



INTRANS EN ROUTE ANNUAL REPORT

| JANUARY 2022 TO DECEMBER 2022 |

IOWA STATE UNIVERSITY
Institute for Transportation



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INSTITUTE FOR TRANSPORTATION

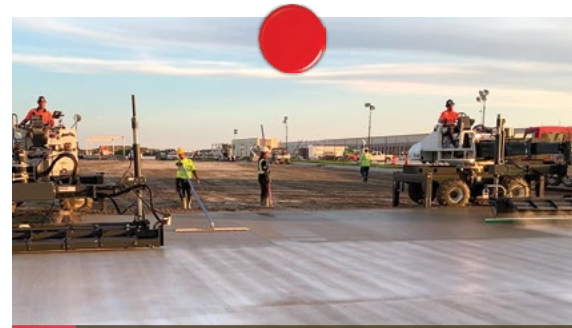
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The Institute for Transportation (InTrans) at Iowa State University administers 15 centers and programs with several distinct yet affinitive research specialties and a variety of technology transfer and professional education initiatives. From traffic safety to big data and from preservation to education, InTrans focuses on research and service that impact transportation now and into the future.

Front Cover Photos

Top left and center: Views of Iowa roads as captured by InTrans Associate Director Neal Hawkins
Top right: On-site training during the Iowa LTAP Motor Grader Operator Field Days in Ames
Bottom left: Installation of EPS isolation barrier as part of a project led by BEC researchers Brent Phares and Justin Dahlberg
Bottom center: Spraying compaction water over Phoenix slag in Howard County during a research project performed by Jeramy Ashlock
Bottom right: Concrete being poured as part of BEC-led research that investigated causes of transverse bridge deck cracking

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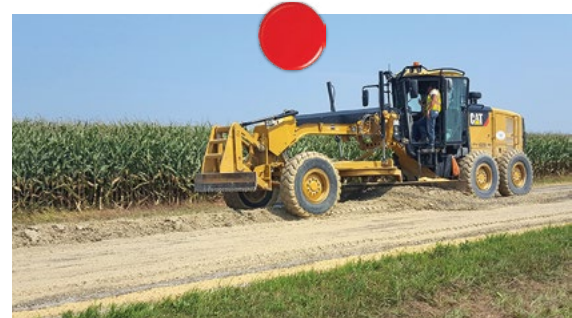


12 Major accomplishments

Photo by Michael Hoeft, K & M Concrete Construction, Inc.



20 InTrans 2022 event recap



22 Publications

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

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DIRECTOR'S MESSAGE

If things are moving safely, they are moving faster, which means we have to keep up. But as 2022 fades away in the rear view mirror, let's take a moment to look back at a few notable mile markers we passed during another successful year.

Our efforts continued to support our mission of saving lives and improving economic vitality while staying true to the promise we've made to our partners—to create, share, and apply transportation knowledge. Without the support of our partners in state agencies, industry groups, and the federal government, we wouldn't be as able as we are to deliver the best practices, technologies, and research results as efficiently as we do. And in a fast-paced industry such as transportation, we know very well that delivery methods matter.

This past year, InTrans turned again to the people that make our successes possible—our staff. Without the people and minds shaping and moving ahead with bold ideas, our research and other efforts would never get a green light. Each year our people find new ways to take part in our shared vision while continuing to reshape what it means to be a transportation researcher—whether by becoming more efficient and effective in what they do or by collaborating with others whose skills complement their own.

We currently collaborate with over 30 faculty members from the Iowa State University College of Engineering, and we employ another 78 research scientists, traffic engineers, and professional staff. Our faculty and staff are supported by 95 graduate and 55 undergraduate students who work on a variety of research and demonstration projects. We are grateful for these relationships and the projects we have worked on together.

This has been another a year of coming together. For the first time since 2019, the Mid-Continent Transportation Research Symposium was held in person in Ames, gathering more than 250 like-minded people to learn about the transportation issues facing us today. However, if we are looking at drawing crowds, our Iowa Local Technical Assistance Program broke attendance records this year. While the program's virtual and in-person events and resources reached nearly 5,200 people in 2021, in 2022 over 5,800 people across Iowa received these services. Additionally, InTrans published 23 technical reports on completed projects, 16 tech transfer summaries, 2 guides, and numerous smaller publications, all of which are available for download on the InTrans website. These accomplishments are a record of our continued growth.



Photo by Christopher Gannon

Now, with 2022 miles behind us and only the future ahead, it's time to slow down, review, and reflect. It's often hard to see how far you've come when you're always thinking about the next project or the next task. So, join me, even if only for a minute or two, and let's idle together and envision the road ahead. ■

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 2022, 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 ISU in asphalt paving materials/products such as additives, emulsions, and seal coats. Highlights include paving a 1.1-acre parking lot for the Farm Progress Show in Boone, Iowa, and applying bio seal coats on experimental roads. 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.



Applying bio seal coating on an experimental road

AURORA PROGRAM

Director: Zach Hans

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 2022, a total of 18 state departments of transportation (DOTs) participated in Aurora.

In 2022, Aurora completed three research projects addressing noninvasive sensors, roadway friction modeling, and extraction of weather variables from imagery. Two additional projects focusing on road surface condition detection, monitoring, and estimation continued through 2022, and three additional projects related to connected vehicle (CV) technology, variable speed limits (VSL), and spring load restrictions were initiated.

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 Portland, Oregon, and Minneapolis, Minnesota, respectively, with Friends of Aurora also participating in the Fall meeting.



*Noninvasive sensor installation at bridge approach in Minnesota
(Image capture January 2022, ©2022 Google)*

Centers and programs continued on page 5

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 2022 brought exciting new projects to the BEC, many of which were in partnership with the Iowa DOT. These projects included continued expansion of the BEC's autonomous structural health monitoring network (the Bridge Engineering Condition Assessment System [BECAS]), improvements to bridge details at both the state and county levels, and many other projects with both laboratory and field components.

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. Ongoing projects funded by the Federal Highway Administration (FHWA) created opportunities for collaboration with partners across the country via BEC-hosted workshops and meetings.



Buchanan County Buffalo Creek Bridge galvanized and painted piles

CENTER FOR EARTHWORKS ENGINEERING RESEARCH (CEER)

Interim Director: Vernon Schaefer

The Center for Earthworks Engineering Research (CEER) is committed to solving earthworks engineering and construction problems by working with industry and government agencies to define, prioritize, and conduct a strategic program of research and education.

CEER's focus on earth mechanics and the creation of innovative technologies, sensors, and systems persisted in 2022.

Work continued on a multiphase Iowa DOT research project that is evaluating low-cost rural surface alternatives using stabilization methods that employ various types of virgin and recycled materials. Now in its fourth phase, this project has turned toward the development of computational and theoretical models for frost depth monitoring and prediction without the need for subgrade soil sensors. This project, which originally began in 2017, will result in an implementation-ready guide for county and district engineers.



Spreading clay slurry in Cherokee County

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 markings, and asset management.

In 2022, 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.

With the pandemic largely in the rearview mirror, CTRE researchers actively traveled and presented at regional, national, and international conferences. Additionally, CTRE researchers have continued to pursue and win projects, lead and participate in national committee activities, and provide technology transfer through a variety of unique delivery methods.



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 2022, CWIMS administered the FHWA Aurora Pooled Fund and led or collaborated on several research projects, including *Navigation System for Snowplows in Low-Visibility Situations* (Iowa DOT), *Pikalert CAV Demonstration* (Iowa DOT), *Adaptive Route Optimization (ARO) for Operations* (FHWA), and *Noninvasive Sensor Deployment in Aurora Member States* (Aurora Pooled Fund).

CWIMS also provided ad hoc support to the Iowa DOT and the National Weather Service in their 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 2022, CMAT continued work on a 2016 FHWA Work Zone Training grant on post-construction project evaluation and several National Cooperative Highway Research Program (NCHRP) projects. The latter included an investigation of valuation and compensation for accommodating utility and communications installations in public rights of way and a synthesis of the implementation of subsurface utility engineering for highway design and construction.

Additionally, in 2022 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 peer exchange on alternative project delivery methods.



Peer exchange on alternative project delivery methods

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 2022, the Iowa LTAP team provided its services to what will likely be a record number of people. Most training events were held on-site, but online webinars continued to be offered once or twice a month during much of the year. Overall, it is estimated that Iowa LTAP impacted approximately 5,800 people through the provision of its on-site, "live" online, and recorded training resources.

Iowa LTAP also continued to publish its quarterly newsletter *Technology News* and to offer its biweekly (monthly during the summer) electronic resource. Iowa LTAP's technical assistance, equipment loan, and road safety review programs also continued.

Additionally, Iowa LTAP began a case-by-case evaluation of how it offers its programs, with updates made so far to its motor grader operator training and work zone/flagger training.



Exercise during Iowa LTAP fall Winter Maintenance Workshop session

IOWA STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS)

Director: Paul Wiegand

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

SUDAS staff and committee members were happy to reconvene in person after meeting for nearly two years virtually. In 2022, SUDAS staff focused on updates to the erosion and sediment control design standards, revisions to the design and specifications manuals to reflect updated Iowa Department of Natural Resources (DNR) rules, and updates to the complete streets design guidance.

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. Since its inception, the PWSB has grown to nearly 400 members and counting. In 2022, the PWSB website was enhanced with bridge condition reports, various resources pages, video tutorials, and a bid tab database. Creation of the bid tab database led to related updates to various SUDAS bid items.



Manhole service activities being performed by public works staff

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 2013–2019 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 University 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.



Application of MTC-sponsored high-friction surface treatment for high-crash locations

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 2022, 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 began work 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.



Placing timber deck panel on the Buchanan County Bridge

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 concrete pavements.

In 2022, 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 webinars and in-person events around the United States. Additionally, two manuals were published on quality concrete systems and pavement preservation. 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 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.



*PCC overlay being placed on Iowa Highway 3
(Photo by Eric Ferrebee, ACPA)*

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 2022. Projects included a pilot study in Clinton County, Iowa, to evaluate the use of RePLAY in asphalt pavements; a demonstration project of low-cost rural surface alternatives; an evaluation of the number of freeze-thaw cycles in warmer Minnesota winters; the development of various innovative pavement data collection and analysis tools for Iowa county engineers; and an evaluation of small uncrewed aircraft systems (sUAS/drones) for airport pavement inspections.

In 2022, the PROSPER team was also awarded seven major research projects that will allow the team to explore the development of cutting-edge technologies to be implemented in transportation infrastructure engineering applications.



Applying RePLAY to a road's surface

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 2022, 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.



Codirector Anuj Sharma meeting with students in the REACTOR Laboratory (Photo by Christopher Gannon)

SMART WORK ZONE DEPLOYMENT INITIATIVE (SWZDI)

Director: Keith Knapp

The Smart Work Zone Deployment Initiative (SWZDI) is a pooled fund effort that now includes nine participating states after Minnesota joined in 2022. 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 2022, SWZDI collected problem statements from researchers and released a request for proposals (RFP) focused on four subjects: the usefulness and reliability of probe data when altering work zone message signs, guidance for incorporating work zone data within traffic management operations, work zone presence lighting, and merge implementation criteria. Proposals were received that addressed three of these four subjects, and contracts are being created to fund projects focused on all subjects but work zone presence lighting. Two SWZDI-funded research projects were completed in 2022, and work continued on three ongoing projects.



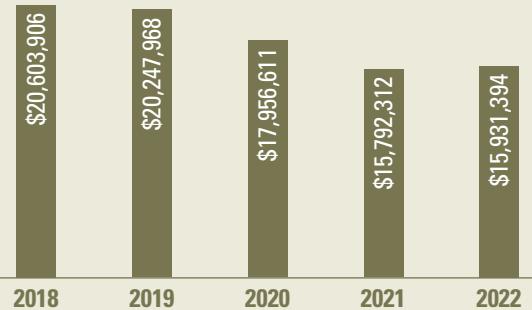
Driveway assistance device deployed on a roadway shoulder as part of a SWZDI-funded field evaluation

INTRANS BY THE NUMBERS

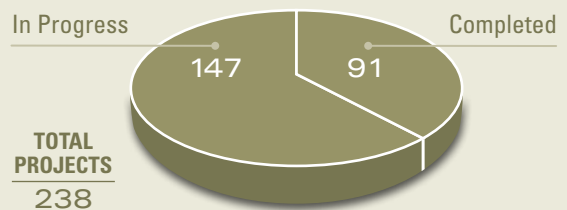
Reports below reflect figures and activities from the fiscal reporting period of July 2021–June 2022

FUNDING SOURCES	2018	2019	2020	2021	2022
Iowa DOT	44%	50%	53%	48%	51%
Other Iowa Govt. Agencies	1%	1%	1%	2%	2%
Other State Agencies	2%	9%	8%	12%	9%
Other (conferences, fees, misc. services, etc.)	15%	14%	16%	12%	16%
Industry	7%	9%	7%	8%	7%
Federal Agencies	31%	17%	15%	18%	15%

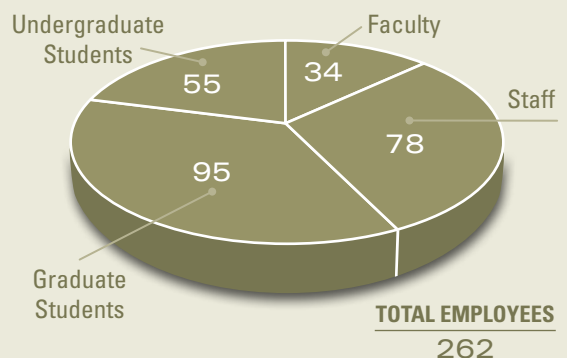
TOTAL FUNDING FROM ALL SOURCES



FY 2022 INTRANS PROJECTS



FY 2022 EMPLOYEE STATISTICS



MAJOR ACCOMPLISHMENTS

With 2022 in the rearview mirror, it can be easy to focus only on the road ahead—like on upcoming projects—rather than on the impact of our research now that it's out in the world.

However, InTrans' vision of "translating science for decision-making" compels us to stop for a moment and enjoy the view of our accomplishments, especially the implementation of our work.

In 2022, InTrans' achievements included completing more than 90 projects, organizing and holding nearly 150 events, and engaging with students, colleagues, transportation professionals, and industry to further our mission.

Among the successes 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 of existing infrastructure.

Some of the highlights from InTrans' centers and programs are as follows.

BEC CONCLUDES TWO FHWA PROJECTS

BEC researchers recently wrapped up two projects sponsored by the FHWA to support its Office of Infrastructure program.

The *Guide for Orthotropic Steel Deck (OSD) Level 1 Design* and *Advancing Bridge Load Rating: State of Practice and Frameworks* projects both concluded in December and are part of the FHWA's Infrastructure Research and Technology Deployment Program.

Though the projects do not set national standards for their respective topics, they both aim to further standardize and simplify the processes in their respective areas.

BEC Director Justin Dahlberg said the intention of the OSD guide is to further develop details of Level 1 design—using proven OSD solutions without the need for analysis—and to encourage the implementation of OSD systems. Similarly, the bridge load rating document helps address the need for improved processes and consistency in standards via the identification and development of the state of the practice and future frameworks.

Accomplishments continued on page 13

GUIDE SPOTLIGHT



A long-span orthotropic bridge, the Poplar Street Bridge over the Mississippi River

GUIDE FOR ORTHOTROPIC STEEL DECK (OSD) LEVEL 1 DESIGN

The OSD design guide published by the FHWA provides typical details similar to those for other bridge deck types and includes design options for open-rib and closed-rib systems. Throughout the document, short summaries on the performance of several in-service OSD bridges and key points are provided to highlight some of the benefits and drawbacks of both systems.

"Through the development of Level 1 design with typical details, the use of OSDs may become more common and fabrication costs may decrease as fabricators work with a small number of designs to establish economically viable fabrication processes," said BEC Director Justin Dahlberg, who served as principal investigator (PI) on the OSD guide project.

He noted that there are some negative perceptions of the OSD deck type given its complexity, cost, and other factors, but the guide aims to provide clarity and note new technologies and methods that expedite rib fabrication and reduce costs. ■

Bridge Research Engineer Brent Phares, who served as PI on the bridge load rating project, said the technological advancements detailed in the document should improve the efficiency of decision-making while taking advantage of better load rating tools, which could also improve management of rehabilitation and replacement budgets.

CP TECH CENTER PUBLISHES TWO GUIDES

It has been a busy couple of years for the CP Tech Center, which published five guides in 2021 and 2022. This past year saw the completion of two of these publications: the *Concrete Pavement Preservation Guide* (Third Edition) and the *Guide to Concrete Overlays of Asphalt Parking Lots* (Second Edition).

Both updated guides reflect advancements and new developments in their respective areas.

The third edition of the pavement preservation guide—which provides guidance and information on the selection, design, and construction of cost-effective concrete pavement preservation treatments—focuses primarily on preservation treatments that are applicable at the project level and addresses such issues as prioritizing and budgeting. The guide was published with funding from and as part of the FHWA cooperative agreement Advancing Concrete Pavement Technology Solutions.

The second edition of the concrete overlays of asphalt parking lots guide—which is a companion document to the fourth edition of the *Guide to Concrete Overlays* published in 2021—provides information for decision-makers and practitioners about selecting, designing, and constructing successful concrete overlays on existing asphalt parking lot pavements that serve public, commercial, or multifamily residential buildings. The guide update was sponsored by the Ready Mixed Concrete Research & Education Foundation.

CTRE PROJECT TACKLES TRAIL MANAGEMENT

CTRE has long overseen a robust pavement management program to support local agencies in the management of their roadway networks. Now, its researchers are turning that expertise toward aiding local jurisdictions in central Iowa with pavement management of a different sort.

As Iowa's local agencies are responsible for more than 600 miles of paved bicycle and pedestrian trails that connect the central region of the state—a network that is starting to show its age—they have a need for pavement condition data to determine maintenance needs.

Accomplishments continued on page 14

GUIDE SPOTLIGHT

National Concrete Pavement
Technology Center



Concrete
pavement diamond grinding
(Photo by IGGA)

CONCRETE PAVEMENT PRESERVATION GUIDE

Pavement preservation is often described as “providing the right treatment to the right pavement at the right time.” To help highway agencies put that maxim into practice on their concrete pavement networks, the CP Tech Center released the third edition of its *Concrete Pavement Preservation Guide*.

This edition of the guide reflects advancements and new developments in the concrete pavement preservation arena.

“Several concrete pavement preservation treatments are available to meet a range of conditions,” said the guide’s project manager Steven Tritsch, a now-retired associate director at the CP Tech Center. “These treatments are often applied in combination to address several deficiencies and to maximize overall effectiveness—and when applied in a timely fashion, preservation treatments can also significantly improve pavement performance and extend service life.” ■

“As the network of paved trails grows, local governments will need to redirect their spending toward preserving and maintaining the existing trails,” said Inya Nlenanya, CTRE research scientist and PI on the project to help establish a trail management program for central Iowa.

The project will develop a crack detection and automated distress calculation methodology, a roughness index calculator, and a trail pavement condition index for the trail pavement data collected by the Des Moines Area Metropolitan Planning Organization’s (MPO’s) Iowa Data Bike. The overall goal of the program is to help inform a long-term maintenance strategy for central Iowa’s trail network.

The project, which began in the spring of 2022, is expected to wrap up early in 2023 with a plan to extend it beyond central Iowa. It also represents a new area of study for the center and expands InTrans’ role in working with local agencies in the state.

NEW SCIENTIFIC METHODS OFFER INSIGHT INTO ROADWAY SAFETY PERFORMANCE

It takes a significant effort to develop a new scientific method for predicting roadway safety performance, and the task of implementing it is no less vast.

One promising approach developed at CTRE by researchers Zachary Hans and Hossein Naraghi is now being implemented at the Iowa DOT under the leadership of Naraghi.

“It takes a lot of effort to change the thought process of safety practitioners to convince them of the robustness of the new method and to answer tons of questions they have about it,” said Naraghi, who had the unique experience of being on both sides of research development and implementation. “I think my experience of being involved in the development side helped me to break roadblocks on the implementation side.”

The project involved developing safety performance functions (SPFs), or models, to predict the average number of crashes per year at a location as a function of exposure and, in some cases, roadway or intersection characteristics. SPFs were developed for 11 categories of paved intersections and for 8 categories of primary road segments.

Sites where the observed number of crashes, corrected for randomness, is higher than the predicted number of crashes offer a potential for crash reduction and may warrant additional study to determine whether countermeasures can help improve safety at those locations.

“The SPFs are an integral part of road safety management activities and enable safety practitioners at the Iowa DOT and other agencies to allocate their limited resources to the sites with highest potential for crash reduction,” said Naraghi. ■

GUIDE SPOTLIGHT

National Concrete Pavement
Technology Center



Active concrete
overlay paving of a parking lot
(Photo by City of Thornton, Colorado)

GUIDE TO CONCRETE OVERLAYS OF ASPHALT PARKING LOTS

Many important factors considered for concrete overlays of asphalt pavements apply to overlays placed on both roadways and parking lots. However, some characteristics and considerations unique to parking lot overlays affect their design and construction—including fixed elevation points, traffic types and levels, and future changes in usage.

To address these types of overlay applications, the CP Tech Center published the second edition of its *Guide to Concrete Overlays of Asphalt Parking Lots*.

The updated material in the second edition of the guide reflects advances in technology and research, offers a simplified approach to assessing existing pavements, includes modifications to the material on design and construction based on lessons learned, and presents project profiles demonstrating the principles of the guide. ■

AWARDS AND HONORS



Top row (left to right): Behrouz Shafei, Chris Rehmann, Jennifer Shane, Sri Sritharan, Christopher Day, and Alice Alipour
Bottom row (left to right): Halil Ceylan, Kejin Wang, Simon Laflamme, Peter Taylor, Roy Sturgill, and Amy Kaleita

FACULTY AWARDS

Shafei named Scientific Exchange Fellow at Swiss National Science Foundation

BEC Structural Research Engineer Behrouz Shafei was named a Scientific Exchange Fellow at the Swiss National Science Foundation. The Scientific Exchange allows Swiss-based researchers to invite colleagues abroad for a research visit to Switzerland, among other activities that help establish international collaborations. Shafei's fellowship entailed researching advanced structural materials and 3D printing strategies at the Structural Engineering Research Laboratory of Swiss Federal Laboratories for Materials Science and Technology.

Alipour named Resilience Research Fellow at 4TU Center for Resilience Engineering

BEC Structure and Infrastructure Engineer Alice Alipour was named a Designing Systems for Informed Resilience Engineering (DeSIRE) Research Fellow at the 4TU Center for Resilience Engineering in the Netherlands. The fellowship allows mid-career professionals the opportunity to strengthen ties and engage with a network of resilience engineers, exchange research challenges and ideas, and develop joint research proposals and publications.

Kaleita earns ASABE educational award

InTrans Faculty Affiliate Amy Kaleita earned the 2022 Massey-Ferguson Educational Gold Medal from the American Society of Agricultural and Biological Engineers (ASABE). The award honors those whose dedication to the spirit of learning and teaching in the field of agricultural engineering has advanced agricultural knowledge and practice with distinction and whose efforts serve as an inspiration to others.

Paper on novel image analysis method receives recognition

CP Tech Center PCC Engineer Kejin Wang and recently graduated doctoral student Yogiraj Sargam were one of two runners-up in Giatec Scientific Inc.'s annual Best Paper Award in 2022. The award recognizes papers that focus on sustainability in construction research. Wang and Sargam were recognized for their paper titled "Quantifying Dispersion of Nanosilica in Hardened Cement Matrix Using a Novel SEM-EDS and Image Analysis-Based Methodology."

InTrans faculty affiliates among those honored with university awards

Two InTrans faculty affiliates were among the 60 Iowa State faculty and staff that earned one of the university's annual awards in teaching, research, and service. Sri Sritharan, the Wilkinson Chair of Interdisciplinary Engineering and assistant dean for the College of Engineering, and Simon Laflamme, Waldo W. Wegner Professor in Civil Engineering, were recognized at a fall ceremony. Details about the awards are as follows:

- Sritharan received the title of distinguished professor. The title is Iowa State's highest academic honor, recognizing a faculty member whose accomplishments in research have had a significant impact on their discipline and who has demonstrated outstanding performance in at least one other area of faculty responsibility.
- Laflamme received the Mid-Career Achievement in Research Award. The award recognizes a faculty member who has demonstrated exemplary performance or scholarship in research and/or creative activity as documented by peers or experts in the field.

Awards continued on page 16

Day named Mack 2050 Challenge Scholar

InTrans Affiliate Researcher Christopher Day was named the Michael and Denise Mack 2050 Challenge Scholar, which provides funds to support future-oriented research that impacts society today. The award contributed to a larger research initiative under a pooled fund research project Day is co-leading with the Iowa DOT on intelligent traffic control. The project is examining sensor technologies and data sharing capabilities for traffic control systems to design new algorithms that will more efficiently control traffic.

Chris Rehmann earns Outstanding Achievement in Teaching award

InTrans Faculty Affiliate Chris Rehmann's dedication to his students through his support for and care in their success helped him earn the Outstanding Achievement in Teaching award from Iowa State's College of Engineering. The award recognizes faculty members for outstanding teaching performance over an extended period of time, totaling at least five years at Iowa State and at least 10 years of teaching experience.

Sturgill earns Early Achievement in Teaching award

CMAT Construction Engineer Roy Sturgill earned Iowa State's Early Achievement in Teaching award in part because his students describe him as having "unmatched commitment" to ensuring they are at the forefront of industry and as "always having an open door." The award recognizes faculty members who have demonstrated outstanding teaching performance unusually early in their professional careers, totaling between two and six years of teaching experience.

Shane earns diversity award

CMAT Director Jennifer Shane's commitment to diversity, equity, and inclusion (DEI) earned her one of two Inclusive Excellence awards from Iowa State's College of Engineering. The award recognizes faculty and staff members in the college who have exhibited dedication and superior service toward enhancing diversity and inclusion. Diversity and inclusion enhancement activities include but are not limited to efforts to integrate and promote diversity-enriching experiences into teaching, research, service, and outreach activities.

PROSPER's Ceylan earns alumni achievement award from alma mater

PROSPER Director Halil Ceylan was recognized by the University of Illinois Alumni Association (UIAA) with its Alumni Achievement Award. The award—the highest conferred by the UIAA—is presented to alumni who have attained outstanding success and national or international distinction in their chosen profession or life's work. Ceylan, who earned his MS and PhD from the University of Illinois Urbana-Champaign, was one of three alumni to earn the award in 2022.

CP Tech Center's Peter Taylor earns award from Expanded Shale, Clay, and Slate Institute

CP Tech Center Director Peter Taylor earned the Frank G. Erskine Award from the Expanded Shale, Clay, and Slate Institute (ESCSI). The recognition is given to highlight tireless efforts to enhance the lives of citizens through the use of expanded shale, clay, and slates, per the ESCSI. Nominees are individuals or organizations that recognize the unique properties of expanded shale, clay, and slates and have demonstrated their use through design, promotion, or implementation.



CP Tech Center staff during summer of 2022

CP Tech Center earns ACI leadership award

The CP Tech Center is the 2022 recipient of the American Concrete Institute's (ACI's) Charles S. Whitney Medal. The ACI Board of Direction recognized the CP Tech Center specifically "for its national leadership role in advancing knowledge, research, and technology transfer in concrete pavement and for leadership in identifying and advancing sustainable solutions and new technologies." The Charles S. Whitney Medal is generally awarded for noteworthy engineering development work in concrete design or construction, per ACI.

PROSPER's Ceylan named ASCE Distinguished Member

PROSPER Director Halil Ceylan was elected as one of 10 people to the class of 2022 American Society of Civil Engineers (ASCE) Distinguished Members. The title is the highest honor that ASCE can bestow on civil engineers. Per ASCE, "a distinguished member is a person who has attained eminence in some branch of engineering or in the arts and sciences related thereto, including the fields of engineering education and construction."

Day receives undergraduate teaching award

InTrans Affiliate Researcher Christopher Day was among two winners recognized by the Department of Civil, Construction, and Environmental Engineering (CCEE) to receive the Joseph C. and Elizabeth A. Anderlik Faculty Award for Excellence in Undergraduate Teaching in 2022. The award promotes excellence in teaching by CCEE 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.

Ceylan's heated pavement research recognized by AASHTO

The American Association of State Highway and Transportation Officials (AASHTO) recognized PROSPER's research on an electrically conductive concrete (ECON) heated pavement system (HPS) as both a High-Value Research project and as a Focus Technology.

PROSPER Director Halil Ceylan and his research team have spent the past nine years working on the ECON HPS by conducting extensive laboratory testing and material characterization, theoretical and numerical modeling studies, and two full-scale demonstration projects at the Des Moines International Airport and at the Iowa DOT headquarters.

The ECON HPS has been shown to be a promising alternative to conventional snow and ice removal operations using snowplows and deicing chemicals, which is time-consuming, labor-intensive, and environmentally unfriendly. The system utilizes the inherent electrical resistance of concrete to maintain the pavement surface at above-freezing temperatures and thus prevent snow and ice accumulation on the surface.



Left to right: Yongsung Koh, Nazik Citir, and Archana Venkatachalapathy

STUDENT AWARDS

Graduate student wins best paper award

Yongsung Koh, a doctoral student with PROSPER, earned the Best Paper Award at the 2022 International Conference for Road Engineers (ICRE) held in Jeju, South Korea. Koh and his co-authors earned the award for a paper titled "Mechanistic-Based Damage Cost Evaluation of Concrete Pavement Systems Subjected to Superloads." The recognition came after Koh's conference presentation on the related research project, which aims to develop approaches to quantify superloads—loads that are substantially over current vehicle weight limits—and their impact on the road infrastructure system.

InTrans graduate student receives awards from women's groups

PROSPER graduate student Nazik Citir received awards from the Society of Women Engineers (SWE) and an Iowa State women's group in March, a month when we celebrate and uplift women's achievements. Citir, who is pursuing a doctorate in intelligent infrastructure engineering and structural engineering at Iowa State, received the Outstanding Individual Award from the nationwide graduate student community in SWE (GradSWE) and a scholarship from the Iowa State University Women's Club (ISUWC). She received notice of the former award on International Women's Day.

InTrans graduate student earns awards

Archana Venkatachalapathy, a doctoral student at InTrans, earned two awards for her work on a naturalistic driving study to understand the impacts of stress under real-world driving conditions in India. Venkatachalapathy received the Jan Kibbe Student Scholarship and earned second place in the Thomas J. Seburn Student Paper Award, both from the Institute of Transportation Engineers Missouri Valley District (MOVITE). She has been a member of the ITE student chapter and Iowa State's Transportation Student Association—including serving in executive positions during her tenure—since her admission to Iowa State in 2017. ■

INTRANS WEBSITE TRAFFIC BY THE NUMBERS

201,758 total page views in 2022

54% increase in views from 2021

COMMITTEE INVOLVEMENT AND SERVICE TO THE PROFESSION

In 2022, InTrans staff served in more than 60 different organizations related to their areas of expertise, including service of some kind in 26 unique TRB committees and subcommittees, 25 unique ASCE committees and subcommittees, and 5 different FHWA working groups, among various roles in other organizations. More details on committee service are provided in the chart below.

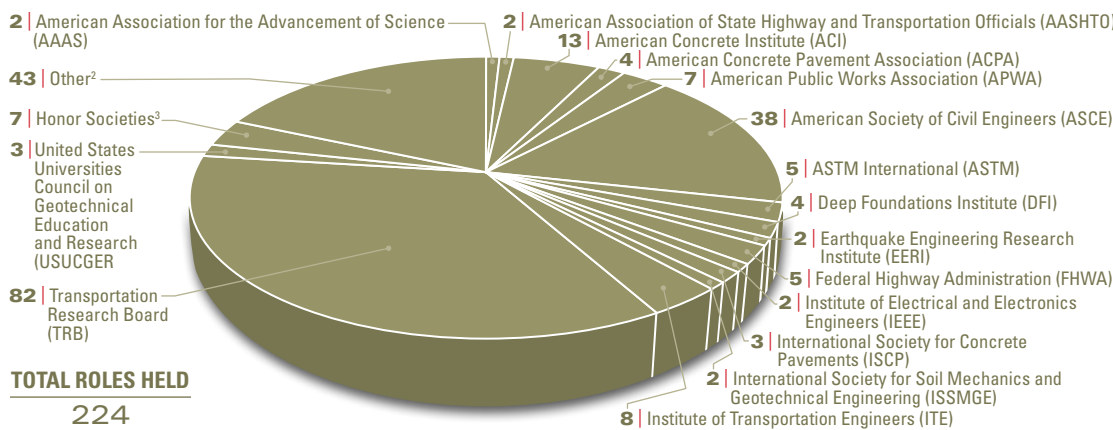
InTrans staff served on the editorial boards of 13 different journals and had various editor roles for 19 different journals in 2022. They also contributed a multitude of reviews for nearly 50 different journal publications and 5 different conferences.

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 27 different state, national, or international conferences and events.

Also, InTrans staff served as panel members for six proposals and as peer reviewers for two different organizations. ■

SERVICE BY ORGANIZATION¹



¹ Tallies include service 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 Tau Beta Pi Engineering Honor Society; Phi Kappa Phi Honor Society; Sigma Gamma Tau Aerospace Honor Society; The Honor Society of Agricultural, Food, and Biological Engineering; Chi Epsilon Honor Society; Sigma Xi; and Sigma Lambda Chi.

EVENT SPOTLIGHT

National Concrete Pavement Technology Center



CP Tech Center Associate Director Leif Wathne performing a resistivity test

FHWA MOBILE CONCRETE TECHNOLOGY CENTER

The Mobile Concrete Technology Center (MCTC) held an open house at InTrans, presenting a unique opportunity for attendees to learn about and see demonstrations of the tests and technology related to the CP Tech Center's work on performance-engineered mixtures (PEM). The MCTC is operated by the FHWA.

The open house, which drew about 50 attendees, was co-sponsored by the Iowa Concrete Paving Association, FHWA, and the CP Tech Center.

Tests that evaluated workability, permeability, and resistance to cold weather were displayed outside the trailer. Workability tests included the VKelly test and the Box test, both of which measure the effects of vibration on a mixture.

Also shown were the super air meter (SAM), resistivity, and Phoenix tests, which respectively focus on the distribution of air, the movement of moisture, and the ratio of water to cement in mixtures.

The PEM pooled fund project (TPF-5(368)) evaluates what makes concrete able to survive the environment and therefore require less maintenance and replacement. The CP Tech Center is continuing its work on PEM with a new pooled fund that focuses on what happens to mixtures after they leave the plant. This next iteration of the project also emphasizes the sustainability benefits of longer-lasting concrete pavements. ■

INTRANS EVENTS BRING PEOPLE TOGETHER AGAIN

InTrans staff organized and held nearly 150 events in 2022—traveling the state to provide training and bringing people together at large conferences while continuing to offer virtual webinars and workshops. These events, as always, aimed to meet people where they are.

For many of us in 2022, that meant meeting in person again.

This year's events—representing a nearly 40% increase from 2021— included the return of the biennial Mid-Continent Transportation Research Symposium after a yearlong delay due to COVID-19, a unique visit from the FHWA's Mobile Concrete Technology Center, and record numbers of attendees at Iowa LTAP trainings.

LTAP increased its impact by beginning to offer regular virtual

webinars and trainings in 2020, but a combination of new staff, a backlog in training needs, and options for both in-person and online events meant its impact grew from pre-COVID numbers of about 4,500 attendees to a record 5,800 in 2022. These numbers don't include its technical assistance or web resources.

While the number of virtual events offered by both LTAP and the CP Tech Center decreased as more of us returned to a pre-COVID normality, the impact that these events have had and the numbers they continue to reach haven't been forgotten.

Not only has the CP Tech Center continued to see hundreds of virtual attendees—averaging more than 300 people at its Technology Tuesday webinars—but offering the recordings after the live event has also led more people across the globe to access the center's wealth of information. Viewers spent nearly a month (27 days) watching the CP Tech Center's embedded videos in 2022, including about 2,000 views of the recordings.

Of course, it's not just about the numbers but about the ability to translate research into practice and bring people together again.

“This (Mid-Con) Research Symposium is such a valuable event to bring researchers, federal agencies, and DOTs together to have research discussions and find new research ideas for the future,” said one of this year's attendees. ■

EVENT SPOTLIGHT



Keynote speaker Edward Mauser kicks off the 2022 Mid-Continent Transportation Research Symposium

MID-CONTINENT TRANSPORTATION RESEARCH SYMPOSIUM

More than 250 people gathered for the Mid-Continent Transportation Research Symposium for the first time since 2019 to hear the latest innovations in the industry.

The biennial Mid-Continent Transportation Research Symposium is hosted by InTrans in partnership with the Iowa DOT. The event was not held in 2021 due to the pandemic, so 2022 offered the first chance to gather again in person.

“The symposium, as always, is a wonderful opportunity for state and federal transportation professionals, university researchers, industry representatives, and students to network and learn about a range of transportation issues,” said InTrans Director Shauna Hallmark. “It was great to see everyone together again.”

The 1½ day event kicked off with a keynote address from Edward Mauser, product lead at Milestone Systems, and remarks from featured speaker Scott Marler, Iowa DOT Director. Both speeches carried themes similar to InTrans' vision of “translating science for decision-making.”

The idea of bridging the gap between research and practice was threaded throughout the entire conference. ■

INTRANS 2022 EVENT RECAP



Motor Grader Operator Field Days on-site training in Ames



BEC staff demonstrating load testing during the Ready, Set, Build! Bridge-Building Challenge



Transportation Institute Course participants working together on a classroom exercise

IN-PERSON EVENTS

- Iowa Local Agency Pavement Management End of Year Workshop (December 6, Ames)
- Iowa Roundabout Design Workshop (November 17, Ames)
- Traffic and Safety Forum (November 16, Ames)
- Municipal Streets Seminar (November 15, Ames)
- Iowa Better Concrete Conference (November 9, Ames)
- Ready, Set, Build! Bridge-Building Challenge (November 3 and 4, Des Moines)
- Iowa Winter Maintenance Workshop Series (several events held in November across Iowa)
- Concrete Lunch & Learn Presentations: Concrete Overlays: The Latest Strategies and Practices for Successful Projects on Highways, Streets, and Parking Lots (several events held in October and November across Iowa)
- Multi-Disciplinary Roadway Safety Series (several events held in October across Iowa)
- Aurora Fall Board Meeting (October 18–20, Bloomington, MN)
- Fall National Concrete Consortium (September 27–29, Detroit, MI)
- Iowa Streets and Roads Workshop and Conference (September 20–22, Ames)
- Mid-Continent Transportation Research Symposium (September 14 and 15, Ames)
- FHWA Mobile Concrete Technology Center – Open House (September 9, Ames)
- Teaching in the Fast Lane: Engineering Workshop for Elementary Teachers (July 18–22, Ames)
- ICEA Mid-Year Conference (July 14, Ames)
- Accessible Sidewalks and Curb Ramps: Design to Installation (June 21, Ames)
- Local Agency Bridge Innovation and Demonstration Days (June 14 and 15, Independence)
- Transportation Institute Course for High School Teachers (June 13–July 1, Ames)
- ICMPA 2022 – 11th International Conference on Managing Pavement Assets (June 7–10, Chicago, IL)
- Motor Grader Operator Workshops – Classroom and Field Sessions (several events held in May and June across Iowa)
- Iowa Pavement Management Program Users' Group Kickoff Meeting (May 18, Ames)
- Aurora Spring Board Meeting (May 17–19, Portland, OR)
- NHI Safety Inspection of In-Service Bridges (April 25–May 6, Ames)
- Iowa County Engineers Research Focus Group (April 20, Ames)
- Spring National Concrete Consortium (April 5–7, Nashville, TN)
- AutoCAD Basics (April 5, Ames)
- Concrete Lunch & Learn Presentations: Sustainability and Carbon Reduction in Iowa Concrete Pavements (several events held in February and March across Iowa)
- NHI Bridge Inspection Refresher Training (February 8–10 and March 29–31, Ames)
- Iowa Work Zone Safety Workshop Series (several events held in February and March across Iowa)
- Work Zone Safety and Flagger Workshop (several events held from February to June across Iowa)

VIRTUAL CPTECH CENTER EVENTS

- Concrete Overlay Case Studies
- Traffic Management Strategies
- Pavement Network Asset Management: A Tool to Maximize the Return on Infrastructure Investments
- Linking PEM and Sustainability
- Value Proposition/Proven Technology: The Story about Concrete Overlays
- Reclaimed Fly Ash in Highway Infrastructure
- Quality Control Plans, Quality Assurance Plans, Dispute Resolution
- Concrete Overlays for Airfield Rehabilitations
- PEM Resistivity
- Design and Construction of Sustainable Concrete Pavements in Desert Environments
- Moving to Greener Pavements: The Vision
- Moving to Greener Pavements: The Strategies
- Concrete Pavement Lunch & Learn Webinar: Sustainability and Carbon Reduction in Iowa Concrete Pavements

2022 event recap continued on page 21



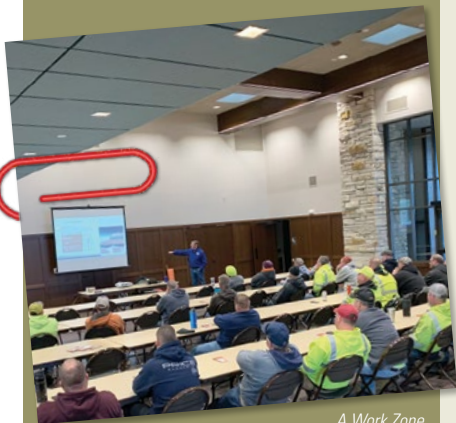
Iowa Streets and Roads Workshop and Conference keynote speaker (top) and vendor display (bottom), with nearly 150 attendees

VIRTUAL IOWA LTAP EVENTS

- Introduction to Adaptive Leadership
- Traffic Calming Overview
- Iowa CDL Training Implementation Virtual Town Hall
- New MUTCD Minimum Retroreflectivity Levels for Pavement Markings
- MUTCD Sign Retroreflectivity Refresher
- The Language of Leadership: Holding Difficult Dialogue
- Pavement Preservation Preventative Maintenance
- Effectively Leading Change
- The Language of Leadership: Employee Readiness and Leadership Style
- Research Series: Evaluating Driver Behavior at Rural Stop-Controlled Intersections
- Leadership Series: How to Measure Morale
- Serving Local Agencies: Equipment Loans and Work Zone Packages
- Using Liquids in Winter Maintenance
- Updates on CDL Drug and Alcohol Clearinghouse and Entry-Level Drivers Training Regulations
- Iowa's Multi-Discipline Safety Team Program
- Low-Cost Safety Improvements for Signalized Intersections

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/. ■

EVENT SPOTLIGHT



A Work Zone Safety and Flagger Workshop training held in Linn County

WORK ZONE SAFETY AND FLAGGER WORKSHOP

The Iowa LTAP had a busy spring, holding events throughout the state and continuing its biweekly webinar series.

Iowa LTAP staff saw a 10% increase in attendance at events from 2020 to 2021—presumably due to a lack of in-person training in 2020 as well as ongoing staff turnover at local agencies—and that level of increase continued again, with another 11% increase from 2021 to 2022.

Much of that increase can likely be attributed to LTAP's annual Work Zone Safety and Flagger Workshop training. The training provides information about the MUTCD, how to correctly set up temporary traffic control devices, and how to implement worker safety considerations in work zones, among other details for work zone flaggers.

More than 1,400 attendees joined one of 57 sessions held across the state in 2022. The typical annual attendance prior to this record number was about 700 people at these events.

This doubling in attendance comes as the training has expanded its requirements for a certificate and as Iowa LTAP has also added a virtual option for the workshop.

The monumental task of fulfilling the needs of public safety and secondary roads department personnel across the state took the efforts of the entire LTAP staff, especially considering that most of the trainings came within the first three months of the year. ■

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.



First bridge project in the US utilizing A709 Grade QST 65 steel: Buchanan County Sand Creek Bridge
Project: Evaluation of the Performance of A709 Grade 65 QST Bridge Steel



Speed feedback trailer positioned at the end of work zone lane closure taper
Project: Work Zone Speed Limits and Motorist Compliance



Culvert under construction showing precast concrete box sections in place
Project: Concrete Box Culvert Earth Pressure Monitoring

These deliverables were the products of research efforts that spanned all aspects of the nation's transportation system: bridges, traffic signage, data analytics, roadway materials, and more. Copies of the reports listed below are available for download from the InTrans website at intrans.iastate.edu/research/completed/.

INTRANS TECHNICAL REPORTS

OCTOBER–DECEMBER

Multi-Span Lateral Slide Laboratory Investigation: Phase II
Evaluation of the Use of IRI Data to Estimate Bridge Dynamic Impact Factor (DIF)
Iowa Work Zone Data Hub
Work Zone Speed Limits and Motorist Compliance

JULY–SEPTEMBER

Evaluation of Galvanized and Painted Galvanized Steel Piling
Evaluation of the Performance of A709 Grade 65 QST Bridge Steel
Investigation of the Causes of Transverse Bridge Deck Cracking
Assessment, Repair, and Replacement of Bridges Subjected to Fire
Guidance to Reduce Shrinkage and Restraint Shrinkage Cracking
Exploration and Evaluation of High-Resolution Imagery for Environmental Assessment and Wetland Classification Tool

APRIL–JUNE

Non-Invasive Sensor Deployment in Aurora Member States
Implementation of Recommendations for Eliminating Longitudinal Median Joints in Wide Bridges
Iowa DOT Data Management Plans
Evaluation of Penetrating Sealers for Concrete
Alternative Project Delivery Peer Exchange
Low-Cost Rural Surface Alternatives Phase III: Demonstration Project
Groundwater System Impacts on the US 63 Railway Underpass near Waterloo, Iowa

JANUARY–MARCH

Concrete Box Culvert Earth Pressure Monitoring
Synthesis on Maintaining PCC Pavement Smoothness
In Situ Cyclic Loading of Concrete Pavement Overlays Supported on Geotextile and Asphalt Interlayers: Buchanan County Road D-16
Synthesis of Rapid Setting Repair Materials
Evaluation of RePLAY for Mainline, Shoulders, and Rumbles: Pilot Study in Clinton County
Effective Signing Strategies and Signal Displays for Work Zone Driveway Assistance Devices (DADs)

- 23** InTrans technical reports
- 16** InTrans technology transfer summaries
- 2** InTrans guides

Publications continued on page 23

JOURNAL ARTICLES, GUIDES, AND OTHER TECHNICAL REPORTS

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- Zhou, D., J. S. Wood, and V. Gayah. 2022.** Integration of Machine Learning and Statistical Models for Crash Frequency Modeling. *Transportation Letters: The International Journal of Transportation Research*. ■

PRESENTATIONS AND CONFERENCE PROCEEDINGS

- Adam, J. 2022.** Concrete Pavement Sustainability. Presented at Missouri Association of General Contractors/Missouri DOT Conference, December 8, Osage Beach, MO.
- Adam, J. 2022.** Presented at FHWA Concrete Pavement Materials Technical Working Group (CPM-TWG), May 9–10, Chicago, IL.
- Adam, J. 2022.** Presented at FHWA CPM-TWG, November 17–18, Austin, TX.
- Adam, J. 2022.** National Concrete Pavement Technology Center Update. Presented at National Concrete Consortium, September 27, Detroit, MI.
- Ahrens, C., S. Laflamme, and N. E. Petro. 2022.** Penetrator Science Objectives for the Moon and Artemis. Presented at International Planetary Probe Workshop, August 27–28, Santa Clara, CA.
- Ahrens, C., S. Laflamme, V. Balaban, and P. Harrison. 2022.** Lunar Science Using Penetrators: Objectives and Concepts. Presented at NASA National Exploration Science Forum, July 19–21, Boulder, CO.
- Alhamdan, A., and I. Nlenanya. 2022.** Pavement Condition Forecast for Local Roads Missing Age Information. Presented at 11th International Conference on Managing Pavement Assets, June 7–10, Chicago, IL.
- Arabi, S., A. Sharma, M. Reyes, C. Hammann, and C. Peek-Asa. 2022.** Farm Vehicle Following Distance Estimation by Using Deep Learning and Monocular Camera Images. Presented at Transportation Research Board (TRB) 101st Annual Meeting, January 9–13, Washington, DC.
- Arenas, A. 2022.** On Road Flood Reduction Structures. Presented at Iowa County Engineers Association Annual Conference, December 14–16, Des Moines, IA.
- Arenas, A., B. Eustace, C. Witte, and M. Helmers. 2022.** Quantifying the Runoff Reduction Potential of Prairie Strips using Physics-Based Modeling. Presented at Iowa Water Conference, September 28–29, Dubuque, IA.
- Arenas, A., L. Weber, and C. Wolter. 2022.** Assessing the Flood Reduction Benefits of On-Road Structures. Presented at Mid-Continent Transportation Research Symposium, September 14–15, Ames, IA.
- Ashlock, J. C. 2022.** Additional Gyrotory Compaction Tests for IHRB Project TR-797. Presented at Iowa Highway Research Board, June 24.
- Ashlock, J. C. 2022.** Borehole Shear Test. Presented at In Situ Soil Testing Short Course, July 28, Smithfield VA.
- Ashlock, J. C. 2022.** Cone Penetration Pore Pressure Dissipation Tests. Presented at In Situ Soil Testing Short Course, July 24, Smithfield VA.
- Ashlock, J. C. 2022.** Determining Vertical Pile Capacity from Pressuremeter Tests. Presented at In Situ Soil Testing Short Course, July 27, Smithfield VA.
- Ashlock, J. C. 2022.** Dilatometer Pore Pressure Dissipation Tests. Presented at In Situ Soil Testing Short Course, July 25, Smithfield VA.
- Ashlock, J. C. 2022.** Gradation Optimization for Improved Performance of Granular-Surfaced Roads. Presented at Mid-Continent Transportation Research Symposium, September 14, Ames, IA.
- Ashlock, J. C. 2022.** Interpreting Shear Strength Values from Vane Shear Tests. Presented at In Situ Soil Testing Short Course, July 26, Smithfield VA.
- Ashlock, J. C. 2022.** Low-Cost Rural Surface Alternatives Phase III: Demonstration Project. Presented at Iowa Highway Research Board, May 28.
- Ashlock, J. C. 2022.** Rural Surface Alternatives Phase III: Demonstration Project. Presented at Iowa Department of Transportation Technical Advisory Committee for Project TR-721, April 8.
- Barzegar, V., M. Nelson, S. Laflamme, C. Hu, A. Downey, J. Bakos, and J. Dodson. 2022.** Deep Learning-Based Real-Time Modeling and State Estimation of High-Rate Systems. Presented at SPIE NDE, March 6–10, Long Beach, CA.
- Basulto-Elias, G., S. Hallmark, J. Merikel, A. Sharma, and M. Rizzo. 2022.** Assessing the Impact of Older Driver Visual and Cognitive Impairment on Intersection Stopping Behavior. Presented at 2022 American Academy of Neurology Conference, April 2–7, Seattle, WA.
- Basulto-Elias, G., S. Hallmark, J. Merikel, A. Sharma, and M. Rizzo. 2022.** Older Driver Visual and Cognitive Impairment on Intersection Behavior. Presented at 7th International Conference on Traffic Safety and Transport Psychology. August 23–25, Gothenburg, Sweden.
- Ceylan, H. 2022.** Electrically Conductive Concrete Heated Pavement Technology. July 21, Middle East Technical University, Ankara, Turkey.
- Ceylan, H. 2022.** FAA PEGASAS COE Project 1: Heated Airport Pavements. Presented at FAA PEGASAS COE 10th Annual Meeting, June 30–July 1, Chicago, IL.
- Ceylan, H. 2022.** Self-Heating Electrically Conductive Concrete Heated Pavement Systems: Innovative Winter Maintenance Solution. Presented at Ege International Congress on Innovation Technologies & Engineering, September 2–4, Ege University, Izmir, Turkey.
- Ceylan, H. 2022.** Use of Innovative Technologies for Achieving Smart and Sustainable Concrete Roads and Cities. Presented at 2nd Concrete Roads Congress and Exhibition, November 16–17, Ankara, Turkey.
- Ceylan, H. 2022.** Use of Uncrewed Aircraft Systems/ Drones for Health Monitoring and Management of Infrastructure Systems. Presented at Ege International Congress on Innovation Technologies & Engineering, September 2–4, Ege University, Izmir, Turkey.
- Ceylan, H. 2022.** Using Small Uncrewed Aircraft and Sensor Systems for Civil Infrastructure Health Monitoring and Management. October 27, University of California, Los Angeles, CA.
- Ceylan, H. et al. 2022.** Base Stabilization of Iowa Granular Roads Using Recycled Plastics. Presented at TRB Committee on Repurposing Plastics Waste in Infrastructure (Virtual), July 9.
- Ceylan, H. et al. 2022.** Evaluating the Impact of Overweight Trucks on Rigid Pavement Performance Using AASHTOWare Pavement ME Design. Presented at MEPDG Implementation RoadMap Workshop, June 1–2, Chicago, IL.
- Ceylan, H. et al. 2022.** Iowa Pavement Analysis Techniques (IPAT) & Smartphone-Based Road Performance Data Collection Tool. Presented at 2022 County Engineers Research Focus Group, April 20, Ames, IA.
- Ceylan, H. et al. 2022.** Latest Trends on Technology to Deal with Pavement Foundation Challenges from Climate Change and Impact. Presented at 2022 Minnesota Transportation Conference & Expo, May 17–19, Minneapolis, MN.
- Ceylan, H. et al. 2022.** Uncrewed Aircraft Systems (Drones) and Sensors for Airfield Pavement Condition Assessment. Presented at National Association of State Aviation Officials (NASAO) 91st Annual Convention & Trade Show, September 10–14, Greenville, SC.
- Citir, N., H. Ceylan, and S. Kim. 2022.** Neural Network Modeling to Forecast Critical Pavement Responses: A Synthetic Approach. Presented at 1st International Data Science for Pavement Symposium, March 22–24.
- Cox, R. A. 2022.** Dissecting Ohio's Workforce. Presented at ADVANCE Partnership Summit, Columbus, OH.
- Cox, R. A. 2022.** The Past, Present, and Future of Minnesota's Workforce. Presented at ARRM Business & Finance Forum, November 30, Minneapolis, MN.
- Cox, R. A. 2022.** The Workforce Skirmishes. Presented at Mid-American Chamber Executive Conference, Sioux Falls, SD.
- Dahlberg, J. 2022.** Condition of Assessment of Fire Damaged Prestressed Concrete Bridge Girders. Presented at Mid-Continent Transportation Research Symposium, September 14, Ames, IA.
- Dahlberg, J. 2022.** Impact of Legalized 25-Kip Axle Loads for Self-Propelled Implements of Husbandry. Presented at Iowa County Engineers Association Midyear Conference, July 14, Ames, IA.
- Dahlberg, J. 2022.** Investigation of the Efficacy of Helical Pile Foundation Implementation in ABC Projects. Presented at AASHTO Committee on Bridges and Structures T-15 Subcommittee, June 20, Pittsburgh, PA.
- Dahlberg, J. 2022.** Iowa State University Bridge Research Overview and Updates. Presented at Bridge Innovation Days, June 14, Independence, IA.
- Dahlberg, J. 2022.** Structural Engineering of Bridges. Presented at Intermodal Transportation Camp at University of Iowa (Virtual), June 13, Iowa City, IA.
- Daneshvar, D., K. Deix, A. Robisson, and B. Shafei. 2022.** Investigation of Drying Shrinkage Effects on Sloped Concrete-Concrete Composites. Presented at Computational Modelling of Concrete and Concrete Structures Conference, May 23–26, Vienna, Austria.
- Day, C. 2022.** Automated Traffic Signal Performance Measures: Present and Future Datasets. Presented at TRB Highway Capacity and Quality of Service Annual Meeting, June 21, Washington, DC.
- Emtenan, A. M. T., A. Haghghat, M. Shields, J. Shaw, P. Hawley, A. Sharma, and C. M. Day. 2022.** Development of Right-Turn-on-Red Volume Estimation Models for the Highway Capacity Manual. Presented at TRB 101st Annual Meeting, January 9–13, Washington, DC.
- Franz, B., K. Madson, and R. Brown. 2022.** Flexible Facility Design and Development Refresher Webinar. Presented at Construction Industry Institute (Virtual), April 27.
- Hallmark, S., D. Veneziano, T. Litteral, and J. S. Wood. 2022.** Short Term Future Proofing Strategies for Local Agencies to Prepare for Connected and Autonomous Vehicles. *Proc., Road Safety and Simulation Conference*, June 8–10, Athens, Greece.
- Hallmark, S., D. Veneziano, T. Litteral, and J. S. Wood. 2022.** Identifying Short Term Strategies for Local Agencies to Prepare for Connected and Autonomous Vehicles. Presented at Road Safety and Simulation Conference, June 8–10, Athens, Greece.
- Hallmark, S., G. Basulto-Elias, N. Oneyear, and O. Smadi. 2022.** Driver Behavior Encountering Back of Queues in Work Zones Using Naturalistic Driving Study Data. Presented at 7th International Conference on Traffic Safety and Transport Psychology, August 23–25, Gothenburg, Sweden.

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- Hallmark, S., N. Hawkins, R. Thapa, and S. Knickerbocker. 2022.** Intersection Scanning Behavior Due to Intersection Collision Warning Systems. Presented at Road Safety and Simulation Conference, June 8–10, Athens, Greece.
- Hasan, M. Z., A. Joshi, M. Rahman, A. Venkatachalapathy, A. Sharma, C. Hegde, and S. Srakar. 2022.** DriveCLIP: Zero-Shot Transfer for Distracted Driving Activity Understanding Using CLIP. Presented at 36th Conference on Neural Information Processing Systems, November 28–December 9, New Orleans, LA.
- Hawkins, N., S. Hallmark, S. Knickerbocker, and T. Litteral. 2022.** COVID-19 Impacts on Speed and Safety in Minnesota. Presented at Annual Meeting of the Institute of Transportation Engineers, July 31–August 3, New Orleans, LA.
- Ingrid, C., A. Arenas, K. Schilling, M. Streeter, and E. Anderson. 2022.** Evaluating a Two-Stage Roadside Ditch Design to Improve Environmental Performance by 2D Sediment Transport Model in HEC-RAS. Presented at American Geophysical Union Fall Meeting, December 12–16, Chicago, IL.
- Jana, U., J. P. D. Karmakar, P. Chakraborty, T. Huang, A. Sharma, D. Ness, and D. Ritcher. 2022.** Automated Approach for Computer Vision-Based Vehicle Movement Classification at Traffic Intersections. Presented at TRB 101st Annual Meeting, January 9–13, Washington, DC.
- Jibon, M., M. Mahedi, B. Yang, H. Ceylan, and S. Kim. 2022.** Laboratory-Based Performance Assessment of Otta Seal for Low-Volume Roads. Presented at TRB 101st Annual Meeting, January 9–13, Washington, D.C.
- Kalmogo, P., J. C. Ashlock, and S. Sritharan. 2022.** Effect of Shaft Diameter on the Unit Side Resistance of Drilled Shafts. Presented at TRB 101st Annual Meeting, January 9–13, Washington, D.C.
- Kalmogo, P., N. Sree Kumar, S. Sritharan, and C. Sikorsky. 2022.** Rehabilitation of Decks in Post-Tensioned Box-Girder Bridges. Presented at International Bridge Conference, July 18–20, Pittsburgh, PA.
- Kandiboina, R., S. Knickerbocker, and A. Sharma. 2022.** Investigation of Heavy Acceleration Events from Connected Vehicle Data and Their Associated Causes. Presented at 14th International Conference on Transportation Planning and Implementation Methodologies for Developing Countries, December 19–21, Mumbai, India.
- Kazemian, M., and B. Shafei. 2022.** Natural Zeolite for Internal Curing of Ultra-High Performance Concrete. Presented at Iowa Better Concrete Conference, November 6–8, Ames, IA.
- King, D., and P. Taylor. 2022.** Rehabilitation and Repair of Concrete Overlays. *Proc., 6th International Conference on Concrete Repair, Rehabilitation, and Retrofitting*, October 3–5, Cape Town, South Africa.
- Klekner, A., and N. Keren. 2022.** Virtual Reality Application for Identifying a Bias in Confined Space Operations. *Proc., 2022 Annual Association of Technology, Management, and Applied Engineering*, November 3–5, Louisville, KY.
- Knickerbocker, S. 2022.** Automated Transportation Program Overview. Presented at 2022 Iowa Communication Alliance Beyond Broadband Expo, September 13, Ankeny, IA.
- Knickerbocker, S. 2022.** Evaluation of Road Weather Messages on DMS Using Roadside Pavement Sensors. Presented at 2022 Western States Rural Transportation Technology Implementers Forum, June 14–16, Yreka, CA.
- Knickerbocker, S. 2022.** FHWA Data Driven Work Zone Process Review. Presented at FHWA Work Zone Management Program Webinar (Virtual), February.
- Knickerbocker, S. 2022.** Improving Winter Road Weather Alerts on Highway Dynamic Message Signs. Presented at 2022 Center for Transportation Studies Transportation Research Conference, November 3, Minneapolis, MN.
- Knickerbocker, S. 2022.** Iowa's Heavy Truck Crash Tool. Presented at 2022 Midwest Commercial Vehicle Safety Summit, June 1, Kansas City, MO.
- Knickerbocker, S. 2022.** Panel. State DOT Update: Connected Work Zones. Presented at 2022 ATSSA Convention and Traffic Expo, February 11–15, Tampa, FL.
- Knickerbocker, S. 2022.** Riverine Infrastructure Database (RIDB) for Rapid Assessment of Asset Vulnerability. Presented at 2022 Mid-Continent Transportation Research Symposium Program, September 14–15, Ames, IA.
- Knickerbocker, S. 2022.** Traffic Operations Open Data Service. Presented at 2022 Mid-Continent Transportation Research Symposium Program, September 14–15, Ames, IA.
- Knickerbocker, S. 2022.** US DOT Work Zone Data Exchange Update. Presented at 2022 ATSSA Convention and Traffic Expo, February 11–15, Tampa, FL.
- Knickerbocker, S. 2022.** Utilizing Off the Shelf Data Visualization for Crash Analysis Tool. Presented at 10th International Symposium on Visualization, November 3–4, Washington, DC.
- Koh, Y., H. Ceylan, S. Kim, and I. H. Cho. 2022.** Characterizations of Super Heavy Loading Configuration for Flexible Pavement Analysis. Presented at 11th International Conference on the Bearing Capacity of Roads, Railways and Airfields, June 27–30, Trondheim, Norway.
- Lafamme, S. 2022.** High-Rate Real-Time Learning: How Fast Can We Learn? Presented at Seminar of the Department of Engineering, November 18, University of Tuscia, Viterbo, Italy.
- Lafamme, S. 2022.** Soft Sensing Technology for Fatigue Crack Discovery and Monitoring. Presented at Seminar of the International Doctoral Program in Civil and Environmental Engineering, November 11, University of Perugia, Perugia, Italy.
- Lawton, B., and S. Hallmark. 2022.** Understanding Driver Behavior and Road Safety Perception in Ghana: A Qualitative Study with a Sociocultural Lens. Presented at Road Safety on Five Continents, October 10–12, Grapevine, TX.
- Lawton, B., S. Hallmark, D. O. Atuah, and W. Ackaah. 2022.** Driver Behavior and Road Safety Perception in Ghana. Presented at Road Safety on Five Continents, October 10–12, Grapevine, TX.
- Lawton, B., S. Hallmark, D. O. Atuah, and W. Ackaah. 2022.** Relationship Between Road Users and Roadway Infrastructure in Ghana, West Africa. Presented at International Road Federation, November 1–3, Washington, DC.
- Lawton, B., S. Hallmark, D. O. Atuah, and W. Ackaah. 2022.** Understanding the Relationship Between Road Users and Roadway Infrastructure in Ghana, West Africa: A Quantitative Video-Driven Study. Presented at Road Safety on Five Continents, October 10–12, Grapevine, TX.
- Luo, Z., W. Li, K. Wang, A. Castel, and S. P. Shah. 2022.** Comparative Study of ITZ in Geopolymer and PC Concrete Using Modelled Interfaces. Presented at ACI Concrete Convention, October 24, Dallas, TX.
- Mack, J. W., G. Dean, and L. G. Wathne. 2022.** Improving Pavement Resiliency to Flooding: A Case for Concrete Pavements. *Proc., 2nd Concrete Road Congress and Exhibition*, November 16–17, Ankara, Turkey.
- Madson, K. 2022.** A Framework for Evaluating Societal Impacts Caused by Disruptions to Inland Waterways. Presented at Construction Research Congress 2022, March 9–12, Arlington, VA.
- Madson, K. 2022.** Comparison of Asset Management Approaches to Optimize Navigable Waterway Infrastructure. Presented at 2022 International Conference on Construction Engineering and Project Management, June 20–24, Las Vegas, NV.
- Madson, K. 2022.** Improved Project Planning Strategies for Transportation Assets: The Necessity of Early Stakeholder Involvement. Presented at Construction Research Congress 2022, March 9–12, Arlington, VA.
- Madson, K. 2022.** State-of-the-Practice of Big Data in Decision-Making Processes within the Construction Industry. Presented at Construction Research Congress 2022, March 9–12, Arlington, VA.
- Madson, K. and J. Lather. 2022.** A Framework for Evaluating Societal Impacts Caused by Disruptions to Inland Waterways. *Proc., Construction Research Congress 2022*, March 9–12, Arlington, VA.
- Mahmud, S., and C. M. Day. 2022.** Machine Learning Assisted Data Fusion for Identifying Recurring Congestion and Determining Causes of Non-Recurring Congestion. Presented at TRB 101st Annual Meeting, January 9–13, Washington, D.C.
- Naphade, M., S. Wang, D. C. Anastasiu, Z. Tang, M. Chang, Y. Yao, L. Zheng, M. S. Rahman, A. Venkatachalapathy, A. Sharma, Q. Feng, V. Ablavsky, S. Sclaroff, P. Chakraborty, A. Li, S. Li, and R. Chellappa. 2022.** The 6th AI City Challenge. Presented at 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops, June 19–20, New Orleans, LA.
- Oni, B., and K. Madson. 2022.** Improved Project Planning Strategies for Transportation Assets: The Necessity of Early Stakeholder Involvement. *Proc., Construction Research Congress 2022*, March 9–12, Arlington, VA.
- Oni, B., K. Madson, and C. MacKenzie. 2022.** Comparison of Asset Management Approaches to Optimize Navigable Waterway Infrastructure. Presented at International Conference on Construction Engineering and Project Management, June 20–24, Las Vegas, NV.
- Ravichandra-Mouli, V., S. Knickerbocker, S. Ajit, and A. Sharma. 2022.** A Big Data Based Scalable Smart Work Zone Solution Using AVL Data. Presented at TRB 101st Annual Meeting, January 9–13, Washington, DC.

- Raza, S., M. Julien, B. Shafei, M. S. Saiidi, M. Motavalli, and M. Shahverdi. 2022.** Seismic Retrofitting of Bridge Piers Using Pre-Stressed Fe-SMA Rebars. Presented at 6th International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures, September 6–8, Shanghai, China.
- Santana, M., S. Azad, and B. Shafei. 2022.** Accelerated Corrosion Test of Structural Steel Angles. Presented at APEX-E Student Research Showcase and Poster Presentation, August 4, Ames, IA.
- Sargam, Y., and K. Wang. 2022.** A Novel Edxia-Based Methodology to Quantify the Dispersion of Nanosilica in Hardened Cement Matrix. Presented at 7th International Symposium on Nanotechnology in Construction (Virtual), November 1, Monash, Australia.
- Schaefer, V.R. 2022.** 70th Kersten Lecture: Past, Present and Future of Ground Improvement. Presented at Minnesota Geotechnical Conference, February 18, Minneapolis, MN.
- Schaefer, V.R. 2022.** GeoTechTools: The First Place to Look. Presented at Arizona Pavements/Materials Conference, November 17, Tempe, AZ.
- Sengun, E., H. Ceylan, and S. Kim. 2022.** Roller Compacted Concrete Pavement Design for Stacked Containers. Presented at 59th Annual Meeting of American Concrete Pavement Association, November 29–December 1, Nashville, TN.
- Shafei, B. 2022.** Advances in the Development and Application of Non-Proprietary Ultra-High Performance Concrete. Presented at Mid-Continent Transportation Research Symposium, September 14–15, Ames, IA.
- Shafei, B. 2022.** New Trends in Concrete Structures: A Transition to Ultra-High Performance Concrete. Presented at Iowa Better Concrete Conference, November 6–8, Ames, IA.
- Sharma, A. 2022.** Application of Big Data Analytics in Improving Transportation Operations. Presented at Business Analytics Symposium, April 5, Ames, IA.
- Sharma, A., T. Sirotiak, X. Wang, P. Taylor, P. Deka, R. Kiran, and D. Naik. 2022.** Cementitious Paste Defects Correlated to Engineering Properties of Concrete. *Proc., 12th International Conference on Construction in the 21st Century*, May 16–19, Amman, Jordan.
- Shi, W., and B. Shafei. 2022.** Design of Shrinkage-Compensating Cement Concretes Resistant to Chloride Penetration. Presented at 6th International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures, September 6–8, Shanghai, China.
- Sourav, A., H. Ceylan, S. Kim, C. Brooks, D. Peshkin, R. Dobson, M. Brynick, and M. DiPilato. 2022.** Small Uncrewed Aircraft Systems-Based Orthophoto and Digital Elevation Model Creation and Accuracy Evaluation for Airfield Portland Cement Concrete Pavement Distress Detection and Rating. Presented at ASCE International Conference on Transportation & Development, May 31–June 3, Seattle, WA.
- Stedile Zolin, J. V., and K. Madson. 2022.** State-of-the-Practice of Big Data in Decision-Making Processes within the Construction Industry. *Proc., Construction Research Congress 2022*, March 9–12, Arlington, VA.
- Taher, S., J. Li, C. Bennet, W. Colins, and S. Laflamme. 2022.** Fatigue Crack Modeling of Steel Bridges Using Wireless Skin Sensors. Presented at SPIE NDE 2022, March 6–10, Long Beach, CA.
- Tran, L., B. J. Covington, I. Nlenanya, and J. Anthony. 2022.** A Success Story of Stakeholder Engagement and Data Unification for Transportation Asset Management. *Proc., TRB 101st Annual Meeting*, January 9–13, Washington, DC.
- Veneziano, D. 2022.** Designing Low Water Crossings. Presented at 2022 Missouri, Iowa, Nebraska, Kansas (MINK) Local Roads Meeting, September 29, St. Joseph, MO.
- Wathne, L. 2022.** Achieving Pavement Quality. Presented at 24th Annual ACPA Pennsylvania Concrete Conference (Virtual), February 23.
- Wathne, L. 2022.** Achieving Quality Concrete Pavement: Workshop on Pavement Construction Quality. Presented at TRB 2022 Annual Meeting, January 9, Washington, DC.
- Wathne, L. 2022.** Advancing Sustainable Solutions. Presented at FHWA CPM TFG Workshop, November 17–18, Austin, TX.
- Wathne, L. 2022.** Competition and Risk Mitigation. Presented at Concrete SASK Pavement Seminar, November 8, Saskatoon, Canada.
- Wathne, L. 2022.** Concrete Pavement Construction Best Practices. Presented at IRF/ISCP Joint Webinar (Virtual), September 7.
- Wathne, L. 2022.** Contractor Considerations and Best Practices for Constructing Concrete Pavements. Presented at 54th Mid-Atlantic Quality Assurance Workshop (Virtual), February 23.
- Wathne, L. 2022.** CP Tech Center Update. Presented at FHWA Sustainable Pavements Technical Working Group Meeting, October 19, San Diego, CA.
- Wathne, L. 2022.** EPDs for Concrete Pavement. Presented at Southwest Concrete Pavement Association Webinar (Virtual), June 28.
- Wathne, L. 2022.** Fundamentals of Concrete Pavement Smoothness. Presented at Southwest Concrete Pavement Association Webinar (Virtual), December 6.
- Wathne, L. 2022.** Inter-Industry Competition and Sustainability. Presented at Annual Concrete Pavement Workshop, March 10, Denver, CO.
- Wathne, L. 2022.** Linking PEM and Sustainability. Presented at Concrete Pavement Tech Tuesday (Virtual), August 16.
- Wathne, L. 2022.** Moving Forward with Sustainable Performance Engineered Concrete. Presented at National Concrete Consortium Fall Meeting, September 27, Detroit, MI.
- Wathne, L. 2022.** Moving to Greener Pavements: The Strategies. Presented at Concrete Pavement Tech Tuesday (Virtual), April 12.
- Wathne, L. 2022.** Pavement Resilience. Presented at Concrete SASK Pavement Seminar, November 8, Saskatoon, Canada.
- Wathne, L. 2022.** Pavement Resilience. Presented at Iowa Needs Concrete Conference, February 4, Des Moines, IA.
- Wathne, L. 2022.** Pavement Resilience. Presented at IRF Global R2T Conference, November 3, Washington DC.
- Wathne, L. 2022.** Paving the Way. Presented at CPAM/ARM Municipal Streets Seminar, December 14, Mankato, MN.
- Wathne, L. 2022.** Shake, Rattle, and Roll: Vibration of Concrete Mixtures. Presented at Ohio Transportation Engineering Conference, October 25, Columbus, OH.
- Wathne, L. 2022.** Update on Sustainability Activities. Presented at FHWA Sustainable Pavements Technical Working Group Meeting, June 23, Denver, CO.
- Wi, K., and K. Wang. 2022.** Taguchi Design of 3D Printable Concrete Mixtures and Investigation into the Interlayer Properties. Presented at ACI Concrete Convention, March 27, Orlando, FL.
- Wood, J. S. 2022.** Accounting for Driver Assistance Systems in Evaluating Safety Impacts of Countermeasures. Presented at Transportation Engineering and Safety Conference, December 8, State College, PA.
- Wood, J. S. 2022.** Driver Assistance Technologies, Connected, and Autonomous Vehicles: Potential Impacts and Considerations for Engineers in Rural Areas. Presented at Iowa State Association of Counties Spring Conference, March 11, Des Moines, IA.
- Wood, J. S. 2022.** Future Vision for Autonomous and Remotely Operated Heavy Equipment. Presented at AASHTO Construction Committee Annual Meeting, August 9, Bellevue, WA.
- Yang, Y., and J. Dong. 2022.** Performance Evaluation of Iowa Truck Parking Information and Management System through Visual Analytics. *Proc., TRB 101st Annual Meeting*, January 9–13, Washington, DC.
- Young, S. E., E. A. Bensen, L. Zhu, C. Day, J. S. Lott, R. Sandhu, C. Tripp, and P. Graf. 2022.** Concept of Operations of Next-Generation Traffic Control Utilizing Infrastructure-Based Cooperative Perception. *Proc., ASCE International Conference on Transportation and Development*, May 31–June 3, Seattle, WA.
- Yrjo, T., N. Keren, A. Lawson, A. Leek, and P. Evans. 2022.** Can Priming Learners Prior to Learning Lead to Higher Learning Gain? *Proc., Interservice/Industry Training, Simulation, and Education Conference*, November 28–December 2, Orlando, FL. ■

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