INTRANS EN ROUTE ANNUAL REPORT

JANUARY 2024 TO DECEMBER 2024

IOWA STATE UNIVERSITY
Institute for Transportation

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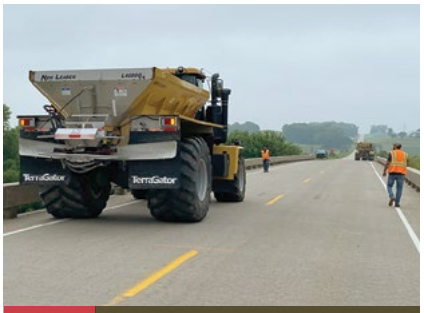

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The Institute for Transportation (InTrans) at Iowa State University administers 14 centers and programs with several distinct yet affinitive research specialties and a variety of technology transfer and professional education initiatives.

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Front Cover Photos: InTrans Associate Director Neal Hawkins

DIRECTOR'S MESSAGE

Photo by Christopher Gannon

Transportation at its very core means movement. And that, by extension, means effort. For my part, as Director of the Institute for Transportation, I strive to ensure that our efforts mean something within the transportation community, which includes everyone from fellow researchers to everyday road users. Our labors to adapt, change, and challenge the constructs of transportation are ongoing, but by continuing to build a stronger, more stable, more data-driven future, we never fail to impact research and practice.

Turning toward 2025, it's time again to remember all the progress we have made over the past year. Our annual budget for work at InTrans in 2024 was over $19 million, an 8 percent increase from the previous 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 for those in Iowa and beyond.

For example, our researchers at the National Concrete Pavement Technology Center, after wrapping up a five-year cooperative agreement with the Federal Highway Administration on advancing concrete pavement technologies, have now gone on to sign another five-year cooperative agreement with that agency. This new $6.7 million project is focused on the deployment and rapid adoption of innovative materials, design and construction procedures, specifications, practices, and methods to improve concrete pavement performance and extend pavement life. More on the project is detailed later in this report.

Our research is the fuel that powers our organization, and in 2024 we published 33 technical reports on completed projects, as well as 28 technology transfer summaries, 10 technical summaries, 8 case studies, and 2 guides, all available for download on the InTrans website. Our ongoing work in the transportation sector is supported by 72 research scientists, traffic engineers, and professional staff, all of whom are experts in their fields and have dedicated their careers to improving and redefining our mobile and built world. 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 84 graduate and 25 undergraduate students, who work on a variety of research and demonstration projects as part of the InTrans team.

This has been a year of activity—and growth—for InTrans and its centers and programs. Our Center for Transportation Research and Education was awarded $1.7 million across four projects sponsored by the National Cooperative Highway Research Program. Additionally, researchers from our Program for Sustainable Pavement Engineering & Research recently completed work that helps local agencies evaluate the full scope of superloads' effects on paved roads through their Road Infrastructure-Superload Analysis Tool, or RISAT.

As researchers, we are always eager for the next project, newest idea, or something more to better understand. But as we look forward, we must not forget everything that has come before. So, take your time as you peruse this publication and appreciate—as I have—all that we have accomplished in 2024. It has been truly a year to remember. ▶

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

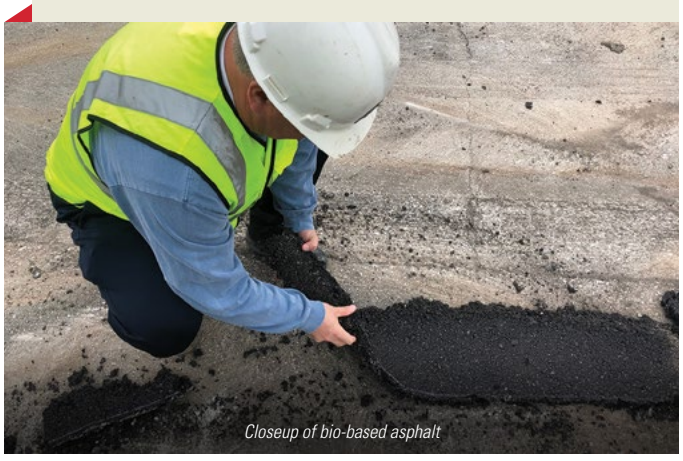
ASPHALT MATERIALS AND PAVEMENTS PROGRAM (AMPP)

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 2024, 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.



Closeup of bio-based asphalt

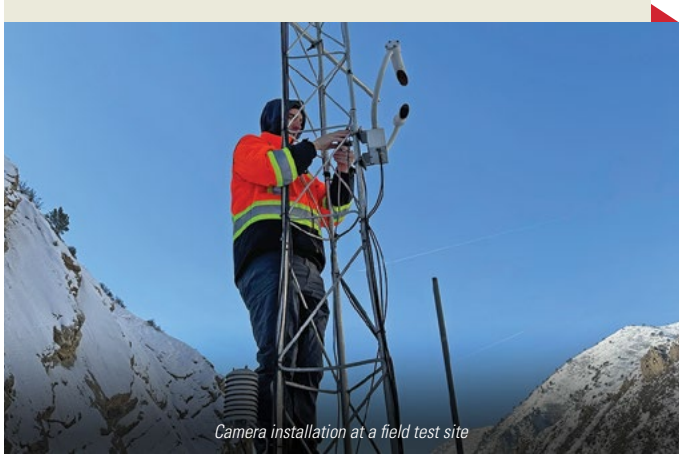
AURORA PROGRAM

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 2024, a total of 19 state departments of transportation (DOTs) participated in Aurora.

Aurora published six research reports in the areas of roadway ice/snow detection, surface condition monitoring, connected vehicles, spring load restrictions, and real user friction. Three projects were ongoing, focusing on variable speed limits, communications for adverse conditions, and road condition indices, and a roadway friction project was initiated. During the last five years, Aurora has invested more than $1.7M in research.

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 Boulder, Colorado, and Madison, Wisconsin, respectively. The Aurora Board continued to engage with industry and research groups and added several new Friends of Aurora.



Camera installation at a field test site

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BRIDGE ENGINEERING CENTER (BEC)

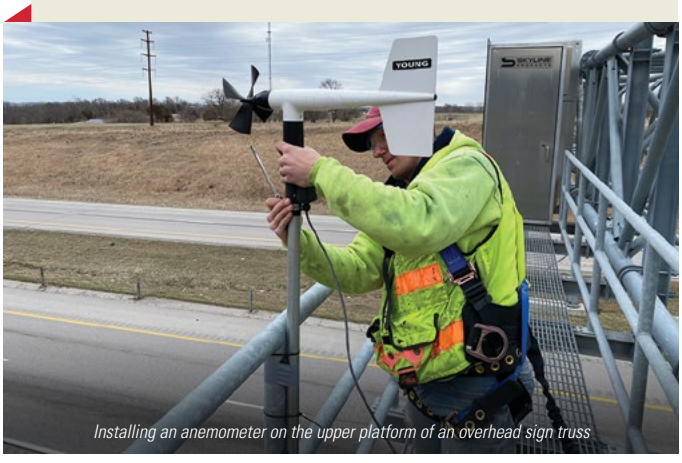
Director: Justin Dahlberg

The Bridge Engineering Center (BEC) is dedicated to advancing and preserving bridge infrastructure through the use of innovative construction methods, advanced materials, improved inspection techniques, and effective management strategies.

In 2024, the BEC worked on several exciting projects. Continuing its partnership with the Iowa DOT, the BEC recently completed a study evaluating the effects of increased legalized axle loads for certain agricultural vehicles on Iowa bridges. Ongoing projects involve laboratory and field testing to address critical topics such as bridge service life, increased service loads, and pile performance.

The BEC also maintained its collaboration with the Federal Highway Administration (FHWA) to encourage the adoption of orthotropic steel decks and facilitate peer exchanges on bridge load rating among state DOTs.

Beyond research, the BEC contributed to science, technology, engineering, and mathematics (STEM) education and outreach through the creation of STEM laboratories in two elementary schools and an annual bridge-building competition for elementary and middle school students.



Installing an anemometer on the upper platform of an overhead sign truss

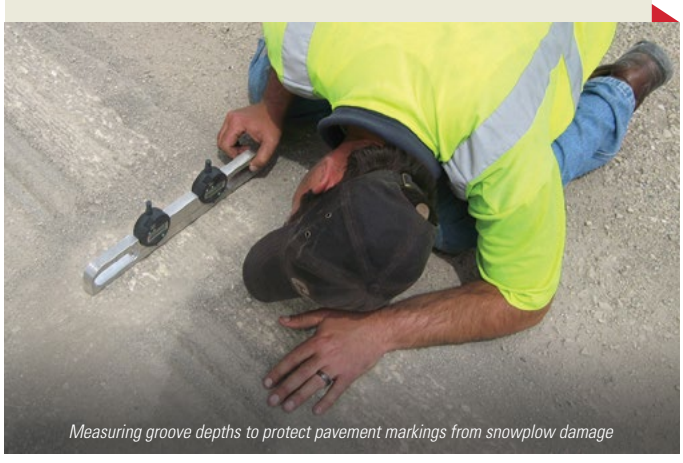
CENTER FOR TRANSPORTATION RESEARCH AND EDUCATION (CTRE)

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 innovative 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 2024, 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. CTRE staff continued to lead and participate in national committee activities and provide technology transfer and training through unique delivery methods.



Measuring groove depths to protect pavement markings from snowplow damage

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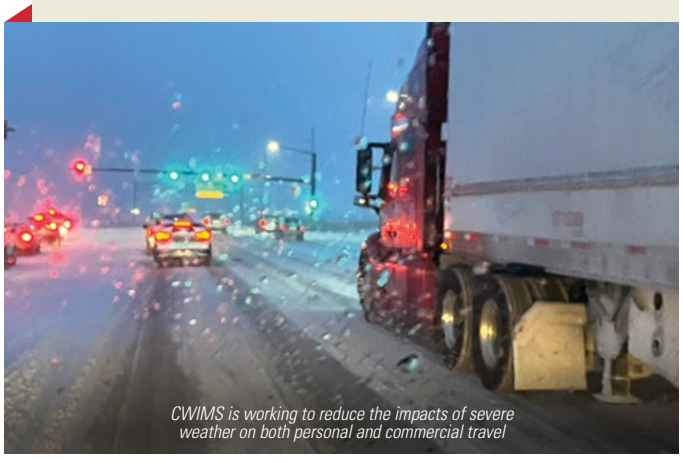
CENTER FOR WEATHER IMPACTS ON MOBILITY AND SAFETY (CWIMS)

Director: Zach Hans

The Center for Weather Impacts on Mobility and Safety (CWIMS) mitigates the effects of adverse weather on transportation by employing data-driven analytics and practical implementation strategies. It facilitates technology transfer between agencies, weather partners, and industry stakeholders, offering essential support to the Iowa DOT and the National Weather Service. Furthermore, CWIMS performs detailed analyses of weather-related freight rollovers within Iowa.

CWIMS also administers the FHWA Aurora Pooled Fund, dedicated to research on transportation safety and resilience. Through the sharing of best practices and the integration of new technologies, CWIMS supports the deployment of Road Weather Information Systems (RWIS). Leveraging interdisciplinary research and practical applications, CWIMS strives to enhance transportation safety and efficiency, ultimately improving weather readiness on a national scale.



CWIMS is working to reduce the impacts of severe weather on both personal and commercial travel

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 2024, 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 2024 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 the development of a scheduling specification.

The Iowa DOT reconstruction of I-235 shown here illustrates the complexity involved from traffic staging to utilities and right-of-way impacts

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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 2024, 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 5,500 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. In 2025, *Technology News* will also be distributed only electronically. Iowa LTAP's technical assistance, equipment loan, and road safety review programs also continued.

Attendees gathered for a work zone safety session at the 2024 Iowa Streets and Roads Workshop and Conference

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 2024, SUDAS staff completed updates to the erosion and sediment control design standards and specifications, updated the stormwater management practices according to the modified language in Iowa Codes 331 and 364, clarified how working days are to be charged, added language to provide for pipe cleaning, added language to allow elliptical dowel bars, updated specifications to allow the use of automated flagger assistance devices, and set a method to pay contractors for cold weather paving and protection when within the contract times.

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 three years after its inception, the PWSB has grown to nearly 700 members and counting. The project continues to be funded by the IHRB.

SUDAS staff pictured with the program's board of directors

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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.

Completed geosynthetic-reinforced-soil integrated bridge system

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 constructing and maintaining wood transportation structures.

In 2024, 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.

Completed demonstration timber bridge

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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 2024, CP Tech Center staff were active in helping agencies specify and contractors deliver quality concrete pavements. The center's primary products continued to be publications, webinars, in-person training events, and troubleshooting guidance.

Ongoing research included projects to understand the effects of superabsorbent polymers and vibration, create lower-carbon sustainable concrete mixtures, develop an implementation road map for calcined clay limestone cement mixtures, and construct long-lasting overlays with and without fibers.

2024 also saw the conclusion of one FHWA cooperative agreement and the initiation of a new five-year contract targeting innovative technologies for concrete pavements. An ongoing cooperative agreement with the Federal Aviation Administration (FAA) enabled the CP Tech Center to direct research toward critical knowledge gaps related to concrete airfield pavements.

CP Tech Center associate director Leif Wathne (left) participating in a smoothness-focused technical site visit in July

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 advanced or completed work on over 20 externally funded research projects in 2024. Projects included a quantification of superloads and their impacts on Iowa road infrastructure, a study on the effects of heavy rain events on Minnesota pavement foundations, an exploration of various recycled materials for pavement and gravel road geo-material stabilization, and an evaluation of small uncrewed aircraft systems (sUAS/drones) for transportation infrastructure applications.

Additionally, the PROSPER research group was awarded seven major research projects in 2024. These initiatives will enable the development of innovative technologies poised to transform transportation infrastructure engineering practices.

Dual-row modular superheavy load

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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 FHWA, the National Science Foundation (NSF), and industry.

In 2024, 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.

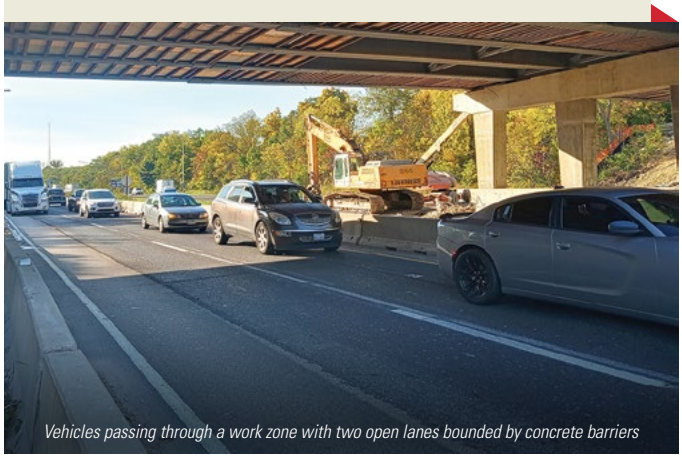
Smart arrow board at the beginning of a work zone in Iowa

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 but will expand in 2025 to include at least 11 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 2024, SWZDI distributed a request for proposals (RFP) and contracted for work on the subject of lighting and worker visibility. It also collected problem statements from researchers and released an RFP focused on continuing work related to work zone traffic control in alternative intersections and the mobility and safety impacts of work zone lane and shoulder widths. Multiple proposals were received that addressed these two subjects, and contracts will be created in 2025 to fund projects focused on them. Four SWZDI-funded research projects were completed in 2024, and work continues on four ongoing projects.



Vehicles passing through a work zone with two open lanes bounded by concrete barriers

MAJOR ACCOMPLISHMENTS

The work here at InTrans to adapt, change, and challenge transportation practice will help build a stronger, sturdier future driven by data and discovery. While these efforts are often ongoing and build on the findings of forebearers, it is essential to stop and admire our progress at the end of each year.

Among InTrans' accomplishments in 2024 was the completion of guides, publications, and tools that reflect new developments and aim to standardize processes. These projects often helped improve safety, develop strategies for more resilient roadways, and streamline maintenance of existing infrastructure.

In 2024, InTrans' achievements also included completing nearly 80 projects, organizing and holding 100+ events, and engaging with a community of students, colleagues, practitioners, and industry to further our mission.

Highlights from InTrans' centers and programs are as follows.

CP TECH CENTER'S FIVE-YEAR FHWA COOPERATIVE AGREEMENT CONCLUDES, BEGINS AGAIN

2024 was an especially busy year for the CP Tech Center, as its staff worked to complete the final deliverables for its five-year FHWA cooperative agreement, Advancing Concrete Pavement Technology Solutions, and at the same time put together another proposal to continue that work.

Both efforts resulted in success. The CP Tech Center staff learned that it was awarded another five-year contract with FHWA in the fall, and then it was back to work to turn in the remainder of the center's nearly 50 deliverables as the year came to a close.

The new $6.7 million cooperative agreement, Development and Deployment of Innovative Technologies for Concrete Pavements, is focused on the deployment and rapid adoption of innovative materials, design and construction procedures, specifications, practices, and methods to improve concrete pavement performance and extend pavement life. It brings together academics and practitioners from 9 universities and 13 consulting firms across the country.

Accomplishments continued on page 12

GUIDE SPOTLIGHT

National Concrete Pavement Technology Center

Sawing buffer cut 1 ft from transverse joint (Photo by Gerald Voigt, Square One Pavement Consulting LLC)

CP TECH CENTER RELEASES *CONCRETE OVERLAY REPAIR AND REPLACEMENT STRATEGIES* GUIDE

As concrete overlays have become a more widely adopted and cost-effective pavement management solution, a persistent question has been how to handle repair and replacement as these overlays wear or fatigue.

The December 2024 release of the CP Tech Center's *Concrete Overlay Repair and Replacement Strategies* guide addresses this question. The guide was published with funding from and as part of the FHWA cooperative agreement Advancing Concrete Pavement Technology Solutions.

The guide, authored by Gerald Voigt of Square One Pavement Consulting LLC, presents preservation and repair solutions tailored to concrete overlay distresses and discusses end-of-life strategies that will enable agencies to preserve their investment for the longest possible time.

"With this guide, a comprehensive set of repair procedures and end-of-life strategies is now available to ensure that concrete overlays continue to serve as a renewable and cost-effective pavement asset," Voigt said.

Included in the guide are comprehensive details on several concrete overlay repair and preservation methods, including pressure relief cuts, full-depth and partial-depth repairs, dowel bar retrofits, cross-stitching, and diamond grinding. Additionally, the guide discusses end-of-life strategies such as overlay replacement, partial and full inlays, and reconstruction. ▶

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"The fundamental intent is to integrate current innovations into best practices in the near future," said Leif Wathne, the project manager for the new cooperative agreement. "A key part of the work will be to evaluate proposed innovations to ensure that they are beneficial and effective and to ensure delivery of the right messages into the hands of the right people through impactful technology transfer efforts."

CTRE RESEARCHERS FIND NCHRP SUCCESS

CTRE researchers conducted work in 2024 on an impressive range of topics, including estimating funding for asset maintenance, managing risk at state agencies, improving traffic signal timing and performance, formulating strategies for excessive speeding, and developing transportation data management plans. And those are just the projects the center has underway that are funded by the NCHRP.

CTRE has seven active projects, all awarded in 2024, with the competitive NCHRP, which, per its 2024 annual report, is a "practical, applied research program that produces implementable products addressing day-to-day problems faced by transportation practitioners and managers." The seven projects represent a total of nearly $3.5 million.

"Our recent success with NCHRP is a testament to our center's reputation and the expertise of our researchers," said CTRE Director Omar Smadi, who is also PI on two of the seven active NCHRP projects. "Also, since DOT representatives across the nation serve on the research panels, it allows them to become more familiar with our researchers and our work, which could help win future projects."

The seven active projects, led by five CTRE researchers, are as follows (with PI in parentheses): Evaluation of the Traffic Signal Timing Manual, Third Edition (Day); Guide for Long-Term Automatic Traffic Signal Performance Measurement Systems Applications (Day); Integrated Strategies for Managing Excessive Travel Speed to Improve Safety Performance (Hallmark); Data Subsystems and Data Management Plans for Traffic Management Systems (Knickerbocker); Transportation Enterprise Data Warehouse Implementation Guide (Nlenanya); Funding Needs for Maintenance and Preservation of Transportation Assets (Smadi); and Integrating Performance Management, Risk Management, and Process Improvement: A Guide (Smadi).

Smadi added, "As project PIs, this gives us the opportunity to contribute at the national level and advance the state of the practice and art in these specific topics."

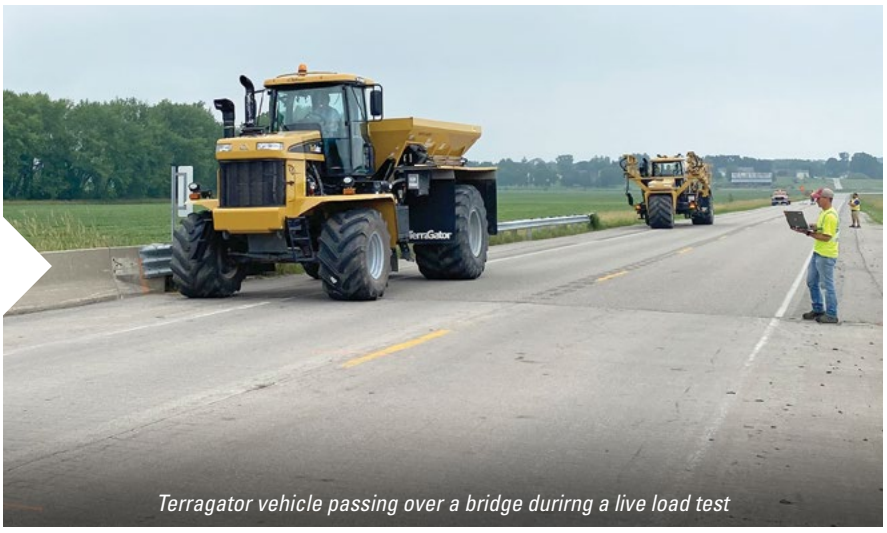
BEC, PROSPER PROJECTS TACKLE IMPACT OF INCREASED LEGAL LOADS

Recent legislation in Iowa has allowed various types of increased loads on Iowa's roads, and in response InTrans researchers have been studying the potential impacts of these changes.

In 2024, BEC and PROSPER each completed a major project in this vein. The BEC project assessed the impact of legally allowed 25-kip axle loads on bridges for certain types of agricultural equipment through field and analytical studies, while the PROSPER project developed methodologies to quantify "superloads," a term that encompasses a range of vehicles that are now allowed to exceed gross weights by up to 12%, and evaluate their impact on various pavement types.

The latter project, led by PROSPER Director Halil Ceylan, further developed a prototype Microsoft Excel-based automation tool, dubbed the Road Infrastructure-Superload Analysis Tool, or RISAT, to help local agencies evaluate the full scope of superloads' effects on paved roads.

Accomplishments continued on page 13



Terragator vehicle passing over a bridge durirng a live load test

Accomplishments continued from page 12

"The development of the RISAT provides a user-friendly platform for engineers and planners to evaluate the structural damage and associated treatment costs induced by superload traffic, enabling informed decision-making and efficient management of road infrastructure," Ceylan said.

The findings from the BEC project, meanwhile, will help bridge owners make informed decisions regarding the design, rating, and preservation of bridge structures.

"Increasing the axle load allowance to 25 kips for Terragator-type vehicles currently used in Iowa does not result in structural impacts greater than those already accounted for with existing design vehicles. However, if axle configurations or load distributions change in the future, it may be necessary to reevaluate axle loads for these vehicles," said BEC Director Justin Dahlberg, who led the BEC project.

REACTOR LAB RESEARCH HELPS SNOWPLOWS STAY ON THE ROAD

REACTOR Lab Co-Director Anuj Sharma is leading a research project funded by the Iowa DOT to develop, test, and prove the concept of a snowplow navigation system to aid operators in the worst winter conditions.

"From a direct request for support by the snowplow drivers, I am enhancing the machines to meet their needs, reduce their workload stress, and maximize the efficacy of each plow," said Sharma, who is also Pitt-Des Moines Inc. Professor in Civil Engineering.

The guiding principles of the project, started in 2021 and expected to conclude in 2025, are the economic efficiency and field readiness of the solution. Sharma and his research team are keeping that balance in mind as they work toward developing a fleet of smart snowplows by collecting data simultaneously with radar, lidar, road sensors, thermal imaging, and computer learning.

"The idea is that we use tools already unlocked and available but informed by data for this use-case and integrate them into the machines to do things like lane keeping assistance or imminent collision detection, increasing the safety of drivers and lowering hazard risks," said Sharma.

The navigation system won't change who is driving the snowplow. It's designed to help drivers maintain their position in a lane. Sharma said that a second phase of the project is designed to help drivers avoid collisions with snow-covered cars or debris in the roadway.

"Driving a snowplow is a very tough job," said InTrans Associate Director Neal Hawkins, who is co-PI on the project. "Agencies want to do anything they can to lower the stress levels for their operators. If they can't keep plowing, we're all in trouble." ▶

Planned snowplow navigation system will aid operators in the worst winter conditions and help maintain their position in a lane

COMMITTEE INVOLVEMENT AND SERVICE TO THE PROFESSION

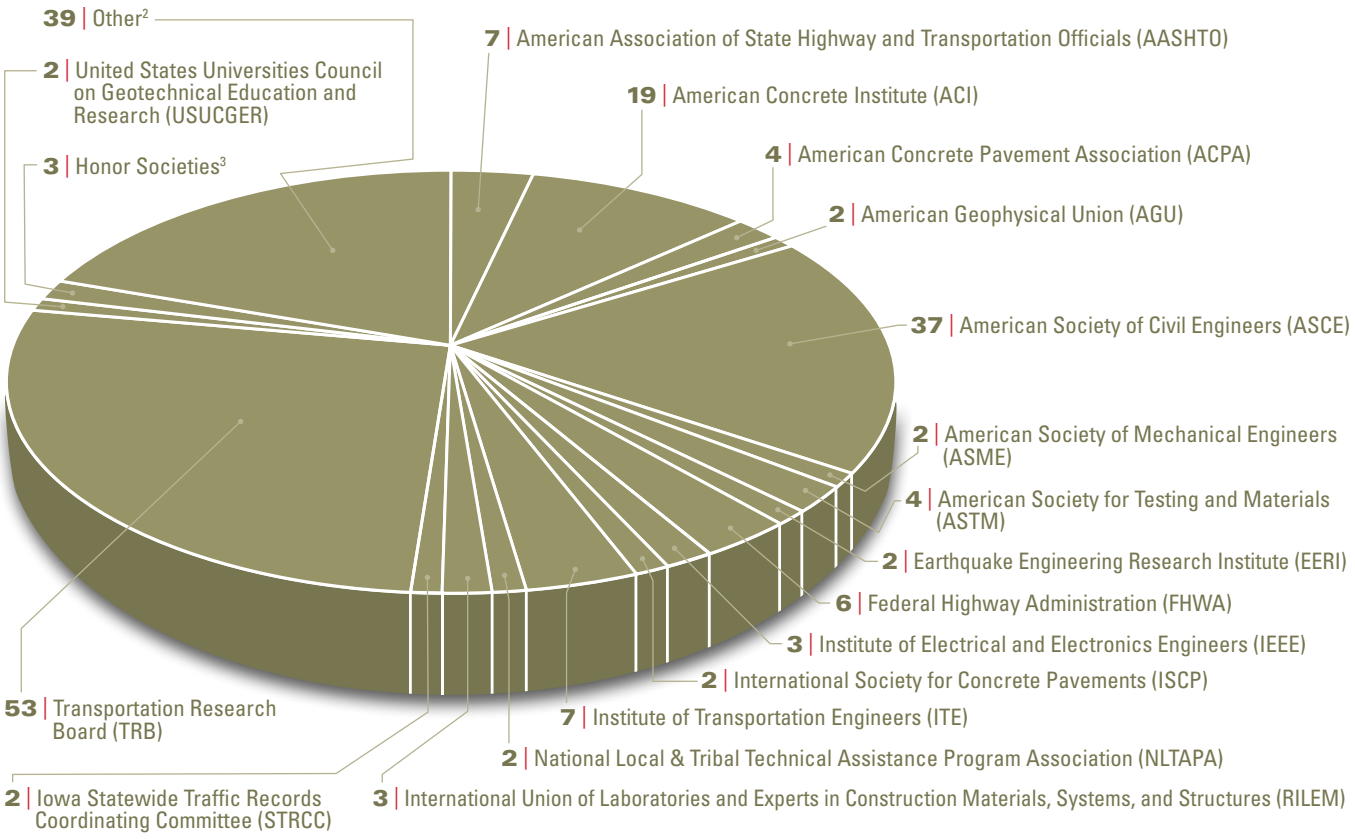
In 2024, InTrans staff served in nearly 60 different organizations related to their areas of expertise, including serving as members or friends or in leadership roles on 38 unique TRB committees and subcommittees, 22 unique ASCE committees and subcommittees, and 11 different ACI committees and subcommittees, 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 17 different journals and had various editor roles for 24 different journals in 2024. They also contributed a multitude of reviews for nearly 50 different journal publications and 3 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

199

[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 The Honor Society of Agricultural, Food, and Biological Engineering, Chi Epsilon, and Sigma Lambda Chi.

AWARDS AND HONORS

FACULTY AND STAFF AWARDS

Richards receives APWA distinguished service award and Iowa State's CYtation award

Iowa SUDAS and PWSB Program Specialist Beth Richards received recognition in 2024 for her hard work and years of dedication:

- In the fall, Richards earned the American Public Works Association (APWA) Stan Ring Distinguished Service Award, which recognizes APWA Iowa Chapter members who have demonstrated exemplary long-term service and commitment to the state chapter and to the public works profession. The Stan Ring Award is the highest honor bestowed by the Iowa Chapter, and Richards is the first female and youngest recipient.
- In the spring, Richards received the university's CYtation Award, which recognizes dedicated Professional and Scientific employees, particularly those who might not otherwise receive notice for their outstanding work. Richards was nominated by SUDAS Director David Carney in part because of her work to keep the SUDAS program running for much of the last year—in addition to building up the Iowa Public Works Service Bureau—after the resignation or retirement of colleagues in those programs.

PROSPER's Ceylan receives TRB and ASCE awards

PROSPER Director Halil Ceylan received two significant awards in 2024:

- In the fall, it was announced that Ceylan earned the Transportation Research Board's (TRB's) Roy W. Crum Award, which recognizes outstanding achievement in transportation research. Ceylan earned the award, presented at TRB's 2025 Annual Meeting, specifically for his "distinguished career in civil, transportation, and pavement engineering marked by exemplary leadership, numerous outstanding achievements, and significant contributions to the performance and production of fundamental and developmental transportation-related research."
- In the spring, Ceylan received the 2023 American Society of Civil Engineers (ASCE) Robert Horonjeff Award. The award, which recognizes outstanding achievements in and contributions to the advancement of the field of air transportation engineering, was presented to Ceylan at the ASCE International Conference on Transportation and Development held in June in Atlanta, Georgia.

BEC's Alipour recognized as outstanding advisor

BEC Structure and Infrastructure Engineer Alice Alipour received the Outstanding Student Organization Advisor of the Year Award from the Iowa State Engineering Student Council for her efforts advising the Earthquake Engineering Research Institute (EERI) Student Chapter. Alipour, who is also an associate professor and Thomas M. Murray Family Faculty Fellow of Civil, Construction, and Environmental Engineering (CCEE), supported events, advised students, and continued to advance the future of resilient infrastructure as part of her role as EERI Student Chapter advisor.

Laflamme receives ASME and Institute of Physics recognition

InTrans Faculty Affiliate Simon Laflamme received the following recognition in 2024:

- The Institute of Physics accepted Laflamme into its fellowship. Becoming a Fellow is the highest level of membership within the institute and is given to distinguished physicists in recognition of their accomplishments. Laflamme earned the membership grade in part because of work with the Air Force Office of Scientific Research and its Research Laboratory.
- The Institute of Physics also recognized Laflamme with a Centenary Award, which gave him the opportunity to publish an article in *Measurement Science and Technology* as part of its centennial celebration. A version of the journal has been published for 100 years as of 2023; Laflamme's article, published in 2024, was entitled "Perspectives on Structural Health Monitoring of Bridge Scour" and offers a look at the past, present, and future of structural health monitoring solutions.
- The ASME *Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems* recognized a paper co-authored by Laflamme for its Best Paper Award in 2024. The purpose of the award is to promote high-quality research contributions in mechanical engineering through the recognition of papers that appear in an ASME journal. The winning paper, entitled "Real-Time Nondestructive Evaluation of Additive Manufacturing Using a Laser Vibrometer and Shock Tube," was authored by Han Liu, Laflamme, Carter Morgan, Matthew Nelson, and Sarah A. Bentil, all students or staff at Iowa State.

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CMAT, AMPP researchers among those honored with university awards

Three InTrans researchers—CMAT Program Director Jennifer Shane, CMAT Construction Engineer Roy Sturgill, and AMPP Director Chris Williams—were among the 80 Iowa State faculty and staff who were recognized in fall 2024 for winning one of the university's annual awards.

- Shane was one of two people to receive the university's Award for Inclusive Excellence, which recognizes those who have advanced the university's mission of diversity, equity, and inclusion beyond their usual job responsibilities.
- Sturgill was one of two faculty to receive the university's Award for Early Achievement in Research, which recognizes faculty who have demonstrated outstanding accomplishments in research and/or creative activity unusually early in their professional careers.
- Williams was part of a team with Eric Cochran, a professor in the Department of Chemical and Biological Engineering, that received the university's Award for Achievement in Economic Development in Iowa. The award recognizes individuals or teams for outstanding university-based achievements in advancing the state of Iowa's economic development.

Two InTrans staff receive COE awards for research achievements

InTrans researchers were among the more than 40 Iowa State College of Engineering (COE) faculty and staff who were recognized at a ceremony in fall 2024 for earning one of the college's annual awards, named positions, or new patents. Two InTrans staff received awards for their research achievements: REACTOR Lab Co-Director Anuj Sharma and CMAT Construction Engineer Roy Sturgill.

- Sharma received the Mid-Career Achievement in Research Award. The award recognizes faculty members who have demonstrated outstanding accomplishments in research and/or creative activity at the mid-career stage, with 9 to 16 years of professional experience and a minimum of 3 years at Iowa State.
- Sturgill received the Early Achievement in Research Award. The award, like the university accolade, recognizes faculty who have had outstanding research accomplishments early in their careers, with less than 9 years of professional experience and a minimum of 2 years at Iowa State.

At the ceremony, InTrans Faculty Affiliate Jonathan Wood was also named a Building a World of Difference Faculty Fellow in Engineering.

InTrans researchers recognized with CCEE awards

Four InTrans staff members or faculty affiliates earned the following awards from the Iowa State CCEE department in 2024:

- InTrans Faculty Affiliate Jeramy Ashlock received the Charles W. Schafer Faculty Award for Excellence in Teaching, Research and Service. The award, given to two faculty members each year, promotes excellence in teaching, research, and service by junior faculty members.
- CMAT Construction Engineer Roy Sturgill received the department's other Charles W. Schafer Faculty Award for Excellence in Teaching, Research and Service in 2024.
- InTrans Faculty Affiliate Jonathan Wood received the Joseph C. & Elizabeth A. Anderlik Faculty Award for Excellence in Undergraduate Teaching. The award, given to two faculty members each year, promotes excellence in teaching by faculty members who teach at least one undergraduate course per year.
- InTrans Research Scientist Christopher Day received the Joel A. and Judy Cerwick Fellowship, which recognizes and promotes the excellence of CCEE faculty and acknowledges the role environmental engineering faculty played in alumnus Joel Cerwick's life.

STUDENT AWARDS

BEC graduate student and advisor Shafei earn FHWA Best Paper Award

BEC graduate student and research assistant Shadi Azad and her advisor BEC Structural Engineer Behrouz Shafei earned the top prize in the FHWA's Long-Term Infrastructure Performance (LTIP) Student Data Analysis Contest. The contest, aimed at students exploring a career in pavement or bridge engineering, encourages participants to use pavement or bridge performance data to study factors affecting pavement or bridge life cycles and then develop papers to document that research.

Azad's winning paper used bridge data from the FHWA InfoHighway web portal, as required, and was entitled "Data-Enabled Joint Condition Assessment of Bridges with Integral Abutments and Tied Approach Slabs."

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PROSPER graduate student among FHWA Student Writing Competition winners

Araz Hasheminezhad, a graduate student with PROSPER, was among the winners of the FHWA's second Student Writing Competition. The competition recognized four winning articles among submissions from high school, undergraduate, and graduate students across the United States studying STEM.

The winning articles were published in the Winter 2025 edition of *Public Roads* released in late December 2024 and debuted at the TRB Annual Meeting in January 2025. Hasheminezhad's article, "Beyond Recycling: Geosynthetics Pioneer Upcycling of Plastic Waste," received the silver award. The article focuses on the field implementation and performance of three full-scale test road sections in Buchanan County using a composite geosynthetic made from 100% upcycled—that is, "creatively repurpose[ed] waste to give it new life and value," per the article—polypropylene for unpaved road stabilization.

PROSPER graduate student earns ACI and IRMCA recognition

PROSPER graduate student Md. Lutfor Rahman received the Burg-Coleman Iowa State '77 Fellowship from the American Concrete Institute (ACI) Foundation for the 2024–2025 academic year. The fellowship provided Rahman with a stipend, travel expenses to two ACI conventions, and assistance finding a mentor. In all, the ACI Foundation awarded 29 fellowships for the 2024–2025 academic year, though Rahman was the sole recipient of the Burg-Coleman award.

Rahman, whose advisor is PROSPER Director Halil Ceylan, also received a scholarship from the Iowa Ready Mixed Concrete Association earlier in 2024.

InTrans students earn recognition at MOVITE Spring Conference

InTrans doctoral candidates Aparna Joshi and Dorcas Okaidjah both earned student awards at the Missouri Valley District of the Institute of Transportation Engineers (MOVITE) Spring Conference held in Omaha, Nebraska.

- Joshi, who is studying transportation engineering under advisor and REACTOR Lab Co-Director Anuj Sharma, received the Jan Kibbe Student Scholarship award. The scholarship is awarded to exceptional students who are pursuing transportation engineering and encourages their continuation in the profession upon graduation.
- Okaidjah, who is studying traffic operations and transportation planning under advisor and InTrans Research Scientist Chris Day, earned the first place Thomas J. Seburn Student Paper Award. Joshi also earned third place in the same category. The student paper award recognizes students for outstanding accomplishments in their efforts to conduct and report on independent and original research.

InTrans graduate students earn Research Excellence Award

Three InTrans graduate students earned the Research Excellence Award from the Iowa State Graduate College:

- CP Tech Center Research Engineer Dan King, who graduated with his doctorate in December 2024, received the award in the fall.
- Former PROSPER graduate student Yongsung Koh, who studied under advisor Halil Ceylan and graduated with his doctorate in 2024, received the award in the summer.
- Former InTrans graduate student, Minsoo Oh, who studied under advisor Jing Dong-O'Brien and graduated with his doctorate in 2024, received the award in the spring.

The award, given to multiple graduate students three times per year, recognizes graduate students for outstanding research accomplishments as documented in their theses and dissertations. The intent of the program is to recognize "the best of the best" graduating students who have submitted theses and dissertations. ▶

CP Tech Center receives AASHTO award

The CP Tech Center, under the direction of Peter Taylor, was awarded the Committee Award of Appreciation during the 2024 annual meeting of the American Association of State Highway and Transportation Officials (AASHTO) Committee on Materials and Pavements (COMP). The award recognized the CP Tech Center for its dedicated contributions to cement and concrete standards and technology over many years. Among other achievements, the CP Tech Center has contributed to the development and maintenance of AASHTO R 101, T 358, T 395, T 402, T 403, and T 413. ▶

INTRANS EVENTS BALANCE FAMILIAR AND NEW

InTrans staff organized and held 100+ live events in 2024 that were attended by nearly 4,000 people either in person or in the digital space.

These events aimed to meet people where they are, both literally—in that events were held across the state in communities of all sizes to reach as many people as possible—and figuratively—through a balance of familiar, recurring events and new offerings to meet changing needs and share novel ideas.

Nowhere was that mix more obvious than at the annual Iowa Streets and Roads Workshop and Conference. Though a regular event held by InTrans, 2024 saw the three-day event being held in Des Moines, the first time it was held outside of Ames.

Similarly, the Teaching in the Fast Lane event—where elementary school teachers participate in a weeklong professional development workshop focused on civil engineering—expanded to offer two weeklong courses in 2023 and then expanded again in 2024 to offer previous years' attendees the chance to further enhance their knowledge by focusing on sustainability in transportation.

Teaching in the Fast Lane participants testing their bridge creations

In addition to these familiar and new events, InTrans's commitment to meeting people where they are is best evidenced by the Iowa Concrete Lunch and Learn. This long-running event is held in five locations across the state three times a year and since 2020 has also offered a virtual option each season that is later posted to the CP Tech Center's Webinars and Videos page.

These events are just a few of the many offerings InTrans had in 2024 and hosts annually.

While the number of events and attendees in 2024 did not reach the highs InTrans achieved in the COVID era—when there was a necessary spike in virtual meetings followed by an increased mix of both in-person and virtual events to accommodate people's comfort levels and meet demands associated with turnover in the industry—the year still saw its share of staggering stats.

Iowa LTAP's events continued to average about 25% higher attendance than its pre-COVID levels. The program's Iowa Streets and Roads Workshop and Conference also saw a 25% increase in attendance at the workshop and a 7% increase at the conference.

The CP Tech Center's offerings continued to reach people at scheduled times, but many of its events are also available round-the-clock through its Webinars and Videos page. Its 119 videos had 2,226 views in 2024—a 27% increase from 2023—meaning people spent an additional 850+ hours at CP Tech Center events on their own time.

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

Teaching in the Fast Lane 2.0 attendees touring PowerFilm Solar Inc.

Participants gathered for the 2024 session of Transportation Institute Course for High School Teachers

INTRANS 2024 EVENT RECAP

IN-PERSON EVENTS

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

Iowa Better Concrete Conference (November 21, Ames, IA)

Ready, Set, Build! Bridge-Building Challenge (November 14 and 15, Des Moines, IA)

Municipal Streets Seminar (November 12, Ames, IA)

Traffic and Safety Forum (November 6, Ames, IA)

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

Fall Concrete Lunch and Learn Presentations: Key Aspects of Concrete Pavement Construction (several events held in October across Iowa)

NHI Bridge Inspection Refresher Training (October 29–31, Ames, IA)

Aurora Fall Board Meeting (October 22–24, Madison, WI)

Iowa Streets and Roads Workshop and Conference (September 10–12, Des Moines, IA)

Fall National Concrete Consortium (August 25–29, Minneapolis, MN)

Motor Grader Operator Workshops – Field Sessions (July 29–August 2, Johnston, IA)

Teaching in the Fast Lane 2.0: Engineering a Greener World Workshop for Elementary School Teachers (July 29–August 2, Ames, IA)

ICEA Mid-Year Conference (July 11, Ames, IA)

Teaching in the Fast Lane: Engineering Workshop for Elementary Teachers (July 8–12, Ames, IA)

Transportation Institute Course for High School Teachers (June 10–June 28, Ames, IA)

Iowa DOT Culvert & Bridge Backwater Program Workshops (several events held in May across Iowa)

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

Aurora Spring Board Meeting (May 21–23, Boulder, CO)

Iowa County Engineers Research Focus Group (May 1, Ames, IA)

Spring Concrete Lunch and Learn Presentations: Adapting to Changes in Concrete Materials and Mixtures (several events held in April and May across Iowa)

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

Accessible Sidewalks and Curb Ramps: Design to Installation (April 30, Ames, IA)

NHI Safety Inspection of In-Service Bridges (April 29–May 10, Ames, IA)

Spring National Concrete Consortium (April 9–11, Birmingham, AL)

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

Winter Concrete Lunch and Learn Presentations: Concrete Roundabout Design and Construction (several events held in February and March across Iowa)

Annual Iowa DOT Utility Meeting (February 29, Ames, IA)

NHI Bridge Inspection Refresher Training (February 20–22, Ames, IA)

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

2024 event recap continued on page 20

EVENT SPOTLIGHT

National Concrete Pavement Technology Center

Dan King presenting at a Concrete Lunch and Learn event

CONCRETE LUNCH AND LEARN

For nearly 20 years, the CP Tech Center, with support from the Iowa Concrete Paving Association and Iowa DOT, has been enhancing professional development for engineering and construction practitioners across Iowa through its Concrete Lunch and Learn series.

The events are held in a half-dozen locations across the state—briefly going virtual in 2020 and continuing to provide a virtual option since COVID-19 restrictions ended—every winter, spring, and fall. Each presentation covers a unique topic related to concrete pavements, and the subjects are chosen by surveying the interests of previous attendees and seeking input from industry experts.

In 2024, topics included Concrete Roundabout Design and Construction, Adapting to Changes in Concrete Materials and Mixtures, and Key Aspects of Concrete Pavement Construction.

Dan King, CP Tech Center research engineer, has been spearheading the events since he joined the center in 2021. The series averages about 180 in-person attendees per season, and the free events have provided training on over 50 topics to more than 6,000 total attendees since the series began in 2006.

"The Lunch and Learn series is a great way to connect with Iowa's public works community," said King. "Traveling across the state for these presentations gives us the opportunity to talk to practitioners about their cities' and counties' biggest needs and priorities, which helps us make sure that we're providing education and training on the most timely and relevant topics."

Slides from the events are available back to fall 2016, and recordings are available for events held since 2020, at https://cptechcenter.org/concrete-lunch-and-learn/. ▶

2024 event recap continued from page 19

VIRTUAL CP TECH CENTER EVENTS

A Fresh Look at Concrete Pavement for Local Agencies
Concrete Overlay Repair and Replacement Strategies
Key Aspects of Concrete Pavement Construction
Profile Measurement and Pavement Surface Research at ICART
e-Compaction Tools for Increasing Performance of Concrete Foundations
Quantification of Global Warming Impacts Using a Project-Level Construction Work Zone Framework
Estimating Opening Strength for Concrete Pavement Using Maturity
Dowels – Best Practices and Specifications
Jointing Roundabouts and Other Intersections
Adapting to Changes in Concrete Materials and Mixtures
Concrete Pumping and Air Testing
Reducing the Cradle-to-Gate Embodied Carbon Content of Paving Concrete – A New Guide
Concrete Roundabout Design and Construction

VIRTUAL IOWA LTAP EVENTS

Urban Cross Section Reconfiguration: 14 Commonly Asked Questions
Roadside Vegetation Programs 101: Manage Your Weeds, Brush, and Erosion
Best Practices for the Use of Speed Feedback Trailers in Work Zone Lane Closures
Designing Pedestrian Safety Countermeasures for Winter Maintenance
Road Safety 365
General Overview of Major Changes in the 11th Edition of the MUTCD
Basic Construction Inspection Series
Overview of Iowa DOT Access Management Manual
Post-Season Tear Down and Inspection of Snow Removal Equipment
Oversize/Overweight Permitting Workshop
Iowa Roadway Safety Assessment Process and Discussion

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

Iowa LTAP Local Technical Assistance Program

Attendees gathered for the keynote presentation at the 2024 Iowa Streets and Roads Workshop and Conference

IOWA STREETS AND ROADS WORKSHOP AND CONFERENCE

For nearly 15 years, the Iowa Streets and Roads Workshop and Conference—which allows city and county maintenance staff to come together, share ideas, and gain insights from presenters—had been held at the same location even as attendance grew. By 2023, the board that organizes the annual event knew that a new venue would be needed in the future.

In 2024, the Iowa Streets and Roads Workshop and Conference was held at the Holiday Inn Des Moines–Airport/Conference Center, the first time the event has been held outside of Ames. And the additional space saw attendance grow even further—a nearly 25% increase at the workshop and a nearly 7% increase at the conference.

In addition to the added space for attendees, vendors had more opportunities to showcase their wares.

"We really enjoyed the new location. The extra space allowed for interior display of equipment, which generated more conversations," read one vendor evaluation after the 2024 event.

The change was also hailed by workshop and conference attendees, with one noting, "New location is FANTASTIC!!"

Work is already underway to continue holding the event at the Des Moines location in 2025 and beyond. In addition to the chance to continue to grow the event over the years, the change of venue also offers more opportunities for tour sites.

"Everyone enjoyed the change to a new location, and with more space we can reach more participants to come and learn at our conference," said Sherrie LaFleur, LTAP's research and event administrator, who assisted with the event in 2024 and will organize it in 2025. ▶

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

Advancing Electrically Heated Pavements for Sustainable Winter Maintenance

Real-Time Smoothness: State of the Practice and Value Proposition

Maintenance of Traffic – Carbon Footprint: Quantification of Environmental Impacts from the Project-Level Construction Work Zone Framework

Autonomous Truck Corridors: Concept and Implementation Plan

Concrete Resistivity: Interim Observations Due to Potential Aggregate Impacts

Improving the Effectiveness of Zipper Merge Lane Control in Freeway Work Zones

Guidance for Incorporating Work Zone Data within Traffic Management Operations

Optimal RWIS Sensor Density and Location – Phase IV

Usefulness and Reliability of Probe Data when Altering Work Zone Message Signs

A Riverine Infrastructure Database (RIDB) for Rapid Assessment of Asset Vulnerability and Incorporating Resiliency into Agency Practices

Performance Evaluation of Very Early Strength Latex-Modified Concrete (LMC-VE) Overlay

Roadway Cross Section Reconfiguration: Responses to 14 Commonly Asked Questions

Impact of Legalized 25-kip Axle Loads for Self-Propelled Implements of Husbandry on Iowa Bridges

Usefulness and Reliability of Probe Data when Altering Work Zone Message Signs

JULY–SEPTEMBER

Assessing the Flood Reduction Benefits of On-Road Structures

Design of Drilled Shafts in Iowa – Validation and Design Recommendations

Use of Iowa Eggshell Waste as Bio-Cement Materials in Pavement and Gravel Road Geo-Material Stabilization

Development of Approaches to Quantify Superloads and Their Impacts on the Iowa Road Infrastructure System

Road Weather Management Using Connected Vehicle Technology

Assessment of Connected Vehicle Friction Measurement Data on DOT Winter Maintenance Use Cases

APRIL–JUNE

Integration of Connected Vehicle and RWIS Technologies

Robust Wireless Skin Sensor Networks for Long-Term Fatigue Crack Monitoring of Bridges (Phase I)

Mobility and Safety Impacts of Work Zone Lane and Shoulder Widths

Accelerated Construction of Highway Steel Overhead Sign Truss (SOST) through the Implementation of U-Bolt Connections

Accelerated Construction of Pile Foundations by Means of Elimination

Unticketing: An Upside-Down Approach to Speed Compliance

JANUARY–MARCH

Partially Grouted Revetment for Low-Volume Road Bridges

Interlaboratory Study to Establish Precision Statements for AASHTO T 358 and AASHTO T 402, Electrical Resistivity of Cylindrical Concrete Specimens

Improving the Effectiveness of Speed Feedback Trailers in Freeway Work Zones

Guidebook for Application of Polymer-Modified Asphalt Overlays: From Decision-Making to Implementation

A Comparison of Department of Transportation Progress Scheduling Specifications from Across the Nation

Roadway Ice/Snow Detection Using a Novel Infrared Thermography Technology

Evaluation of Spring Load Restriction Removal Protocols

Publications continued on page 22

Grout placement as part of a BEC project led by research engineer Brent Phares

Residential three-lane roadway documented during a roadway cross section reconfiguration research project led by Iowa LTAP director Keith Knapp

Publications continued from page 21

JOURNAL ARTICLES, GUIDES, PATENTS, AND OTHER TECHNICAL REPORTS

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GUIDE SPOTLIGHT

National Concrete Pavement Technology Center

VKelly Test being performed in-field

CP TECH CENTER DEVELOPS MANUAL PROVIDING COMMENTARY ON AASHTO SPECIFICATION

The CP Tech Center, as a leading expert in performance-engineered concrete mixtures, published a manual in June 2024 that supplements AASHTO R 101 by providing background information on and the rationale behind the approaches recommended in the specification.

The manual, *Commentary on AASHTO R 101, Developing Performance Engineered Concrete Pavement Mixtures*, was authored by Peter Taylor, CP Tech Center director, and Tom Van Dam, of Wiss, Janney, Elstner Associates, Inc. It was sponsored by the Ready Mixed Concrete Research & Education Foundation.

"This commentary is intended to provide agencies with tools to prepare a specification for concrete pavement mixtures that moves closer to measuring and basing acceptance on parameters that are critical to the long-term performance of the pavement system," reads the introduction to the manual.

AASHTO R 101, Standard Practices for Developing Performance Engineered Concrete Pavement Mixtures, was adopted in 2022. The specification formalizes many performance-related principles and addresses critical parameters such as strength, durability, and workability.

The specification was able to be developed in part thanks to new testing methods—some of which were created as part of a transportation pooled fund project the CP Tech Center led for five years—that are better able to assess the ability of a concrete mixture to resist the environment to which it is exposed. ▶

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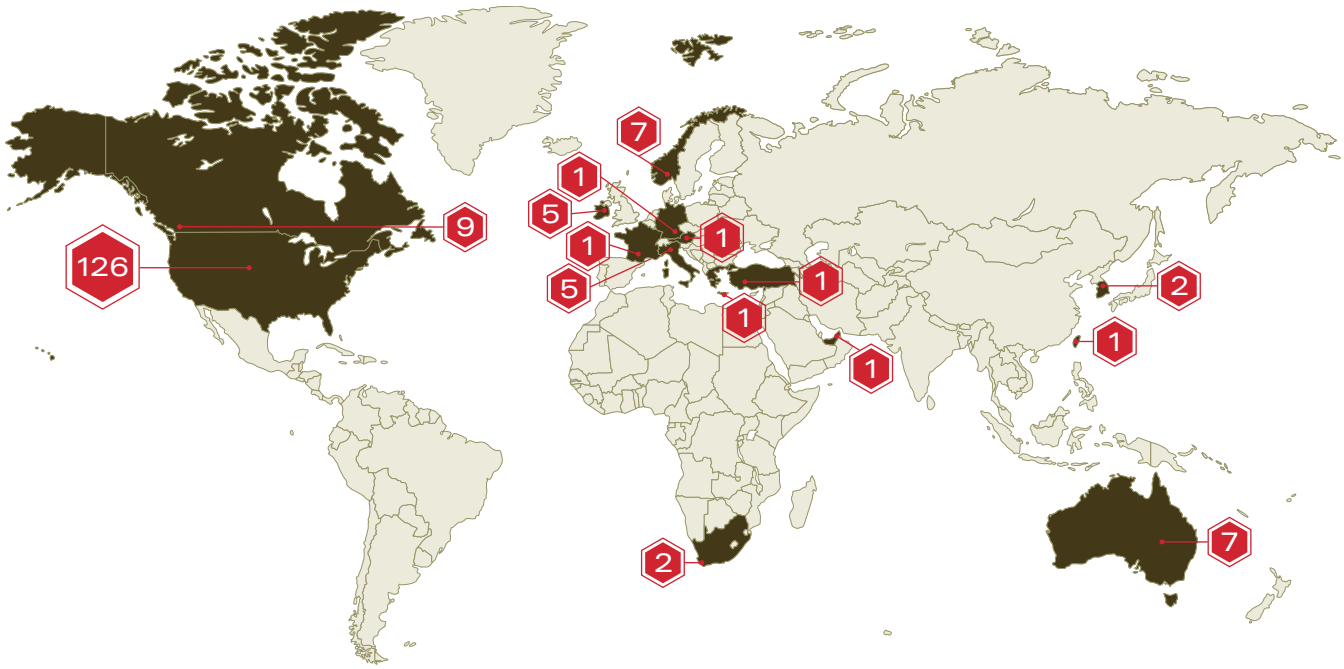
Speed feedback trailer + digital speed limit assembly deployed in a freeway lane closure during a field study for a SWZDI-sponsored project

PRESENTATIONS AND CONFERENCE PROCEEDINGS



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Arezoumand, S., A. Sassani, and O. Smadi. 2024. Quantifying Pavement Preservation Effectiveness for Enhanced Decision-Making. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Arshad, A., T. Z. Jubery, A. K. Singh, A. Singh, C. Hegde, B. Ganapathysubramanian, A. Balu, A. Krishnamurthy, and S. Sarkar. 2024. Assisted Few-Shot Learning for Vision-Language Models in Agricultural Stress Phenotype Identification. *Presented at the 38th Conference on Neural Information Processing Systems (NeurIPS) Adaptive Foundation Models: Evolving AI for Personalized and Efficient Learning Workshop*, December 14, Vancouver, BC.

Arya, M. S., M. Reyes, S. Arabi, A. Sharma, and C. Hamann. 2024. Unsupervised Learning-Based Analysis of Driver Following Behavior in Agricultural Traffic. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Ashlock, J. C. 2024. Gyratory Abrasion with Image Analysis (GAIA) Test Method for Granular Materials. *Presented at the Iowa State Association of Counties (ISAC) Spring Conference*, March 14–15, Des Moines, IA.

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Aydin, C., M. Hatipoglu, B. Cetin, and H. Ceylan. 2024. Effect of Moving Vehicle Load on Stiffness Characteristics of Unbound Granular Materials. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

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Cao, L., S. Al-Subaihawi, J. Ricles, T. Marullo, C. Kolay, A. Downey, and S. Laflamme. 2024. 3D Real-Time Hybrid Simulation (RTHS) of Two-Story Building Equipped with Novel Base Isolation System. *Presented at the 18th World Conference on Earthquake Engineering (WCEE)*, June 30–July 5, Milan, Italy.

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Ceylan, H. 2024. Otta Seal Surfacing for Low-Volume Roads Update. *Presented at the Iowa State Association of Counties (ISAC) Spring Conference*, March 14–15, Des Moines, IA.

Ceylan, H. 2024. Assessing Otta Seal Performance and Establishing Implementation Guidelines: Insights from Recent Research Studies in Iowa. *Presented at the Aggregate Convention and Agg1 Academy*, March 25, Nashville, TN.

Ceylan, H. 2024. Artificial Intelligence Applications in Geotechnical Engineering. *Presented at the American Society of Civil Engineers Geotechnical Conference*, April 2, Ames, IA.

Ceylan, H. 2024. Rock Road Construction and Performance: Academic Perspective. *Presented at the National Association of County Engineers Conference*, April 15–18, Palm Springs, FL.

Ceylan, H. 2024. Development of Iowa Granular Road Structural Design Tool. *Presented at the National Association of County Engineers Conference*, April 15–18, Palm Springs, FL.

Ceylan, H. 2024. Innovations and Insights in Iowa's Granular Road Design Tool for Enhancing Gravel Roads Maintenance & Management. *Presented at the Wyoming Local Technical Assistance Program Conference*, May 8, Laramie, WY.

Ceylan, H. 2024. FAA PEGASAS COE Project No. 37: Comprehensive Analysis and Technical Standards on the Use of a Small Unmanned Aircraft System (sUAS) for Pavement Inspection. *Presented at the Federal Aviation Association (FAA) Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Center of Excellence (COE) 12th Annual Meeting*, June 11–12, Atlantic City, NJ.

Ceylan, H. 2024. Ensuring Resilient Pavements in the Face of Increasing Heavy Rains. *Presented at the Resilient Roads Roundtable (Virtual)*, August 15.

Ceylan, H. 2024. Iowa's Gravel Road Assessment and Asset Management Tool for Quantifying Superloads Impacts. *Presented at Good Roads – Navigating Low-Volume Roads Workshop*, October 9, Barrie, ON.

Ceylan, H. 2024. AI in Transportation Geotechnics: Unlocking Complex Solutions for a New Era. *Presented at the 2nd International Symposium on Innovations in Civil Engineering and Technologies*, October 30–November 1, Isparta, Turkey.

Ceylan, H. 2024. Quantifying and Integrating Superload Impacts to Advance Pavement Assessment and Asset Management. *Presented to the New South Wales Government*, November 18, New South Wales, Australia.

Ceylan, H., E. Sengun, and S. Kim. 2024. Advancing Roller-Compacted Concrete Pavements for Heavy-Load Container Terminals: A Study on Optimizing Structural Design under Increased Stacking Pressures. *Presented at the 3rd International Conference on Architectural, Civil, and Environmental (ACE) Forensic Engineering (Virtual)*, January 25.

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Ceylan, H., S. Kim, B. Gulmezoglu, Y. Mo, B. Ajmera, I. H. Cho, W. Zhang, R. Mitra, A. Sourav, and D. Peshkin. 2024. Evaluation of Machine Learning (ML) and Deep Learning (DL) Capabilities for Small Uncrewed Aircraft Systems (sUAS) Data Analysis to Enhance the Efficiency of Airport Pavement Inspections. *Presented at the Federal Aviation Association (FAA) Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Center of Excellence (COE) 12th Annual Meeting*, June 11–12, Atlantic City, NJ.

Chattopadhyay, S., H.-J. Yang, I. Shihab, C. Day, D. Hurwitz, S. Sarkar, and A. Sharma. 2024. Exploring Current Capabilities of Large Language Models for Use as Signal Timing Virtual Assistants. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Daneshvar, D., P. Preinstorfer, K. Deix, B. Shafei, and A. Robisson. 2024. Characterization of Time-Dependent Restrained Shrinkage in Thin Ultra-high Performance Concrete Overlays. *Presented at the American Society of Civil Engineers Engineering Mechanics Institute (EMI) Annual International Conference*, September 11–13, Vienna, Austria.

Day, C. 2024. Exploring Current Capabilities of Large Language Models for Use as Signal Timing Virtual Assistants. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Day, C. 2024. Impact of Dynamic Message Sign Textual Content on Changes in Vehicle Speed: Observations with Connected Vehicle Data. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Day, C. 2024. Improved Right-Turn-on-Red Volume Estimation Models for Analysis of Signalized Intersection. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Day, C. 2024. Integration of Real-Time Vehicle Trajectories into Actuated Traffic Signals to Improve Local Intersection and Arterial Control. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Day, C. 2024. New Traffic Signal Actuation Concepts Using Enhanced Detector Information. *Presented at the Signal Timing Subcommittee Meeting at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Day, C. 2024. AI in Transportation Education. *Presented at the Institute of Transportation Engineers Webinar (Virtual)*, March 7.

Dokhaei, B., B. Shafei, and A. Alipour. 2024. Data-Enabled Performance Improvement of Buildings Located in High Wind Hazard Regions. *Presented at the Department of Civil, Construction and Environmental Engineering (CCEE) Graduate Research Poster Showcase*, April 18, Ames, IA.

Dokhaei, B., B. Shafei, and A. Alipour. 2024. Design Optimization to Minimize Materials Usage in Steel Buildings Subjected to Lateral Loads. *Proceedings of the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Dong, Y., and J. S. Wood. 2024. Evaluation of Lane-Keeping Systems and Automatic Emergency Braking Systems. *Presented at Session 2124 of the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Dralle, E., and A. Alipour. 2024. Performance Assessment of Transmission Towers after the 2020 Iowa Derecho. *Presented at the Final Honors Program Poster Presentation*, April 10, Iowa State University, Ames, IA.

Dumka, A., R. Kandiboina, V. Mouli, S. Knickerbocker, N. Hawkins, and A. Sharma. 2024. Work Zone Identification Using Connected Vehicle Data: Leveraging Shallow Learning Model. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Emtenan, A. M. T., C. Day, A. Sharma, J. Shaw, P. Hawley, M. Shields, and A. Haghighat. 2024. Improved Right-Turn-on-Red Volume Estimation Models for Analysis of Signalized Intersection Capacity. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Hallmark, S. 2024. Rural Speed Management. *Presented at the Iowa County Engineers Research Focus Group*, May 1, Ames, IA.

Hallmark, S. 2024. Gravel Road Safety Improvements Research Project Update. *Presented at the Iowa County Engineers Association Conference*, December 4–6, Des Moines, IA.

Hallmark, S. 2024. Speed Management Strategies for Small Towns and High to Low Speed Transition Zones. *Presented at the Iowa County Engineers Association Conference*, December 4–6, Des Moines, IA.

Hallmark, S., and J. S. Wood. 2024. A Method for Short-Term Network Screening. *Presented at Poster Session 1.1 Transport Safety of the Transportation Research Arena*, April 15, Dublin, Ireland.

Hallmark, S., and J. Wood. 2024. Synthesis of the Effectiveness of Low-Cost Countermeasures for Rural Curves. *Presented at the Transportation Research Board 2nd International Conference on Roadside Safety*, June 23–26, Orlando, FL.

Hallmark, S., and J. Wood. 2024. Synthesis of the Effectiveness of Low-Cost Countermeasures for Rural Curves. *Proceedings of the International Roadside Safety Conference*, June 23–26, Orlando, FL.

Hallmark, S., J. Wood, G. Basulto-Elias, Z. Hans, T. Litteral, and N. Oneyear. 2024. Data Driven Approach to Assessing Effectiveness of HVE. *Presented to the Association of Transportation Safety Information Professionals Traffic Records Forum*, August 11–14, San Diego, CA.

Hallmark, S., J. Wood, G. Basulto-Elias, Z. Hans, T. Litteral, and N. Oneyear. 2024. BTSCRP Project BTS-17: Frameworks for Assessing Effectiveness of HVE. *Presented at the American Association of State Highway Transportation Officials Safety Summit*, October 15–17, Houston, TX.

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Hallmark, S., N. Oneyear, D. Veneziano, H. Naraghi, and V. Lund. 2024. Evaluation of Different Transverse Rumble Strip Patterns at Rural Stop-Controlled Intersections in Minnesota. *Presented at the Transportation Research Board 2nd International Conference on Roadside Safety*, June 23–26, Orlando, FL.

Hallmark, S., N. Oneyear, G. Basulto-Elias, and O. Smadi. 2024. Evaluation of Work Zone Speed Profiles Using the SHRP2 NDS. *Presented at the Transportation Research Board 2nd International Conference on Roadside Safety*, June 23–26, Orlando, FL.

Hallmark, S., N. Oneyear, G. Basulto-Elias, and O. Smadi. 2024. Stop Behavior at Rural All-Way Stop—Controlled Intersections with the SHRP2 Naturalistic Driving Study. *Presented at the International Road Federation (IRF) Global R2T Conference & Exhibition*, December 10–13, Orlando, FL.

Hallmark, S., and O. Smadi. 2024. Summarizing Agency Implementation of Infrastructure Assets and Maintenance Practices to Accommodate CAV. *Presented at the International Road Federation (IRF) Global R2T Conference & Exhibition*, December 10–13, Orlando, FL.

Hallmark, S., V. Lund, H. Naraghi, N. Oneyear and D. Veneziano. 2024. Assessment of Transverse Rumble Strip Patterns at Rural Stop-Controlled Intersections in Minnesota. *Presented at the Center for Transportation Studies Research Conference*, November 7, Minneapolis, MN.

Hassan, Z., S. Bernard, S. Raza, D. Kammer, B. Shafei, M. Mahoutian, and M. Shahverdi. 2024. Feasibility Assessment of 3D Printability of Portland Cement-Steel Slag Blended Mortars. *Presented at the 4th RILEM International Conference on Concrete and Digital Fabrication*, September 4–6, Munich, Germany.

Hassan, Z., S. Bernard, S. Raza, D. Kammer, B. Shafei, M. Mahoutian, and M. Shahverdi. 2024. Innovations to Improve the 3D Concrete Printing of Portland Cement-Steel Slag Blended Mortars. *Presented at the 7th International Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures*, September 4–6, Salerno, Italy.

Hinshaw, M., A. Larsen, I. Hamilton, S. Himes, Z. Hans, and C. Kwilinski. Current Methods for Risk-Based Safety Planning. *Presented at the 2nd International Conference and Peer Exchange on Roadside Safety*, June 23, Orlando, FL.

Jiang, Z., N. Saadati, A. Balu, M. Pham, J. R. Waite, N. Saleem, C. Hegde, and S. Sarkar. 2024. A Unified Convergence Theory for Large Language Model Efficient Fine-Tuning. *Presented at the 38th Conference on Neural Information Processing Systems (NeurIPS) International OPT Workshop on Optimization for Machine Learning*, December 15, Vancouver, BC.

Jibon, M., A. Sourav, M. Mahedi, S. Kim, H. Ceylan, and R. Velasquez. 2024. Heavy Rainfall and Moisture Susceptibility of Pavement Foundation: A Case Study Coupling Finite Element Method and MnROAD Moisture Monitoring Data. *Presented at the Transportation Research Board Annual Meeting*, January 7–11, Washington, DC.

Jibon, M., A. Sourav, S. Kim, and H. Ceylan. 2024. Assessment of Flexible Pavement Foundation's Vulnerability Due to Heavy Rainfall in Minnesota. *Proceedings of the 5th International Conference on Transportation Geotechnics (ICTG)*, November 20–22, Sydney, Australia.

Jignasu, A., A. Balu, S. Sarkar, C. Hegde, B. Ganapathysubramanian, and A. Krishnamurthy. 2024. SDFConnect: Neural Implicit Surface Reconstruction of a Sparse Point Cloud with Topological Constraints. *Proceedings of the Institute of Electrical and Electronics Engineers (IEEE)/Computer Vision and Pattern Recognition (CVF) Conference on Computer Vision and Pattern Recognition Workshops*, pp. 5271–5279, June 17–18, Seattle, WA.

Kaluarachchi, M., M. Rojas Ibarra, and J. S. Wood. 2024. Investigating Socioeconomic Correlates of Transportation Safety. *Presented at the Poster Session of the 2nd Conference on Advancing Transportation Equity*, July 19, Baltimore, MD.

Kim, H., J. C. Ashlock, and R. A. Failmezger. 2024. Development and Preliminary Field Testing of Cyclic Borehole Shear Test Device. *Presented at the American Society of Civil Engineers Geo-Congress*, February 25–28, Vancouver, BC.

Kim, S., and H. Ceylan. 2024. A Decade of Advancements: Electrically Conductive Concrete Heated Pavement Systems for Sustainable and Resilient Winter Infrastructure. *Presented at the 4th International Civil Engineering and Architecture Conference*, March 15, Seoul, South Korea.

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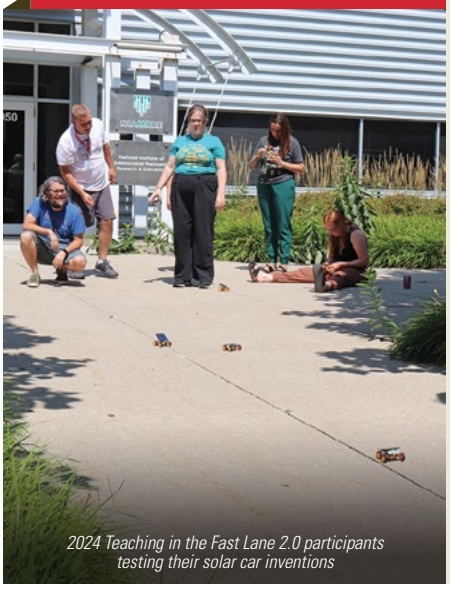
EVENT SPOTLIGHT

INSTITUTE FOR TRANSPORTATION



2024 Teaching in the Fast Lane 2.0 participants testing their solar car inventions

TEACHING IN THE FAST LANE 2.0: ENGINEERING A GREENER WORLD WORKSHOP FOR ELEMENTARY SCHOOL TEACHERS

As part of its outreach efforts, InTrans, with the support of the Iowa DOT, offers elementary school teachers the opportunity to participate in a one-week professional development workshop to learn about transportation and civil engineering and bring those concepts into their classrooms.

After more than a decade of hosting Teaching in the Fast Lane—and growing the program to two weeklong sessions in 2023—InTrans again expanded the program in 2024 to provide past attendees the opportunity to further enhance their knowledge, with a focus on the nature of engineering, energy, and sustainable practices, particularly related to transportation and infrastructure.

"With the adoption of the Next Generation Science Standards in Iowa, there is a huge demand for bringing engineering to the elementary classroom, and proper professional development for teachers is imperative," said CMAT Director Jennifer Shane, who spearheads the program.

Teaching in the Fast Lane 2.0, as with the original 1.0 version, is led by science/math specialists Lynne Bleeker and Debbie Haywood. In 2024, the 2.0 course included expert speakers, field trips to the BioCentury Research Farm and PowerFilm Solar Inc., and hands-on activities to build solar cars and solar cookers.

"These STEM-based activities address real-world issues that will help ensure that the next generation of students is scientifically literate and equipped to fill the needs of the 21st century workforce," said Shane. ▶

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Kim, S., and H. Ceylan. 2024. Advancing Sustainable and Resilient Pavement Systems: Breakthroughs in Research and Technological Innovation. *Presented at Gangneung-Wonju National University*, March 19, Gangneung, South Korea.

King, D. 2024. Adapting to Changes in Concrete Mixtures and Materials. *Presented at the Spring 2024 Iowa Concrete Lunch and Learn Series* (various locations).

King, D. 2024. Concrete Overlays: Basics of Design and Construction, Wisconsin Projects, and Lessons Learned. *Presented at the Wisconsin Annual Concrete Paving Conference*, February 15, Middleton, WI.

King, D. 2024. Cradle-to-Grave Pavement Life-Cycle Assessment. *Presented at the Minnesota Municipal Streets Seminar,* February 20, Mankato, MN.

King, D. 2024. Concrete Pavements: Flood Resilience and Carbon Reduction. *Presented at the Nebraska Concrete & Aggregates Association Annual Convention*, February 22, Kearney, NE.

King, D. 2024. Concrete Overlays for Local Roads and Streets. *Presented at Florida Gulf Coast University Concrete Exposure Day*, April 2, Fort Myers, FL.

King, D. 2024. Performance-Engineered Concrete Mix Design, Specifications, and Testing. *Presented at Florida Gulf Coast University Concrete Exposure Day*, April 2, Fort Myers, FL.

King, D. 2024. Concrete Mixtures for Long-Term Durability. *Presented at the 2024 Municipal Streets Seminar,* November 12, Ames, IA.

King, D. 2024. Key Aspects of Concrete Pavement Construction. *Presented at the Fall 2024 Iowa Concrete Lunch and Learn Series* (various locations).

King, D., and P. Taylor. 2024. Change is Coming! *Presented at the Spring 2024 Meeting of the National Concrete Consortium*, April 9, Birmingham, AL.

King, D., and P. Taylor. 2024. Benefits of Internal Curing for Concrete Pavement Overlays. *Presented at the Fall 2024 American Concrete Institute Convention*, November 4, Philadelphia, PA.

King, D., and P. Taylor. 2024. Technical, Environmental, and Economic Considerations of Low-Carbon Concrete Pavements. *Presented at the Fall 2024 American Concrete Institute Convention*, November 4, Philadelphia, PA.

King, D., and P. Taylor. 2024. Survival Analysis for Concrete Pavement Service Life Assessment. *Proceedings of the 7th International Conference on Concrete Repair, Rehabilitation, and Retrofitting*, November 4–6, Cape Town, South Africa.

King, D., E. Ferrebee, and P. Taylor. 2024. Life-Cycle Assessment of Concrete Overlay Strategies. *Proceedings of the 13th International Conference on Concrete Pavements*, August 25–29, Minneapolis, MN.

Knickerbocker, S. 2024. Data Integration and Connectivity for Work Zone Management. *Presented at the National Operations Center of Excellence Webinar on Work Zone Management (Virtual)*, March 13.

Knickerbocker, S. 2024. Emerging Data and Applications for Work Zone Safety. *Presented at the Work Zone Management Conference (Virtual)*, November 14.

Koh, Y., H. Ceylan, S. Kim, and I. H. Cho. 2024. Construction of Remote Data Acquisition System for Jointed Plain Concrete Pavement and Performance Monitoring. *Presented at the Transportation Research Board Annual Meeting*, January 7–11, Washington, DC.

Koh, Y., H. Ceylan, S. Kim, and I. H. Cho. 2024. Development of Artificial Intelligence-Based Rutting Damage Prediction Models for Granular Roads Under Superload Traffic. *Proceedings of the 5th International Conference on Transportation Geotechnics (ICTG)*, November 20–22, Sydney, Australia.

Koh, Y., N. Citir, H. Ceylan, S. Kim, and I. H. Cho. 2024. Development of a Prototype Tool to Evaluate the Impact of Superloads on Road Infrastructure. *Presented at the 3rd International Data Science for Pavement Symposium*, March 11–14, McLean, VA.

Laflamme, S., and H. Liu. 2024. Sensing Skin Technology for Structural Health Monitoring: From Proof-of-Concept to Field Validation. *Proceedings of SPIE Smart Structures and Nondestructive Evaluation*, Vol. 12949, pp. 244–251.

Larsen, A., S. Abley, L. Mohr, Z. Hans, and K. Vachal. Risk-Based Safety Planning for Tribes. *Presented to the National Center for Rural Road Safety (Virtual)*, November 13.

Le, N., D. Tran, R. Sturgill, and C. Harper. 2024. Exploring Remote Sensing and Monitoring Technology for Highway Infrastructure Inspection. *Presented at the Construction Research Congress*, March 20–23, Des Moines, IA.

Le, N., D. Tran, R. Sturgill, and C. Harper. 2024. Use of Nondestructive Testing Technologies for Highway Infrastructure Inspection. *Presented at the Construction Research Congress*, March 20–23, Des Moines, IA.

Litteral, T. 2024. Presentation on TIM Training. *Presented to the Statewide Traffic incident Management (TIM) Committee*, April 16.

Litteral, T. 2024. Presentation on MDST Program and TIM Training. *Presented at the Homeland Security Conference*, September 24, Miami, FL.

Liu, H., S. Laflamme, A. D'Alessandro, and F. Ubertini. 2024. Functionalized 3D-Printed Cementitious Materials Using Carbon Microfibers for Strain Sensing. *Presented at the 18th World Conference on Earthquake Engineering (WCEE)*, June 30–July 5, Milan, Italy.

Mazaheri, P., and A. Alipour. 2024. Multi-dimensional Reliability Assessment and Resilience-Based Analysis of Electric Power Networks. *Presented at the Department of Civil, Construction and Environmental Engineering (CCEE) Graduate Research Poster Showcase*, April 18, Ames, IA.

Mazaheri, P., and A. Alipour. 2024. Risk Assessment for Transmission Line Systems during Extreme Wind Events. *Presented at the 61st Electric Power Research Center Annual Meeting Poster Presentation*, May 14–16, Ames, IA.

Mazaheri, P., and A. Alipour. 2024. Risk Assessment of Transmission Line Systems under Severe Weather Conditions. *Presented at the American Society of Civil Engineers Engineering Mechanics Institute (EMI) Annual Conference*, May 28–31, Chicago, IL.

Mesbahi, P., M. Breccolotti, E. Garcia-Macias, S. Laflamme, and F. Ubertini. 2024. Seismic Damage Detection in Bridge Networks Using OpenSees Nonlinear Analysis and Machine Learning. *Presented at the 18th World Conference on Earthquake Engineering (WCEE)*, June 30–July 5, Milan, Italy.

Mitra, R., A. Sourav, H. Ceylan, B. Gulmezoglu, S. Kim, C. Brooks, and D. Peshkin. 2024. Guideline and Specification Development for sUASs-based Airfield Pavement Inspection. *Presented at the Federal Aviation Association (FAA) Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Center of Excellence (COE) 12th Annual Meeting*, June 11–12, Atlantic City, NJ.

Montes Victorio, S., and R. Sturgill. 2024. Review of Effective Practices for Managing Utility Coordination Stakeholders in Highway Projects. *Presented at the Construction Research Congress*, March 20–23, Des Moines, IA.

Mumtarin, M., and J. S. Wood. 2024. Short-Term Network Screening and Crash Hotspot Detection. *Presented at Session 2124 of the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Mumtarin, M., and J. S. Wood. 2024. A Method for Short-Term Network Screening. *Presented at Poster Session 1.1 Transport Safety of the Transportation Research Arena*, April 15, Dublin, Ireland.

Mumtarin, M., and J. S. Wood. 2024. A Method for Short-Term Network Screening. *Proceedings of the Transportation Research Arena*, April 15–18, Dublin, Ireland.

Mumtarin, M., and J. S. Wood. 2024. A Method for Short-Term Network Screening. *Presented at the Poster Session of the American Association of State Highway and Transportation Officials Safety Summit*, October 15, Houston, TX.

Mumtarin, M., Y. Dong, S. Bhagat, and J. S. Wood. 2024. At Fault or At Bias: Evaluation of Equity toward Motorcyclists on Accident Accountability. *Presented at Session 2159 of the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Nelson, T., C. Poleacovschi, K. Ikuma, I. García, C. F. Weems, and C. R. Rehmann. 2024. Actual versus Perceived Tap Water Quality in Vulnerable Puerto Rican Communities. *Presented at the Construction Institute (CI) & Construction Research Congress (CRC) Joint Conference*, March 20–23, Des Moines, IA.

Nirala, A., A. Joshi, S. Sarkar, and C. Hegde. 2024. Fast Certification of Vision-Language Models Using Incremental Randomized Smoothing. *Proceedings of the Institute of Electrical and Electronics Engineers (IEEE) Conference on Secure and Trustworthy Machine Learning (SaTML)*, pp. 252–271. April 9–11, Toronto, ON.

Odeh, I., and B. Shafei. 2024. An Unmanned Aerial Vehicle-Based Digital Twin Framework for Inspection and Assessment of Bridge Structures. *Presented at the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Ogunniyi, E. A., H. Liu, J. White, A. R. Downey, S. Laflamme, J. Li, and P. Ziehl. 2024. Performance Evaluation of Flexible Capacitive Sensors on Nonuniform Surfaces. *Proceedings of SPIE Smart Structures and Nondestructive Evaluation*, Vol. 12949, pp. 267–274.

Oh, M., J. Dong-O'Brien. 2024. Using Connected Vehicle Data to Assess the Impact of Winter Road Maintenance Operations on Traffic Safety. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Oh, M., J. Shaw, J. Dong-O'Brien. 2024. Anti-tailgating Messages for Encouraging Safe Spacing in Work Zones. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Oni, B., M. Rojas, Y. Alatoom, R. Adhikari, A. Albughdadi, and O. Smadi. 2024. Resilience- and Risk-Based Framework for Managing Culverts in Changing Climates: A Case Study of Colorado Culverts. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

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Patel, P., and R. Sturgill. 2024. An Assessment of As-Built Accuracy Using Ground-Based Photogrammetry Compared to Traditional GPS Survey. *Presented at the Construction Research Congress*, March 20–23, Des Moines, IA.

Persaud, B., R. Srinivasan, V. Gayah, K. Kersavage, T. Saleem, and S. Hallmark. 2024. Estimating the Expected Change in Safety for a Potential Application of Three Intelligent Transportation System Treatments. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Qudaisat, M., and A. Alipour. 2024. Multi-dimensional Fragility Assessment of Electric Power Network Components. *Presented at the Department of Civil, Construction and Environmental Engineering (CCEE) Graduate Research Poster Showcase*, April 18, Ames, IA.

Qudaisat, M., and A. Alipour. 2024. Multi-dimensional Reliability-Based Wind Resilience Assessment of Electric Distribution Networks. *Presented at the 61st Electric Power Research Center Annual Meeting Poster Presentation*, May 14–16, Ames, IA.

Qudaisat, M., and A. Alipour. 2024. Multi-dimensional Reliability-Based Wind Resilience Assessment of Electric Distribution Networks. *Presented at the American Society of Civil Engineers Engineering Mechanics Institute (EMI) Annual Conference*, May 28–31, Chicago, IL.

Qudaisat, M., D. Houssou, W. Gallus, and A. Alipour. 2024. Future-Proofing Energy Infrastructure: Power Grid Risk Assessment. *Proceedings of the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Rahman, M. L., A. Malakooti, H. Ceylan, S. Kim, and P. C. Taylor. 2024. Unlocking Performance Insights: Evaluating Full-Scale Electrically-Conductive Concrete Heated-Pavement Systems to Identify Key Design Parameters. *Presented at the Transportation Research Board Annual Meeting*, January 7–11, Washington, DC.

Ramezani, A., and B. Shafei. 2024. Investigation of Lightweight Ultra-high Performance Concrete for Net-Zero Solutions. *Presented at the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Razmarashooli, A., D. A. S. Martinez, Y. K. Chua, S. Laflamme, and C. Hu. 2024. Real-Time State Estimation Using Recurrent Neural Network and Topological Data Analysis. *Proceedings of the SPIE Smart Structures and Nondestructive Evaluation*, Vol. 12950, pp. 106–114.

Razmarashooli, A., D. Salazar, and S. Laflamme. 2024. Topological Data Analysis for High-Rate State Estimation. *Presented at the Engineering Mechanics Institute (EMI) Annual Conference*, May 28–31, Chicago, IL.

Ricles, J., L. Cao, S. Al-Subaihawi, T. Marullo, A. Downey, and S. Laflamme. 2024. 3D Real-Time Hybrid Simulations of Tall Buildings with a Novel Tuned Mass Friction Damper. *Presented at the 18th World Conference on Earthquake Engineering (WCEE)*, June 30–July 5, Milan, Italy.

Saadati, N., M. Pham, N. Saleem, J. R. Waite, A. Balu, Z. Jiang, C. Hegde, and S. Sarkar. 2024. DIMAT: Decentralized Iterative Merging-and-Training for Deep Learning Models. *Presented at the Institute of Electrical and Electronics Engineers (IEEE)/Computer Vision and Pattern Recognition (CVF) Computer Vision and Pattern Recognition Conference (CVPR)*, June 17–18, Seattle, WA.

Sarkar, S. 2024. AI-Enabled Digital Twins for Resilient and Climate Smart Agriculture. *Presented at the Symposium on Application of Cyber-Physical Systems in Agriculture*, March, Taichung, Taiwan.

Sarkar, S. 2024. AI-Enabled Digital Twins for Resilient and Climate Smart Agriculture. *Presented at the Artificial Intelligence in Agriculture and Natural Resources Conference*, April 15, College Station, TX.

Shafei, B. 2024. Repair and Restoration of Deteriorated Bridge Structures Using Ultra-high Performance Concrete. *Presented at the 7th International Conference on Concrete Repair, Rehabilitation and Retrofitting*, November 4–6, Cape Town, South Africa.

Shams, A., N. Dobrota, B. Cesme, and C. M. Day. 2024. Integration of Real-Time Vehicle Trajectories into Actuated Traffic Signals to Improve Local Intersection and Arterial Control. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Sharma, A. 2024. Role of Generative AI in Transportation. *Presented at the Ohio Transportation Engineering Conference*, October 8, Columbus, OH.

Sharma, A. 2024. Traffic Signal Solutions – Driven by Industry 4.0 Transformation. *Presented at Queensland University of Technology (QUT)*, October, Brisbane, Australia.

Shihab, I. F., B. I. Alvee, and A. Sharma, 2024. Leveraging Video-LLMs for Crash Detection and Narrative Generation: Performance Analysis and Challenges. *Presented at the Conference in Emerging Technologies in Transportation Systems (TRC-30)*, September 2–4, Crete, Greece.

Smadi, O. 2024. Workshop on Establishing Transportation Research Programs in the United Arab Emirates. *Presented at the Roads and Transport Authority Transportation Research Conference*, April, Dubai, United Arab Emirates.

Sourav, M. A. A., H. Ceylan, S. Kim, and M. Brynick. 2024. Integration of Small Unmanned Aircraft Systems and Deep Learning for Efficient Airfield Pavement Crack Detection and Assessment. *Presented at the American Society of Civil Engineers International Conference on Transportation and Development (ICTD)*, June 15–18, Atlanta, GA.

Sturgill, R. 2024. Proactive Strategies for Damage Prevention: Innovative Approaches to Minimize Risk and Enhance Safety. *Presented at the Iowa National Utility Contractors Association (NUCA) Annual Meeting*, February 16.

Torabi, T., B. Shafei, and A. Alipour. 2024. Intensity Measures for Flood Hazards in Fragility Assessments of Bridges. *Proceedings of the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Tripathi, A., R. Sturgill, G. Dadi, and H. Nassereddine. 2024. Investigating Implementation Factors for Successful Technology Implementation at State DOTs. *Presented at the Construction Research Congress*, March 20–23, Des Moines, IA.

Veneziano, D. 2024. Sign Life Expectancy on Low-Volume Roads in Iowa. *Presented at the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Veneziano, D. 2024. Designing and Implementing Maintainable Pedestrian Safety Countermeasures. *Presented at a Local Technical Assistance Program Webinar (Virtual)*, September 19.

Veneziano, D. 2024. Work Zone Safety and Flagging. *Presented at the Iowa Streets and Roads Workshop and Conference*, September 10–12, Des Moines, IA.

Wang, K., and D. King. 2024. Evaluating and Implementing CC·I·L Cement for the Next Generation of Concrete Bridge Construction. *Presented at the 2024 Iowa Better Concrete Conference*, November 21, Ames, IA.

Wang, S., D. C. Anastasiu, Z. Tang, M. C. Chang, Y. Yao, L. Zheng, M.S. Rahman, M. S Arya, A. Sharma, P. Chakraborty, S. Prajapati, Q. Kong, N. Kobori, M. Gochoo, M. E. Otgonbold, F. Alnajjar, G. Batnasan, P. Y. Chen, J. W. Hsieh, X. Wu, S. S. Pusegaonkar, Y. Wang, S. Biswas, and R. Chellappa. 2024. The 8th AI City Challenge. *Presented at Institute of Electrical and Electronics Engineers (IEEE)/Computer Vision and Pattern Recognition (CVF) Conference on Computer Vision and Pattern Recognition Workshops*, June 17–21, Seattle, WA.

Wathne, L. 2024. Airfield Concrete Pavement Technology Program Update. *Presented at the Colorado/Wyoming Concrete Pavement Conference*, January, Denver, CO.

Wathne, L. 2024. Low-Carbon Infrastructure. *Presented at the Federal Highway Administration Transportation Policy Symposium*, January, Washington DC.

Wathne, L. 2024. ACPTP Research Update. *Presented at the Military Tri-Services Workshop*, February, Denver, CO.

Wathne, L. 2024. Iowa DOT Climate Challenge Project. *Presented at the ICPA 60th Annual Workshop*, February, Des Moines, IA.

Wathne, L. 2024. What Have We Been Up To? *Presented at the 64th Annual Kentucky Concrete Association Convention*, February, Covington, KY.

Wathne, L. 2024. LCCA, Mix of Fixes, and Overlays. *Presented at the Wisconsin Concrete Pavement Association Annual Concrete Pavement Workshop*, February, Madison, WI.

Wathne, L. 2024. Competition… a Win-Win Strategy. *Presented at the Oklahoma Concrete Pavement Conference*, March, Oklahoma City, OK.

Wathne, L. 2024. Concrete Surface Defects…? *Presented at the Annual Concrete Pavement Workshop*, March, Deadwood, SD.

Wathne, L. 2024. LCCA and Competition? *Presented at the Annual Concrete Pavement Workshop*, March, Deadwood, SD.

Wathne, L. 2024. CP Tech Center Update. *Presented to the American Concrete Pavement Association Research Technology and Innovation Committee*, June, Kansas City, MO.

Wathne, L. 2024. What Are We Up To? *Presented at the National Institute of Standards and Technology LC4 2nd Annual Meeting (Virtual)*, July, Frederick, MD.

Wathne, L. 2024. Smoother Concrete Pavements. *Presented to the Southwest Concrete Pavement Association (Virtual)*, August.

Wathne, L. 2024. Improving Pavement Resilience to Flooding. *Presented to the Nevada Infrastructure Concrete Conference*, October, Reno, NV.

Wathne, L. 2024. CP Tech Center Celebrates 25 Years. *Presented to the CP Tech Center Board of Directors*, December, Phoenix, AZ.

Wathne, L. 2024. CP Tech Center's Tech Tuesday Webinar Program. *Presented to the American Concrete Pavement Association Chapter/State Committee*, December, Phoenix, AZ.

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Wathne, L. 2024. Vision for Our Next FHWA Cooperative Agreement. *Presented to the American Concrete Pavement Association Highway Market Forum*, December, Phoenix, AZ.

Wei, X., S. Knickerbocker, N. Hawkins, Z. Hans, and A. Sharma. 2024. Leveraging Connected Vehicle Telematics for High-Speed Signalized Intersection Safety: A Quantitative Analysis of Hard-Braking Events and Crash Occurrences. *Presented at the Institute of Electrical and Electronics Engineers (IEEE) World Forum on Public Safety Technology*, May 14–15, Washington, DC.

Wi, K., O. Sihan, K. Wang, and Y. Lee. 2024. Use of MSWI Fly Ash with Mainstream Supplementary Cementitious Materials. *Proceedings of the 12th American Concrete Institute (ACI)/RILEM International Conference on Cementitious Materials and Alternative Binders for Sustainable Concrete*, pp. 871–886, June 23–26, Toulouse, France.

Wivast, J., A. Nyland, S. Bozorgmehr Nia, M. Kioumarsi, and B. Shafei. 2024. Developing Eco-friendly Ultra-high Performance Concrete by Utilizing Recycled Alternatives. *Presented at the 1st International Conference on Net-Zero Built Environment: Innovations in Materials, Structures, and Management Practices*, June 19–21, Oslo, Norway.

Wood, J. S., and I. Schalkwyk. 2024. Reproducibility in Transportation Research: Importance, Best Practices, and Dealing with Protected and Sensitive Data. *Presented at Session 2167 of the Transportation Research Board 103rd Annual Meeting*, January 7–11, Washington, DC.

Yang, B., M. A. Alsheyab, H. Ceylan, S. Kim, and Y. Zhang. 2024. Field Assessment of Lignin-Based By-Product-Stabilized Geomaterials. *Proceedings of the 5th International Conference on Transportation Geotechnics (ICTG)*, November 20–22, Sydney, Australia.

Yang, B., Z. Yin, H. Ceylan, and S. Kim. 2024. Laboratory Assessment for Utilizing Eggshell Waste on Iowa Soil Stabilization. *Presented at the American Society of Civil Engineers Geo-Congress*, February 25–28, Vancouver, BC.

Yang, C. -H., B. Feuer, T. Z. Jubery, Z. K. Deng, A. Nakkab, Z. Hasan, S. Chiranjeevi, K. O. Marshall, N. Baishnab, A. K. Singh, A. Singh, S. Sarkar, N. Merchant, C. Hegde, and B. Ganapathysubramanian. 2024. BioTrove: A Large Curated Image Dataset Enabling AI for Biodiversity. *Presented at the 38th Conference on Neural Information Processing Systems (NeurIPS) Datasets and Benchmarks Track*, December 9, Vancouver, BC.

Yang, H. J., J. Beck, Z. Hasan, E. Beyazit, S. Chakraborty, T. Wongpiromsarn, and S. Sarkar. 2024. GENESIS-RL: Generating Natural Edge-Cases with Systematic Integration of Safety Considerations and Reinforcement Learning. *Presented at the Institute of Electrical and Electronics Engineers (IEEE) International Automated Vehicle Validation Conference (IAVVC)*, October 21–23, Pittsburgh, PA.

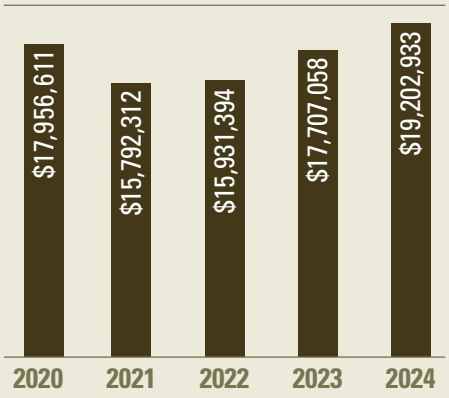
Yosef, T., R. Faller, B. Shafei, B. Bielenberg, S. Rosenbaugh, S. Saini, S. Sritharan, B. Phares, J. Rasmussen, A. Vakili, J. Steelman, and A. Loken. 2024. Investigation and Evaluation of a MASH TL-4 Precast Concrete Bridge Railing. *Presented at the 2nd International Roadside Safety Conference and Peer Exchange*, June 23–26, Orlando, FL. ▶

INTRANS BY THE NUMBERS

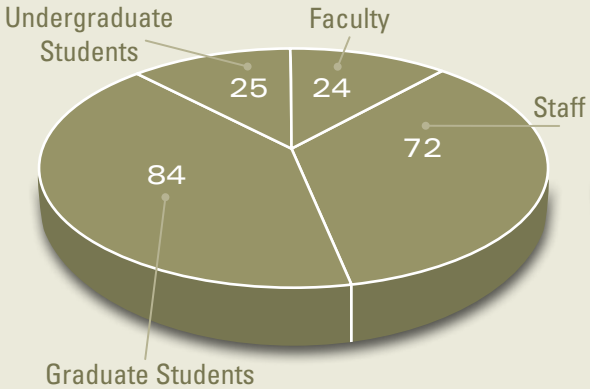
Reports below reflect figures and activities from the fiscal reporting period of July 2023–June 2024

FUNDING SOURCES	2020	2021	2022	2023	2024
Iowa DOT	53%	48%	51%	47%	48%
Other Iowa Govt. Agencies	1%	2%	2%	1%	1%
Other State Agencies	8%	12%	9%	8%	8%
Other (conferences, fees, misc. services, etc.)	16%	12%	16%	19%	14%
Industry	7%	8%	7%	9%	6%
Federal Agencies	15%	18%	15%	16%	23%

TOTAL FUNDING FROM ALL SOURCES

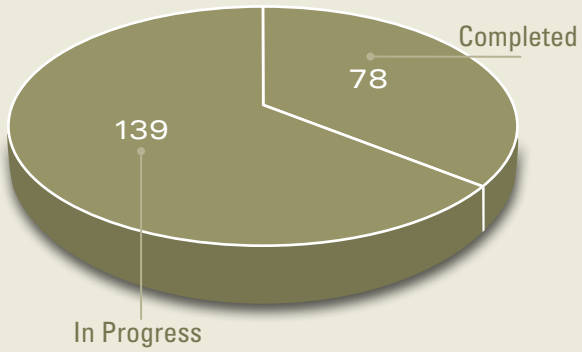


FY 2024 EMPLOYEE STATISTICS

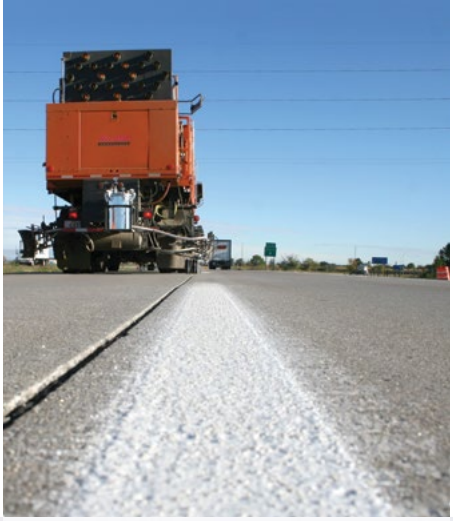


TOTAL EMPLOYEES: 205

FY 2024 INTRANS PROJECTS



TOTAL PROJECTS: 217



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