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**Program Progress Performance Report for University Transportation Center at  
Johns Hopkins University**

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**Submitted to** U.S. Department of Transportation  
Office of the Assistant Secretary for Research and  
Technology (OST-R)

**Grant Number:** 69A3552348325

**Project Title:** **Center for Climate-Smart Transportation (CCST)**  
Consortia member:

- Diné College, Tsaile, AZ 86556
- Massachusetts Institute of Technology, Cambridge, MA 02139
- Morgan State University, Baltimore, MD 21251
- University of Texas at Austin, Austin, TX 78712
- University of Utah, Salt Lake City, UT 84112

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**Submitting Official:** Same as above

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**Recipient Organization:** Johns Hopkins University

**Grant Period:** June 1<sup>st</sup>, 2023 - May 31<sup>th</sup>, 2028

**Reporting Period End Date:** September 30, 2024

**Report Term:** Semi-annual

**Signature:** 

**1. ACCOMPLISHMENTS: What was done? What was learned?  
What are the major goals and objectives of the program?**

**MISSION:**

The Center for Climate-Smart Transportation (CCST) is a consortium of 6 universities including Diné College, Massachusetts Institute of Technology(MIT), Morgan State University(MSU), University of Texas at Austin(UT), University of Utah (UU) and led by Johns Hopkins University(JHU). CCST's proposed research, education, leadership and technology transfer programs and activities are inspired by the urgent call for an evidence-based research agenda that goes beyond scientific merits, focuses on solutions and is practice-ready and would result in changes in transportation policy and practice, making climate change the center of transportation decisions as emphasized in the USDOT Strategic Plan Goals and the USDOT Climate Adaptation and Resilience Plan. CCST contributes to this mission in the following focus areas:

**CATEGORY #1: Research**

**GOAL 1: CCST PROPOSES MULTIDISCIPLINARY RESEARCH IN FIVE BROAD AREAS:**

Focus Area 1: Promoting Climate Culture in All Levels of Transportation Decisions by focusing evidence-based research agenda that goes beyond scientific merits, focuses on solutions and is practice-ready and would result in changes in transportation policy and practice.

Focus Area 2: Community-Centered Solutions to Environmental Justice by empowering communities to undertake their own investigations and actively engage in actions and decision-making.

Focus Area 3: Accelerating the Mass Market Adoption of EVs & Alternative Fuels to make transportation sector as one of the biggest contributors to VMT/GHG emission.

Focus Area 4: VMT & GHG Reduction via Modal Shift and Changes in Travel Behavior by expanding the policy-oriented efforts in public transit use, promote practices toward climate-responsible urban development to reduce VMT/GHG emission.

Focus Area 5: Smart Cities & Innovative Adaptation and Mitigation Technologies by developing and implementing a sustainable, scalable, and transferrable method for collaborating with communities to co-create solutions that meet their needs and align with their values.

**GOAL 2: COMPETITIVE, PEER REVIEW PROJECT SELECTION PROCESS**

- CCST projects for the year 2-5 are selected through a Request for Proposals (RFP) process. (First year projects are selected based on initial grant proposal.)
- RFPs are open to faculty at member insinuations. All faculty members, postdocs and research associates are eligible to submit research, education and technology transfer project proposals responding to CCST RFPs.
- Proposal evaluation and selection process are based on external peer review and rely on the expertise of practitioners and researchers nationally.

**GOAL 3: DIVERSE RESEARCH GRANT CATEGORIES**

*RFP process:* CCST will prioritize projects that are multidisciplinary and multimodal and promotes diversity and inclusion through the CCST RFP. Projects that are solutions-based and practice-ready and would make impactful changes on transportation practice

and policy. CCST will prioritize projects that focus on diversity and equity and involve underrepresented students, untenured junior faculty and researchers from multiple disciplines & universities. In addition, CCST's *High Impact Project(s): From Research to Policy and Practice* builds upon the previous cutting-edge research of consortium members to transform them into actionable outcomes for practitioners in partnership with transportation agencies, local governments, private sector and non-profit community organizations. This project aims to demonstrate practice-readiness and has at least three non-academic partners.

#### **GOAL 4: ENHANCE COLLABORATIVE RESEARCH & PARTNERSHIP OPPORTUNITIES**

- *External Advisory Board:* The Advisory Board will help CCST to identify transformative research topics, to define CCST's annual plan and strategies and to connect with appropriate partners.
- *Project Stakeholders and Partners:* As part of RFP package, CCST requests each PI to establish two partnering relationships with local, state or national organizations to implement the project results.
- *Diverse Internal Collaborations:* CCST encourages Multi-modal, multi-disciplinary and multi-university collaborations across disciplines and our areas of research covers expertise from engineering, planning, public policy, business, social science & big data.

#### **CATEGORY #2: Education and Workforce Development**

CCST's education and workforce development goals are centered around the creation of pre-college, undergraduate and graduate programs and professional development learning opportunities.

#### **GOAL 1: ATTRACT AND EDUCATE PRE-COLLEGE STUDENTS**

- *Sustainable Energy Education Program:* CCST will develop a nation-wide online course on sustainable energy education. It will host high school students for a summer course to train them on sustainable energy solutions to climate change, educational opportunities, and career paths.
- *COMTO Minority Initiative:* CCST will partner with the Maryland Conference of Minority Transportation Officials (COMTO) on a scholarship program to provide mentorship and introduction to STEM education.

#### **GOAL 2: ATTRACT AND EDUCATE UNDERGRADUATE AND GRADUATE**

**STUDENTS:** CCST is committed to enhance educational programs in Climate-Smart Transportation by designing and offering the following courses/programs:

- *Climate and Transportation Leaders Training:* CCST will develop a set of training opportunities on *Climate and Transportation Leadership* which will be open to undergraduate and graduate students of all majors.
- *Graduate Concentration in Citizen Science and Environmental Justice (CSEJ):* This track will be offered to graduate students in transportation-related degrees within our consortium with the goal to train future transportation workforce with novel tools and approaches designed for empowering minority communities to actively participate in decision-making.
- *Energy Minor for Undergraduate Students:* CCST plan to create a new course on Clean Energy and Transportation: Opportunities and Challenges which will be integrated into the Energy Minor at Johns Hopkins University.

- *Undergraduate Experiential Learning Program*: In collaboration with center for Community Health (CHARMED) at JHU, CCST seeks to promote opportunities for undergraduate students to involve in research in transportation and climate change with CCST-funded research projects.

**GOAL 3: PROVIDE RESEARCH OPPORTUNITIES TO UNDERGRADUATE AND GRADUATE STUDENTS:**

- *Experiential Training Opportunities through Students' Involvement in Research Projects*: CCST requires research projects to include undergraduate and graduate students and offer training opportunities for research in transportation and climate change with the goal of expanding the workforce pool and diversity of new professionals.
- *Student Competitions, Fellowship and Scholarship Programs*: To demonstrate our commitment to the ongoing education for students, CCST will offer competitive scholarships, fellowships, assistantships and awards to attract students, especially those from underrepresented populations, as following:
  - *Climate Change and Transportation Competition*
  - *Environmental Justice Scholarship*
  - *Student-led Publications and Presentations*

**GOAL 4: PROFESSIONAL DEVELOPMENT OPPORTUNITIES**

- *CCST Net-Zero Emission Academy (NEA)*: CCST will develop and implement a virtual academy, tailored particularly for local government transportation leaders and decision-makers. Our curriculum will cover a range of topics from best practices of paths to next-zero emission, innovative technologies, equity considerations and effective policy interventions.
- *Data for Environmental Justice Workshop*: CCST will offer a day-long virtual workshop particularly designed for transportation staff to build data-driven public sector that fairly and justly uses data, research and analytics to better understand the complex nature of environmental justice challenges and implement policy interventions that lead to equitable outcomes.

**GOAL 5: PROMOTE EDUCATIONAL DIVERSITY BY PROVIDING EDUCATIONAL OPPORTUNITIES FOR MINORITY STUDENTS.** CCST is committed to offering opportunities for underrepresented students and researchers in all its educational, research and scholarship programs including:

- *Indigenous Communities Educational Initiative*: CCST recognizes the extreme gap in education and workforce training opportunities for Tribal communities and, in partnership with Dine College, is particularly committed to support educational and workforce development activities for this population group.

**CATEGORY #3: Engagement and Technology Transfer**

**GOAL 1: REGULAR DISSEMINATION OF INFORMATION FOR CCST PROGRAMS, EVENTS AND NEWS:**

- CCST Website and social media will be principal communication channels to both disseminate the research news and an online host for the news outlets to share CCST news with the broader audience.
- *CCST Subscription and Email Pipeline*: CCST research, news, events and updates are publicly accessible through subscription. CCST will send a quarterly e-newsletter to a list of recipients to drive interest and awareness in the center's programs.

- YouTube Channels: CCST YouTube channels also make CCST's recorded events, webinars, and other educational programs publicly accessible.

## **GOAL 2: EFFECTIVE DISSEMINATION AND IMPLEMENTATION OF EACH RESEARCH PROJECT**

- *Two-Page Policy Briefs*: Each project is required to produce a plain-language research brief written for decision- and policy makers.
- *Implementation plan*: CCST research proposals will identify a strategy for implementing their outcomes and/or research findings.
- *Webinar Series*: CCST projects are required to present a webinar session upon completion of the projects
- *Partnership Development*: CCST establishes extensive partnerships with a number of local/ regional and national organizations/communities to implement the results of each project's funding. Table 1 provides an overview of the partnerships initiated in the current reporting period.

### **What was accomplished under these goals?**

#### **Administrative Tasks**

- Created the CCST listserv consist of PIs, researchers, advisory board & students from members of CCST consortium universities to communicate webinars, announcements, news, and updates.
- Templates for final deliverables for YEAR1 projects were created and shared with PIs.
- Scheduled CCST Signature Webinar Series to highlight each project's key findings and policy implications to the CCST community, USDOT and other UTCs.
- CCST Director attended the *Future of Transportation Summit* in Washington DC on August 13-15 to share the most recent research, programs and initiatives with the DOT and UTC communities.
- CCST Associate Director attended the 2024 CUTC Summer Meeting at the UT South Padre and discussed the UTC best practices with other UTCs.
- CCST research projects were reviewed quarterly, and leadership's feedback was communicated with the project PIs and the CCST associate directors.
- Request for Proposals (RFP) for selecting the second-year funded projects was created and widely advertised to consortium universities by CCST's leadership and associate directors.
- More than 21 proposals for the second-year funding were received and currently are in the process internal review by the leadership to evaluate their alignment with the CCST's mission and focus areas.
- All 21 proposals have been also sent to at least two external reviewers for the peer review evaluation and scoring.
- Several of YEAR1 projects requested No-Cost Time Extension (NCE). These requests were reviewed by Center's leadership based on the project's progress so far and the NCE was approved, communicated and officially processed.
- CCST Held regular monthly meetings with the associate directors (members of the Executive Committee) to provide updates, receive feedback and discuss upcoming opportunities.
- Monthly meetings took place with the Director of the Office of Grants and Contracts at JHU pertaining financial updates to research and fellowship programs.

- Two postdoctoral positions for CCST were created and broadly advertised. Shortlisted candidates for this position are in the interview process.

### **Research**

#### YEAR 1 Research Project Updates:

- 2023\_01: *Climate Change Adaptation for Active Transportation: What Are American Cities Doing?* (Lead: U of Utah): Expected Completion: Dec 2024
- 2023\_02: *Predicting the impacts of mixed-use development on vehicle miles travelled.* (Lead: U of Utah): Expected Completion: Dec 2024
- 2023\_03: *The 15-Minute City Quantified Using Mobility Data* (Lead: MIT): Completed, waiting for final deliverables.  
The results were published in Nature Human Behavior interdisciplinary journal with significant citations and impact.
- 2023\_04: *A Granular Characterization of Mobility-Related Air Pollution Exposure Disparity* (Lead: MIT): Completed, waiting for final deliverables  
The results were published in Nature Cities titled: “Big mobility data reveals hyperlocal air pollution exposure disparities in the Bronx, New York City”.
- 2023\_05: *Green TOD: Concept, Framework, and the Empirical Case Study of Austin, TX* (Lead: UT): Expected Completion: Dec 2024
- 2023\_06: *Digital Twins as a Catalyst for Sustainable and Smart Cities* (Lead: UT): Expected Completion: Dec 2024
- 2023\_07: *Deploying Autonomous Robot Delivery System to Replace Truck Delivery and Reduce GHG Emission in Austin, TX* (Lead: UT): Expected Completion: Dec 2024
- 2023\_08: *Charging Forward: Crafting an Inclusive SMART Roadmap for Electric Vehicle Infrastructure in Navajo Nation, AZ* (Lead: Dine’ College, UT): Expected Completion: Dec 2024
- 2023\_09: *Factors Affecting Electric Vehicle and Public Charging Infrastructure Adoption in Baltimore, MD* (Lead: MSU): Expected Completion: Feb 2025
- 2023\_10: *Metropolitan Planning Organizations’ Long-range Transportation Plans: Best Practices in Sustainability, Equity, and Climate Change* (Lead: MSU): Expected Completion: Feb 2025
- 2023\_11: *National Investigation on the Environmental, Safety and Livability Impacts of Travel Lane Width: Evidence from 10 American Cities* (Lead: JHU): Completed, waiting for final deliverables  
The results have been widely disseminated and also submitted to two top transportation journals.
- 2023\_12: *How Actionable are Climate Action Plans? In-depth Analysis through an Integrated Policy Mix Framework* (Lead: JHU): Expected Completion: Dec 2025
- 2023\_13: *A Census of the US Climate-High Risk Area Population: Transportation and Environmental Justice Considerations* (Lead: JHU): Expected Completion: Feb 2025

## YEAR2 Project Selection and Funding Distribution:

The CCST's YEAR2 Request for Proposals was issued on August 26<sup>th</sup> 2024 and was widely distributed throughout the consortium by the CCST leadership and the Executive Committee to foster diverse, and multidisciplinary proposal submissions. A total of 21 proposals were received on October 7<sup>th</sup>.

All proposals are currently going through the internal and external peer review process to evaluate the quality, feasibility, impact and alignment with the CCST and USDOT strategic goals. The internal review is done by the CCST Director and Associate Director to evaluate the extent to which submissions are multidisciplinary and multimodal and promote diversity and inclusion. We aim to prioritize submissions that are solution-based and practice-ready and would make impactful changes on transportation practice and policy. We also evaluated and ranked proposals based on their alignment with the CCST focus areas, proposed scope and budget, proposed technology transfer activities, and contribution to diversity and inclusion.

The external peer review evaluates proposals based on their 1) creativity, originality of concept, 2) quality of science and methodology, 3) the likelihood of successful implementation in one year, 4) the level of community partnership and external collaborations, 5) potential impacts on policy/practice and 6) PIs' experience to conduct the research successfully. External reviewers have been also asked to assign an overall score and explain their rationale, highlighting the proposal's strengths and weaknesses.

CCST eventually will rank the proposals based on both internal and external review results and will select the top-scoring proposals for each institution. If top proposals require modifications as a result of the peer-reviewed process, we will ask the PIs to revise accordingly and resubmit before the final funding approval. We expect the review process to be completed by November 15<sup>th</sup> and new awards to have the official start date of December 1<sup>st</sup>.

## Other Research Updates:

- CCST leadership (Dr. Shima Hamidi, Director and Dr. Ebrahim Azimi, Associate Director) has secured a 3-year, \$1.2 million from the Bloomberg American Health Initiative (BAHI) as a matching fund for CCST through a competitive process. We have been invited to submit a proposal outlining a series of research, educational and outreach activities that would lead into impacts in health, transportation and climate change policies and practices. In June 2024, our proposal was selected from more than 10 center proposal submissions within Johns Hopkins Bloomberg School of Public Health.
- This award aims to foster collaboration opportunities between the CCST, and the Bloomberg Initiative. In addition, the Bloomberg Initiative brings a range of in-kind matching contributions to CCST including a unique network of active collaborators from cities to transit agencies and other state and local governments.
- All four YEAR2 JHU proposals are part of this collaborative effort. In addition, three high-impact research projects, as part of this collaboration, will start in YEAR3 and YEAR4. Other collaborative programs under this award include the "*Models for Change*" series and professional trainings such as "*Data for Climate Friendly Community Design Workshop*". We will report more details about these programs in future reports.

## **Education and Workforce**

### ATTRACT AND EDUCATE PRE-COLLEGE STUDENTS

Nothing to report in this period

### ATTRACT AND EDUCATE UNDERGRADUATE AND GRADUATE STUDENTS

- CCST student-led events: CCST sponsored The Smart Mobility and AI Symposium hosted at the University of Texas at Austin Campus on August 16<sup>th</sup>. The event gathered a diverse group of students, professionals, and academics from various disciplines to explore the transformative impacts of Autonomous Vehicles (AV), Electric Vehicles (EV), and Artificial Intelligence (AI) on transportation systems and urban climates. The symposium featured 8 distinguished speakers from industry and academia, who shared their cutting-edge work in smart mobility, clean energy, and intelligent transportation systems.
- With the matching financial supports from the Bloomberg Initiative, faculty members from Johns Hopkins and the University of Alabama are in the process of developing a course titled “*Data Analytics and Tools for Environmental Justice*”. This course aims to provide a foundational understanding of environmental justice and data analytics tools to a broad range of transportation, health and climate change disciplines. We plan to offer the course on a MOOC platform such as Coursera, to reach a wide range of audiences, including students, professionals, and concerned citizens, and empower them to contribute meaningfully to environmental discussions and decision-making. Adding EJ Screening tools and data analysis in the course equips participants with practical skills to assess environmental justice issues using publicly available data and tools. The course is scheduled to be offered in Summer 2025.
- The 15-Minute City project (2023\_03), led by MIT, have been integrated into two courses: 1) The curriculum developed by Dr. Fabio Duarte for the *Land Use and Transportation Planning* course at MIT's Department of Urban Studies and Planning, enriching the learning experience for students. 2) The project results were also incorporated in the lecture entitled “*Understanding Urban Mobility through Big Data*”, which Co-PI Santi delivered in Sept 2024 as part of the MitX online course on Transportation.
- The content and results of the Green TOD project (2023\_05) have been integrated in a graduate level course in the community and regional program at UT Austin and delivered by Dr. Ming Zhang in Spring 2024.
- Dr Junfeng Jiao offered a new graduate-level course, *Smart City and GIS*, in Spring 2024. The findings and policies collected for the project 2023\_08 (*Crafting an Inclusive SMART Roadmap for Electric Vehicle Infrastructure in Navajo Nation, AZ*) have been incorporated to this course.
- During this reporting period, a total of 18 undergraduate and graduate students have been supported to participate in CCST’s research programs. Through research assistantship positions, they will gain research skillsets, technical and experiential training opportunities. CCST consortium members also have trained 8 postdoc associates to work closely with lead faculty and obtain necessary trainings for a successful research-based career.



## **Engagement and Technology Transfer**

### **How have the results been disseminated? If so, in what way/s?**

- CCST has scheduled its monthly Signature Webinar Series for the 2024-2025 Academic Calendar to present the cutting-edge findings of the YEAR1 projects. The CCST leadership has been widely disseminated this announcement and schedule with the CCST community, the USDOT and the Bloomberg Initiative (to be shared with their extensive network of collaborating organizations).
- On June 17, 2024, officials from the USDOT including Dr. Robert Hampshire, Dr. Firas Ibrahim, Dr. Gretchen Goldman and Dr. Rolf Schmitt joined the JHU and CCST faculty and policy advocates for a roundtable discussion on evidence-based approaches to make both climate change and human health a pivotal part of national transportation infrastructure decisions. The event was hosted by the JHU Bloomberg School of Public Health and was livestreamed by C-SPAN and featured in the JHU website.
- On June 17, 2024, CCST organized a one-day event by inviting the USDOT officials, Maryland and Baltimore officials, Johns Hopkins University leadership team and faculty members at the JHU Bloomberg School of Public Health in Baltimore. Other attendees were the CCST Associate Directors and members of the Executive Committee from consortium universities. Each university presented their YEAR1 research projects, followed by discussions with the USDOT officials.
- The CCST Director was invited to attend the United States European Union Transportation Research Symposium entitled *Global Pathways to Net-Zero: Social, Behavioral, and Technological Research and Innovation Strategies for Transportation Decarbonization* (June 11-12) to be part of the U.S Team. Several research and educational collaboration opportunities with European partners were discussed during the event and is currently under publication (UN's WIPO Flagship Report on Future of Transportation).

Most CCST YEAR1 projects are still in progress (expected to be completed in December and February). However, a few have been completed and widely disseminated during this reporting period as following:

- The 15-min City project (2023\_03): The results have been widely disseminated through various channels. Following its publication in *Nature Human Behavior*, the paper has been downloaded over 6,000 times from Nature's website. Furthermore, the findings of the paper has been reported in multiple news outlets and tweeted over 40 times. According to Google Scholar, the paper has already gathered 14 citations, which is quite impressive considering that the paper has been published recently.
- The Air-Quality Disparity project (2023\_04): The findings of this project have been presented in 5 professional and academic events during this reporting period. In addition, an interview with project PIs was published in MIT news. This project has created a methodology that is intended to be used by the team for measuring air quality in other US cities. The PIs have also developed a website titled "Breathing Disparity" featuring an interactive map that tracks daily exposure to air pollution and exposure disparities in Bronx, NY (<https://senseable.mit.edu/breathing-disparity/>).

- Climate change adaptation for active transportation (2023\_02): The preliminary results were presented in a testimony to the FDOT District 4 Officials in June 2024, titled *Advancing Sustainability of Transportation System and Communities Through Planning, Projects, and Other Efforts*. Two manuscripts from this project have been submitted to top transportation journals such as TRR and Sustainable Cities and Society. These papers are also submitted to ACSP and TRB meetings for presentation.
- The autonomous delivery system for the Autonomous Robot Delivery (2023\_07) was tested in UT Campus (as a real-world deployment site) and a report was drafted to analyze system's efficiency and environmental benefits including the GHG emission reductions. In addition, the digital twin website was updated for the Digital Twin project (2023\_06) with additional features based on the project findings. Both projects were also presented in the Smart Cities and AI Innovations Symposium in Summer 2024.
- The Narrowing Lane Width project (2023\_11): during this reporting period, the PIs delivered two keynotes and two invited talks 1) at the Texas Pedestrian Safety Coalition in Houston, TX to more than 200 transportation, safety and public health professionals in May; 2) at the Future of Transportation Summit in Washington D.C in August; 3) at the Maryland Bike Symposium to discuss impacts of travel lane narrowing on bike safety with more than 100 mayors, community leaders and city council members in Maryland; and 4) in a day-long event organized by the University of Alabama and City of Huntsville, AL and a number of other community organizations. The last event created an opportunity to meet with the Huntsville City officials to discuss the possibility of narrowing lanes in the region as a fast growing and progressive city with major climate change and active transportation challenges.

**What do you plan to do during the next reporting period to accomplish the goals and objectives?**

**Research**

- We expect all YEAR 1 projects to be completed, and final deliverables will be submitted by lead PIs during the next reporting period (December 2024 through February 2025).
- Final report and other deliverables for YEAR1 projects will be reviewed, formatted and published on the CCST website. The final report will also be uploaded on the TIRD database.
- Finalizing the YEAR 2 research funding selection based on the results of internal and external peer reviews and completing the award notifications for funded projects. The notice of award will be sent to PIs highlighting the CCST's reporting requirements and deliverables. We expect the YEAR2 funded projects to be officially started on December 1<sup>st</sup>, 2024.
- Data management Plan for each YEAR2 funded project will be drafted, reviewed and approved.
- The graduate/undergraduate research assistants for CCST-funded YEAR2 projects will be hired. In addition, one CCST postdoctoral associate (new hire) will start their position in Winter 2025.
- A series of 2-page policy briefs will be published for each YEAR1 project, highlighting key findings and policy takeaways for transportation practitioners and policymakers. We

plan to widely disseminate policy briefs via the CCST website, various listservs, the Bloomberg Initiative and other consortium members' extensive network.

- In collaboration with the JHU Office of Communication and the lead university for each YEAR1 project, we plan for a series of press releases that feature each project's key findings and policy implications to maximize visibility and news coverage for each completed project.

### **Education and Workforce**

- *Innovative Applications of Data Science to Address Transportation and Environmental Challenges Course* will be developed by Associate Director Dr. Azimi during the next reporting period with the goal to go through the approval process by Summer 2025. The course will be designed to provide JHU graduate students with foundational knowledge of data science and an introduction to design and its implementation in climate change, transportation, and community design. Students can choose to focus on problem definition and solution design or alternatively they can focus mainly on solution implementation depending on their technical background and interests.
- *Introduction to Data Management, and Environmental Justice Tools: A proposal for offering this professional course* was submitted by the CCST Associate Director Dr. Azimi and the University of Alabama Professor Dr. Azita Amiri on September 2024 to the Bloomberg Initiative at JHU and is currently under review. If approved, the Bloomberg Initiative will provide \$15,000 which will be used as the CCST matching fund for course development. This course aims to provide a foundational understanding of environmental justice and data management to a broad audience of transportation and environment professionals. By offering this course on Coursera, we seek to reach a wide range of individuals, including students, professionals, and concerned citizens, and empower them to contribute meaningfully to environmental discussions and decision-making. The course is expected to be developed during Spring 2025 with the target launch date of Fall 2025.
- *CCST Student Leadership Council: the CCST student organization* has already been launched with representatives from consortium members. During the next reporting period, CCST will seek funding proposals for a wide range of student-led activities ranging from organizing events to workshops and outreach activities. The proposals will be evaluated by the CCST' leadership for their scope and potential to advance student training as well as inclusion of underrepresented population groups.
- *Environmental Justice Scholarship program will be initiated: This initiative* will award up to 3 scholarships on a competitive basis to a student project that focuses on a local pressing environmental justice issue caused by transportation decisions in the past and offer innovative solutions presentable to policymakers.
- *Climate Change and Transportation Travel Scholarship Program will be initiated: CCST* plans to award 8 to 10 mini-grants to students producing transportation-related scholarly research. The funding will be used to support student-led presentations at TRB and other flagship conferences and/or could cover the publication costs for student-led publications. We are in the process of developing an application form which will be shared widely with the CCST community late November.

- CCST Consortium members will continue offering courses and degrees in transportation, climate change and related fields. CCST requires PIs to incorporate their funded research in course design.

### **Engagement and Technology Transfer**

- *CCST Signature Webinar Series:* 10 Webinars have been already scheduled and shared with the CCST and DOT communities for the next reporting period. These Webinars will be delivered by the CCST PIs as a platform to share cutting-edge findings of their projects with a broader community of transportation, environment and public health students, professionals and academics. The sessions will be recorded and uploaded to the CCST YouTube channel and will be also featured in the CCST website.
- In addition, CCST will work with the Bloomberg American Health Initiative to disseminate findings from YEAR 1 projects through their extensive network of cities, transportation agencies, health departments and collaborating organizations.
- CCST leadership is invited to participate in the Bloomberg Summit on December 2<sup>nd</sup> to share findings of the lane width project (2023\_11) with more than 600 health, transportation and planning practitioners and policymakers across the country. We expect this event to generate significant collaboration and implementation opportunities.
- More than 16 papers and posters by CCST researchers will be presented during the TRB annual meeting in January 2025. We expect CCST to be extensively represented at the TRB meetings and in TRB committees. The full report will be provided in the next reporting period.
- *Website:* the CCST website will go through major updates to feature YEAR2 funded projects and showcase the final report and policy brief for YEAR1 research projects. The CCST will update and expand more detailed information on technology transfer activities for each research projects and their progress.
- CCST-funded implementation plans: CCST will work closely with projects' PIs to draft an implementation plan for each YEAR1 completed project based on established partnerships with local/regional and national organizations for future practical and policy implications as was proposed in their proposals. CCST will document these efforts and will report to the USDOT as part of potential Impacts.

#### **1. PRODUCTS:** What has the program produced?

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

CCST projects have led to 23 presentations/accepted abstracts and 11 journal submission/publications. The following list are examples of journal submissions and publications during this reporting period (we could not include the complete list due to the page limit):

- Testi, I., Wang, A., Paul, S., Mora, S., Walker, E., Nyhan, M., ... & Ratti, C. (2024). Big mobility data reveals hyperlocal air pollution exposure disparities in the Bronx, New York. *Nature Cities*, 1(8), 512-521.
- Salazar-Miranda, A., & Ratti, C. (2024). The trade-off between sustainability and social segregation in the 15-minute city. *Nature Human Behaviour*, 8(3), 418-419.

- Jiao, J., Choi, S. J., & Nguyen, C. (2024). Toward an equitable transportation electrification plan: Measuring public electric vehicle charging station access disparities in Austin, Texas. *Plos one*, 19(9), e0309302.
- Choi, S. J., & Jiao, J. (2024). Uncovering electric vehicle ownership disparities using K-means clustering analysis: A case study of Austin, Texas. *Journal of Computational Social Science*, 1-54.
- Choi, S. J., Jiao, J., & Mendez, T. (2024). Who owns Electric Vehicles (EVs)? The relationship between EV adoption and socio-demographic characteristics across different price segments and brands in the Texas triangle. *Research in Transportation Business & Management*, 57, 101225.
- Lewis, R. H., Jiao, J., Seong, K., Farahi, A., Navrátil, P., Casebeer, N., & Niyogi, D. (2024). Fire and smoke digital twin—A computational framework for modeling fire incident outcomes. *Computers, Environment and Urban Systems*, 110, 102093.
- Zhao, Y., Hu, S., & Zhang, M. (2024). Evaluating equitable Transit-Oriented development (TOD) via the Node-Place-People model. *Transportation Research Part A: Policy and Practice*, 185, 104116.
- Rigolon, A., Tabassum, N., & Ewing, R. (minor revision). Climate adaptation strategies for active transportation: Barriers and facilitators in U.S. cities. *Sustainable Cities and Society*.
- Tabassum, N., Rigolon, A., & Ewing, R. (2024). Climate change adaptation strategies for active transportation in US cities. 2024 American Collegiate Schools of Planning (ACSP) Conference. Seattle, WA.
- Ewing, R., Yang, W., Promy, N. S., Kaniewska, J., & Tabassum, N. (2024). Selective State DOT Lane Width Standards and Guidelines to Reduce Speeds and Improve Safety. *Infrastructures*, 9(9), 141.
- Hamidi S., Azimi, E. (under review) Are Wider Lanes Safer? Evidence From New York City submitted to *Sustainable Cities and Society*
- Hamidi S., Azimi, E. (under review) Examining Safety Impacts of Travel Lane Width in An Auto-Oriented City: Evidence from Dallas, TX submitted to *Transportation Research Part D*.

In addition, more than 16 papers and posters by CCST researchers have been accepted for presentation at the TRB Annual Meeting in January 2025 including the Urban Digital Twin project (2023\_06) and climate change adaptation by active transportation (2023\_01). Other major conference presentations include the Association of Collegiate Schools of Planning (6 paper presentations) and the Smart Cities and AI Innovations Symposium (one presentation).

In addition, the 15-Min City project led by MIT (2023\_03) has been presented and globally disseminated at the Senseable City Labs, including locations in MIT, Dubai, Amsterdam, Stockholm, and Rio de Janeiro. The other MIT project, A Granular Characterization of Mobility-Related Air Pollution Exposure Disparity (2023\_04) has been featured by MIT News and also on the cover page of MIT Institutional Website on July 31<sup>st</sup>, 2024.

### **Website(s) or other Internet site(s)**

In addition to updating and expanding the three previous CCST projects websites that were launched during the previous reporting period including the Narrowing Lane Width project (2023\_11) <https://narrowlanes.americanhealth.jhu.edu/>, the Digital Twins project (2023\_06) <https://austindigitaltwin.com/> and the 15-min City project (2023\_03) <https://senseable-us-15.com/>, during this reporting period two more websites were launched by the CCST consortium members:

- <https://senseable.mit.edu/breathing-disparity/> ; Launched by MIT  
Mobility-Related Air Pollution Exposure Disparity (2023\_04): Breathing Disparity is an interactive visualization website that tracks daily exposure to air pollution in Bronx, NY. The website also maps exposure disparities for each street of the Bronx and allow users to display the degree of exposure inequality based on income and race attributes. The findings and the associated website offer new directions for measuring exposure disparities from roads and its health outcomes.
- <https://sites.google.com/utexas.edu/smartmobilityaisymposium/home> ; Launched by UT Austin  
The website features the Smart Mobility and AI Symposium sponsored by CCST and hosted at UT Austin on August 16<sup>th</sup>, 2024. The event gathered a diverse group of students, professionals, and academics to explore the transformative impacts of Autonomous Vehicles (AV), Electric Vehicles (EV), and Artificial Intelligence (AI) on transportation systems and climate change. Full presentations could be requested via the website and cover topics related to clean energy integration, robot safety, last mile mobility solutions, electric truck innovations, and advancements in EV charging infrastructure.

### **Technologies or Techniques**

- The CCST project led by MIT titled *A Granular Characterization of Mobility-Related Air Pollution Exposure Disparity* (2023\_04) introduces a paradigm shift in measuring highly granular mobility-related air pollution exposures. Previous studies have typically measured air pollution exposure based on people's home locations without considering how individual mobility patterns might influence it. This study's cutting-edge data and methodology, does not just estimate air pollution exposure based on where people live or work, but uses big mobility data on individual trips to examine where people go during a typical day, building a more thorough assessment of the environment's impact on them. This research is the first to combine high resolution mobility and air pollution data, advancing the state-of-the-art of exposure science by providing granular exposure estimation associated with social inequality. It is instrumental for academics and practitioners working on environmental epidemiological and public health research as

well as evidence-based and equitable environmental policymaking. All data and developed methodology will be publicly available via the CCST and MIT’s Senseable City Lab websites.

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

Nothing to report for this period

**Other products, such as data or databases, physical collections, audio or video products, software or NetWare, models, educational aids or curricula, instruments, or equipment**

- The 15-Minute City project (2023\_03) led by MIT has developed novel metrics for 15-minute access and 15-minute usage, which were published alongside the paper in the *Nature Human Behavior* journal. These metrics are available at the city level for other researchers to use in further analysis. The data and codes can be accessed on the Journal’s website under the "Source Data" section and eventually via the CCST’s website.

**2. PARTICIPANTS & COLLABORATING ORGANIZATIONS: Who has been involved? What organizations have been involved as partners?**

CCST consortium members have been collaborating closely with more than 27 organizations such as the City of Boston MA, City of Austin TX, Baltimore MD, Salt Lake City UT, Baltimore Transit Equity Coalition, Texas Robotics, Wasatch Front Regional Council, New York City NY, MassDOT, UDOT, TXDOT, MDOT, Capital Metro, Baltimore Metropolitan Transportation Council, Navajo Nation Division of Transportation and Sacramento Area Council of Governments. These partnerships range from data sharing, cash and in-kind matches, student training and implementation partnerships. During the current reporting period, CCST faculty members have initiated 22 new collaborative opportunities. Table 2 presents a summary of recent partnerships, information about the status and nature of collaboration.

**Table 2: CCST New External Collaborations During the Reporting Period**

Partner(s)	Collaboration Type	Program/ project	Member Institution	Status*
University College Cork, Ireland,	Data sharing & advisory role	2023_4	MIT	3
Office of New Urban Mechanics, City of Boston	community engagement & data sharing	M2401 & M2403	MIT	2
Spectus/Cuebiq	Sharing large scale mobility data & computational resources	M2401	MIT	2
New York City DOT	Data sharing & urban traffic management expertise	M2402	MIT	2
MIT Center for Real Estate	Data sharing and advisory role	M2403	MIT	2

Oak Ridge National Laboratory	Data sharing and in-kind expertise support	MS2401	MSU	2
Baltimore Office of Sustainability	In-kind Advisory role	MS2402	MSU	3
National Renewable Energy Laboratory (NREL)	In-kind Advisory role	U2401	U of Utah	2
Utah Transit Authority	dissemination of results	U2403	U of Utah	1
High Valley Transit, UT	Data sharing & dissemination	U2404	U of Utah	2
Bloomberg American Health Initiative	Financial support (cash match) & dissemination	JHU2401-4	JHU	3
City of Huntsville, AL	Technology transfer	2023_11	JHU	1
University of Alabama	Research in-kind Collaborations	JHU2401	JHU	2
Hunter College, CUNY	Research collaborations, data sharing & advisory role	JHU2403 & JHU2404	JHU	3
JHU Business School	Research collaboration	White paper	JHU	3
Google LLC	Advisory role	T2403	UT Austin	2
Mobility Systems Lab (MSL)	Student Training		UT Austin	
DART Transit Authority	Data sharing & advisory role	T2406	UT Austin	2
North Central Texas Council of Governments	Data sharing & advisory role	T2406	UT Austin	2
Smart Charge America	Student Training	Education	UT Austin	3
Lone Star Clean Fuels Alliance	Student Training	Education	UT Austin	3
Electric Cab North America	Student Training	Education	UT Austin	3
* Status: 1. Initial arrangement 2. Agreement for collaboration made 3. Implementation phase 4. Completion				

### Have other collaborators or contacts been involved?

The Bloomberg American Health Initiative has awarded \$1.2 millions of matching funds to CCST for a range of high impact research, educational, and leadership programs in the next three years. This partnership will be transformative in a unique way to create a momentum in Environmental Challenges in relationship with Transportation and built Environment by bringing together an incredible team of JHU environmental faculty on the CCST Executive Team and collectively lead joint impactful research, outreach and training programs including 7 high-impact research projects as well as *Models for Change Series*, *Data for Climate Friendly Community Design Workshop* and *CCST-Bloomberg Bank of Problem Statements*. The Bloomberg Initiative will also be one of CCST's dissemination and technology transfer arms with its extensive network of cities, health and transportation agencies and other public and private sector collaboration organizations. We will report more details in the next reporting periods as we launch this award and its programs during the next three years.

### 3. **IMPACT:** What is the impact of the program? How has it contributed to transportation education, research and technology transfer?



### **What is the impact on the development of the principal discipline(s) of the project?**

- The Narrowing Lane Width Project (2023\_11) led by JHU has resulted in more than 14 media coverages, 10 interviews and podcasts. more than 24 cities, transportation departments' staff and elected officials (mayors, council members, state senators, etc.) have contacted PIs with interests to learn more about this work and requested technical assistance for implementing lane width reduction in their jurisdictions. To name a few, Maryland DOT, Caltrans, City of Fall Church, VA, City of Annapolis, MD, League of American Bicyclists, Ontario Traffic Council, Salt Lake City, UT and Streets for All have reached out expressing their interest in lane-width reduction in their jurisdictions. This project has been also selected to be featured in a panel discussion with Dr. Robert Hampshire during the Bloomberg Summit in December.
- In addition, Several CCST faculty members have incorporated their CCST research findings into their course contents in their universities enhancing learning opportunities. For example, the findings of 15-min City (2023\_03), Green TOD (2023\_05), and Digital twin (2023\_06) projects have been incorporated in undergraduate and graduate courses in transportation and urban planning. The concepts, data and technologies developed in these projects have immediate practical implications and contribute to the up-to-date and cutting-edge workforce development in transportation.

### **What is the impact on the other disciplines?**

Nothing to report for this period

### **What is the impact on development of human resources?**

Nothing to report for this period

### **What is the impact on physical, institutional, and information resources at the university and/or other partner institution?**

Nothing to report for this period

### **What is the impact on technology transfer (include transfer of results to entities in government or industry, adoption of new practices, or instances where research has led to the initiation of a start-up company)?**

Nothing to report for this period

### **What is the impact on society beyond science and technology?**

Nothing to report for this period

## **4. CHANGES/PROBLEMS**

### **Changes in approach and reasons for change**

Nothing to report for this period

### **Actual or anticipated problems or delays and actions or plans to resolve them**

Nothing to report for this period: Change in RFP and budget based on proposals received.

**Changes that have a significant impact on expenditures**

Nothing to report for this period

**Significant changes in use or care of human subjects, vertebrate animals, and/or Biohazards**

Nothing to report for this period

**Change of primary performance site location from that originally proposed**

Nothing to report for this period