Center for
Healthy and Efficient Mobility
CHEM
A USDOT University Transportation Center

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Overview

As mentioned in the previous reporting period, in March 2025, in compliance with latest United States Department of Transportation directives, The Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) was renamed as the Center for Healthy and Efficient Mobility (CHEM). CARTEEH was originally established under the Fixing America's Surface Transportation (FAST) Act as a Tier 1 UTC in 2016. The Texas A&M Transportation Institute (TTI) has led this UTC consortium (Fig 1) and provided impactful research results that transferred into practice, and effective education and workforce training programs. In 2022, when competing for the center to be renewed under the Infrastructure Investment and Jobs Act (IIJA) the CARTEEH consortium put forward a proposal that was aligned with the Notice of Funding Opportunity released at the time, which reflected the previous administration's policy goals. In 2025, with the USDOT issuing new directives focused on safety, efficiency, and economic impact, CARTEEH proactively restructured and rebranded as the Center for Healthy and Efficient Mobility (CHEM). This transformation reflects a streamlined mission: to advance transportation efficiency, promote public health, and deliver economic benefits through mobility. CHEM has phased out programs that no longer align with the department's core mission and has reoriented its research to support transportation efficiency and public health. CHEM's new direction—centered on healthy and efficient mobility—echoes this by 1) Prioritizing transportation sector efficiency, 2) Reducing adverse impacts on families and communities and promoting health, including a focus on transportation safety and 3) Promoting economic benefits and mobility through transportation.

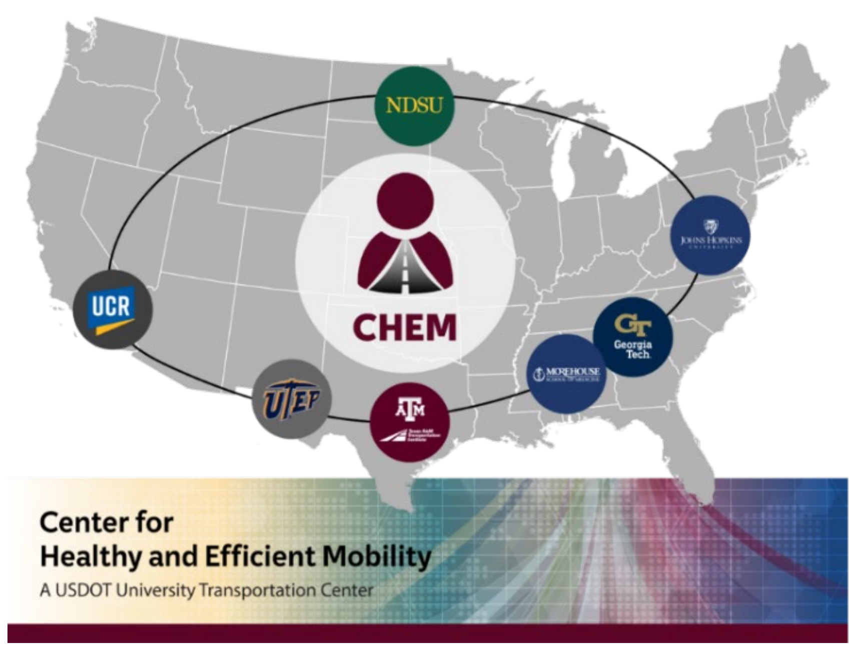

Figure 1. CHEM Consortium Members.

This semiannual progress report, covers the 6-month period immediately after the realignment of CARTEEH to CHEM. Due to this, the report focuses more on some of the strategic planning and redirection that CHEM has undertaken, while several projects were paused and realigned to ensure compliance with federal directives.

1. Accomplishments

Major Goals of the Program

CHEM's mission will now focus on advancing healthy and efficient mobility, with a focus on improving transportation efficiency, promoting health, reducing adverse impacts of transportation on families and communities and promoting opportunities for access and economic benefit. While CHEM is still classified under the IIJA focus area of "Preserving the Environment", our realignment has broadened our emphasis to a more mobility-centric, safety-driven and technology-forward research portfolio.

Redefining CHEM Partner Focus Areas

With this realigned approach, the CHEM consortium still prioritizes synergies between the consortium members. Each partner brings a unique role and expertise to the CHEM consortium keeping in mind these new focus areas, as summarized below.

Table 1. Consortium Member Expertise

Consortium Member	Key Role/Expertise in CHEM
Texas A&M Transportation Institute (TTI)	TTI serves as the lead institution and brings a broad range of transportation expertise as the nation's largest university-based transportation research center. TTI will focus on bridging research to practice and accelerating innovation and commercialization.
Johns Hopkins University (JHU)	JHU brings a wealth of public health, human factors, and engineering expertise which will be leveraged for policy-relevant research outputs.
Georgia Institute of Technology (GT)	GT will focus on advanced modeling, simulation, and data incorporating AI and emerging methods for technology deployment.

University of Texas at El Paso (UTEP)	UTEP will leverage its expertise on environmental and health topics and transportation infrastructure to address risk, resilience, emergency preparedness.
University of California, Riverside (UCR)	UCR will provide freight- and goods-movement focused expertise leveraging their facilities and capabilities that include real-world testing and data collection.
Morehouse School of Medicine (MSM)	As a premier medical institution, MSM will support research on healthy and efficient mobility with a focus on health promotion, safety, and community health applied to transportation.
North Dakota State University (NDSU)	NDSU will apply its vast transportation sector experience and expertise in rural and tribal areas with a focus on access, efficient mobility and safety.

The following sections provide a high-level discussion of activities in-progress and planned during this reporting period under the goal areas of research, education, and technology transfer, which we will continue to build on during future reporting periods of this grant.

CHEM Goal #1: Research Program

Completion of Year 1 Collaborative Research Projects

In this reporting period, several of the Year 1 collaborative projects were completed. As several of these projects included elements that had to be rescoped or realigned, we are in the process of reviewing final reports and materials and will amend and publish these reports in the following reporting period.

Initiation of Year 2 Research Projects

CARTEEH had issued a call for proposals in Fall 2024 that were in the process of being awarded prior to the release of new USDOT directives and the subsequent renaming and realigning of the center as CHEM. Therefore, individual projects (summarized in Table 2) were initiated after realigning them as necessary to address new priorities and directives. Detailed progress on these projects will be provided in the next reporting period, as several of these projects have only recently been fully rescoped and initiated.

Table 2. Year 2 Project Portfolio

Project	Institution	PI	Title
02-01-UCR	University of California, Riverside	Georgios Karavalakis	Microplastic Air Pollution from the Wear of Vehicle
02-02-JHU	Johns Hopkins University	Johnathon Ehsani	Healthy Micromobility: Moving From Crisis to Opportunity
02-03-UTEP	University of Texas at El Paso	J. Choi	Digital Twin Modeling of NOx Formation from Transient Vehicle Operations in Hilly Terrains
02-04-UTEP	University of Texas at El Paso	Anantaa Kotal	Bridging Data Gaps with Modeled Data from Generative AI: Advancing Health in Transportation Research
02-05-UTEP	University of Texas at El Paso	Jaeyoon (Jason) Kim	Evaluating the Cumulative Impact of Environmental Conditions on Stress Levels in Micromobility Users: An AI-Driven Multimodal Approach
02-06-JHU	Johns Hopkins University	Allison Barlow	Data Driven Evaluation of the Transportation Barriers to Water Access on the Navajo Nation
02-07-GT	Georgia Institute of Technology	Daniel Hunsaker	Pedestrian Route Choice and Traffic Exposures: A Case Study in Downtown Atlanta
02-08-NDSU	North Dakota State University	Ranjit Godavarthy	Evaluating Efficiency of Rural Transit Systems
02-09-TTI	Texas A&M Transportation Institute	Minjie Xu	Health and Activity Impacts of Student Commute Modes
02-10-TTI	Texas A&M Transportation Institute	Joan Hudson	Transportation and Mental Health in Central Texas Using 211 Call Center Data – An Exploratory Analysis
02-11-TTI	Texas A&M Transportation Institute	Tom Sanchez	Enhancing Rural Public Transportation Through Community Engagement and Technology
02-12-TTI	Texas A&M Transportation Institute	Kunhee (KC) Choi	Pavement-Maintenance-GPT: Optimizing Pavement Maintenance Decisions Using Generative AI
02-13-TTI	Texas A&M Transportation Institute	Haneen Khreis	Integrated Transportation and Health Impact Modeling Tool for U.S. Cities
02-14-TTI	Texas A&M Transportation Institute	Deanna Belden	Destination Access and Health – Data Exploration
02-15-UCR	University of California, Riverside	Heejung Jung	Improving Vehicle Cabin Air Quality in Daily Transportation
02-16-MSM	Morehouse School of Medicine	Fengxia Yan	A Data Framework: Factors Influencing Transportation and Health at the Atlanta Neighborhood Planning Unit (NPU) Level

Project	Institution	PI	Title
02-17-GT	Georgia Institute of Technology	Ziming Liu	Real-Time Corridor Modeling and Health Impact Assessment using Dynamic Vehicle Fleet Composition Data

Selection of Year 3 Projects

With the release of Year 3 funds and the changed requirements for DOT approval of research projects prior to commencing work, CHEM has identified a set of Year 3 projects (with total funding, including matching funds, of nearly $2 million) to put forward for consideration. This set of Year 3 projects focus on leveraging AI for efficiency and developing new technologies and methods. Projects include those covering rural areas, addressing the needs of communities, using AI to power infrastructure decisions and efficiency, advanced modeling, advanced air mobility, and co-optimizing mobility and health. CHEM also plans to work on commercialization opportunities and seek to bring technology to market, to ensure our work has broader impacts. We will also ensure that we collaborate synergistically with other UTCs undertaking similar work, to ensure that our projects and efforts are complementary and not duplicative of activities undertaken elsewhere within the UTC program.

Research Results Disseminated

As projects have progressed, research results have been accepted for presentation at events such as the 2026 Transportation Research Board Annual Meeting and other conferences. However, given the realignment of the center's priorities and focus, dissemination of research results have been limited.

Plans for Next Reporting Period to Accomplish Research Goal

In the next reporting period, the ongoing and newly initiated projects will be continued, and Year 3 projects will commence following DOT review and approval of the submitted project abstracts.

CHEM Goal #2: Education and Workforce Development

Under education and workforce development, CHEM will continue to mentor the future transportation workforce and train and inform practitioners. Our programs include research assistantships and summer internships for university students and programs for high schoolers and community health workers. Some notable initiatives during this reporting period include:

Summer Internship Program

CHEM's fifth annual Summer Internship program concluded on August 1, 2025.

CHEM welcomed five outstanding undergraduate students to our Summer Internship Program, hosted in collaboration with two other UTCs at TTI, the National Center for Infrastructure Transformation (NCIT) and the Southern Plains Transportation Center (SPTC). Interns worked full-time alongside TTI researchers on projects related to healthy and efficient mobility. Over the 10-week program, interns conducted hands-on research, participated in professional development workshops and tours, and wrapped up with final presentations (Fig 1). The students and their research topics were as follows:

- Ela Aldrete, University of Arizona – LCAPave Tool and Concrete Paving Sustainability
- Vainavi Chilukuri, Texas A&M University – Assessing Student Exposure to In-Cabin Pollution
- Cassidy Irwin, Eastern Connecticut State University – Transportation Stress – A Silent Threat to Public Health
- Jackson Reasoner, Texas A&M University – Exploring the Connection Between Destination Access and Public Health
- Magalie Salomon, Howard University – Leveraging Artificial Intelligence in Sustainable Transportation Research: A Literature Review

Figure 1 CHEM summer interns (along with other UTC interns) at their final presentation

Student Involvement

In addition to our flagship internship program, several students are engaged as part of ongoing projects. In this reporting period, projects across the member institutions involved several students from different majors as shown in Table 3.

Table 3. Students involved in CHEM Activities in this Reporting Period

Academic Level	Number of Students	Program of Study/Majors
Bachelor's	20	Civil and Environmental Engineering, Computer Science, and City and Regional Planning
Master's	15	Master of City and Regional Planning (MCRP) and the Master of Science in Geographic System, Master of Public Health, Civil and Environmental Engineering, and City and Regional Planning, Education
Ph.D.	7	Civil and Environmental Engineering, Exposure Sciences and Environmental Epidemiology, Transportation, Logistics, and Finance

Education and Workforce Development Results Disseminated

Nothing to report.

Plans for Next Reporting Period to Accomplish Education and Workforce Development Goal

For the next reporting period, the team will continue to expand on the involvement of students in center activities and plan for the 2026 Summer Internship Program.

CHEM Goal #3: Technology Transfer and Collaboration

In this reporting period, most of our usual technology transfer and collaboration activities were paused as we refocused and realigned our centers' activities. The update of the center's website continued with an ongoing review and removal of materials that are no longer compliant with current USDOT guidelines.

Plans for Next Reporting Period to Accomplish Technology Transfer and Collaboration Goal

In the next reporting period, we plan to resume several traditional technology transfer activities (webinars, etc) that were paused while our UTC was undertaking a realignment. Further, we plan to initiative targeted technology and commercialization focuses activities to ensure our technology transfer and collaboration goals are further expanded.

2. Participants and Collaborating Organizations

Organizations Involved as Partners

The CHEM consortium is a seven-member consortium led by the Texas A&M Transportation Institute (TTI)—part of The Texas A&M University System. Other members include The University of Texas at El Paso, Johns Hopkins University, Georgia Technology University, University of California at Riverside, Morehouse School of Medicine, and North Dakota State University. The team members from the various partner universities have begun to collaborate on their projects and are refining plans for other CARTEEH activities.

Other Collaborators and Contacts

Table 5 lists organizations our consortium members interacted substantively in the context of center activities during this reporting period. While we typically include a larger list of collaborating institutions and also identify individuals we have collaborated with, this reporting period had more limited activities on this front due to the focus on realignment of our activities.

Table 5. Organizations Interacted with During the Reporting Period on CHEM Related Activities

Organization Name	Location	Contribution
Georgia Department of Transportation (GDOT)	Atlanta, GA	Collaboration, data sharing, access to traffic and roadway datasets
Texas Department of Transportation (TxDOT)	Austin, TX	Discussion of innovation hub and commercialization partnership
Austin ISD	Austin, Texas	Collaboration
North Central Texas Council of Governments	Arlington, Texas	Collaboration
El Paso Metropolitan Planning Organization (MPO)	El Paso	Provided Traffic Demand Model (TDM) shapefiles
Atlanta Regional Commission (ARC)	Atlanta, GA	Land-use data sharing and analytical support

City of Atlanta Neighborhood Planning Unit	Atlanta, GA	NPU partner
City of Atlanta Department of Transportation	Atlanta, GA	City Transportation planning and data source
Southern California Association of Governments	Los Angeles, CA	Share regional transportation model for use in the Year 1 collaborative research project
California Attorney General's Office	Sacramento, CA	Provide matching fund for the work done as part of the Year 1 collaborative research project
Baltimore City Public Schools (BCPS)	Baltimore, MD	Access to facilities

3. Outputs

The CHEM website (https://chem.tti.tamu.edu) has been updated to differentiate products and outputs from the CARTEEH center under the FAST Act Grant and BIL Grant as well as the new CHEM activities.

Journal Publications

Nothing to report.

Conference Paper Acceptances (TRB Meeting 2026)

Transportation Research Board Annual Meeting, Microtransit Adoption by Rural Communities and Rural Transit Agencies, Ranjit Godavarthy, Jeremy Mattson, Bright Parker Quayson, Washington, DC, January 2026

D., Sammour, F., and Zhang, Z. (2026). "Pavement-Maintenance-GPT: Facilitating Pavement Maintenance Decisions through Multimodal Large Language Model." Preprints of the Transportation Research Board 105th Annual Meeting, Transportation Research Board, TRB, National Research Council, Washington, D.C., January 11-15.

Liu, Z., H. Lu, A. Guin, and R. Guensler. "A Multi-Stage Machine Vision Framework for Comprehensive Vehicle Attribute Recognition Using Freeway Video Data." Submitted for presentation at the 105th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2026 (Accepted).

Liu, Z., H. Lu, A. Guin, and R. Guensler. "Can We Use Electric Vehicle Penetration Rates in Project-Level Energy Use and Emission Modeling." Submitted for presentation at the 105th Annual Meeting of the Transportation Research Board, Washington, D.C., January 2026 (Accepted).

Minjie Xu, Vainavi Chilukuri, Vainavi Chilukuri, Madhusudhan Venugopal, Tara Ramani, Bumsik Kim; Assessing Student Exposure to In-cabin PM2.5 and Black Carbon in School Buses;

Books or Other Non-Periodical, One-Time Publications:

Nothing to report.

Other Publications, Conference Papers, and Presentations

Presenters Name(s):	Liu, Z., H. Lu, Hunsaker, D., A. Guin, and R. Guensler
Presentation Title:	Machine Vision Assessment of Lane-Level Fleet Composition and the Implications for Freeway Energy Use
Event:	Poster Session at 2025 GDOT Expo, Sept. 10, 2025
Location:	Atlanta, GA

Presenters Name(s):	Hunsaker, D., G. Ames, A. Oshri, I. Pathak, A. Guin, and R. Guensler
Presentation Title:	Atlanta Sidewalk Infrastructure Assessment: Methods to Support Impedance-based Routing
Event:	Poster Session at 2025 GDOT Expo, Sept. 10, 2025
Location:	Atlanta, GA

Presenters Name(s):	Pathak, I., D. Hunsaker, A. Oshri, A. Guin, and R. Guensler
Presentation Title:	Developing an Enhanced Complete Paths Pedestrian Network for Use in Impedance-Based Routing in Downtown Atlanta
Event:	Poster Session at 2025 GDOT Expo, Sept. 10, 2025
Location:	Atlanta, GA

Presenters Name(s):	Liao, Y., Xu, L., Hao, P., Porter, W., Barth, M., and Boriboonsomsin, K.
Presentation Title:	Enhancing Air Quality Impact Assessment of Freight-related Emission with Large-Scale, Real-World Truck Activity Data
Event:	CRC Real-World Vehicle Emissions Workshop
Location:	Long Beach, April 13-16, 2025

Presenters Name(s):	Liao, Y., Hao, P., Boriboonsomsin, K., and Barth, M.
Presentation Title:	Developing an Integrated Activity-based Simulation Model for Freight Transportation in Inland Empire, California

Event:	2025 International Urban Freight Conference
Location:	Los Angeles, April 9-11, 2025

Presenters Name(s):	Haneen Khreis
Presentation Title:	Transportation and Health: What Do We Know
Event:	Health Effects Institute and Africa Clean Air Network. 26 September 2025.
Location:	Online

Presenters Name(s):	Haneen Khreis
Presentation Title:	Description, Development and Application of the Integrated Transport and Health Impact Modelling Tool
Event:	Health Effects Institute Annual Conference. 4 – 6 May 2025.
Location	Austin, Texas

Technologies or Techniques

Nothing to report.

Inventions, Patent Applications and/or Licenses

Nothing to report.

4. Outcomes

Nothing to report.

5. Impacts

Nothing to report.

6. Changes/Problems

Nothing to report.

7. Special Reporting Requirements

Nothing to report.