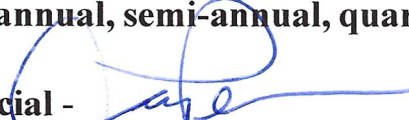
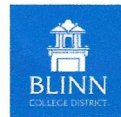


# National Center for INFRASTRUCTURE TRANSFORMATION

Led by: Prairie View A&M University

- **Federal Agency and Organization Element to Which Report is Submitted** – US Department of Transportation, Office of the Assistant Secretary for Research and Technology (OST-R), University Transportation Center Program (UTC)
- **Federal Grant or Other Identifying Number Assigned by Agency** - National University Transportation Center (UTC) headquartered at Prairie View A&M University and focused on Improving the Durability and Extending the Life of Transportation Infrastructure
- **Project Title** – National Center for Infrastructure Transformation
- **Center Director Name, Title, and Contact Information (e-mail address and phone number)** – Judy A. Perkins, Ph.D., PE, Director, [juperkins@pvamu.edu](mailto:juperkins@pvamu.edu), 936-261-1655.
- **Name of Submitting Official** – Same as Center Director
- **Submission Date** – October 30, 2024
- **DUNS Number** (138170220) and **EIN Number** (74-6001078)
- **Recipient Organization (Name and Address)** – Prairie View A&M University, 700 University Drive, Prairie View, Texas 77446
- **Recipient Identifying Number or Account Number** - No. 69A3552344813 and No. 69A3552348318.
- **Project/Grant Period (Start Date, End Date)** – June 1, 2023 – May 31, 2029
- **Reporting Period End Date** – April 1, 2024 – September 30, 2024
- **Report Term or Frequency (annual, semi-annual, quarterly, other)** – Semi-Annual.
- **Signature of Submitting Official** - 



## 1. ACCOMPLISHMENTS

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a. *What are the major goals of the program?*

The National Center for Infrastructure Transformation (NCIT) is led by Prairie View A&M University (PVAMU). The following consortium partners support PVAMU - Arizona State University (ASU), Blinn College District (BCD), Michigan State University (MSU), Rutgers University (RU), Texas A&M Transportation Institute (TTI) and Texas A&M University (TAMU). NCIT's goal is to support improving the durability and extending the life of transportation infrastructure by transforming the transportation system through leadership, research, education, and workforce development (EWD), and technology transfer and collaboration (T2C).

b. *What was accomplished under these goals?*

Leadership/Management Important Activities

- The NCIT Leadership meets weekly and consists of the following individuals:
  - Judy Perkins – Director/Advancing Education in Excellence (AEIE) Coordinator
  - Melissa Tooley - Deputy Director/Research Coordinator
  - Claudia Zapata – ASU - Associate Director & AEIE Coordinator
  - Marshall Rich – BCD - Associate Director & EWD Coordinator
  - Bora Cetin – MSU – Associate Director
  - Md Jobair Bin Alam – PVAMU- Associate Director
  - Yonggao Yang – PVAMU- Associate Director & EWD Coordinator
  - Patrick Szary – RU – Associate Director
  - Anand Puppala – TAMU – Associate Director
  - Charles Gurganus – TTI – Associate Director & EWD Coordinator
- The NCIT Executive Leadership consisting of the Director and Deputy Director met with all Associate Directors, the AEIE Coordinators, and EWD Coordinators to discuss management and operational matters, their roles and responsibilities, and policies and standing operating procedures (SOPs) that will guide NCIT's business practices.
- The Director and Deputy Director meet virtually and in person on a regular basis to ensure the execution of NCIT's implementation plan and calendar of events for Year-1 and Year-2.
- The Associate Directors meet periodically with the research faculty at their respective institutions to share Center information, ensure implementation of individual and collaborative projects/programs, and respond to questions and/or comments.
- The Director served as a peer reviewer for the Center for Equitable Transit-Oriented Communities' (CETOC) second year project selection. The proposal was entitled, "FP-Y2-21 - "Transit Planning Automation Based on a Multi-Agent Deep Reinforcement Learning Approach."
- The Director and Deputy Director met with staff members – Xavier Monroe, Helena Zyblikewycz, and Jackie Schmitz with the Office of Representative Rick Larsen (WA-02) to discuss the topic of Artificial Intelligence & Transportation on May 23, 2024. Other attendees were Valerie Offutt (Assistant Vice Chancellor, TAMUS Office of Federal Relations) and Michael Gibson (TAMUS Assistant Vice Chancellor of Government Relations, PVAMU Representative).
- The Director, Deputy Director, RU Associate Director, and NCIT Staff (Donna Broussard - PVAMU Program Coordinator II, Elissa Cuellar – TTI UTC Assistant Director, and Haylee Yung – TTI UTC Administration) attended the Council of University Transportation Center (CUTC) Summer Meeting in South Padre Island, TX in June 10-12, 2024.
- The Director, Dr. Michael McFrazier (Senior Vice President for Strategy and Transformation), and Dr. Pamela Obiomon (PVAMU Dean of Roy G. Perry College of Engineering & Co-Chair of NCIT Advisory Board) participated in an in person "Meet & Greet" conversation with Acting Under Secretary Christopher Coes and Director Irene Marion from the US DOT Departmental Office of Civil Rights on July 10, 2024, in Houston, TX. This was an opportunity to meet specifically with the NCIT Director and leadership of two local Historical Black Colleges & Universities (HBCU)

institutions (PVAMU and Texas Southern University) as a part of the HBCU initiative at U.S Department of Transportation (USDOT) and the White House Black Initiative.

- On July 16, 2024, the Director, Dr. Md Jobair Bin Alam (PVAMU Associate Director, Dr. Yonggao Yang (PVAMU Associate Director & EWD Coordinator), and Mrs. Donna Broussard (NCIT Program Coordinator II) met with Staff from the Office of Congressman Michael Thomas McCaul Sr. (TX-10) and TAMUS Office of Government Relations (State Relations Office and Federal Relations Office) to discuss NCIT and the overall UTC program. Staff members were Drew Ross, Cam Madsen, Alana Lomis, Rhett Styles, and Destinee Vargas. In attendance from the TAMUS' Office of Government Relations | State Relations Office was Michael Gibson. Dustin Bryant and Valerie Offutt were representatives from TAMUS' Office of Government Relations | Federal Relations Office.
- The Director and Deputy Director attended the 2024 American Road & Transportation Builders Association (ARTBA) National Convention held in Amelia Island, FL in September 22-25, 2024.

Collectively and individually, NCIT's leadership cadre are having a significant impact on the UTC infrastructure community through the education, research, and outreach efforts occurring on their campuses and beyond. The NCIT consortium members continue to mentor and encourage students, early career faculty, and experienced researchers to look for more prominent roles throughout the transportation profession. Below are the achievements of NCIT's faculty, students, and staff for this reporting period.

- **BCD**
  - Marshall Rich, Invited Panelist, "Workforce Development Panel Discussion," 2024 Future of Transportation Summit, August 13-15, 2024.
  - Kamryn Carter, Invited Panelist and Graduate of Highway Construction Workforce Partnership, "Workforce Development Panel Discussion," 2024 Future of Transportation Summit, August 13-15, 2024.
- **MSU**
  - Surya Congress, Invited Speaker, "Application of Drones for 360-degree Bridge Inspection," 2024 Use of UAVs and AI in the Construction Sector Workshop, Indian Institute of Technology Delhi (IIT D), July 28, 2024.
  - Surya Congress, Invited Speaker, "Applications of Deep Neural Networks for Feature Identification in Drone Datasets," Automated Distress Surveys Panel, Minnesota Transportation Conference and Expo, Minneapolis, MN, May 29-31, 2024.
  - Surya Congress, Invited Speaker, "Applications of Uncrewed Aerial Vehicles (UAVs) for 360° Bridge Inspections and Asset Management," 2024 Michigan Infrastructure Conference, East Lansing, MI, May 9, 2024.
- **PVAMU**
  - Ahmed Ahmed, Invited Speaker, "IoT Devices and their Role in Enhancing Future Transportation Systems," NCIT Smart Transportation Summer Workshop, Prairie View, TX, May 20-23, 2024.
  - Jobair Alam, Moderator, Infrastructure Session III, 2024 USDOT Future of Transportation Summit, August 13-15, 2024
  - Judy Perkins serves on the 2024 USDOT Future of Transportation Summit Steering Committee, Chairperson of the Poster Committee, and Chairperson of the Infrastructure Thematic Lectern Committee.
  - Judy Perkins, Invited Speaker, "NCIT and Opportunities for Computer Science-Related Research in the Center," PVAMU Computer Science Department COMP Research Methods & Graduate Seminar, March 27, 2024.
  - Judy Perkins, Invited Panelist, "UTCs and WFD – What Works, What Does Not Work, What Needs to Change, Best Practices, and Focus on Rural and Tribal Communities," Southern

- Plains Transportation Center, Transportation Industry & Workforce Development Symposium, April 30, 2024.
- Judy Perkins, Opening Remarks Speaker, NCIT Smart Transportation Technology Workshop, May 20-23, 2024.
- Judy Perkins, Invited Panelist, An Early Career Academic Workshop, ASCE T&DI Conference, Atlanta, GA, June 15, 2024.
- Judy Perkins, Invited Panelist, “Seize the Opportunity: Uncover Your USDOT Funding Potential,” HBCU Week Conference, Philadelphia, PA, September 18, 2024.
- Judy Perkins received the 2024 ARTBA Excellence in Academia Award, September 2024.
- Lening Wang, Invited Speaker, “Evolution of Self-Driving Cars,” NCIT Smart Transportation Summer Workshop, Prairie View, TX, May 20-23, 2024.
- Yonggao Yang, Invited Speaker, “Development of a Road Incident App for Smart Transportation Grid,” NCIT Smart Transportation Summer Workshop, Prairie View, TX, May 20-23, 2024.
- **RU**
  - Patrick Szary, Moderator, Infrastructure Session II, 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- **TAMU**
  - Anand Puppala, Panel Moderator, “Student Role in Research,” Southern Plains Transportation Center, Transportation Industry & Workforce Development Symposium, April 30, 2024.

Research Important Activities

NCIT’s research program includes traditional engineering and planning research but also policy research to ensure that the Infrastructure Investment and Jobs Act’s unprecedented investment is made wisely. In our first semi-annual progress report (SAPR), NCIT funded and deployed a total of 16 projects - 13 research, 2 EWD, and 1 T2C.

During this reporting period, one new research project was funded and is listed in Table 1 below. NCIT now has a total of 19 active projects operating in the second year of the grant.

The Principal Investigator (PI) received the Kickoff Research Packet for the NCIT research projects/programs. Per Table 1, PVAMU’s project proposes to offer professional development activities that will provide consortium faculty with rigorous training in effective classroom strategies, learning and teaching styles, diversity/multiculturalism, and culturally/discipline-specific pedagogy. Six modules will support key research and EWD activities.

**Table 1 – NCIT Research Project (1 Total)**

<b>Project Number</b>	<b>Project Title</b>	<b>Lead Institution</b>
1	NCIT Faculty Professional Development Program	PVAMU

EWD Important Activities

The scope and reach of the NCIT consortium will have a major impact on the transportation workforce through its EWD programs. NCIT is creating an inclusive culture to develop a globally competitive workforce by educating the next generation of transportation leaders. Through collaboration and engagement with various educational stakeholders, programs and activities are designed to address critical workforce needs and prepare a diverse pool of future professionals who are innovative and creative thinkers. To support the goal of producing graduates and a professional workforce proficient in the skills needed in the infrastructure focus areas, a collection of strategies and approaches are used.





### Smart Transportation Technology Workshop

The first “Smart Transportation Technology Workshop” was hosted by the PVAMU Computer Science Department during May 20-23, 2024, and there were thirteen students in attendance. Two of the thirteen students were from HBCUs outside of Texas. The four-day workshop covered topics such as Internet of Things (IoT) devices in the transportation industry, the future of self-driving cars, and incident



**Photo # 1 – Summer Workshop Cohort #1**

reporting apps for smart road systems. The first two days featured firsthand IoT experiments paired with presentations on IoT and self-driving technologies. On Day 3, the focus involved a session about developing road incident Apps, while on the last day, the workshop concluded with an open discussion panel where students explored the potential future of transportation technology. Positive feedback from participants has inspired plans to hold a second workshop in summer 2025 and it will offer students an opportunity to use modern technologies to develop smart transportation applications to address real world transportation challenges.

### ASU K-12 Education and Outreach

In the Research Experiences for science, technology, engineering, and mathematics (STEM) Teachers Program, K-12 STEM teachers and community college STEM faculty teaching at schools from rural areas and serving Native American populations take part in authentic research experiences with faculty researchers. These experiences, traditionally held in person, provide participants with the following: engineering research experiences in engineering research labs, guidance in developing engineering content curricula based on NCIT research, and follow-up support for translating research experiences into classroom practice. Programming will include both asynchronous and synchronous components in a hybrid format and the program provides a stipend to the participants.

In summer 2024, two STEM teachers took part in research through the NCIT research experience for teacher program. Recruitment for the program was targeted at underserved schools with a high population of teachers and students from underrepresented groups. Both teachers recruited are from racial/ethnic minority groups. One teacher, Brandon Trotter, who teaches at South Mountain High School, worked on Dr. Kaloush’s project titled “A Sustainable Approach for Making More Climate Resilient Asphalt Pavements.” Mr. Trotter was also mentored by Dr. Jolina Karam during the five-week program. A second teacher, Leslie Arriaga, teaches at Estrella Mountain Community College and worked on Dr. Ozer’s project titled “Automated Construction Quality Monitoring and Inspection Protocols using Unmanned Aerial Vehicles.” Ms. Arriaga was mentored by NCIT funded graduate assistant researchers Naaga Vedula and Masih Beheshti. Both teachers collaborated with their mentors to develop lesson plans based on the assigned research project and will implement the lessons in their classrooms in Fall 2024.

### Leadership through Mentoring Program

In a bid to cultivate the next generation of leaders in the infrastructure and transformation sector, NCIT proudly introduces its innovative Leadership through Mentoring Program tailored for both graduate and undergraduate students to learn how to diversify their participation in leadership processes beyond the hierarchical leader-follower construct. This unique initiative is spearheaded by NCIT’s ASU partner, and it focuses on understanding leadership as a ubiquitous and ever-present social process of influence within groups to prepare students for working in the transportation industry.



Transportation industry professionals need a broad array of leadership competencies to engage with multiple simultaneous complex projects responding to communities changing regional needs, climate change, or remediating past highway projects that harmed historical marginalized communities. Graduate students and undergraduate students apply together for this semester-long collaboration and those undergraduates selected receive a stipend. This structured mentorship process emphasizes shared leadership actions that are distinct from traditional mentorship and offers an enriching experience that goes beyond hierarchical leading actions. The mentor pairs develop and implement a mentoring plan that supports both partners' goals and objectives. A mentorship coordinator (NCIT Associate Director or NCIT Faculty Researcher) supports the mentor pairs, meeting individually with pairs to start and then twice monthly. All the mentor pairs also take part in online exercises to expand their leadership knowledge and competencies.

Since launching the program, five versions of the online course have been created thus far to accommodate participants. Table 2 provides the number of participants from each institution, which course they took part in, and the semester. Across the consortium, a total of sixteen participants completed various versions of the course.

**Table 2 – 2024 Leadership through Mentoring Program Participants**

Institution Name	Course Version	Semester	Number of Participants
ASU	Full Course	Spring 2024	2
ASU	Full Course	Summer 2024	2
MSU	Mini Course	Spring 2024	2
PVAMU	Mini Course	Spring	1
PVAMU	Full Course Compressed	Summer 4	7
RU	Mini Course	Spring 2024	1
TAMU	Mini Course	Spring 2024	1

Highway Construction Workforce Partnership (HWCP) Program Graduation

Approximately fifteen high schools allowed 750 students to attend presentations about the program. On July 12, 2024, the HWCP Program graduated 11 students in their second Cohort. This cohort completed a compressed 6-week course designed to empower students with the knowledge and skills needed to jump-start their careers in the highway construction industry. The program introduced students to various aspects of road building, including safety, heavy equipment operation and actual paving with hot-mix asphalt. Collaborating on this certification program is BCD, TTI, NCIT, and the Texas Asphalt Pavement Association. Below is a group photo of the July 2024 graduates - Joseph Alessandra-Smith, Rogelio Cepeda, Alex Goodson, Kyle Goodson, Pedro Juarez, David Lopez, James Morgan, Hugo Moreno, Anden Nobles, Joyloy Ortiz, Asher Peddy, - along with Charles Gurganus and Rick Davenport.





**Photo # 2– HWCP Cohort #2 Graduation**  
*(Far Left)* – Charles Gurganus (TTI PI of HCWP and TAMU Associate Director) and Rick Davenport (TTI Project Specialist II) - *(Far Right)*

*Outreach – Increasing Awareness of Transportation*

To increase understanding and awareness of the transportation field, on July 18<sup>th</sup>, John Braley gave a tour of the Center for Advanced Infrastructure & Transportation (CAIT) Bridge Evaluation and Accelerated Structural Testing (BEAST) facility to 30 youth participants. Additionally, he conducted an educational session for the Rutgers Engineering Summer Academy that introduces high school students to engineering disciplines.

*TTI 2024 Summer Undergraduate Research Internship Program*

It is more than just an internship; it is an opportunity for students to embark on a journey of discovery within the dynamic and ever-evolving field of transportation. Whether someone is interested in infrastructure durability and resiliency, economic analysis for transportation improvements, or innovative technologies shaping the future of transportation, this internship is a gateway for undergraduates to take part in real-world research.

This program is offered through NCIT’s TTI partner and is open to undergraduate juniors. Every student should have a strong enthusiasm for engaging in research, be paired with a TTI research mentor, and contribute to an ongoing research initiative within one of TTI’s UTCs. The core focus area of the respective UTCs are as follows:

- Center for Advancing Research in Transportation Emissions, Energy, and Health: Transportation Emissions, Energy, and Health
- NCIT: Infrastructure Transformation
- SPTC: Climate-related Transportation Challenges/Resilience

The internship occurred from May 28, 2024 – August 2, 2024, and five students were selected to take part in this amazing EWD program at the Texas A&M RELLIS Campus located in Bryan, Texas.



**Table 3 – Summer 2024 Internship Participants**

Intern Name	Major	Institution
Carly Loe	Environmental Studies	TAMU
Mahshid Malazizi	Civil Engineering	Farmingdale State College
Jacob Nolte	Management Information Systems	TAMU
Teale Robinson	Urban Planning	Texas State University
Kaleigh Spears	Urban Science and Planning with Computer Science	MIT

On July 30, 2024, all participants delivered successful presentations on the research conducted during the 10-week program and below is a group photo of those attending the program both in person and remotely.



**Photo # 3 – Summer Internship Participants**

T2C Important Activities

Proven T2C techniques combined with strong industry, agency, and association partnerships will ensure that NCIT’s output is put into practice.

USDOT Future of Transportation Summit

- During August 13-15, 2024, NCIT participated in the 2024 USDOT Future of Transportation Summit held at the US DOT Headquarters in Washington, DC. The Director and two Associate Directors (Dr. Alam (PVAMU) and Dr. Szary (RU)) served as moderators of the infrastructure durability and resiliency sessions. One Associate Director (Dr. Alam) and four researchers (Dr. Demetracoupoulou (RU), Dr. Gonnabathula (TAMU), Mr. Hofferichter (TTI) and Mr. Prieto (TTI)) presented posters and/or desktop displays. Participating in the EWD Session was Mr. Marshall Rich (BCD Associate Director) and NCIT’s first female (Kamryn Carter) graduate from our HWCP program. Dr. Congress (MSU) and Mr. Vedula (ASU) gave live demonstrations of unmanned aerial technology. The Co-Chair of NCIT’s Advisory Board, Honorable Greg Winfree served as a panelist on August 14, 2024. Dr. Magesh Rajan (PVAMU’s Vice President of Research, Innovation, and Sponsored Programs as well as a member of NCIT’s Internal Oversight





Committee) took part in the UTC Senior Research Officer (SRO) Roundtable Lunch on August 13, 2024. Over 20 members of NCIT’s leadership as well as researchers attended the event.

- The NCIT Webinar Committee was successful in hosting two online seminars during this period. The first speaker was Derrick Dasenbrock, P.E., D. GE, F. ASCE, Geotechnical Engineer, Geotechnical and Hydraulic Engineering Team, Federal Highway Administration (FHWA) Resource Center. His presentation was entitled, “Responding to Transportation Project Challenges: New Developments in Geotechnical Tools, Processes and Workflow.” Eighty-eight were in attendance on Monday, April 15, 2024. On July 23, 2024, NCIT hosted two speakers from FHWA, and they were Brian Dobling and Austin Jarrell. Their topic was entitled “Sustainable Pavement Program and Pavement Resilience,” and the presentation covered the steps that FHWA is taking to address the impacts climate change and extreme weather events are having to pavement lifecycle performance. There were over 100 participants in attendance.

#### Administrative/Management Important Activities

- The Director and TAMU Sponsored Research Services (SRS) representatives met on a regular basis with our UTC Grants Manager to ensure NCIT would successfully meet the UTC reporting requirements.
- The Director and Deputy Director completed their site visits to ASU, BCD, MSU, RU, TAMU, and TTI. The purpose of the site visits was to meet with researchers, students, and tour their facilities.
- Associate Director, and NCIT Staff (Donna Broussard -PVAMU Program Coordinator II, Elissa Cuellar – TTI UTC Assistant Director, and Haylee Yung – TTI UTC Administration attended the Council of University Transportation Center (CUTC) Summer Meeting in South Padre Island, TX in June 10-12, 2024.

#### *b. How have the results been disseminated?*

Combining the efforts of supported researchers, we successfully disseminate the results from our three core areas of research, EWD, and T2C, through the following avenues:

- NCIT website [<https://ncit.pvamu.edu/>], total visits to the site as of September 2024 was slightly over 8,558.
- 6 conference poster presentations
- 6 conference presentations
- 5 invited speeches
- 1 invited keynote speech
- 7 invited speaker presentations
- 5 invited panelists
- 2 journal article publication
- 2 conference live demonstrations
- 1 workshop presentation
- The local news station KBTX attended the HWCP Cohort #2 graduation ceremony and conducted interviews which detailed the program’s benefits. The report was broadcast on various station broadcasts and a social media page was developed for the program.
- Release second newsletter [<https://ncit.pvamu.edu/newsletter/>]

#### *c. What do you plan to do during the next reporting period to accomplish the goals?*

##### Leadership/Management Important Activities

- The NCIT Committees listed below will use their Year #2 Plan of Action to ensure programs/projects involving all partners are successfully implemented.
  - NCIT AEIE Scholarship – Perkins (**Chair**), Tooley, and Zapata
  - NCIT Student Council – Rich (**Chair**), Gurganus, and Yang



- NCIT Traveling Assistance to TRB Annual Meeting – Cetin (**Chair**), Zapata, and Puppala
- NCIT 2024 Virtual Colloquium Event – Perkins (**Chair**), Alam, and Yang
- NCIT Webinars – Puppala (**Chair**), Alam, Szary, and Tooley
- NCIT’s Advisory Board first meeting will occur by December 2024. NCIT’s Advisory Board membership consists of the following individuals.
  - Mr. Paul C Ajegba, PE, Senior Vice President, Infrastructure Engineering Incorporated and Affiliates
  - Dr. Jay Anderson, Vice Chancellor, BCD Applied Sciences, Workforce and Economic Development
  - Mr. Greg A. Baker, PE, Vice-President, Senior Project Director, Arcadis Incorporated
  - Dr. Bouzid Choubane, Director of the National Center for Pavement Preservation, MSU
  - Ms. Megan Dere, Civil Rights Program Manager, FHWA Texas Division Office
  - Dr. Zachary Grasley, Chair, Zachry Department of Civil and Environmental Engineering, TAMU
  - Ms. Allison Klein, Senior Vice President of Strategic Engagement, American Road and Transportation Builders Association (ARTBA)
  - Dr. Ali Maher, Professor of Civil Engineering and Center for Advanced Infrastructure & Transportation (CAIT) Director, RU
  - Dr. Pamela Obiomon (Co-Chair), Dean, PVAMU Roy G. Perry College of Engineering
  - Dr. Ram Pendyala, Director of the School of Sustainable Engineering and Built Environment at ASU and Director of Teaching Old Models New Tricks (TOMNET), a Tier 1 UTC
  - The Honorable Greg Winfree (Co-Chair), TTI Agency Director
- Select two NCIT T2C coordinators to fill the current vacancies.

#### Research Important Activities

- Ensure all Year-1 and Year-2 research projects/programs have started.
- Ensure PVAMU and the UTC Grants Manager receive all IRB approvals for specific research projects/programs.
- H. Ozer (ASU NCIT Researcher) graduate student N. Vedula submitted a paper to the 2025 Transportation Research Board Annual Meeting which was accepted in September 2024. The paper title is “Thermal Segregation and Compaction Quality Analysis of Asphalt Pavements using Unmanned Aerial Vehicles (UAV)” Other authors are M. Beheshti and S. Madasu. The final presentation will take place in January 2025.
- Jobair Bin Alam (PVAMU NCIT Associate Director) abstract submission to ASCE Geotechnical Frontiers 2025 Conference was accepted in March 2024. The title of the abstract is “An IoT-Based Monitoring System for Detecting Slope Movement.” The presentation at the conference will take place in March 2025.
- Jobair Bin Alam (PVAMU NCIT Associate Director) paper submission to the 2025 International Conference on Computing, Networking and Communications is awaiting a final decision. The paper title is ‘On Developing Smart IoT-Based Distributed System for Remote Detection of Slope Movements.’ Other authors are Rahul Debnath (Graduate Student in Computer Science) and Ahmed Ahmed (Associate Professor in Computer Science).
- Jobair Bin Alam (PVAMU NCIT Associate Director) master student Rahul Debnath (Computer Science) submitted a paper to the 2025 Transportation Research Board Annual Meeting which was accepted in September 2024. The paper title is “Enhanced Earthen Slope Monitoring with IoT-Enabled Systems.” The final presentation will take place in January 2025.
- Bora Cetin’s (MSU NCIT Associate Director) doctoral students Md Fyaz Sadiq and Qasim Zulfiqar paper submissions to ASCE Geotechnical Frontiers 2025 Conference were accepted in March 2024. The titles of their papers are “Evaluation of Shape Array Sensors (SAS) for Characterizing Frost Heave-Thaw Settlement and Spatial Distribution of Roadways” and “Field Analysis of



Temperature Variances: Identifying Hydration Processes in Chemically Stabilized Soils.” The final submission of a full manuscript for publication as well as conducting a presentation at the conference will occur respectively, in May 2024 and March 2025.

- Dallas Little (TAMU Researcher) and Yong-Rak Kim (TAMU Researcher) submitted a paper to the 2025 Transportation Research Board Annual Meeting which was accepted in September 2024. The paper title is “A Novel Testing to Assess Moisture-Induced Durability of Stabilized Soils under Cyclic Loading.” The final presentation will take place in January 2025 and is being considered for potential publication by the Transportation Research Record Editorial Board.

#### EWD Important Activities

- Ensure all Year-1 and Year-2 EWD projects/programs have started.
- Ensure PVAMU and the UTC Grants Manager receive all IRB approvals for specific EWD projects/programs.
- Additional participants from TAMU are expected to join the Fall 2024 course offering from the Leadership through Mentoring Program.
- ASU will pursue attracting undergraduate students to transportation engineering through the Vertically Integrated Project (VIP) Program. In this program students will be engaged in long-term research projects led by faculty and industry members, while receiving academic credit. Established course line numbers for undergraduate students at ASU to register for the VIP Program have been processed so students can register for the Fall 2024 semester.
- In addition to the TTI and BCD recruitment of area high school seniors, the HWCP program was approved by the Texas Veterans Commission to allow veterans to use their government issued benefits for enrolling in the BCD class. Efforts are underway now to inform the various military branches about the opportunity and prepare for and prepare for Cohort 3 which is projected to start in April 2025.

#### T2C Important Activities

- Ensure that all new PIs and Co-PIs complete the required T2C/Intellectual Property (IP)/Commercialization Webinar in Year-2. Historically, NCIT engages Pete O’Neill, Chief Innovation Officer of the Texas A&M Innovation Office to discuss topics on IP (license of IP rights), patents (process and timeline), copyrights, trademarks, proprietary information, trade secrets, commercialization, invention disclosures, and public disclosures.
- Work on activating social media platforms such as Facebook, Instagram, Twitter, and YouTube to transfer research results to practitioners and the transportation infrastructure community.
- Develop the NCIT Blog to display current and trending news to practitioners and the transportation infrastructure community.
- Ensure the Research in Progress (RiP) Database is current on all active projects, thus contributing to the dissemination of valuable knowledge and research findings.

#### Administrative/Management Important Activities

- Finalize hiring NCIT’s headquarters primary staff that will fill four vacant positions – (1) Administrative Associate Level (III), (2) Associate Level (I), (3) Budget Specialist (II), and (4) Communications Manager.
- Occupy designated NCIT office space.
- Prepare for NCIT Open Houser Event.



## 2. PARTICIPANTS & COLLABORATING ORGANIZATIONS

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### a. *What organizations have been involved as partners?*

As part of every NCIT project proposal, the PI must name a Project Monitor (i.e., stakeholder(s)). Additionally, they must describe how they will engage industry stakeholders(s) and what they expect them to add to the project. Engagement of stakeholders from the outset will ensure that all projects work toward improving the durability and extending the life of the nation's infrastructure, with the mindset of adoption and implementation of research findings. Below is a list of organizations (name, location, and partner's contribution) that are involved with the NCIT ASU projects for which Kamil Kaloush and Hasan Ozer are PIs.

- Arizonia Science and Technology Centers, Tempe, AZ – Financial Support, In-Kind Support, and Facilities
- City of Mesa, Mesa, AZ - Facilities
- Creative Paving Solution, Tempe, AZ - Facilities and In-Kind Support
- Fisher Industries' Southwest Asphalt Division, Glendale, AZ - Facilities and In-Kind Support
- International Road Federation, Alexandria, VA – Facilities
- Integer Consulting, Gilbert, AZ - Facilities
- MR Tanner Construction, Gilbert, AZ – Facilities
- Sunland Asphalt, Phoenix, AZ – Facilities
- Southwest Asphalt, Tempe, AZ - Facilities
- ViaSun Corporation, Tempe, AZ - Facilities and In-Kind Support

During this reporting period, RU PI, Vassiliki Demetracopoulou and Todd Pisani engaged with the New Jersey Department of Transportation Pavement Management Division to obtain pavement condition scores.

One of TTI's PI, Curtis Morgan, continues to collaborate with the organization (name, location, and partner's contribution) listed below. This taskforce works under the Texas Department of Transportation by keeping track of Connected and Autonomous Vehicles (CAV) activities happening across the state. The TTI research team and the Texas CAV Task Force members exchange information which helps the research team find any information gaps that can be addressed by the NCIT project.

- Texas Department of Transportation Connected and Autonomous Vehicles Task Force, Austin, TX, Information Exchange

The remaining partners, MSU, PVAMU, and TAMU continued to engage with the stakeholders listed in SAPR #1. Collaborative research is still the primary contribution organizations, including other consortium partnering institutions, are providing to the individual as well as collaborative NCIT projects deployed.

### b. *Have other collaborators or contacts been involved?*

Marshall Rich (BCD Associate Director and Co-PI of the HWCP project) collaborated with TTI and the Texas Department of Transportation's Connect You to Jobs (CU2J) to expand recruitment options for HWCP.





### 3. OUTPUTS

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#### a. *Publications, conference papers, and presentations*

The NCIT faculty and students were successful in publishing journal articles as well as presenting their research results at different venues. NCIT is extremely proud of our students, faculty, and the mentoring our students receive from the faculty. Below is a summary of the output for this reporting period.

##### 1) *Journal publications:*

- Members from the ASU partner submitted a paper for publication in the Transportation Research Record. Vedula, N., Beheshti, M., Al-Alawi, O., & Ozer, H. (2024). Thermal Profiling of Asphalt Pavement Construction using Unmanned Aerial Vehicle (UAV), 2024 Transportation Research Record. <https://doi.org/10.1177/03611981241239957>
- Members from the PVAMU partner submitted a paper for publication in the MDPI Journal on Hydrology. J. Alam, L. Manzano, R. Debnath, and A. Ahmed (July 2024). Monitoring Slope Movement and Soil Hydrologic Behavior Using IoT and AI Technologies: A Systematic Review. Hydrology 2024, 11, 111. <https://doi.org/10.3390/hydrology11080111>  
<https://www.mdpi.com/journal/hydrology>

##### 2) *Books or other non-periodical, one-time publications:* Nothing to Report.

##### 3) *Identify for each one-time publication:* Nothing to Report.

##### 4) *Other publications, conference papers and presentations:*

###### **Poster Presentations – Total is 6.**

- Poster presentation by J. Alam (PVAMU) on “A Smart IoT-Based Monitoring System of Earthen Slope,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Poster presentation by V. Demetracoupoulou (RU) on “Integrating Equity into Transportation Asset Management: Identifying Metrics and Challenges,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Poster presentation by S. Gonnabathula (TAMU) on the “Use of Innovative Geosynthetics to Improve the Resiliency of Highway Embankment Slopes Under Extreme,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Poster presentation by P. Hofferichter (TTI) on “Strategies to Improve Cracking Performance of Asphalt Mixtures with High RAP Content,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Poster presentation by T. Pisani (RU) on “Equity & Safety: Hand in Hand on the Road to Success,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Poster presentation by B. Prieto (TTI) on “Necessary Infrastructure Accommodations for Automated Trucks and Truck Platoons,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.

###### **Presentations – Total is 5.**

- Presentation by J. Braley (RU) on “Understanding RC Deck Performance through Accelerated Testing,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Presentation by C. Gurganus (TAMU) on the “Lessons Learned with Heavy Highway Workforce Development,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Presentation by J. Perkins (PVAMU) on the “FAST Act and BIL Act: High Impactful, Innovative, and Transformative Infrastructure Projects/Programs & Welcome to the National Center for Infrastructure Transformation,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Presentation by A. Puppala on “Remote Sensing Technologies for Civil Infrastructure Health Monitoring and Asset Management,” occurred at the Second Joint Workshop of Korean Geotechnical Society and ASCE Geo-Institute, August 9, 2024.

- Presentation by Md Fyaz Sadiq (MSU) on the “Performance Evaluation of Wicking Geotextile for Improving Drainage and Stiffness of Road Foundation,” occurred at the National Road Research Alliance, Minneapolis, MN, May 1, 2024.

**Keynote Presentation – Total is 1.**

- Keynote Presentation by P. Szary (RU) on the “UTC Grant – A Launching Pad for a Larger Center” occurred at the 2024 CUTC Summer Meeting, South Padre Island, TX, June 11, 2024.

**Live Demonstrations – Total is 2.**

- Demonstration by H. Ozer (ASU), N. Vedula, and M. Beheshti on the “Unmanned Aerial-Vehicle Assisted Real-Time Construction Quality Support System for Pavements,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.
- Demonstration by S. Congress (MSU) on the “Eye in the Sky: Transportation Infrastructure Condition Monitoring Using UAVs and AI,” occurred at the 2024 USDOT Future of Transportation Summit, August 13-15, 2024.

**Workshop Presentation – Total is 1.**

- T. Pisani (RU) Co-organized the “Workshop to Broaden the Diversity of the Skilled, Technical Transportation Workforce” with the National Academies of Sciences, Engineering, and Medicine, Washington DC, September 18-19, 2024.
  - T. Pisani (RU), Took part in Workshop Panel #1 titled “Recruitment of Diverse Populations and Addressing Employment Barriers,” and Panel #4 titled “Resources and Funding.”

*b. Website(s) or other Internet site(s).*

NCIT will continue to be a national showplace through the Internet and social media platforms such as Facebook, Instagram, Twitter, and YouTube to transfer research results to practitioners and the research community. The site provides comprehensive information about NCIT and its programs/projects. Updates to the NCIT website will occur on a continual basis. To directly access NCIT’s nineteen active research projects use the following link [<https://ncit.pvamu.edu/projects/>].

*c. Technologies or techniques.*

Nothing to Report.

*d. Inventions, patent applications, and/or licenses.*

Nothing to Report.

*e. Other products, such as data or databases, physical collections, audio or video products, application software, analytical models, educational aids, courses or curricula, instruments, equipment, or research material.*

Nothing to Report

**4. OUTCOMES**

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*a. Increased understanding and awareness of transportation issues.*

Nothing to Report.

*b. Passage of new policies, regulation, rulemaking, or legislation.*

Nothing to Report.

*c. Increases in the body of knowledge.*

Nothing to Report

*d. Improved processes, technologies, techniques, and skills in addressing transportation issues.*

Nothing to Report.

*e. Enlargement of the pool of trained transportation professionals.*

The eleven graduates of the HWCP Cohort #2 are gainfully employed in the highway construction field.

*f. Adoption of new technologies, techniques, or practices.*

Nothing to Report.



## 5. IMPACTS

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- a. *What is the impact on the effectiveness of the transportation system?*  
Nothing to Report.
- b. *What is the impact of technology transfer on industry and government entities, on the adoption of new practices, or on research outcomes which have led to initiating a start-up company?*  
Nothing to Report.
- c. *What is the impact on the body of scientific knowledge?*  
Nothing to Report.
- d. *What is the impact on transportation workforce development?*
  - **ASU**  
Jolina Karam – Civil Engineering Doctoral Student. She will continue as a Postdoc working with NCIT’s ASU consortium partner – Spring 2024.
  - **BCD**  
The eleven graduates of the HWCP Cohort #2 are gainfully employed in the highway construction field. TTI is tracking post-graduation employment.
  - **PVAMU**  
George Ugochukwu Ekechukwu - Computer Science Master Student - Spring 2024  
Shaykh Siddique – Computer Science Master Student - Spring 2024  
Marolina Alicia Thomas - Digital Media Undergraduate Student - Spring 2024  
Tye A. Fairley - Construction Science/Architecture Undergraduate Student – Summer 2024

## 6. CHANGES/PROBLEMS

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- a. *Changes in approach and reasons for change.*  
Nothing to Report.
- b. *Actual or anticipated problems or delays and actions or plans to resolve them.*  
Nothing to Report.
- c. *Changes that have a significant impact on expenditures.*  
Nothing to Report.
- d. *Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards*  
Nothing to Report.
- e. *Change of primary performance site location from that originally proposed.*  
Nothing to Report.

## 7. SPECIAL REPORTING REQUIREMENTS

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NCIT completed the Exhibit D Form for one new project and entered required information for these new projects into the TRB’s RiP Database (<https://rip.trb.org/>).

