2027 State Planning and Research Program II

Table of Contents

Research....4
A. Program Administration....5
B. Research....9
C. Technology Transfer....23
D. Regional and National Collaboration....28
E. 100% Federal Costs....33
Totals....34

Research

A. Program Administration

Task Lead: Hao Yin

Task Purpose:

Provide overall leadership, oversight, and administration of MassDOT's Research and Technology Transfer Program in accordance with 23 U.S.C. Section 505 and 23 CFR Part 420, Subpart B. Prepare and administer the annual SPR Part II Work Program; solicit, evaluate, prioritize, and document Research Problem Statements; coordinate project selection, procurement, research contracts and Interdepartmental Service Agreements, and Federal Highway Administration (FHWA) approvals; monitor project scope, schedule, budget, reporting, invoicing, implementation, evaluation, and closeout; and coordinate stakeholder engagement and technology transfer so research investments advance MassDOT's strategic priorities and deliver measurable benefits to the Commonwealth.

Accomplishments in prior year:

During FFY26, MassDOT strengthened governance, accountability, communication, and technology transfer for the Research and Technology Transfer Program through the following accomplishments:

- Published the 2026 MassDOT Research Manual, the program's first comprehensive update in more than 10 years, establishing updated governance, project development, reporting, implementation, evaluation, peer exchange, and documentation procedures.
- Published the FFY25 Research & Technology Transfer Annual Report.
- Updated and enhanced the MassDOT Research and Technology Transfer website to improve public access to research information and products.
- Published quarterly research newsletters highlighting program activities, accomplishments, implementation efforts, and technology transfer opportunities.

Proposed activities for next year:

During FFY27, the Research Section will administer the approved SPR Part II Work Program and continue strengthening program performance, accountability, and implementation through the following activities:

- Coordinate FHWA review and approval of the FFY27 SPR Part II Work Program and any required revisions or amendments before implementation.
- Provide oversight and administration of active research contracts and Interdepartmental Service Agreements (ISAs) from Notice to Proceed through fiscal and administrative closeout.

- Monitor project scope, schedules, budgets, deliverables, monthly and quarterly progress reports, quarterly program-level reporting to FHWA, invoices, implementation activities, and program outcomes; conduct mid-project reviews and corrective actions as needed.
- Document and retain project selection, approval, monitoring, invoicing, termination, and closeout records in centralized electronic systems to support accessibility, consistency, audit readiness, and applicable state and federal record-retention requirements.
- Develop the MassDOT Research Implementation Guide to establish a standardized framework for implementation, monitoring, evaluation, and technology transfer.
- Publish the FFY26 Research & Technology Transfer Annual Report.
- Maintain and enhance the Research and Technology Transfer website and publish quarterly research newsletters to improve access to research information, products, and implementation updates.
- Plan, coordinate, and host an Innovation Webinar to disseminate research findings, implementation lessons, and emerging transportation technologies.
- Expand collaboration with MassDOT divisions, the MBTA, municipalities, peer State DOTs, and industry partners; monitor implementation of completed research through documented follow-up evaluations and five-year look-back reviews, as applicable. Research Implementation Guide MassDOT will develop a Research Implementation Guide to operationalize the implementation, monitoring, and evaluation requirements established in the 2026 MassDOT Research Manual. The guide will provide a consistent framework for planning, documenting, tracking, and evaluating implementation across the research project lifecycle, from problem statement and Scope of Work development through project closeout, follow-up evaluation, and the five-year look-back. The guide will support greater adoption of research findings by providing practical direction on implementation planning, stakeholder roles, performance measurement, technology transfer, and integration of successful results into MassDOT practice. It is expected to address:
- Incorporating implementation pathways, potential users, and expected benefits into Research Problem Statements and Scopes of Work.
- Developing standalone Implementation Plans that identify responsibilities, costs, funding sources, risks, barriers, strategies, milestones, and technology transfer methods.
- Establishing measurable performance indicators and documented follow-up evaluations to assess implementation progress, outcomes, and benefits.
- Tracking implementation activities, decisions, lessons learned, success stories, and follow-up actions in centralized program records.
- Using publications, executive summaries, training, webinars, conferences, pilot projects, and other outreach to support technology transfer and deployment.

- Conducting post-project monitoring and five-year look-back reviews to assess long-term outcomes and determine whether additional research is warranted.
- Integrating completed research into MassDOT policies, standards, specifications, guidance documents, business processes, and operational practices. It is anticipated that the U.S. DOT Volpe National Transportation Systems Center (Volpe Center) will provide technical assistance under the existing MassDOT-Volpe Interagency Agreement. Volpe's expertise in transportation research program management and implementation will help ensure that the guide reflects national best practices while addressing MassDOT's organizational needs and strategic priorities. Upon completion, the guide will provide a standardized approach for strengthening implementation planning, increasing utilization of research results, documenting performance and benefits, and maximizing the long-term value of SPR investments. Research Solicitation and Project Selection During FFY27, the Research Section will conduct the annual research solicitation and remain open to time-sensitive or emerging out-of-cycle requests, including small, quick-hit research within the limits of the approved Work Program. Outreach may include email notices, intranet postings, presentations, workshops, and targeted coordination with MassDOT divisions and offices. Each Research Problem Statement will identify a MassDOT staff sponsor who can serve as Project Champion and will document the research need, anticipated benefits, available knowledge, schedule, and potential implementation pathways. Division leadership will review proposals using documented criteria such as impact, feasibility, urgency, cost, data availability, and alignment with agency objectives. Conduct preliminary literature reviews to reduce duplication, and selection decisions and supporting records will be documented and retained. Selected proposals will be advanced for SPR Part II funding, Work Program amendment, and FHWA approval, as applicable.

Anticipated products:

- Approved SPR Part II Work Program revisions or amendments, certification materials, and FHWA coordination records.
- Executed research contracts, Interdepartmental Service Agreements (ISAs), and Notices to Proceed.
- MassDOT Research Implementation Guide.
- FFY26 Research & Technology Transfer Annual Report and quarterly research newsletters.
- Updated Research and Technology Transfer website.
- Innovation Webinar and related presentation materials.
- Program governance and project management documentation, including solicitation and selection records, progress and financial monitoring records, quarterly program reports, closeout memoranda, implementation tracking, and follow-up evaluation records.

Estimated task completion: 09-30-2027

Estimated task budget: $124,477.86

Estimated staff salaries and benefits: $124,477.86

MassDOT Staff Assignments

MassDOT staff members	% Time to task
Michael Flanary	20.0
Nicholas Zavolas	20.0
Anil Gurcan	20.0
Austin Sanders	20.0
Hao Yin	10.0

B. Research

Task Lead: Hao Yin

Task Purpose:

The Research Task supports applied transportation research and technology development that address current and emerging challenges and advance MassDOT's strategic priorities. Projects are carried out through research institutions, private-sector consultants, and other eligible entities under competitively procured contracts or Interdepartmental Service Agreements, consistent with the approved SPR Part II Work Program and applicable federal and state requirements. Research activities emphasize practical, implementable results and broad dissemination of findings to improve the safety, resiliency, sustainability, efficiency, performance, and cost-effectiveness of the Commonwealth's transportation system while supporting informed policy, planning, design, construction, operations, and maintenance decisions. Each project is assigned an anticipated schedule. Completion dates may change because of justified technical, operational, procurement, or administrative factors. Significant schedule or scope changes requiring FHWA concurrence will be submitted for approval before implementation. For tracking, reporting, and financial management, projects will remain within their original federal fiscal year category. In administering contracted research, will:

- Develop detailed Scopes of Work (SOW) that define tasks, deliverables, schedules, resource needs, and implementation expectations; and manage procurement, contract execution, and project closeout.
- Issue Notices to Proceed; conduct kickoff and mid-project review meetings; and monitor meeting minutes, monthly and quarterly progress reports, schedules, deliverables, and draft and final reports, including draft final reports at least 60 days before contract end unless otherwise agreed.
- Review monthly invoices and project expenditures for consistency with the contract and to ensure costs are allowable, allocable, and reasonable under 2 CFR Part 200; reconcile financial obligations at closeout.
- Conduct preliminary literature reviews, state-of-the-practice reviews, and technology scans to support research planning, reduce duplication, and inform project development.
- Maintain current project information in the Transportation Research Information Database (TRID), the National Transportation Library, and other national repositories.
- Promote technology transfer and implementation through publications, executive summaries, presentations, webinars, conferences, training, pilot activities, and documented follow-up evaluation, including five-year look-back reviews when applicable.
- On-going Projects Subtasks:

- Cracks of Low-P Rapid Set Concrete in Deck Repairs: Analysis, Prevention, and Alternatives The overall objective of this project is to analyze the correlations between cracks in Low-P rapid set concrete and factors including concrete mix design, construction practices, curing conditions, and the service environment/weather conditions of bridge decks. This analysis aims to deepen the understanding of cracking mechanisms and to develop strategies for preventing crack formation in this special concrete. The outcomes will guide the treatment of deck repair materials for MassDOT projects, ultimately enhancing the durability and longevity of repaired bridge decks. Anticipated outcomes include:

    1. A comprehensive literature review.

    2. Detailed data collected via laboratory tests per selected AASHTO and ASTM test methods.

    3. A thorough understanding of the causes and mechanisms behind crack formation in young Low-P rapid set concrete.

    4. Recommendation for preventing cracks in bridge decks repaired with Low-P concrete.

    5. Development of high-performance alternative materials for bridge deck repair.

- Evaluation and Mitigation Methods for the Prevention of Cement Concrete Deterioration due to Pyrrhotite Phase II: The research will investigate the effectiveness of concrete mix design mitigation methods on the evolution of deterioration of cement concrete containing pyrrhotite reactive minerals. The project will be performed by using the developed electro-chemical acceleration testing method complemented by visual observations, quantitative crack-length development, non-destructive evaluation test methods and microstructural analysis. Additionally, the effectiveness of other potential mitigation methods on the deterioration rate of affected concrete mixtures will be investigated.
- Advanced Technologies and Data Analytics for Safe, Smart, and Efficient Transportation (ASSET) The project will recalibrate the SPFs in Chapter 16.6.4 of the HSM2, along with the associated parameters, for the twelve types of urban intersections in Massachusetts using the most recent data. Develop and refine methodologies that can effectively and reliably extract sidewalk data from aerial imagery. Leverage artificial intelligence (AI) to automate the counting of pedestrians, active transit modes (such as bicycles and e-scooters), and site trips generated by new developments.
- Salt Spreader Field Implementation Clearing roadways during winter seasons, it is critical to deliver the materials efficiently and effectively so that the impacts of winter storms are

minimized while the utilization of the materials is maximized to reduce potential environmental impacts. The objective of this study is twofold:

1. To develop an improved RSC algorithm by incorporating additional critical road condition categories (e.g., black ice and packed snow) and employing a more complex deep learning architecture;
2. To develop a new SRP model by incorporating the real-time mobile RWIS information from the instrumented truck, the regional stationary RWIS information, and the climate and weather forecasting information. The algorithm and model developed will be validated on multiple snowplowing trucks.

- Speed Management Research This scope of work will synthesize existing speed management research and guidance to resources to aid MassDOT and municipalities with the application and implementation of speed management countermeasures.
- Drone-in-a-Box (DiB): Enhancing Public Safety and Environmental Monitoring on Cape Cod This project is aimed at enhancing Public Safety and Environmental Monitoring on Cape Cod with specific research objectives:
    1. Evaluate the technical feasibility of deploying DiB systems in the Cape Cod environment, considering factors such as weather conditions, FAA regulations, and communication infrastructure;
    2. Assess the operational effectiveness of DiB systems in each use case, measuring improvements in traffic flow, emergency response times, and shark detection accuracy;
    3. Analyze the cost-benefit of DiB implementation compared to traditional methods; and
    4. Investigate public perception and acceptance of drone technology for public safety and environmental monitoring.
- 3D Printing of Ultra-High Performance Concrete for Automated Construction and Repair of Resilient Transportation Infrastructure Ultra-high performance concrete (UHPC) has emerged as a next-generation material offering exceptional strength, high toughness, and superior durability. However, even though this material shows high feasibility for 3D printing due to its unique formulation and favorable fresh properties, few studies have been conducted in this field, resulting in limited understanding of its printability, interlayer performance, and structural performance in in-situ structural repairs and rehabilitation. Addressing these knowledge gaps is critical to unlocking the full potential of 3D-printed UHPC for the next generation of resilient transportation systems. This research seeks to establish the scientific foundation and practical framework necessary for deploying 3D-

printed UHPC in both new construction and large-scale repair applications through the following specific goals:

1. Design and optimize UHPC mixtures with tailored rheological properties to ensure superior extrudability, buildability, and print stability;
2. Evaluate the material characteristics and structural performance of 3D-printed UHPC elements to establish relationships between printing parameters, mechanical behavior, and durability;
3. Investigate and enhance interfacial bonding performance between printed UHPC layers and between printed UHPC and existing concrete substrates to ensure reliable adhesion for repair and overlay applications; and
4. Demonstrate and validate automated fabrication and repair techniques using 3D-printed UHPC in representative bridge and infrastructure components, supported by a comprehensive implementation framework for field deployment.

- Statewide Testing and Validation of Valmont Damper:s The pending updates to the AASHTO LRFD SLTS Specifications allow for the quantification of effective vibration mitigation devices to provide fatigue protection for sign and traffic signal structures. For the Commonwealth of Massachusetts to fully adopt these vibration mitigation devices, there needs to be validation on the common types of traffic signal and sign structures deployed by MassDOT. 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.

Subtasks:

1. **3D Printing of Ultra-High Performance Concrete for Automated Construction and Repair of Resilient Transportation Infrastructure:** The durability and resilience of transportation infrastructure are under increasing threat from aging materials, growing traffic demands, and extreme climate events. There is an urgent need for innovative technologies that not only accelerate the fabrication and repair of transportation systems but also embed resilience into both the materials and construction process. The anticipated deliverables from this research will include validated UHPC mix designs optimized for 3D printing, quantitative performance data for printed structural elements, interfacial bonding guidelines for repair applications, and a practical implementation plan with recommended protocols for field adoption by DOT engineers and contractors.
2. **Advanced Technologies and Data Analytics for Safe, Smart, and Efficient Transportation (ASSET):** Project objectives: Recalibrate the SPFs in Chapter 16.6.4 of the HSM2, along with the

associated parameters, for the twelve types of urban intersections in Massachusetts using the most recent data. Develop and refine methodologies that can effectively and reliably extract sidewalk data from aerial imagery. Leverage artificial intelligence (AI) to automate the counting of pedestrians, active transit modes (such as bicycles and e-scooters), and site trips generated by new developments. By using real-time AI models that process video and sensor data, this task also aims to develop algorithms to estimate multimodal trip projections associated with multiple ITE land use codes or Massachusetts-specific land use codes, considering the existing or planned infrastructure design, congestion management, and mobility strategies.

3. **Alternative Constituent Materials for Use in Low-Carbon Cement Concrete – Part II:** Emerging binders and admixtures (EBAs) offer practical pathways to lower embodied CO2e while maintaining or improving durability. The objective of this project is to evaluate the viability of EBAs and other alternative constituent materials as suitable alternatives to traditional supplementary cementitious materials (SCM) in replacing hydraulic cement, to both decrease the carbon footprint and increase the quality and long-term durability of cement concrete used in MassDOT highway projects.
4. **Cracks of Low-P Rapid Set Concrete in Deck Repairs: Analysis, Prevention, and Alternatives:** The overall objective of this project is to analyze the correlations between cracks in Low-P rapid set concrete and factors including concrete mix design, construction practices, curing conditions, and the service environment/weather conditions of bridge decks. This analysis aims to deepen the understanding of cracking mechanisms and to develop strategies for preventing crack formation in this special concrete. The outcomes will guide the treatment of deck repair materials for MassDOT projects, ultimately enhancing the durability and longevity of repaired bridge decks. Anticipated outcomes include:
    a. A comprehensive literature review.
    b. Detailed data collected via laboratory tests per selected AASHTO and ASTM test methods.
    c. A thorough understanding of the causes and mechanisms behind crack formation in young Low-P rapid set concrete.
    d. Recommendation for preventing cracks in bridge decks repaired with Low-P concrete.
    e. Development of high-performance alternative materials for bridge deck repair.
5. **Drone-in-a-Box Enhancing Public Safety and Environmental Monitoring on Cape Cod:** Assess the practicality, cost-effectiveness, and operational benefits of automated drone stations for Traffic congestion monitoring and mitigation Emergency response support
6. **Evaluation and Mitigation Methods for the Prevention of Cement Concrete Deterioration due to Pyrrhotite Phase II:** The project will investigate the effectiveness of concrete mix design mitigation methods on the evolution of deterioration of cement concrete containing

pyrrhotite reactive minerals. The study will be performed by using the developed electro-chemical acceleration testing method complemented by visual observations, quantitative crack-length development, non-destructive evaluation test methods and microstructural analysis. Additionally, the effectiveness of other potential mitigation methods on the deterioration rate of affected concrete mixtures will be investigated.

7. **Evaluation of Transit Signal Display Options:** The goal of this research is to assess the operational and safety impacts of alternative transit displays and inform recommendations to be incorporated in state and national transit signal design guidelines. The goal is to provide the best guidance for all road users.
8. **Salt Spreader Field Implementation:** Clearing roadways during winter seasons, it is critical to deliver the materials efficiently and effectively so that the impacts of winter storms are minimized while the utilization of the materials is maximized to reduce potential environmental impacts. The objective of this study is twofold:
    a. To develop an improved RSC algorithm by incorporating additional critical road condition categories (e.g., black ice and packed snow) and employing a more complex deep learning architecture;
    b. To develop a new SRP model by incorporating the real-time mobile RWIS information from the instrumented truck, the regional stationary RWIS information, and the climate and weather forecasting information. The algorithm and model developed will be validated on multiple snowplowing trucks.
9. **Speed Management Research:** This scope of work will synthesize existing speed management research and guidance to resources to aid MassDOT and municipalities with the application and implementation of speed management countermeasures.
10. **Statewide Testing & Validation of Valmont Dampers:** Evaluate performance and reliability of Valmont dampers for traffic signal and sign structures under various environmental and operational conditions
11. **Traffic Sign Inventory and Retroreflectivity**
12. **Detectable Warning Panels**
13. **Pavement Performance at Traffic Data Collection Sites**
14. **Rail Infrastructure Heat Resilience and Safety Monitoring**
15. **Risk Informed Coastal Flood Adaptation**
16. **Safety Research Support**
17. **Research Solicitation**

Accomplishments in prior year:

MassDOT successfully completed the following research projects during FFY26:

- 3D-Printed Lattice-Based Structures for Next Generation Bridge Bearings
- Environmental Scan of Community Transit Needs for Older Adults in Massachusetts
- MassDOT Speed Regulation Editing Support
- Evaluating the Effectiveness of Driver Education Safety Modules

These projects expanded MassDOT's technical knowledge in bridge engineering, transportation equity, traffic safety, and policy development and produced actionable recommendations and implementation pathways.

Proposed activities for next year:

MassDOT will continue to manage the following ongoing research projects in accordance with approved Scopes of Work, reporting and invoice requirements, implementation plans, and FHWA-approved schedules:

- Advanced Technologies and Data Analytics for Safe, Smart, and Efficient Transportation (ASSET).
- Evaluation and Mitigation Methods for Cement Concrete Deterioration Due to Pyrrhotite – Phase II.
- Cracks in Low-P Rapid Set Concrete for Bridge Deck Repairs: Analysis, Prevention, and Alternatives.
- Speed Management Research.
- Development of a Salt Spreader Controller Program Using Machine-Sensed Roadway Weather Parameters and Climate Data.
- Alternative Constituent Materials for Low-Carbon Cement Concrete – Part II.
- Evaluation of Transit Signal Display Options.
- Drone-in-a-Box: Enhancing Public Safety and Environmental Monitoring on Cape Cod.
- 3D Printing of Ultra-High Performance Concrete for Automated Construction and Repair of Resilient Transportation Infrastructure.
- Statewide Testing and Validation of Valmont Dampers.

New Research Initiatives Based on coordination with MassDOT divisions and offices, and MBTA, anticipate initiating research or pilot projects in the following areas during FFY27, subject to funding availability and project approval.

Subtasks:

- Evaluation of Detectable Warning Panel Materials: This research will evaluate detectable warning panel materials with respect to: Long-term accessibility performance; Visual contrast retention; Slip resistance; Durability; Constructability; Ease of installation; Maintenance requirements; and Life-cycle cost. The results will provide an objective, evidence-based evaluation to support future MassDOT specifications, material selection, and installation practices.
- Pavement Performance at Traffic Data Collection Sites Traffic Data Collection (TDC) sites contain embedded sensors and equipment that can affect pavement performance and long-term maintenance. This research will: Evaluate pavement performance at representative Massachusetts TDC sites; Compare MassDOT experience with practices used by other State DOTs; Identify factors affecting pavement durability and reliability; Develop recommendations for improving pavement design, installation practices, and maintenance; Recommend updates to MassDOT standard plans and specifications for future TDC installations.
- Rail Infrastructure Heat Resilience and Safety Monitoring: Extreme heat can contribute to rail expansion, thermal stress, and track misalignment, particularly on older rail infrastructure. This pilot will evaluate technologies capable of improving: Rail temperature monitoring; Heat-related infrastructure condition assessment; Predictive maintenance; Operational decision support; Rail safety during extreme temperature events. The research will support MassDOT's efforts to improve climate resilience, infrastructure reliability, and public safety.
- Risk Informed Coastal Flood Adaptation Coastal flooding, storm surge, and sea-level rise pose a growing systemwide threat to MBTA rail yards, tunnel portals, stations, maintenance facilities, power and signal systems, rolling-stock storage areas, and other critical infrastructure located along or near the Massachusetts coastline. The research idea is to develop an integrated coastal flood adaptation framework that links asset-level engineering design with site-specific geotechnical and structural conditions. It will establish typical flood-protection concepts for representative Boston-area geologic and operational conditions; develop transparent rough-order-of-magnitude (ROM) cost models that separate major structural, geotechnical, drainage, utility, and construction elements; and produce a practical playbook for elevating land or placing engineered fill beneath or adjacent to MBTA infrastructure.
- Traffic Sign Inventory: MassDOT requires a comprehensive statewide traffic sign inventory to support: Asset management; Maintenance planning; Replacement prioritization; Budget development; Safety analysis; MUTCD compliance; Sign retroreflectivity management. This effort will evaluate technologies and methodologies for developing a complete, accurate, and maintainable inventory of statewide traffic sign assets.

- Safety Research Support: This research will provide generalized assistance with elements related to the Strategic Highway Safety Plan: Safety data; Potential work to conduct surveys/focus groups to better understand some safety needs; Perform lit searches as needed; Assistance in developing the SHSP and follow up related work
- Massachusetts Bicycle Facility Maintenance Study: As regional and statewide bicycle networks expand, the maintenance needs of these facilities increase as well. This research plans to examine current practices for bicycle facilities across Massachusetts and evaluate if there's a need to address bike facilities maintenance, specifically clearing debris (but potentially snow removal as well if survey responses highlight need). The project is also expected to identify gaps in equipment capability, operational capacity, and institutional responsibility.

Anticipated products:

Expected products from the Research Task include:

- Interim technical memoranda and progress reports.
- Final research reports.
- Research implementation recommendations.
- Technical guidance documents.
- Updated specifications, standards, and best practices where appropriate.
- Decision-support tools, models, algorithms, databases, and software developed through research.
- Peer-reviewed publications, conference presentations, webinars, and other technology transfer products.
- Research findings supporting future policy, planning, design, construction, maintenance, and operations.

Estimated task completion: 09-30-2027

Estimated task budget: $3,624,024.40

Estimated staff salaries and benefits: $273,600.78

MassDOT Staff Assignments

MassDOT staff members	% Time to task
Michael Flanary	70.0
Anil Gurcan	65.0
Austin Sanders	65.0
Nicholas Zavolas	30.0

Hao Yin	10.0

Subtask Financial Table

Estimated consultant costs: $3,157,432.21

Subtask / contract #	Total cost:	Pre-FFY 2027:	FFY 2027:	Post-FFY 2027:	Consultant/Contractor Name:	Contract End Date:
3D Printing of Ultra-High Performance Concrete for Automated Construction and Repair of Resilient Transportation Infrastructure / 132887	$550,659.00	$0.00	$183,552.00	$367,107.00	University of Maryland	09-30-2029
Advanced Technologies and Data Analytics for Safe, Smart, and Efficient Transportation (ASSET) / 129892	$604,334.00	$521,927.00	$82,407.00	$0.00	UMass Lowell	12-31-2026
Alternative Constituent Materials for Use in Low-Carbon Cement Concrete – Part II / 132749	$333,722.00	$50,000.00	$124,143.00	$159,579.00	WPI	09-30-2029

Cracks of Low-P Rapid Set Concrete in Deck Repairs: Analysis, Prevention, and Alternatives / 128752	$300,000.00	$50,000.00	$112,500.00	$137,500.00	University of Maryland	09-30-2027
Detectable Warning Panels / None	$0.00	$0.00	$160,000.00	$0.00		None
Drone-in-a-Box Enhancing Public Safety and Environmental Monitoring on Cape Cod / 132748	$281,124.00	$20,000.00	$178,200.00	$82,924.00	Endicott College	08-15-2028
Evaluation and Mitigation Methods for the Prevention of Cement Concrete Deterioration due to Pyrrhotite Phase II / 129275	$204,889.00	$175,723.00	$29,166.00	$0.00	UConn	12-31-2026
Evaluation of Transit Signal	$455,109.54	$50,000.00	$194,239.79	$210,869.75	UMass Amherst	09-30-2028

Display Options / 133854						
Pavement Performance at Traffic Data Collection Sites / None	$0.00	$0.00	$150,000.00	$0.00		None
Rail Infrastructure Heat Resilience and Safety Monitoring / None	$0.00	$0.00	$150,000.00	$0.00		None
Research Solicitation / None	$0.00	$0.00	$1,200,000.00	$0.00		None
Risk Informed Coastal Flood Adaptation / None	$0.00	$0.00	$160,000.00	$0.00		None
Safety Research Support / None	$0.00	$0.00	$100,000.00	$0.00		None
Salt Spreader Field Implementation / 128970	$234,921.00	$135,000.00	$65,265.00	$34,656.00	UMass Amherst	12-31-2027
Speed Management Research / 129014	$161,285.65	$80,000.00	$68,513.42	$12,772.23	Kittelson&Associates	09-30-2027
Statewide Testing & Validation of	$49,446.00	$0.00	$49,446.00	$0.00	UConn	09-30-2026

Valmont Dampers / 132888						
Traffic Sign Inventory and Retroreflectivity / None	$0.00	$0.00	$150,000.00	$0.00		None

Estimated Other costs: $192,991.41

C. Technology Transfer

Task Lead: Hao Yin

Task Purpose:

The Technology Transfer Task promotes dissemination, adoption, and implementation of transportation research, best practices, and emerging technologies across MassDOT and the Commonwealth in accordance with 23 CFR 420.107(c). Through training, technical assistance, publications, and workforce development, the task moves research findings from researchers and subject-matter experts to practitioners and strengthens transportation planning, design, construction, operations, maintenance, and asset management. Technology transfer activities will be delivered through four primary program areas:

- Local Technical Assistance Program (LTAP) - Provides technical assistance, training, and information exchange to Massachusetts municipalities.
- MassDOT Training Services (MTS) - Delivers technical and professional training to MassDOT employees, with a primary focus on the Highway Division.
- Transportation Technology Transfer Conferences - Provide statewide forums for sharing research findings, innovative technologies, implementation experiences, and best practices among transportation professionals.[HY1.1]
- Construction Management Certificate Program - Develops technical and leadership competencies through a partnership with Wentworth Institute of Technology (WIT). Collectively, these programs will help translate SPR II investments into practice, expand access to current knowledge and innovative solutions, and support continuing education and implementation across the Commonwealth.

Subtasks:

- LTAP: Massachusetts' LTAP serves as the Commonwealth's primary resource for technical assistance, training, and information exchange for municipal departments of public works and highway departments. The program provides practical guidance on transportation engineering, roadway maintenance, asset management, safety, and emerging technologies while serving as an effective communication network for distributing MassDOT policies, engineering directives, funding opportunities, and other transportation-related information to all 351 Massachusetts municipalities. LTAP also promotes peer-to-peer learning and strengthens collaboration among municipal agencies, MassDOT, MBTA, and transportation professionals throughout the Commonwealth.

- MTS: MassDOT Training Services (MTS) supports the development and delivery of comprehensive technical training programs for MassDOT employees, with an emphasis on the Highway Division. MassDOT coordinates, oversees, and evaluates training courses requested by the Highway Division to ensure employees have access to current technical knowledge, industry best practices, and emerging technologies. Training topics include engineering, construction, maintenance, safety, asset management, leadership development, and other workforce development priorities identified by MassDOT.
- Transportation Technology Transfer Conferences: MassDOT hosts two statewide transportation technology transfer conferences annually to promote the exchange of innovative practices and lessons learned among transportation professionals. These conferences include:
  - Moving Together Conference (Fall) – A one-day conference focused on transportation policy, planning, and collaboration.
  - Transportation Innovation Conference (Spring) – A two-day conference highlighting transportation innovation, emerging technologies, implementation successes, and best practices from MassDOT, academia, industry, FHWA, and other transportation agencies.
  - These conferences provide valuable opportunities for professional networking, interdisciplinary collaboration, and dissemination of continuous improvement across the transportation community.
- Construction Management Certificate Program: MassDOT will continue implementation of the four-year partnership agreement with the Wentworth Institute of Technology (WIT) to deliver the Construction Management Certificate Program. The program provides structured professional development for approximately 30 MassDOT employees representing all Highway Districts through a seven-week curriculum covering construction management principles, contract administration, project delivery, leadership, communication, and field operations.

Subtasks:

Conferences: MassDOT convenes two transportation technology transfer conferences each year: a one-day Moving Together Conference in the fall and a two-day Transportation Innovation Conference in the spring. Through the comprehensive MassDOT-UMass Amherst Interdepartmental Service Agreement (ISA #109600), UMTC provides services to MassDOT including conference program planning, coordinating with speakers and moderators, managing event registration and exhibitors, contracting with venue and event support services, managing conference logistics, and delivering the conferences.

Construction Management Certificate Program: Continue implementing the new 4-year partnership agreement with the Wentworth Institute of Technology (WIT). Deliver the Construction

Management Certification Program to 30 participants representing all Highway districts. The annual expense is set at $65,000, which covers the delivery of the 7-week curriculum.

LTAP: Baystate Roads is the longstanding program name for Massachusetts LTAP, and it serves as a conduit for information transfer on technologies, best practices, and methodologies for operating, maintaining, and managing municipal departments of public works and highway departments throughout the Commonwealth. The program also serves as an efficient communications network, by which MassDOT transfers policy information, engineering directives, program funding, and other updates to the 351 municipalities in Massachusetts. Please see Appendix C.1 for FFY26 LTAP Training Plan.

MTS: MassDOT Training Services (MTS) assist MassDOT in developing and implementing an annual plan to provide essential and high-quality technical training to MassDOT employees with a focus on the Highway Division. Through this component, MassDOT coordinates, directs, and oversees the UMTC training team as it provides training classes requested by MassDOT's Highway Division to its staff throughout the state. Please see Appendix C.2 for FFY26 MTS Training Plan.

Accomplishments in prior year:

During FFY26, MassDOT advanced technology transfer, implementation, and workforce development through the following accomplishments:

- Delivered LTAP training courses in accordance with the FFY26 LTAP Training Plan.
- Delivered MassDOT Training Services (MTS) courses in accordance with the FFY26 MTS Training Plan.
- Successfully hosted the 2025 Moving Together Conference and the 2026 Transportation Innovation Conference, bringing together transportation professionals from government and industry to exchange knowledge and best practices.
- Continued implementation of the Construction Management Certificate Program in partnership with Wentworth Institute of Technology.
- Expanded dissemination of transportation innovation through webinars, newsletters, conference presentations, and online communication platforms.

Proposed activities for next year:

During FFY27, MassDOT will strengthen technology transfer, implementation, and workforce development through the following activities:

- Implement the FFY27 LTAP Training Plan.
- Implement the FFY27 MassDOT Training Services (MTS) Training Plan.

- Deliver the 2026 Moving Together Conference.
- Plan and deliver the 2027 Transportation Innovation Conference. [HY3.1]
- Continue implementation of the Construction Management Certificate Program in partnership with Wentworth Institute of Technology.
- Promote implementation of completed research through technical presentations, webinars, publications, newsletters, and conference sessions.
- Conduct technology scanning and expand outreach to municipalities, peer State DOTs, and industry partners to encourage broader adoption of transportation innovations and research findings.
- Evaluate participant feedback, training outcomes, and evidence of research adoption; document lessons learned and use the results to improve program effectiveness.

Anticipated products:

Expected products for FFY27 include:

- Delivery of the FFY27 LTAP Training Program.
- Delivery of the FFY27 MassDOT Training Services Training Program.
- Successful delivery of the 2026 Moving Together Conference.
- Successful delivery of the 2027 Transportation Innovation Conference. [HY4.1]
- Delivery of the Construction Management Certificate Program.
- Training curricula, materials, participant records, course evaluations, and outcome summaries.
- Presentation materials, publications, and recorded webinar content, as appropriate.
- Documented dissemination and implementation activities that increase awareness and use of research findings, innovative technologies, and best practices throughout MassDOT and the Commonwealth.

Estimated task completion: 09-30-2027

Estimated task budget: $2,774,474.45

Estimated staff salaries and benefits: $21,643.50

MassDOT Staff Assignments

MassDOT staff members	% Time to task
Hao Yin	10.0
Anil Gurcan	5.0
Austin Sanders	5.0

Subtask Financial Table

Estimated consultant costs: $2,702,830.95

Subtask / contract #	Total cost:	Pre-FFY 2027:	FFY 2027:	Post-FFY 2027:	Consultant/Contractor Name:	Contract End Date:
Conferences / 109600	$2,553,823.00	$2,203,823.00	$350,000.00	$0.00	UMTC	10-30-2026
Construction Management Certificate Program / 129272	$256,197.95	$127,337.95	$64,337.95	$64,552.05	WIT	09-30-2028
LTAP / 109600	$7,920,807.00	$7,920,807.00	$1,000,000.00	$0.00	UMTC	10-30-26
MTS / 109600	$1,106,771.00	$9,106,771.00	$1,288,493.00	$0.00	UMTC	10-30-26

Consultant notes: LTAP: $600K in SPR II PLS and $400K in old LTAP funds MTS: $1,000,000.00 in SPR II PLS and $288,493 in old MTS

Estimated Other costs: $50,000.00

D. Regional and National Collaboration

Task Lead: Hao Yin

Task Purpose:

Consistent with federal research, development, and technology transfer cooperation objectives, this task supports MassDOT's participation in regional and national research, innovation, technology transfer, and implementation activities.

Through collaboration with FHWA, the Transportation Research Board (TRB), the American Association of State Highway and Transportation Officials (AASHTO), Transportation Pooled Fund programs, cooperative research programs, and peer State DOTs, MassDOT advances shared research priorities, leverages expertise and funding, avoids duplication, and promotes practical application of innovative transportation solutions. These activities enable MassDOT to help shape national research agendas, access leading-edge research and technical resources, leverage SPR investments through collaborative funding, exchange research-management practices through peer review, and bring proven technologies and practices to Massachusetts.

Subtasks:

- Pooled Fund Studies: MassDOT will continue participating in Transportation Pooled Fund (TPF) studies that address shared transportation challenges, support national research objectives, and maximize the value of SPR investments. TPF participation allows MassDOT to combine funds, subject-matter expertise, and other resources with FHWA and peer State DOTs on work that would be difficult or cost-prohibitive to conduct independently. For FFY27, MassDOT anticipates participating in the following Transportation Pooled Fund studies:
  - 479 Clear Roads Winter Highway Operations Phase III
  - 481 In-Service Performance Evaluation (ISPE) of Roadway Safety Features
  - 501 Roadside Safety Pooled Fund – Phase 3
  - 514 Work Zone Analytics 516 Highway Safety Manual 2nd Edition (HSM2) Implementation
  - 544 Technology Transfer Concrete Consortium
  - 549 Northeast Transportation Research Consortium (NTRC)
  - 556 Uncrewed Aircraft Systems (UAS) Standardization
  - 561 Consortium for Asphalt Pavement Research and Implementation 2 (CAPRI-2)
  - 573 State DOT Council for Strategic AI Adoption
  - 575 TRB Core Program Services for a Highway Research, Development, and Technology Program

- National Coordination: MassDOT will continue active participation in national transportation research activities so the Commonwealth's priorities are represented in future research programs and MassDOT staff can access and apply national research products. Activities include:
  - Coordinating MassDOT participation in AASHTO RAC activities.
  - Coordinating the annual National Cooperative Highway Research Program (NCHRP) problem statement review and prioritization process.
  - Participating in Transportation Research Board (TRB) workshops, webinars, and the TRB Annual Meeting.
  - Coordinate technical exchanges with TRB, FHWA, and peer agencies, as appropriate.
- Regional Collaboration MassDOT will continue collaborating with transportation agencies throughout the Northeast to identify common research priorities, exchange technical knowledge, and coordinate implementation. Activities include participation in:
  - AASHTO RAC Region 1
  - New England transportation research initiatives
  - Research peer exchanges hosted by other State DOTs
  - Regional workshops, technical meetings, and implementation activities
- These collaborations provide opportunities to exchange best practices, identify emerging transportation issues, coordinate research investments, avoid duplication, and accelerate implementation of innovative technologies.
- Knowledge Exchange and Technology Dissemination: MassDOT will continue disseminating transportation research information throughout the agency by:
  - Sharing newly published TRB, FHWA, NCHRP, AASHTO, and pooled fund research products.
  - Distributing information on webinars, workshops, conferences, peer exchanges, and training opportunities.
  - Promoting MassDOT participation in national research panels, technical committees, and implementation activities.
  - Maintaining current MassDOT project information in TRID, the TRB Research in Progress (RIP) database, and other applicable national research repositories.
  - Identifying, evaluating, and promoting opportunities to implement nationally developed research products within Massachusetts.

Subtasks:

Peer Exchange

Pooled Fund Studies: In FFY27, MassDOT intends to the following Transportation Pooled Fund studies.

- 479 Clear Roads Winter Highway Operations Phase III
- 481 In-Service Performance Evaluation (ISPE) of Roadway Safety Features
- 501 Roadside Safety Pooled Fund – Phase 3
- 514 Work Zone Analytics 516 Highway Safety Manual 2nd Edition (HSM2) Implementation
- 544 Technology Transfer Concrete Consortium
- 549 Northeast Transportation Research Consortium (NTRC)
- 556 Uncrewed Aircraft Systems (UAS) Standardization
- 561 Consortium for Asphalt Pavement Research and Implementation 2 (CAPRI-2)
- 573 State DOT Council for Strategic AI Adoption
- 575 TRB Core Program Services for a Highway Research, Development, and Technology Program

Accomplishments in prior year:

During FFY26, MassDOT expanded its engagement in regional and national transportation research through the following accomplishments:

- Coordinated participation in Transportation Pooled Fund studies.
- Participated in AASHTO Research Advisory Committee (RAC) activities at both the national and regional levels.
- Coordinated the annual National Cooperative Highway Research Program (NCHRP) problem statement review process.
- Distributed TRB research reports, technical webinars, and research opportunities to appropriate MassDOT staff.
- Participated in AASHTO RAC Region 1 meetings and planning activities for the 2025 Winter Meeting and 2026 Summer Meeting.
- Received national recognition through the AASHTO RAC Sweet Sixteen High Value Research Award.
- Updated MassDOT research projects in the TRB Research in Progress (RIP) database.

Proposed activities for next year:

During FFY27, MassDOT will continue strengthening regional and national collaboration through the following activities:

- Coordinate MassDOT participation in Transportation Pooled Fund studies and associated Work Program, agreement, and reporting requirements.
- Support AASHTO RAC committees and regional activities.
- Coordinate the annual NCHRP problem statement review process.

- Participate in regional and national research peer exchanges, workshops, technical meetings, and knowledge-sharing activities.
- Identify opportunities to leverage external funding, collaborative research, and cooperative research programs.
- Promote implementation of national and regional research findings within MassDOT programs, policies, standards, specifications, and projects.
- Continue disseminating transportation research products, technical guidance, implementation resources, and best practices throughout the agency.

Anticipated products:

Expected products include:

- Participation in approved Transportation Pooled Fund studies and related technical and program-management documentation.
- Participation in AASHTO RAC, AASHTO RAC Region 1, and other regional research activities.
- MassDOT recommendations for annual NCHRP problem statement submissions.
- Distribution of transportation research reports, technical guidance, webinars, peer-exchange materials, and implementation resources.
- Updated MassDOT project information in TRID, the Research in Progress database, and other national transportation research repositories.
- Increased collaboration with peer State DOTs, FHWA, TRB, and industry partners.

Estimated task completion: 09-30-2027

Estimated task budget: $240,516.28

Estimated staff salaries and benefits: $140,516.28

MassDOT Staff Assignments

MassDOT staff members	% Time to task
Nicholas Zavolas	50.0
Hao Yin	30.0
Michael Flanary	10.0
Anil Gurcan	10.0
Austin Sanders	10.0

Subtask Financial Table

Estimated consultant costs: $0.00

Subtask / contract #	Total cost:	Pre-FFY 2027:	FFY 2027:	Post-FFY 2027:	Consultant/Contractor Name:	Consultant NTP:	Contract End Date:
Peer Exchange / 126725	$0.00	$140,727.00	$0.00	$0.00	VOLPE	None	05-19-2029
Pooled Fund Studies / None	$0.00	$0.00	$0.00	$0.00		None	None

Estimated Other costs: $100,000.00

E. 100% Federal Costs

Task Lead: Hao Yin

Task Purpose:

This task encompasses costs that are eligible for 100% Federal match waiver.

Accomplishments in prior year:

N/A

Proposed activities for next year:

Payment of AASHTO TSPs, AASHTO Census Transportation Technical Services

Anticipated products:

Payment of AASHTO fees/dues

Estimated task completion: 09-30-2027

Estimated task budget: $300,000.00

Estimated staff salaries and benefits: $0.00

Estimated Other costs: $300,000.00

Totals

	Staff cost	Consultant cost	Other cost	Total cost
SPR I A	$6,079,870.51	$3,648,482.88	$4,113,410.92	$13,841,764.32
SPR I B	$5,146,136.94	$1,259,500.00	$745,500.00	$7,151,136.94
SPR I (A+B) total	$11,226,007.46	$4,907,982.88	$4,858,910.92	$20,992,901.26
SPR II	$560,238.43	$5,860,263.16	$642,991.41	$7,063,493.00
SPR I & II total	$11,786,245.89	$10,768,246.04	$5,501,902.33	$28,056,394.26

SPR II % of total	25.2%
Complete Streets % of total	2.8%

The SPR will be monitored throughout the year to determine if an amendment to the STIP is necessary to ensure adequate funding. The SPR II is 25.2% of the overall program, meeting the 25% minimum threshold.