InTrans En Route

ANNUAL REPORT

IOWA STATE UNIVERSITY
Institute for Transportation

JANUARY 2023
TO
DECEMBER 2023

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The Institute for Transportation (InTrans) at Iowa State University administers 14 centers and programs with several distinct yet affinitive research specialties and a variety of technology transfer and professional education initiatives. From traffic safety to big data and from preservation to education, InTrans focuses on research and service that impact transportation now and into the future.

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DIRECTOR'S MESSAGE

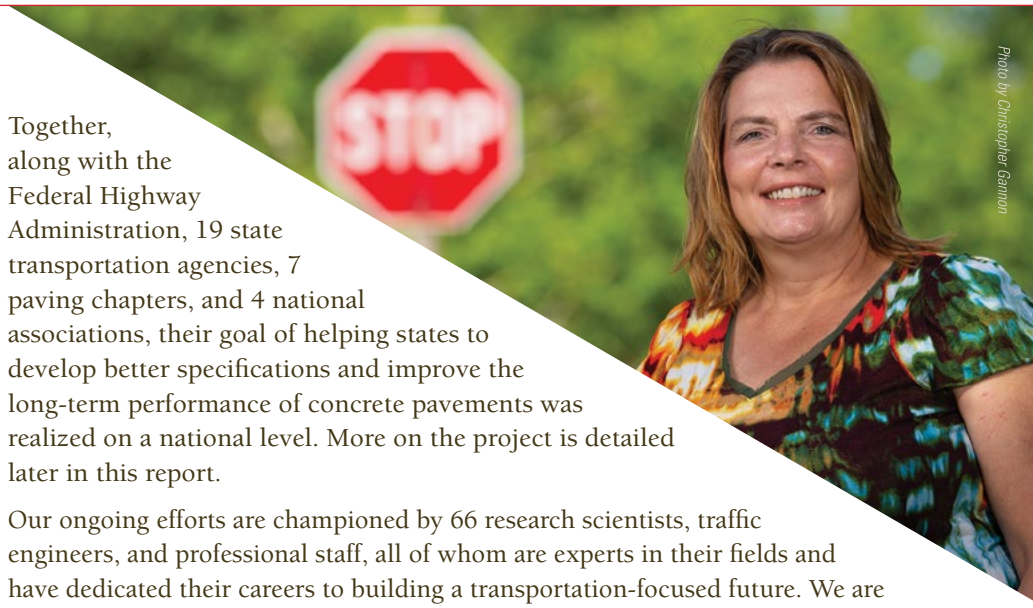


Photo by Christopher Gannon

If it were possible, what advice would you give to yourself a year, two years, even a decade ago? What secrets to success do you entrust to that younger, enthusiastic version of you that today has seen it all? For me, as I approach nearly a decade serving as Director of the Institute for Transportation, I would say: "Believe, build, and never stop moving forward."

Each year there is something new to celebrate, and now, at the end of 2023, it's time to recount what has made this year the best one yet. Our annual budget for work at InTrans in 2023 was nearly $18 million, a 12 percent increase from last year. Our partners in state agencies, industry groups, and the federal government continue to place their confidence in our efforts as we deliver on that shared promise of creating, sharing, and applying transportation knowledge to those in Iowa and beyond. For example, our researchers at the National Concrete Pavement Technology Center recently wrapped up a joint five-year project focusing on performance-engineered mixtures. Together, along with the Federal Highway Administration, 19 state transportation agencies, 7 paving chapters, and 4 national associations, their goal of helping states to develop better specifications and improve the long-term performance of concrete pavements was realized on a national level. More on the project is detailed later in this report.

Our ongoing efforts are championed by 66 research scientists, traffic engineers, and professional staff, all of whom are experts in their fields and have dedicated their careers to building a transportation-focused future. We are also grateful for our continued collaborations with over 20 faculty members from the Iowa State University College of Engineering. Our faculty and staff are supported by 80 graduate and 51 undergraduate students who work on a variety of research and demonstration projects as part of the InTrans' team.

This is a year of milestones for InTrans and its centers and programs, as 2023 marks the 35th anniversary of its beginnings with a single research grant in 1988. Additionally, it was 40 years ago, in 1983, that the Iowa Local Technical Assistance Program began as a resource for public transportation agencies, originally known then as the Local Transportation Information Center. Despite the passing of time, and changing of names, we all remain true to InTrans' vision, mission, and dedication to progress.

Within this publication, you will find highlights of today's efforts. These accomplishments come as a result of our belief in engineering, science, and each other. The discoveries we have made this year are only the beginning. Come back next year to see what's next.

Shauna L Hallmark

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

VISION

Translating science for decision-making

MISSION

Saving lives and improving economic vitality through discovery, research innovation, outreach, and the implementation of bold ideas

CENTER AND PROGRAM HIGHLIGHTS

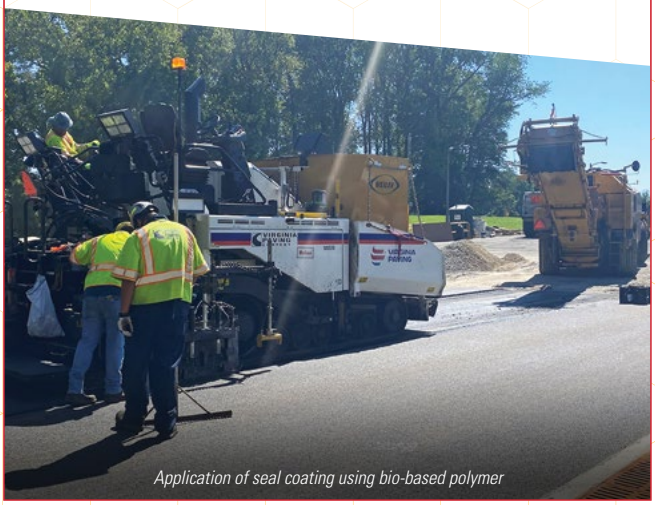
ASPHALT MATERIALS AND PAVEMENTS PROGRAM (AMPP)

Director: Chris Williams

The Asphalt Materials and Pavements Program (AMPP) is the leading state and regional asphalt materials and pavements educator, research provider, and technology transfer program. AMPP participates in national and international research and technology transfer.

In partnership with academia, state and local transportation agencies, the asphalt paving industry, and material suppliers, AMPP is leading research to improve the quality and performance of asphalt materials and pavements.

In 2023, AMPP researchers worked on multiple projects for several state, federal, and industry sponsors. The major thrust of the research was biomaterials and sustainability, including the use of biomaterials developed at Iowa State in asphalt paving materials/products such as additives, emulsions, and seal coats. Additional ongoing research has involved using recycled ground tire rubber in highly trafficked roadways. The products of this sustainability research are being scaled for commercialization, with interest extending as far as South America and Europe.



Application of seal coating using bio-based polymer

AURORA PROGRAM

Codirectors: Zach Hans and Neal Hawkins

The Aurora program is a partnership of highway agencies that collaborate on researching, developing, and deploying road weather information to improve the efficiency, safety, and reliability of surface transportation. In 2023, a total of 19 state departments of transportation (DOTs) participated in Aurora, with Delaware joining in 2023.

In 2023, Aurora published two research reports on extracting weather data from images and roadway friction modeling, with the latter project earning an American Association of State Highway and Transportation Officials (AASHTO) High Value Research (HVR) award. Two additional research projects were completed on spring load restrictions and infrared thermography. Aurora awarded over half a million dollars of new research in 2023.

The Aurora Board held monthly meetings to conduct business; facilitate agency discussion regarding current practices, challenges, and solutions; and provide an opportunity for researchers and vendors to present their work and evolving technologies. Spring and Fall Aurora Board meetings were held in San Diego, California, and Portland, Maine, respectively. The Aurora Board continued to engage with industry and research groups and added two new Friends of Aurora.

Stationary friction sensors mounted at an RWIS site in Etna, Maine

Centers and programs continued on page 5

Centers and programs continued from page 4

BRIDGE ENGINEERING CENTER (BEC)

Director: Justin Dahlberg

The Bridge Engineering Center (BEC) focuses on maintaining and improving bridge infrastructure assets through new construction approaches and materials, better inspection approaches and management philosophies, and the development of bridge preservation techniques.

The year 2023 brought exciting new projects to the BEC, many of which were in partnership with the Iowa DOT. These projects included an evaluation of concrete additives to promote longer lasting bridge decks, an evaluation of a novel two-course deck system using fiber-reinforced concrete and ultra-high performance concrete, and many other projects with both laboratory and field components.

The BEC continued or started projects with the Federal Highway Administration (FHWA) to promote the use of orthotropic steel decks and to arrange peer exchanges among all state DOTs to identify the best bridge load rating practices.

The BEC continued its partnership with the Accelerated Bridge Construction (ABC) University Transportation Center, with projects focusing on both new materials and techniques and the expansion of existing ABC strategies.

Placement of joint concrete in the field

CENTER FOR TRANSPORTATION RESEARCH AND EDUCATION (CTRE)

Director: Omar Smadi

The Center for Transportation Research and Education (CTRE) performs transportation-related research and outreach activities. CTRE faculty, staff, and students remain engaged across several research and development areas, including smart work zones, safety, traffic operations, connected and autonomous vehicle initiatives, pavement and bridge management, pavement markings, and asset management.

In 2023, CTRE researchers continued to support the Iowa DOT, law enforcement, and local agencies through a multitude of research projects that aimed to enhance safety in Iowa. Researchers also actively conducted research on the management of pavement, bridge, and pavement marking assets. Such projects are critical to advancing the state of the practice both in Iowa and nationally. Additionally, CTRE researchers were awarded multiple National Cooperative Highway Research Program (NCHRP) and FHWA projects to continue their involvement in research at the national level.

Researchers have continued to lead and participate in national committee activities and provide technology transfer through unique delivery methods.

CTRE researchers measuring pavement friction

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Centers and programs continued from page 5

CENTER FOR WEATHER IMPACTS ON MOBILITY AND SAFETY (CWIMS)

Director: Zach Hans

The Center for Weather Impacts on Mobility and Safety (CWIMS) focuses on understanding and mitigating the impacts of weather on surface transportation.

In 2023, CWIMS continued its administration of the FHWA Aurora Pooled Fund and led or collaborated on several research projects, such as *Navigation System for Snowplows in Low-Visibility Situations* (Iowa DOT), *Pikalert CAV Demonstration* (Iowa DOT), and *Adaptive Route Optimization (ARO) for Operations* (FHWA).

CWIMS also continued to provide ad hoc support to the Iowa DOT through the presentation of road conditions and to the National Weather Service through an investigation of crash experience with respect to winter weather forecasts and conditions.

CONSTRUCTION MANAGEMENT AND TECHNOLOGY (CMAT) PROGRAM

Director: Jennifer Shane

The Construction Management and Technology (CMAT) program conducts work related to the delivery of transportation and infrastructure systems—from development through construction—with a focus on construction and management aspects.

In 2023, CMAT continued work on several NCHRP projects, including an investigation of valuation and compensation for accommodating utility and communications installations in public rights of way and an investigation of the alignment of utilities with the project development process.

Additionally, in 2023 CMAT worked on projects for the Kentucky Transportation Cabinet (KYTC) and Iowa DOT. The KYTC project involved integrating the cabinet's highway design and utility coordination processes and the development of associated training. The Iowa DOT projects involved utility coordination and development of a scheduling specification.

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Centers and programs continued from page 6

IOWA LOCAL TECHNICAL ASSISTANCE PROGRAM (IOWA LTAP)

Director: Keith Knapp

The Iowa Local Technical Assistance Program (Iowa LTAP) provides training and technical assistance to local transportation agency staff and those who work with them.

In 2023, the Iowa LTAP team continued to provide its services throughout the state of Iowa. Most of its training events were held on-site, but online webinars continued to be offered once a month during much of the year. Overall, it is estimated that Iowa LTAP impacted approximately 5,200 participants through the provision of its on-site, "live" online, and recorded training resources.

Additionally, Iowa LTAP continued to publish its quarterly newsletter *Technology News* and to offer its biweekly (monthly during the summer) electronic resource. By the end of 2024, *Technology News* will also be distributed only electronically. Iowa LTAP's technical assistance, equipment loan, and road safety review programs also continued.

Participants at a 2023 Iowa Winter Maintenance Workshop in Atlantic

IOWA STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS)

Director: David Carney

The Iowa Statewide Urban Design and Specifications (SUDAS) program promotes uniformity of urban design and construction across Iowa.

In 2023, SUDAS staff focused on updates to the erosion and sediment control design standards, updates to various chapters to incorporate additional complete streets design guidance and new pavement smoothness requirements, and the development of nondestructive pavement thickness specifications.

SUDAS staff also continued work on the Iowa Public Works Service Bureau (PWSB), an Iowa Highway Research Board (IHRB) project begun in 2021 to help public works staff from cities of all sizes connect with and learn from each other. Only two years after its inception, the PWSB has grown to over 600 members and counting. In 2023, staff expanded marketing opportunities by establishing a consistent social media presence and presenting and exhibiting at numerous conferences. The project was also awarded an additional two years of IHRB funding.

SUDAS Program Coordinator Beth Richards presenting at the 2023 Municipal Streets Seminar

Centers and programs continued on page 8

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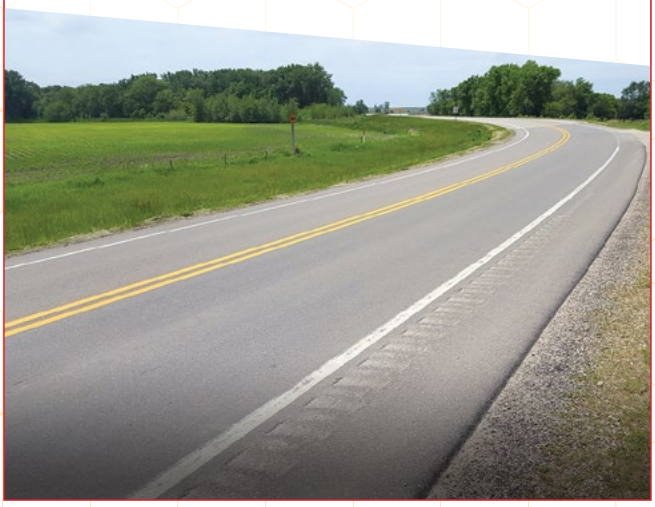
MIDWEST TRANSPORTATION CENTER (MTC)

Director: Shauna Hallmark

The Midwest Transportation Center (MTC) focused its research on data-driven performance measures of transportation infrastructure, traffic safety, and project construction. The MTC was one of 10 regional University Transportation Centers sponsored by the U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology (USDOT/OST-R).

Funded from 2013 to 2019 by the 2012 federal transportation bill, the Moving Ahead for Progress in the 21st Century Act (MAP-21), the MTC's research focus area was "State of Good Repair," a key program under MAP-21.

Over the grant period, the MTC collaborated with 23 colleges, departments, and centers at Iowa State and 81 external partners from various sectors of government, academia, and industry. These connections resulted in 83 completed projects, including 4 innovative research projects focusing on advances in the design, construction, instrumentation and monitoring, modeling, and management of highway-related projects.



NATIONAL CENTER FOR WOOD TRANSPORTATION STRUCTURES (NCWTS)

Codirectors: Justin Dahlberg and James Wacker

The National Center for Wood Transportation Structures (NCWTS) helps agencies efficiently utilize and maintain naturally sustainable forest resources in durable, cost-effective wood transportation structures. NCWTS efforts include technical and demonstration meetings, webinars, and presentations to advance the use of wood in transportation structures as well as research projects and funding procurement to support agencies in the construction and maintenance of wood transportation structures.

In 2023, the NCWTS and its collaborative partner, the United States Department of Agriculture (USDA) Forest Products Laboratory (FPL), continued work on an ongoing laboratory investigation of cross-laminated bridge decks and on a project to develop and evaluate robust moisture control strategies to enhance the long-term durability of timber highway bridges.

Furthermore, the NCWTS continued efforts to identify and prioritize national research and educational needs for wood transportation structures and to conduct an independent evaluation of program activities.

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NATIONAL CONCRETE PAVEMENT TECHNOLOGY CENTER (CP TECH CENTER)

Director: Peter Taylor

Standing at the nexus of agencies, industry, and academia, the National Concrete Pavement Technology Center (CP Tech Center) is focused on discovering and implementing best practices for the design, construction, and maintenance of sustainable and resilient concrete pavements.

In 2023, the CP Tech Center continued to develop and deliver technology transfer materials on concrete overlays, performance-engineered mixtures, and sustainability to a variety of audiences through publications, webinars, and in-person events around the United States. Ongoing research included projects to understand the effects of superabsorbent polymers and vibration, develop sustainable concrete mixtures, and construct long-lasting overlays with and without fibers.

Cooperative agreements with the FHWA and Federal Aviation Administration (FAA) enabled the CP Tech Center to continue developing materials on sustainability and to manage several million dollars of fundamental research conducted by external researchers.

PROSPER director Halil Ceylan speaking at the 2023 Iowa Better Concrete Conference

PROGRAM FOR SUSTAINABLE PAVEMENT ENGINEERING AND RESEARCH (PROSPER)

Director: Halil Ceylan

The Program for Sustainable Pavement Engineering and Research (PROSPER) is instrumental in advancing research, education, and technology transfer related to sustainable highway and airport pavement infrastructure systems.

The PROSPER team continued or completed work on over 20 externally funded research projects in 2023. Projects included an evaluation of field implementations of Otta seal, the development of various innovative pavement data collection and analysis tools for county and transportation infrastructure engineers in Iowa, an evaluation of curling and warping in Iowa's concrete pavement systems, and an evaluation of the use of small uncrewed aircraft systems (sUAS/drones) for airport pavement inspections.

In 2023, the PROSPER team was also awarded eight major research projects that will allow the team to explore the development of cutting-edge technologies to be implemented in transportation infrastructure engineering applications.

Discharge of CGR during concrete diamond grinding

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REAL-TIME ANALYTICS OF TRANSPORTATION DATA (REACTOR) LABORATORY

Codirectors: Anuj Sharma, Neal Hawkins, and Skylar Knickerbocker

The Real-Time Analytics of Transportation Data (REACTOR) Laboratory serves as a focal point for traffic operations research. Operating under InTrans' CTRE program, the laboratory began in 2013 with the aim of supporting the Iowa DOT's Operations Division. Since its inception, this work has been expanded through projects for the FHWA, the National Science Foundation (NSF), and industry.

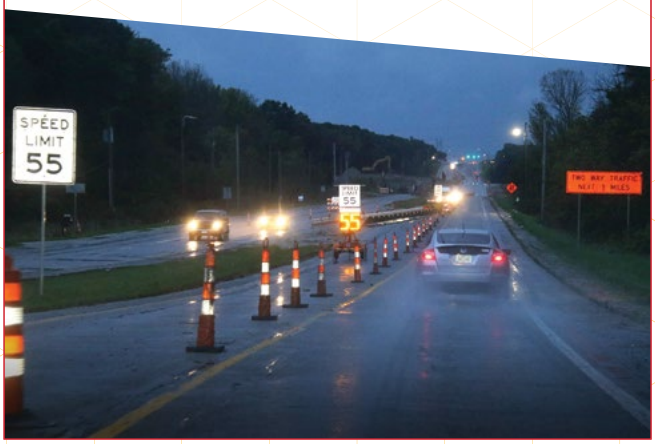
In 2023, the laboratory's research team continued its work in developing technology to transform continual data streams into decision support information and solutions. Through analytics that make use of emerging data sources (such as data from connected vehicles), the team continued to support Iowa DOT decision making across a range of topics, including safety, enforcement, operations, and work zones. The team's work also supported initiatives such as performance measures for automated traffic signals, implementation of smart arrow boards, and automation of the Iowa DOT's audible alert system to enable dynamically triggered alerts for drivers and workers.

SMART WORK ZONE DEPLOYMENT INITIATIVE (SWZDI)

Director: Keith Knapp

The Smart Work Zone Deployment Initiative (SWZDI) is a pooled fund effort that currently includes nine participating states. SWZDI supports research and outreach activities that focus on innovative practice-ready policies, processes, tools, and products that enhance the implementation and constructability, safety, mobility impacts, and/or operation of all types of work zones.

In 2023, SWZDI collected problem statements from researchers and released a request for proposals (RFP) focused on three subjects: work zone performance, accommodation of vulnerable road users, and artificial intelligence and its uses for work zone management. Multiple proposals were received that addressed the three subjects, and contracts are being created to fund projects focused on them. One SWZDI-funded research project was completed in 2023, and work continued on five ongoing projects.



MAJOR ACCOMPLISHMENTS

Each year there is something new to celebrate, and 2023 is no exception. Whether it's marking the completion of a project, discovering new research areas to study, or simply noting key milestones, it's important to stop for a moment and rejoice in our successes.

Among InTrans' accomplishments in 2023 were the completion of guides, publications, and tools that reflect new developments and aim to standardize processes. These projects often helped improve safety and streamline maintenance efforts for existing infrastructure.

In 2023, InTrans' achievements also included completing 80 projects, organizing and holding nearly 150 events, and engaging with students, colleagues, transportation professionals, and industry to further our mission.

We also took a moment to look back over the past 40 years of Iowa LTAP—InTrans is also celebrating 35 years—and look ahead to exciting new projects underway in 2023.

Highlights from InTrans' centers and programs are as follows.

FHWA EAR PROJECT TO FOCUS ON NEXT-GENERATION CEMENT

The FHWA Exploratory Advanced Research (EAR) program recently greenlighted a $1.2M project spearheaded by Kejin Wang and researchers at Iowa State and the CP Tech Center, with support from the University of Texas–Austin, Georgia Institute of Technology, University of Florida, and Carnegie Mellon University.

This project, which is currently in progress, focuses on formulating, characterizing, optimizing, evaluating, and implementing a next-generation, low-carbon, energy-saving, and cost-effective cement for pavement and bridge applications. This material, called CC·I·L cement, is made with calcined clay (CC) or natural pozzolan, type I portland cement (I), and limestone powder (L).

Concrete remains the most widely used construction material, with approximately 500 million tons of concrete produced in the United States each year. Additionally, 75% of the nation's bridges and over 60% of its Interstate highways are made of concrete. Although traditional concrete has plenty of benefits, its production consumes massive amounts of raw materials. CC·I·L cement is a much more sustainable cement in comparison, characterized by its use of emerging raw materials and blends, which can generally be produced at much lower temperatures and ground with much less energy.

Accomplishments continued on page 12

GUIDE SPOTLIGHT

Helical pile installation equipment

HELICAL PILE FOUNDATION GUIDE FOR BRIDGE STRUCTURES

Helical pile foundation systems have been used for numerous applications across various industries for many years. Their use has gained popularity more recently as concerted effort has been given to standardize design procedures, develop design tools, and develop the construction methods necessary to satisfy and ensure strength and serviceability requirements.

Despite the fact that helical piles have been recognized through code adoption, the advancement of helical pile technology and the development of the governing codes have been minimally focused on the bridge design community and the use of helical piles in bridge structures. To realize this potential, a project led by BEC Director Justin Dahlberg investigated helical pile foundation implementation for bridges and produced the *Helical Pile Foundation Guide for Bridge Structures*.

The guide provides bridge engineers and designers with direction and specifications for this substructure foundation option, which can be advantageous on any bridge project but is particularly useful for bridges on low-volume roads, where budgetary considerations tend to be a specific priority. The guide includes examples of many useful design specification reference tables and handy construction and installation documentation tools.

Accomplishments continued from page 11

Through the course of the project, knowledge gaps regarding CC·I·L cement will be identified and current knowledge advanced, with an end goal of developing a roadmap for possible national and state-by-state implementation.

Research began in late fall 2023 with work expected to continue through 2025.

SOIL TESTING DEVICE DEVELOPED AT INTRANS

A newly developed soil testing device will allow users to measure the cyclic behavior of soils in the ground rather than in a laboratory, saving time and money and delivering more accurate measurements.

The Cyclic Borehole Shear Test (CBST) device was developed as part of an InTrans project sponsored by the NCHRP Innovations Deserving Exploratory Analysis (IDEA) program. The project developed a prototype device and software control program, and a future research project is expected to further develop and commercialize the CBST product.

"The device has the potential to help advance the safety and sustainability of transportation infrastructure by improving the speed, reliability, and accuracy with which daily foundation design inputs and liquefaction susceptibility of soils are assessed," said Jeramy Ashlock, principal investigator on the project and InTrans faculty affiliate.

The CBST is unique in its ability to measure soil parameters in its natural setting, under cyclic loading, in a matter of minutes. The current most commonly used tests can require up to several weeks and must be conducted in a laboratory using meticulously prepared samples.

"By testing the soil in situ, the device will not only save time but also reduce or avoid the effects of soil sample disturbance, which can significantly affect laboratory test results," said Ashlock.

PROSPER PROJECT FINDS LONG-TERM BENEFITS FROM OTTA SEAL TREATMENTS

Iowa's first Otta seal, a low-cost bituminous surface treatment (BST) for low-volume roads, was constructed in 2017. Since that first four-mile stretch built in Cherokee County, more than 50 Otta seal sites have been constructed.

Those sites demonstrate the widespread interest in this relatively new technology imported from Norway and adapted to Iowa's climate and quarries. The sites also presented PROSPER Director Halil Ceylan and his research team the opportunity to evaluate the performance of the existing sites and recommend specifications for Otta seal in Iowa.

"The method developed under the project can help county engineers determine optimal binder and aggregate application rates for local materials and better understand how various parameters—such as aggregate gradation, aggregate and binder type, and aggregate and binder application rate—can affect the performance of Otta seal surfacing," said Ceylan, principal investigator on the project.

As part of the Otta seal project, the researchers also conducted laboratory tests to aid in developing the specifications, evaluated the field performance of the treatment through additional site construction in Page County, and performed a life-cycle cost analysis using those new test sites.

Accomplishments continued on page 13

Otta seal construction

Accomplishments continued from page 12

CP TECH CENTER WRAPS UP PEM PROJECT AFTER FIVE YEARS

The CP Tech Center published the final report for a five-year project on performance-engineered mixtures (PEM) that helped states implement newer concrete pavement technologies and adopt specifications and test methods to enhance concrete durability. The project was conducted under a Transportation Pooled Fund (TPF-5(368)) as a joint venture between Oregon State University, Oklahoma State University, and Iowa State University.

"The aim of the program was to help states develop better specifications by focusing on the properties that matter and implementing approaches to evaluate those properties using appropriate test methods," said CP Tech Center Director Peter Taylor.

He added, "Our goal was to reduce the risk of accepting concrete that would not survive as intended while also reducing dependence on old methods that are no longer ideal. We also sought to help contractors consistently produce mixtures that would comply with these needs."

Project activities included the following:

- Formal test training was provided in 12 of the 19 pooled fund member states.
- Shadow projects supported state agencies in implementing PEM and using new testing methods.
- Eighty-two workshops, meetings, and webinars facilitated technology transfer for PEM across the country.
- A PEM webpage was created, and a PEM database was developed to house data collected by state agencies during the shadow test projects.
- Several test methods in the areas of strength, shrinkage, freeze-thaw durability, transport, aggregate stability, and workability were studied.

LTAP MARKS 40 YEARS

Iowa LTAP was initially founded as the Local Transportation Information Center on January 28, 1983, after the federal government for the first time appropriated funding for states to establish rural transportation assistance programs.

Over the years, Iowa LTAP has gone through several name changes, but its mission has always been the same: to provide technical and management assistance to Iowa's local governments and thus improve traffic safety through locally coordinated multidisciplinary efforts based on trusted relationships.

The previous 40 years have shown that Iowa LTAP has continuously adapted its training and technical assistance offerings over the decades to keep pace with the technologies that local agencies in Iowa are working with.

To pause for a moment and reflect on (and celebrate) the past 40 years, Iowa LTAP put together a booklet looking back at the founding of the program and how it has changed and grown—along with the world around it—since 1983.

What might happen in the next 40 years—with technologies changing at the rate they currently are—is something to think about, but ultimately Iowa LTAP, in keeping with its mission, will continue to be in sync with local agencies' needs and will adapt to those needs as demands change.

Paving on US 20 using PEM test procedures (Photo by Todd Hanson, Iowa DOT)

COMMITTEE INVOLVEMENT AND SERVICE TO THE PROFESSION

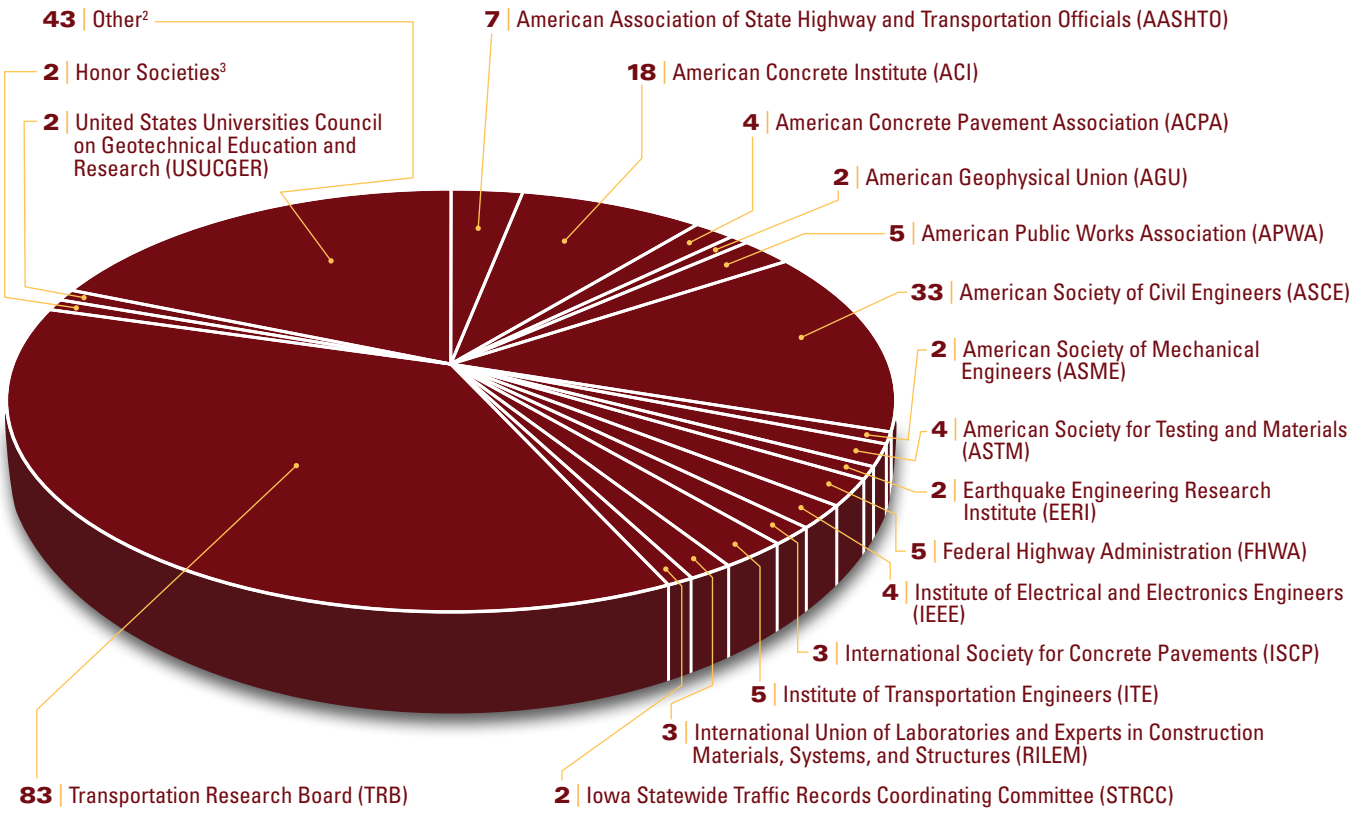
In 2023, InTrans staff served in more than 60 different organizations related to their areas of expertise, including serving as members or in leadership roles on 31 unique TRB committees and subcommittees, 24 unique ASCE committees and subcommittees, and 9 different ACI committees and subcommittees, among various roles in other organizations. More details on committee service are provided in the chart below.

InTrans staff served on the editorial boards of 22 different journals and had various editor roles for 29 different journals in 2023. They also contributed a multitude of reviews for nearly 50 different journal publications and 4 different conferences.

In addition to hosting events and conferences and reviewing papers for national meetings, InTrans staff also served as presenters and judges for K-12 conferences and events, as panelists or on organizing committees for international conferences, and as track or session chairs for 22 different state, national, or international conferences and events.

Also, InTrans staff served as panel members or peer reviewers on 11 different research projects.

SERVICE BY ORGANIZATION[1]



TOTAL ROLES HELD

229

[1]*Tallies include services in roles such as members, friends, liaisons, fellows, and various other positions in organizations, chapters, and committees.*

[2]*Other organizations include transportation-focused associations, committees, councils, societies, and other industry and academic groups in which one InTrans staff member held a role.*

[3]*Honor societies include The Honor Society of Agricultural, Food, and Biological Engineering and Sigma Lambda Chi.*

AWARDS AND HONORS

FACULTY AND STAFF AWARDS

CP Tech Center's Peter Taylor earns College of Engineering award

CP Tech Center Director Peter Taylor was recognized by Iowa State's College of Engineering for his outreach efforts through the center. Taylor, who is also a research professor in the Civil, Construction, and Environmental Engineering (CCEE) department, received the Excellence in Extension and Outreach Faculty award during a ceremony that recognized many College of Engineering faculty and staff members.

The award citation notes that "Peter has been a tireless advocate for the National Concrete Pavement Technology Center's mission through extensive travel, relationship building, and his natural ability to bring industry, government, and academia together under a common purpose."

Richards receives APWA service award

SUDAS Program Coordinator Beth Richards received the American Public Works Association (APWA) Iowa Chapter L. O. Steward Service Award during its 2023 Fall Conference. The award recognizes Iowa Chapter members who have served the same governmental agency for 15 years in continuous employment and have been a member of APWA for a minimum of 5 years. Richards was among nine recipients of the award in 2023.

Richards has been at InTrans since 2003 and has been involved with the APWA since 2008, serving in many roles during her involvement with the association. She is currently the Iowa Chapter's secretary and treasurer.

Arenas Amado receives undergraduate teaching award

InTrans Faculty Affiliate Antonio Arenas Amado was among two recipients of the CCEE department's Joseph C. and Elizabeth A. Anderlik Faculty Award for Excellence in Undergraduate Teaching in 2023. The award promotes excellence in teaching by faculty members who teach at least one undergraduate course per year. Two awards are given annually, one to a tenured/tenure-track faculty member and one to a term faculty member.

Aurora project on friction modeling earns AASHTO award

A recently completed project on roadway friction modeling funded by the Aurora Program earned an AASHTO High Value Research (HVR) award.

The project, led by Gerry Wiener of the National Center for Atmospheric Research and Laura Fay of the Western Transportation Institute, trained and improved computer models to predict where salt or other treatments should be applied during winter weather to make roads safer. The research project was selected for the supplemental award in AASHTO Region 3.

Day, Wood receive teaching excellence awards

InTrans Research Scientist Christopher Day and Faculty Affiliate Jonathan Wood both earned the CCEE department's Charles W. Schafer Award for Excellence in Teaching, Research, and Service in 2023. Two awards are given per year to promote excellence in teaching, research, and service by faculty members who hold an academic rank below that of professor.

InTrans affiliates receive College of Engineering recognition

Iowa State's College of Engineering granted three InTrans staff and affiliates new named faculty positions:

- Alice Alipour, BEC Structure and Infrastructure Engineer—Thomas M. Murray Family Faculty Fellowship
- Roy Sturgill, CMAT Program Construction Engineer—Building a World of Difference Faculty Fellowship in Engineering
- Jeramy Ashlock, InTrans Faculty Affiliate—James M. Hoover Chair in Geotechnical Engineering

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Sarkar receives College of Engineering research award

InTrans Faculty Affiliate Soumik Sarkar earned Iowa State's College of Engineering Mid-Career Achievement in Research Award in 2023. The award recognizes faculty members who have demonstrated outstanding accomplishments in research and/or creative activity at the mid-career stage. Sarkar, who is also a Walter W. Wilson Faculty Fellow in Engineering and Associate Professor in the Department of Mechanical Engineering, was recognized with faculty and staff at a September awards ceremony.

Taylor receives ACPA technical achievement award

CP Tech Center Director Peter Taylor was awarded the Marlin J. Knutson Award for Technical Achievement from the American Concrete Pavement Association (ACPA) at its 60th Annual Meeting held in late 2023.

Taylor earned the award for his unwavering commitment to advancing the field of concrete pavement technology and his exceptional contribution to the industry. He was also recognized for being a "trailblazing expert and scholar" whose influential and innovative research has significantly improved concrete pavement mix design, durability, strength, and resilience.

InTrans researchers among those honored with university awards

Three InTrans researchers—Portland Cement Concrete (PCC) Engineer Kejin Wang, BEC Structure and Infrastructure Engineer Alice Alipour, and BEC Structural Engineer Behrouz Shafei—were among the more than 80 Iowa State faculty and staff recognized in fall 2023 for winning one of the university's annual awards.

Wang received the title of distinguished professor along with four other Iowa State faculty. The title recognizes faculty whose accomplishments in research or creative activities have had a significant impact on their discipline nationally or internationally and who have demonstrated outstanding performance in at least one other area of faculty responsibility.

Alipour and Shafei are among a team that received the Interdisciplinary Team Research Award for their Electric Network Disaster Mitigation for Utilities in Rural Environment (ENDURE) project. The award recognizes an interdisciplinary team of two or more faculty researchers with outstanding achievements who have made a significant contribution to the university's research and scholarship mission through successful interdisciplinary collaborations.

STUDENT AWARDS

PROSPER student wins best paper award

PROSPER graduate student Araz Hasheminezhad won the Student Paper Competition at Dam Safety 2023, an annual conference organized by the Association of State Dam Safety Officials (ASDSO). Hasheminezhad presented the award-winning paper, "Numerical Evaluation of Anti-Liquefaction Performance of Deep Soil Mixing Method under Embankment Dams," as part of a poster-lightning talk at the conference and received recognition during the conference's awards ceremony.

InTrans graduate student receives women's group award

During her time at InTrans, spring 2023 graduate Nazik Çıtır impacted the field of engineering by building up and empowering women as an ambassador and president of the Graduate Society of Women Engineers. Her efforts earned her the Guiding Star award from the Society of Women Engineers, an award given to women who have been involved in the society for two years or more and have done outstanding work with their team.

Awards continued on page 17

Awards continued from page 16

InTrans students see success at MOVITE Spring Conference

InTrans students earned numerous awards at the recent Missouri Valley District of the Institute of Transportation Engineers (MOVITE) Spring Conference held in Cedar Rapids in summer 2023. Iowa State earned the Student Chapter Momentum Award and placed second in the Traffic Bowl, a team competition. Traffic Bowl team members included Aparna Joshi, Ashutosh Dumka, and Abdallah Alhamdan.

InTrans graduate students also placed first in the Design Challenge, where team members Alhamdan, Maria Rojas, Frances Agbenya, and Camilla Junaid worked out a real-world solution to a

design prompt from moderators. The 2023 Design Challenge focused on the problem of pedestrian-related crashes in a commercial district.

Additionally, InTrans graduate students won the top two spots in the Thomas J. Seburn Student Paper Award and received both Jan Kibbe Student Scholarships. InTrans doctoral student Minsoo Oh won the Thomas J. Seburn Student Paper Award, while InTrans doctoral student and Transportation Student Association (TSA) president Raghupathi Kandiboina earned second in the competition. Kandiboina and InTrans doctoral student Maroa Mumtarin earned the two Jan Kibbe Student Scholarships awarded.

Mumtarin also placed second in the Poster Competition.

EVENT SPOTLIGHT

INSTITUTE FOR TRANSPORTATION

BEC bridge research engineers conducting load testing of student-built bridges during the 2023 Challenge

READY, SET, BUILD! BRIDGE-BUILDING CHALLENGE

Whether they were building an arch, suspension, or truss bridge, the participants in this year's Bridge-Building Challenge braced for fierce competition. The 2023 Challenge began on November 3 at the Science Center of Iowa in Des Moines, bringing in 50 teams with over 150 students from across Iowa to participate in the two-day event.

The Bridge-Building Challenge sets teams against the clock, as they only have 2½ hours to build a bridge out of materials like Popsicle sticks, wooden dowels, masking tape, glue, string, and poster board. Although design and efficiency play a key role in building a successful bridge, winning the Bridge-Building Challenge also takes teamwork.

"Teamwork is essential in any bridge project—big or small," said Brent Phares, judge and bridge research engineer with the BEC at InTrans.

Throughout the competition, students had the opportunity to interact with engineering professionals from the Iowa DOT and InTrans to learn more about bridges and other transportation-related topics. The Bridge-Building Challenge provides an opportunity for participants to use real science while learning about the engineering design process that practicing engineers use to come up with solutions to a problem.

INTRANS CENTERS AND PROGRAMS—THEN AND NOW

"The Center will conduct short courses, training schools, and workshops on various aspects of local transportation. In general, these schools will offer an opportunity for hands-on learning. They will be conducted throughout the state to minimize your travel. Cost will be minimal."

This objective was among four items that LTAP announced 40 years ago, when it was founded as the Local Transportation Information Center, to meet its goal of sharing new research and useful updates with those who build and maintain local transportation services and facilities.

As the program has grown and changed, and is now encompassed under the InTrans umbrella, this objective remains a core of what we—LTAP, InTrans, and our other centers and programs—do.

In 2023, this foundational goal led our centers and programs to hold nearly 150 events and travel the state to provide the latest iterations of those "short courses, training schools, and workshops," bring people together at large conferences, and offer virtual webinars and workshops.

This year's events included both unique events—like an open house highlighting geosynthetic base stabilization research and LTAP's Motor Grader Operator (MoGO) Field Days at Camp Dodge—and recurring, well-attended events like the annual Bridge-Building Challenge.

2022 saw record attendance as in-person events returned, but 2023 nearly kept that pace with at least 5,500 attendees at various events, not including those conferences that our centers and programs assist in hosting.

More than half of the attendees turned out for our virtual events. The CP Tech Center's Technology Tuesday virtual events averaged about 300+ attendees at each of its 9 events in 2023. LTAP's virtual events averaged nearly 70 attendees at each of its 10 webinars, held monthly except for a summer break.

Of course, these events are not just about growing the numbers but about translating research into practice and bringing people together.

EVENT SPOTLIGHT

PROSPER Director Halil Ceylan, right, discusses base stabilization project at test site near Independence, Iowa

GEOSYNTHETIC BASE STABILIZATION OPEN HOUSE

Geosynthetics offer a promising solution for road base stabilization. However, using geosynthetics made from recycled materials carries the additional benefit of reducing the amount of plastic waste that ends up in landfills and the natural environment.

An in-progress project from PROSPER, led by its director Halil Ceylan, aims to determine the structural benefits and environmental suitability of using recycled plastics as a base stabilization agent.

The project began in 2022, and the first test section to incorporate recycled plastics was built in late September 2023. To mark the occasion, demonstrate the technology, and discuss the research, PROSPER held an open house on September 26 in Independence, near the test section site.

"This here is like a triple win," said Buchanan County Board of Supervisors Chair Clayton Ohrt to kick off the event, which included more than 20 people.

He cited the project's potential to provide environmental benefits from the use of upcycled plastic waste, create jobs and business opportunities in the county, and address infrastructure issues related to freeze-thaw cycles as the triple benefits.

It's fitting that Buchanan County is the location selected for the test sites for the project, as the research is a direct result of a short message Ohrt sent to Buchanan County Engineer Brian Keierleber five years ago asking about the potential to use recycled plastics as a base stabilizer. From there, the idea was submitted to the Iowa Highway Research Board, which is now sponsoring the PROSPER project along with the Iowa DOT.

INTRANS 2023 EVENT RECAP

IN-PERSON EVENTS

Iowa Local Agency Pavement Management End of Year Workshop (December 5, Ames, IA)

Municipal Streets Seminar (November 14, Ames, IA)

Iowa Better Concrete Conference (November 9, Ames, IA)

Traffic and Safety Forum (November 8, Ames, IA)

AutoCAD Basics 2023 (November 7, Ames, IA)

Ready, Set, Build! Bridge-Building Challenge (November 2 and 3, Des Moines, IA)

Iowa Winter Maintenance Workshop Series (several events held in November across Iowa)

Multidisciplinary Roadway Safety Series (several events held in October across Iowa)

Fall Concrete Lunch & Learn Presentations: Concrete Pavement Evaluation and Troubleshooting (several events held in September and October across Iowa)

Iowa Streets and Roads Workshop and Conference (September 19–21, Ames, IA)

Fall National Concrete Consortium (September 12–14, Portland, OR)

Aurora Fall Board Meeting (September 12–14, Portland, ME)

Motor Grader Operator Workshops – Field Sessions (August 7–11, Johnston, IA)

ICEA Mid-Year Conference (July 13, Ames, IA)

Teaching in the Fast Lane: Engineering Workshop for Elementary Teachers (July 10–14, Ames, IA)

Transportation Institute Course for High School Teachers (June 12–June 30, Ames, IA)

Iowa Pavement Management Program Users' Group Quarterly Meeting (May 10, Ames, IA)

Aurora Spring Board Meeting (May 16–18, San Diego, CA)

Iowa County Engineers Research Focus Group (May 4, Ames, IA)

MUTCD Signing Review (several events held in May across Iowa)

Motor Grader Operator Workshops – Classroom Sessions (several events held in May across Iowa)

Spring Concrete Lunch & Learn Presentations: Concrete Pavement Mix Selection and Design (several events held in April and May across Iowa)

Critical Thinking Skills for Managing Contract Changes Workshop (April 25–27, Ames, IA)

Spring National Concrete Consortium (April 11–13, Savannah, GA)

Accessible Sidewalks and Curb Ramps: Design to Installation (April 6, Ames, IA)

Excavation Safety Workshops (several events held in April across Iowa)

NHI Safety Inspection of In-Service Bridges for PEs (March 6–10, Ames, IA)

Iowa Work Zone Safety Workshop Series (several events held in February and March across Iowa)

NHI Bridge Inspection Refresher Training (February 21–23, Ames, IA)

OSHA 10 Hour for Public Agency Roadway Workers (February 8–9, Mount Ayr, IA)

Work Zone Safety and Flagger Workshop (several events held from January to May across Iowa)

2023 event recap continued on page 20

EVENT SPOTLIGHT

Iowa LTAP Local Technical Assistance Program

MoGO Field Days attendees getting hands-on training at Camp Dodge in August 2023

MOTOR GRADER OPERATOR (MOGO) TRAINING

Iowa LTAP took a slightly different approach to the 2023 MoGO Field Days than it did in past years, producing successful results for the 42 participants but also providing beneficial community service.

The MoGO Field Days event was initiated in 2022—at the request of Iowa LTAP's clientele—to enhance the classroom training that has been offered for decades by allowing new operators to get first-hand experience in a motor grader and blade a gravel road that has been closed to the public.

In scouting a location for the 2023 event, Iowa LTAP, with its partners, was able to work with leadership at Camp Dodge to utilize the military installation's miles of gravel roads for the hands-on training.

"This approach not only improved the safety of the workshop participants but also allowed the instructors to spend more time one-on-one with attendees," said Paul Albritton, Iowa LTAP Technical Training Coordinator, who organizes the MoGO training. "The roadways were also in better shape after the training, and some base personnel were able to participate."

The military also supplied the roadway materials used to improve the roads during the training, and Iowa LTAP worked with a local motor grader vendor that provided the equipment.

The training was held during a week-long session in August, with about 10 participants each day. The associated MoGO classroom training sessions occurred in five locations earlier in May. The Field Days event was open to the 238 attendees at the 2023 classroom sessions, with a focus on new operators.

2023 event recap continued from page 19

BEC Director Justin Dahlberg leading a classroom exercise during the 2023 Teaching in the Fast Lane Workshop

VIRTUAL CP TECH CENTER EVENTS

Reducing the Cradle-to-Gate Embodied Carbon Content of Paving Grade Concrete – A New Guide

Cold Weather Concrete

Smooth Concrete Pavements: How to build them and why they are important

Finishing Concrete Slabs to Minimize the Risk of Surface Distress

Performance Cements

Soil Stabilization Methods

Life-Cycle Cost Analysis (LCCA)

Concrete Pavement Preservation

FAA Specification Updates

Moving Forward With PEM… What's Next?

VIRTUAL IOWA LTAP EVENTS

Highway Design and Maintenance for Horse-Drawn Vehicles

W-Beam Bridge Rails for Low-Volume Rural Roads: Issues and Solutions

Risk Management Lessons Learned from Lawsuits Against Local Road Agencies

Gradation Optimization Tool for Granular-Surfaced Roads

Intervening Skillfully

Grant Writing 101

Five Leadership Practices to Quickly Improve Team Morale

Iowa Stormwater Applications – Scour Repair, Culvert Invert Armoring, Bank Stabilization, and Channel Erosion Applications

Evaluation of the Safety Impacts of Transverse Rumble Strip Configurations

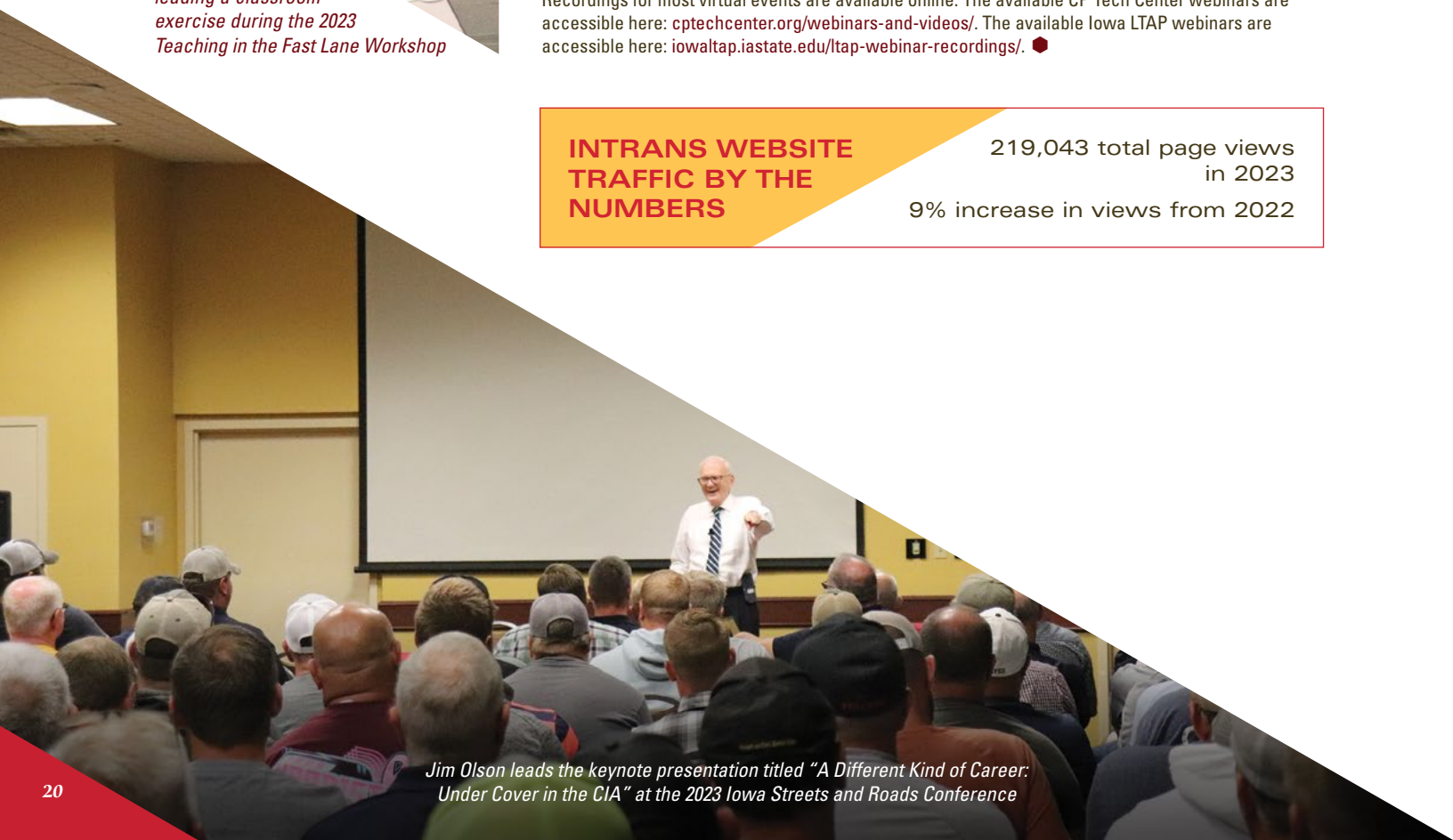
Excavation and Trench Safety Refresher Webinar

Recordings for most virtual events are available online. The available CP Tech Center webinars are accessible here: cptechcenter.org/webinars-and-videos/. The available Iowa LTAP webinars are accessible here: iowaltap.iastate.edu/ltap-webinar-recordings/.

INTRANS WEBSITE TRAFFIC BY THE NUMBERS

219,043 total page views in 2023

9% increase in views from 2022



Jim Olson leads the keynote presentation titled "A Different Kind of Career: Under Cover in the CIA" at the 2023 Iowa Streets and Roads Conference

PUBLICATIONS

One way to grasp the depth and breadth of work conducted by InTrans faculty, staff, and graduate students is to scan the lists on the following pages. These deliverables were the products of research efforts that spanned all aspects of the nation's transportation system.

TECHNICAL REPORTS

OCTOBER–DECEMBER

Unreported Deer Crashes on Iowa Highways

Evaluation of Otta Seal Surfacing for Low-Volume Roads in Iowa, Phase II Study: Comprehensive Laboratory Evaluation and Characterization and Full-Scale Field Implementation

Development of a Smartphone-Based Road Performance Data Collection Tool

Evaluation of Iowa Truck Parking Information and Management System Phase 2: Performance Measures and Data Analysis

Increase Service Life at Bridge Ends through Improved Abutment and Approach Slab Details and Water Management Practices

Helical Pile Foundation Guide for Bridge Structures

Right-Turn-on-Red Operation at Signalized Intersections with Single and Dual Right-Turn Lanes: Evaluating Performance

Valuation and Compensation Approaches in Utility Accommodations: A Guide

Bio-Material Maintenance Treatments

JULY–SEPTEMBER

Next Generation Life-Cycle Cost Analysis Tool for Bridges in Iowa – Phase II

Evaluation of Messaging Techniques to Increase Vehicle Spacing at Work Zones

Interlaboratory Study to Establish a Multi-Laboratory Precision Statement for AASHTO T 395-22, Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method

Cold In-Place Recycling Project Selection and Guidance for Iowa Roadways

Practices to Motivate Safe Behaviors with Highway Construction and Maintenance Crews

Right-Turn-on-Red Site Considerations and Capacity Analysis: Practitioner's Guide

Valuation and Compensation for Accommodating Utility and Communications Installations in Public Rights-of-Way

Use of Unmanned Aerial Systems for Inspection of Stormwater Best Management Practices

APRIL–JUNE

Evaluation of the Use of Link Slabs in Bridge Projects

Electric Vehicle Charging: Strategies and Programs

Designing and Implementing Maintainable Pedestrian Safety Countermeasures

Impact of Curling and Warping on Concrete Pavement: Phase II

Transverse Rumble Strips at Rural Intersections

Evaluating the Relationship between the Driver and Roadway to Address Rural Intersection Safety using the SHRP2 Naturalistic Driving Study Data

JANUARY–MARCH

Development of Pavement Structural Analysis Tool (PSAT) for Iowa Local Roads

Advanced Construction Techniques for Heated Pavement Systems

Performance-Engineered Concrete Paving Mixtures

Performance of Concrete Overlays over Full Depth Reclamation

Assessment of Bridge Decks with Glass Fiber-Reinforced Polymer (GFRP) Reinforcement

Shrinkage and Temperature Forces in Frame Piers

Automated Extraction of Weather Variables from Imagery

Development of In Situ Cyclic Borehole Shear Soil Test Device

Use of Concrete Grinding Residue as a Soil Amendment

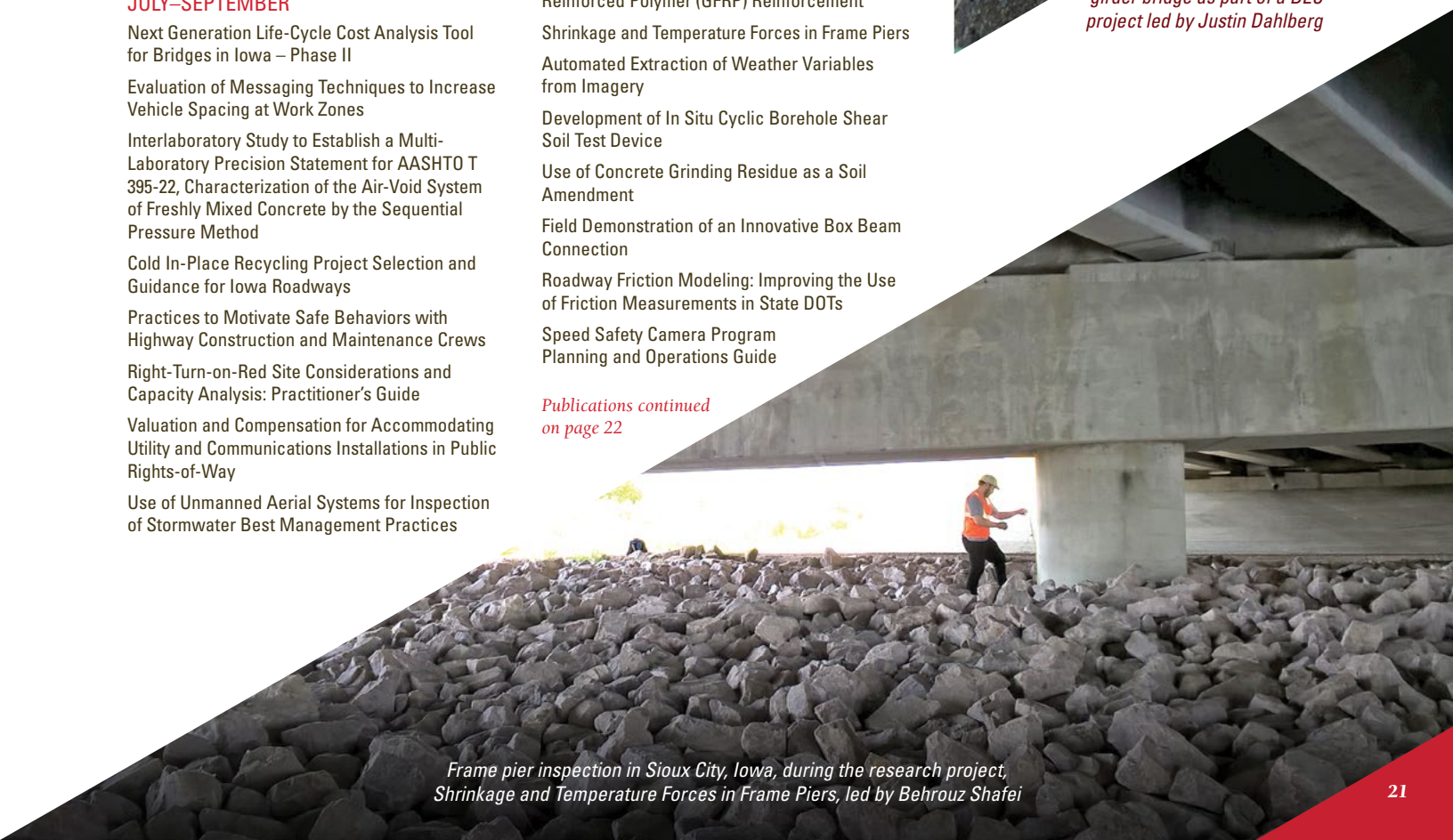
Field Demonstration of an Innovative Box Beam Connection

Roadway Friction Modeling: Improving the Use of Friction Measurements in State DOTs

Speed Safety Camera Program Planning and Operations Guide

Publications continued on page 22

Installation of joint reinforcement in a box girder bridge as part of a BEC project led by Justin Dahlberg



Frame pier inspection in Sioux City, Iowa, during the research project, Shrinkage and Temperature Forces in Frame Piers, led by Behrouz Shafei

Publications continued from page 21

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Publications continued from page 22

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GUIDE SPOTLIGHT

THE DESIGN-BUILDER'S GUIDE TO DESIGN MANAGEMENT

The Design-Builder's Guide to Design Management details the unique role that the design integration manager plays in design-build projects. The guide was co-authored by CMAT Director Jennifer Shane, edited at InTrans, and published by the Charles Pankow Foundation.

Organized as a handbook for design integration managers, the guide discusses the skills and characteristics that lead to success and explores the tasks the design integration manager performs, when those tasks need to be performed, and why those tasks are vital to a project.

Previous versions of the guide were published by the Charles Pankow Foundation in 2011 and 2014. The latest version of the guide further expands on the content in previous versions by adding specific guidance on design-assist, offsite fabrication, and cloud-based collaboration tools.

Though the guide focuses on the building construction sector, playbooks are currently in development that adapt the guide's content to design-build projects in the highway, aviation, industrial, federal, and water/wastewater sectors.

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GUIDE SPOTLIGHT

PAVEMENT STRUCTURAL ANALYSIS TOOL (PSAT) FOR IOWA LOCAL ROADS

Those responsible for constructing and maintaining local road systems know better than most the complexity of their pavements. The pavement structures often have multiple layers of various ages, thicknesses, stress levels, materials, conditions, and past traffic impacts.

These complexities can be a challenge for local public works agencies and county engineers in their efforts to estimate the structural capacities of in-service pavements and develop cost-effective strategies for managing their pavement systems.

To aid in those efforts, PROSPER developed a tool and associated user guide to help engineers more effectively make decisions related to routine pavement analysis, design, and asset management practices. The Pavement Structural Analysis Tool (PSAT), created as part of a broader research project, has the added benefit of giving city and county engineers another means to communicate with the public and elected officials regarding pavement needs.

"The PSAT is beneficial to Iowa county engineers responsible for pavement management," said PROSPER Director Halil Ceylan, principal investigator on the project. "It helps users make informed decisions about managing paved county roads, and this leads to an increase in the overall performance of the pavement network and improvements in pavement preservation and rehabilitation practices." ⬢

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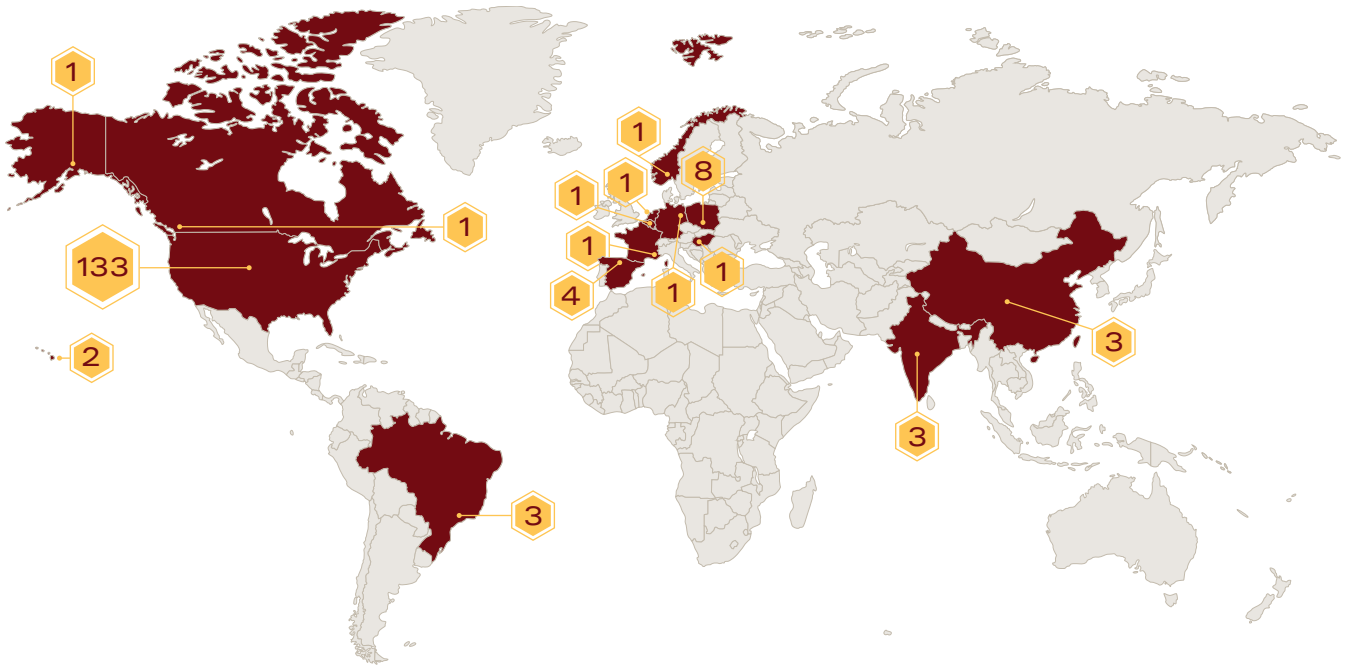

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Sharma, A. 2023. Emerging Transportation Solutions driven by Industry 4.0 Transformation. *Presented at the Indian Institute of Technology Kanpur*, December, Kanpur, Uttar Pradesh, India.

Sharma, A. 2023. Demystifying Graduate School. *Presented at Anurag University*, December, Venkatapur, Medchal-Malkajgiri District, Hyderabad, Telangana, India.

Shane, S. 2023. Optimal Replacement Intervals for Equipment. *Presented at the Missouri, Iowa, Nebraska, Kansas (MINK) Conference*, September 13–14, St. Joseph, MO.

Shaw, J. and N. Oneyear. 2023. Pedestrian Accommodations in Work Zones: Systematic Literature Review and Research Needs. *Proc., 102nd Transportation Research Board Annual Meeting*, January 8–12, Washington, DC.

Shihab, I. F., S. Bhagat, and A. Sharma. 2023. Robust and Precise Sidewalk Detection with Ensemble Learning: Enhancing Road Safety and Facilitating Curb Space Management. *Proc., 26th Institute of Electrical and Electronics Engineers International Conference on Intelligent Transportation Systems*, September 24–28, Bilbao, Bizkaia, Spain.

Sourav, A., H. Ceylan, and S. Kim. 2023. Longitudinal and Transverse Crack Detection in Flexible Pavements from Uncrewed Aircraft System Images Using Deep Learning Models. *Presented at the American Society of Civil Engineers International Airfield & Highway Pavements Conference*, June 14–17, Austin, TX.

Sourav, A., H. Ceylan, S. Kim, C. Brooks, D. Peshkin, R. Dobson, and M. Brynick. 2023. Use of Digital Elevation Model for Detecting Airfield Pavement Distress. *Proc., American Society of Civil Engineers International Airfield & Highway Pavements Conference*, June 14–17, Austin, TX.

Sritharan, S. 2023. Feasibility of Land-Based Wind Generated Electricity for the US Southeast. *Presented at the 7th Global Energy Meeting*, March, Boston, MA.

Sritharan, S. 2023. Growth and Trends of Wind Power in the US: Decarbonization and Energy Transition. *Presented at the Webinar for Institution of Engineers Indonesia (Virtual)*, May.

Sritharan, S., P. Kalmogo, N. Sreekumar, G. Milla, and C. Sikorsky. 2023. Use of UHPC to Rehabilitate Post-Tensioned Box-Girder Bridge Decks. *Proc., International Interactive Symposium on Ultra-High Performance Concrete*, June 4–7, Wilmington, DE, Vol. 3, No. 1, 131pp.

Sturgill, R. 2023. 3D Model Viewers in Construction: Current Practice and Emerging Trends. *Presented at the Iowa Better Concrete Conference*, November 9, Ames, IA.

Sturgill, R. 2023. Project Development and Utility Approaches to Promote Damage Prevention. *Presented at the Common Ground Iowa Annual Meeting*, December 1, Ankeny, IA.

Veneziano, D. 2023. Sign Life Expectancy on Low-Volume Roads in Iowa. Presented at the 13th Transportation Research Board International Conference on Low Volume Roads, July 23–26, Cedar Rapids, IA.

Veneziano, D. 2023. Pedestrian and Bicycle Countermeasures in Rural Areas. *Presented at the Iowa County Engineer's Association Conference*, December 14, Des Moines, IA.

Wathne, L. G. 2023. CP Tech Center 2023 Outlook. *Presented at the American Concrete Pavement Association Chapter State Committee Meeting (Virtual)*, January.

Wathne, L. G. 2023. QC/QA for Concrete: A Changing World. *Presented at the Iowa Concrete Paving Association 59th Annual Workshop*, February 3, Des Moines, IA.

Wathne, L. G. 2023. Concrete Innovations. *Presented at the Annual Concrete Conference*, February 7, Deadwood, SD.

Wathne, L. G. 2023. Concrete Pavement Resilience. *Presented at the Annual Concrete Conference*, February 7, Deadwood, SD.

Wathne, L. G. 2023. Pavement Resilience. *Presented at the 25th Annual American Concrete Pavement Association/Pennsylvania Concrete Conference (Virtual)*, February 23.

Wathne, L. G. 2023. *Presented at the Concrete Pavement Preservation Workshop*, February 28-March 1, Boise, ID.

Wathne, L. G. 2023. New Approaches to Quality. *Presented at the American Concrete Pavement Association and Colorado/Wyoming Chapter Annual Concrete Pavement Workshop*, March 2, Denver, CO.

Wathne, L. G. 2023. *Presented at the Concrete Paving Association of Minnesota Annual Workshop*, March 9, St. Cloud, MN.

Wathne, L. G. 2023. Clean Procurement & Low Carbon. *Presented at the National Ready Mixed Concrete Association Promotion Committee Meeting*, CONEXPO, March 12, Las Vegas, NV.

Wathne, L. G. 2023. Our Role in PCA's Roadmap to Carbon Neutrality. *Presented at the Portland Cement Association Fall Meetings*, March 13, Las Vegas, NV.

Wathne, L. G. 2023. FHWA's Concrete Pavement Materials Sustainability Efforts. *Presented at the National Concrete Consortium*, Spring Meeting, April 11, Savannah, GA.

Wathne, L. G. 2023. How Increasing Industry Competition Benefits the Pavement Market, and How Agencies Can Use It To Lower Their Pavement Expenditures. *Presented at the 14th International Symposium on Concrete Roads*, June 25–29, Krakow, Poland.

Wathne, L. G. 2023. Improving Pavement Resilience to Flooding: A Case for Concrete Pavements. *Presented at the 14th International Symposium on Concrete Roads*, June 25–29, Krakow, Poland.

Wathne, L. G. 2023. Low-Carbon Concrete Pavement: What Does It Mean and How Do We Get There? *Presented at the 14th International Symposium on Concrete Roads*, June 25–29, Krakow, Poland.

Wathne, L. G. 2023. Opportunities in the Embodied Space, Embodied Carbon Workshop: Market Transformation for Cement and Concrete. *Presented at the American Council for an Energy-Efficient Economy & Breakthrough Energy*, July 11, Detroit MI.

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Presentations and proceedings continued from page 30

Wathne, L. G. 2023. Update Precision and Bias Information for T 395 (SAM). *Presented at the American Association of State Highway and Transportation Officials Committee on Materials and Pavements – TS 3b*, July 31, San Diego, CA.

Wathne, L. G. 2023. Sustainability and LCA for Concrete Pavement. *Presented at the Transportation Research Board Webinar (Virtual)*, August 17.

Wathne, L. G. 2023. CP Tech Center: An Investment Worth Making. *Presented at the Portland Cement Association Fall Meetings*, October 3, Nashville, TN.

Wathne, L. G. 2023. Benefits of Inter-Industry Competition. *Presented at the Cementos Progreso Webinar (Virtual)*, October 17.

Wathne, L. G. 2023. Improving pavement Resilience to Flooding. *Presented at the Cementos Progreso Webinar (Virtual)*, October 17.

Wathne, L. G. 2023. *Presented at the California Nevada Cement Association Pavement Forum (Virtual)*, November 6.

Wathne, L. G. 2023. Concrete Pavement Innovations. *Presented at the North Carolina Concrete Conference*, November 28, Charlotte, NC.

Wathne, L. G. 2023. *Presented at the American Concrete Pavement Association Chapter State Committee Meeting*, December 12, Marco Island, FL.

Wathne, L. G. 2023. Highways. *Presented at the American Concrete Pavement Association Highway Forum Meeting*, December 13, Marco Island, FL.

Wathne, L. G. 2023. Guide for Reducing the Cradle to Gate Carbon Emissions of Concrete. *Presented at the National Institute of Standards and Technology Webinar (Virtual)*, December 18.

Wathne, L. G. 2023. The Ghost of Concrete Pavements Past… *Presented at the California Nevada Cement Association Webinar (Virtual)*, December 19.

Williams, R. C. 2023. Biomaterials: An Opportunity for More Sustainable Bitumen Pavement Systems. *Presented at the World Transport Convention (Virtual)*, Wuhan, China.

Wood, J. S. 2023. Introduction to the Safe Systems Approach. *Presented at the University of Michigan Undergraduate and Graduate Student Seminar*, April 3, Ann Arbor, MI.

Wood, J. S. 2023. Short-Term Network Screening Method. *Presented at the Michigan State University Graduate Student Seminar*, April 7, Landing, MI.

Yang, B, K. Tian, K., D. King, D., H. Ceylan, and S. Kim. 2023. Assessment of the Effects of Temperature and Moisture Gradients on Curling and Warping Behavior of Jointed Plain Concrete Pavements. *Proc., American Society of Civil Engineers International Airfield & Highway Pavements Conference*, June 14–17, Austin, TX.

Yang, H.-J., C.-H. Yang, P. Sornberger, R. Duke, C. Risko, B. Ganapathysubramanian, and S. Sarkar. 2023. Deep Reinforcement Learning Exploration in Continuous Latent Space for Molecular Design. *Proc., Association for the Advancement of Artificial Intelligence Workshop on AI for Agriculture and Food Systems*, February 14, Washington, DC.

Zihan, Z. U. A., O. Smadi, and I. Nlenanya. 2023. Instance Segmentation of Pavement Distresses from Unmanned Aerial Vehicle Based Vision Data: An Implementation of Mask R Convolutional Neural Network. *Proc., 102nd Transportation Research Board Annual Meeting*, January 8–12, Washington, DC.

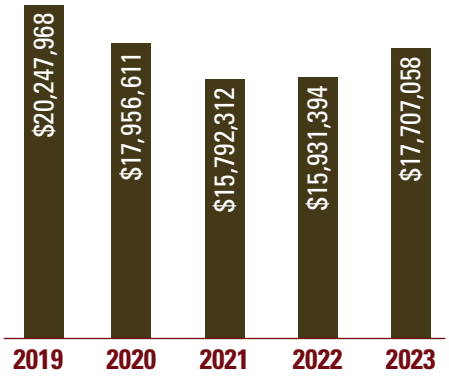
Zimmerman, K., and O. Smadi. 2023. Leaders Dialogue: Readying Organizations for Future Policy, Legal, and Organizational Issues. *Proc., 102nd Transportation Research Board Annual Meeting*, January 8–12, Washington, DC.

INTRANS BY THE NUMBERS

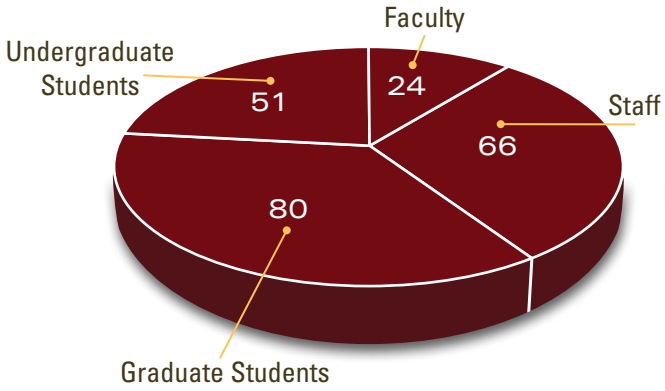
Reports below reflect figures and activities from the fiscal reporting period of July 2022–June 2023

FUNDING SOURCES	2019	2020	2021	2022	2023
Iowa DOT	50%	53%	48%	51%	47%
Other Iowa Govt. Agencies	1%	1%	2%	2%	1%
Other State Agencies	9%	8%	12%	9%	8%
Other (conferences, fees, misc. services, etc.)	14%	16%	12%	16%	19%
Industry	9%	7%	8%	7%	9%
Federal Agencies	17%	15%	18%	15%	16%

TOTAL FUNDING FROM ALL SOURCES

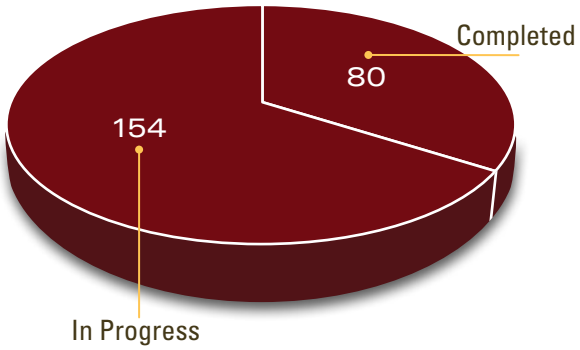


FY 2023 EMPLOYEE STATISTICS



TOTAL EMPLOYEES: 221

FY 2023 INTRANS PROJECTS



TOTAL PROJECTS: 234

From traffic safety to big data and from preservation to education, InTrans focuses on research and service that impact transportation now and into the future.

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