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IOWA STATE UNIVERSITY  
Institute for Transportation

## REACTOR Lab tool aids in traffic incident management response

Whenever there's a slowdown on Iowa's roadways, every second counts to prevent crashes or secondary crashes.

That's why the Iowa Department of Transportation (DOT) has invested in putting together traffic incident management (TIM) plans to provide coordinated, safe, efficient, and timely management of highway incidents.

Those plans mean that at high traffic areas and interstates, there's a coordinated effort among multiple agencies to alert drivers and reroute traffic to a pre-arranged course. More than 800 of those TIM plans exist throughout the state.

Iowa State University's Institute for Transportation (InTrans) has been working with the Iowa DOT to make those plans easier to access with a TIM Dashboard, and save those critical seconds. The TIM Dashboard is available here: <https://bit.ly/2qoHhBG>

"Every minute it takes to clear off a roadway has safety implications to people driving by, as well as people in the field," said Skylar Knickerbocker, InTrans research engineer, who worked on the dashboard project. "The easy access of this dashboard is the key part of making it available to everyone easily."

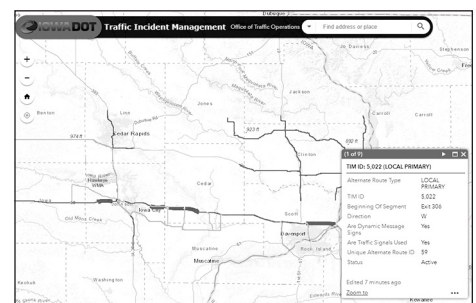
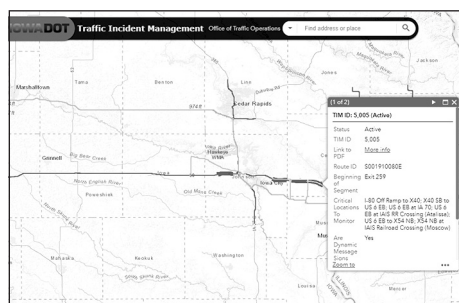
The dashboard includes a map of Iowa with highlighted routes, where emergency responders, police, and other local officials can click on any part of the highlighted route to access quick information on the TIM plan for that area, and then link to the full plan. The idea is that the map can always be up-to-date, and quickly accessed on a desktop computer or mobile device whenever and whatever incident occurs.

Jared Smith, Iowa DOT Traffic Incident Management coordinator, has worked closely with InTrans to develop the TIM Dashboard.

"Our goal in TIM is to respond to incidents in a timely manner, keep drivers moving, and keep people safe, this dashboard tool will make those efforts easier," Smith said.

Theresa Litteral, who works with a variety of agencies as the statewide multidisciplinary safety teams (MDST) facilitator to develop these plans, said the coordination between the agencies is essential and incredible.

"It's really more than anything a coordination and communication of efforts," Litteral said. ■



Screenshots from the TIM Dashboard tool

## 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



### 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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## From the Director: Deconstruction and renewal

As some of you know, LTAPs throughout the United States, have been waiting for some time as the FHWA works to finalize its new vision for the LTAP funding they have historically provided to each state. It is developing a draft strategic plan that they indicate will be released any day. At the time I wrote this column, this information had not yet been delivered to the states for review. The timing, however, may work out well because here in Iowa our next proposal workplan to the Iowa Highway Research Board for LTAP state funding will need to occur in the next six months (if all goes as planned). As always, our primary focus and goal will be on providing the local transportation agencies of Iowa what they need in the format they would like.

The FHWA initiative, workplan needs, and various other factors will make 2019 a transition year for Iowa LTAP. The approach I've decided to take to address the needs of this transition is to essentially "deconstruct" LTAP and ask the question, "If all of us were building Iowa LTAP today, what it would look like?" Of course, an absolutely essential part of answering that question is getting input from all the different types of local agency staff we serve. In 2018 FHWA and Iowa LTAP completed national and state-level, respectively, needs assessments. If FHWA provides us with the Iowa data they collected, we will use the results from both of these activities in the "construction" of our new workplan. The content of the draft or final FHWA national strategic plan will also be used.

More importantly, as part of this entire process, I will be holding a second internal strategic planning meeting with my staff, a LTAP advisory board meeting (which includes city, county, DOT, FHWA, and ISU representatives), and an external partner strategic planning meeting.

This external partner strategic planning meeting, if things go as planned, will be run by an external facilitator rather than myself. It is hoped that this will increase input from those at the meeting and that the facilitator may elicit different types of responses by removing LTAP staff from the room. Overall, it seems like a good idea to see what this proven approach might produce. The facilitator may also do pre-surveys of the executive boards of Iowa County Engineers Association (ICEA) and Iowa APWA, but those details are still being worked out. The external partner strategic planning meeting will have representatives invited from all our partner organizations.

I believe this may be the first time in the 35 years of Iowa LTAP (just celebrated last year) that its structure has been considered this closely. The whole process may be a bit scary. Risky, probably, but as long as the focus remains on our service to local transportation agencies of Iowa, it is worth it all. Evolution can come from decay and mud can produce beautiful flowers. Hard journeys are our best opportunities for growth. With each step the person taking it changes.

Thanks for coming along on the journey. If you have any questions or want to get involved, please call me for a chat.

With deepest gratitude. ■

Keith

## Submissions welcome for Iowa's Build a Better Mousetrap Competition

Employees of Iowa's local agencies often find creative solutions to common problems in order to do their work more effectively or efficiently. New tools, innovative processes, or equipment modifications can all result in a cost savings and benefit the local community. And those latest innovations or best practices are often dreamed up by the people who work on the front lines.

Iowa's Build a Better Mousetrap Competition gives local agencies the chance to show off the unique solutions they've developed, the better mousetraps they've built. Local agency employees can learn more about the competition, as well as get details to submit an entry at <https://iowaltap.iastate.edu/build-a-better-mousetrap-competition/>.

The entries will be judged on cost savings/benefit to the community, ingenuity, ease of transferability, effectiveness, and video demonstrations. The deadline to submit an entry is June 3, 2019. ■

## Safe Driver Manual offers model policies for local agencies

Incidents with vehicles remain as one of the top causes of injury among Iowa Municipalities Workers' Compensation Association (IMWCA) members. Distracted driving has become a significant factor in the growing number of vehicle-related incidents, and the lack of seatbelt usage contributes heavily to the severity of vehicle-related claims. When the two factors are combined the compounded effect on large, costly injuries becomes staggering.

IMWCA has previously adopted a policy requiring members adopt and implement a seatbelt policy that goes beyond state law. The result was a decline in seatbelt incidents for members who adopted and consistently enforce the policy. Conversely, members who do not have a separate policy or have not enforced their policy continue to see significant losses. A recent review of claims showed three of the largest claims in 2018 involved truck drivers not wearing seatbelts and being distracted in some fashion while driving.

The new Safe Driver Manual has a model seatbelt policy that also covers off-road equipment and passengers. The model policy also clarifies who qualifies for the

slow-moving route exception defined in state law, which is generally misinterpreted to be broader than it really is. In addition, the new model also makes clear that management is responsible for the enforcement of the policy.

The manual includes commonly asked questions, seatbelt facts, and seatbelt-related training IMWCA members can access through the IMWCA Online Safety University.

Distracted driving has become a bigger issue as more employees rely on cell phones to communicate personal and work needs. The model policy defines distracted driving and sets guidelines for employees to follow to safely use personal communication devices. Some of the updates include use of hands-free technology, which is now available in more trucks and heavy equipment.

The policy also addresses operating vehicles and equipment while taking medications, being ill or fatigued. Employers should review their policies on how to address employees who may be impaired due to illness or using medications while working. This is a

policy very similar to what is used by the Iowa League of Cities, and therefore followed by IWMCA administrative staff.

To help curtail the number of needless vehicle and equipment-related claims, IMWCA hopes members will utilize this manual to give employees and management more tools to be safe drivers. At the end of the day, the manual is about getting wherever you're going, including home, safe.

Take a look at the Safe Driver Manual with its model policies for seatbelt use and prevention of distracted driving here: <https://www.imwca.org/SiteCollectionDocuments/SafeDriverManual.pdf>.

*Reprinted with permission from the Iowa Municipalities Workers' Compensation Association (IMWCA). Originally appeared in the January 2019 edition of **The Informer**, a publication of IMWCA, as "Introducing the Safe Driver Manual." Read the article and more here: <https://www.imwca.org/NewsEvents/Documents/Jan19Informer.pdf>. ■*

## 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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# Using local, native plants has benefits to roadside maintenance

Integrated roadside vegetation management is just a fancy term for putting things back the way they were when buffalos roamed Iowa prairies. In the 1940s, 50s, and 60s when most Iowa roadways were originally built, roadside plantings were not a main focus before, during, or after highway construction. Planting non-native species along the road was inexpensive and seemed to work just fine to cover the area.

By the 1980s, roadside erosion and water quality started becoming a problem. The Iowa DOT's roadside development group began researching the underlying issues causing these problems. This led them to advocate for a transformation of roadsides back to deep-rooted native prairie plantings to stabilize the soil and provide filtration for water runoff.

Now, nearly 40 years later, Iowa is a national leader in the use of natives in roadside planting. Iowa DOT-managed roadsides are blooming with cone flower, penstemon, blazing star, and dozens of other species of trees, grasses, shrubs, and wildflowers. Hardy and beautiful, native roadsides offer aesthetic, economic, environmental, and educational benefits and opportunities.

## Planting native species has benefits

Establishing prairie plants in roadside rights of way has many benefits. They include the following:

- Provides low-maintenance weed and erosion control
- Slows surface runoff and improves storm water infiltration
- Reduces blowing and drifting snow and winter glare
- Improves sustainability by increasing species diversity
- Enhances wildlife habitat
- Beautifies the landscape by providing ever-changing color and texture throughout the year

- Preserves natural heritage
- Provides filtering and capture of nutrients, pesticides, and sediment

“Native” plants are defined as those that occur naturally in a particular region, ecosystem, or habitat without direct or indirect human actions, and are thus better suited for survival under natural conditions.

Since 1990, the Iowa DOT has planted or enhanced 54,097 acres of roadsides with native grasses and wildflowers.

## Funding for local native plantings available

In 1988, the Iowa Legislature established the Living Roadway Trust Fund (LRTF) within Iowa. The Iowa DOT administers this fund, including an annual, competitive grant program that provides funding for integrated roadside vegetation management activities to eligible cities, counties, and applicants with statewide impact. In doing so, the Iowa DOT and its partners promote and educate the public about the need for an integrated approach to managing the vegetation along Iowa's roadsides. This approach ensures that roadside vegetation is preserved, planted, and maintained to be safe; visually interesting; ecologically integrated; and useful for many purposes.

The LRTF has funded more than \$17 million for research and demonstration projects, vegetation inventories, education and training programs, gateway landscaping, snow and erosion control, and roadside enhancement and maintenance since 1990.

*Reprinted with permission from the Iowa DOT. Originally appeared in the Iowa DOT's June 14, 2017, edition of **Transportation Matters for Iowa** blog as “IOWA'S ROADSIDES: BEAUTY AND ENVIRONMENTAL BENEFITS RUN DEEP.” Read the original and more here: [www.transportationmatters.iowadot.gov/2017/06/iowas-roadsides-beauty-and-environmental-benefits-run-deep.html](http://www.transportationmatters.iowadot.gov/2017/06/iowas-roadsides-beauty-and-environmental-benefits-run-deep.html) ■*



# LTAP expands equipment loan program

Iowa LTAP has recently expanded its equipment loan program, with new equipment acquired to assist in testing wood pilings and bridges. The test set includes basic sounding and probing equipment, a moisture meter, stress wave timer, and resistance drill. Equipment consists of an IML RESI PD400 Wood Piling Inspection Drill and accessories, a Fakopp Microsecond Timer, and a Delmhorst J-2000 pin style moisture meter.

The RESI PD400 is a tool that digitally records and presents wood quality by measuring the drill's needle resistance while it passes through a wood pile. The drill works based on the principal of measuring the resistance in wood that is encountered by the drilling needle. The drill bit (needle) is inserted by the drill tool into the wood being tested under a constant drive, with the energy expended being measured based on the depth of the bit. A measurement profile generated through this process provides information about the internal condition of the wood being evaluated. This includes annual growth rings and areas of decay that are present. The drill is capable of obtaining measurements to depths up to 1,000 mm (~40 in.). The data is recorded electronically in the drill's memory, plotted on a screen on top

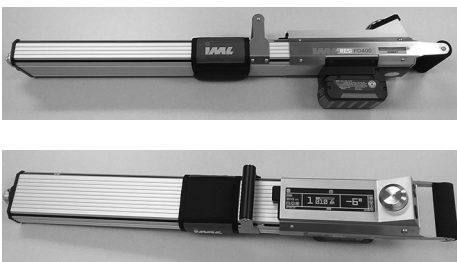
of the drill itself, and capable of being downloaded for analysis through software provided with the drill kit.

The Fakopp microsecond timer is another tool that can be used to locate and define areas of decay in wood. It is especially useful for thick or glulam timbers. Stress waves generally travel faster through sound/quality wood faster than decayed wood. If a defect or decay is encountered in the wood, the stress wave will avoid it. By measuring wave transmission time through the wood in the transverse direction, the internal condition of the element can be evaluated. The microsecond timer uses two transducers to define a line through the wood. A stress wave, created by tapping one of the sensors with a hammer, travels through the wood to the opposite sensor, with the time for the wave to reach that transducer measured. The elapsed time is displayed on the handheld timer that is connected to the transducers, and this value, which is converted to a transmission time on a per length basis, is used to predict physical conditions inside the wood. The elapsed time (in microseconds,  $\mu\text{s}$ ) can then be compared to stress wave times for different levels of deterioration for that particular wood species.

The Delmhorst J-2000 pin style moisture meter is a tool that can be used for moisture content inspection. Lower moisture content (below 20%) will not produce wood decay, but as moisture content begins to rise, the potential for decay increases. The Delmhorst J-2000 moisture meter detects electrical resistance between two pins (approximately 3 in. in length) driven into the wood. Based on the species of wood specified by the user, the meter converts the resistivity reading into a moisture content percentage.

In addition to the new wood testing equipment, the equipment program still offers the sign retroreflectometer and digital ball banks for local agency use. All equipment loans are free for local agencies. Visit <https://iowaltap.iastate.edu/equipment-loan-program/> to learn more about the different equipment that is available and to request a loan.

*Article written by David Veneziano, Safety Circuit Rider, Iowa LTAP. ■*



Images of the IML RESI PD 400 Wood Piling Inspection Drill seen from the side (top) and from above (bottom)



An image of the Fakopp Microsecond Timer



An image of the Delmhorst J-2000 Moisture Meter

# Design techniques protect roadway embankments, reduce damage during flooding

Roadway overtopping—when floodwaters flow unimpeded across roads—can be dangerous and costly. In a recent project, University of Minnesota researchers studied erosion, flow, and shear stress to find new ways to protect roadways from this major safety concern.

“This project was a combination of basic and applied science, and is a great example of the university and MnDOT working together successfully to solve problems unique to our geography and climate,” says Jeff Marr, associate director of engineering and facilities with the university’s St. Anthony Falls Laboratory (SAFL). The project was funded by the Minnesota Local Road Research Board and the Minnesota Department of Transportation (MnDOT).

SAFL researchers focused their analysis on the Red River watershed in northwestern Minnesota; roads in the area are prone to flooding and overtopping. Downstream scour and erosion of roadway embankments can result in breach or washout of the entire roadway. Raising the roadway to prevent overtopping is not a feasible solution, Marr explains, as flood plain law does not allow moving the problem elsewhere by backing up the water. The most cost-effective option is to allow floodwaters to overtop roadways and to try to protect their embankments from scour. Developing cost-effective scour-prevention measures

could greatly reduce the cost of repairs, as well as the time required to reopen the roadway after a flood event.

## Project scope

The goal of this project was to investigate the effectiveness of slope protection techniques to shield overtopped roadways and their downstream embankments from scour and erosion. A further goal was to use cost-effective methods that could be installed by local agencies instead of contractors, Marr says.

The research team developed a field-based program to collect data on the hydraulics associated with full-scale overtopping events. Researchers recorded flood stage at several locations during overtopping events and evaluated the failure modes under natural conditions. Annual field monitoring occurred from 2013 through 2016.

Next, the research team conducted a series of experiments at SAFL to study the hydraulic and erosional processes associated with overtopping. With bare soil used as a control, three erosion protection techniques were investigated: geogrid over existing vegetation (armored sod), turf reinforcement mat, and flexible concrete geogrid mat. All three encourage vegetation to grow through a mat, helping to stabilize the soil, and protect the embankment from scour and erosion.

## Research conclusions

The researchers were able to draw some conclusions from the laboratory experiments, including:

- Bare soil with no vegetative cover (the control) is highly susceptible to erosion and is the worst-case scenario. New installations should have established vegetation before the first overtopping event is expected.
- All three mitigation techniques reduced erosion, but the flexible concrete geogrid mat provided the best protection.

“This project developed a fairly complete matrix of useful erosion-protection measures that our own staff can implement—techniques that are less elaborate and more cost-effective than hiring contractors,” says J.T. Anderson, assistant district engineer with MnDOT District 2.

*Reprinted with permission from the Center for Transportation Studies, University of Minnesota. Originally appeared in the February 2018 edition of **Catalyst** as “DESIGN TECHNIQUES PROTECT ROADWAY EMBANKMENTS, REDUCE DAMAGE DURING FLOODING.” Read the original and more here: [www.cts.umn.edu/publications/catalyst/2018/february/flooding](http://www.cts.umn.edu/publications/catalyst/2018/february/flooding). ■*

*“This project developed a fairly complete matrix of useful erosion-protection measures that our own staff can implement—techniques that are less elaborate and more cost-effective than hiring contractors.”*

*—J.T. Anderson, Assistant District Engineer, MnDOT District 2*

# Workshop and conference calendar

Date	Event Name	Location	Contact
<b>April 2019</b>			
4–5	2019 APWA Iowa Chapter Spring Conference	West Des Moines	Peggy Englehart
8	Excavation Safety Workshop	Davenport	Paul Albritton
8	Low Cost Safety Improvements	Ames	David Veneziano
9	Excavation Safety Workshop	Tripoli	Paul Albritton
10	Excavation Safety Workshop	Storm Lake	Paul Albritton
11	Excavation Safety Workshop	Atlantic	Paul Albritton
11	Low Cost Safety Improvements	Cedar Rapids	David Veneziano
12	Excavation Safety Workshop	Knoxville	Paul Albritton
12	Low Cost Safety Improvements	Waverly	David Veneziano
14–18	National Association of County Engineers	Wichita, KS	Keith Knapp
24	Low Cost Safety Improvements	Atlantic	David Veneziano
25	Low Cost Safety Improvements	Storm Lake	David Veneziano
30	Motor Grader Operator Workshop	Sigourney	Paul Albritton
<b>May 2019</b>			
7	Motor Grader Operator Workshop	Atlantic	Paul Albritton
14	Motor Grader Operator Workshop	Spencer	Paul Albritton
21	Motor Grader Operator Workshop	Waverly	Paul Albritton
29	Motor Grader Operator Workshop	Ames	Paul Albritton

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## Event details and online registration

Watch for details and online registration information, by specific dates and events, on the Iowa LTAP Workshops page, [iowaltap.iastate.edu/workshops/](http://iowaltap.iastate.edu/workshops/). ■

## Iowa LTAP Tech Corner—PaveCool

### What is it?

Asphalt paving contractors, inspectors, and engineers need to make rapid decisions regarding cool-weather paving. PaveCool, developed by the Minnesota Department of Transportation, is a tool that uses a heat flow model to estimate the time it takes for the asphalt mix to cool from the delivery temperature to the recommended stopping temperature.

### How does it work?

Users enter the relevant details—time, date, and latitude details of the paving job, the type of mixture, the type of surface to be paved, weather conditions, thickness, and mixture delivery temperatures—to get the estimated start and stop times, as well as a graph showing those details. Users can save their results to compare different conditions to do a more effective job.

### Where can I get it?

Available for free on iTunes or Google Play. A desktop version is also available at: <http://www.dot.state.mn.us/app/pavecool/index.html>. ■



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