Technology NEWS
April–June 2011
Iowa LTAP
Local Technical Assistance Program
Providing transportation technology transfer for Iowa's cities and counties

Inside this issue

Iowa Local Technical Assistance Program

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IOWA STATE UNIVERSITY
Institute for Transportation

Bridge inspection policies and procedures

Thanks to Eric Souhrada at the Iowa DOT for his help preparing this summary of Instructional Memorandum (I.M.) No. 2.120, Bridge Inspections, issued in February 2011 by the Iowa DOT.

Background

State and local public agencies (LPAs) are responsible for the safety inspection and evaluation of all bridge structures greater than 20 feet in length located on public roads under their jurisdiction.

This responsibility includes complying with the National Bridge Inspection Standards (NBIS) policies and procedures (23 CFR 650) for maintaining a bridge inventory, conducting inspections, filing inspection reports, determining load ratings, and other requirements.

The purpose of I.M. No. 2.120 is to provide guidance for the LPAs in complying with NBIS by providing commentary for specific sections in the NBIS that require clarification.

Qualifications of inspection personnel

To qualify as a Program Manager, an individual must be a licensed professional engineer and have successfully completed the two-week National Highway Institute (NHI) Safety Inspection of In-Service Bridges training course.

The NBIS requires a qualified Team Leader to be present during all field inspections. An individual can become qualified as a Team Leader by satisfying one of the five qualification requirements listed in the NBIS.

Technicians pursuing a Team Leader qualification must demonstrate that they have a minimum of five years of bridge inspection experience and have successfully completed the two-week NHI Safety Inspection of In-Service Bridges training course. The experience requirement can include a combination of bridge design, maintenance, construction, and inspection experience, but at least 50 percent (or 30 months) must be bridge inspection. The I.M. includes a sample calculation of bridge inspection experience for technician Team Leaders.

Team Leaders may inspect structures with fracture critical members (FCMs) only after they have successfully completed the NHI Fracture Critical Inspection Techniques for Steel Bridges training course.

The NBIS requires periodic bridge inspection refresher training for Program Managers and Team Leaders as part of quality control (QC) and quality assurance (QA). The Iowa DOT has defined "periodic" as every five years. Therefore, all bridge inspection personnel are required to successfully complete the NHI Bridge Inspection Refresher training course every five years following the successful completion of the NHI Safety Inspection of In-Service Bridges training course.

Inspection frequency

The NBIS requires bridge structures to be inspected every 24 months. The bridge owner or designated bridge inspection Program Manager can determine that a bridge requires inspection on a more frequent basis. The I.M. provides guidelines to determine when it would be appropriate to reduce the time between inspections (to 12 months, for example) for bridges that have advanced deterioration or FCMs or require underwater inspection of substructure elements.

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Acronyms 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

LTAP is a national program of the FHWA. Iowa LTAP, which produces this newsletter, is financed by the FHWA and the Iowa DOT and administered by the Institute for Transportation.

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Message from the director: New places and new faces

by Keith Knapp, LTAP director

First and foremost – a big thank you to those that have welcomed me back to Iowa. On June 1 I'll have been here a year. It's been a fast one and I'm looking forward to many more.

In the past few months there has been a lot of activity at Iowa LTAP. Spring and fall are always our busiest times. In March we held two OSHA 10-hour training workshops for the transportation industry. We were able to offer these because of the response to our email/survey and funding through a federal grant. The workshops and the instructor were well received, and we may offer it again if it can be provided at a competitive registration cost. The focus of the workshops on the transportation, rather than general, industry made it more relevant to the attendees. I try to keep a lookout for these types of opportunities and take advantage of them when it makes sense.

This spring we are also offering workshops on the MUTCD and motor grader operator (MoGO) training. The 2009 MUTCD includes some new information and several compliance dates that are fast approaching. Many of these dates have been around for some time and a few were introduced with the new 2009 MUTCD. This training has resulted in many interesting discussions and certainly taught me more about some of the signing/marking concerns here in Iowa. The MoGO training is also in full swing, and we are offering six classroom and five field days this year. I've been told this is actually one of the most requested courses at some LTAPs, and a wide range of approaches are used to offer it. Excavation safety is again being offered here in Iowa and of course we have our retroreflectivity training.

We've also continued to develop new partnerships and reinforce others. Collaboration with our national partners allowed us to bring in the OSHA training noted above, and our state partnership with the Iowa DOT continues to produce various workshops, tools, guidance, and technical transfer events. This spring we also held our first APWA/LTAP breakfast training meeting, and we have offered our assistance to a number of groups that already provide technology transfer opportunities to local agencies in Iowa. One objective at LTAP is to provide technical information that is valuable to local transportation agencies and also to make them aware of others who are doing the same here in Iowa.

Finally, we are also starting to update our website. We hope that the redesign of our website allows us to start posting notifications of additional low-cost or no-cost online training opportunities. LTAP staff members hear about many of these offerings—sometimes only days before they occur—but they have not had the ability to share this information effectively. We hope that as our website evolves it will become a true resource that can be checked on a regular basis.

Two documents were recently released that may also be of interest to local transportation agencies in Iowa: the Effective Delivery of Small-Scale Federal-Aid Projects and Speed Reduction Techniques for Rural High-to-Low Speed Transitions. Both of these documents can be found online, www.trb.org/Publications/PubsNCHRPSynthesisReports.aspx.

Have a great summer. ■

Keith Knapp
Director
Local Technical Assistance Program

Bridge inspection

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Bridge load rating

All bridge structures are required to be rated for load carrying capacity by a licensed professional engineer. The I.M. contains information regarding the rating of Iowa DOT standard bridge structures along with FHWA policy memorandums addressing the load factor (LF) and load and resistance factor requirements for load rating bridges.

Diagrams of the Iowa legal trucks and routine permit trucks are included in the I.M. to assist in determining the load posting requirements at each bridge location, along with commentary addressing advanced posting.

Bridge records

Bridge owners are required to maintain a complete, accurate, and current record of each bridge under their jurisdiction as per the AASHTO Manual for Bridge Evaluation. The components of a complete bridge record can consist of, but are not limited to, bridge plans, repair plans, photographs, scour evaluation data, channel cross section, field inspection forms, Structure Inventory & Appraisal forms, load rating calculations, critical findings, and QC/QA program documentation.

In 2010, the Iowa DOT converted to the use of an electronic bridge inspection software called Structure Inventory Inspection Management System (SIIMS) to maintain all bridge inspection records. The I.M. provides commentary regarding use of the SIIMS software to comply with the requirements of AASHTO and the NBIS along with the state policy and procedures.

For more information

Contact Eric Souhrada, bridge maintenance and inspection, Iowa DOT, 515-233-7720, eric.souhrada@dot.iowa.gov.

All NBIS policies and procedures (23 CFR 650) are online, http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=%2Findex.tpl; see Title 23 in the pull-down menu.

Answers to frequently asked questions are provided online by the FHWA, www.fhwa.dot.gov/bridge/nbis/index.htm. ■

Checklist for local bridge inspection and repair

Conducting basic inspections and maintenance activities is a cost-effective practice to help local agencies keep bridges safer and more serviceable for the duration of their design lives.

Plan

Based on your bridge inventory,

- Schedule required NBIS inspections for the season.
- Schedule general inspections and cleaning for other bridges.
- Identify maintenance work needed, set priorities, and schedule repairs.

Update emergency records

Be prepared for an emergency such as bridge damage due to a flood, storm damage, or motor vehicle crash. Develop or update a response plan with names, home and cell phone numbers, and a sequence of contacts.

Distribute the plan to your employees and emergency services in your area.

General inspections, cleaning, and repairs

Spring clean. Flush decks, seats, caps, and salt-splash zones with water. Clean drainage systems and expansion joints. Clean and lubricate bearing assemblies.

Get down. Go under the bridge and examine critical substructures. Look for corrosion on beams and for piles of sand and debris around seats, caps, and bearing structures.

Remove brush and woody debris from under timber bridges to reduce the risk of fire damage.

Check that rock is adequate to protect the embankment.

Remove accumulations of loose rock and debris from the stream bed and around the piers that could restrict or change normal water flow and lead to scour. Even a small amount of visible debris can signal much more under the surface.

Look at loads. Accumulated gravel surfacing and bituminous overlays sometimes get carried over the bridge deck to improve the ride. If their weight has reduced the bridge's capacity for carrying traffic loads, consider removing the extra surface material to improve the bridge's durability and load-carrying ability.

High water—higher alert. Monitor all bridges and culverts during and after high water conditions. Look for signs of scour and erosion and correct the problem.

Improve approaches. Repair dips in the roadway surface leading to the bridge deck.

Perform general repairs. Seal cracks and joints in the deck and substructure elements if needed, to keep water from carrying chlorides into rebar and other steel structures.

Repair or replace damaged joint filler material in expansion joints.

Don't forget the "shorties." Bridges less than 20 feet long are not included in the federal bridge inspection program. However, inspect them regularly and complete a basic condition form in the same manner as bridges longer than 20 feet.

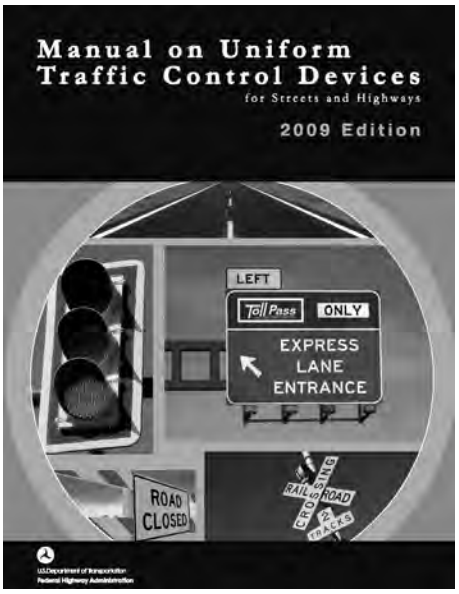
For more information

If you have questions about bridge inspections, including the National Bridge Inspection Standards (NBIS), contact Michael Todsen, Iowa DOT Office of Bridges and Structures, 515-233-7726, michael.todsen@dot.iowa.gov.

For more information, contact Eric Souhrada, bridge maintenance and inspection, Iowa DOT, 515-233-7720, eric.souhrada@dot.iowa.gov. ■

Changes in 2009 MUTCD

by Tom McDonald, Safety Circuit Rider



The 2009 Manual on Uniform Traffic Control Devices (MUTCD) was released in December 2009 by the FHWA and was adopted, with some modifications, earlier this year by the Iowa DOT. The 2009 edition presents hundreds of revisions to MUTCD requirements, guidance, and options.

As a follow-up to a general list of changes printed in the July–September 2010 issue of Technology News, this article describes some of the changes in the 2009 MUTCD that have potential impacts to Iowa's local agencies. However, all transportation agencies should study the document carefully to fully comprehend changes of major importance to them.

Global revisions

First, the 2009 MUTCD has some new visual cues. While standard statements remain in bold print, guidance information is now printed in italics for quick identification. In addition, all paragraphs are numbered for easy reference.

Metric measurements have been removed from the body of the document, but conversion information is contained in Appendix A2.

The new MUTCD contains an introduction and nine parts, many of which contain revisions of importance to Iowa agencies:

Introduction

The Introduction to the MUTCD contains a list of compliance dates for several revisions with potential budget impacts. Only a few of the dates are related to changes in this edition; most are carried over from the 2000 and 2003 editions.

In addition to actual compliance dates listed in Table I-2, paragraphs 19 through 24 on page I-3 are especially important. They describe specific requirements regarding the interpretation of compliance with MUTCD requirements and recommendations.

Part 1—General

In both the Introduction and Section 1A.13 of Part 1, the 2009 MUTCD expands application to certain private roads and streets that are open to public travel. These might include toll roads and access roads to shopping centers, sports arenas, airports, and other similar facilities where public access is not restricted.

Section 1A.13 lists a total of 259 definitions of words and terms to aid users' understanding.

Part 2—Signs

This section contains several revisions of interest.

While technically a change from the 2003 MUTCD, Section 2A.08 Maintaining Minimum Retroreflectivity has probably caused more concern than any other revision. This section describes requirements and responsibilities for all transportation agencies regarding adequate nighttime visibility of road and street signs.

Table 2A-3 lists minimum retroreflectivity levels for various signs, sheeting, and applications. Several options are presented for agencies to use to ensure compliance, and compliance dates have been established.

Many changes in the 2009 MUTCD reflect the needs of older drivers. For example, Part 2 increases the sizes of several signs and recommends increased lettering size.

Travel through at-grade intersections has proven problematic in some locations on multi-lane divided expressways. Part 2B

of the 2009 Manual addresses some of the problems by including descriptions and illustrations of sign installations for such intersections, addressing various configurations and median widths.

Numerous new regulatory and warning signs are presented in the new manual to assist drivers in safely and efficiently navigating roads and streets.

Section 2C, Warning Signs and Object Markers, contains several requirements and recommendations of interest. For example, Table 2C-4, Guidelines for Advance Placement of Warning Signs (in Section 2C.04), has been modified to accommodate a visual acuity of 20/40 or a rule of thumb of 1 inch of lettering for 30 feet of visibility. This results in increased distances for advance warning sign locations in advance of an obstruction or conflict situation.

For rural roads with traffic volumes of 1,000 vpd and higher, Sections 2C.06 and 2C.07, along with Table 2C-5, contain requirements and recommendations for use of certain warning signs, chevrons, and advisory speed plaques. These applications can also be used on lower volume rural roads as an option. Enhanced guidance for determination of proper advisory speeds is also included.

Section 2C.09 and Table 2C-6 describe the use and placement of chevron alignment signs at horizontal curves.

Chapter 2D, Guide Signs-Conventional Roads, describes several issues of potential concern for local agencies, especially regarding Street Name Signs in Section 2D.43. While some of the revisions have also been contained in previous editions of the MUTCD, impending compliance dates are a concern at this time. Issues of importance include the following:

- The lettering on street name signs must be composed of a combination of upper case initial letters and lower case lettering for the remaining legend.
- For roads and streets with speeds greater than 25 mph, the initial capital letter should be at least 6 inches in height, with lower case lettering a minimum 4.5 inches in height for post-mounted signs.
- For lower speed streets, the lettering may be composed of a 4-inch initial capital letter with minimum 3-inch lower case lettering.
- The preferred color for street name signs is a green background with white lettering and border, if used. However, alternative background colors of blue, brown, and white are also permissible. With a white background, black lettering is required.
- Street name letter heights are increased for higher speed multi-lane roads and overhead mountings.

These recommendations are listed in Table 2D-2 in Section 2D.43.

Part 3—Markings

This part contains revised guidance and requirements for the use of dotted lane lines on freeways, expressways, and conventional roads. Several illustrations are included in Section 3B.04.

These revisions have a compliance date of December 31, 2016, or resurfacing (whichever comes first).

A new Section 3B.17 describes Do Not Block Intersection Markings, and Section 3B.18 contains guidance for marked crosswalks. Speed reduction markings are included in Section 3B.22 as an option.

A new Chapter 3C has been added for roundabout markings. Several illustrations are shown in this chapter for several configurations of roundabouts.

Chapter 3F describes the design and application of delineators along a roadway and on guardrail and bridge rail. The approximate spacing of delineators on horizontal curves is shown in Table 3F-1. New Chapter 3J contains valuable information for rumble strip markings.

Part 4—Highway Traffic Signals

Section 4C.10 describes revised guidance for some signal warrants and describes a new warrant 9 for intersections near at-grade rail crossings.

Chapter 4D allows optional use of a flashing yellow arrow and flashing red arrow for permissive left turns.

Section 4D.07 requires a 12-inch lamp for all new signal faces, and Section 4D.11 specifies a minimum of two signals faces for each through movement. Section 4D.13 contains several new requirements for positioning of signal heads for turn movements. For a protected only mode, Section 4D.19 requires the use of red arrows, not circular red signals, if a separate left turn signal face is provided.

Section 4D.26 requires that accepted engineering practices must be used to determine the length of yellow change and all-red clearance intervals.

Sections 4E.06, 4E.07, and 4E.08 contain new guidance and requirements for pedestrian signals, and Sections 4E.09 through 4E.13 offer numerous new requirements and guidance for accessible pedestrian signals and detectors.

Chapter 4F describes new pedestrian hybrid beacons, and Section 4G.04 contains requirements for new emergency vehicle hybrid beacons.

Part 5—Traffic Control for Low-Volume Roads

The definition of this class of roadway is further explained to definitely exclude freeways, expressways, ramps, service roads, state highways, or residential streets in a residential area.

A new Chapter 5H was added to describe traffic control needs for school areas on low volume roads.

Part 6—Temporary Traffic Control

This part now extends the requirement for worker apparel to meet Class 2 ANSI minimum standards to all workers within the public right of way on all roads.

Chapter 6E now includes an option to use Automated Flagger Assistance Devices to augment flagger operations. An alternating diamond display is also added to the caution mode options for arrow boards.

Section 6G.01 includes a recommendation for a temporary traffic control plan for special events such as parades, farm markets, street fairs, or other events that could impact roadway traffic.

Part 7—Traffic Control for School Areas

This part lists several important revisions including a restricted use of minimum sign sizes to low traffic volume and speed areas in Section 7B.01.

Section 7B.07 requires all school-related warning signs and plaques to have a fluorescent yellow green background.

Section 7B.13 presents a new symbol warning sign for School Bus Stop Ahead signs, and 7B.14 displays a new School Bus Turnaround warning sign.

Several other new regulatory, warning, and guide signs and plaques are also included in Part 7.

Sections 7D.04 and 7D.05 contains new requirements for adult crossing guards, including wearing of minimum standard high-visibility apparel.

Part 8—Traffic Control for Railroad and Light Rail Transit Grade Crossings

In the 2009 MUTCD, Part 8 and Part 10 from the 2003 MUTCD have been combined into a single Part 8.

In new Section 8A.07, quiet zone treatments are described, and in Section 8B.21 a new "No Train Horn" warning sign is introduced.

Section 8B.04 requires the erection of either Stop or Yield signs at all passive highway-rail grade crossings.

Section 8B.28 requires that stop lines be installed on all paved roadways at rail crossings controlled by active devices.

Section 8C.04 includes a requirement that stripes on gate arms be vertical, not sloped.

A new Chapter 8D has been added to describe traffic control requirements for pathway/at-grade crossings.

Part 9—Traffic Control for Bicycle Facilities

This part provides several new signs and plaques for bicyclist use.

Section 9B.01 contains new requirements for placement of traffic control devices on shared use paths. A new warning sign and plaque is illustrated in Section 9B.18 for combined pedestrian/bicycle crossings.

Section 9C.07 shows a new shared lane pavement marking.

For more information

The full electronic 2009 edition of the MUTCD is online, http://mutcd.fhwa.dot.gov/.

The Iowa LTAP at ISU's Institute for Transportation can provide advice and training.

Contact Keith Knapp, 515-294-9481, kkknapp@iastate.edu, or Tom McDonald, 515-294-6384, tmcdonal@iastate.edu, with any questions about training opportunities. ■

Road Use Tax (RUT) transfer for cities under 500 population

John Dostart,
Office of Local Systems, Iowa DOT

July 2011 Road Use Tax (RUT) payments, which will be distributed in August, will be reduced for Iowa cities with both

- populations that dropped below 500 as of the 2010 federal census and
- a farm-to-market (FM) road through their jurisdictions.

At the same time, maintenance responsibility for the FM segments through these towns will be transferred to the home counties.

Here is what is happening:

Iowa's RUT is distributed to cities based on the latest available federal census (Iowa Code 312.3). The 2010 federal census results were certified by the Iowa Secretary of State in February 2011 and, beginning with the March payments, became the basis for monthly RUT distributions.

In general, RUT distributions are made on a per-capita basis. The estimated per-capita distribution remains the same ($90.50) for FY 2011, but the change to 2010 census figures has had some impact on the monthly payment amount for many if not all of Iowa's communities.

Cities are generally responsible for maintaining not only their own street systems but also segments of FM roads that pass through their jurisdictions. However, if a segment of FM road passes through a town with population less than 500, the maintenance responsibility for the segment is transferred to the home county.

Beginning in July 2011, FM extensions through towns whose official populations are now below 500 will be transferred to the home counties. The affected towns will receive a letter from the Iowa DOT explaining the transfer, and their RUT distributions will be adjusted accordingly beginning with the August payments.

If a town's population increases to greater than 750, jurisdiction of an FM extension will be transferred back to a town, and the RUT distribution will be adjusted accordingly.

A city may have a special census conducted by the Census Bureau once each decade. After the results are certified by the Secretary of State, the new population total will be used to distribute RUT beginning the calendar year following the year the special census was taken.

There is no provision in the law to give "back pay" for RUT payments if the census count was incorrect in some manner. Any corrections to the census numbers will be reflected in the RUT payments to cities after the correction is certified by the Secretary of State.

Note: RUT payments to cities and counties can be found on the State Treasurer's webpage, www.treasurer.state.ia.us/roadusetax/. For FY 2012, the estimated per capita distribution will be $91.25.

For more information, contact John Dostart, P.E., Urban Engineer, Office of Local Systems, Iowa DOT, 515-239-1291, John.Dostart@dot.iowa.gov. ■

Stanley L. Ring Memorial Library: Current materials

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- Contact Jim Hogan, library coordinator, 515-294-9481, hoganj@iastate.edu, fax 515-294-0467.
- Mail or fax the order form on the back cover of this *Technology News*.

Publications

CR 108 Local Rural Road Owners Manuals (2011 US DOT-FHWA)

This set of three documents was developed to help local transportation practitioners better understand and address safety issues on rural roads. Road Safety Information Analysis discusses data types, collection, and analysis, and how to use data to identify locations with safety issues and then implement appropriate countermeasures. Roadway Departure Safety and Intersection Safety provide understandable, step-by-step approaches for identifying and addressing intersection and roadway departure safety issues.

P 1759 Culvert Scour Assessment (2009 USDA-Forest Service)

This publication quantitatively analyzes the geomorphic and structure controls on channel bed and footing scour at road-stream crossings. It also analyzes the effectiveness of aquatic organism passage at these crossings by comparing channel characteristics within the crossing structure to reference channel conditions not influenced by the structure. Bases on these analyses, it is possible to determine design, construction, stream, and channel conditions that contribute to the success or failure of an installation for both aquatic organism passage and scour resistance. Seventeen case studies are presented.

P 1763 Traffic Monitoring: A Guidebook (2010 US DOT-FHWA)

This booklet can help users understand traffic data collection principles and procedures. It discusses different approaches to traffic monitoring and the importance of collecting quality data that accurately reflect actual conditions.

P 1764 Traffic Monitoring in Recreational Areas (2010 US DOT-FHWA)

This document reports the results of an assessment of nationwide practices for recreational traffic data collection.

P 1765 Design Example of Simple Span T-Beam Strengthening With Fiber-Reinforced Polymer Composites (2011 US DOT-FHWA)

This report illustrates the design of an interior reinforced concrete T-beam strengthened with fiber-reinforced polymer (FRP) composites to meet the AASHTO Load and Resistance Design Bridge Design Specifications. The design example provides a straightforward, step-by-step procedure that can be used as a reference for the design and/or review of similar reinforced or prestressed concrete bridge members strengthened with FRP composites.

DVD 274 Road Safety 365: A Safety Workshop for Local Governments (2011 US DOT-FHWA) Note: Must be played on a PC

This one-day workshop is divided into nine modules that cover all aspects of improving safety on rural roadways. The video demonstrates how personnel who adopt a safety attitude/culture in performing their duties can have a significant impact on making their roadways safer.

DVD 278 The Safety Edge: Your Angle for Reducing Roadway Departure Crashes (2010 US DOT-FHWA)

This video shows the construction and safety benefits of the safety edge. (For information about implementation of the Safety Edge in Iowa, see the cover story in the Jan–Mar 2011 issue of Technology News, www.intrans.iastate.edu/ltap/tech_news/2011/jan-mar/safety edge.pdf.) ■

Conference calendar

June 2011			
17	IA District 6 Full-Dept Reclamation and Roller Compacted Concrete Lunch and Learn	Dubuque, IA	Anne Leopold, Snyder & Associates, Inc. 515-964-2020 aleopold@snyder-associates.com
August 2011			
18–19	2011 Mid-Continent Transportation Research Symposium	Gateway Hotel, Ames, IA	Kris Angaran 515-294-8103 krisa@iastate.edu
September 2011			
13–14	SPOT (Snow Plow Operators Training)	Camp Dodge, Johnston, IA	Kris Angaran 515-294-8103 krisa@iastate.edu
15	Snow Roadeo (Truck, Motor Grader, Loader) more information soon	Iowa State Fairgrounds, Des Moines, IA	Kris Angaran 515-294-8103 krisa@iastate.edu
27–29	Iowa Streets and Roads Conference and Workshop	Quality Inn, Ames, IA	Beth Richards 515-294-2869 brich@iastate.edu

Online Registration
Information and registration details about events sponsored by LTAP, InTrans, or other ISU organizations are available via the online calendar, www.intrans.iastate.edu/calendar/index.cfm.

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