decision making for downtime, repair costs, and estimating the remaining useful life of critically scoured bridge structures—translating to an inexpensive, automated bridge monitoring system with potential applications for other critical infrastructure, such as dams, levees, or other near-shore structures.



Monitoring of bridge infrastructure. Photograph courtesy of Thanos Papanicolaou

## Key findings

- A 10-foot by 6-foot antenna consisting of two 12-American-wire-gauge-stranded wire loops 1.375 inches apart offered a maximum detection range of 45 feet with a moderate inductance.
- RFID transponders, or tags, can be encased in an epoxy potting compound and placed in a watertight PVC tube so that they can be submerged in a streambed with no loss in the detection range.
- Two methods can be used with the suggested RFID system to detect scour:
  1. The “folding chain” method, which utilizes the loss of tag return from a change in its orientation.
  2. The “signal strength” method, which utilizes the intensity and distribution of the tag return signal. Tags exposed in water have a more peaky function than those buried in the sediment.
- An easy-to-use software developed by the research team is available that can quantify scour using both above methods.

## For more information

To read the final Iowa DOT report, visit [www.iowadot.gov/research/reports/Year/2014/fullreports/TR-617\\_final.pdf](http://www.iowadot.gov/research/reports/Year/2014/fullreports/TR-617_final.pdf).

For questions regarding this study, contact Thanos Papanicolaou, 865-974-7836, [tpapanic@utk.edu](mailto:tpapanic@utk.edu). ■

# Conference calendar

Date	Event Name	Location	Contact
<b>April 2015</b>			
2	Accessible Sidewalk/Curb Ramp Design & Construction	Ames	Keith Knapp
9	FHWA Every Day Counts (EDC) Exchange	Ames	Keith Knapp
15-16	Work Zone Research and Focus Group and SWZDI BOD Meeting	St. Joseph, MO	Keith Knapp
21	Accessible Sidewalk/Curb Ramp Design & Construction	Charles City	Keith Knapp
22	Accessible Sidewalk/Curb Ramp Design & Construction	Fairfield	Keith Knapp
23	Accessible Sidewalk/Curb Ramp Design & Construction	Davenport	Keith Knapp
28	Accessible Sidewalk/Curb Ramp Design & Construction	Sioux City	Keith Knapp
29	Accessible Sidewalk/Curb Ramp Design & Construction	Harlan	Keith Knapp
30	Accessible Sidewalk/Curb Ramp Design & Construction	Des Moines	Keith Knapp
<b>May 2015</b>			
5	Motor Grader Operator Training	Tripoli	Paul Albritton
12	Motor Grader Operator Training	Oskaloosa	Paul Albritton
19	Motor Grader Operator Training	Cherokee	Paul Albritton
27	Motor Grader Operator Training	Ames	Paul Albritton
27-28	North Central Region Annual Regional Meeting	Ames	Devin Happe
<b>June 2015</b>			
2	Motor Grader Operator Training	Red Oak	Paul Albritton
<b>September 2015</b>			
20-22	Bridge Inspection Refresher Training	Ames	Devin Happe
22-24	Iowa Streets and Roads Workshop and Conference	Ames	Beth Richards

## Contact information

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## Event details and online registration

Watch for details and online registration information, by specific dates and events, on the online calendar, [www.intrans.iastate.edu/mors/calendar/](http://www.intrans.iastate.edu/mors/calendar/). ■

## National Center for Rural Road Safety

The Institute for Transportation at Iowa State University, together with several partner organizations, announces the development of a new National Center for Rural Road Safety.

Funded by a four-year, \$4.8 million grant from the FHWA and partner support, the center will offer training, technical support, and information to transportation practitioners around the country. The ultimate goal is to help them reduce serious injuries and fatalities on the roads they manage.

The center's programs will target transportation practitioners in rural road agencies, which manage 80 percent of the surface road network in the United States. Drivers on these roads face a disproportionate share of safety risks, including approximately 54 percent of roadway fatalities, high rates of crashes in which vehicles go off the road, as well as emergency response times that are 50 percent longer than those in urban/suburban areas. The center will work closely with local technical assistance programs in Iowa, Louisiana, Montana, and New Jersey.

"We have built a solid public-private partnership that has developed and delivered innovative transportation training to a broad range of agencies, including local, state and tribal," says Keith Knapp, director of the Iowa LTAP at the Institute for Transportation. "We will also have the geographic coverage across the United States as team members to efficiently address safety training and technical assistance needs on a regional basis."

The National Center for Rural Road Safety will be housed and led by the Western Transportation Institute at Montana State University. Other partners include the Center for Advanced Infrastructure and Transportation at Rutgers University, Cambridge Systematics, Inc., the IDT Group, and the Four Corners Tribal Technical Assistance Center.

For more information, contact Keith Knapp, 515-294-8817, [kknapp@iastate.edu](mailto:kknapp@iastate.edu). ■

# LTAP Materials

- √ Order library materials
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- √ Correct your mailing information

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