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IOWA STATE UNIVERSITY
Institute for Transportation

Iowa's Build a Better Mousetrap winners announced

The winners of this year's Build a Better Mousetrap have at least one thing in common: they all developed a simple yet innovative piece of equipment that made their workplaces safer or their jobs more efficient or both.

The city of Clive earned the top prize this year for its inventive custom rivet press for its street blade assembly. Clayton and Appanoose counties earned second and third places, respectively. Jasper County also earned an honorable mention.

The top three entries were recognized with plaques at this year's Iowa Streets and Roads Conference, and they will be entitled to between three and one free registrations to LTAP's many training courses. Clive will also get on-site recognition and an appreciation lunch.

City of Clive

Though commercial rivet presses are available, they were not suitable for the designs the city uses to place its street signs. Instead, the staff had been hammering in the rivets by hand, which created a louder and potentially less safe environment. It took about three weeks to develop and finalize the design and cost about \$125, and made the workplace quieter and safer. The city put together a short video to demonstrate their invention, which is available at https://youtu.be/FHa3h_FutLA.



Clayton County

Washboarding on hilly gravel roads had been a constant and recurring problem in the county, so staff put together a motor grader roller that combines blading rocks and "wheel pack" them at the same time in one pass on a roadway. The new roller cost about \$5,000, but it reduces the time spent grading and packing roads and also makes for longer lasting improved road quality. Video of the motor grader roller at work is available on Clayton County Road Department's Facebook page at www.facebook.com/claytoncountyiowaroaddepartment/videos.

Appanoose County

The county created its own back-up alarms that plug into trailer plug outlets and can be removed when not being used on a work site. The cost is \$35 and makes construction sites safer for everyone working or traveling around it.

Those interested in submitting their inventions or learning more about the contest and its categories can visit: <https://iowaltap.iastate.edu/build-a-better-mousetrap-competition/>. Entries can be submitted year-round, and the deadline for next year's competition is June 3. ■



City of Clive's custom rivet press (left) and Clayton County's motor grader roller (right)

Acronyms and Abbreviations in Technology News

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
FHWA	Federal Highway Administration
ICEA	Iowa County Engineers Association
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

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From the Director: Living with intention

Living with intention. What does this mean to me? It is said that in order to live an intentional life we need to know our primary motivation. What is that motivation at a particular time in our lives and how does it guide our actions? It will influence our habits, our social structure, and our environment. In other words, what we do, who we do it with, and where we do it. It might be self-focused or focused on others. But, it does impact how we go about our lives and interact with those around us. A motivation for service to others is something I feel is a noble pursuit, and we've all met people that embody some or all of this approach. Seems like a good objective.

So, why am I thinking about intention so much? Well, this past July I did something that was not so much motivated by service to others but to myself. I supported a habit of mine, found myself with like-minded people, and changed my environment to get it done. I went to Colorado to hike up what I hope is just my first "fourteener" (a mountain greater than 14,000 ft at its summit). But, it was not something I *had* to do, and after reading about some of the dangers involved, I resolved that I needed to do it with the proper intention. Making the summit would be great, but the journey was what was really important. And evaluating the situation, as it existed at that moment, thousands of feet up, was *most* important. For example, altitude sickness could occur (it did, but to someone else), and storms could come in quickly (being above the tree line is not a good thing and it would be time to turn around if that happened).



Keith at summit of one of Colorado's fourteeners

Upon reflection, during this short but relatively challenging hike (3,000 ft, 3 mi, and six hrs), I had to evaluate current situations and make decisions as they came, while all the while remembering my intention. Situations changed with the time of day (the sun came over the mountains at about 7:30 am), the altitude (there was still snow at 13,000 ft!), and with the input from my trail partners, which I met for the first time at 5:00 am the day of the hike. That trail and that group and that hike were everything. But, don't get me wrong. The summit was beautiful, and it was interesting being above the mountains in Colorado. The intention I had for doing that hike, however, also revisited me when I got back to Iowa and my knee gave out. People "blame" the mountain, blame the experience. William Shakespeare's Horatio said, "There is nothing good or bad, but thinking makes it so." I will always hold that hike in my heart for what it was and nothing more—whether it will be my last or the first of many.

As I've noted in past columns, I'm extremely grateful for being able to do these type of things (and my "bad" knee only emphasized that to me). I have the same level of gratefulness for being able to hold a job where I think I'm helping people do their best.

There are several workshops coming up in this fall and winter for the Iowa LTAP. We will be doing some OSHA training and a short series called the Iowa Safety Information Circuit. The Local Road Safety Workshops done each year are now every other year, and the "Circuit" is our offering when they won't be occurring. The Circuit will focus on both roadway and worker safety subjects and information. We also have some bridge inspection trainings that we are offering or will soon be offering. Keep a look out for some new efforts in 2020.

Act with good intention. ■

Keith

Unmanned aircraft help improve quality, cost, and safety at Iowa DOT

Unmanned aircraft systems (UAS) are fun toys for hobbyists, but they are also proving to be important tools for businesses and government agencies like the Iowa DOT. Advancements in UAS technology have created rapid growth in the popularity of these tools as a platform for aerial photography, video, and survey work.

Federal regulatory changes in 2016 created Federal Aviation Administration (FAA) Part 107 regulations for small UAS (under 55 lbs.), simplifying their use for commercial applications and public agencies. Since that time, small UAS have been used in a variety of applications that are working to improve our work, reduce costs, and increase safety.

To date, Iowa DOT's Aviation, Design, and Location & Environment bureaus have acquired UAS and successfully used them on projects. Uses have included recording the impact of flooding on transportation assets, road surveys, wetland mitigation analysis, recording airport assets, capturing photos for the heliport directory, and even inspection of a lighting system on a 2,000 foot bridge over the Mississippi River. The last project was able to be completed with no workers on the bridge and no lane closures to disrupt traffic. While potential uses are unlimited, other future applications the DOT has considered could include crash clearance, traffic operations, and bridge inspections.



A drone surveys Cedar River flooding along I-80 in September 2016

Approved guidelines for the use of UAS at the Iowa DOT went into effect January 1, 2019. The guidelines make it clear that UAS are an acceptable tool for improving their work. But they also put in place some basic rules when bureaus and districts want to utilize them as a tool. Since that time, an Iowa DOT user group has been created with members appointed from bureaus and districts throughout the DOT.

Members will champion UAS for their respective bureaus and districts and will be the first stop in their work units for questions involving the use of UAS at the Iowa DOT. The members will lean on the DOT's Aviation Bureau for assistance in keeping in compliance with FAA regulations, and will also share experiences to aid in the practical development of UAS at the Iowa DOT.

The user group is currently focused on UAS training and certification to integrate additional unmanned aircraft in select bureaus and in all six Iowa DOT districts by this fall. The goal is to have the technology readily available throughout the Iowa DOT as a tool to improve quality, costs, and safety.

Article written and provided by Tim McClung, Planning and Outreach Manager, Iowa DOT, Aviation Bureau. ■

Additional resources

Interested in learning more? Watch an FHWA sponsored webinar on unmanned aerial systems (UAS) and their uses with respect to emergency management of flooding moderated by Bridge Engineering Center Associate Director Katelyn Freeseaman

and led by Robin Murphy, Director of the Center for Robot Assisted Search and Rescue: <https://intrans.iastate.edu/research/in-progress/fhwa-unmanned-aerial-system-tech-brief-development-and-every-day-counts-round-5-support/>.

The same link also provides an EDC-5 UAS Summit Workbook. Additional webinars and tech briefs are also forthcoming on using UAS for construction inspection, surveying, and bridge inspection. ■

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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Iowa's grant for the Competitive Highway Bridge Program

Finding creative ways to fund the modernization of Iowa's aging infrastructure is a challenge shared by the Iowa DOT and its county and city partners.

In September 2018, the Iowa DOT learned of a federal grant opportunity for bridges, referred to as the Competitive Highway Bridge Program (CHBP). The grant made available \$225 million to 25 states classified as "rural," for the replacement or rehabilitation of bridges. The Iowa DOT recently received word that it has been awarded this funding. The total award to Iowa is \$33,442,000, which is 55% of the estimated construction cost.

When the grant opportunity was discovered, Iowa DOT staff immediately contacted representatives from cities and counties across Iowa, as well as the Associated General Contractors (AGC) of Iowa and the FHWA Iowa Division, to create a working group to collaborate on developing a grant application. This working group met six times over a three-month period, in order to reach a clear agreement on the bridges the request would include, how to best meet grant funding requirements, and to collaborate on the application.

The collaboration was critical because an element to this grant required bridge projects to be "bundled" with at least one other bridge in the same construction contract. The group's fast action was required due to the tight 90-day application deadline, which was December 4, 2018. While only state DOTs could apply for the grant, each state was allowed to submit up to three applications, which were to be ranked by the state from most important to least important.

The Iowa DOT and its partners agree that all bridges are important to the state of Iowa; therefore, all bridges included in the grant application went into one large application. This application for the state of Iowa included 77 bridges: 4 state DOT bridges, 5 city-owned bridges in 4 cities, and 68 county-owned bridges across 45 counties.



The total cost of construction for these bridges is \$61.2 million. Iowa requested \$45.9 million federal-aid participation of total construction costs, which is 75 percent of the estimated construction costs. The remaining construction costs will be matched with non-federal-aid funding sources from each entity.

How did the stakeholders coordinate which bridges were to be included in the application? Bridges were carefully selected using a data-driven selection criteria to determine which county and municipal bridges would be included in the CHBP application. This application includes bridges considered "structurally deficient," bridges with average daily traffic counts greater than 100, and generally bridges with a total length less than 150 feet. County bridges that fit that criteria were then ranked based on a priority point system that had already been established for another bridge funding program in Iowa. The city bridges were selected by prioritizing a list of bridges already on a City Bridge Candidate List awaiting funding. The ICEA Service Bureau played an instrumental role in the county data analysis to determine which bridges got included in the applications.

For these grants, new ideas are highly valued. The applications from each state were scored based on innovations in design, materials, or construction techniques. Other out-of-the box ideas could include efficiency of the environmental permitting

Iowa CHBP grant continued from page 4

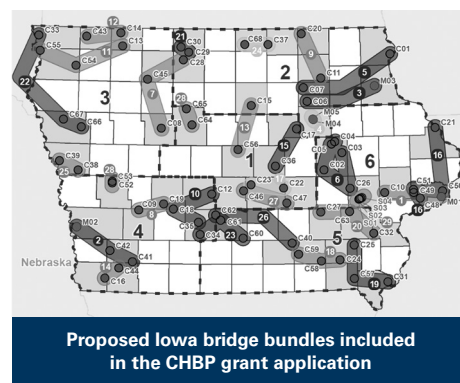
process or other modernized project delivery, and innovative financing options such as private sector funding. Other items that the applications were ranked on include a benefit cost analysis, as well as “project readiness” with a bid letting before September 30, 2021.

Iowa utilized Standard Bridge Plans for almost all of the bridges in this grant application, which is an approach to bridge designs only used in Iowa. The Standard Bridge Plans include bridge plans that are already structurally designed and come in various lengths, so a designer only needs to determine the length of bridge needed, based on the drainage area and other hydraulic factors. Because of the short timeframe to get a bridge designed and let, the length of the bridges chosen for this application are generally less than 150 feet long. This allows the Iowa DOT Standard Bridge Plans to be utilized, as the standards only go up to 243 feet in length. The shorter length bridges are also easier to obtain multiple types of

environmental permits, such as permits from the U.S. Army Corps of Engineers, as well as the Iowa Department of Natural Resources.

The Iowa DOT listed its proposed bridge bundles in the grant application; shown below is a picture of the proposed bundles. The bundles generally have different agencies bundled together under one contract.

Iowa was awarded this grant on August 26, 2019; this additional funding of \$33,442,000 will enhance the Iowa DOT’s



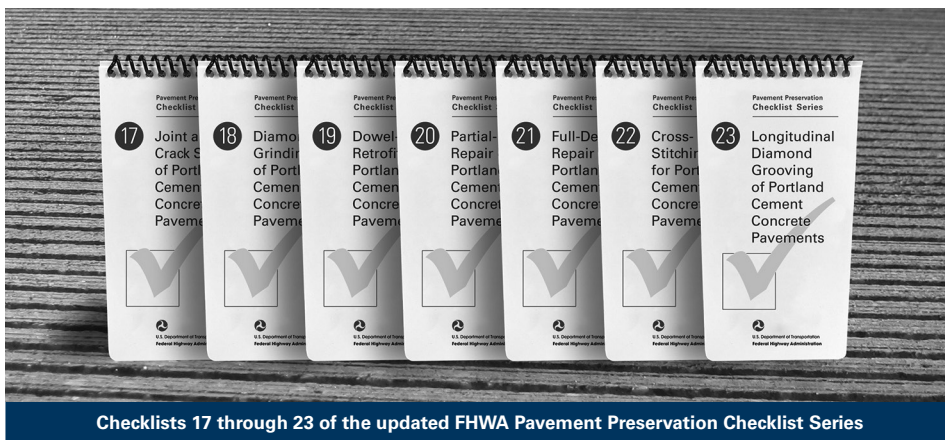
regular dedicated bridge funding, allowing the state of Iowa to replace additional structurally deficient bridges more quickly.

With this grant for CHBP funding, it’s believed that improving a mix of municipal, county, and Iowa DOT bridges will balance Iowa’s freight needs, promote economic prosperity, and maintain critical, local access to many Iowa farming communities.

Receipt of this grant represents a great collaboration amongst the CHBP working group including the Iowa DOT, ICEA, APWA, AGC, and FHWA. The ability to work as partners across agency boundaries for the good of the state as a whole, is one thing Iowa is known for nationwide. The CHBP collaboration group will continue to meet, coordinate bridge bundles, and finalize project development, bid letting, and construction.

Article written and provided by Nicole Fox, Deputy Director, Iowa DOT, Bureau of Local Systems. ■

FHWA publishes Concrete Pavement Preservation Checklists



Transportation agencies are continually being asked to do more with less when maintaining their assets, and pavements constitute a large part of transportation infrastructure.

Pavement preservation treatments applied at the right time and place, using appropriate, high-quality materials and construction, can

be very effective in sustainably extending performance life.

To aid in the ongoing preservation effort, the National Concrete Pavement Technology (CP Tech) Center worked with the FHWA to update its Pavement Preservation Checklists.

FHWA initially developed the Pavement Preservation Checklist Series in 2002 to guide state and local highway preservation/maintenance and inspection staff on the use of innovative pavement preservation techniques.

Checklists 17 through 23 cover concrete pavement preservation strategies. The remainder of the checklist series focuses on asphalt preservation strategies.

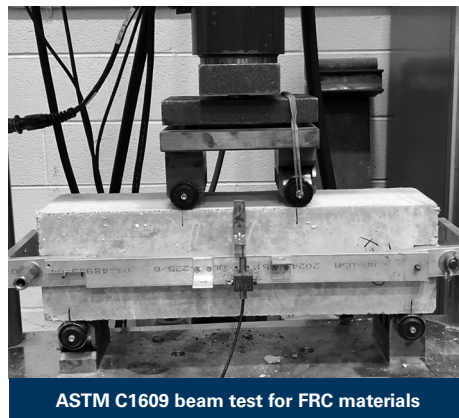
All 23 checklists are available for download here: <https://cptechcenter.org/pavement-preservation/> and here: <https://www.fhwa.dot.gov/pavement/preservation/ppcl00.cfm>. ■

New FRC tool and publications issued by CP Tech Center

Limited guidance is currently available on design and testing of fiber-reinforced concrete (FRC) for bridge decks and overlays. Nevertheless, multiple states have required bridge decks to be constructed with macrofibers in order to reduce deck cracking. A new report and tech brief issued by the National Concrete Pavement Technology (CP Tech) Center summarize laboratory and field performance of various FRC bridge decks and concrete overlays.

In addition, another tech brief explains how to determine the appropriate fiber reinforcement performance values to specify and implement in the structural design calculations for bonded and unbonded concrete overlay projects using a tool developed as part of the project.

The spreadsheet tool called the Residual Strength Estimator will help pavement



engineers use FRC in concrete pavement applications. The tool provides an estimate of the FRC performance value to specify for a project, as well as the effective flexural strength to input into the mechanistic-empirical (M-E) concrete pavement design software.

The project, which is still ongoing, is sponsored by the FHWA Technology

Transfer Concrete Consortium Transportation Pooled Fund. CP Tech Center Associate Director Steven Tritsch is the principal investigator on the project and center Director Peter Taylor is co-principal investigator. The report and tech briefs were authored by Jeffery Roesler, a professor at University of Illinois Urbana-Champaign; Armen Amirkhanian, assistant professor at University of Alabama; Amanda Bordelon, assistant professor at Utah Valley University; and Alexander Brand, assistant professor at Virginia Polytechnic Institute and State University.

A project overview, the publications, and the spreadsheet tool are available here: <https://cptechcenter.org/research/in-progress/technology-transfer-concrete-consortium-tpf-5313/>. ■

Tailgate Talks give tips for quick safety training opportunities

LTAPs across the country have been working together to provide safety training tools for local agencies to offer quick lessons that they can use to prevent accidents and injuries in the workplace.

The Tailgate Talks are sponsored by the National LTAP Association and hosted by Connecticut Training and Technical Assistance Center, the state's LTAP. The about 70 available talks have been vetted by LTAP volunteers and more talks are being added all the time.

Along with one- to two-page lessons—on everything from backing safety to carbon monoxide safety to ladder safety to roadside mowing tips—the website



also offers some “how to” guidance for supervisors, or others, on leading the talks with workers.

The talks are meant to be short, about 10 to 15 minutes, and adaptable so they can be tailored to specific safety concerns of the local agency.

Other recommendations include:

- Focus on one topic per talk
- Hold talks about once a week or on a regular schedule
- Encourage employees to ask questions and interact

Download the talks and make them your own here: https://www.t2center.uconn.edu/tailgate_talks_for_ltap_center_use.php. ■

Workshop and conference calendar

Date	Event Name	Location	Contact
October 2019			
30–1	Midwest Traffic Incident Management Safety Summit (MTIMSS) 2019	Ames	Judy Thomas
1–3	2019 APWA Snow Plow Operator Training and Rodeo	Cedar Rapids	Kim Pinegar
2	2019 Traffic and Safety Forum	Des Moines	Judy Thomas
10–11	2019 APWA Iowa Chapter Fall Conference	Des Moines	Peggy Englehart
15–16	2019 OSHA 10 Hour for Public Agency Roadway Workers	Atlantic	Paul Albritton
22	Safety Informational Circuit	Ames	David Veneziano
23	Safety Informational Circuit	Marion	David Veneziano
29–30	2019 OSHA 10 Hour for Public Agency Roadway Workers	Tripoli	Paul Albritton
31	Safety Informational Circuit	Storm Lake	David Veneziano
November 2019			
13–14	2019 Load and Resistance Factor Rating for Highway Bridges	Ames	Paul Albritton
19–20	2019 OSHA 10 Hour for Public Agency Roadway Workers	Storm Lake	Paul Albritton
December 2019			
11–13	2019 Iowa County Engineers Conference	Des Moines	Keith Knapp
3–4	2019 OSHA 10 Hour for Public Agency Roadway Workers	Sigourney	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/. ■

Speed feedback equipment available for loan

Have a road segment that has a known speeding problem and want to test a common speed management countermeasure? The LTAP Equipment Loan Program can help with that.

The Iowa DOT recently provided funding for LTAP to purchase two speed feedback signs that it will lend to agencies free of charge. One of the signs is meant to be post-mounted with posts supplied by the applicant, and the other is trailer-mounted.

The objective is to provide local agencies the opportunity to determine if they would like to purchase their own sign after testing with the loaned equipment. The signs cannot be used for special events, work zones, or similar infrequent speed problems. A speed study will need to be



Side view of the speed feedback sign equipment with trailer

conducted prior to the loan to establish that a speeding issue is present at the intended site.

If interested, fill out the form here to request the equipment: <https://iowaltap.iastate.edu/speed-feedback-signs/>

LTAP has been expanding its Equipment Loan Program since it launched. It recently added a set of equipment that aids in testing wood pilings and structural members for decay. It also offers sign retroreflectometer and digital ball banks for local agency use.

To request any of the items or learn more about their uses, visit <https://iowaltap.iastate.edu/equipment-loan-program>. ■

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