massDOT
Massachusetts Department of Transportation

Transportation Research Quarterly

Providing highlights of MassDOT's transportation research activities and other helpful information **2025 Q3**

Focus on Research

"Getting from good homes to good jobs depends on good transportation."
- Marty Walsh

INSIDE THIS ISSUE

Up Coming Research Projects

Geopolymer-based, Low- Carbon Concrete for Resilience Enhancements of Climate-Adaptive Coastal Highway Infrastructure in Massachusetts

This project aims to develop, validate, and facilitate the adoption of innovative, geopolymer-based concrete for enhancing the performance, durability, and climate resilience of highway infrastructure in Massachusetts' coastal regions.

Drone-in-a-Box: Enhancing Public Safety and Environmental Monitoring on Cape Cod.

This project will employ drone-in-a-box (DiB) technology, an autonomous drone system with automated launch, landing, and charging capabilities, to address unique challenges facing Cape Cod, a popular tourist destination, due to its geographic isolation, seasonal population fluctuations, and increasing environmental concerns.

3D Printing of Ultra-High-Performance Concrete for Automated Construction and Repair of Resilient Transportation Infrastructure

By integrating UHPC with 3D printing, this project aims to establish automated and resilient solutions for future infrastructure fabrication and repair.

Performance Evaluation of Valmont Dampers for Traffic Signal and Sign Structures

This project will validate the performance of the Valmont vibration mitigation devices over the range of traffic signals and sign structures in Massachusetts. Successful completion of this project will provide definitive guidance on the specific sign and traffic signal structures on which to deploy vibration mitigation devices.

Ongoing Research Project Highlights

Environmental Scan of Community Transit Needs Among Older Adults in Massachusetts

This project aims to support MassDOT in advancing its community transit programs by systematically identifying and addressing the needs of older adults. Through detailed analysis and stakeholder engagement, the project will provide actionable recommendations for improving transit options and enhancing the quality of life for Massachusetts's aging population. It includes:

1. A comprehensive environmental scan of community transit needs for community dwelling older adults in Massachusetts.
2. A secondary-data analysis of existing individual-level data from residents in selected cities and towns to recommend priority areas for community transit.
3. Develop evaluation questions for community transit grantees.
4. A final report and slide deck summarizing key findings and recommendations.

This study includes the following methodology:
1. Literature review to identify trends, patterns, and key needs and challenges, providing a comprehensive picture of the current community transit needs;
2. Secondary-data analysis of individual-level data from residents in selected cities and towns to highlight nuanced differences by age, and by disability or economic status and across regions and demographic groups.
3. Individual interview to learn about the most impactful dimensions of measurement and approches.

Completed Research Project Highlights

Measuring Access to Improve Public Health – Phase II

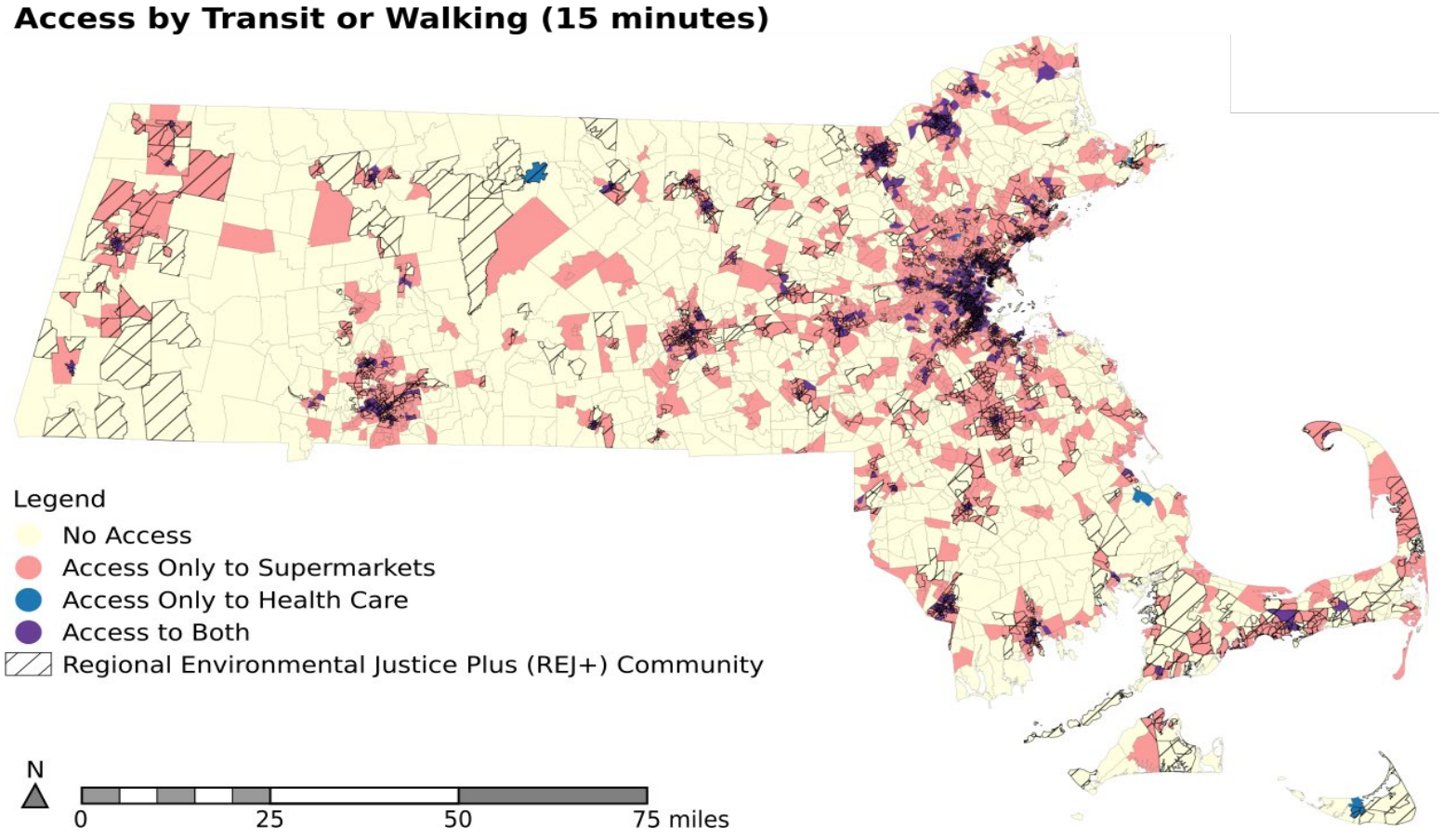
Access to food, healthcare, education, and recreation are all important for public health. Phase I, which focused on food access, identified three research needs: 1) access metrics should account for walkability, bikeability, and emerging microtransit services; 2) analysis should account for vulnerable populations affected; and 3) access should be measured for other determinants of public health, including healthcare, education, and recreation.

Building on Phase I, which focused on food access in Massachusetts, this project expands the scope to include healthcare, higher education, and parks. The research improves methods to account for walkability (adjusting travel time using the National Walkability Index), bikeability (limiting network to level of traffic stress ≤ 2), and the role of microtransit alongside fixed-route transit. The analysis method generates high-resolution access maps to key destinations. Demographic data are integrated to quantify disparities faced by vulnerable populations. To examine links between access and health, Geographic Weighted Random Forest (GWRF) models relate accessibility and demographic variables to chronic health outcomes including diabetes, heart disease, and obesity. The study concludes with policy recommendations to embed access metrics into planning tools, including dashboards that guide equitable transportation investments and promote public health across the state.

Key findings from linking the improved access metrics to demographic data include:

1) Access by car is relatively more equitable than for other modes, so there is a disparity for people that do not have access to a car.

2) There are significant populations with low income or living in zero-vehicle households outside of the Regional Environmental Justice Plus (REJ+) communities, so access gaps are more meaningfully identified by counting the size of vulnerable populations without access.



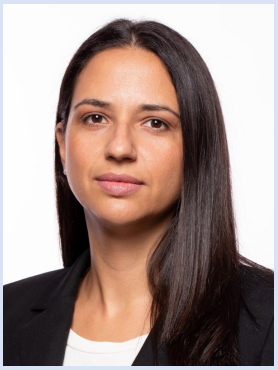
A Look at Who We are – Team Highlights

Each MassDOT research project team is comprised of a Project Champion(s), a Principal Investigator(s) and a Project Manager. The Project Champion serves as the MassDOT technical representative, the Principal Investigator conducts research investigation and produces deliverables per project scope and schedule, and the Project Manager takes charge of the overall project administrative management and coordination. Highlighted below are the key members of "Measuring Access to Improve Public Health – Phase II" project team. This project was managed by project manager Anil Gurcan from our research team.

Principal Investigator – Eric Gonzales

Dr. Eric Gonzales is an is an Associate Professor of Civil and Environmental Engineering at UMass Amherst. Eric holds a BS in civil engineering from Carnegie Mellon and a PhD in civil engineering from the University of California, Berkeley. He is also an experienced PI having previously worked on eight MassDOT research projects. Eric is a member of the American Society of Civil Engineers Public Transport Committee as well as the TRB Committee on Innovative Public Transportation Services and Technologies. He previously served as the Secretary of the TRB Committee on Paratransit.

Co-Principal Investigator – Eleni Christofa

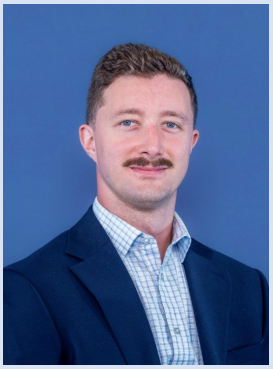


Dr. Eleni Christofa is an Associate Professor of Civil and Environmental Engineering at UMass Amherst. Eleni holds a BS in civil engineering from the National Technical University of Athens, Greece and a PhD in civil engineering from the University of California, Berkeley. She led the research team on the "Public Health Assessment of Transportation Projects" research project preceding the current project and served as a PI for nine other MassDOT research projects. Her research centers on public health & equity and she is an active member of the TRB Committee on Transportation and Public Health and Editorial Board.

Project Champion – Nicole Bilbo

Nicole Bilbo is the Manager of Environmental, Social, and Governance (ESG) in MassDOT's Office of Transportation Planning. The ESG team conducts research and analysis and creates resources around transportation vulnerability and security, destination access, and land use and housing. The team has worked on such projects and resources as the Equitable Transit Oriented Development Score dashboard, the District Community Initiative, the Accessibility Observatory dashboard, and the RTA Service Delivery tool. She holds a B.A. in Psychology from Brown University.

Co-Project Champion – Marthinus J. Riekert



Marthinus (M.J.) Riekert is the project manager for the MassDOT Office of Transportation Planning (OTP) GIS Team. M.J. holds a BS in Sociology and an MS Urban Planning and Policy from Northeastern University. M.J. works across both GIS Data Engineering and Geospaital Technology teams to assist in project delivery as well as working between MassDOT business units to assist with new project development. In addition to his work with the GIS Team, M.J. serves as project manager for the Massachusetts Travel Study, MassDOT's primary travel behavior data collection effort.

News and Events

105th TRB Annual Meeting
Registration now Open
Washington, D.C.
happening January 11–15, 2026.

massDOT Innovation Webinar Series

Measuring Access to Improve Public Health – Phase II
October 22, 2025
This study advances transportation access metrics that support public health planning across Massachusetts. Building on Measuring Access to Improve Public Health Phase I, which focused on food access, Phase II expands the scope to include healthcare, higher education, and parks. This research improves methods to account for walkability, bikeability, and the role of microtransit alongside fixed-route transit.
Click here for the webinar recording

3D Printing Applications for Transportation Infrastructure Construction & Maintenance
September 18, 2025
This webinar showcased 3D printing applications in the transportation sector. With the Phase I report of this research completed in 2022; the Phase II report completed in 2024, and the Phase III research underway, the MassDOT 3D Printing Applications for Transportation Infrastructure Construction & Maintenance reports provide innovative, technology transfer results the Commonwealth could utilize.
Click here for the webinar recording

Robust Decision-Making Framework for Sustainable Operations and Planning of MBTA Rapid Transit Vehicles - July 24, 2025
Understanding and predicting energy consumption patterns in Urban Rail Transit (URT) systems is vital for sustainable urban planning, especially during disruptive events. This study presents a Long Short-Term Memory (LSTM) recurrent neural network, the model can accurately predict daily energy consumption and average daily temperature, with root mean squared errors (RMSE) of 50.6 MWh and 6.62°F. These findings provide URT operators with a robust framework for making data-driven decisions and improving energy efficiency in URT systems
Click here for the webinar recording

Research Resources

In Progress MassDOT Research

	Start Date
Field Study to Determine Salt Usage Efficiency on Two Pavement Types	August 2022
Evaluating the Effectiveness of Drivers' Education Modules on Safety	April 2023
3D-Printed Lattice-Based Structures for Next Generation Bridge Bearings and Bridge Isolation Bearings III	April 2023
Cracks of Low-P Rapid Set Concrete in Deck Repairs: Analysis, Prevention, and Alternatives	December 2024
MassDOT Speed Regulation Editing Support	January 2025
Environmental Scan of Community Transit Needs Among Older Adults in Massachusetts	February 2025
Development of a Salt Spreader Controller Program Using Machine-Sensed Roadway Weather Parameters II	February 2025
Advanced Technologies and Data Analytics for Safe, Smart, and Efficient Transportation (ASSET)	April 2025

Recently Completed MassDOT Research

	Completion Date
Post-Fire Damage Inspection of Concrete Structures (Phase II) – Experimental Phase	February 2023
Building Information Model for Transit Infrastructure: Feasibility and Gap Analysis	August 2023
Implementing AASHTO Mechanist-Empirical Pavement Design Guide Phase II	September2023
Developing Massachusetts-Specific Trip Generation Models for Land Use Projects	September 2023
Revised Load Rating Procedures for Prestressed Concrete Beams	November 2023
Ultra-High-Performance Concrete Reinforced with Multi-scale Hybrid Fibers	December 2023
Artificial Intelligence Framework for Midblock Crosswalk Detection Across Massachusetts	February 2024
Using Traffic Signals to Reduce Speeding Opportunities	February 2024
Smart Work Zone Safety Control and Performance Evaluation	May 2024
LIMMS Development Planning	July 2024
Development of a Salt Spreader Controller Program	July 2024
3D Printing Applications for Bridge Element Repair	August 2024
Data-Driven Approaches for Transit Capital Planning	August 2024
Cross-Modal Assessment of Sustainable Transportation Networks	August 2024
Evaluating Safety Impacts of Two-stage Bike Boxes	August 2024
Evaluation & Mitigation Methods for the Prevention of Cement Concrete Deterioration due to Pyrrhotite	September 2024
Accessible Bus Stop Design in the Presence of Bike Lanes	September 2024
Speed Management and Emergency Response – A Synthesis Study	September 2024
Post-Fire Inspection of Concrete Structure Phase III- In-Situ Experiments	December 2024
Methods to Identify Problematic Carriers and Prevent Infrastructure Damage	December 2024
Tree Preservation and Planting for Complete Streets Development	June 2024
Fare Payment Compliance on MBTA Buses and Light Rail	October 2024
A Pavement marking Inventory and Retroreflectivity Condition Assessment Method Phase II	February 2025
Development of Improved Inspection Techniques Using LIDAR for Deteriorated Steel Beam Ends	February 2025
Measuring Food Access to Improve Public Health Phase II	July 2025
Recycled Ground-Glass Pozzolan (RGGP) for Use in Cement Concrete	July 2025
Implementing AASHTO Mechanistic-Empirical Pavement Design Guide Phase III	September 2025
Effect of Asphalt Binder Source on Asphalt Mixture Performance	October 2025

Additional Resources

Transportation Research and Information Database (TRID) is a comprehensive bibliographic database containing more than 1.2 million records of transportation research.

Research in Progress (RiP) Database contains information on more than 13,000 current or recently completed federally-funded transportation research projects.

AASHTO Publications include the most accepted technical guides, specifications, and manuals of the industry.

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