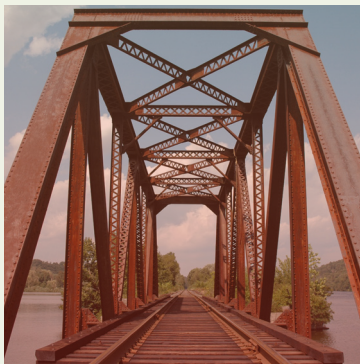


INTRANS EN ROUTE

JULY 2015 TO JUNE 2016

S T O R I E S A N D N E W S



IOWA STATE UNIVERSITY
Institute for Transportation

Partnerships have made InTrans a dynamic, productive transportation center

Hello,

This publication highlights a few of the many partners we are fortunate to have at the Institute for Transportation. Collaboration with all our partners over the years has focused and strengthened our efforts and helped InTrans become a dynamic and productive transportation research, education, workforce development, and outreach center.

The number and strength of our partnerships continue to increase. We have relationships that are local and international, with government entities at all levels, with businesses and others in the private sector, and with other research universities. Our multidisciplinary research programs collaborate with scholars from several academic fields, both at Iowa State University and on other campuses.

It is these relationships that have helped InTrans grow to a record \$17.4 million operation in fiscal year 2016, a 7.5 percent increase over the previous year. We are fulfilling our mission at new levels, with pronounced increases in transportation research, more support for masters and Ph.D. students, enhanced workforce development and worker training programs, and greater emphasis on shifting new transportation knowledge into practice.

InTrans has a special relationship with the Iowa Department of Transportation, our primary sponsor. We conduct research for the Iowa DOT as well as provide technical support and statewide asset management assistance. InTrans and the Iowa DOT also share four faculty positions with expertise in areas such as bridges, materials, and pavements.

InTrans En Route is published by the Communications Office at the Iowa State University Institute for Transportation.

EDITOR STEVE JONES • WRITERS MARCIA BRINK, BRANDY HAENLEIN • DESIGNER STEPHEN POST

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3350 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515 294-7612, email eooffice@iastate.edu.

Federal sources accounted for \$6.49 million last year, which is also a record and accounts for more than one-third of the InTrans budget. InTrans investigators are conducting projects sponsored by the National Cooperative Highway Research Program, Strategic Highway Research Program (SHRP2), and the Federal Highway Administration.

These are exciting times at InTrans. Please enjoy the following stories.



Shauna Hallmark

**Director, Institute for Transportation
Professor, Department of Civil, Construction, and
Environmental Engineering
Iowa State University**

INTRANS AT A GLANCE

Institute for Transportation (InTrans)

2711 S. Loop Drive, Suite 4700
Ames, IA 50010-8664
515-294-8103
515-294-0467 (fax)
www.intrans.iastate.edu

Shauna Hallmark, Director
shallmar@iastate.edu
515-294-5249

Neal Hawkins, Associate Director
hawkins@iastate.edu
515-294-7733

Centers

Bridge Engineering Center (BEC)

Conducting research to solve real-world structural problems
Brent Phares, Director
bphares@iastate.edu
515-294-8103
www.bec.iastate.edu

Center for Earthworks Engineering Research (CEER)

Solving critical geotechnical engineering and earthworks construction challenges through research and advanced technologies
Vernon Schaefer, Interim Director
vern@iastate.edu
515-294-9540
www.ceer.iastate.edu

Center for Transportation Research and Education (CTRE)

Exploring safety, infrastructure management systems, and sustainability in transportation

- Iowa Pavement Management Program (IPMP)
- Iowa Traffic Safety Data Service (ITSDS)
- Roadway Infrastructure Management and Operations Systems (RIMOS)

Omar Smadi, Director
smadi@iastate.edu
515-294-7710
www.ctre.iastate.edu

Center for Weather Impacts on Mobility and Safety (CWIMS)

Facilitating better and safer ways to travel when weather impacts transportation systems
Zach Hans, Director
zhans@iastate.edu
515-294-7733
www.intrans.iastate.edu/cwims

Midwest Transportation Center (MTC)

Employing data-driven performance measures for enhanced infrastructure condition, safety, and project delivery
Shauna Hallmark, Director
shallmar@iastate.edu
515-294-5249
www.intrans.iastate.edu/mtc

National Center for Wood Transportation Structures (NCWTS)

Integrating research, demonstration, and education to improve wood transportation structures
Travis Hosteng, Director
kickhos@iastate.edu
515-294-7197
www.woodcenter.org

National Concrete Pavement Technology Center (CP Tech Center)

Serving as the national hub for concrete pavement research and technology transfer
Peter Taylor, Director
ptaylor@iastate.edu
515-294-9333
www.cptechcenter.org

Programs

Asphalt Materials and Pavements Program (AMPP)

Improving asphalt pavements through research and education
Chris Williams, Manager
rwilliam@iastate.edu
515-294-4419
www.intrans.iastate.edu/asphalt

Construction Management and Technology (CMAT)

Researching innovative construction technologies and processes for the transportation industry
Jennifer Shane, Director
jsshane@iastate.edu
515-294-1703
www.intrans.iastate.edu/cmat

Iowa Local Technical Assistance Program (Iowa LTAP)

Helping Iowa's local governments keep up with growing transportation demands
Keith Knapp, Director
kknapp@iastate.edu
515-294-8817
www.iowaltap.iastate.edu

Program for Sustainable Pavement Engineering and Research (ProSPER)

Investigating and integrating innovative, sustainable pavement materials and technologies
Halil Ceylan, Director
hceylan@iastate.edu
515-294-8051
www.intrans.iastate.edu/prosper

Statewide Urban Design and Specifications (SUDAS)

Providing uniform design guidelines and construction specifications for Iowa's urban public improvement projects
Paul Wiegand, Director
pwiegand@iastate.edu
515-294-7082
www.iowasudas.org

INTRANS IS ALL ABOUT TRANSPORTATION

The Institute for Transportation and its centers and programs are helping the transportation community move forward to meet the needs of the future.

Improving ABC (Accelerated Bridge Construction) for efficiency, cost-savings, and safety.

Developing solutions to move roadway traffic safely and efficiently.

Advancing energy-efficient and sustainable transportation systems.

Developing longer-lasting concrete pavement.

Exploring better and more sustainable ways of making asphalt.

Growing the knowledge and skills of transportation workers.

Using “big data” to help move transportation into tomorrow.

Advancing durable, cost-effective wood transportation structures.

Enhancing transportation construction tools and technologies.

Improving the foundations that support roads and bridges.

Educating tomorrow’s transportation workforce.

Introducing youth to transportation careers.

Transferring research results to transportation decision makers.

Embracing partnerships to improve transportation and mobility for all.



Chris Williams at bio-polymer facility



FHWA's Francine Shaw-Whitson, symposium speaker



Flooded I-80 in 2008 (Keven Arrowsmith photo)



Mapping Iowa's deer corridors

NEWS

Neal Hawkins named InTrans associate director

Neal Hawkins has been named the associate director of the Institute for Transportation, where he has been a researcher and center director in traffic operations, roadway safety, and asset management since 2003.

In his new role, Hawkins is leading efforts in strategic planning, economic development, and external and internal relations, and is seeking opportunities to create new interdisciplinary research and outreach projects. He will continue to lead an active research program.

“Neal has a long and successful record as a researcher, center director, and someone who has developed and sustained partnerships with transportation agencies throughout the nation,” Shauna Hallmark, InTrans director, says.



Neal Hawkins

Transportation research symposium attracts large turnout

More than 360 registrants from 11 states and Canada participated in the 2015 Mid-Continent Transportation Research Symposium in Ames in August.

The biennial event was sponsored and run by the Institute for Transportation and the Iowa Department of Transportation. The Midwest Transportation Workforce Center at the University of Wisconsin-Madison and the Wisconsin DOT also sponsored the event.

“We had state and federal DOT professionals, university researchers, industry representatives, and students all together networking and learning about a broad range of transportation issues,” Shauna Hallmark, InTrans director, says.

Eisenhower Fellowships go to two InTrans grad students

Two graduate students at the Institute for Transportation received prestigious Eisenhower Transportation Fellowships from the Federal Highway Administration in 2015. Ellen Nightingale and Patty Thompson are both studying transportation in the Iowa State University Department of Civil, Construction, and Environmental Engineering. “The Eisenhower graduate fellowship is one of the most prestigious awards given to graduate students in the field of transportation engineering,” says Peter Savolainen, the students’ major professor.

Studying the efficiency of Iowa's Interstate median cable barriers

Studies show Interstate highway median cable barriers save lives. Now Iowa's transportation officials want to know how well the state's barrier system is working.

Peter Savolainen, a safety engineer at the Institute for Transportation, is determining the effectiveness and cost efficiency of the barrier system. He is conducting a two-year, in-depth analysis for the Iowa Department of Transportation that will help the state determine where to install additional cables.

“Cable barriers significantly reduce fatalities and serious injuries,” Savolainen says. “But they also tend to increase the number of crashes that result in minor injuries or property damage.”

Although a cable system is less expensive to install than concrete or steel barriers, cables and posts usually require repair when hit by a vehicle. Repair costs, however, are more desirable than head-on collisions, he says.

Savolainen will examine crash data including injuries, fatalities, and crash locations before and after the barriers were installed. He also will analyze the system's cost-effectiveness. “This study will help the Iowa DOT to more effectively invest their limited resources in this safety feature,” he adds.

Novel approach integrates climate projections into transportation planning

Iowa State University climate researchers have led the development of a new method that could help transportation departments to better plan for excessive flooding that in the past has closed and damaged some of the Midwest's busiest highways and bridges.

ISU's Chris Anderson and Gene Takle, in collaboration with the Iowa Flood Center at the University of Iowa, studied two Iowa river basins using the innovative methodology to produce scenarios of future flood conditions.

Transportation agencies could use projections of this type to prepare and plan for future maintenance, repair, and replacement of highway structures, the researchers say. Sponsored by the Iowa Department of Transportation, the research is the first to combine climate and streamflow projections with highway engineering metrics, Anderson says.

The study was conducted through the Institute for Transportation and was one of 19 Federal Highway Administration Climate Change Vulnerability Assessment Pilot projects.

“Our project is the first to compute with well-tested simulation systems and standard engineering software the likelihood of change in overtopping of bridges by extremely high streamflow as climate changes over the lifetimes of bridges,” Anderson says.

New Iowa State facility ramps up bio-polymer production for asphalt

Petroleum-based polymers have been added to asphalt since the 1990s. The rubbery polymer compounds improve asphalt by adding resilience and durability to the pavement. Iowa State University professor Chris Williams is confident the polymers in asphalt will someday be environmentally friendlier bio-polymers made from soybeans grown in Iowa and the Midwest.

The idea took a major step forward with the fall 2015 opening of the \$5.3 million Bio-Polymer Processing Facility, located at ISU's BioCentury Farm. The result of an ISU-industry partnership, the pilot plant-scale facility was built by Argo Genesis Chemical LLC, a sister company of Seneca Petroleum Co. Inc., of Crestwood, Illinois.

The facility will produce about 1,000 pounds of bio-polymers daily, a far cry from the few ounces that Williams and ISU chemical engineer Eric Cochran could make on campus. The pilot plant will provide enough bio-polymers for more research and industrial testing.

In 2010 and 2011 the researchers developed a novel process to transform soybean oil into thermoplastics, polymers that can be melted and reshaped repeatedly. “It is so exciting to see an ISU intellectual property taking the next step to commercialization with the pilot plant,” says Williams, the Gerald and Audrey Olson Professor of Civil Engineering and manager of the Asphalt Materials and Pavements Program at the Institute for Transportation.

The Midwest Transportation Center, located at InTrans, provided some matching funds to further the technology.

Iowa's deer 'hot spots' are mapped for State Patrol

It's not news when cars hit deer, but it can be costly. In 2014, more than a quarter of the damage to Iowa Department of Public Safety vehicles came from hitting critters, mostly deer.

That's why state officials asked the Iowa Traffic Safety Data Service (ITSDS) at the Institute for Transportation for assistance. The ITSDS analyzed the locations of deer crashes and deer carcasses found along Iowa primary roads to determine which highway segments are most prone to deer crashes.

Zach Hans, ITSDS manager, says the analysis used four metrics for each highway section from 2010 to 2014: number of animal crashes and roadside deer carcasses per mile per year, and number of animal crashes and deer carcasses per 100 million vehicle miles.

State Patrol officials hope the deer-crash data can be integrated into their MACH system in State Patrol vehicles to warn troopers entering a deer corridor. MACH is Mobile Architecture for Communications Handling, communication software for public safety agencies. Mapping is one of the MACH features.

Iowa's top three “deer corridors”:

- U.S. 18 through Marquette
- U.S. 218 from Nashua to Plainfield
- Iowa 100 in Cedar Rapids and Marion

BRIDGE MONITORING

Immediate, autonomous and easily accessible data

The bridge structural health monitoring development project is moving toward a “complete and quantifiable” assessment tool.

If a highway bridge fails, the results can be catastrophic.

Fortunately, bridge failure in the United States is the exception—with, on average, about 50 bridges each year failing. And to ensure bridge performance as much as possible, advanced diagnostic testing is needed to complement existing inspection methods to identify damage and deterioration that can compromise structural integrity.

In Iowa, such a diagnostic system, one that continuously and autonomously monitors the structural health of bridges in real time, is getting closer to mainstream use. The structural health monitoring (SHM) development project is a joint venture between the Bridge Engineering Center (BEC) at Iowa State University’s Institute for Transportation and the Iowa Department of Transportation. This work has resulted in a patent-pending system known as Bridge Engineering Condition Assessment System (BECAS).

The system differs from others because it provides immediate, autonomous data analysis and a much improved method for presenting the data so Iowa DOT engineers can readily use it and also access it later should the need arise.

“The monitoring takes place in real time with very, very little user interaction,” says Brent Phares, BEC director, who has been developing the system since 2005. “The system’s software applications run 24 hours a day, analyzing data collected 250 times per second and only alerts an engineer when needed.”

The fully automated SHM system, which uses sensors and software with several specially designed algorithms, was first tested on a U.S. Highway 30 bridge near Ames. Its success led to its yearlong use on the new U.S. 65 Iowa River arch bridge in Iowa Falls, where BEC engineers installed sensors during and after construction of the span. The system has since been installed at locations in Iowa, Illinois, and Wisconsin.

Implementation continues on several Interstate and high-traffic state highway bridges. Overall, Phares likes what he sees. “I’m really excited about its potential.”

Iowa started monitoring bridges in the early 2000s, but the new BEC monitoring system is a major step forward as a “complete and quantifiable bridge assessment tool,” Phares says. In addition to providing real-time alerts of a bridge overload or catastrophic event, it provides historical, quantifiable tracking of changes in a bridge’s structural condition.

Ahmad Abu-Hawash, chief structural engineer in the Iowa DOT Office of Bridges and Structures, says traditional inspections will continue to be the primary method for assessing the condition of Iowa bridges, but adds that additional tools are needed to improve efficiency and accuracy. “Continuous SHM systems will help us obtain real-time data and alert us of any unusual behavior due to unforeseen events.”

Another feature of the SHM, Abu-Hawash says, is its capability to determine a bridge’s true load-carrying capacity, something “that cannot be quantified by traditional analysis methods.”

Phares says the monitoring system provides continuous data that are easily accessible and readily and directly implementable by Iowa DOT staff for timely decision making. “The system can be implemented on basically any bridge type to evaluate general performance in addition to targeted, damage-prone structural areas,” he says.

Someday, he hopes, bridges on an entire major Iowa highway corridor will be equipped with the SHM system. “I’d love to see 100 regular bridges on Interstate 80 all self-reporting data every day.”

BRIDGE PARTNERSHIP

Bridge partnership between Iowa DOT, ISU’s Bridge Engineering Center benefits the state

Since 1996, InTrans has had a special relationship with its primary sponsor, the Iowa DOT, through ongoing agreements. This unique-in-the-nation relationship enables InTrans to conduct research, provide technical support, oversee state-wide asset management programs, and partner in other ways for the Iowa DOT.

One of the partnership’s major cogs is between the Iowa DOT’s Office of Bridges and Structures and the ISU Bridge Engineering Center, which “is valuable to both organizations and the state of Iowa in general,” says Ahmad Abu-Hawash of the Iowa DOT.

“Iowa DOT benefits from having access to technical resources and expertise in structural engineering at BEC to address bridge engineering problems. It also benefits the researchers at ISU by getting input from practitioners at Iowa DOT and providing access to a large pool of highway structures.

“The result is safer highway infrastructure, innovative research, and improved efficiency, which may lead into improved livability and economic development in Iowa.”

“The monitoring takes place in real time with very, very little user interaction.”

—Brent Phares, Bridge Engineering Center director

FOUNDATION LAYERS

Optimizing the support system under concrete pavements

The project is identifying and providing guidance for implementing best practices regarding construction foundation layers.

High-quality foundation layers (the natural subgrade, the subbase, and embankment) are essential for optimizing pavement performance. No matter how well a pavement is designed, lack of uniform support conditions can contribute to premature pavement failures.

Unfortunately, many pavements in the United States still fail due to problems with the foundation layers. To help address this situation, a multi-year pooled-fund project (Improving the Foundation Layers for Concrete Pavements, TPF-5[183]) is being conducted by the National Concrete Pavement Technology Center (CP Tech Center) and the Center for Earthworks Engineering Research (CEER). Significant initial funding was also provided by the Federal Highway Administration.

The CP Tech Center and CEER are located at Iowa State University's Institute for Transportation.

Scheduled to wrap up at the end of 2016, the project is identifying—and providing guidance for implementing—best practices regarding constructing foundation layers for concrete pavements.

As part of this project, 12 field studies were conducted of several in-service and newly constructed concrete pavements in the participating states: California, Iowa (lead state), Michigan, Pennsylvania, and Wisconsin. These pavements represented a broad range of either successful long-term pavements or pavement sections with premature failures.

For some failures, the existing pavement distresses and underlying foundation were removed and reconstructed, sometimes using innovative technologies. For other pavement failures, the existing foundation and pavement were left in place and rehabilitated. On one distressed pavement in Pennsylvania, for example, the foundation was rehabilitated by injecting expandable polyurethane foam into the base layer.

A key aspect of each field study was to tie performance of the foundation layers to key engineering properties and pavement performance. Foundation layer performance data, as well as original construction data and maintenance/rehabilitation history data, were collected and analyzed.

The goal was to determine the effects of site-specific foundation layer construction methods, site evaluation, materials selection, design, treatments, and maintenance procedures on the performance of the foundation layers and of the related pavements.

The field studies and analyses showed that the quality of pavement foundations varies greatly, depending on agencies' experience and knowledge.

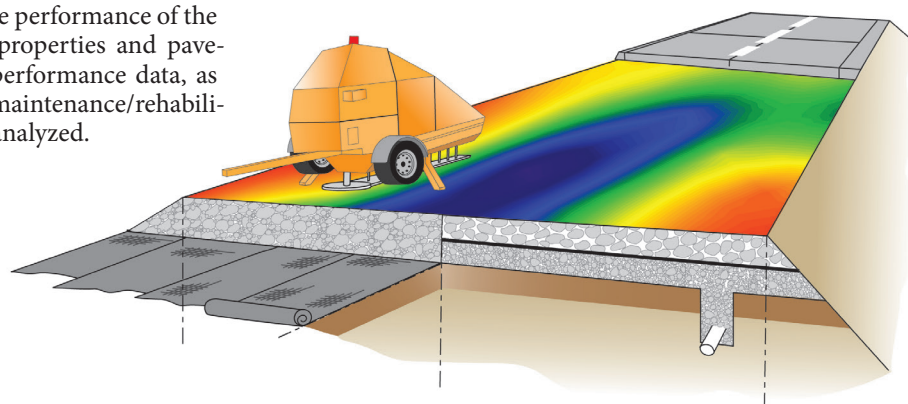
At all the project sites, the design input parameters for the foundation layers were based on either past experience or very limited field testing. Depending on the test method chosen for verification, however, the design parameters were either higher or lower than the assumed value. Field testing showed that significant non-uniform support conditions exist that are not accounted for in the design. The non-uniform support conditions contribute to increased fatigue in the pavement layers.

These results confirmed the need to move toward identifying best practices for field verifying the project-specific design parameters.

Now, the lessons learned through this project are being compiled into a concise but comprehensive best-practices manual supporting the design, construction, and field verification of economical pavement foundation systems that meet pavement performance requirements. The manual focuses on identifying pavement- and foundation-related pavement distresses, specific failure mechanisms and contributing factors related to the foundation, and key controls and tests.

"By providing state-of-the-art guidelines in one resource," says David White, who leads the foundations layer project, "this manual has the potential to significantly improve the practice of foundation design and construction and thus reduce the number of foundation-related pavement failures across the country."

The manual is scheduled to be published by year's end.



A diagram of in situ testing of pavement foundation layer conditions.



The product could
"significantly improve"
foundation design and
construction.

NC2 PARTNERSHIP

Information about progress on the foundations project is regularly shared on a national basis through the National Concrete Consortium (NC2), which is administered and facilitated by the CP Tech Center.

The NC2 provides an organizational structure for twice-a-year meetings of state agencies, industry representatives, and university researchers. The ultimate goal of these meetings is to share information about concrete-related successes and challenges and accelerate the implementation of solutions.

With up to 150 people in attendance, the NC2 meetings allow a unique level of sharing among users, providers, and improvers of concrete-related information and technology. Topics are identified and prioritized for research, publications, and/or training.

The NC2 was instrumental in instigating a multi-year effort "Material and Construction Optimization for the Prevention of Premature Concrete Pavement Distress" (the MCO project). Through projects funded by various stakeholders, detailed information was gathered through site visits in 17 participating states, and research was undertaken to address identified issues. The MCO effort resulted in a variety of resources developed by the CP Tech Center, including a state-of-the-practice manual (a second edition of which will soon be published), a suite of tests, a testing guide, and local and regional workshops.

The NC2 has also been a significant factor in the CP Tech Center's multi-year focus on concrete overlays. Information collected through research and demonstration projects has been incorporated into a variety of CP Tech Center-published resources: a general guide to concrete overlay solutions (now in its third edition), a design guide, a guide specification, and dozens of related training events.

In addition, through an FHWA pooled fund (the Technology Transfer Concrete Consortium, or TTCC), 30 states that participate in NC2 support research and implementation of priority topics and technologies. The TTCC funds, for example, member states' participation in CP Tech Center workshops and webinars on a variety of pavement-related topics, including internal curing, concrete pavement recycling, aggregates, surface characteristics, early-age cracking, pavement preservation, roller-compacted concrete, and overlays.

When the foundations project is finished and the manual published in late 2016, final results and training will be shared directly with the NC2—another example of how the CP Tech Center, through its partnerships, helps accelerate implementation and change practice.

Improving the knowledge and skills of Iowa's transportation workforce

Iowa LTAP began as one of the original 10 Rural Technical Assistance Programs funded by the FHWA.

It was a warm day for early March. Twenty-two county public works employees were in a meeting room at the Hamilton County Courthouse in Webster City, Iowa, attending a Flagger and Work Zone Safety training session.

The training is important, even for this group of mostly veteran workers, because many would soon be working on county roads, often with cars and trucks zipping by. The traffic control flagging principles and work zone safety training they received is designed to help keep them and drivers safe.

"The training is required for those who do the actual flagging and recommended for all other road workers," said Paul Albritton, technical training coordinator with the Iowa Local Technical Assistance Program located at Iowa State University's Institute for Transportation.

Flaggers learn, for example, what to wear, how to stop and release vehicles, and how to handle emergencies. However, all road maintenance workers benefit from the instruction.

"We also talk to the broader group of workers to encourage and emphasize safety," added David Veneziano, Iowa LTAP Safety Circuit Rider, who conducted the training session with Albritton. "If the training prevents even one person from getting injured, it is worthwhile."

The workshop is an example of Iowa LTAP's mission of improving the quality and safety of the surface transportation system in Iowa, says Keith Knapp, Iowa LTAP director, who has been providing transportation-related training, outreach, and research for more than 25 years. "Our primary objective is to provide quality training events and technical transportation-related information that is useful to local transportation agencies in their daily operations."

Iowa LTAP is managed through InTrans under an annual contract administered by the Iowa Department of Transportation. It began in 1983 as the Rural Technical Assistance Program, one of 10 original such programs funded by the Federal Highway Administration.

LTAP's goal today is the same as 1983: bring many types of transportation technology to Iowa's public works and county employees to improve their knowledge and skills. LTAP staff develop workshops on topics such as bridge inspection, sign and pavement markings, and motor grader operation. LTAP staff also assist other groups, such as Iowa's county engineers, with professional development events.

LTAP offers two professional development programs, the Public Employees Leadership Institute (see adjacent story) and the Roads Scholar Program, which promotes continuing education among transportation workers. Road Scholars take courses and workshops to earn up to four levels of achievement, the highest of which is the Elite Roads Scholar. Each level is a significant accomplishment, Knapp says.

Iowa LTAP recently began a new Iowa traffic safety effort. The Statewide Multi-Disciplinary Safety Team (MDST) program is a coordinated effort between LTAP, the Iowa DOT, and the Iowa Governors Traffic Safety Bureau to facilitate communication and collaboration among Iowa's regional MDSTs. The regional groups consist of local city and county officials, law enforcement, and others who help identify and address local transportation issues, including identifying and mitigating the causes of crashes.

"One of the program's main goals is interagency collaboration and information exchange," Knapp says. "This statewide approach will improve communication among MDSTs on important technical transportation issues."

Technical information from LTAP is also available through various media. In addition to a quarterly newsletter, LTAP's Stan Ring Memorial Library, named for a former Iowa LTAP director, has a growing collection of printed materials, DVDs, online content, and recorded webinars. Of course, information is also available by simply contacting one of the LTAP staff.

Knapp said he is proud of LTAP's role in fostering a safe, efficient, and environmentally friendly transportation system in Iowa. He said through training, technical assistance, technology transfer, and by working together, "We strive to enhance the quality of life for all Iowans."

Iowa LTAP recently initiated the statewide Multi-Disciplinary Safety Program to facilitate collaboration among regional safety teams.

PUBLIC EMPLOYEES PARTNERSHIP

Public Employees Leadership Institute helps current and future supervisors

The Iowa Local Technical Assistance Program works with its partner organizations to help some Iowa public works employees better prepare themselves for leadership positions. The Public Employees Leadership Institute provides a convenient way for new supervisors and those wanting to someday move into management positions to gain valuable skills and enhance their leadership qualifications.

The Leadership Institute offers 14 self-paced online courses on topics such as supervisory and leadership skills, legal issues, emergency management, finance, and project management. The content is targeted for city, county, or state agency workers, but most of the courses are applicable for employees in almost any business.

The program is a joint effort of Iowa LTAP, the Institute for Transportation at Iowa State University, and ISU Extension and Outreach, with support and assistance provided by the Iowa chapter of American Public Works Association and the Iowa County Engineers Association. The APWA has accredited the institute.

One participant said the Leadership Institute was "invaluable" as he furthered his career. "The web-based format was perfect for working courses into my hectic schedule." He added that the course content "was well worth my time."

K-12 SUMMER PROGRAMS

Developing the next generation of STEM professionals

Summer programs promote STEM with a focus on transportation engineering.

The demand for students educated in STEM fields continues to grow. Many sectors of American society need more men and women with degrees in science, technology, engineering, or mathematics, including transportation.

That's why the Midwest Transportation Center headquartered at Iowa State University's Institute for Transportation has several programs to promote STEM fields for youth and teachers. The MTC teamed up with the Iowa Department of Transportation to offer three educational workshops during summer 2015:

Transportation Institute for High School Educators

This workshop, funded by the Iowa DOT, was held at InTrans. Twelve high school and middle school teachers (who reach nearly 1,200 students) attended, participating in the creation of transportation-related activities such as yellow light timing and runaway truck ramps. The activities helped bring STEM into the teachers' classrooms and after-school programs.

Go! Further Workshop for High School Students

Nineteen high school students from classrooms across Iowa came to InTrans for a week of leadership training and team-building, which included traversing a rope climbing obstacle course. Participants were also able to "test drive" the MiniCym—a driving simulator that allowed them to respond to various obstacles and hazards. Students were able to see what a snow plow operator really does by "driving" in a snow plow simulator housed at the Iowa DOT. And they learned the true value of leadership by "giving forward" as volunteers at a local area food pantry.

Teaching in the Fast Lane Workshop for Elementary Teachers

Two dozen elementary teachers participated in activities based on the American Association of State Highway and Transportation Officials' Roadways in Developing Elementary Students kit. Teachers also visited actual bridge testing sites and heard from visiting Iowa DOT and InTrans speakers on the importance of an engineering education.

The summer educational workshops helped reach teachers, some of whom were unsure how to include engineering topics in their classrooms. Daniel Loy, a fourth-grade math and science teacher from Beaver Creek Elementary in Johnston, Iowa, was one of those educators until he attended the Teaching in the Fast Lane Workshop.

"I have been a long-time advocate of promoting more science in the elementary classroom, but I admit I had never specifically targeted engineering. This workshop completely changed my tactics," he said. "I've now set up an active 'tinker table' in my class where kids could begin independent projects focused on science and engineering."

The MTC also sponsors *Go!* magazine, a free online publication for teens and young adults that explores the world of transportation and transportation-related careers. The publication's goal is to develop the transportation workforce by educating and stimulating young minds about the vast educational and career possibilities in transportation. *Go!* (www.go-explore-trans.org) offers entertaining and informative articles, a database of transportation careers and educational opportunities, and links to other resources.

Go! has a companion Spanish e-zine, *¡Vamos!* (www.vamos-explora-trans.org). The publications' major sponsors are InTrans, the MTC, and the Federal Highway Administration.

K-12 PARTNERSHIP

"Ready. Set. Build!" bridge-building competition combines engineering, teamwork

The Iowa Department of Transportation and Iowa State University's Institute for Transportation joined forces with the Science Center of Iowa to sponsor the first "Ready. Set. Build! Bridge-Building Challenge," an event to inspire future engineers to "build" their dreams.

Participants learned about bridge construction topics like structural efficiency working in a team.

Held in Des Moines on November 7, 2015 at the Science Center, the competition consisted of 24 teams and 75 participants. Groups of two to four participants and even families had three hours to design and build their own bridge using balsa wood, wooden clothespins, ice cream sticks, hot glue, and string.

The members of Bumble Squirt, an all-girl team from Eason Elementary (see below) in Waukee, Iowa, said that their success was only possible because they worked together and just had fun. "We learned so much! Like that a triangle is the strongest shape," said one team member. Bumble Squirt's hard work paid off because they took home the award for Highest Structural Efficiency within their age group, with a bridge holding 73 pounds.

Another all-girl team, the Pink Fluffy Unicorns from Adel-Desoto-Minburn Middle School in Adel, Iowa, was one of the only teams to utilize string in an attempt to make suspensions for their bridge. They took home the award for Truss Teamwork.

"Teamwork is essential in any bridge project," said Brent Phares, a judge and the director of the Bridge Engineering Center at InTrans.

The Midwest Transportation Center teamed up with the Iowa Department of Transportation to offer three educational workshops during summer 2015.



THE INSTITUTE FOR TRANSPORTATION IS THE FOCAL POINT FOR TRANSPORTATION AT IOWA STATE UNIVERSITY.

InTrans performs transportation research for public and private agencies and companies,

InTrans manages its own education program for transportation students and provides K-12 resources, and

InTrans conducts local, regional, and national transportation services and continuing education programs.