August–October 2009

Technology NEWS

Iowa LTAP
Local Technical Assistance Program

Providing transportation technology transfer for Iowa's cities and counties

Inside this issue

IOWA STATE UNIVERSITY
Institute for Transportation

High-tension cable issues

Emergency precautions for cutting tension cable systems

Because they offer some advantages over other barrier systems, high-tension cable barriers are becoming more popular in several states, including Iowa. But first responders need to take special precautions when removing a vehicle that has become entangled in a high-tension cable system.

Anatomy of a high-tension cable system

NCHRP-350 certified systems are manufactured by various companies. In general, they consist of three or four cables (21-wire, ¾-in. rope), held at various heights on posts. The posts are designed to bend or break on impact.

End anchors hold the cables in constant tension—generally from 3,000 to 8,000 pounds. The tension can be adjusted and the cables can be released at the end anchors.

Potential advantages

Like other barrier systems, high-tension cable systems can prevent errant vehicles from entering oncoming lanes of traffic, preventing head-on collisions.

The tension in the cables absorbs the energy of an impact, potentially reducing the severity of injuries and damages.

After impact, the cables maintain their tension, even if a post has been damaged or broken, and can endure another impact if necessary. Systems have continued to provide crossover protection even after being struck by several vehicles.

The systems can cost significantly less to install than concrete median barriers, which require a paved median and storm sewer.

Damaged posts can be removed from their sleeves and replaced, and the cables reattached quickly without lane closures or heavy equipment.

High-tension cables absorb energy from an impact. Photos courtesy of the Iowa DOT.

Removing vehicles

Although not common, vehicles that crash into the cable systems can get entangled in the cables.

Whenever possible, responders should NOT cut the cable.

Try one of the following approaches to remove the vehicle, listed in order of preference:

1. Push or pull the vehicle back in line with the centerline of the barrier to reduce the lateral tension in the cables.
2. Lift the cables out of and/or off the posts for approximately 100 feet upstream AND downstream of the vehicle.
3. Lift and remove posts out of their sleeves or sockets for approximately 100 feet upstream AND downstream of the vehicle.
4. Loosen the nearest upstream AND downstream end tension anchors to release tension.
5. Release the cables from the nearest end tension anchor.

High-tension cable issues continued on page 2

Acronyms in *Technology News*

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
CTRE	Center for Transportation Research and Education
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

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High-tension cable issues continues from page 1

Cutting the cable as a last resort

In extreme emergency situations, if there is not time to release the vehicle as suggested above, the cable(s) might have to be cut. Cutting the cables may be necessary, for example, if a vehicle occupant has sustained life-threatening injuries and the cables are preventing responders from quickly reaching the occupant.

If the cable(s) must be cut, follow these guidelines:

Whenever possible, responders should NOT cut the cable.

- Everyone except the person making the cut should move well away from the cable system. When it is cut, each cable will immediately move perhaps 15 feet in both directions. Although whipping is not common, it is impossible to predict the exact direction and distance it will move.
- If possible, make the cut several hundred feet from the entangled vehicle, midway between two posts where the cables are parallel and are not being subjected to multiple forces.
- Cut the minimum number of cables required in the situation.
- Before cutting, wrap duct tape around the cable on each side of the intended cut. This will help reduce the amount of damage to the cable because it will help prevent unraveling of the cut wires.
- The person making the cut should stand perpendicular to the cables, arms in front, and should wear heavy gloves and protective gear.
- Use either an abrasive blade cutoff saw or hydraulic cutters.

After cutting

If a cable is cut, that section of roadway between end anchors—up to 1,000 feet or more—will be without guardrail protection until the cable is repaired or replaced.

Cut cable can often be repaired by splicing, especially if the cable is wrapped with duct tape in advance to reduce unraveling at the cut ends, as described above. Depending on the length of cable that must be replaced, the cost to replace the cable may be much higher than to repair it.

For more information

Find a short article describing high-tension cable barrier systems in the Mar–May 2004 issue of Technology News, www.intrans.iastate.edu/ltap/tech_news/2004/mar-may/guardrail.pdf.

Recently, the Iowa City fire department contacted LTAP librarian Jim Hogan about the dangers of cutting cable guard rail when responding to highway incidents. Jim obtained written guidelines from Chris Poole in the Iowa DOT's design methods section, from which this article is adapted.

The document directs readers to a Minnesota website with more information, including links to three videos showing cables being cut in different situations and with different equipment: www.minnesotafireservice.com/whatsnew_high_tension_cables.html.

Jim also obtained a training video on this topic from Kentucky. He has provided the video and the Iowa DOT guidelines to the Fire Service Training Bureau (FSTB), which will incorporate cable-cutting guidelines into future training.

To borrow the Kentucky video, contact Jim, 515-294-9481, hoganj@iastate.edu. Ask for DVD-264. ■

Why avoid cutting tension cable barriers?

Cutting the cable quickly releases the tension, and the sharp cut ends of the heavy, ¾-in. cable immediately spring apart. Although this situation is not overly dangerous, responders should use extreme caution and follow the guidelines in the accompanying article to avoid injuries.

Cut cable can often be repaired by splicing. If repair is not possible, however, the cost of replacement can be very high since several hundred feet of cable may be involved.

Until the cut cable is repaired or replaced, several hundred feet of roadway will be without barrier protection.

Goodbye from director

"Together we have made a difference."

– Duane Smith

After more than 15 years as Iowa's LTAP director, I am retiring from Iowa State University on December 31, 2009. It has been my privilege to lead this program and to work with Iowa's many fine public works directors, transportation engineers, maintenance supervisors, and road workers.

Looking back

It's satisfying to remember some Iowa LTAP accomplishments during the past 15 years.

Growth of training programs. Iowa LTAP's outreach activities have grown steadily. Today we conduct about 75 events annually, serving about 3,000 attendees.

During my term as director, we developed some major, statewide events like the annual maintenance expos, which at one point attracted 1,200 people from shops across the state. As I'll discuss briefly below, the trend is now shifting from large, centralized events back to smaller workshops held at more venues around the state.

In 2003 we initiated the Roads Scholar program to encourage and reward local streets and roads personnel who improve their knowledge and skills through LTAP workshops. The program recognizes various levels of achievement.

Involvement in the Roads Scholar program has far exceeded our expectations. To date, 15,963 people have participated in at least one workshop. Ten people have achieved senior level, and nine have achieved master level.

Partnerships. First, parallel to FHWA's emphasis on partnering with professional associations, the Iowa LTAP has developed strong working relationships with local organizations. Partnership agreements have been signed with the Iowa chapter of the American Public Works Association and the Iowa County Engineers Association (local chapter of the national Association of County Engineers).

Second, we also helped nurture the development and growth of the Iowa Secondary Roads Maintenance Supervisors Association (ISRMSA), which focuses on meeting the unique training needs of local roads maintenance supervisors. Many thanks to Ron Dirks from Pocahontas County for the initial idea for this association.

These partnerships, together with our close working relationship with the Iowa DOT, have led to many new initiatives. One of these is LTAP's online Leadership Academy, which is currently being developed in partnership with ISU Extension.

Valuable relationships. In addition to partner organizations, we have developed long-term relationships with several dedicated people around the state who, time after time, contribute their effort and knowledge to LTAP. These include the folks who have served stints on the LTAP advisory board and workshop committees and the staff in the Iowa DOT's Office of Local Systems who have managed the LTAP contract—currently Charlie Purcell, office director, and Donna Buchwald, deputy office director. So many of these people have become personally involved in and committed to LTAP's success.

In addition, at the risk of omitting someone who should be named, I would like to personally recognize some of our other LTAP "champions." They include Bret Hodne of West Des Moines, Mark Bair of Poweshiek County, Al Olson of Ankeny, Bob Dingman and Matt Dolan of West Des Moines, Chad Schaeffer of Fort Dodge, Pat Miller from Council Bluffs, Brian Keierleber from Buchanan County, Mark Nahra from Woodbury County, and Greg Parker from Johnson County. For me the list goes on and on.

I'll always be particularly grateful to Stan Ring, the original director of Iowa's LTAP. During my first several years with the program, it was my privilege to work closely with and learn from Stan, who had officially retired but was still enthusiastically managing the LTAP library. Many of Iowa LTAP's accomplishments during the last 15 years were made possible because of the solid foundation of service and outreach on which Stan built the program. Stan died in 2000, but he's still part of our LTAP family through the renamed Stanley L. Ring Memorial Library.

Looking ahead

Agencies continue to face reduced training budgets for travel and training. Yet, the combination of staff turnover and continually advancing technologies only increases the need for up-to-date, affordable training. Iowa LTAP's goal is to adapt training delivery to meet local agencies' needs within available budgets.

As one solution, Iowa LTAP is returning to its roots of conducting workshops at many

Goodbye from director continued on page 4

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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Goodbye from director continues from page 3

locations across the state for smaller local or regional audiences instead of requiring attendees to travel to one central location. The annual winter maintenance workshop, for example, will be offered at three regional locales.

In some cases, this will require us to build up a broader base of instructors. We've already staffed up in the area of safety. Tom McDonald, safety circuit rider, is continuing and expanding his workshop offerings around the state, while Bob Sperry offers in-house, local crash data–based training to local agencies.

In addition, we are experimenting with Internet-based training. The Leadership Academy mentioned above is one of our first initiatives in this format, and we're eager to evaluate each module's effectiveness and participants' reactions.

LTAP will be offering more workshops and demonstration projects based on research. Like a recent workshop on retroreflectometers, many of these events provide training on the use of new or updated technologies, including surveying equipment.

Not goodbye

Through LTAP, I have met hundreds of skilled and knowledgeable people who are dedicated to improving the condition and safety of Iowa's streets and roads. You have challenged me and made me better, and I hope I was able to help you in some way. I know that together we have made a difference.

And, you haven't seen the last of me. While I'm looking forward to spending more time with my wife Carol and our far-flung children and grandchildren in the near future, I also plan to find ways to remain active in the transportation profession.

Thank you and best wishes. ■

Record-setting symposium

Nearly 400 professionals—the largest number ever—from 17 states attended the Mid-Continent Transportation Research Symposium on Aug. 20–21, 2009, at Iowa State University. Many of the 135+ papers, abstracts, and/or presentation slides are available online, as are revolving sets of photos from the event. See www.intrans.iastate.edu/news/2009/2009symposium.htm.

Thank you to the presenters, special speakers, and attendees, all of whom helped make this one of our most successful symposia to date. ■

Best Practices for Low-Cost Safety Improvements on Iowa's Local Roads | Excerpt 2 – Traffic Calming

This is the second in a series of summarized excerpts from the manual* Best Practices for Low-Cost Safety Improvements on Iowa's Local Roads. *This excerpt is based on Chapter 2: Traffic Calming. Remove this page and post it, or photocopy it and distribute it to your staff.

Speed Displays

Speed displays make drivers aware of their vehicle speeds, which may lead them to slow down to comply with the posted speed limit. In addition, speed displays can have variable messages such as "SLOW DOWN."

A speed display installed at the north entrance of Slater, Iowa, on R-38 was effective in slowing drivers. The cost per display is between $2,000 and $11,000.

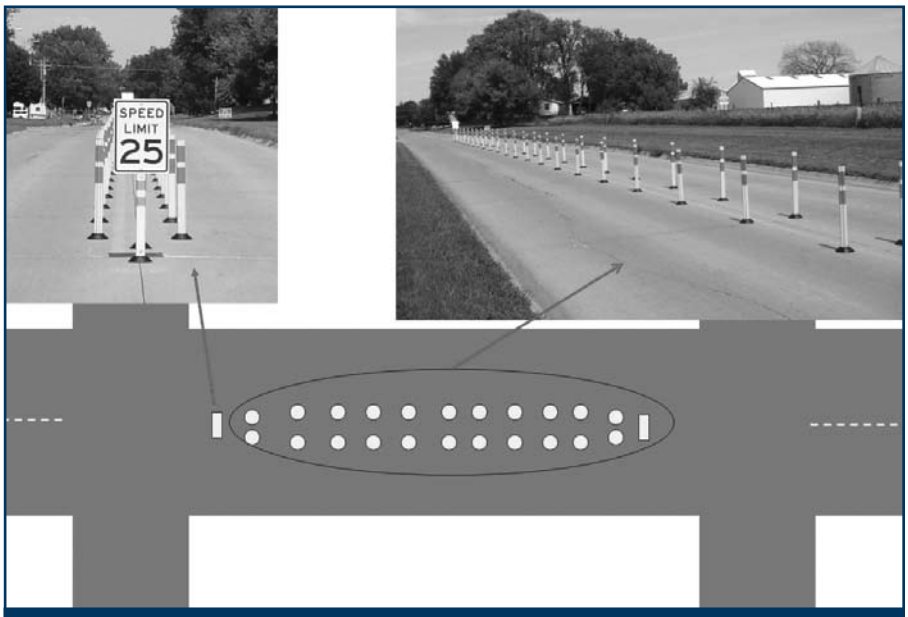
Project contact
City Clerk
Slater City Hall
105 Greene Street
Slater, IA 50244
Phone: 515-685-2531

A speed display installed in Slater (left) and speed displays with variable messages (right). (All photos courtesy of Dr. Shauna Hallmark, InTrans, ISU)

Lane Width Reduction with Channelizers

Channelizers effectively slow drivers using visual and physical stimuli. They should not be placed so that they block driveways or cross-streets. With their flexible structure, channelizers quickly return to their initial position if struck by a vehicle. Channelizers that have been struck repeatedly, however, may require maintenance. Longitudinal channelizers were installed along the centerline south of the Slater, Iowa, entrance on R-38. One disadvantage of placing channelizers along the centerline is that wide trucks and farm machinery may have difficulty maneuvering around them.

Project contact
City Clerk
Slater City Hall
105 Greene Street
Slater, IA 50244
Phone: 515-685-2531



Channelizers along the centerline in Slater, Iowa.

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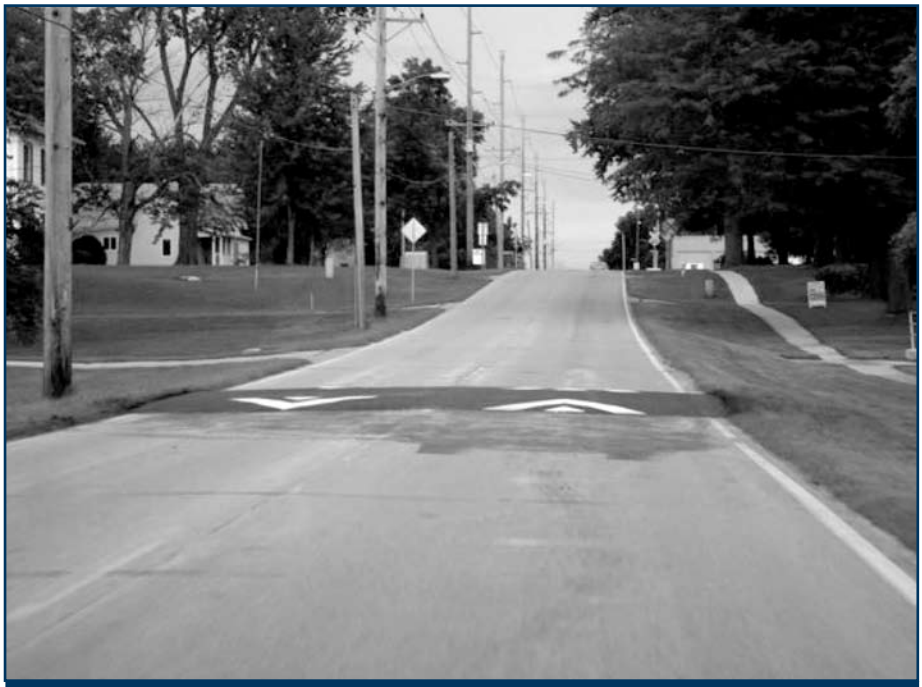
Speed Tables

Speed tables are speed humps designed for roadways with posted traffic speeds up to 45 mph. Like speed humps, they force drivers to slow down and comply with the speed limit. Speed tables are made of asphalt or rubber. With their wide, flat tops and gentle slopes, they cause less vehicle disruption than speed humps, which is important for emergency vehicles. Speed tables were installed at the western entrance of Gilbert, Iowa, on County Road E-23. Each speed table costs $3,000 to $4,000.

Project contact
City Clerk
Gilbert City Hall
Gilbert, IA 50105
Phone: 515-233-2670

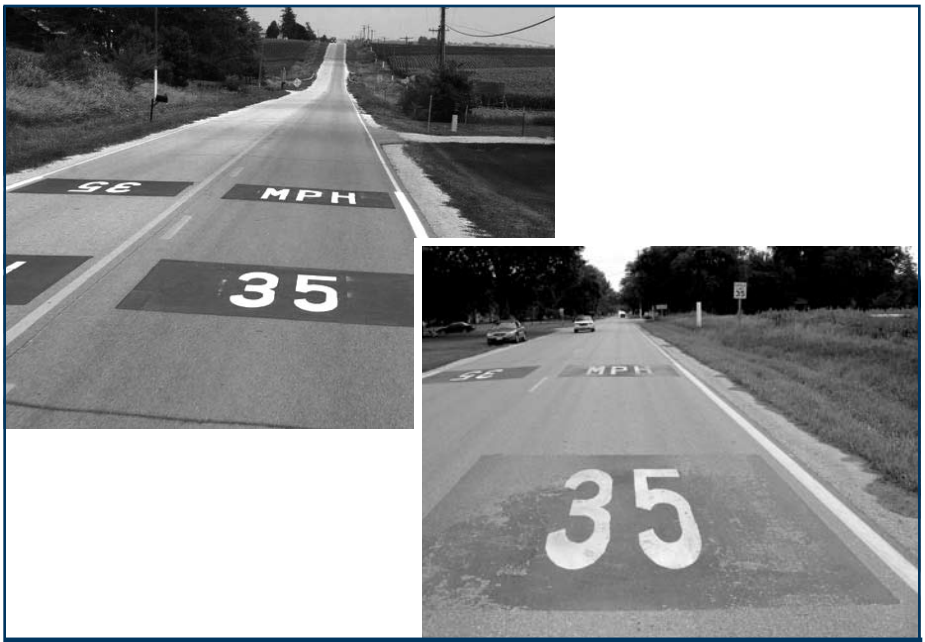


A 30 mph speed table used for residential traffic calming in Gilbert, Iowa.

Red Painted Pavement Markings

Red painted pavement markings feature the speed limit painted in white on a red background. The red painted pavement markings can slow drivers by making them more aware of the posted speed limit. This traffic calming technique was installed at the Dexter, Iowa, city entrances on County Road F-65. The technique's effectiveness decreased over time as the markings faded but was restored when the markings were re-painted.

Project contact
City of Dexter Clerk
911 State Street
Dexter, IA 50070
Phone: 515-789-4210



East entrance to Dexter, Iowa, immediately after treatment was installed (left), and west entrance to Dexter after nine months (right).

Conference calendar

October 2009			
27	Low Cost Safety Improvements for Local Rural Roads Workshop	Storm Lake	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
28	Low Cost Safety Improvements for Local Rural Roads Workshop	Waverly	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
November 2009			
4	14th Annual Traffic and Safety Engineering Forum (by invitation only)	West Des Moines	Mary Stahlhut 515-239-1169 mary.stahlhut@dot.iowa.gov
5	Human Factors Focus Group/Workshop (by invitation only)	Gateway Hotel, Ames	Judy Thomas 515-294-1866 jathomas@iastate.edu
12	Low Cost Safety Improvements for Local Rural Roads Workshop	Ottumwa	Tom McDonald 515-294-6384 tmcdonal@iastate.edu
17	Low Cost Safety Improvements for Local Rural Roads Workshop	Creston	Tom McDonald 515-294-6384 tmcdonal@iastate.edu

Stanley L. Ring Memorial Library: Current materials

Note about delivery of materials: *The library now sends orders through the U.S. Postal Service. This change is resulting in important savings for LTAP, but ordered materials do not arrive as quickly. If you have an urgent need for library materials, let us know when you place your order and we will arrange faster delivery.*

Three ways to order LTAP library materials

- Use the online catalog, www.intrans.iastate.edu/ltap/library/search.cfm.
- 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 *Technology News*.

Publications

P-1741 Ground-Based LiDAR: Rock Slope Mapping and Assessment

This report determines whether the new ground-based LiDAR (Light Detection and Ranging) technology could assist with highway rock slope stability. It discusses currently available LiDAR hardware and software, the current state of LiDAR for highway geotechnical applications, and best practices and current trends in the industry.

P-1742 Guide to Promoting Bicycles on Federal Lands

This report provides guidance on how to promote bicycling. It presents the benefits of bicycling, successful bicycling programs, policies that support bicycling, issues and challenges faced by land managers, and useful resources available to help meet those challenges.

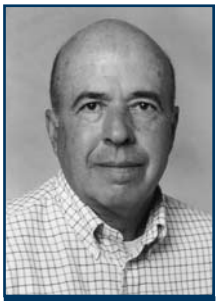
P-1743 Connection Details for Prefabricated Bridge Elements and Systems

This document was developed to promote the use of prefabricated elements and systems in bridges and focuses on "connection details" as part of accelerated construction projects. Most of the details were obtained from state departments of transportation, industry organizations, and private consultants.

DVDs

DVD-263 Operators Pre-Start Motor Grader Inspection

This video promotes motor grader safety and productivity for city and county road agencies. It covers the daily walk around inspection in great detail and emphasizes safety practices during both maintenance and operation. ■



Jim Hogan, LTAP librarian

From the Iowa DOT library

The following information is excerpted from the Iowa DOT's library newsletter:

The Iowa DOT Historical Archive Committee continues adding new photo collections to its website, http://historicalphotos.iowadot.gov/ermsportal/historicalphotos_home.aspx/. Following are three recent additions:

1. Iowa airports—268 photos of aerial views of airport facilities that date from the 1960s to the present. These photos were taken to supplement airport improvement plans submitted by the cities to the Aeronautic Commission and DOT Office of Aviation.
2. Julien Dubuque Bridge, Dubuque, Iowa—183 photos taken in 1941 from initial bridge construction to completion.
3. Interstate 480 bridge between Council Bluffs, Iowa, and Omaha, Nebraska—140 photos taken in 1966 from initial bridge construction to completion.

The library has added several new Iowa railroad books to its collection:

1. Iowa's Railroads: An Album, H. Roger Grant and Don L. Hofsommer. Indiana University Press. 2009, 301 pp.
2. The Minneapolis and St. Louis Railway, A Photographic History, Don L. Hofsommer. University of Minnesota Press, May 2009, 296 pp.
3. Quincy Route, A History of the Quincy, Omaha, and Kansas City Railroad and the Iowa and St. Louis Railway, Michael R. Johns with Ralph L. Cooper. Poker Books, Omaha, NE. 2008. ■

Hank Zaletel, Iowa DOT librarian
Lori Fiscus, Iowa DOT library assistant

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