2023 State Planning and Research Program I

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Office of Transportation Planning

David Mohler, Executive Director	**Steve Woelfel**, Deputy Executive Director	**Bob Frey**, Director of Project-Oriented Planning	**Ethan Britland**, Manager of Multimodal Planning	Peter Sutton
				Makaela Niles
				Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
			Lionel Lucien, Manager of Public Private Development	Curtis Wiemann
				Vacant TPP II (to be filled)
		Kevin Lopes, Director of GIS Services		David Dinocco
				Michael McGill
				Jose Simo
				Argenis Sosa
				Manny Zotos
				Sudip Paudel
				Shruti Venkatesh
				Mary Molloy
				Florence Person
				Aanchal Gupta
				Charlotte Mays
				Charles Major
			Derek Krevat, Manager of MPO Activities	Derek Shooster
				Christopher Klem
				Miranda Briseno
				Raissah A. Kouame
			Jules Williams, Manager of Sustainable Transportation	Max Natanagara
				Daisy Brown
			Hongyan (Lily) Oliver, Manager of Research	Nicholas Zavolas
				Patrick McMahon
				Michael Flanary
				Drew Pflaumer
				Vacant TPP II (to be filled)
			Manager (Vacant)	Patricia Cahill
				Doug Johnson
				Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
		Liz Williams, Director of Data and Policy		Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
		Michelle Ho, Director of Capital Planning		Andrew Wang
				Vacant TPP II (to be filled)
		Maria Ramirez, Manager of Administration		Nathaniel Kerr
				Vacant (to be filled)
		Susan Repucci		

Highway Division

Jonathan Gulliver, *Highway Administrator*	**Carrie Lavallee**, *Deputy Administrator and Chief Engineer*	**Jack Moran**, *Deputy Chief Engineer for Performance and Asset Management*	**Ed Naras**, *Pavement Management Engineer*	Jonathan Smith
				Cody Holemo
				William Guttierrez
				Stefan Kargakis
				Patrick Lawlor
				Liz Cruz-Falero
				Subash Shahi
				Steven Morin
		John Bechard, *Deputy Chief Engineer for Project Delivery*	**John Anthong**, *Survey Engineer*	Arben Zhuri
				Brian Knowles
				Evanson Browne
				Jeff Bruce
				John Anthony
				John Barnes
				Leo Scanlon
				Michael Chouinard *(reports to John DeLeire)*
				Michael Roberts *(reports to Michael Chouinard)*
				Eugene Tivnan
				Mehdi Sadjady
	Neil Boudreau, *Assistant Administrator for Traffic and Safety*		**Carrie McInerney**, *Manager of Advanced Transportation Technology*	John Amato
				Robert Belcastro
				Tracy DeYoung
				Brian Farrington
				Stanley Lamb
				David Manktelow
				Steven O'Neill
				Michael Ribeiro
				Wayne Schofield Jr.
				Misrak Sultan
				Lori Suss
				Ian Adams
				Corey O'Connor
				Spencer Cullen
				Zachary Medeiros
				Amy Getchell
				Christopher Falcos
			Bonnie Polin, *State Safety Engineer*	Ana Fill
				Dakota DelSignore
				Jennifer Inzana
				Michelle Deng
				Stacey Schwartz
				Kirsten Johnson
				Rosalynd Scott
				Kevin Fitzgerald
				Kevin Chiang
				Buu Tran
				Noah Thompson
				Emmanuel Gonzalez
				Thao Tran
				Everlyn Galloway
				Zachary Medeiros
				Fang Xi
				Amitai Lipton
				Civil Engineer II (TBH)
				Transportation Program Planner II (TBH)
				Student Intern
				Student Intern
				Student Intern

SPR I Part A

Administration

A.1 / Administration and SPR Coordination

Task Lead: Maria Ramirez

Task Purpose: To supervise and direct planning and research staff and projects to maximize State Planning and Research (SPR) funding. The administrative staff includes the Executive Director, Deputy Executive Director, Director of Project-Oriented Planning, Director of Data and Policy, Director of Capital Planning and Manager of Administration, the SPR Program Coordinator, and one administrative support staff. The administrative staff oversees all fiscal and administrative activities of the following units:

- Capital Planning
- GIS Services
- MPO Activities
- Multimodal Planning
- Public-Private Development
- Research
- Sustainable Transportation
- Transit Planning

Guidance is also provided to the following units of the MassDOT Highway Division that are authorized for SPR reimbursement: Pavement Management, Statewide Traffic Data Collection, Traffic Crash Records and Safety Management, and Survey.

Accomplishments in prior year:

Developed standard operating procedures for billing, project closeouts and new project/contract awards and funding to ensure proper billing and consistency with project and contract awards/closeouts.

Proposed activities for next year:

SPR I and II administration, including required reporting, amendments, and scope approvals by FHWA. Submit SPR I and II deliverables to FHWA. Continue onboarding several OTP staff to fill vacancies. Internal working group to continue coordination with FHWA on billing, project closeouts and new contracts/awards consistent with SOP.

Anticipated products:

All activities, tasks, and deliverables identified for completion within FFY 2023. Finalization of project closeout documentation and Standard Operating Procedure(s) addressing billing and contract closeouts and new contract/project awards.

Estimated task completion: 09-30-2023

Estimated task budget: $1,228,911.62

Staff salaries and benefits: $852,911.62

MassDOT staff members	% Time to task
David Mohler	100.0
Stephen Woelfel	100.0
Maria Ramirez	100.0
Nathaniel Kerr	100.0
Susan Reppucci	100.0
Contracted Student Co-op	100.0
Contracted Student Co-op	100.0
Business Management Specialist	100.0
Bob Frey	50.0
Liz Williams	50.0
Kevin Lopes	50.0
Michelle Ho	40.0

Other costs: $376,000.00

1. American Association of State Highway and Transportation Officials (AASHTO) Annual Membership: $48,000.00
2. Transportation Research Board (TRB) (State Contribution to Core Programs): $155,000.00
3. Miscellaneous administrative expenses: $10,000.00
4. Northeast Association of State Transportation Officials (NASTO): $2,000.00
5. Newspaper ads for public meetings/announcements: $8,000.00
6. The Eastern Transportation Coalition: $92,000.00
7. Translation Services: $30,000.00
8. Office supplies: $5,000.00
9. Travel: $26,000.00

Capital Planning

A.2 / Capital Planning Development and Coordination

Task Lead: Michelle Ho

Task Purpose: This task is necessary for the development and process improvements of the annual Capital Investment Plan (CIP) for MassDOT and the state-funded portion of the MBTA CIP. Work under this task will involve the production of the state fiscal year (SFY) 2024-2028 CIP, a fiscally constrained document that includes all of MassDOT's capital investments across all Divisions as well as investments for MassDOT's Enterprise Services. In building this plan, staff will work with each MassDOT Division to identify and prioritize projects for funding over this five-year period. Additionally, public input will be solicited following the procedures established in MassDOT's Public Participation Plan. The SFY 2024-2028 CIP will incorporate trends and changing demands on our transportation system and the vision of how our transportation system should evolve to meet the demands of our customers and the changing demographics of the Commonwealth. With input and guidance from the Secretary, Administrators, and the Divisions, staff will revisit goals, strategic objectives, and priorities for the next five years in developing a new capital plan for MassDOT. The new CIP will be informed by and align with the strategies and goals developed as part of the long range state transportation plan "Beyond Mobility" currently under development. The 2024-2028 CIP will continue to incorporate process improvements for the planning cycle including enhancements to the model used to track project information and costs; incorporation of objectives from updated asset management and strategic plans (e.g. the Transit and Transportation Asset Management Plans, Rail Plan, Bicycle and Pedestrian Plans, Freight Plan, among others); refinements to project scoring methodologies; incorporation of more detailed equity analyses; incorporation of sustainability and resiliency investment considerations in program sizing and project evaluations; and a focus on engaging traditionally underrepresented groups during public participation processes.

Accomplishments in prior year:

- Developed and published the SFY 2023-2027 Capital Investment Plan which reflects a return to a five-year capital plan. All public outreach activities were accomplished virtually to reach as broad an audience as possible.
- Utilized on-call consultant support from Cambridge Systematics (CS) under SPR Task A.16, "On-Call Contracts," to develop and maintain the project universe of all projects programmed in the CIP. All projects programmed in the federal 2023-2027 STIP were incorporated into the CIP.
- Worked with CS to add additional functionality to the project universe to align with new requests from the Executive Office for Administration and Finance (ANF) as well as the Divisions.

- Continued to advocate and advance project scoring improvements in the areas of economic impact, resiliency, and sustainability.
- Refined reporting templates for the Massachusetts Executive Office of Administration and Finance (ANF) that pull from the project universe and are used to submit the MassDOT CIP by ANF Plan Item, CIP program, and funding.
- Updated our crosswalk with CIP funding categories to reflect new sources (e.g., new grant anticipation notes - Next Gen GANs - for the Highway bridge program) and Other Commonwealth Funds (Surplus Operating Funds) that align with the Commonwealth's accounting system (MMARS) to facilitate reporting on capital spending.
- Continued to refine the new online CIP story map and utilized the "Tableau" software tool to create graphics for the story map directly from the project universe to incorporate new funding sources and information.
- Continued to improve the functionality and usability of the CIP online comment tool to enhance its search capability.
- Utilized and refined the program developed for the 2021 CIP that automated the equity analysis process to minimize the manual data analysis required and to align with the mapped investments in the project universe.

Proposed activities for next year:

- Coordinate the development of the SFY 2024-2028 Capital Investment Plan.
- Continue to implement improvements to streamline the CIP development process and minimize the amount of manual inputs and analyses. Continue with the change to initiate development of the CIP sooner in the summer (July-August).
- Coordinate and continue to ensure alignment with the development of the STIP and the long-range state transportation plan.

Anticipated products:

- SFY 2024-2028 Capital Investment Plan.
- Capital planning improvements to governance; milestone establishment; scoring and investment evaluation; alignment with multimodal planning and performance targets/metrics; and CIP/STIP alignment.
- CIP Development Manual.

Estimated task completion: 09-30-2023

Estimated task budget: $218,308.22

Staff salaries and benefits: $218,308.22

MassDOT staff members	% Time to task
TPP II (TBH)	100.0
Michelle Ho	60.0
Andrew Wang	50.0

Other costs:

Geospatial Technology

A.3 / GIS Coordination

Task Lead: Kevin Lopes

Task Purpose: To work closely with each MassDOT Division; other state agencies, including MassGIS; municipalities; and regional agencies, including Metropolitan Planning Organizations (MPOs), to continually improve the delivery of GIS data and applications for all customers of the Commonwealth, ensuring better information and project delivery through a variety of systems and technologies. Work under this task will also involve participating in and contributing to the specialized coordination required to integrate OTP's GIS tools and platforms into agency-wide asset management inventories and processes. We will also represent MassDOT at various state, regional and national GIS user groups.

Accomplishments in prior year:

Continued ongoing GIS coordination through a variety of correspondence and meetings.

- Worked with the Massachusetts Emergency Management Agency (MEMA) and other parties to create the Mutual Aid application
- Began working with the Registry of Motor Vehicles (RMV) on a Road Test analysis project.
- Began working with the MPOs to create a TIP application that provides a bridge between MaPIT and eSTIP.
- Continued outreach with municipalities to develop partnerships and help maintain road and asset data.

Proposed activities for next year:

All coordination activities performed in FFY 2022 are intended to continue throughout FFY 2023. The level of coordination needed will vary throughout the year, based on particular issues or efforts to support all GIS tasks and projects.

- Continue working with Massachusetts Bay Transit Authority (MBTA) on building out the elevator cleaning application and bringing new assets into the tool.
- Begin working with the Highway Division to bring Plans and Records into a spatial database.
- Continue to work with the Rail & Transit Division on connecting with the Grants Plus database.
- Continue working with the MBTA to incorporate their projects into the MaPIT application.

Anticipated products:

- Various products may be initiated through coordination with MassDOT Divisions, the MBTA, and municipal and regional governments.

Estimated task completion: 09-30-2023

Estimated task budget: $151,212.67

Staff salaries and benefits: $151,212.67

MassDOT staff members	% Time to task
Kevin Lopes	50.0
Jose Simo	75.0

Other costs:

A.4 / GIS Platform Development

Task Lead: Kevin Lopes

Task Purpose: To support the use of geographic information systems (GIS) for all MassDOT, MBTA, Metropolitan Planning Organization (MPO) and municipal staff. To ensure that there is continuous access to the GeoDOT platform; that users are able to work with all applications; and that GIS technology is kept current and operating efficiently with updated and reliable tools introduced throughout the year.

Accomplishments in prior year:

Provided a variety of support services to the MassDOT Divisions, the MBTA, and municipalities including providing relevant applications for various agency staff.

- Completed and Implemented the Transit module in eSTIP.
- Developed a Mutual Aid application in partnership with MEMA for Cities and Towns.
- Completed the Waze dashboard on the GeoDOT platform that was piloted in EDC6.
- Continued working on the TIP Scoring application for MPOs and hope to complete this in FFY23.
- Completed the new Project Viewer related to the Bond Bill with significant enhancements including funding information.
- Began redesigning the Engage suite of apps and will be building them out in the next FFY.
- Designed and built an interactive year-end report dashboard to supplement the paper report.
- Began building the next generation MaPIT tool in Experience Builder.
- Continued providing training and support to various business units throughout MassDOT, MBTA and various municipalities.

Proposed activities for next year:

- The MaPIT application will be updated to include other project types (including for Rail & Transit Division, Aeronautics Division, and MBTA projects).
- Enhancement of eSTIP will continue this year to include transit projects and information.
- Development of a TIP scoring tool for the MPOs.
- Redevelopment of the Engage outreach and equity suite of tools.
- Update the Road and Bicycle Inventory Report application.
- Conflation of the Road Inventory to the Regional Integrated Transportation Information System (RITIS) and other road networks.
- Procure consultant to develop Location Service Data Transit Modeling tool.
- Development and maintenance of GeoDOT will continue.

- Using new platforms for enhanced data visualizations and analysis.
- Websites will be created and updated as necessary.
- New applications will continue to be developed throughout the year.
- Existing applications will be updated and improved as necessary.
- Continue cloud hosting for our GIS platform.

Anticipated products:

Various applications, web sites and web maps are expected to be created.

Estimated task completion: 09-30-2023

Timeline for new consultant support: Engage Development and Application Maintenance (continuing)

Consultant name: CDM Smith
Scope development and FHWA review/approval: 08-12-2022
Contract negotiations and FHWA review/approval: 09-02-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 12 months

Timeline for new consultant support: eSTIP Enhancements and Supporting Applications (continuing)

Consultant name: PMG Software
Scope development and FHWA review/approval: 08-19-2022
Contract negotiations and FHWA review/approval: 09-02-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 12 months

Timeline for new consultant support: MaPIT Development (continuing)

Consultant name: ESRI
Scope development and FHWA review/approval: 08-19-2022
Contract negotiations and FHWA review/approval: 09-02-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 12 months

Timeline for new consultant support: LBS Data Transit Modeling (New)

Consultant name: TBD
Scope development and FHWA review/approval: 08-19-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 10 months

Estimated task budget: $4,279,338.56

Staff salaries and benefits: $242,288.56

MassDOT staff members	% Time to task
Menelaos Zotos	100.0
Shruti Venkatesh	100.0
Argenis Cordones Sosa	50.0

Consultant costs: $1,799,250.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Engage Development and Application Maintenance / 85243	$803,332.00	$503,332.00	$200,000.00	$100,000.00	CDM Smith	10-01-2022	12	09-30-2023
eSTIP Enhancements and Supporting Applications / 110641	$1,573,323.00	$824,073.00	$549,250.00	$200,000.00	PMG Software	10-01-2022	12	09-30-2023
MaPIT Development / 110122	$4,136,134.00	$2,836,134.00	$800,000.00	$500,000.00	ESRI	10-01-2022	12	09-30-2023
LBS Data Transit Modeling / TBD	$250,000.00	$0.00	$250,000.00	$0.00	TBD	TBD	10	TBD

Consultant notes:

Other costs: $2,237,800.00

- $700 for annual Intuilabs maintenance.
- $1,600 for annual GeoJobe maintenance.
- $3,000 for annual Intersection Manager maintenance.
- $5,000 for annual search engine subscriptions for research program.
- $8,000 for annual SalesForce maintenance.
- $8,500 for annual Tableau maintenance.
- $20,000 for annual VertiGIS maintenance
- $20,000 for annual Wrike maintenance.
- $28,000 for annual TransCAD maintenance.
- $30,000 for annual Pictometry maintenance.
- $35,000 for PMG Maintenance
- $40,000 for 1Spatial Maintenance.
- $50,000 for Hardware/software purchases.
- $68,000 for Voyager Search maintenance.

- $100,000 for Conveyal annual software licenses and support.
- $400,000 for annual ROK Technologies for AWS Cloud Hosting.
- $1,400,000 for annual ESRI Enterprise Agreement.

A.5 / GIS Services

Task Lead: Kevin Lopes

Task Purpose: To provide maintenance and support of the GeoDOT Platform. Also, to provide a wide variety of standard and customized maps in support of MassDOT's operations for customers, maintain annual reports and catalogs, as well as provide post-production support and miscellaneous graphic design.

Accomplishments in prior year:

The GIS Services Team continued to maintain the platform and user accounts of the GeoDOT platform as well as provide a wide variety of standard and customized maps for many internal and external customers on an ongoing basis.

- GeoDOT user accounts were created and maintained
- Staff responded to over 400 map and data requests.
- Map and data catalogs were maintained and updated on schedule.
- Miscellaneous graphics support tasks performed frequently including the new GeoDOT Local Hub Site.

Proposed activities for next year:

- Continue to maintain and expand the GeoDOT platform including additional content, new Hub sites and additional named user accounts.
- All standard and recurring mapping and data provision activities performed in 2022 are intended to continue throughout 2023, as well as responding to specialized map and data requests as needed.
- Continue to improve the MassDOT map library and increase access to MassDOT data resources and improve provision of transportation information to a larger audience.

Anticipated products:

- GIS Maps
- Map Catalog
- Miscellaneous graphic products and reports

Estimated task completion: 09-30-2023

Estimated task budget: $378,757.65

Staff salaries and benefits: $378,757.65

MassDOT staff members	% Time to task
Michael McGill	100.0
GIS Analyst (TBH)	100.0
GIS Analyst (TBH)	100.0
Argenis Cordones Sosa	50.0
Mary Molloy	50.0
Jose Simo	25.0
Charles Major	25.0

Other costs:

A.6 / Highway Performance Monitoring System (HPMS)

Task Lead: Kevin Lopes

Task Purpose: To update and maintain the Highway Performance Monitoring System (HPMS) data files in order to comply with Federal Highway Administration (FHWA) reporting requirements for the National Highway System (NHS) including Surface Transportation Block Grant Program (STBG) route mileage, system condition and performance, vehicle-miles of travel, highway functional classification, and administrative jurisdiction.

Accomplishments in prior year:

Submitted the Certified Public Road Mileage of 2021 to FHWA on May 17, 2022, with an updated letter from Governor Charles Baker authorizing the Secretary of Transportation to approve public roadway mileage.

- The 2021 Interstate submittal was uploaded to the FHWA web site on April 15th, 2022.
- 2021 HPMS full submittal was uploaded to the FHWA web site on June 15, 2022.

Proposed activities for next year:

All activities performed in FFY 2022 are intended to continue throughout FFY 2023, with any additional FHWA requirements added to the process as needed.

- Continue participating in the AEGIST Pooled Fund Study
- Intend to submit the complete HPMS submittal by April 15th.

Anticipated products:

2022 Certification of Public Road Mileage - April 1, 2023.

- 2022 HPMS Submittal - April 15, 2023.

Estimated task completion: 06-15-2023

Estimated task budget: $77,705.03

Staff salaries and benefits: $77,705.03

MassDOT staff members	% Time to task
David DiNocco	50.0
Sudip Paudel	25.0

Other costs:

A.7 / Inventory Data Management

Task Lead: Kevin Lopes

Task Purpose: To provide MassDOT Divisions, the MBTA, other state agencies, municipalities and our public customers with comprehensive data and database management, as well as, to ensure that all users can access needed data efficiently. We will also provide data and spatial analysis where needed.

Accomplishments in prior year:

Performed data management tasks and projects supporting MassDOT Divisions, including many spatial databases.

- Completed several analysis projects including the CIP Equity Analysis.
- Processed significant updates to the Bicycle Inventory dataset.
- Performed a major upgrade to the Roads and Highways database schema to allow use of ArcGIS Pro.
- Added several new event layers to the Roads and Highways database including Adopt A Highway and municipal pavement
- Improved scripting for managing the network including updates to the route priority process.

Proposed activities for next year:

Data management tasks and projects performed in FFY 2022 are intended to continue throughout FFY 2023.

- Incorporate MIRE Data Elements into the data model including interchange type and several others.
- Update several events including bridges, number of lanes and pedestrian facilities.
- Edit the network on all lower ordered routes.
- Increase new data development tasks to enhance our data portfolio.
- Develop and implement data quality control standards.
- Implement metadata standards.

Anticipated products:

New data products and analysis will be completed this year.

Estimated task completion: 09-30-2023

Estimated task budget: $439,270.37

Staff salaries and benefits: $439,270.37

MassDOT staff members	% Time to task
Florence Person	100.0
Aanchal Gupta	100.0
Charlotte Mays	100.0
Sudip Paudel	75.0
Charles Major	75.0
Mary Molloy	50.0
David DiNocco	50.0

Other costs:

A.8 / Location Based Services Data

Task Lead: Liz Williams

Task Purpose: MassDOT is looking to procure Location-Based Services (LBS) data with modal information to help support planning and operations decisions at MassDOT, the MBTA, and all Massachusetts MPOs. LBS data has helped support numerous major planning projects in the past, including the Statewide Pedestrian and Bicycle Plans and the Bus Network Redesign. It has also been used to drive MassDOT's understanding of changing pandemic travel patterns on all modes to allow the agencies to make informed, data-driven policy decisions. As a final example, it has transformed the way that MassDOT and the MBTA measure equity. Renewed access to LBS data can expand the number of projects and departments that can use current and historical granular travel patterns to make decisions and complete planning studies.

Accomplishments in prior year:

N/A

Proposed activities for next year:

- Execute procurement of new LBS data
- Execute data trainings and advisory support

Anticipated products:

MassDOT is looking to procure new LBS data through a competitive process. This data should contain modal assignments, historical and recent travel volumes, origin and destination data, segment data (like speeds, etc.), and demographics data. This data would be freely available to all Divisions of MassDOT, the MBTA, and all MPOs.

The Office of Performance Management and Innovation, in partnership with the Office of Transportation Planning, would be responsible for the training of staff on using data; fulfilling data requests when necessary; and supporting the uptake of this data in an accurate way. Depending on the data procured, the administrative processes developed may include account management, data storage, training and advisory support, and quality assurance.

Estimated task completion: 09-30-2026

Timeline for new consultant support: LBS Data procurement

Consultant name: TBD
Scope development and FHWA review/approval: 12-01-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 04-03-2023
Total duration of task: 36 months

Estimated task budget: $500,000.00

Staff salaries and benefits: $0

Consultant costs: $500,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
LBS Data procurement / TBD	$1,500,000.00	$0.00	$500,000.00	$1,000,000.00	TBD	04-03-2023	36	TBD

Consultant notes: Total estimated consultant costs of $1,500,000: $500K for FFY23

Other costs:

A.9 / MA Regional Rail Demand Modeling Tool

Task Lead: Liz Williams

Task Purpose: Building a regional rail demand forecasting tool to prioritize investment and address future mobility needs. The tool will provide rail demand data to help prioritize investments, including:

- Service improvements and track projects;
- Station upgrades;
- First and last mile plans with local authorities and Regional Transit Authorities;
- Transit-Oriented Development (TOD) projects;
- Parking upgrades;
- Fare policy modifications. The key output would be the potential/latent demand/revenue that could be accessed a policy change. The tool should be flexible enough to allow quantification of societal benefits and wider economic benefits for Benefit Costs Analysis (BCA) purposes and for economic impact assessments. Specifically, the tool will be able to assess the impact of land use changes, new mobility options, and behavioral changes (including teleworking) on rail demand. In this regard the tool would leverage the Post-COVID19 teleworking Study.

Accomplishments in prior year:

N/A

Proposed activities for next year:

- Part 1 – Market Analysis – 4 to 6 months (include outreach effort for behavioral surveys)
- Part 2 - Model Development – 6-9 months (can start concurrently with Part 1)
- Part 3 – Model Calibration and Validation – Use cases

Anticipated products:

The modeling tool will include the following features:

- Rail demand by geography, time of day and day of week.
- Latent demand for rail - demand rail service that is currently not satisfied because rail service is not available, or is less attractive than other options such as driving.

- Impacts of more frequent service, lower or higher fares, parking costs, interchanges, and travel times on rail demand. The tool will include price elasticity/impact of fare/parking cuts/discounts.
- Differentiated rail demand based on existing and new customer profiles.
- Capacity constraint – both for train and parking.
- Model of first/last mile mobility options, including new mobility.

Estimated task completion: 9-30-2023

Timeline for new consultant support: MA Regional Rail Demand Modeling Tool

Consultant name: TBD
Scope development and FHWA review/approval: 11-18-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 12 months

Estimated task budget: $500,000.00

Staff salaries and benefits: $0

Consultant costs: $500,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
MA Regional Rail Demand Modeling Tool / TBD	$500,000.00	$0.00	$500,000.00	$0.00	TBD	None	12	TBD

Consultant notes:

Other costs:

A.10 / Travel Forecasting, Data Collection and Transportation System Performance

Task Lead: Bob Frey

Task Purpose: To measure and forecast statewide travel and measure transportation system performance to meet federal and state planning requirements and provide decision-makers with information to help guide current and future transportation policies and investments. This task has two major components: Travel Data Analyses: Daily and historical travel data are collected and analyzed to measure and monitor performance, conditions, changes and trends in travel patterns, mode use, person movement, behavior and preferences, and; Socioeconomic Projections: Changes in population, employment, housing, land use, and development patterns and trends are examined and projected for their effects on the transportation landscape. Periodic full-scale updates are performed to help inform development of state and regional transportation plans. Both of these components are recurring, ongoing activities that help to provide the latest planning assumptions by incorporating updated data collection methods, surveys, and projections.

Accomplishments in prior year:

- Implemented the third year of a three-year MassDOT-wide contract providing historical and real-time traffic data through the Eastern Transportation Coalition's Vehicle Probe Project (VPPII). The contractor is the University of Maryland's agent for the Coalition, CATT Lab, which provides automated data sharing and analyses through the Regional Integrated Transportation Information System (RITIS) platform. Combined with INRIX travel data, RITIS enables MassDOT to measure and monitor performance, communicate information, and support numerous planning, operations, and research activities.
- Developed and executed a new four-year MassDOT-wide contract providing historical and real-time travel data through the Eastern Transportation Coalition's Transportation Data Marketplace (which has replaced VPPII).
- Performed various activities related to the statewide travel demand model including data requests and coordination of updates.

Proposed activities for next year:

- Continue analyses of real-time and historical travel data through the Transportation Data Marketplace, including measuring and monitoring system performance and supporting planning, operations, and research activities.
- Continue work with the UMass Donahue Institute, Metropolitan Area Planning Council (MAPC), sub-consultants and regional planning agencies to produce Year 2050 socioeconomic projections consistent with multiple land-use scenarios and at a detailed level incorporating anticipated development to help inform future long range transportation planning efforts on the state and regional levels.
- Continue data work and coordination of activities related to the statewide travel demand model.
- Funding participation in and review of expanded RITIS products for State DOTs (a pooled fund effort coordinated through The Eastern Transportation Coalition).

Anticipated products:

- Travel patterns, travel time and movement, mobility data and performance reports (including detailed analysis components in transportation studies).
- Population, household, and employment projections for the Year 2050.
- Data provision to internal and external customers and coordination of travel demand modeling activities.
- Miscellaneous reports.
- Expanded and improved RITIS reports and applications for travel data analyses.

Estimated task completion: 09-30-2026

Timeline for new consultant support: Travel Data Analyses

Consultant name: UMD CATT Lab
Scope development and FHWA review/approval: 04-22-2022
Contract negotiations and FHWA review/approval: 06-01-2022
Consultant Notice to Proceed: 06-01-2022
Total duration of task: 48 months

Timeline for new consultant support: Socioeconomic Projections (MAPC)

Consultant name: Metropolitan Area Planning Council (MAPC)
Scope development and FHWA review/approval: 10-19-2021
Contract negotiations and FHWA review/approval: 10-29-2021
Consultant Notice to Proceed: 11-07-2021
Total duration of task: 23 months

Timeline for new consultant support: Socioeconomic Projections (UMDI)

Consultant name: UMass Donahue Institute (UMDI)
Scope development and FHWA review/approval: 10-19-2021
Contract negotiations and FHWA review/approval: 10-29-2021
Consultant Notice to Proceed: 10-02-2021
Total duration of task: 20 months

Estimated task budget: $1,840,371.24

Staff salaries and benefits: $61,885.78

MassDOT staff members	% Time to task
Bob Frey	50.0

Consultant costs: $1,778,485.46

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Travel Data Analyses / 118037	$8,699,474.15	$128,734.38	$1,565,485.46	$7,033,910.69	UMD CATT Lab	06-01-2022	48	05-31-2026
Socioeconomic Projections (MAPC) / 116578	$243,000.00	$130,000.00	$113,000.00	$0.00	Metropolitan Area Planning Council (MAPC)	11-07-2021	23	09-30-2023
Socioeconomic Projections (UMDI) / 116579	$270,000.00	$170,000.00	$100,000.00	$0.00	UMass Donahue Institute (UMDI)	10-02-2021	20	06-30-2023

Consultant notes:

Other costs:

MPO Activities

A.11 / Implementation of Federal Programs and Regulations

Task Lead: Derek Krevat

Task Purpose: Activities under this task will include the administration of the following discrete federal programs: Congestion Mitigation Air Quality Improvement Program (CMAQ), Federal Lands Access Program (FLAP), Scenic Byways, and Title VI strategies and compliance. This task will also include the administration of the Safe Routes to School (SRTS) education and infrastructure programs.

Accomplishments in prior year:

- CMAQ was administered successfully with four consultation committee meetings held and a full program of projects was identified for the State Transportation Improvement Program (STIP). Additionally, two projects received approval via electronic votes due to extenuating circumstances surrounding deadlines.
- Distributed a survey to all Massachusetts municipalities in order to obtain the information necessary to complete the Local Highway Finance Form (Form 536) for Highway Statistics 500-series reporting.
- FLAP was administered successfully with the obligation of federal funds for previously identified projects.
- The SRTS infrastructure program project solicitation was implemented, and nine additional projects were awarded for programming in the 2023-2027 STIP. A process for a new project solicitation in FFY 2023 has been developed.
- MPO Activities staff continued to support regional partners' efforts to acquire land, preserve historic sites, and promote byways. Two grant applications for Scenic Byways funding were submitted by OTP staff.

Proposed activities for next year:

- Distribute CMAQ analysis spreadsheets to each metropolitan planning organization (MPO) for their use in determining proposed CMAQ-funded projects' emissions reductions.
- Hold CMAQ Consultation Committee meetings.

- Compile notes from the CMAQ Consultation Committee meeting(s) and record new CMAQ-eligible projects.
- Complete annual CMAQ report submission to FHWA through the User Profile and Access Control System (UPACS).
- Work with the Eastern Federal Lands Highway Division (EFLHD) to coordinate activities related to FLAP project solicitation and selection.
- Work with the Office of Diversity and Civil Rights (ODCR) on delivery of the Title VI reports from the MPOs.
- Work with ODCR and the MassDOT Office of Public Engagement and Outreach (OPEO) on activities related to MassDOT's Virtual Public Involvement (VPI) initiatives.
- In support of the Highway Statistics 500-series reporting requirements, distribute a survey to all Massachusetts municipalities in order to obtain the information necessary to complete the Local Highway Finance Form (Form 536). Continue work to address discrepancies in MassDOT's Highway Statistics 500-series reporting.
- Continue to have a SRTS educational program focused on growing the number of participating schools, especially in underserved communities (staff and consultant).
- Continue to improve the SRTS infrastructure program and undertake a new project solicitation to fill the current FFY 2027 placeholder in the STIP.
- Host and/or lead SRTS pedestrian and bicycle events (e.g., walk/bike to school, safety trainings, etc.).
- Support MassDOT's Highway Division in the design and construction of SRTS infrastructure projects that have been initiated and approved through the MassDOT Highway Division's Project Review Committee (PRC).
- Oversee all activities that are part of contract 108522 (Statewide Safe Routes to School Program) with AECOM, which is funded using Transportation Alternatives Program (TAP) funding.
- Provide grant application assistance and coordination for any new Scenic Byway funding that becomes available.
- Coordinate all Ferry Boat Program (FBP) activities.

Anticipated products:

- The determination of CMAQ-eligible projects.
- The programming of new SRTS infrastructure projects.
- SRTS education and infrastructure program implementation.

- MPO Title VI Reports.
- Programming of awarded FLAP projects in coordination with the Eastern Federal Lands Highway Division (EFLHD).

Estimated task completion: 09-30-2023

Estimated task budget: $97,596.23

Staff salaries and benefits: $97,596.23

MassDOT staff members	% Time to task
Miranda Briseno	70.0
Derek Krevat	20.0
Raissah Kouame	10.0
Christopher Klem	15.0
Derek Shooster	15.0

Other costs:

A.12 / Metropolitan Planning Support and Oversight

Task Lead: Derek Krevat

Task Purpose: Activities under this task include liaisons assisting in the development and oversight of MPO 3C certification documents such as Regional Transportation Plans (RTPs), Transportation Improvement Programs (TIPs), and Unified Planning Work Programs (UPWPs), and coordination and oversight of MPO planning deliverables through their respective UPWPs. Additionally, MPO liaisons will assist regional partners with target setting activities for required federal performance measures. MPO Activities staff will also assist with planning and corridor studies as needed. Regional planning co-ops will assist with this task as needed.

Accomplishments in prior year:

- All thirteen regions within the Commonwealth drafted and endorsed UPWPs and TIPs that were submitted to federal partners for approval.
- Multiple amendments to TIPs and UPWPs were drafted and endorsed across all of the MPOs, requiring oversight and administration by the MPO Activities Group.
- All thirteen regions adopted statewide safety performance measures, as required by the Federal Highway Administration (FHWA) for Calendar Year (CY) 2022.
- Various memoranda of understanding (MOUs) were developed and endorsed by applicable stakeholders.
- Managed contracts for regional programs and projects.
- Participated in federal certification reviews.

Proposed activities for next year:

- All thirteen regions within the Commonwealth will draft and endorse 3C documents, including Regional Transportation Plans (RTPs), UPWPs and TIPs.
- The MPO Activities group will coordinate the setting of Federal Highway Administration (FHWA) performance targets for Calendar Year (CY) 2023 safety measures (PM1) and will submit federal reporting associated with Federal Fiscal Year (FFY) 2022 National Highway System (NHS) measures (PM2) and FFY 2022 Congestion, Emissions and Freight measures (PM3). Each of the thirteen regions will be consulted as part of this reporting.

- MPO liaisons will work with their respective MPO partners to ensure the development of these 3C documents according to schedule.
- MPO liaisons will also work with their respective MPO staffs to continue the delivery of planning activities programmed within UPWPs and look towards ways of improving the utility and quality of MPO staff-produced planning products.
- Participation in federal certification review processes as needed.
- Participation in state and regional planning studies and working groups as needed.
- Manage contracts for regional programs and projects when necessary.

Anticipated products:

Most activities are ongoing throughout the year; RTPs, TIPs, and UPWPs will be developed by summer 2022 with approval by reviewing partners before the start of FFY 2023.

Estimated task completion: 09-30-2022

Estimated task budget: $138,274.61

Staff salaries and benefits: $138,274.61

MassDOT staff members	% Time to task
Christopher Klem	50.0
Raissah Kouame	50.0
Derek Krevat	35.0
Derek Shooster	25.0
Andrew Wang	12.0
Miranda Briseno	10.0

Other costs:

A.13 / Next Generation Massachusetts Household Travel Survey - Wave 1

Task Lead: Liz Williams

Task Purpose: It has been over 10 years since MassDOT collected information to support the statewide travel demand model, and much has changed in the transportation landscape including the introduction of new modes and services; new commuting patterns and travel behaviors; and new data collection and survey analysis techniques. As a recurring, longitudinal survey, the Next Generation Massachusetts Household Travel Survey will be implemented over 10 years in four (4) waves. The objectives of the Next Generation Massachusetts Household Travel Survey (MTS) Wave 1 are to collect a representative sample of households across Massachusetts to support updates to the statewide travel demand model. Subsequent waves of the survey will focus on specific regions of the Commonwealth.

Accomplishments in prior year:

N/A

Proposed activities for next year:

- Procure consultant support for Next Generation MTS Wave 1
- Collect representative sample of MA households

Anticipated products:

Data, analysis, and visualization reflecting trips, households, vehicles, destinations, and tours. These products would be shared with CTPS, who are responsible for ongoing maintenance of the statewide travel demand model

Estimated task completion: 09-30-2023

Timeline for new consultant support: Next Generation Massachusetts Household Travel Survey - Wave 1

Consultant name: TBD
Scope development and FHWA review/approval: 11-30-2022
Contract negotiations and FHWA review/approval: 02-01-2023
Consultant Notice to Proceed: 04-01-2023-
Total duration of task: 18 months

Estimated task budget: $1,000,000.00

Staff salaries and benefits: $0

Consultant costs: $1,000,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Next Generation Massachusetts Household Travel Survey - Wave 1 / TBD	$2,000,000.00	$0.00	$1,000,000.00	$1,000,000.00	TBD	TBD	12	TBD

Consultant notes:

Other costs:

A.14 / State Transportation Improvement Program Coordination and Capital Planning Support

Task Lead: Derek Krevat

Task Purpose: Work under this task involves supporting the development of the annual Capital Investment Plan (CIP) update (see "Capital Planning Coordination," for more details) and leading the development of the Federal Fiscal Year (FFY) 2024 - 2028 State Transportation Improvement Program (STIP) update. Work also includes the oversight and internal/external coordination of an electronic STIP (eSTIP) application (see "GIS Support Services" for more details). The STIP is a financially constrained document that contains a listing of all federally funded transportation projects in the Commonwealth of Massachusetts. It is a combined effort among MassDOT, Metropolitan Planning Organizations (MPOs, Regional Transit Authorities) and a number of state agencies that work to design and build highways and transit projects.

Accomplishments in prior year:

- Coordinated the maintenance of the FFY 2022-2026 STIP.
- Produced the FFY 2023-2027 STIP accounting for new apportionments and programs under the Bipartisan Infrastructure Law (BIL).
- Supported the production of the SFY 2023 CIP Update.
- Continued to implement the electronic STIP (eSTIP) application and initiated a work task with consultant, PMG, and the Rail and Transit Division to begin incorporating transit projects into eSTIP.
- Assisted with the coordination and programming of special federal-aid sources.

Proposed activities for next year:

- Support the State Fiscal Year (SFY) 2024-2028 CIP and associated mapping, analysis, and public engagement activities.
- Lead the development of the FFY 2024-2028 STIP and incorporate any new information and guidance materials coming from the BIL.
- Coordinate the maintenance of the FFY 2023-2027 STIP.
- Coordinate the development and implementation of an eSTIP for the FFY 2024-2028 STIP (see "GIS Support Services" task for more details).

- Develop and coordinate responses to any federal planning findings on the STIP on a quarterly basis.
- Assist with the coordination and programming of special federal-aid sources.
- Continue incorporating transit projects into eSTIP.
- Serve as the Project Champion for the research project, "Measuring Accessibility to Improve Public Health" (see SPR II for more details) and assist with other CIP process improvements.

Anticipated products:

- FFY 2024-2028 STIP.
- eSTIP application process improvements.
- SFY 2024-2028 CIP.

Estimated task completion: 09-30-2023

Estimated task budget: $88,071.71

Staff salaries and benefits: $88,071.71

MassDOT staff members	% Time to task
Derek Shooster	55.0
Christopher Klem	20.0
Derek Krevat	15.0
Miranda Briseno	10.0
Raissah Kouame	10.0

Other costs:

A.15 / Statewide Long Range Transportation Plan

Task Lead: Derek Krevat

Task Purpose: MassDOT's 2050 Statewide Long Range Transportation Plan, Beyond Mobility, will articulate MassDOT's vision and goals and serve as a guidepost for allocating new federal and state funding to advance the Commonwealth's most pressing transportation priorities. Internally, Beyond Mobility will serve as a guide for strategic planning across all modes. As part of the effort, MassDOT is coordinating with a number of both internal and external stakeholders and conducting extensive public engagement activities with a focus on engaging traditionally underrepresented communities through targeted outreach. The Plan will be comprised of the following tasks: Existing Conditions Analysis; Public Engagement Plan; A Statewide Vision for Transportation in Massachusetts; Performance-Based Planning Targets; Value and Policy Problem Statements; Scenario Planning; Site-Specific Needs Assessment; Financial Plan; and Recommendations.

Accomplishments in prior year:

- Development of the Public Engagement Plan and implementation of a number of public engagement techniques, including multilingual and multi-ethnic focus groups; external stakeholder engagement and outreach; presentations to all thirteen regions and other stakeholder groups; the development of a project webpage; and the distribution of a visioning survey that received over 1,000 responses.
- The identification of scenarios based on research of trends impacting transportation.
- Analysis of site-specific needs across Massachusetts based on a compilation of previous MassDOT modal and statewide plans, regional transportation plans, and other transportation planning and policy documents.
- Analysis of transportation equity populations and development of a web map displaying these communities, which will be overlaid with the site-specific needs assessment to ensure that sites in more vulnerable communities are prioritized as part of the Plan.

Proposed activities for next year:

- The development of a vision statement and values for the future of transportation in Massachusetts.

- Continued implementation of the Public Engagement Plan, including an additional survey focused on budgetary tradeoffs as well as the use of Meeting-In-A-Box, which will involve external stakeholders representing specific stakeholder groups (e.g., people with disabilities, older adults, bicycle and pedestrian advocates, etc.) holding meetings on behalf of MassDOT and reporting back their findings.
- The implementation of the task on performance-based planning and programming to articulate performance targets in a number of areas.
- Continued coordination with external and internal stakeholder.

Anticipated products:

- Reports documenting public engagement results, scenarios, performance-based planning targets, site-specific needs, and other tasks as necessary.
- Updates to the project website.

Estimated task completion: 12-31-2023

Timeline for new consultant support: Statewide Long Range Transportation Plan, Beyond Mobility

Consultant name: Cambridge Systematics
Scope development and FHWA review/approval: 03-01-2021
Contract negotiations and FHWA review/approval: 09-01-2021
Consultant Notice to Proceed: 10-01-2021
Total duration of task: 27 months

Estimated task budget: $941,835.84

Staff salaries and benefits: $78,592.84

MassDOT staff members	% Time to task
Raissah Kouame	30.0
Derek Krevat	30.0
Christopher Klem	15.0
Andrew Wang	13.0
Miranda Briseno	10.0
Derek Shooster	5.0

Consultant costs: $863,243.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Statewide Long Range Transportation Plan, Beyond Mobility / 114869	$1,696,610.00	$783,367.00	$863,243.00	$50,000.00	Cambridge Systematics	08-26-2021	27	12-31-2023

Consultant notes:

Other costs:

Multimodal Planning

A.16 / Bicycle and Pedestrian Planning

Task Lead: Peter Sutton

Task Purpose: To provide continued support for bicycle and pedestrian planning activities in Massachusetts in order to promote healthy, safe, and accessible non-motorized transportation options. This task will serve to continue implementation and advancement of the recommendations of the Statewide Pedestrian Plan and the Statewide Bicycle Plan. Additional work under this task will involve providing assistance to MassDOT Highway District offices, MPOs, local governments, community-based organizations, and advocacy efforts in order to encourage, educate, plan, and design pedestrian and bicycle facilities.

Accomplishments in prior year:

- Organized and participated in Moving Together 2021.
- Organized and attended the Massachusetts Bicycle and Pedestrian Advisory Board Meetings.
- Organized and attended MassTrails Team Meetings.
- Continued implementation of the Bike and Pedestrian Plan deliverables.
- Conducted and completed the North Adams Adventure Trail Feasibility Study (on-call services contract assignment).

Proposed activities for next year:

- Organize and participate in Moving Together 2022 (hybrid meeting format).
- Organize and participate in Bay State Bike Week 2023 (staff).
- Organize and attend the Massachusetts Bicycle and Pedestrian Advisory Board Meetings (staff).
- Organize and attend the MassTrails Team Meetings (staff).
- Continue to oversee and participate in OTP-specific implementation activities of the Statewide Bicycle and Pedestrian Plans (staff).

Anticipated products:

- Moving Together Conference 2022.
- Bay State Bike Week 2023.
- Implementation of Bike and Pedestrian Plan Deliverables.

Estimated task completion: 09-30-2023

Estimated task budget: $110,912.79

Staff salaries and benefits: $110,912.79

MassDOT staff members	% Time to task
Peter Sutton	100.0
Ethan Britland	5.0

Other costs:

A.17 / Corridor Planning Studies

Task Lead: Ethan Britland

Task Purpose: To perform, participate in, and manage several types of transportation planning studies, conducted either internally or by other entities, such as regional planning agencies and other MassDOT Divisions. The level of involvement is project-specific and includes activities such as study development and analysis, public participation, coordination, technical assistance, and review. Often, these studies are part of the standard planning, design, and environmental processes required to advance a transportation project forward to implementation.

Accomplishments in prior year:

- Continued to conduct the Wellington Circle Study (non-SPR Funded for consultant costs).
- Continued to conduct the Route 128 Land Use and Transportation Study (split funding of SPR and non-SPR funding for consultant costs).
- Continued to conduct the Route 1A East Boston Corridor Study (SPR funded for consultant costs).
- Continued to conduct the Northern Tier Passenger Rail Study (SPR funded for consultant costs).
- Procured consultant services, contracted, and initiated the Kosciuszko Circle/Morrissey and Day Boulevard Study (non-SPR funded for consultant costs).

Proposed activities for next year:

- Complete the Wellington Circle Study (non-SPR Funded for consultant costs).
- Complete the Route 128 Land Use and Transportation Study (split funding of SPR and non-SPR for consultant costs).
- Complete the Route 1A East Boston Corridor Study (SPR funded for consultant costs).
- Complete the Northern Tier Passenger Rail Study (SPR funded for consultant costs).
- Begin Massachusetts Rail Plan Study.
- Begin Newton Corner Long-Term Planning Study.
- Being People and Transportation Study.
- Conduct the Kosciuszko Circle/Morrissey and Day Boulevard Study (non-SPR funded for consultant costs).

Anticipated products:

- Wellington Circle Study, task deliverables, Draft Report, and Final Report (non-SPR funded for consultant costs).
- Route 128 Land Use and Transportation Study, task deliverables, Draft Report, and Final Report (split funding of SPR and non-SPR for consultant costs).
- Route 1A East Boston Corridor Study, task deliverables, Draft Report, and Final Report (SPR funded for consultant costs).
- Northern Tier Passenger Rail Study, task deliverables, Draft Report, and Final Report (SPR funded for consultant costs).
- Kosciuszko Circle/Morrissey and Day Boulevard Study task deliverables (non-SPR funded for consultant costs).

Estimated task completion: 09-30-2022

Timeline for new consultant support: Northern Tier Passenger Rail Study (SPR funded for consultant costs)

Consultant name: HNTB
Scope development and FHWA review/approval: 02-01-2021
Contract negotiations and FHWA review/approval: 08-02-2021
Consultant Notice to Proceed: 10-20-2021
Total duration of task: 18 months

Timeline for new consultant support: Route 128 Land Use and Transportation Study (split funding of SPR and non-SPR)

Consultant name: VHB
Scope development and FHWA review/approval: 01-01-2021
Contract negotiations and FHWA review/approval: 06-01-2021
Consultant Notice to Proceed: 07-01-2021
Total duration of task: 24 months

Timeline for new consultant support: Route 1A East Boston Corridor Study (SPR funded for consultant costs)

Consultant name: WSP
Scope development and FHWA review/approval: 12-01-2020
Contract negotiations and FHWA review/approval: 06-01-2021
Consultant Notice to Proceed: 07-01-2021
Total duration of task: 15 months

Timeline for new consultant support: Newton Corner Long-Term Planning Study (SPR funded for consultant costs)

Consultant name: TBD
Scope development and FHWA review/approval: 12-01-2022
Contract negotiations and FHWA review/approval: 1-10-2023
Consultant Notice to Proceed: 2-01-2023
Total duration of task: 18 months

Timeline for new consultant support: People and Transportation Study

Consultant name: TBD
Scope development and FHWA review/approval: 11-01-2022
Contract negotiations and FHWA review/approval: 01-01-2023
Consultant Notice to Proceed: 02-01-2023
Total duration of task: 12 months

Timeline for new consultant support: Massachusetts Rail Plan

Consultant name: TBD
Scope development and FHWA review/approval: 11-01-2022
Contract negotiations and FHWA review/approval: 01-01-2023
Consultant Notice to Proceed: 02-01-2023
Total duration of task: 18 months

Timeline for new consultant support: Kosciuszko Circle/William T. Morrissey Boulevard Study (non-SPR funded)

Consultant name: AECOM
Scope development and FHWA review/approval: N/A
Contract negotiations and FHWA review/approval: N/A
Consultant Notice to Proceed: 05-01-2022

Total duration of task: 18 months

Timeline for new consultant support: Wellington Circle Study (non-SPR funded for consultant costs)

Consultant name: McMahon Associates
Scope development and FHWA review/approval: N/A
Contract negotiations and FHWA review/approval: N/A
Consultant Notice to Proceed: 04-01-2020
Total duration of task: 32 months

Estimated task budget: $2,614,865.36

Staff salaries and benefits: $304,249.36

MassDOT staff members	% Time to task
TPPII TBD - In hiring phase	100.0
TPPII TBD - In hiring phase	100.0
Ethan Britland	80.0
Makaela Niles	70.0

Consultant costs: $2,310,616.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Northern Tier Passenger Rail Study (SPR funded for consultant costs) / 116404	$999,975.00	$499,975.00	$500,000.00	$0.00	HNTB	10-20-2021	18	04-30-2023
Route 128 Land Use and Transportation Study (split funding of SPR and non-SPR) / 114652	$762,702.00	$152,086.00	$310,616.00	$0.00	VHB	07-01-2021	24	06-30-2023
Route 1A East Boston Corridor Study (SPR funded for consultant costs) / 114356	$500,000.00	$475,000.00	$25,000.00	$0.00	WSP	07-01-2021	15	12-31-2022
Newton Corner Long-Term Planning Study (SPR funded for consultant costs) / TBD	$1,000,000.00	$0.00	$500,000.00	$500,000.00	TBD	12-01-2022	18	TBD
People and Transportation Study / TBD	$500,000.00	$0.00	$375,000.00	$125,000.00	TBD	02-01-2023	12	TBD
Massachusetts Rail Plan / TBD	$1,000,000.00	$0.00	$600,000.00	$400,000.00	TBD	12-01-2022	18	TBD

Consultant notes: Route 128 Land Use and Transportation Study - $300,000 in developer mitigation funding was used first in FFY2022 in addition to $449,702 of programmed SPR funding (Total $749,702).

Other costs:

A.18 / CTPS Annual On-Call Planning Assistance

Task Lead: Bob Frey

Task Purpose: To expeditiously provide recurring technical and miscellaneous staff support for planning studies, travel modeling, data management, and other related tasks. Tasks assigned to the Central Transportation Planning Staff are intended to support OTP's function as a shared/enterprise service for MassDOT.

Accomplishments in prior year:

Ongoing and recurring tasks including Road Inventory support, travel model assistance, and miscellaneous study support.

Proposed activities for next year:

Ongoing and recurring tasks including Road Inventory support, travel model assistance, and miscellaneous study support.

Anticipated products:

Road Inventory support and maintenance. Statewide Travel Demand Model assistance. Miscellaneous studies and related assistance.

Estimated task completion: 09-30-2023

Estimated task budget: $490,000.00

Staff salaries and benefits: $0

Consultant costs: $490,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
CTPS Annual On-Call Planning Assistance/TBD	$490,000.00	$0.00	$490,000.00	$0.00	CTPS	10-01-2022	12	09-30-2023

Consultant notes:

Other costs:

A.19 / Freight Planning

Task Lead: Makaela Niles

Task Purpose: To continue to implement immediate infrastructure and policy strategies recommended in the 2017 Massachusetts Freight Plan. Other annual activities include 1) monitoring and responding as needed to multimodal freight trends, funding opportunities, legislation and rulemaking, and 2) participation in regional and national freight coordination efforts. In addition, we will begin the procurement process for developing a new Massachusetts Freight Plan that builds on the current 2017 Plan and the ongoing "Understanding the Impacts of COVID-19 on the Massachusetts Freight Network & Freight Planning" study.

Accomplishments in prior year:

- Continued to explore implementation strategies from the 2017 Massachusetts Freight Plan as applicable.
- Conducted the FHWA Resource Center sponsored Freight/Truck Parking Workshop.
- Initiated the "Understanding the Impacts of COVID-19 on the Massachusetts Freight Network & Freight Planning" study (staff and consultant support).
- Monitored freight trends.
- Monitored Notice of Funding Opportunities, legislation, and rulemaking.
- Participated in regional and national freight coordination efforts, including coordination with the freight Advisory Committee.
- Supported the MassDOT Rail and Transit Division's Freight planning activities.

Proposed activities for next year:

- Continue to explore implementation strategies from the 2017 Massachusetts Freight Plan as applicable.
- Procure, initiate and complete the 2023 Massachusetts Freight Plan
- Complete the Understanding the Impacts of COVID-19 on the Massachusetts Freight Network & Freight Planning study. (staff and consultant support)
- Continue to monitor freight trends.
- Continue to monitor notice of funding opportunities, legislation, and rulemaking.
- Continue to participate in regional and national freight coordination efforts, including coordination with the freight Advisory Committee.

- Continue to support the MassDOT Rail and Transit Division's freight planning activities.
- Complete COVID-19 Impacts Study Final Report.

Anticipated products:

- 2023 Massachusetts Freight Plan Final Report
- COVID-19 Impacts Study Report

Estimated task completion:

Timeline for new consultant support: Understanding the Impacts of COVID-19 on the Massachusetts Freight Network & Freight Planning Study

Consultant name: Jacobs Engineering Group
Scope development and FHWA review/approval: 02-01-2021
Contract negotiations and FHWA review/approval: 09-01-2021
Consultant Notice to Proceed: 10-21-2021
Total duration of task: 12 months

Timeline for new consultant support: 2023 Massachusetts Freight Plan

Consultant name: TBD
Scope development and FHWA review/approval: 07-11-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 10 months

Estimated task budget: $826,459.59

Staff salaries and benefits: $26,584.59

MassDOT staff members	% Time to task
Makaela Niles	25.0
Ethan Britland	5.0

Consultant costs: $799,875.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Understanding the Impacts of COVID-19 on the Massachusetts Freight Network & Freight Planning Study / 114842	$349,875.00	$300,000.00	$49,875.00	$0.00	Jacobs Engineering Group	10-21-2021	12	10-31-2022
2023 Massachusetts Freight Plan / TBD	$750,000.00	$0.00	$750,000.00	$0.00	TBD	10-01-2022	10	TBD

Consultant notes:

Other costs:

A.20 / On-Call Contracts

Task Lead: Makaela Niles

Task Purpose: Procure Five (5) new consultant contracts for on-call services in order to expeditiously initiate and conduct planning-level assignments. The time frames of these assignments vary, ranging from short-term assignments, such as technical analysis of transportation data, to long-term efforts, such as conceptual studies that may include a technical component along with coordination and interaction with other state agencies, advisory groups, stakeholders, and/or members of the public. These assignments are intended to support OTP's function as a shared/enterprise service for MassDOT, and also provide opportunities to examine and implement state of the art practices as part of our statewide transportation planning process.

Accomplishments in prior year:

Scoped and procured five (5) new on-call services consultant contracts

Proposed activities for next year:

- Issue Notice to Proceed for five (5) new on-call services consultant contracts
- Scope and initiate new on-call contract assignments

Anticipated products:

Scope, initiate and conduct various on-call assignments.

Estimated task completion: 09-30-2025

Timeline for new consultant support: Contract #1

Consultant name: ARUP
Scope development and FHWA review/approval: 5-20-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Timeline for new consultant support: Contract #2

Consultant name: Cambridge Systematics
Scope development and FHWA review/approval: 5-20-2022
Contract negotiations and FHWA review/approval: TBD

Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Timeline for new consultant support: Contract #3

Consultant name: HNTB
Scope development and FHWA review/approval: 5-20-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Timeline for new consultant support: Contract #4

Consultant name: Nelson\Nygaard
Scope development and FHWA review/approval: 5-20-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Timeline for new consultant support: Contract #5

Consultant name: VHB
Scope development and FHWA review/approval: 5-20-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Estimated task budget: $850,353.63

Staff salaries and benefits: $17,018.63

MassDOT staff members	% Time to task
Ethan Britland	10.0
Makaela Niles	5.0

Consultant costs: $833,335.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Contract #1 / TBD	$500,000.00	$0.00	$166,667.00	$333,333.00	TBD	TBD	TBD	TBD
Contract #2 / TBD	$500,000.00	$0.00	$166,667.00	$333,333.00	TBD	TBD	TBD	TBD
Contract #3 / TBD	$500,000.00	$0.00	$166,667.00	$333,333.00	TBD	TBD	TBD	TBD
Contract #4 / TBD	$500,000.00	$0.00	$166,667.00	$333,333.00	TBD	TBD	TBD	TBD
Contract #5 / TBD	$500,000.00	$0.00	$166,667.00	$333,333.00	TBD	TBD	TBD	TBD

Consultant notes:

Other costs:

Public Private Development Unit

A.21 / Access Management through Development Review and Land Disposition

Task Lead: Lionel Lucien

Task Purpose: To implement access management through the review of private development proposals and the disposition of MassDOT land or railroad right-of-way (ROW).

1. Implement Access Management principles in the review of all private development projects in accordance with the Project Development and Design Guidebook (PDDG).
2. Work with the Highway Division in the revision of the PDDG Chapter on Access Management
3. Review all canvases related to the purchase or lease of MassDOT owned-property.
4. Review all requests for break-in access-controlled lines along state and interstate highways.
5. Review all requests to use, acquire, or dispose of railroad right of way.
6. Ensure that canvassing decisions are consistent with MassDOT policies on safety and mobility.
7. Review post-monitoring of permitted development site access to ensure that access management decisions maintain safety and mobility.

Accomplishments in prior year:

- 8 ROW canvases were reviewed by the Public Private Development Unit (PPDU).
- Working with the MBTA, issued a Request for Proposal to develop better methodology to identify impacts to the transit system and make more realistic and implementable mitigation.
- Identified in collaboration with Massport and the MBTA a list of capital improvement projects to keep the Anderson Regional Transportation Center in a state of good repair. Projects to be implemented include: parking lot repairs and repaving, roof repair and/or replacement, and upgrades to parking revenue collection system.

Proposed activities for next year:

All coordination activities performed in FFY 2022 are intended to continue throughout FFY 2023.

Anticipated products:

Internal staff coordination with MassDOT Divisions. External staff coordination with other agencies.

Estimated task completion: 06-30-2023

Estimated task budget: $47,733.62

Staff salaries and benefits: $47,733.62

MassDOT staff members	% Time to task
Curtis Wiemann	30.0
Lionel Lucien	20.0

Other costs:

A.22 / Coordination and Consultation with Developers and Project Stakeholders

Task Lead: Lionel Lucien

Task Purpose: To conduct consultation meetings and provide technical guidance to developers and project stakeholders on transportation policies, planning, and design issues during the development of private projects. Work under this task will include the following specific items: 1.) Review all Transportation Scoping Letters (TSL); confirm the assumptions; and provide feedback on the information included in transportation impact assessment studies. 2.) Conduct consultation meetings on all technical issues, transportation analyses and conceptual plans for mitigation. 3.) Coordinate with all appropriate MassDOT Division units and the MBTA to seek inputs into the early development of transportation infrastructure to mitigate project impacts. 4.) Coordinate as necessary with other state agencies, cities, and towns. 5.) Respond to all questions and requests for information regarding the MassDOT permitting process.

Accomplishments in prior year:

- Reviewed approximately 12 transportation-related grant applications for the Massachusetts Gaming Commission's grant mitigation program.
- Conducted a significant number of meetings to provide technical support to developers and their consultants as part of their Massachusetts Environmental Policy Act (MEPA) submissions and review processes.
- Provided technical review and support on transportation issues for the environmental permitting of MassDOT/MBTA air rights projects.
- Worked with the Central Transportation Planning Staff (CTPS) to monitor the transportation modeling for the Dorchester Bay City project.

Proposed activities for next year:

- All coordination activities performed in FFY 2022 are intended to continue throughout FFY 2023.
- Work with MassDOT's Office of Real Estate and Asset Development (OREAD) and potential developers to provide assistance and guidance on development proposals.

Anticipated products:

- Internal staff coordination with MassDOT Divisions, the Massachusetts Port Authority (Massport), and the MBTA.
- External staff coordination with other agencies, including the Massachusetts Executive Office of Energy and Environmental Affairs and the Executive Office of Housing and Economic Development.

Estimated task completion: 09-30-2023

Estimated task budget: $37,863.41

Staff salaries and benefits: $37,863.41

MassDOT staff members	% Time to task
Curtis Wiemann	25.0
Lionel Lucien	15.0

Other costs:

A.23 / Development Review through the MEPA and MassDOT Access Permit Processes

Task Lead: Lionel Lucien

Task Purpose: To provide timely and thorough technical reviews and evaluations of the anticipated transportation impacts of development projects under the Massachusetts Environmental Policy Act (MEPA) and as part of the approval process for access permits issued by MassDOT. Work under this task will include the following specific items: 1.) Review and issue comments on behalf of MassDOT and the MBTA on all Environmental Notification Forms, Environmental Impact Reports, and Notices of Project Change to ensure consistency with MassDOT policies, regulations, and design standards. 2.) Adequately review all environmental documents attached to transportation studies for consistency with the latest transportation impact assessment guidelines. 3.) Ensure the coordination of transportation-related comments between all MassDOT Divisions and the MBTA, cities, towns, and stakeholders as appropriate. 4.) Coordinate with the MEPA Office to address outstanding issues on projects and timely submission of all MEPA comments. 5.) Review and submit comments on all Requests for Determination and Requests for Advisory Opinion when asked by the MEPA Office. 6.) Provide technical assistance to the MEPA Office and/or project stakeholders on all transportation-related issues.

Accomplishments in prior year:

- Coordinated throughout the year with all MassDOT Divisions, the MBTA, Massport, and cities and towns on technical reviews for development projects and responded to several public inquiries.
- Reviewed projects' commitments to provide pedestrian, bicycle, and/or transit accommodations.
- Reviewed all conceptual plans or permitted projects for Complete Streets accommodations.

Proposed activities for next year:

- All coordination activities performed in FFY 2022 are intended to continue throughout FFY 2023.

- Reviews include: Dorchester Bay City, Route 20 corridor in Charlton, multiple developments around the Sullivan Square area, and the South Exchange project in Boston.
- Continue to work with the developer of the Dorchester Bay City project to identify infrastructure needs to mitigate the impacts of substantial redevelopment of the site.

Anticipated products:

- Internal staff coordination with MassDOT Divisions and the MBTA.
- External staff coordination with other agencies including MEPA, Massport, and the Massachusetts Department of Conservation and Recreation (DCR).
- Timely reviews and submissions of all MassDOT comments on environmental documents.

Estimated task completion: 09-30-2023

Estimated task budget: $55,986.36

Staff salaries and benefits: $55,986.36

MassDOT staff members	% Time to task
Curtis Wiemann	40.0
Lionel Lucien	20.0

Other costs:

A.24 / MassDOT Policies Supported and Incorporated in Inter-Agency Objectives

Task Lead: Lionel Lucien

Task Purpose: 1.) Represent MassDOT on the Interagency Permitting Board. Attend all meetings and review submissions from cities and towns for Priority Development Site Designations; review and approve requests for 43D Expedited Permitting designations; and participate in all activities to expedite the permitting process at the state level. 2.) Work with MassDOT Divisions to review the overall permitting and approval process for developments with an emphasis on reviewing MassDOT/MBTA's approach to implementing transportation mitigation. 3.) Represent MassDOT on the Woburn Anderson Regional Transportation Center (RTC) Executive Committee. Participate in the management and oversight of the facility to promote multimodal objectives and fiscal solvency.

Accomplishments in prior year:

- Assisted with the management of the Anderson Regional Transportation Center which has withstood the financial impacts of the COVID-19 pandemic as a result of steps taken to reduce administrative and operational costs. After two years of lost revenues, the ARTC has started to generate revenues based on increased airport ridership.
- Provided technical support on permitting and economic development issues to five cities and towns that have adopted 43D Expedited Permitting.
- Initiated work with OPMI. To date, a methodology to address bus analysis has been developed and implemented.

Proposed activities for next year:

- All activities performed in FFY 2022 are intended to continue throughout FFY 2023.
- Conduct internal and external planning coordination for the 2023 TRB National/International Access Management Conference in Boston.
- Work with OPMI to develop an improved methodology for transit analysis and transit mitigation requests.
- Update the 2014 Transportation Impact Assessment Guidelines for consistency with MassDOT policies and regulations.

Anticipated products:

- Internal staff coordination with MassDOT Divisions and the MBTA.
- External staff coordination with Massport, the Massachusetts Department of Housing and Economic Development (HED), the Massachusetts Department of Conservation and Recreation (DCR) and other agencies.
- Draft of a new MassDOT/EEA Transportation Impact Assessment Guidelines.

Estimated task completion: 09-30-2023

Estimated task budget: $27,101.78

Staff salaries and benefits: $27,101.78

MassDOT staff members	% Time to task
Lionel Lucien	20.0
Curtis Wiemann	5.0

Other costs:

A.25 / Mitigation, Transportation Demand Management, and Monitoring Programs for Development Projects

Task Lead: Lionel Lucien

Task Purpose: Secure appropriate multimodal mitigation benefits consistent with MassDOT policies and to ensure that developers implement and follow up on their mitigation commitments. Work under this task will include the following specific items:

- Negotiate appropriate multimodal mitigation measures with private developers in the form of both capital and operational improvements. Prepare and issue Section 61 Findings on behalf of MassDOT to formalize mitigation measures.
- Ensure the timely issuance of needed MassDOT permits in accordance with State Highway Access Regulations. Ensure that project proponents meet all commitments to implement mitigation required as part of their Section 61 Findings.
- Review all submitted Transportation Monitoring Reports.
- Additionally, consultant support will be procured to assist MassDOT to revise the existing MassDOT/EEA Transportation Impact Assessment Guidelines to address a number of issues raised by consultants and the reviewers and also to incorporate the latest MassDOT policies, regulations, and engineering directives.

Accomplishments in prior year:

- Issued nine Section 61 Findings for projects previously reviewed.
- Provided support to developers in designing and implementing transportation demand management (TDM) programs.
- Monitored recently built projects that received a Section 61 Finding from MassDOT using the Transportation Impact Assessment Monitoring Report (TIAMR) tool.

Proposed activities for next year:

- Coordinate activities performed in FFY 2022 throughout FFY 2023.

- Assist with the oversight of the Land Use and Transportation Study along the Route 128 Corridor to serve as a prototype for multimodal program and project mitigation requests for development projects.
- This study is funded under SPR Task A.14, "Corridor Planning Studies."
- Procure consultant support for the Transit Mitigation Program project.
- Collect developers' commitments to mitigation funds and monitor implementation of targeted study/improvements.

Anticipated products:

- Internal staff coordination with MassDOT Divisions and the MBTA.
- External staff coordination with Massport, HED, DCR and other agencies.
- Approved research proposal and contracts for Update of MassDOT/EEA Transportation Impact Assessment Guidelines.

Estimated task completion: 09-30-2023

Timeline for new consultant support: MassDOT/EEA Transportation Impact Assessment Guidelines Revision

Consultant name: TBD
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 12 months

Estimated task budget: $181,228.15

Staff salaries and benefits: $31,228.15

MassDOT staff members	% Time to task
Lionel Lucien	20.0
Curtis Wiemann	10.0

Consultant costs: $150,000

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
MassDOT/EEA Transportation Impact Assessment Guidelines / TBD	$150,000.00	$0.00	$150,000.00	$0.00	TBD	TBD	12	TBD

Other costs:

Sustainable Transportation

A.26 / Climate Adaptation Vulnerability Assessment

Task Lead: Jules Williams

Task Purpose: To identify a prioritized set of high-risk climate hazards and associated high-risk transportation assets throughout the state using a rigorous methodology that integrates GIS tools, climate projections, and hydrologic and hydraulic models. In a second phase, the project will provide recommendations about how project results could be integrated into planning, asset management, operations, and maintenance activities. This task also includes coordination with adaptation initiatives by MassDOT Divisions, other state agencies, and Metropolitan Planning Organizations (MPOs). This task supports compliance with Executive Order 569, which requires state agencies to assess vulnerability to climate change and extreme weather events and identify adaptation options for assets.

Accomplishments in prior year:

- Completion of WRF-Hydro modeling for the first of four hydrological domains that make up the state,
- Completion of MassDOT's review of depth-damage functions for each asset category,
- Development of draft floodplains for the first hydrological domain
- Validating the choice of climate models via sensitivity testing of the WRF-Hydro model,
- Scoping a conflation of the road-inventory with the open-street map network used in the Climate Adaptation Vulnerability Assessment (CAVA) equity analysis.
- Geocoding of public use airport asset data,
- Completion of the streetlight insights component of the equity analysis
- Generation of additional coastal data

Proposed activities for next year:

Continuing the development of floodplains, maps of erosive levels of concern, asset exposure and applying risk analysis

Anticipated products:

- Floodplain maps of flooding depth and extent
- Maps of erosive potential
- Exposure identified for multimodal transportation assets

- Risk quantified for multi modal transportation assets

Estimated task completion: 09-30-2023

Estimated task budget: $1,094,412.49

Staff salaries and benefits: $65,009.49

MassDOT staff members	% Time to task
Jules Williams	50.0

Consultant costs: $1,029.403.01

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Climate Adaptation Vulnerability Assessment /106882	$3,885,002.00	$2,100,522.30	$1,029.403.01	$0.00	WSP	January 2020		02/01/2023

Consultant notes: These consultant costs are uncertain because MassDOT has put a hold on invoice payments. This is the balance left on the contract based on invoices that OTP has received to date.

Other costs:

A.27 / GHG Mitigation Analysis, Research, Guidance & Regulatory Requirements

Task Lead: Jules Williams

Task Purpose: To support the Commonwealth's efforts to meet ambitious greenhouse gas (GHG) reduction goals. The scope of OTP's work under this task includes undertaking studies of GHG mitigation opportunities in Massachusetts; providing transportation planning input into state government efforts to develop, monitor and update the Commonwealth's Climate Policies; offering feedback on MassDOT's role in reducing statewide emissions; supporting Metropolitan Planning Organizations' (MPO) GHG impact estimation and reporting; continuing to collect data on on-road GHG emissions as well as MassDOT and MBTA emissions. During FFY 2023, the Commonwealth's new climate law requires a 2050 GHG emissions limit for the transportation sector as part of requirements designed to reach specified emissions targets. The Federal Government's Infrastructure Investment and Jobs Act (IIJA) requires a carbon reduction strategy to be developed by State DOTs by November 2023 and FHWA has issued guidance on the development of this strategy. There is also the possibility of a new federal performance measure on GHG emissions from vehicles operating on the National Highway System which could require MassDOT to set a performance target for GHG emissions that is consistent with the Biden Administration's net zero target.

Accomplishments in prior year:

- OTP staff coordinated with relevant MassDOT and MBTA personnel to acquire data necessary for annual tracking of MassDOT-MBTA GHG emissions.
- OTP staff reviewed and provided feedback on final proposals for the Clean Energy and Climate Plans for 2025 and 2030 and transportation sector emissions limits developed by the Executive Office of Energy and Environmental Affairs.

Proposed activities for next year:

- Review federal guidance and IIJA requirements for carbon reduction strategy; develop an approach to carbon reduction strategy; and consult with FHWA to confirm compliance with guidance.
- Initiate development of the carbon reduction strategy.

- Develop scope for analysis using Location Based Services (LBS) data for an empirical analysis of project impacts.
- Support implementation of the GHG performance measure being proposed by FHWA including consideration of the Commonwealth's pre-existing limits on transportation sector GHG emissions.
- Review opportunities for partnerships with transportation sector emitters that could be partners in grant applications under the IIJA and initiate outreach to these entities.

Anticipated products:

- Final approach to carbon reduction strategy required by the IIJA.
- Advice and analysis on transportation sector modeling and policy issues raised during the development of the 2050 emissions limit for the transportation sector
- Revised scope for LBS data on project GHG impacts.
- Shortlist of partnership opportunities

Estimated task completion: 09-30-2023

Timeline for new consultant support: GHG Mitigation Analysis and Research

Consultant name:
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: TBD

Estimated task budget: $111,851.37

Staff salaries and benefits: $111,851.37

MassDOT staff members	% Time to task
Daisy Brown	100.0
Jules Williams	25.0
Max Natanagara	10.0

Other costs:

A.28 / Low Emissions Vehicles, Fuels and Infrastructure

Task Lead: Max Natanagara

Task Purpose: To provide planning studies and other analysis on issues related to low-emission vehicles and infrastructure. Increased adoption of low emissions vehicles and fuels is targeted as part of Massachusetts' efforts to reduce emissions. A range of policies are in place that seek to increase adoption of these technologies. This impacts MassDOT and the transportation system in a number of ways: changes in motor fuel excise revenues; demand for new kinds of refueling in different locations; changes in the kinds of signage needed on highways; changes in vehicle operating costs and associated incentives to drive and changes in the amount, types and locations of pollutants emitted; and requests for how the transportation network can support increased uptake of these technologies.

Accomplishments in prior year:

- OTP staff participated in AASHTO EV practitioners working group meetings and contributed to the ongoing NCHRP Synthesis Panel 53-08
- OTP staff reviewed the Infrastructure Investment and Jobs Act and scoped a study for analyzing EV charging demand on corridors in Massachusetts
- OTP staff worked on activities related to development of NEVI Plan and coordinated with the Joint Office of Energy and Transportation and FHWA on questions related to NEVI.
- OTP staff developed and submitted an Alternative Fuel Corridor nomination package using suitability criteria and outreach to Metropolitan Planning Organizations in Massachusetts. OTP staff also coordinated with the Executive Office of Energy and Environmental Affairs on these nominations.
- OTP staff met with electric vehicle charging station operators, energy providers, and other parties to learn about different EV charging business models and other challenges and opportunities related to the build-out of a statewide EV charging network in Massachusetts.
- OTP staff coordinated with MassDOT Highway Division and the MassDOT Office of Real Estate and Asset Development to better understand the challenges and opportunities related to installing EV chargers on suitable MassDOT sites.
- OTP staff met with electric vehicle charging station operators, energy providers, and other parties to learn about different EV charging business

models and other challenges and opportunities related to the build-out of a statewide EV charging network in Massachusetts.
- OTP staff began a review of FHWA's Notice of Proposed Rulemaking regarding the NEVI program.
- OTP staff provided feedback on the feasibility of deploying hydrogen powered fast charging equipment at rest areas.

Proposed activities for next year:

- Support Highway Division in implementation of the NEVI Plan through determining role of MassDOT locations; development of public-private partnership approach; and assisting with the solicitation design and supporting program transition.
- Undertake a survey on access to garaging/parking for drivers in Massachusetts and relation to EV charging provision
- Repeat statistical survey conducted as part of NEVI Plan analysis
- Work with the MPO Activities Group and the Highway Division to reprogram funds.
- Continue regional coordination with other states on NEVI Plan implementation.

Anticipated products:

Slide decks and memoranda for NEVI Plan implementation tasks

Estimated task completion: 09-30-2023

Estimated task budget: $90,273.92

Staff salaries and benefits: $90,273.92

MassDOT staff members	% Time to task
Max Natanagara	70.0
Jules Williams	25.0

Consultant contract for NEVI Plan development and analysis activities does not use SPR funding.

Other costs:

A.29 / Post-COVID-19 Teleworking Study

Task Lead: Max Natanagara

Task Purpose: This study will assess the impact of teleworking on the Commonwealth's transportation system post-COVID-19. The different teleworking scenarios to be modeled and the resulting estimations of how future trips will change will have important implications for the public services that MassDOT provides in the future. Employer-resident surveys and a thorough literature review are shaping the inputs for both transportation modeling and economic modeling. A strategy will also be developed for continuing to monitor shifts in teleworking.

Accomplishments in prior year:

- Developed, fielded, and analyzed an online survey of Massachusetts residents.
- Developed, fielded, and analyzed a survey to employers in Massachusetts.
- Calibrated transportation and economic modeling tools.
- Refined initial round of scenarios via workshop and began modeling initial scenarios.

Proposed activities for next year:

- Finish modeling initial and second round of scenarios
- Review MassDOT planning processes and investments
- Develop teleworking monitoring strategy
- Prepare final report

Anticipated products:

- Presentation, map interface, and all data from trip/economic modeling of different scenarios.
- Strategy for continuing to monitor changes in telework.
- Final report and summary incorporating all prior deliverables.

Estimated task completion: 02-28-2023

Estimated task budget: $216,505.48

Staff salaries and benefits: $16,505.48

MassDOT staff members	% Time to task
Max Natanagara	20.0

Consultant costs: $200,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Post-COVID-19 Teleworking Study/113996	$896,504.00	$696,504.00	$200,000.00	$0.00	RSG, Inc.	02-28-2021	24	02-28-2023

Consultant notes:

Other costs:

Transit Planning

A.30 / Bus Network Redesign

Task Lead: Douglas Johnson

Task Purpose: Over time, changes in land use, increasing traffic congestion, and changing demographics across the Boston region have resulted in travel needs that the MBTA's current network does not serve well - or, in some cases, needs that the network does not serve at all. The MBTA Bus Network Redesign initiative will identify network-level accessibility metrics against which proposed changes can be measured to develop a route system that reliably and efficiently serves the largest number of existing and potential riders while also serving customers with significant equity issues and mobility access needs. This initiative will use trip-making data for all modes to analyze how to better serve trips currently not made on the MBTA, as well as those of existing riders that are not met well. The initiative's deliverable will be a set of recommendations for a new bus network that will better serve the region's travel needs - including routes, frequency, span of service, and coverage.

Accomplishments in prior year:

Developed and released a Draft Network Map for public comment and conducted a public engagement process. To date, the project team has conducted 10 street team events, 9 station open houses, 7 regional public meetings, attended community events, and held meetings with individual municipalities, elected officials, community-based organizations, and rider focus groups. Feedback on the draft network map is being collected through a variety of means, both physical and virtual, in 9 different languages. Notice of the public feedback period has been advertised using digital boards at stations, radio advertisements, project emails, ads placed in buses, announcements over bus PA systems, billboards, and local newspapers. The public comment period ended on July 31st. The project team will utilize the feedback received to make revisions to the draft map this fall.

Proposed activities for next year:

Final map based on public feedback and conduct a Title VI analysis of the finalized map.

Anticipated products:

A final network map, equity analysis, associated public outreach materials, and a final report detailing the Bus Network Redesign project.

Estimated task completion: 02-28-2023

Timeline for new consultant support: Bus Network Redesign

Consultant name: Cambridge Systematics
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: 05-29-2019
Consultant Notice to Proceed: 06-20-2019
Total duration of task: 42 months

Estimated task budget: $274,032.79

Staff salaries and benefits: $74,032.79

MassDOT staff members	% Time to task
Doug Johnson	85%

Consultant costs: $200,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date
Bus Network Redesign /107591	$3,543,901.00	$3,343,901.00	$200,000.00	$0.00	Cambridge Systematics	06-20-2019	42	02-28-2023

Consultant notes:

Other costs:

A.31 / Developer Mitigation Methodology

Task Lead: Patricia Cahill

Task Purpose: Although land use developments (both public and private and inclusive of commercial, residential, retail, mixed-use, and other types) can have significant impacts on the delivery of public transportation services, there is no standard methodology to estimate these impacts in the Greater Boston region. Therefore, establishing an equitable and comprehensive strategy for evaluating service impacts is of particular interest to the agency. The deliverables from this project will provide the MBTA with the information needed to inform new strategies and procedures for developer mitigation. They could also inform new strategies and procedures for agencies beyond the MBTA, including MassDOT, Regional Transit Authorities (RTAs) and other transit providers.

Accomplishments in prior year:

- Finalized scope and released Request for Proposals (RFP).

Proposed activities for next year:

- Case study research and literature review regarding how other transit agencies calculate system impacts due to commercial, residential, and other developments/land use impacts.
- Development of a guidance document that reviews potential strategies for quantifying service impacts on MBTA services.
- Development of a potential methodology that could be used to estimate the impacts of commercial, retail, residential, and other types of land and property development activities on the throughput and delay of public transportation services.

Anticipated products:

- Final report with recommendations for adoption of a methodology for determining developer mitigation.
- Memorandum/report that summarizes research and literature review findings
- Quantitative models (and guidance on associated thresholds and metrics) that can be used to estimate service delivery impacts
- Detailed methodology and guidance regarding the estimation of impacts on public transportation and strategies for mitigation

Estimated task completion: 09-30-2023

Timeline for new consultant support: Developer Mitigation Methodology

Consultant name:
Scope development and FHWA review/approval: 04-20-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 12 months

Estimated task budget: $522,368.19

Staff salaries and benefits: $22,368.19

MassDOT staff members	% Time to task
Patricia Cahill	25.0

Consultant costs: $500,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Developer Mitigation Methodology / TBD	$500,000.00	$0.00	$500,000.00	$0.00	TBD	None	12	TBD

Consultant notes:

Other costs:

A.32 / Exploring the Connection Between Bus Trips and Other Modes

Task Lead: Vacant

Task Purpose: This study will build off of the lessons learned from the MBTA Systemwide Station Access Study, and the MBTA's recent bus stop inventory analysis to identify potential connections between bus trips and other modes from the perspective of bus passengers. The following are the three critical questions that will be considered as part of this study:

1. Based on existing research and best practices from other transit systems, what does the most effective bus to bus, or bus to other mode, connection look like?
2. How is the MBTA system performing against that standard?
3. Depending on the findings to the two questions above, what are the most effective improvements the MBTA could implement to enhance bus connections to other modes?

Accomplishments in prior year:

N/A

Proposed activities for next year:

- GIS and field mapping activities will contribute toward achieving the study's goals and answer the questions outlined above.
- Identify and recommend prioritized long term areas of improvement, particularly for future capital investments in major busway facilities
- Identify and recommend prioritized tactical improvements for connections, particularly in the short term for bus stops.

Anticipated products:

- Standard rubric and evaluation tool that defines not only the locations of bus shelters, but if transferring, where cross streets are needed.
- Inventory of existing connections, focusing on high volume connections (bus to bus, bus to other modes).

Estimated task completion: 03-31-2023

Timeline for new consultant support: TBD

Consultant name: TBD
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 6 months

Estimated task budget: $185,000.00

Staff salaries and benefits: $0

Consultant costs: $185,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Exploring the Connection Between Bus Trips and Other Modes/TBD	$185,000.00	$0.00	$185,000.00	$0.00	TBD	NA	6	TBD

A. 33 / Inner North Shore Access Demand Study

Task Lead: Douglas Johnson

Task Purpose: The MBTA and municipalities across the region served by transit are encouraged by the Legislature and constituents to create dense, walkable, safe neighborhoods oriented around transit. As this pressure continues to mount and the MBTA considers the development of its parcels to provide additional value for the communities that it serves, the MBTA should look holistically at the potential impacts to transit usage that could result from changes to MBTA facilities across the Inner North Shore Region (including Orange Line, Blue Line, Regional Rail, Bus).

Across the Northern Branch of the Orange Line and Blue Line, new developments (both on MBTA properties and on nearby properties) will impact the amount of available parking for communities served by these lines. Upcoming and potential projects that will impact station access include the redevelopment of the site at Wellington to accommodate a new Bus Maintenance Facility; development of the MBTA, City and privately-owned parking lots at Sullivan Square; potential air rights and development at Malden Center; development of Beachmont and Suffolk Downs, as well as others.

The Inner North Shore Access Demand Study will help the MBTA to understand what station access accommodations are needed across the corridor to support and encourage transit demand. These could include additional parking at other facilities (i.e., Oak Grove), bike or other active transportation accommodations, and bus service, or commuter rail service to support access to transit across the North Shore region.

Accomplishments in prior year:

N/A

Proposed activities for next year:

- Conduct procurement for consultant services to support study

Anticipated products:

Leveraging the outputs of the Systemwide Station Access Study, the Inner North Shore Access Demand Study will identify where regional demand is coming from and where it is likely to go across the transit network to help inform real estate development and facility planning needs. Deliverables will include:

(1) Playbook summarizing the situation, tactics for meeting station access demand;

(2) Data tool that can be updated as new data become available and post-Covid ridership and regional mobility trends begin to stabilize.

Estimated task completion: 09-30-2023

Timeline for new consultant support: TBD

Consultant name: TBD
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 12 months

Estimated task budget: $300,000

Staff salaries and benefits: $0

Consultant costs: $300,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Inner North Shore Access Demand Study/TBD	$300,000.00	$0.00	$300,000.00	$0.00	TBD	NA	12	TBD

A.34 / MBTA Fare Review

Task Lead: Liz Williams

Task Purpose: The MBTA has over 100 different price points for a transit ride depending on mode, zone/distance, transfers, product type, and eligibility for reduced fares. This project would provide a comprehensive review of MBTA fare policy and pricing; how pricing currently works; alternative pricing options; public/stakeholder input; impact analysis of alternative pricing options; recommendations for changes to MBTA fares; and potential barriers and strategies for implementing the recommendations.

Accomplishments in prior year:

Developed scope in preparation for RFP

Proposed activities for next year:

- Case study research and literature review regarding how the MBTA fare tariff compares to other transit agencies, inclusive of contextual factors such as service area, coverage, revenue service hours, etc.
- Data collection (qualitative, quantitative, spatial) regarding MBTA fare policy, including studies conducted by non-state agencies such as advocacy groups and the MBTA Advisory Board
- Model and 'tariff alternatives' development

Anticipated products:

- Background report and presentation describing how MBTA fares compare to alternative pricing approaches used at other transit agencies around the world.
- Review/synthesis of previous public outreach on MBTA fare policy; a supplemental public survey and stakeholder interviews; and a summary report describing findings
- Modeling analysis of the potential ridership, revenue, and equity implications of alternative pricing options, using existing MBTA modeling tools where applicable
- Qualitative analysis of the technological, operational, and regulatory implications of alternative pricing options
- A report and presentation of findings, recommendations, potential barriers, and strategies for implementation

Estimated task completion: 03-29-2024

Timeline for new consultant support: MBTA Fare Review

Consultant name: TBD
Scope development and FHWA review/approval: 11-30-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 18 months

Estimated task budget: $93,000.00

Staff salaries and benefits: $18,000.00

MassDOT staff members	% Time to task
TPPII TBD - In hiring phase	25.0

Consultant costs: $75,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date
MBTA Fare Review / None	$150,000.00	$0.00	$75,000.00	$75,000.00	TBD	None	18	TBD

Consultant notes:

Other costs:

Virtual Public Involvement

A.35 / Virtual Public Involvement

Task Lead: Liz Williams

Task Purpose: Responding to the Planning Emphasis Areas as outlined in FHWA's April 2022 SPR Work Program Guidance letter, OTP will set aside funds to support staff time spent in Virtual Public Involvement (VPI) activities. VPI tools help MassDOT improve the effectiveness and efficiency of public involvement by providing opportunities to engage those who would otherwise be unable to participate in transportation planning and project development, and by making participation more convenient and accessible, more interactive, and more enjoyable for the public. Activities under this task will include conducting public meetings and other public engagements for MassDOT Office of Transportation Planning (OTP) projects.

Accomplishments in prior year: N/A

Proposed activities for next year:

- Conduct Virtual Public Involvement to support public meetings for OTP projects and initiatives.

Anticipated products:

N/A

Estimated task completion: 09-30-2023

Estimated task budget: $25,000.00

Staff salaries and benefits: $25,000.00

MassDOT staff members	% Time to task
TBD	TBD

Staff cost notes: The VPI support staff will be identified in the coming months—these staff will be able to charge hours worked on VPI activities to this SPR code.

SPR I Part B

Pavement Management

B.1 / Statewide Pavement Management Activities

Task Lead: Edmund Naras

Task Purpose: The objective of the pavement management program is to responsibly manage the pavement portion of the highway transportation network. The program provides a rational and uniform system for evaluating roadway conditions in order to improve the effectiveness of pavement preservation and rehabilitation strategies. Additionally, it provides analytical and evaluation tools that assist administrators and project managers with improving the consistency of decision-making and formulate strategies to optimize pavement network performance and the allocation of resources.

Accomplishments in prior year:

- Collected, processed and analyzed 4,000+ miles of pavement condition data.
- Submitted successfully Interstate and Non-Interstate NHS pavement data for the Highway Performance Management System (HPMS).
- Developed an optimized multi-year program for the Interstate and Non-Interstate NHS. Integrated optimized program into the rolling 5-year STIP.
- Utilized the MassDOT Pavement Management modeling, forecasting & optimized project selection tool to identify $350 Million dollars of future NHS pavement projects.
- Conducted scoping meetings with District, Bridge, Environmental and Highway Design staff to screen the $350 Million NHS project locations to establish non-pavement scope, identify preservation candidates, and prioritize future programming.
- Developed a statewide list of municipal numbered highways in fair and poor condition. Prioritized these sections by condition, NHS status, scope and other factors for rehabilitation over a five year period.
- Performed correlation and certification for ride quality testing equipment utilized by contractors\other Northeast states and MassDOT for QC and acceptance testing.
- Performed acceptance testing for ride quality on approximately 600+ lane miles.
- Continued monitoring performance of EDC-2 High Friction Surfacing Projects statewide.
- Continued monitoring SHRP2 (R-26) pavement preservation sections on US Route 3 and evaluated the need for future preservation treatments.

- Reviewed over 375 projects at various stages of design.
- Continued to advance EDC-6 Targeted Overlay Pavement Solutions Initiative for Asphalt Rubber Mixtures, Highly Modified Polymer Mixtures and Stone Matrix Asphalt (SMA) mixtures. Pilot project awarded with paving scheduled for Fall 2022 and an anticipated Spring 2023 completion.
- Two "Higher reclaimed asphalt pavement (RAP)" demonstration projects based on prior SPR Research Activities under construction and additional project has been advertised for bid.
- Completed 3 year effort to benchmark 35 hot mix asphalt (HMA) mixtures for Balanced Mix Design.
- Advertised 10 Non-Interstate NHS Pavement Preservation\Resurfacing Contracts.

Proposed activities for next year:

- Collect pavement distress, rutting, geometric, GPS and video data for the Interstate System and continue the bi-annual data collection cycle for the remaining NHS, numbered routes and other highways under MassDOT jurisdiction.
- Use Pavement Management Data to revise\develop 2024-2028 STIP for Interstate and Non-Interstate NHS projects.
- Perform ride quality acceptance testing for all new construction, resurfacing and preservation projects.
- Procure new Automated Pavement Data Collection Vehicle/Equipment to replace the outdated 2012 Pathrunner. Alternatively, establish a contract for Network Pavement Data Collection for the Interstate, Non-Interstate NHS, State Numbered routes as well as other highways under MassDOT Jurisdiction.
- Perform annual maintenance and upgrades on the Pavement Friction Tester and Bumper Mounted Profilers.
- Issue a new Interdepartmental Service Agreement (ISA) with UMass Dartmouth for continued support of pavement management activities including correlation of data collection equipment, implementation of new technologies and test methods, develop innovative pavement mixture designs (Superpave 5) and evaluations with existing designs, assist with evaluating Bridge Waterproofing Mixtures (SSC-W), and assess Asphalt Pavement sustainability evaluation methodologies LCA and INVEST for MassDOT implementation.

- Continue Pilot Program for EDC-6 Targeted Overlay Pavement Solutions, Superpave 5, and Balanced Mix Design (BMD) in projects statewide.

Anticipated products:

- Pavement condition data for Interstate, State-Maintained and NHS roadways and data required for the Highway Performance Monitoring System (HPMS).
- Optimized multi-year program for the Interstate and Non-Interstate NHS pavement construction and preservation programs.
- Continued support of MassDOT's Municipal pavement program for State Numbered Routes.
- New maintenance and software upgrades for the Pavement Management section's pavement management database.
- Improvements to PMS predictive modeling and project selection tools.
- Development of the web-based pavement management database software and regression analysis for different types of pavements.
- Purchase of new automated pavement data collection equipment or alternatively establish a contract for pavement data collection services.
- Calibration and certification on all equipment used for MassDOT ride quality project acceptance testing.
- Purchase Dynamic Friction Tester and Circular Track Meter to conduct friction evaluation on High Performance Asphalt Overlays (HPOL) to determine acceptable frictional characteristics that can be included in MassDOT's specifications for HPOL's.
- Asphalt binder specifications that incorporate two new binder parameters to address age induced surface distresses.
- Testing of different tack coats to determine pavement bond strength.
- Performance of High RAP surface mixtures on high volume roads on two pilot projects.
- Guidance\specifications for mix design and performance assessment of High RAP mixtures on low volume roads.
- Mixture design procedure, performance test(s), and pilot specifications for cold central plant recycling (CCPR) and cold in-place recycling (CIR).
- Aging Protocol for a Balanced Mix Design that can be incorporated into MassDOT BMD.
- Implementation of Superpave 5

- Determine mix performance of Superpave Waterproofing Surface Course on Bridge Mixtures (SSC-W) by conducting Flexural Beam Fatigue and Hamburg performance tests

Estimated task completion: 09-30-2026

Timeline for new consultant support: ISA: MassDOT Pavement Support Service (PS2)

Consultant name: UMass Dartmouth
Scope development and FHWA review/approval: 08-01-2022
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: TBD
Total duration of task: 48 months

Timeline for new consultant support: Pavement management modeling, forecasting & optimized project selection for the Capital Investment Plan (CIP)

Consultant name: Deighton Associates Ltd
Scope development and FHWA review/approval: 10-03-2022
Contract negotiations and FHWA review/approval: 12-05-2022
Consultant Notice to Proceed: 12-12-2022
Total duration of task: 12 months

Estimated task budget: $3,060,330.30

Staff salaries and benefits: $876,123.30

MassDOT staff members	% Time to task
Stefan Kargakis	100.0
Edmund Naras	100.0
Subash Shahi	100.0
Jonathan Smith	100.0
William Gutierrez	100.0
Liz Cruz-Falero	100.0
Cody Holemo	100.0
Steven Morin	100.0
Patrick Lawlor	100.0

Consultant costs: $539,207.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
ISA: MassDOT Pavement Support Service (PS2) / TBD	$1,485,562.00	$0.00	$409,207.00	$1,076,355.00	UMass Dartmouth	None	48	TBD
Pavement management modeling, forecasting & optimized project selection for the Capital Investment Plan (CIP) / TBD	$130,000.00	$0.00	$130,000.00	$0.00	Deighton Associates Ltd	12-12-2022	12	TBD

Consultant notes: Deighton dTIMS Business Analytics-$130,000 ISA UMass Dartmouth-$409,207 ($1,485,562 total for 4 years of ISA)

Other costs: $1,645,000.00

- Skid Truck annual maintenance and software upgrades -$25,000
- Bumper Mounted Profilers annual maintenance and software upgrades -$50,000
- Purchase new Automated Pavement Data condition collection equipment -$1,500,000
- Pavement Preservation TSP2 membership -$20,000
- Miscellaneous mechanical & electronic supplies and training -$50,000

Statewide Traffic Data Collection

B.2 / Statewide Traffic Data Collection

Task Lead: Carrie Mclnerney

Task Purpose: The MassDOT Highway Division's Statewide Traffic Data Collection Section (STDC) is responsible for the development and maintenance of the Annual Traffic Data Collection Program. The program is designed in accordance with FHWA's Traffic Monitoring Guide (TMG), the AASHTO Guide for Statewide Traffic Data Collection Programs, and the Highway Performance Monitoring System (HPMS) guidelines. Traffic-derived travel data from the HPMS are used in the federal-aid highway fund apportionment formulae. Traffic data are critical to the analyses that support the Condition and Performance Reports to Congress, which are subsequently used for national highway budgeting purposes. HPMS-derived travel data are required to meet Clean Air Act requirements, and travel data are central to estimating several of MassDOT's performance indicators such as vehicle crash and fatality rates and delay. Therefore, a traffic counting program is conducted each year by the Statewide Traffic Data Collection section of the MassDOT Highway Division's Traffic Data Collection Section. The counting program is modeled after FHWA's Traffic Monitoring Guide, AASHTO's Guidelines for Traffic Data Programs and, most importantly, the HPMS Field Manual. The annual program involves the systematic collection of traffic data utilizing automatic traffic recorders located on various roadways throughout the state. In addition, the Statewide Traffic Data Collection section provides traffic data for MassDOT's pavement, highway, and bridge design efforts. This includes pavement rehabilitation, construction, maintenance, and construction staging and traffic management. Data gathered in support of the Department's program varies from single road tube automatic traffic recorder counts to intersection turning movements for traffic signal design and vehicle type classification for pavement design and environmental analyses (air quality and noise levels). Due to MassDOT's desire and interest to accommodate all road users and measure the performance of safety and mobility, starting this year, there will be a focus on expanding the newly created pedestrian and bicyclist counter program and increasing the pedestrian and bicyclist counts available. In 2021, MassDOT purchased and installed twelve bicycle and pedestrian counters at eight locations across the state, including intersections, roadways, and shared-use trails. MassDOT will build upon the success of the bicycle and pedestrian pilot program initiated in the FFY21 SPR cycle and increase the bicycle and pedestrian count stations across the state. The goal is to standardize the collection of bicyclist and pedestrian count data; expand the scope of data collection to

other parts of the state; and to continue populating in order to collect and populate our statewide traffic portal to create a more comprehensive network of counting sites. MassDOT will also work with Regional Planning Authorities (RPAs) to upload their bicycle and pedestrian count data into the newly purchased Non-Motorized Database System. Likewise, MassDOT's desire to improve upon Weigh-In-Motion (WIM) data and technology to further assist the Commercial Vehicle Enforcement Section and improve safety is being evaluated. This technology should also assist with pavement management and bridge evaluations and design. We understand MassDOT needs to improve upon commercial motor vehicle inspection and weight data and will work towards meeting the goal of obtaining WIM data and providing FHWA and the Federal Motor Carrier Safety Administration (FMCSA) with necessary information. The intention is to develop requirements and obtain assistance with vendor solicitations, proposal evaluations, deployment, testing and acceptance of a multi-purpose virtual weigh station pilot. The intent of a new WIM Program would be to identify the proper technology applications for additional WIM sensors in pavement.

Accomplishments in prior year:

The STDC program supported and monitored continuous count activities on a monthly basis, capturing class, volume and speed data to support FHWA requirements. The maintenance of special counts were performed by request in which data is used by MassDOT staff on various levels (e.g., Design, Project, Pavement, Traffic Engineering, etc.) for planning and evaluation of highway conditions. All operational, continuous count sites (430 out of 576) were monitored on a monthly basis. Monthly volume, classification, & WIM data were uploaded to FHWA's web-based QC software, "Travel Monitoring Analysis System (TMAS) 2.8 for TVT, VMT and vehicle type reports.

- 22 special request studies were completed during FFY22, which included 158 volume, 56 classification and 56 speed studies.
- 114 turning movement count (TMC) studies were completed.
- Additional continuous count sites were configured and are using telemetry for a total of 408 out of the 576 sites.
- Counted 377 out of 441 2021 Coverage Program count locations over the course of calendar year 2021. The overall combined total counted in FFY22 Q1, Q2 and Q3 is 176.

- Counted a total of 421 ramps in FFY22 Q1, Q2 and Q3. There are a total of 459 locations in the Ramp Count Program per calendar year.
- Regional Planning Agencies (RPA) counted 211 of 245 assigned 2021 coverage program counts. In addition, they completed 626 additional (special) counts and 93 turning movement counts (TMC) in 2021.
- Ordered short-term, portable counters for bicycle and pedestrian counts
- Installed new permanent bicycle and pedestrian counters
- In support of HPMS requirements:
    - Submitted short term coverage program counts.
    - Submitted continuous count station data.
    - Submitted the updated FAADT per MS2 average daily traffic (ADT) calculations.
    - Submitted updated 2021 percentage peak single units (SU) and combination units (CU) data for all samples per MS2 calculations.
    - Submitted corrected K factor data for those samples where they are less than 4.5 and improved the K factors reported for future years and reviewed with MS2.
    - Submitted data for all ramps for 2021 and completed 2021 ramp data submittal.
    - Submitted travel summary table, including rural interstates in the SU and CU.
- New Personnel: Misrak Sultan, PE joined the Traffic Data Collection team as a senior member of the group in the Spring of 2022. She joins us after serving for several years in MassDOT's project development unit. She has been training with Steve O'Neill for several months to ensure knowledge transfer prior to Steve's upcoming retirement. Misrak has TMAS account privileges and has been successfully uploading TMAS monthly reports. She is a valued member of the team already.
- Bicycle/Pedestrian Count Program:
    - In Q3, MassDOT placed orders for five Eco-Counter Mobile MULTI units. These portable counters are capable of counting bicycles and pedestrians for a span of 1-2 weeks on a single shared pathway or on two separate pathways, such as a sidewalk and an adjacent roadway bike lane. Having access to these counters will give the counter program more flexibility, allowing MassDOT to supplement the existing and expanding permanent counter network with on-demand short-term counts. These counts will

provide crucial information on facility use for highway projects and will help to calibrate the bicycle and pedestrian probe data that MassDOT uses for projects such as trail demand estimation. Eventually, these short-term counts can be used in conjunction from seasonal factor data from permanent stations to estimate Annual Daily Traffic at locations without a permanent count station. MassDOT also created a list of twelve final candidate locations for the second round of permanent counter installations. These locations will be visited to determine which counter technologies are best suited for each, and where such a counter should be placed. After these visits, the final list of 6-8 locations will be selected and plans will be drawn up for installation. MassDOT has added these counters to our public-facing data storage platform MS2.

- New Consultant Support Contracts:
    - TrafInfo Contract:
        - The five-year contract with TrafInfo Communications, Inc. - Contract 95857 - expired on March 6, 2022, and is 100% complete. STDC created a new 3-year Statewide Telemetry Program Support Services contract with TrafInfo Communications, Inc., Contract 116428 (March 7, 2022-March 6, 2025).
    - Kittleson Associates – Statewide FREEVAL model:
        - MassDOT executed the contract with Kittleson Associates (Contract # 117018) on May, 9 2022 to develop a statewide Freeval model. A portion of the $350,000 contract value is funded through SPR funds.

Proposed activities for next year:

The focus of the STDC department is to continue telemetry upgrades to eligible, continuous permanent count stations, in which daily data studies of class, volume, and speed will be uploaded and processed through MS2, the application used to process all traffic studies by month. This approach will significantly reduce the delay in delivering the data to TMAS and the annual HPMS reports. Staff will include proper class portable counts on all functionally classified roadways including rural interstate roadways, which is a requirement of FHWA. In supporting HPMS requirements:

- Submit the 2022 FAADT data.
- Submit the 2022 percentage peak SU and CU data for all samples.

- Submit data for collected ramp counts for 2022.
- Vehicle miles traveled (VMT) weight HPMS summary data for future year's submittal.
- Class factor portable class counts to properly annualize them.
- Class factor from year to year for any non-current year data so the HPMS data for SU and CU.
- AADT is properly part of the current year with each year's submittal.
- Run all data through MS2 and quality control it before sending the data into TMAS.
- Begin conducting short-term bicycle and pedestrian counts to support statewide planning needs.
- Expand permanent bicycle and pedestrian counter network with 6-8 new permanent count stations.
- Continue development of the statewide FREEVAL model.
- Conduct technology assessment and develop formal plan for expanding WIM stations for each functional class of roadway as recommended in DAT Review and include enforcement capabilities to support MSP truck team activities.

Anticipated products:

- Clustering Analysis - Seasonal, axle and growth factor grouping.
- Short Count Assignment - Factor group assignment for all short count stations.
- HPMS Traffic Data Reporting: a. HPMS Segment Traffic Table b. HPMS Ramp Count Table c. HPMS Traffic Meta Data d. HPMS State Summary - Vehicle Type Table
- Travel Time Database System (TTDS): a. 2022 Travel Time Metric HPMS Reports
- FREEVAL interim model results
- Bicycle and Pedestrian count program accuracy assessments
- WIM technology assessment report with expansion capabilities
- Continue development of Statewide TDC Strategic Plan Report

Estimated task completion: 09-30-2023

Timeline for new consultant support: Development of Statewide FREEVAL model

Consultant name: Kittleson & Associates
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 05-11-2022
Total duration of task: 48 months

Timeline for new consultant support: TrafInfo Consultant Contract

Consultant name: TrafInfo
Scope development and FHWA review/approval: TBD
Contract negotiations and FHWA review/approval: TBD
Consultant Notice to Proceed: 03-09-2022
Total duration of task: 36 months

Estimated task budget: $3,355,108.75

Staff salaries and benefits: $1,110,108.75

MassDOT staff members	% Time to task
Brian Farrington	100.0
Lori Suss	100.0
Steven O'Neill	100.0
David Manktelow	100.0
Wayne Schofield	100.0
John Amato	100.0
Tracy DeYoung	100.0
Robert Belcastro	100.0
Stanley Lamb	100.0
Michael Ribeiro	100.0
Ian Adams	100.0
Misrak Sultan	100.0
Carrie Mclnerney	50.0
Corey O'Connor	20.0
Neil Boudreau	5.0

Consultant costs: $505,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Development of Statewide FREEVAL model / 117018	$350,000.00	$100,000.00	$150,000.00	$100,000.00	Kittleson & Associates	05-11-2022	48	06-01-2026
TrafInfo Consultant Contract / 116428	$1,057,000.00	$165,000.00	$355,000.00	$537,000.00	TrafInfo	03-09-2022	36	03-06-2025

Consultant notes: Existing TrafInfo Consultant Contract (Contract #116248)- estimated at $355,000 for FFY23 - total executed contract amount of $1,057,000 divided by 36 months multiplied by 12 months and rounded up a bit for even number) Existing Kittleson & Associates Consultant (Contract #117018)- Development of Statewide FREEVAL model - $150K previously programmed for this FFY

Other costs: $1,740,000.00

- Midwestern Software Solutions (MS2) Traffic Count Database/Portal - Annual Vendor Support: --$350,000
- Miovision (through PDI) Turning Movement Counts Support Services - Annual Vendor Support Services (Billed Quarterly): -- $145,000
- State Police Details to support counter installations: --State Police details needed for traffic control and safety ($100,000).
- Miscellaneous Equipment/Spare Parts:
    - Road tube clamps ($10,000).
    - Road Tube ($100,000).
    - Road Tube Tape ($10,000).
    - Miscellaneous supplies from Home Depot ($5,000).
    - Miscellaneous supplies from Grainger ($5,000).
    - Automatic Traffic Recorders (ATRs) upgrades/replacement ($200,000).
    - Verizon Wireless service for HERE Sensors, Co-located Stations and Telemetry Stations ($120,000).
    - Solar Panels 60 Watt, 12V ($40,000).
    - 15 AMP MPPT Charge Controller Prewired Assembly with Surge Option ($75,000).
    - Batteries for Telemetry Stations (Boston Battery) ($30,000).
    - Posts for solar panels (RoadSafe Traffic Systems) ($5,000).
    - Utilities ($15,000).
    - Modems and Antennas ($70,000)
    - Hilti Automatic Powder-Actuated Fastening Nail Gun Package, supply of shot and nails ($15,000)
- New Equipment Purchases to support continuous data needs:
    - Proposed purchase of TIRTL Light Based Non-Invasive Sensor for counting, vehicle classification and speed ($15,000 ea.) ($60,000)
    - Portable Sensor Trailer (PTS sensor trailers with modem, oversize solar panels and batteries $20,000 ea.) ($100,000)
- New Bike/Ped/Micromobility program:
    - Data storage and subscription fees: $45,000
    - 5 new permanent count locations: $50,000
- New Vehicle Purchases to support TDC field activities:
    - Two (2) Ford F150 4X4 SuperCrew XLT (G), White, sliding internal bed shelves with sliding weatherproof bed cover, $45k each, ($90,000)

    - One (1) Ford Escape SE AWD, White, ($35,000)
    - One (1) Ford F150 4X4 SuperCrew XL, 5.5 Bed, Traffic Spec, Yellow, sliding internal bed shelves with sliding weatherproof bed cover ($45,000)
- Training and Conference Travel Budget for ongoing education for TMG requirements, AASHTO best practices, peer to peer knowledge transfer for staff: Conference Travel and Training ($20,000)

Survey

B.3 / CORS Network Operation and Expansion

Task Lead: John Anthony

Task Purpose: Work under this task will involve managing the Continuously Operating Reference Station (CORS) Network and accompanying website as well as supporting MassDOT departments, other state agencies, municipalities, planners, GIS users, and the architectural and engineering community on the use of the CORS Network. The Survey Section endeavors to expand the MaCORS Network by identifying suitable locations for the construction of additional CORS stations to expand and enhance the network.

Accomplishments in prior year:

- Registered approximately 140 new subscribers for the CORS network in Q3 of FFY2022. We have so far registered approximately 405 new subscribers for FFY2022.
- In Q2 of FFY2022, we entered a new three-year CORS Network support contract that covers software and firmware upgrades, as well as extended warranties through CCPs (Customer Care Packages).
- In Q4 of FFY2022 we are planning to perform a full network adjustment of all stations. This will include the newly constructed Martha's Vineyard CORS.

Proposed activities for next year:

Continue to register new subscribers to the CORS Network.

Anticipated products:

- The CORS network will be expanded to include the MV CORS, bringing the total number of CORs sites to 21.
- With the CORS Network support contract occurring in Q2FFY2022, the CORS Network will receive all pertinent upgrades for the next three years.

Estimated task completion: 09-30-2023

Estimated task budget: $162,519.45

Staff salaries and benefits: $136,519.45

MassDOT staff members	% Time to task
Evanson Browne	60.0
John Anthony	15.0
John Barnes	15.0
Mehdi Sadjady	10.0
Jeffrey Bruce	10.0

Other costs: $26,000.00

- Cable/Internet bills

B.4 / Development and Training

Task Lead: John Anthony

Task Purpose: To participate in national, regional, and statewide boards and conferences that promote continued professional development and training relative to GPS and the use of MassDOT's CORS Network. Attendance at these meetings will promote and help develop the statewide geodetic control network for statewide spatial data.

Accomplishments in prior year:

The MassDOT Survey section did not attend any conferences or seminars relating to geospatial or location functions that required SPR funding.

Proposed activities for next year:

Seek out and attend conferences and seminars relative to geospatial and location technologies that would be beneficial to MassDOT staff.

Anticipated products:

N/A

Estimated task completion: 09/30/2023

Estimated task budget: $5,000.00

Staff salaries and benefits: $0

Other costs: $5,000.00

Other costs include travel expenses to attend development and training events

B.5 / Geodetic Surveys for Statewide Project Control

Task Lead: John Anthony

Task Purpose: The MassDOT Survey Section maintains a statewide network of permanent geodetic control markers that provide public and private surveyors access to the NAD 83/NAVD 88 horizontal and vertical geodetic survey control datums. The Survey Section utilizes these markers, in conjunction with the MassDOT CORS Network, to establish semi-permanent survey control stations on MassDOT bridge and roadway projects throughout the Commonwealth. NAD 83 and NAVD 88 are common and widely recognized geodetic datums. Their use for project control is essential to maintain consistency throughout the various phases of project planning, design, and construction. The network is also used by MassDOT's Office of Transportation Planning, MassGIS, private surveyors, and numerous municipal and state agencies for various engineering, surveying, and GIS applications.

Accomplishments in prior year:

- Performed GPS observations and electronic bar-code leveling to establish NAD 83 and NAVD 88 project survey control for forty-four (44) bridge rehabilitation/reconstruction and highway reconstruction/improvement projects.
- Performed second order electronic bar-coded leveling to establish thirteen (13) new NAVD 88 benchmarks; all thirteen (13) were adjusted and published in FFY22.
- Performed eighty-eight (88) GNSS observations as part of the National Geodetic Survey's (NGS) GPS on Priority NGS Benchmarks program. The results from sixty-two (62) were published by NGS.

Proposed activities for next year:

- Continue ongoing surveys to maintain and densify the statewide network of horizontal and vertical control stations.
- Continue to set project controls for various bridge rehabilitation/reconstruction, highway reconstruction/improvement, and photogrammetric mapping projects.
- Continue GNSS observations on the Priority NGS Benchmarks program to facilitate the NGS' development of new horizontal and vertical survey control datums. These observations will continue through the first quarter of FFY2023. After that, MassDOT will continue to work with NGS as we prepare for the future adoption of new horizontal and vertical survey datums.

Anticipated products:

- Updated control point database and data card file enabling the MassDOT survey control point website to publish newly established controls to the public.
- Individual control reports for each MassDOT project to be distributed to end users.

Estimated task completion: 09-30-2023

Estimated task budget: $502,953.75

Staff salaries and benefits: $502,953.75

MassDOT staff members	% Time to task
Michael Roberts	60.0
Brian Knowles	60.0
Arben Zhuri	60.0
Eugene Tivnan	60.0
Leo Scanlon	60.0
Mehdi Sadjady	40.0
Jeffrey Bruce	40.0
John Barnes	25.0
John Anthony	25.0
Michael Chouinard	20.0

Other costs:

B.6 / GPS and Conventional Survey Equipment

Task Lead: John Anthony

Task Purpose: To maintain and service MassDOT's GPS and conventional survey equipment to ensure accurate data collection and efficient data transmission to users.

Accomplishments in prior year:

Procured survey field supplies and mark setting equipment; extensions to the service/maintenance plans on our data collection and GNSS processing software; repairs to one of our GNSS receivers; and a replacement FC6000 field tablet/data collector through our existing service/equipment contract with Spiller's Inc.

Proposed activities for next year:

This is an ongoing task that will allow the Survey Section to purchase field equipment and supplies, and service equipment as necessary.

Anticipated products:

Incidental survey supplies such as batteries, cables, prisms, nails, markers, and other survey instruments as needed.

Estimated task completion:

Estimated task budget: $50,000.00

Staff salaries and benefits: $0

Other costs: $50,000.00

This is an allocated amount for the purchase field equipment (batteries, cables, prisims, etc.) and supplies (stakes, nails, markers, paint, etc.), and service equipment as necessary.

Traffic Crash Records and Safety Management

B.7 / Improved Crash Data and Safety on Massachusetts Roadways

Task Lead: Bonnie Polin

Task Purpose: This work consists of improving data collection and dissemination through working with police, the Registry of Motor Vehicles (RMV), MassDOT's Office of Transportation Planning, and others to improve distribution efforts. MassDOT will work with consultants and MassDOT Information Technology (IT) to upgrade and improve data dissemination and assist with the development of an updated crash system so that an enhanced data-driven approach to safety can be utilized. Data-driven safety analysis will be required to reach the goal areas related to zero deaths and serious injuries. The data will then be used to develop and enhance a Safety Management System where effective and efficient programs and projects are identified, programmed and implemented. We then apply highway safety methodologies to define and refine projects and programs to reduce fatalities and serious injuries. This will all be identified through the Strategic Highway Safety Plan (SHSP) and the Highway Safety Improvement Program.

Accomplishments in prior year:

- Total user sessions of IMPACT crash data portal = 19,460 during this year.
- Used the IMPACT geocoding tool for crash location validation, editing, automated and operator-assisted geocoding, and roadway inventory matching (From October 1, 2021, through June 30, 2022 when this report was prepared – 134,280 crashes were geocoded, of those, 17,588 were manually geocoded by MassDOT Highway Safety staff).
- Actively working on the SHSP update that will be completed by 2023. A series of meetings were held and the report is being developed under the Safe System framework.
- Provided data quality information to the RMV, including monthly rejection reports, police agency reporting levels, etc., in an effort to improve the data quality of the crash system.
- Provided input for the preparation of a Request for Responses (RFR) for the RMV's new Merit Rating Board public facing data portal as well as provided input and feedback on development of the RMV's new Crash Data System.
- Continued collecting and overseeing intersection data collection for Model Inventory of Roadway Elements (MIRE) Fundamental Data Elements (FDE) and collected nearly 99% of the eligible intersections. The remaining intersections

waiting to be inventoried are those that have issues with the road file and are awaiting corrections before the intersection data can be entered.
- Provided data information, maps and reports for all MPOs and local communities so that they can prepare local safety plans and/or apply for IIJA/BIL grants like Safe Streets for All
- Participated in meetings and activities of the Traffic Records Coordinating Committee (TRCC), Executive TRCC and subcommittees.
- Prioritized facility types for SPF development and contracted with UMASS Lowell to begin SPF development for ramp termini intersections.
- Conducted 21 road safety audits (RSAs) throughout the Commonwealth to identify issues and proposed recommendations so that data driven safety improvements can be made. Due to COVID-19, 8 of the RSAs have been conducted virtually. The remaining 13 RSAs were conducted in person.
- Reviewed ICE data and alternative analyses for several projects in an effort to identify the design alternatives with the greatest improvements to safety.
- Rolled out the 2023 Highway Safety Improvement Program (HSIP), and 2022 infrastructure projects were advertised, and data and other non-infrastructure projects were contracted.
- Prepared HSIP annual report.
- Promoted awareness on safety matters (developed social media, enhanced Scan the Street for Wheels and Feet campaign, and assisted Communications Group on safety messaging) including the 4 motorcycle safety awareness videos in an effort to stem the increase in motorcycle fatalities and serious injuries (https://www.youtube.com/playlist?list=PLzBxrvXzs-5EU2BHxbDXa12eSUJxcskZB). There were 197 tweets, 20,028 engagements, 817,800 impressions from October 1, 2021.
- Assisted with Every Day Counts (EDC) Crowdsourcing Initiative.
- Worked with FHWA to test out the Safe System methodology in the Route 114 corridor in Danvers/Peabody as one of 8 pilots organized by FHWA.
- Collaboratively work internally with others in MassDOT to develop a Speed Management Policy.

Proposed activities for next year:

- Additional trainings on IMPACT and begin collecting feedback on additional needs to further enhance the MA Safety Management System.

- Continue geocoding crashes and bringing them up to real time geocoding so that we can follow up with the police who prepared the crash report. This should also help to improve data quality.
- Continue providing data quality information to the RMV, including monthly rejection reports, police agency reporting levels, etc., in an effort to improve the data quality of the crash system. Finalize input on RMV's Request for Quotes (RFQ) for a new Crash data System so that a new contractor is procured.
- Complete the collection of the intersection data collection for Model Inventory of Roadway Elements (MIRE) Fundamental Data Elements (FDE).
- Prepare and disseminate the updated risk models and network screening models so that top intersections and segments can be identified, visualized and disseminated.
- Continue participating in meetings and activities of the Traffic Records Coordinating Committee (TRCC), Executive TRCC and subcommittees.
- Continue developing SPFs so that HSM methodologies can be utilized.
- Conduct road safety audits (RSAs) throughout the Commonwealth to identify issues and propose recommendations so that data driven safety improvements can be made, whether in person or remote. We anticipate conducting over 60 RSAs.
- Put in place and publicize guidance on HSIP eligibility
- Develop several systemic type projects where MassDOT procures materials and provides to the locals
- Complete the updated Strategic Highway Safety Plan based on a Safe System approach
- Roll out the 2023 HSIP program to include infrastructure projects and non-infrastructure projects and focus on systemic approaches (like the EDC initiatives for FoRRRwD and STEP) based on the results of the soon-to-be-completed HSIP Implementation Plan
- Assist with Safe Street and Roads For All Grants and other grants from IIJA / BIL
- Prepare the HSIP annual report.
- Continue to assist with raising awareness of safety messaging.
- Assist with Every Day Counts (EDC) Crowdsourcing Initiative and other EDC initiatives.
- Continue working with Safe System Intersection analyses and other Safe System methods to quantify safety.

Anticipated products:

- Listing/plan to further enhance IMPACT Data quality reports for the RMV.
- Completed network screening to identify top crash and risk based locations.
- Additional MA-specific SPFs
- Linked road attributes for automatically- and manually geocoded crashes.
- Completed SHSP
- Completed Road Safety Audits
- Guidance on HSIP eligibility

Estimated task completion: 09-30-2023

Timeline for new consultant support: Data Quality Assurance / either renew 100725 or new TBD

Consultant name: Trillium
Scope development and FHWA review/approval: 08-05-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 15 months

Timeline for new consultant support: Visualizing and Linking Corrected Speed Regulation Data / TBD

Consultant name: Framingham State
Scope development and FHWA review/approval: 06-30-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 09-04-2022
Total duration of task: 18 months

Timeline for new consultant support: Design Level MA-specific SPF Development/ TBD

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 01-31-2023
Consultant Notice to Proceed: 01-31-2023
Total duration of task: 18 months

Timeline for new consultant support: SPF Ramp Termini / TBD

Consultant name: UMAS Lowell

Scope development and FHWA review/approval: 06-28-2022
Contract negotiations and FHWA review/approval: 07-30-2022
Consultant Notice to Proceed: 09-01-2022
Total duration of task: 12 months

Timeline for new consultant support: GIS Speed Reg mapping /TBD

Consultant name: UMASS Boston
Scope development and FHWA review/approval: 07-01-2022
Contract negotiations and FHWA review/approval: 07-11-2022
Consultant Notice to Proceed: 09-04-2022
Total duration of task: 18 months

Estimated task budget: $1,669,645.87

Staff salaries and benefits: $1,014,893.87

MassDOT staff members	% Time to task
TPPII TBD - In hiring phase	85.0
intern 3 co-op 3	85.0
Bonnie Polin	85.0
Jennifer Inzana	85.0
Dakota DelSignore	85.0
Ana Fill	85.0
Kirsten Johnson	85.0
Intern-1 co-op-1	85.0
Kevin Fitzgerald	85.0
NEW CEII TBD - waiting on contract	85.0
Michelle Deng	85.0
Rosalynd Scott	85.0
Stacey Schwartz	85.0
intern 2 co-op 2	85.0

Consultant costs: $654,752.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Data Quality Assurance / either renew 100725 or new TBD / 100725	$705,984.00	$576,606.00	$115,800.00	$13,578.00	Trillium	10-01-2022	15	12-31-2024
Visualizing and Linking Corrected Speed Regulation Data / TBD	$50,976.00	$3,000.00	$40,476.00	$7,500.00	Framingham State	09-04-2022	18	03-01-2024
Design Level MA-specific SPF Development/ TBD	$300,000.00	$0.00	$200,000.00	$100,000.00	TBD	TBD	18	TBD
SPF Ramp Termini / 119204	$276,600.00	$18,000.00	$258,000.00	$0.00	UMASS Lowell	09-01-2022	12	09-03-2023
GIS Speed Reg mapping /120027	$58,976.00	$3,000.00	$40,476.00	$15,500.00	UMASS Boston	09-04-2022	18	03-01-2024

Consultant notes: The Highway Division is in the process of renewing and increasing the Data Quality Assurance Contract with Trillium. The increase will be in the amount of $110,00 (less than 25% of the overall contract value); MassDOT IT is in the process of renewing/increasing this contract.

Other costs:

B.8 / Prevent and Minimize Risks to MassDOT Staff and Workers on the Roadways

Task Lead: Bonnie Polin

Task Purpose: Work is required to manage known and preventable risks to MassDOT employees and those working on the roadways by setting, communicating, and following safety standards to achieve our goal of zero fatalities and injuries.

Accomplishments in prior year:

- As of the date of this preparation (July 9th), work was just beginning on the assessment (2 per each district) preparations. The bulk of the work will take place in the end of July, August and early September.

Proposed activities for next year:

- Continue to research and support work zone safety initiatives through participation in the Work Zone Technical Committee as part of the AASHTO Subcommittee on Traffic Engineering (SCOTE) and National Committee on Uniform Traffic Control Devices (NCUTCD).
- Continue involvement in the Strategic Highway Safety Plan (SHSP) emphasis area of Safety of Workers on the Roadways.
- Work with Highway Operations Center and FHWA on the Every Day Counts (EDC) crowdsourcing initiative. This will help with incident response and minimize exposure for workers on roadways.
- Continue work at the national level on work zones safety and integration of technology
- Perform work zone safety assessments (two per MassDOT district). This is anticipated to take place in the end of July, August, and September 2023.

Anticipated products:

12 Work Zone Safety Assessments.

Estimated task completion: 09-30-2023

Estimated task budget: $34,324.08

Staff salaries and benefits: $34,324.08

MassDOT staff members	% Time to task
Noah Thompson	5.0
Fang Xi	5.0
Everlyn Galloway	5.0
Thao Tran	5.0
Zachary Medeiros	5.0
Buu Tran	5.0
Kevin Chiang	5.0
Emmanuel Gonzalez	5.0

Other costs:

B.9 / Training of MassDOT Staff to Keep Current and Cutting Edge

Task Lead: Bonnie Polin

Task Purpose: This task includes training for MassDOT Traffic and Safety staff with the intention of keeping up with the latest practices in highway safety to effectively reduce fatalities and injuries on Massachusetts' roadways.

Accomplishments in prior year:

- Attended the Transportation Research Board (TRB) Annual Meeting, FHWA Peer Exchanges, and the AASHTO Committee on Safety and other AASHTO related meetings
- Served as panel members for National Cooperative Highway Research Program (NCHRP) studies.
- Trained other staff members on HSM methodologies and data driven safety analyses and other trainings to further the efforts to reduce fatalities and injuries

Proposed activities for next year:

- Attend the TRB Annual Meeting, FHWA Peer Exchanges, and the AASHTO Committee on Safety, NCUTCD, and other meetings
- Participate in NCHRP panels on safety research.
- Attend webinars on best practices and latest findings of enhancing and incorporating safety
- MassDOT staff will avail themselves of training (May be virtual or in person)

Anticipated products:

Better trained employees who can push new methodologies to reduce fatalities and injuries

Estimated task completion: 09-30-2022

Estimated task budget: $80,348.49

Staff salaries and benefits: $62,348.49

MassDOT staff members	% Time to task
Kevin Fitzgerald	5.0
Dakota DelSignore	5.0
Kirsten Johnson	5.0
Rosalynd Scott	5.0
Bonnie Polin	5.0
Amitai Lipton	5.0
Stacey Schwartz	5.0
Neil Boudreau	5.0
Jennifer Inzana	5.0
Ana Fill	5.0
Michelle Deng	5.0
TPPII TBD - In hiring phase	2.0
NEW CEII TBD - waiting on contract	2.0

Other costs: $18,000.00

Travel costs (airfare, mileage, hotel, registrations, per diems, etc.) to attend conferences, meetings by staff so that they can be trained

Financial Tables

SPR I Part A

Task	PARS #	Staff cost	Consultant cost	Other cost	Total task cost
A.1 / Supervision and direction of SPR tasks and staff	**TBD**	$ 852,912	$ -	$ 376,000	$ 1,228,912
A.2 / Capital Planning Development and Coordination	**TBD**	$ 218,308	$ -	$ -	$ 218,308
A.3 / GIS Coordination	**TBD**	$ 151,213	$ -	$ -	$ 151,213
A.4 / GIS Platform Development	**TBD**	$ 242,289	$ 1,799,250	$ 2,237,800	$ 4,279,339
A.5 / GIS Services	**TBD**	$ 378,758			$ 378,758
A.6 / Highway Performance Monitoring System (HPMS)	**TBD**	$ 77,705	$ -		$ 77,705
A.7 / Inventory Data Management	**TBD**	$ 439,270			$ 439,270
A.8 / Location Based Services Data	**TBD**	$ -	$ 500,000	$ -	$ 500,000
A.9 / MA Regional Rail Demand Modeling Tool	**TBD**	$ -	$ 500,000		$ 500,000
A.10 / Travel Forecasting, Data Collection and Transportation System Performance	**TBD**	$ 61,886	$ 1,778,485	$ -	$ 1,840,371
A.11 / Implementation of Federal Programs and Regulations	**TBD**	$ 97,596	$ -	$ -	$ 97,596
A.12 / Metropolitan Planning Support and Oversight	**TBD**	$ 138,275	$ -	$ -	$ 138,275
A.13 / Next Generation Massachusetts Household Travel Survey - Wave 1	**TBD**	$ -	$ 1,000,000		$ 1,000,000
A.14 / State Transportation Improvement Program Coordination and Capital Planning Support	**TBD**	$ 88,072			$ 88,072
A.15 / Statewide Long Range Transportation Plan	**TBD**	$ 78,593	$ 863,243	$ -	$ 941,836
A.16 / Bicycle and Pedestrian Planning	**TBD**	$ 110,913	$ -	$ -	$ 110,913
A.17 / Corridor Planning Studies	**TBD**	$ 304,249	$ 2,310,616	$ -	$ 2,614,865
A.18/ CTPS Annual On-Call Planning Assistance	**TBD**	$ -	$ 490,000	$ -	$ 490,000
A.19 / Freight Planning	**TBD**	$ 26,585	$ 799,875	$ -	$ 826,460
A.20 / On-Call Contracts	**TBD**	$ 17,019	$ 833,335	$ -	$ 850,354
A.21 / Access Management Through Development Review and Land Disposition	**TBD**	$ 47,734	$ -	$ -	$ 47,734
A.22 / Coordination and Consultation with Developers and Project Stakeholders	**TBD**	$ 37,863	$ -	$ -	$ 37,863
A.23 / Development Review through the MEPA and MassDOT Access Permit Processes	**TBD**	$ 55,986	$ -	$ -	$ 55,986
A.24 / MassDOT Policies Supported and Incorporated in Inter-Agency Objectives	**TBD**	$ 27,102	$ -	$ -	$ 27,102
A.25 / Mitigation, Transportation Demand Management, and Monitoring Programs for Development Projects	**TBD**	$ 31,228	$ 150,000	$ -	$ 181,228
A.26 / Climate Adaptation Vulnerability Assessment	**TBD**	$ 65,009	$ 1,029,403	$ -	$ 1,094,412
A.27 / GHG Mitigation Analysis, Research, Guidance & Regulatory Requirements	**TBD**	$ 111,851	$ -	$ -	$ 111,851
A.28 / Low Emissions Vehicles, Fuels and Infrastructure	**TBD**	$ 90,274	$ -	$ -	$ 90,274
A.29 / Post-COVID-19 Teleworking Study	**TBD**	$ 16,505	$ 200,000	$ -	$ 216,505

Task	PARS #	Staff cost	Consultant cost	Other cost	Total task cost
A.30 / Bus Network Redesign	**TBD**	$ 74,033	$ 200,000	$ -	$ 274,033
A.31 / Developer Mitigation Methodology	**TBD**	$ 22,368	$ 500,000	$ -	$ 522,368
A.32 / Exploring the Connection Between Bus Trips and Other Modes	**TBD**	$ -	$ 185,000	$ -	$ 185,000
A.33 / Inner North Shore Access Demand Study	**TBD**	$ -	$ 300,000	$ -	$ 300,000
A.34 / MBTA Fare Review	**TBD**	$ 18,000	$ 75,000	$ -	$ 93,000
A. 35 / Virtual Public Involvement	**TBD**	$ 25,000	$ -	$ -	$ 25,000

SPR I Part B

Task	PARS #	Staff cost	Consultant cost	Other cost	Total task cost
B.1 / Statewide Pavement Management Activities	TBD	$ 876,123	$ 539,207	$ 1,645,000	$ 3,060,330
B. 2 / Statewide Traffic Data Collection	TBD	$ 1,110,109	$ 505,000	$ 1,740,000	$ 3,355,109
B.3 / CORS Network Operation and Expansion	TBD	$ 136,519	$ -	$ 26,000	$ 162,519
B.4 / Development and Training	TBD	$ -	$ -	$ 5,000	$ 5,000
B.5 / Geodetic Surveys for Statewide Project Control	TBD	$ 502,954	$ -	$ -	$ 502,954
B.6 / GPS and Conventional Survey Equipment	TBD	$ -	$ -	$ 50,000	$ 50,000
B.7 / Improved Crash Data and Safety on Massachusetts Roadways	TBD	$ 1,014,894	$ 654,752	$ -	$ 1,669,646
B.8 / Prevent and Minimize Risks to MassDOT Staff and Workers on the Roadways	TBD	$ 34,324	$ -	$ -	$ 34,324
B.9 / Training of MassDOT Staff to Keep Current and Cutting Edge	TBD	$ 62,348	$ -	$ 18,000	$ 80,348

Totals

Task	Staff cost	Consultant cost	Other cost	Total task cost
SPR I Part A Total	$ 3,906,595.22	$13,514,207.46	$2,613,800.00	$20,034,602.68
SPR I Part B Total	$3,737,271.69	$1,698,959.00	$3,484,000.00	$8,920,230.69
SPR I Parts A and B totals	$7,643,866.91	$15,213,166.46	$6,097,800.00	$28,954,833.37

The SPR will be monitored throughout the year to determine if an amendment to the STIP is necessary to ensure adequate funding.
The SPR I is 75% of the overall program, meeting the 75% maximum threshold.

2023 State Planning and Research Program II

Table of Contents

Office of Transportation Planning

David Mohler, Executive Director	**Steve Woelfel**, Deputy Executive Director	**Bob Frey**, Director of Project-Oriented Planning	**Ethan Britland**, Manager of Multimodal Planning	Peter Sutton
				Makaela Niles
				Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
			Lionel Lucien, Manager of Public Private Development	Curtis Wiemann
				Vacant TPP II (to be filled)
		Kevin Lopes, Director of GIS Services		David Dinocco
				Michael McGill
				Jose Simo
				Argenis Sosa
				Manny Zotos
				Sudip Paudel
				Shruti Venkatesh
				Mary Molloy
				Florence Person
				Aanchal Gupta
				Charlotte Mays
				Charles Major
			Derek Krevat, Manager of MPO Activities	Derek Shooster
				Christopher Klem
				Miranda Briseno
				Raissah A. Kouame
			Jules Williams, Manager of Sustainable Transportation	Max Natanagara
				Daisy Brown
			Hongyan (Lily) Oliver, Manager of Research	Nicholas Zavolas
				Patrick McMahon
				Michael Flanary
				Drew Pflaumer
				Vacant TPP II (to be filled)
			Manager (Vacant)	Patricia Cahill
				Doug Johnson
				Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
		Liz Williams, Director of Data and Policy		Vacant TPP II (to be filled)
				Vacant TPP II (to be filled)
		Michelle Ho, Director of Capital Planning		Andrew Wang
				Vacant TPP II (to be filled)
		Maria Ramirez, Manager of Administration		Nathaniel Kerr
				Vacant (to be filled)
		Susan Repucci		

Research

A. Research Program Development, Administration, and Implementation

Task Lead: Hongyan Oliver

Task Purpose: To provide oversight and administration of the research program; conduct internal and external outreach activities; and manage associated contracts. The Research Section's work includes conducting research problem statement (RPS) solicitations; organizing RPS evaluation and selection; procuring and administering research contracts; and tracking project performance and implementation efforts and impacts. Please see Appendix A for the FFY23 Problem Statement Solicitation Form, where implementation and potential benefits are emphasized.

Accomplishments in prior year:

- Engaged in scoping and contracting coordination efforts between research project principal investigators (PI) and project champions (PC).
- Procured and/or administered over 30 research agreements (and/or contracts) with research entities.
- Performed project development and management for 35 research projects.
- Conducted three research roundtables to connect MassDOT personnel with researchers and two internal information sessions during the 2023 problem statement solicitation period.
- Conducted a "Lunch & Learn" session to inform and engage MassDOT and MBTA staff on research activities.
- Received 22 new research problem statements.
- Coordinated the review and prioritization of statements for new FFY23 projects.
- Coordinated initial scope discussion and PI identification approach for the FFY23 research projects.
- Produced FFY21 Research & Tech Transfer Annual Report.
- Produced four MassDOT Research Quarterly Newsletters.
- Updated MassDOT research website with new contents regularly.
- Conducted web-based project completion survey with project champions, principal investigators and project managers for thirteen projects completed in 2021 to collect feedback and information on how research process can be improved and research results have been/are to be utilized and implemented.

- Prepared quarterly reports on the status of research and training programs.
- Worked on a first draft of the updated Research Manual.

Proposed activities for next year:

- Continue providing the management of research contracts and agreements.
- Continue research project management.
- Prepare quarterly reports on the status of research and training programs.
- Update MassDOT Research Section website regularly.
- Produce FFY22 Research & Tech Transfer Annual Report.
- Produce MassDOT Research Quarterly Newsletters.
- Continue tracking research project performance, implementation and impacts.
- Track equipment purchased with research funds.
- Finalize the updated MassDOT Research Manual.

Anticipated products:

- Executed ISAs and contracts.
- Quarterly reports.
- Final draft of the updated Research Manual.
- Regular updating of the Research & Technology Transfer website.
- FFY22 Research & Tech Transfer Annual Report.
- Research Quarterly Newsletters.
- Improved research processes for increased effectiveness and better communication of research value.

Estimated task completion: 09-30-2023

Estimated task budget: $98,278.25

Staff salaries and benefits: $98,278.25

MassDOT staff members	% Time to task
Nicholas Zavolas	20.0
Patrick McMahon	20.0
Hongyan Oliver	20.0
Drew Pflaumer	20.0
Michael Flanary	20.0

Other costs: $0

B. Massachusetts Cooperative Research Program (MCRP)

Task Lead: Hongyan Oliver

Task Purpose: MassDOT plans to renew the multi-year Interdepartmental Service Agreements (ISA) with the University of Massachusetts Amherst to continue receiving the UMass Transportation Center (UMTC) services in assisting MassDOT with transportation research, training, and technology transfer activities for FFY23-25. There are four components in the ISA Amendment: Massachusetts Cooperative Research Program (Task B), Local Technical Assistance Program (Task C), MassDOT Technical Services (Task D) and MassDOT Conference Services (Task J). Through the MCRP component, the Research Section directs, coordinates, and oversees UMTC to provide research support and conducting tasks as requested. MCRP's services fall into five categories:

a) Literature searches and reviews: Perform literature and information searches and syntheses at the Research Section's request.

b) Research subtasks: Perform quick-turnaround subtasks to address MassDOT's imminent research needs. These subtasks can typically be completed in under 12 months (including a 3-month final product review and acceptance period) with a cost less than $100,000, and carried out by researchers with matching expertise (principal investigators) within the UMass system, but not by UMTC staff directly funded under the ISA.

c) Research project support: Assist MassDOT during the annual problem statement solicitation process; plan and support research roundtables; assist with identification of potential principal investigators (PI) with expertise matching specific research needs; assist with initial scope of work description; ensure quality control (final copy-editing and 508 compliance of all research final reports and cut sheets); and submit final reports to Transportation Research International Documentation (TRID), National Transportation Library and other national transportation research record repositories.

d) Research collaboration and outreach support: Maintain the UMTC associated transportation researcher network; curate and host MassDOT transportation research and innovation webinar series; assist MassDOT with the National Cooperative Highway Research Program (NCHRP) problem statement

review process; compiling contents for MassDOT Research Annual Report; and other activities as needed.

e) Research project administration: Provide fiscal and procedural administration for all research projects with UMass Amherst, including budget preparation; invoicing backup preparation; template developments/updating; accounting, orientation/training; and on-demand activities. Provide advice to other state universities on how to administrate ISAs with MassDOT.

Under Category B, MassDOT intends to conduct up to 5 research subtasks during FFY23 through the UMTC ISA to address research problems and needs. Some of the subtasks are generated from the annual research problem statement solicitation process and some may be selected outside of that process. The second type of research subtask will depend on the emerging agency needs and may include technical assistance in implementing completed research. The Research Section works with MassDOT project champions to identify the suitable principal investigators for each of the subtasks based on researcher expertise and anticipated completion dates, and assists with the development of scopes, budgets, and schedules for these projects. MassDOT will coordinate with and request FHWA's approval of the scopes and budgets prior to the issuance of any research subtasks.

Subtasks:

- MCRP

Accomplishments in prior year:

- Initiated and administrated two research subtasks (FYA Phase II and Concrete Sidewalks Phase II)
- Completed one MCRP research subtask (Best Practices for Cost-Recovery)
- Assisted with 2023 MassDOT Research Problem Statement solicitation (for FFY23 SPR Work Program).
- Assisted with research solicitation outreach materials and hosted the outreach sessions.
- Assisted with research project completion survey.
- Conducted literature searches for 22 received problem statements.
- Drafted brief project statements for the final list of FFY23 projects to initiate PI identification process.
- Assisted with PI Interest Statement solicitation.

- Facilitated dialogues between the Affiliate network/academic researchers and MassDOT practitioners.
- Maintained the network of the transportation affiliated researchers.
- Conducted literature search on travel demand alternative analysis and state-of-practice for managing ferry services at MassDOT staff's request.

Proposed activities for next year:

Subtasks: MCRP

Currently MCRP research subtasks to be completed during FFY23 include:

B.1. Construction & Materials Best Practice for Concrete Sidewalks Phase II (Continuing Research Subtask): Phase II investigates concrete placed in hot weather and continues to monitor the performance of the concrete placed in Phase I that was not included in Phase I but may also be also critical in triggering concrete scaling. All sample preparation, field observation, data collection, lab experiment and data analysis were completed in FFY22. Final report draft is in progress and is anticipated to be submitted for review in the first quarter of FFY23. Anticipated duration: 21 months. Anticipated costs for FFY23: $30,000. Project total costs: $250,000.

B.2. Evaluating the Safety Impacts of Flashing Yellow Permissive Left-Turn Indications in Massachusetts: Approach Level Analysis (Continuing Research Subtask: Phase II aims at evaluating the before/after crashes of these FYA intersections from the approach-level to better understand the safety impacts of the Left-Turn permissive FYA signal. The advancement of these crash data analytics, methodologies, and applications will continue to remain important in years to come and will increase safety by providing an increased understanding of conflict risk at signalized intersections involving this novel traffic control device. All data collection and analysis were completed in FFY22. Final report draft is in progress and is anticipated to be submitted for review in the first quarter of FFY23. Anticipated duration: 21 months. Anticipated costs in FFY23: $20,000.

Additional subtasks will be developed based on emerging needs and be issued with FHWA's approval; such subtasks may include technical assistance in implementing completed research.

- Continue to provide research services in the categories listed above.
- Complete the two existing research subtasks listed above.

- Initiate and perform up to 5 new research subtasks under MCRP's Services (Category B above).
- Assist Research Section in preparing FY22 Research Annual Report.
- Assist Research Section in preparing FY23 quarterly updates.

Anticipated products:

- Delivery of research subtask interim and final reports.
- Delivery of monthly and quarterly reports.
- Delivery of 2022 Research Annual Report.
- Delivery of other research services as requested by the MassDOT Research Section.
- Delivery of logistical support for the annual NCHRP problem statement review.

Estimated task completion: 09-30-2023

Timeline for new consultant support: MCRP

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 08-15-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 72 months

Estimated task budget: $982,193.03

Staff salaries and benefits: $53,656.03

MassDOT staff members	% Time to task
Hongyan Oliver	20.0
Michael Flanary	15.0
Drew Pflaumer	10.0
Nicholas Zavolas	10.0

Consultant costs: $928,537.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date
MCRP / 109600	$5,677,226.00	$2,788,822.00	$928,537.00	$1,959,867.00	UMass Amherst	10-01-2022*	72	09-30-2025

Consultant notes: This is the MCRP component of the MassDOT-UMA UMTC ISA Amendment for FFY23-25. The duration of the whole ISA, after being amended, is 72 months. The total cost reflects the total amount estimated for the 72-month period.

* Anticipated NTP date for the ISA Amendment.

Other costs:

C. Local Technical Assistance Program (LTAP)

Task Lead: Hongyan Oliver

Task Purpose: MassDOT plans to renew the multi-year Interdepartmental Service Agreements (ISA) with the University of Massachusetts Amherst to continue receiving the UMass Transportation Center (UMTC) services in assisting MassDOT with transportation research, training, and technology transfer activities for FFY23-25. There are four components in the ISA Amendment: Massachusetts Cooperative Research Program (Task B), Local Technical Assistance Program (Task C), MassDOT Technical Services (Task D) and MassDOT Conference Services (Task J). 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 B for FFY23 LTAP Training Plan.

Subtasks:

- LTAP

Accomplishments in prior year:

The Local Technical Assistance Program (LTAP) resumed in person training in 2022 while maintaining a variety of additional remote options including virtual classes, blended learning, webinars and self-paced virtual courses. Major accomplishments to date, with estimated Quarter 4 trainings scheduled, provided 117 classes attended by about 2,400 participants in total. trainings are summarized below (including scheduled sessions for Q4):

- AASHTO TC3 Plan Reading
- ADA Accessible sidewalk Ramp Construction
- AASHTO TC3 Intro to GIS Mapping
- Basic Welding
- Bucket Truck
- Capital Budgeting for municipal DPWs
- Chainsaw Maintenance
- Chainsaw Skills and Safety
- Class A CDL
- Class B CDL

- Complete Street 201
- Complete Streets 302
- Complete Streets 303 – Bicycle/Pedestrian Network Planning
- Complete Streets 304 – Traffic Calming
- Complete Streets 306
- Concrete Sidewalk Construction
- Confined Space
- Design of ADA Curb Ramps
- Drainage – Roadway Maintenance and Reconstruction
- Effective Beaver Management
- Erosion Prevention and Sediment Control – BMPs
- Flagger/First Aid Certification
- FAA Remote Pilot Certification Pilot Test Preparation
- Grader Operator
- Grader Training
- Hands on Excavator/Loader/Backhoe Operation & Safety
- Hands on Grader Operation & Safety
- Large Mower Operation & Safety
- Illicit Discharge Detection & Elimination for MS4 Permitting
- Load Securement & Rigging
- Maintaining your Roadways with Pavement Preservation Part 1
- Maintaining your Roadways with Pavement Preservation Part 2
- MaPIT 3.0
- Municipal Culvert Assessment
- Municipal DPW Operating Budget
- MS4
- NHI Urban Drainage Design
- OSHA 10
- Pavement Management & Preservation
- Ped & Bike Work Zone Safety Training
- Roundabouts Series #11: Multilane Design
- Roundabouts Series #12: Signage and Markings
- Roundabouts #13: Construction and Operations
- Roundabouts Series #14 – Simulation
- Snow & Ice Operations for Front Line Employees
- Snow & Ice Operations for Supervisors
- Street Tree Essentials
- Stump the Instructor – Been there and Bid that!
- Stump the Instructor – Calibration is the Key
- Stump the Instructor – CDL Entry Level Driver Training Requirements
- Stump the Instructor – Concrete Sidewalks
- Stump the Instructor – Future of Commonwealth’s Curbs
- Stump the Instructor – Scopes, Contracts and Contractors

- Stump the Instructor – Equipment Inspection and Operation
- Stump the Instructor – From Brine to Beet Juice
- Stump the Instructor – Grader Operation
- Stump the Instructor – Gravel Roads 101
- Stump the Instructor – Gravel Road 201
- Stump the Instructor – Snow and Ice
- Stump the Instructor – So, you had a…Flood, Major Snow Event. Now what!
- Stump the Instructor – Spring is in the Air and Mud is Coming for Your Roads
- Stump the Instructor – Trench Safety Month Kickoff
- Traffic Signal Warrants
- Trenching and Excavation Safety
- Truck or Backhoe Maintenance Essentials
- Welding Equipment Safety and Operation
- Woodchipper Safety
- Work Zone Safety
- Conducted training evaluation at end of each class.
- Conducted training impact evaluations on selected classes.
- Hosted one hybrid LTAP Advisory Board meetings.
- Developed job-aids on selected topics for municipal DPWs.
- Provided monthly and quarterly reports.
- Published quarterly LTAP M3 newsletters.
- Updated LTAP website frequently to disseminate information.
- Conducted and evaluated FFY23 LTAP training needs survey.
- Developed draft FFY23 LTAP Training Plan.

Proposed activities for next year:

- Continue to prepare, coordinate, and deliver training classes to municipalities per the FFY23 training plan (Attachment B), and yet be flexible to accommodate evolving, critical municipal needs and to follow MassDOT's guidance.
- Continue to expand and deliver online training and information sharing videos.
- Continue to develop and implement suitable approaches to evaluate training effectiveness.

Anticipated products:

- Delivery of at least 100 virtual or in-person training sessions throughout the state.
- Quarterly M3 newsletters.
- Updates to and maintenance of LTAP website.

- Training and conference feedback surveys and summaries.
- Monthly and quarterly reports on LTAP training activities.
- Draft FFY24 LTAP Training Plan.

Estimated task completion: 09-30-2023

Timeline for new consultant support: LTAP

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 08-15-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 72 months

Estimated task budget: $1,217,551.88

Staff salaries and benefits: $14,698.88

MassDOT staff members	% Time to task
Drew Pflaumer	5.0
Hongyan Oliver	10.0

Consultant costs: $1,202,853.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
LTAP / 109600	$7,509,659.00	$3,748,574.00	$1,202,853.00	$2,558,232.00	UMass Amherst	10-01-2022	72	09-30-2025

Consultant notes: This is the LTAP component of the four components of the MassDOT-UMA UMTC services ISA Amendment for FFY23-25. The duration of the whole ISA, after being amended, is 72 months. The total cost reflects the total amount estimated for the 72-month period.

* Anticipated NTP date for the ISA Amendment.

Other costs:

D. MassDOT Training Services (MTS)

Task Lead: Hongyan Oliver

Task Purpose: MassDOT plans to renew the multi-year Interdepartmental Service Agreements (ISA) with the University of Massachusetts Amherst to continue receiving the UMass Transportation Center (UMTC) services in assisting MassDOT with transportation research, training, and technology transfer activities for FFY23-25. There are four components in the ISA Amendment: Massachusetts Cooperative Research Program (Task B), Local Technical Assistance Program (Task C), MassDOT Technical Services (Task D) and MassDOT Conference Services (Task J). 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 for FFY23 MTS Training Plan.

Subtasks:

- MTS

The MTS annual budget has increased considerably for the FY23-25 period for two reasons: a significant amount of mandatory Highway employee technical trainings and certifications were transferred from MassDOT HR Training to UMTC starting in FFY22; and, the Highway Division is expecting to hire a large number of new staff to develop and deliver projects funded by the BIL; and these new staff will need to take technical trainings to get up to speed and perform their responsibilities satisfactorily.

Accomplishments in prior year:

MassDOT Training Services resumed in-person training while continuing with a variety of training topics via a variety of remote training environments. Trainings were offered through a virtual format (live-streamed through a variety of platforms), a blended learning approach, combining self-paced online modules and live streamed sessions, webinars, and on-demand video options. MTS provided over 100 classes for over 2,800 attendees. Individual classes are listed below (including scheduled sessions for Q4):

- AASHTO TC3 Aggregate Sampling Basics

- AASHTO TC3 Erosion and Sediment Control for Construction
- AASHTO TC3 Global Positioning System
- AASHTO TC3 Introduction to GIS
- AASHTO TC3 Micropile
- American Concrete Institute (ACI) training and certification
- Asphalt 101
- ATSSA - Guardrail Installation
- AutoCAD Civil 3D
- Bridge Specialized Processes: Bolted Connections
- Bridge Specialized Processes: Removal & Replacement of Bridge Coatings
- Bucket Truck Operation & Safety
- Chainsaw Maintenance
- Chainsaw Safety & Storm Damage Awareness
- Confined Space Training
- Construction Supervisor License CEUs
- Design of ADA Curb Ramps
- Drainage – Roadside Maintenance and Reconstruction
- FHWA NHI-130055 - Safety Inspection of In-Service Bridges (10 Day)
- FHWA NHI 130091 Underwater Bridge Inspection
- FHWA NHI 130108 – Bridge Maintenance
- FHWA NHI 135056 Culvert Design
- FHWA NHI 131141 – Quality Assurance for Construction
- FHWA NHI 132042 – Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes
- FHWA NHI 132078 - Micropile Design and Construction
- FHWA NHI 134067 - Construction Inspection of Bridge Rehabilitation Projects
- FHWA NHI-135048 - Countermeasure Design for Bridge Scour & Stream Instability
- Highway/Construction Survey
- Introduction to SIDRA
- Larger Mower Operation & Safety
- Load Securement and Rigging
- MassDOT Project Manager Certification Training
- Mechanics Training
- New England Transportation Technician Certification Program (NETTCP) training and exams
- NRMCA Concrete Exterior Finishers Certification

- OSHA-10 for Construction
- OSHA Safety Awareness Training
- Railroad ROW safety trainings
- School of PE – FE Prep Course
- SIDRA Fundamentals
- Sign Installation & Maintenance
- Stormwater Maintenance
- Sweeper Operation and Safety
- Trenching & Excavation Safety
- Woodchipper Operation and Safety
- Work Zone Safety for Construction Supervisors
- Work Zone Safety for Field Personnel
- Work Zone Safety for Maintenance Field Personnel
- Work Zone Safety for Maintenance Supervisors & Foremen
- Welding Procedure Safety Explained
- Procured, coordinated, and administered 3-party training and certification services to meet Highway Division needs.
- Worked on streamlining MTS processes to improve training effectiveness and quality including needed coordination, registration, evaluation, and customized contents to reflect MassDOT's technical requirements.
- Coordinated with the Highway Division to develop FFY23 training plan.
- Submitted monthly and quarterly reports.

Proposed activities for next year:

- Prepare, coordinate, and deliver MTS training classes per the FFY23 Training Plan (Attachment C), which will be updated quarterly based on availability and schedule of external training classes and to accommodate critical, emerging Highway training needs.
- Coordinate with the Highway Division and OTP to accommodate on-demand training needs.
- Record training attendance to inform future plans.
- Conduct training needs and effectiveness surveys.
- Develop FFY24 annual training plan.
- Prepare and submit monthly and quarterly reports.

Anticipated products:

- Implementation of the FFY23 Training Plan.

- Accommodation of Highway Division urgent training needs.
- Implementation of FFY24-25 training needs survey.
- Training attendance records.
- Training feedback surveys and summaries.
- Development of FFY24 MTS annual plan.
- Monthly and quarterly reports.

Estimated task completion: 09-30-2023

Timeline for new consultant support: MTS

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 08-15-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 72 months

Estimated task budget: $1,675,080.88

Staff salaries and benefits: $14,698.88

MassDOT staff members	% Time to task
Hongyan Oliver	10.0
Drew Pflaumer	5.0

Consultant costs: $1,660,382.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
MTS / 109600	$777,798.00	$2,703,932.00	$1,660,382.00	$3,413,484.00	UMass Amherst	10-01-2022	72	09-30-2025

Consultant notes: This is the MTS component of the four components of the MassDOT-UMA UMTC Services ISA Amendment for FFY23-25. The duration of the whole ISA, after being amended, is 72 months. The total cost reflects the total amount estimated for the 72-month period.

* Anticipated NTP date for the ISA Amendment.

Other costs:

E. Short-Term Research Projects

Task Lead: Michael Flanary

Task Purpose: To perform the studies contained within this task, MassDOT contracts directly with universities, research institutes and/or private companies. The anticipated duration of active investigation and report writing efforts for short-term, medium-term and long-term projects are, respectively: less than 15 months, 15-21 months, and longer than 21 months (including 3 months of final report review, approval and 508 compliance). There may be an occasion when a project's actual duration doesn't align with the anticipated duration due to challenges arising during research investigation and beyond the project team's control. Under such circumstances, additional time may be granted pending FHWA's approval, and the project shall remain within the original category for fiscal tracking purposes. The Research Section conducts annual research problem statement (RPS) solicitations to collect research needs from agency staff. The submitted problem statements are then prioritized based on MassDOT Division/Shared-Service Office Senior Leaders' rankings, MassDOT overall priorities, and research funding eligibility and availability. The Research Section assists MassDOT project champions with literature searches; the drafting of scopes of work; identification and selection of principal investigators, and the administration of project agreements/contracts, deliverables, final report reviews and publication, and coordination with FHWA.

Subtasks:

1. Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III (Continuing Project)

A four-phased approach was planned to complete this research effort. Phase I (Literature Review and State of Practice Assessment) was completed in June 2021 and Phase II (Develop an AASHTOWare Pavement ME User Manual and the Local Experimental Plan and Sampling Template) deliverables are being reviewed. Phase III (Sample and Test Mixtures for Local Calibration and Field Data Collection) will be based on the local experimental plan and sampling template developed under Phase 2, and a larger volume of mixtures will be tested to have the best local calibration possible for Massachusetts. Additionally, field data needed for calibration will be collected. All this lab and field data will be used in Phase IV (Calibrate and Validate the M-E Prediction Models). The phase III ISA is expected to

be in place before FFY23 and the project will be kicked off in early FFY23 subsequently.

2. Methods to Identify Problematic Carriers and Prevent Infrastructure Damage (Continuing Project)

This project aims to develop methods to connect and harmonize various Massachusetts datasets on carriers, permits, citations, road accidents, road infrastructure inventory, and freight restrictions to improve the use and availability of relevant datasets. Following a compilation of state-of-the-practice from other states, the available datasets are examined to determine consistency and usability on mirrored or relational fields. Specific datasets and their fields are being categorized by relevancy to formulate data canisters for analysis across multiple enterprise platforms. Thresholds will be determined to identify overrepresented carriers and resulting trigger points on a rolling basis at which further investigation should be conducted. Additionally, experimentation of a comprehensive scoring system will assign individual factors a weight to best accommodate incomplete data in determining overall carrier risk to road and infrastructure safety. Research results will provide a solid foundation for conducting risk assessments of overweight/oversize use and flagging problematic use of existing weight-permit practices to further protect roadway assets and sensitive bridge structures.

3. Feasibility Study of 3D Printing Applications for Bridge Elements in MA (Continuing Project)

Building on the promising experimental results of Phase I (i.e., additive repair of real corroded steel plates in the lab), the current project aims at exploring the onsite feasibility of additive repair technology for corroded steel beam ends. Cold spray solutions as well as other applicable onsite technologies will be studied and tested. The project will further connect interested MassDOT bridge engineers with additive manufacturing facilities to explore potential collaborative opportunities around implementation of candidate objects identified during Phase I. Additionally, the project will further characterize the cost and value of implementing these candidate components by using specific econometric models and will contextualize that cost within MassDOT-specific operational models and planning.

4. Data-Driven Approach for Transit Capital Planning (Continuing Project)

This research aims to develop new approaches and identify best practices by peer State-level agencies for MassDOT to compile, aggregate and understand data that

enables better decision making for transit capital planning. It will also work to define a standard operating procedure, focusing on what data is currently being collected and the existing collection methods used at MassDOT, and how this data is ultimately integrated into or used to validate MassDOT's forecast of need. This research could eventually serve as the framework for a solution that will help to streamline time-consuming data collection efforts while ensuring the accuracy of the predicted need across MassDOT's transit grantees. A transparent, repeatable, and uniform processes for data aggregation and analysis will allow MassDOT to make capital planning decisions that are driven by data and consistent with needs and priorities across the Commonwealth.

5. BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA (Continuing Project)

It is important to consider data governance and integration from the conception of a project's data dictionary, through the asset provisioning and commissioning process of new infrastructure and data management, to computerized maintenance management systems. MBTA management of new projects and ongoing operations can be improved by implementing the Building Information Modeling (BIM) delivery methodology in the Capital Delivery department. The project aims to review practices at other state and regional agencies to recommend best practices for implementing a systemwide BIM workflow throughout the MBTA infrastructure design, construction, operations, and maintenance areas.

6. Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads (Continuing Project)

This project will provide guidance and case studies for developing traffic signal timing plans in Massachusetts that limit the number of speeding opportunities, while addressing other signal control objectives such as capacity and delay. This will be achieved by creating a method for determining the number of speeding opportunities afforded by a signal timing plan on an arterial with the similar inputs used in traffic signal timing design and developing an easy-to-use, no-cost tool that implements this method. Literature review and the initial online tool development has been completed; and MassDOT will review and implement the revised signal timing plan for the tool validation in FFY23.

7. Uncovering the Root Causes for Truck Rollover Crashes on Ramps (Continuing Project)

This project will provide a better understanding of the causes of truck rollover crashes on highway ramps, and develop effective countermeasures (e.g., improved ramp design and traffic control). The project has reviewed literature and best practices on reducing highway ramp truck rollovers; 2) analyzed historical ramp truck rollover data in Massachusetts by utilizing existing traffic cameras on state-maintained highways and advanced video analytics tools to uncover the causes of truck rollovers on highway ramps and derive surrogate safety performance measures, and (3) identified some correlations between truck rollovers and Intelligent Transportation System (ITS) devices, signage and markings, and roadway design practices. Additional video images were collected by the MassDOT drone team and are being analyzed by the researchers. A 6-month NCTE was approved by FHWA in August 2022 to extend the project end date to March 31, 2023.

8. Synthesis study: Microfiltration Treatment and Design Options (Continuing Project)

This project involves synthesizing microfiltration treatment design and operations for projects by type and making recommendations on their potential use on MassDOT projects for stormwater management and water quality improvement particularly with sediment control barriers and bioswales. A no-cost contract amendment was approved in FFY22 for updating the scope and extending the project end date to April 30, 2023.

Accomplishments in prior year:

- Contracted and initiated "Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III" project. 1% completed.
- Contracted and initiated "Methods to Identify Problematic Carriers and Prevent Infrastructure Damage" project. 5% completed.
- Contracted and initiated "Feasibility Study of 3D Printing Applications for Bridge Elements in MA" project. 5% completed.
- Contracted and initiated "Data-Driven Approach for Transit Capital Planning" project. 1% completed.
- Contracted and initiated "BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA" project. 10% completed.
- Managed "Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads" project. 40% completed.

- Managed "Uncovering the Root Causes for Truck Rollover Crashes on Ramps" project. 80% completed.
- Managed "Microfiltration Treatment and Design Options" synthesis project. 65% completed.
- Identified FFY24 short-term research projects.

Proposed activities for next year:

- Complete “BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA” project.
- Complete “Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads” project.
- Complete "Uncovering the Root Causes for Truck Rollover Crashes on Ramps" project. 80% completed.
- Complete "Microfiltration Treatment and Design Options" synthesis project.
- Advance "Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III” project to 75% completion.
- Advance “Methods to Identify Problematic Carriers and Prevent Infrastructure Damage” project to 85% completion.
- Advance “Feasibility Study of 3D Printing Applications for Bridge Elements in MA” project to 75% completion.
- Advance “Data-Driven Approach for Transit Capital Planning” project to 75% completion.
- Solicit and identify FFY24 short-term projects.

Anticipated products:

- Interim deliverables and final reports for all short-term research projects.
- List of short-term projects for FFY24.

Estimated task completion: 09-30-2022

Timeline for new consultant support: 1.Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III (Continuing Project)

Consultant name: UMass Dartmouth
Scope development and FHWA review/approval: 08-15-2022
Contract negotiations and FHWA review/approval: 09-15-2022
Consultant Notice to Proceed: 09-30-2022
Total duration of task: 18 months

Timeline for new consultant support: 2.Methods to Identify Problematic Carriers and Prevent Infrastructure Damage (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 03-23-2022
Contract negotiations and FHWA review/approval: 05-10-2022
Consultant Notice to Proceed: 06-02-2022
Total duration of task: 18 months

Timeline for new consultant support: 3.Feasibility Study of 3D Printing Applications for Bridge Elements in MA (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 03-20-2022
Contract negotiations and FHWA review/approval: 04-14-2022
Consultant Notice to Proceed: 04-25-2022
Total duration of task: 19 months

Timeline for new consultant support: 4.Data-Driven Approach for Transit Capital Planning (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 08-03-2022
Contract negotiations and FHWA review/approval: 08-15-2022
Consultant Notice to Proceed: 08-31-2022
Total duration of task: 15 months

Timeline for new consultant support: 5.BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 02-09-2022
Contract negotiations and FHWA review/approval: 03-15-2022
Consultant Notice to Proceed: 03-21-2022
Total duration of task: 15 months

Timeline for new consultant support: 6.Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads (Continuing Project)

Consultant name: Northeastern University
Scope development and FHWA review/approval: 12-10-2020
Contract negotiations and FHWA review/approval: 06-10-2021
Consultant Notice to Proceed: 07-01-2021
Total duration of task: 24 months

Timeline for new consultant support: 7.Uncovering the Root Causes for Truck Rollover Crashes on Ramps (Continuing Project)

Consultant name: UMass Lowell
Scope development and FHWA review/approval: 01-08-2021
Contract negotiations and FHWA review/approval: 03-11-2021
Consultant Notice to Proceed: 04-07-2021
Total duration of task: 22 months

Timeline for new consultant support: 8.Synthesis study: Microfiltration Treatment and Design Options (Continuing Project)

Consultant name: Offshoot Inc
Scope development and FHWA review/approval: 01-04-2021
Contract negotiations and FHWA review/approval: 07-19-2021
Consultant Notice to Proceed: 07-23-2021
Total duration of task: 21 months

Estimated task budget: $789,216.72

Staff salaries and benefits: $55,234.72

MassDOT staff members	% Time to task
Michael Flanary	20.0
Drew Pflaumer	15.0
Nicholas Zavolas	10.0
Patrick McMahon	10.0
Hongyan Oliver	5.0

Consultant costs: $733,982.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
1. Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III (Continuing Project) / None	$400,167.00	$0.00	$241,352.00	$158,755.00	UMass Dartmouth	09-30-2022	18	N/A
2. Methods to Identify Problematic Carriers and Prevent Infrastructure Damage (Continuing Project) / 117649	$126,200.00	$5,000.00	$107,000.00	$14,220.00	UMass Amherst	06-02-2022	18	11-30-2023
3. Feasibility Study of 3D Printing Applications for Bridge Elements in MA (Continuing Project) / 117646	$150,000.00	$7,000.00	$139,000.00	$4,000.00	UMass Amherst	04-25-2022	19	11-30-2023
4. Data-Driven Approach for Transit Capital Planning (Continuing Project) / None	$100,000.00	$0.00	$80,000.00	$20,000.00	UMass Amherst	08-31-2022	15	N/A
5. BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA (Continuing Project) / 117455	$99,997.00	$39,875.00	$60,122.00	$0.00	UMass Amherst	03-21-2022	15	05-31-2023
6. Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads (Continuing Project) / 114372	$140,000.00	$80,000.00	$60,000.00	$0.00	Northeast University	07-01-2021	24	05-31-2023
7. Uncovering the Root Causes for Truck Rollover Crashes on Ramps (Continuing Project) / 113772	$120,000.00	$83,492.00	$36,508.00	$0.00	UMass Lowell	04-07-2021	22	03-31-2023
8. Synthesis study: Microfiltration Treatment and Design Options (Continuing Project) / 114903	$40,000.00	$30,000.00	$10,000.00	$0.00	Offshoot Inc	07-23-2021	21	04-01-2023

Consultant notes:

Other costs:

F. Medium-term Research Projects

Task Lead: Michael Flanary

Task Purpose: To perform the studies contained within this task, MassDOT contracts directly with universities, research institutes and/or private companies. The anticipated duration of active investigation and report writing efforts for short-term, medium-term and long-term projects are, respectively: less than 15 months, 15-21 months, and longer than 21 months (including 3 months of final report review, approval and 508 compliance). There may be occasion when a project's actual duration doesn't align with the anticipated duration due to challenges arising during research investigation and beyond the project team's control. Under such circumstances, additional time may be granted pending FHWA's approval, and the project shall remain within the original category for fiscal tracking purpose. The Research Section conducts annual research problem statement (RPS) solicitations to collect research needs from agency staff. The submitted problem statements are then prioritized based on MassDOT Division/Shared-Service Office Senior Leaders' rankings, MassDOT overall priorities, and research funding eligibility and availability. The Research Section assists MassDOT project champions with literature searches; the drafting of scopes of work; identification and selection of principal investigators, and the administration of project agreements/contracts, deliverables, final report reviews and publication, and coordination with FHWA.

Subtasks:

1. Measuring Accessibility to Improve Public Health (Continuing Project)

This project aims to 1) develop a methodology to identify and classify gaps in accessibility to jobs, health care, and food across time, demographic groups, and locations, which impact the public health of the populations affected; and 2) provide a set of recommendations for actions to address the specific types of identified accessibility gaps to reduce inequities. These methods could support MassDOT's existing accessibility data dashboard to continuously monitor accessibility gaps and inequities that affect public health. The research team has completed substantial work bringing together a diverse and representative group of public and private stakeholders from across Massachusetts for a technical advisory committee. Spatial analysis and travel time methodology are largely completed, to be refined with additional data as available. Accessibility metrics are

under development, as are the anticipated questions and discussion topics for intended stakeholder engagement meetings.

2. Energy-Focused Decision-making Framework for MBTA Operations and Planning (FY23 New Project)

This project aims to develop an enhanced system-wide energy model for MBTA urban rail transit building on prior efforts and harnessing network-specific substation energy data and to calibrate train-specific energy models for all the lines in the MBTA in order to evaluate high-resolution trajectory and ridership impacts on energy consumption. It will eventually build a decision-support tool to provide system-wide energy and cost predictions for given input on operational strategies in order to enable robust planning by the MBTA.

3. Accessible Bus Stop Design in the Presence of Bike Lanes (FY23 New Project)

The MBTA has been upgrading its bus stops for better accessibility, especially for wheelchair users and visually impaired individuals. While these accessible bus stops are integrated with Complete Street designs and other multi-modal accommodations, the impact of other modes and related infrastructure on transit user safety (e.g., conflicts between bicycles traveling on adjacent bike lanes and transit riders), has not been fully investigated. There is a pressing need for a better understanding of the impacts of bicycle infrastructure on bus stop accessibility and the exploration of mitigation plans that will ensure an accessible, equitable, and safe travel experience for all travelers. The objectives of this research are to: 1) investigate interactions of bus riders and bicyclists when bicycle infrastructure is adjacent to bus stops, and 2) propose design improvements to mitigate conflicts between bus riders of all abilities and bicyclists.

4. Developing a Salt Spreader Control Program based on Grip (Continuing Project)

Deicing material conservation makes fiscal sense and is also critical to protecting environmental resources while engaged in combating wintry precipitation on our roadways. There is growing interest in the design and utilization of systems that automatically adjust a salt spreader's deicing material (salt) dispensation rate based on observed grip levels in real time. The project aims to develop a prototypical technology and equip it onto one or more of MassDOT's salt spreaders to calibrate a salter's material dispensation rate to observed grip levels. The project

was kicked off in FFY22 Q3. Literature review and investigation of specifications and capabilities of MassDOT current equipment are currently underway.

5. Cross-Modal Impact Assessment for Sustainable Transportation Networks (FY23 New Project)

State agencies must make large investments into the transportation system which should be environmentally friendly, equitable and cost-effective which defines the three pillars of sustainable development. Therefore, when investing in a multi-mode transportation system, the following questions are crucial for defining the sustainability of the system: 1) What is the best way to quantify complex impacts across multiple domains (i.e., social, economic, and environmental)? 2) How does an agency quantify the impact of taking different transportation modes? 3) How can policy decisions about mode choice be evaluated through an equity lens? This project has three objectives: 1) introducing normalized metrics that can be used for cross-modal comparisons; 2) quantifying impacts in social, economic, and environmental dimensions; and 3) analyzing investment decisions with respect to equity.

6. Speed Management and Emergency Personnel (FY23 New Project)

Emergency personnel are frequently cited as reason not to implement speed management roadway treatments. The objective of this research is to learn more about specific concerns; how communities have overcome them; and share exemplary case studies from Massachusetts as well as other states for our new mass.gov/safe-speeds site. Additionally, research could include pilot and testing of treatments. The resulting data will be used to inform standards and specifications on speed management treatments that are workable for emergency personnel while still controlling speed.

7. LIMMS Gap Analysis and Development Plan (FY23 New Project)

The Laboratory Information Materials Management System (LIMMS) was designed as a secure platform to streamline and centralize materials data collection and provide tools to analyze patterns and trends statewide. The current design of LIMMS limits the expected benefits of the system. Through this project, MassDOT will investigate alternative software that can meet or exceed MassDOT’s technical and design requirements. The purpose of this project is to conduct a gap analysis that will examine the needs of LIMMS users from system design to functionality. Findings will be used to inform the selection of future LIMMS software vendors.

8. Smart Work Zone Control and Performance Evaluation Based on Trajectory Data (Continuing Project)

The goal of this study is to develop computer vision technologies to extract trajectories of vehicles approaching work zones, and use the results to analyze driver behavior; identify safety hazards; and develop effective control strategies. The findings can be integrated into the existing MassDOT smart work zone systems for dynamic traffic control and can also be used to analyze and improve traffic operations at on-ramps and entrances of managed lane facilities.

9. Developing Massachusetts Specific Trip Generation Rates for Land Use Projects (Continuing Project)

This project aims to assist MassDOT in developing trip generation rates for high-priority land uses in Massachusetts. It intends to develop an algorithm-based model for deriving accurate trip generation rates for development projects located in Massachusetts. It will also identify and study available innovative technologies such as machine learning models and video analytics that can be used to assist MassDOT's efforts to collect vehicular and multi-modal trip generation data. The results of the project will improve the current methods used by MassDOT for projecting trip generation rates resulting from new, large urban development projects. The project champion established a wide-ranging group of technical experts as an advisory committee. The research team identified targeted land use types and all representative examples recently approved and constructed in Massachusetts to calibrate trip generation model. Due to the relatively low sample size, streetlight data was collected for comparable existing projects, with the added benefit of providing a longer-term example and sample. Pilot study, model guidance, and comparison of data collection methods are expected to be completed in FFY23.

10. Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection (Continuing Project)

This research investigates how data from the various traffic data sources that MassDOT owns or has access can be merged for accurate, real-time traffic incident detection, to improve travel time reliability. It assesses the current traffic incident detection methods employed by MassDOT and develops new tools for improved traffic incident detection based on available traffic data and addresses the fusion of

information from multiple sources of different temporal and spatial scales such as traffic data collected from loop detectors; information from the MassDOT Real Time Traffic Management (RTTM) system; and information available through third-party vendors (e.g., Waze, Google, INRIX). The research team continued working on model evaluation, while work was being completed on the anomaly detection model. Field implementation, led by the Highway Operation Center, was started in FFY22 Q3. A 4-month No-cost Time Extension was approved by FHWA in early September, which extends the project end date from December 30, 2022 to April 30, 2023.

11. Post-fire Damage Inspection of Concrete Structures Phase II (Continuing Project)

This phase focuses on physical testing of critical components of tunnels after being exposed to high combustion temperature. Key activities in this phase include identification of critical tunnel components for testing; physical testing of the components in a structural testing facility for their post-fire residual capacity; evaluating the non-destructive test methods identified in the Phase I literature review and owned by MassDOT based on the testing results; and adding new information resulting from lab testing to the inspection protocol checklist to assist field inspections. The project team conducted experimental testing; worked on the post-fire inspection checklist and drafted recommendations for future research. Slab testing will be completed in FFY23.

12. Massachusetts Depth to Bedrock Project (Continuing Project)

This project achieved the followings: 1) identified, collected, assembled and applied necessary data validation, quality control, attribution and processing to each of the existing geoformation data sources to unify the information for modeling soil thickness; 2) Combined soil thickness values with the constraints in the recently completed statewide surficial materials map (outcrops and shallow bedrock areas), LiDAR data (surface elevation) and other sources to model a continuous soil thickness raster along with a data quality confidence raster using appropriate geostatistical or other methods; and, 3) Used the soil thickness raster along with existing shear wave velocity data to generate a National Earthquake Hazards Reduction Program soil classification map for Massachusetts. The team is currently delivering resource maps in raster format showing the altitude of the top of bedrock and thickness of overburden that can be imported directly into MassDOT's Geographic Information System (GIS) for use in helping plan and design any

highway project in Massachusetts. A 6-month No-Cost Time Extension was approved by FHWA in early September, which extends the project end date from November 31, 2022 to May 31, 2023.

13. Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery (Continuing Project)

This research aims to provide a better understanding of which transit Real Time Travel Information (RTTI) meets the needs of current ridership connecting to transit by vehicle; how RTTI can be used to incentivize off-peak travel; and how RTTI may lead to mode-shifting based on the value propositions of information presented. Semi-structured interviews of selected travelers and broader online surveys are to be carried out in FFY23 to understand traveler's preference for position-specific RTTI and their behavior change. A no-cost time request is expected to accommodate the delays caused by the MBTA project champion change and the new approach to collect traveler preferences and mode choices.

14. Post-Fire Damage Inspection of Concrete Structures Phase III – Field Verification Phase (Continuing Project)

Built upon efforts of previous phases, this project addresses site conditions through in-situ heat testing of structural elements scheduled for demolition and evaluation of concrete patching materials subjected to high thermal load. This will allow for field results (including moisture content and thermal conductivity) to verify results from the laboratory tests, as well as proof of concept for using the heating set up in field testing. Testing will only be completed on components that are scheduled for demolition or removal and are expected to include both tunnel (wall or panel elements) and bridge components (deck, abutment or pier). In addition, Phase III will also evaluate the performance of concrete patches under extreme fire temperatures and test new materials which are currently proposed as protection methods for future tunnel structures in MassDOT.

15. Measuring Fare Payment Compliance on MBTA Buses and Light Rails (FY23 New Project)

Fare collection is a critical revenue stream for transit agencies, and evasion or underpayment reduces these needed revenues. Most MBTA riders are required to pay fares either on a pre-trip basis or by purchasing a pass, although some riders are eligible to use the system for free. Faregates in MBTA heavy rail stations provide reliable measures of fare non-payment but it is more difficult to

understand who is evading payment and how often on buses and light rail vehicles without direct manual observations. As the MBTA implements new fare and proof of payment policies, it is important to track any changes in fare-evasion over time. This project has two objectives: 1) use existing data from infrequent manual observations and from continuous AFC and APC devices to estimate rates of fare evasion on buses and light rail vehicles, and 2) develop a method to identify when and where manual spot checks of fare payment/evasion behaviors are most valuable.

16. Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes (Continuing Project)

A recently completed MassDOT study investigated both motorist and bicyclist behavior at single-stage bike box locations using field data from Massachusetts, and this project will assess the effectiveness of two-stage turn queue boxes. Results will be compared with the completed study to develop a design and implementation guideline for these two treatments. Data of interest that will be collected from field studies include how bicyclists are using these treatments (e.g., turning maneuvers, use of bike lane upstream) and how drivers behave when encountering these treatments, conflicts between bicycles and cars, as well as design characteristics. Design characteristics of specific bike box and two-stage turn queue box implementations, e.g., dimensions, the existence of green pavement markings vs. plain markings, and their impact on bicyclist and driver behavior and conflicts, will also be studied to inform design guidelines.

17. Developing a Visualization, Sharing and Processing Platform for Large-Scale Highway Asset Point Cloud Data (FY23 New Project)

MassDOT initiated procurement of a Mobile LiDAR unit this year. Due to the large size and the complex format, the utilization of the data has been burdened with expensive hardware, proprietary software, extensive training, and inflexible workflow. The point cloud data is only beneficial if MassDOT has the means to extract, process, access and visualize the information. There is a great need for a convenient platform that can maximize the utilization of the valuable point cloud data. The objectives of this study include 1) to develop a convenient data platform to enable visualization, sharing and processing of large-scale point cloud dataset; 2) to integrate the platform with the existing data sources and analysis tools in MassDOT; and 3) to customize processing pipelines using the platform for several

MassDOT's critical highway applications and demonstrate the feasibility and benefits of the platform.

Accomplishments in prior year:

- Completed the "A Method for Pavement Marking Inventory and Retroreflectivity Condition Assessment Using Mobile LiDAR " project.
- Completed the "Feasibility of the 3D Printing Application for Highway Infrastructure Construction and Maintenance" project.
- Completed the "Impact of Advanced Driver Assistance Systems (ADAS) on Road Safety and Implications for Education, Licensing, Registration and Enforcement" project.
- Completed the "Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase II" project. Final report was posted on Research website and submitted to TRID and the National Transportation Library.
- Completed the "UAS Network for Surface Transportation Emergency Response" project.
- Completed the "Detecting Subsurface Voids Using UAS with Infrared Thermal Imaging" project.
- Advanced the "Measuring Accessibility to Improve Public Health" project. 65% completed.
- Advanced the "Developing Massachusetts Specific Trip Generation Rates for Land Use Projects" project. 65% completed.
- Advanced the "Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection" project. 65% completed.
- Advanced the "Post-Fire Damage Inspection of Concrete Structures in Tunnels Phase II" project. 40% completed.
- Advanced the "Massachusetts Depth to Bedrock Project" project. 85% completed.
- Advanced the "Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery" project. 45% completed.
- Scoped, contracted, and started the "Using Grip Sensors to Control a Salt Spreader Application Rate" project. 8% completed.
- Scoped, contracted, and started the "Smart work zone control and performance evaluation based on trajectory data" project. 10% completed.

- Scoped, contracted, and started the “Post-Fire Damage Inspection of Concrete Structures Phase III Field Verification Phase” project. 5% completed.
- Scoped, contracted, and started the “Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes” project.
- Solicited and selected FFY23 medium-term research projects.

Proposed activities for next year:

- Identify PIs, develop amplified work plans, and establish ISAs and contracts for FFY23 new medium-term research projects.
- Complete the “Measuring Accessibility to Improve Public Health" project.
- Complete the "Developing Massachusetts Specific Trip Generation Rates for Land Use Projects" project.
- Complete the "Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection" project.
- Complete the "Post-Fire Damage Inspection of Concrete Structures in Tunnels Phase II" project.
- Complete the "Massachusetts Depth to Bedrock Project" project.
- Complete the “Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery” project.
- Complete the “Smart work zone control and performance evaluation based on trajectory data” project.
- Advance the “Using Grip Sensors to Control a Salt Spreader Application Rate” project to 50% completion.
- Advance the “Post-Fire Damage Inspection of Concrete Structures Phase III Field Verification Phase” project to 65% completion.
- Advance the “Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes” project to 50% completion.
- Scope, contract, and kick off all seven FFY23 new medium-term research projects.
- Solicitate and identify the list of FFY24 medium-term research projects.

Anticipated products:

- Contracts/ISAs for FFY23 medium-term projects.
- Initiation of FFY 23 medium-term projects.
- Interim deliverables and final reports for medium-term research projects that are scheduled to be completed in FFY23.

- Identification of FFY24 medium-term research projects.

Estimated task completion: 09-30-2023

Timeline for new consultant support: 1. Measuring Accessibility to Improve Public Health (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 02-08-2021
Contract negotiations and FHWA review/approval: 03-23-2021
Consultant Notice to Proceed: 03-29-2021
Total duration of task: 21 months

Timeline for new consultant support: 2. Energy-Focused Decision-making Framework for MBTA Operations and Planning (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 12-31-2022
Contract negotiations and FHWA review/approval: 02-28-2023
Consultant Notice to Proceed: 02-28-2023
Total duration of task: 18 months

Timeline for new consultant support: 3. Accessible Bus Stop Design in the Presence of Bike Lanes (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 12-31-2022
Contract negotiations and FHWA review/approval: 02-28-2023
Consultant Notice to Proceed: 02-28-2023
Total duration of task: 18 months

Timeline for new consultant support: 4. Developing a Salt Spreader Control Program based on Grip (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 03-28-2022
Contract negotiations and FHWA review/approval: 04-15-2022
Consultant Notice to Proceed: 04-25-2022
Total duration of task: 24 months

Timeline for new consultant support: 5. Cross-Modal Impact Assessment for Sustainable Transportation Networks (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 18 months

Timeline for new consultant support: 6. Speed Management and Emergency Personnel (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 21 months

Timeline for new consultant support: 7. LIMMS Gap Analysis and Development Plan (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 18 months

Timeline for new consultant support: 8. Smart Work Zone Control and Performance Evaluation Based on Trajectory Data (Continuing Project)

Consultant name: UMass Lowell
Scope development and FHWA review/approval: 02-08-2022
Contract negotiations and FHWA review/approval: 03-15-2022
Consultant Notice to Proceed: 04-12-2022
Total duration of task: 18 months

Timeline for new consultant support: 9. Developing Massachusetts Specific Trip Generation Rates for Land Use Projects (Continuing Project)

Consultant name: UMass Lowell

Scope development and FHWA review/approval: 01-29-2021
Contract negotiations and FHWA review/approval: 03-11-2021
Consultant Notice to Proceed: 03-26-2021
Total duration of task: 19 months

Timeline for new consultant support: 10. Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection (Continuing Project)

Consultant name: UMass Lowell
Scope development and FHWA review/approval: 01-21-2021
Contract negotiations and FHWA review/approval: 03-31-2021
Consultant Notice to Proceed: 04-01-2021
Total duration of task: 18 months

Timeline for new consultant support: 11. Post-fire Damage Inspection of Concrete Structures Phase II (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 03-18-2021
Contract negotiations and FHWA review/approval: 04-19-2021
Consultant Notice to Proceed: 05-01-2021
Total duration of task: 22 months

Timeline for new consultant support: 12. Massachusetts Depth to Bedrock Project (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 01-21-2021
Contract negotiations and FHWA review/approval: 02-18-2021
Consultant Notice to Proceed: 03-24-2021
Total duration of task: 21 months

Timeline for new consultant support: 13. Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 03-23-2021
Contract negotiations and FHWA review/approval: 05-14-2021
Consultant Notice to Proceed: 05-24-2021
Total duration of task: 18 months

Timeline for new consultant support: 14. Post-Fire Damage Inspection of Concrete Structures Phase III – Field Verification Phase (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 04-03-2022
Contract negotiations and FHWA review/approval: 04-15-2022
Consultant Notice to Proceed: 04-25-2022
Total duration of task: 22 months

Timeline for new consultant support: 15. Measuring Fare Payment Compliance on MBTA Buses and Light Rails (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 21 months

Timeline for new consultant support: 16. Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 06-02-2022
Contract negotiations and FHWA review/approval: 08-01-2022
Consultant Notice to Proceed: 08-31-2022
Total duration of task: 21 months

Timeline for new consultant support: 17. Developing a Visualization, Sharing and Processing Platform for Large-Scale Highway Asset Point Cloud Data (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 12-31-2022
Contract negotiations and FHWA review/approval: 01-31-2023
Consultant Notice to Proceed: 02-15-2023
Total duration of task: 21 months

Estimated task budget: $1,313,839.12

Staff salaries and benefits: $95,067.12

MassDOT staff members	% Time to task
Nicholas Zavolas	25.0
Patrick McMahon	25.0
Michael Flanary	20.0
Drew Pflaumer	15.0
Hongyan Oliver	10.0

Consultant costs: $1,218,772.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
1. Measuring Accessibility to Improve Public Health (Continuing Project) / 114069	$149,999.00	$127,724.00	$22,275.00	$0.00	UMass Amherst	03-29-2021	21	01-31-2023
2. Energy-Focused Decision-making Framework for MBTA Operations and Planning / TBD	$125,000.00	$0.00	$60,000.00	$65,000.00	TBD	02-28-2023	18	N/A
3. Accessible Bus Stop Design in the Presence of Bike Lanes / TBD	$200,000.00	$0.00	$100,000.00	$100,000.00	TBD	02-28-2023	18	N/A
4. Developing a Salt Spreader Control Program based on Grip / 117740	$125,000.00	$13,000.00	$80,000.00	$32,000.00	UMass Amherst	04-25-2022	24	04-30-2024
5. Cross-Modal Impact Assessment for Sustainable Transportation Networks / TBD	$100,000.00	$0.00	$50,000.00	$50,000.00	TBD	04-30-2023	18	N/A
6. Speed Management and Emergency Personnel / TBD	$300,000.00	$0.00	$100,000.00	$200,000.00	TBD	04-30-2023	21	N/A
7. LIMMS Gap Analysis and Development Plan / TBD	$300,000.00	$0.00	$100,000.00	$200,000.00	TBD	04-30-2023	18	N/A
8. Smart work zone control and performance evaluation based on trajectory data / 117478	$150,000.00	$27,400.00	$122,600.00	$0.00	UMass Lowell	04-12-2022	18	09-30-2023
9. Developing Massachusetts Specific Trip Generation Rates for Land Use Projects / 113773	$150,000.00	$88,371.00	$61,629.00	$0.00	UMass Lowell	03-26-2021	19	12-31-2022
10. Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection / 113774	$150,000.00	$84,770.00	$65,230.00	$0.00	UMass Lowell	04-01-2021	18	12-31-2022
11. Post-fire Damage Inspection of Concrete Structures Phase II / 114201	$160,000.00	$153,735.00	$6,265.00	$0.00	UMass Amherst	05-01-2021	22	02-28-2023
12. Massachusetts Depth to Bedrock Project / 113776	$114,675.00	$103,720.00	$10,955.00	$0.00	UMass Amherst	03-24-2021	21	11-30-2022

13. Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery / 114217	$124,999.00	$86,181.00	$38,818.00	$0.00	UMass Amherst	05-24-2021	18	01-21-2023
14. Post-Fire Damage Inspection of Concrete Structures Phase III – Field Verification Phase / 117741	$180,000.00	$17,000.00	$138,000.00	$25,000.00	UMass Amherst	04-25-2022	22	02-28-2024
15. Measuring Fare Payment Compliance on MBTA Buses and Light Rails / TBD	$150,000.00	$0.00	$50,000.00	$100,000.00	TBD	04-30-2023	21	None
16. Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes / 118671	$149,778.00	$4,000.00	$138,000.00	$7,778.00	UMass Amherst	08-31-2022	21	12-31-2023
17. Developing a Visualization, Sharing and Processing Platform for Large-Scale Highway Asset Point Cloud Data / TBD	$175,000.00	$0.00	$75,000.00	$100,000.00	TBD	02-15-2023	21	N/A

Consultant notes: 10. Expecting a 4-month NCTE to be approved. 12. Expecting a 6-month NCTE to be approved.

Other costs:

G. Long-term Research Projects

Task Lead: Michael Flanary

Task Purpose: To perform the studies contained within this task, MassDOT contracts directly with universities, research institutes and/or private companies. The anticipated duration of active investigation and report writing efforts for short-term, medium-term and long-term projects are, respectively: less than 15 months, 15-21 months, and longer than 21 months (including 3 months of final report review, approval and 508 compliance). There may be occasion when a project's actual duration doesn't align with the anticipated duration due to challenges arising during research investigation and beyond the project team's control. Under such circumstances, additional time may be granted pending FHWA's approval, and the project shall remain within the original category for fiscal tracking purpose. The Research Section conducts annual research problem statement (RPS) solicitations to collect research needs from agency staff. The submitted problem statements are then prioritized based on MassDOT Division/Shared-Service Office Senior Leaders' rankings, MassDOT overall priorities, and research funding eligibility and availability. The Research Section assists MassDOT project champions with literature searches; the drafting of scopes of work; identification and selection of principal investigators, and the administration of project agreements/contracts, deliverables, final report reviews and publication, and coordination with FHWA.

Subtasks:

1. Ultra-High-Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties (Continuing Project)

The study is to develop a novel UHPC reinforced with Multi-Scale Hybrid Fibers (MSHF) and nano-scale additives with enhancements in both early-age properties and long-term performance such as high early-age strength, low volume change, low permeability and extended service life in the presence of environmental threats in Massachusetts. The project will also develop a comprehensive understanding of the roles of MSHF, additives, and cement chemistry in improving durability-related properties of UHPC. The project team purchased an appropriate mixer for fiber-reinforced concrete and performed analysis of fiber properties for several materials, lengths, and diameters, finalized mixture component analysis and mixture design, and developed a toolbox for modified Andersen and Andersen model and least square fitting. Instruments for mechanical and physical property

testing have been calibrated and prepared for use. Initial castings have been performed with property testing and further mixture refinement to occur shortly.

2. Complete Street and Urban Trees (Continuing Project)

Focusing on soil impacts and root systems, the research will bring a much-needed arboricultural perspective to early project development, as well as design and construction, when it can most effectively anticipate, minimize, and mitigate impacts to trees, at the same time identifying strategies for both restoration and enhancement of the urban forest. This research includes a multifaceted approach to surveying the state of the practice, including: a literature search of related professional journals; input from a cross-disciplinary panel of experts; an on-line survey of practicing professionals responsible for the health of urban forests at select DOTs and cities. These information resources will yield guidance documentation for preliminary corridor tree-health evaluation and general impact analysis for engineers, planners, and landscape architects, as well as consulting arborists. Research will also provide guidance for soil area planting requirements for new trees, as well as best management practices for soil protection during construction.

3. Recycled Ground-Glass Pozzolan (RGGP) for Use in Cement Concrete (FY23 New Project)

Cement concrete is the most critical building material used in the construction of our infrastructure. However, hydraulic cement, the key ingredient of cement concrete, produces an immense amount of heat and carbon dioxide during the manufacturing process. Recycled ground-glass pozzolan (RGGP) is a new type of material that has the potential to greatly reduce the amount of hydraulic cement (up to 50% reduction) needed in the mix design formulation. Additionally, other hydraulic cement replacement materials used in today's cement concrete, such as fly ash and slag, are becoming more and more scarce, resulting in a problematic supply crunch and increases in cost. The objectives of this research project include validation of the efficacy of RGGP and development of new mix design formulations with RGGP, which will lead to decreasing our carbon footprint, while increasing the quality and long-term durability of cement concrete used in MassDOT projects.

4. Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams (Continuing Project)

The project is to develop an approach to determine a safe working capacity realistically and reliably for existing precast, prestressed concrete bridges which exhibit deterioration to avoid unnecessary bridge closures while also keeping the public safe. This project is being carried out through a combination of computer model simulations and full-scale testing of actual deteriorated beams in the laboratory. Extensive literature review and inspection report synthesis have been completed. The project team developed and calibrated computer models and prepared lab setup and equipment for beam testing. Six 40'-long concrete beams from MassDOT bridge demolition projects were delivered to the lab in August. These beams are much longer than what had been anticipated during scoping. As a result, a professional crane truck service must be hired to move the beams in and out of the lab facility at UMass and allow the project team to proceed with beam testing. Consequently, a request for $20K cost increase is anticipated for the necessary crane truck service. This cost increase can be accommodated within Task G's overall budget.

5. Field Study to Determine Salt Usage Efficiency on Two Pavement Types (Continuing Project)

Winter maintenance activities are a high priority to MassDOT in order to ensure its roadways are safe for the motoring public during winter events. MassDOT is concerned that certain pavement surface types may have been over-treated during winter maintenance. As such, there is a need to collect and analyze field data to understand if the current treatment applications and frequencies are correct, deficient or excessive. Through field study, the project will quantify the minimum safe level of salt application for typical pavement surface types and compare the results to the current application rates and frequency. The study will also investigate both safety and environmental aspects of the current salt treatment rate and those of the determined efficient rate.

6. Evaluating Driver Education Modules on Safety (FY23 New Project)

This project intends to conduct a comprehensive examination of the contents of current Massachusetts driver's education modules and their delivery methods to determine which, if any, modules of the program positively influence novice driver behavior and improve roadway safety. Additionally, there are numerous new technologies affecting drivers, such as advanced driving assistance systems, that are not yet covered under any drivers' education modules. The project will yield data and an associated report detailing the effectiveness of drivers' education on

improving safety and reducing drivers' citations, guidelines/standards for driver's education components, and delivery methods. that lead to optimal effectiveness. It will also provide guidance on the creation and implementation of new modules covering emerging technologies affecting drivers.

7. Optimization of MassDOT's High Performance Thin Lift Mixtures (Continuing Project)

This project aims to 1) evaluate the three types of high-performance thin pavement lift mixture specifications and performance characteristics as they currently stand; 2) test the current MassDOT mixes and benchmark their performance and construction costs and determining if it is possible to optimize materials or design parameters to improve on the current specifications; and 3) perform a life cycle cost analysis for the optimized mixture types. Extensive literature review has been completed and extensive lab testing of different overlay mixtures are being conducted during FFY22.

8. Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends (Continuing Project)

Through recently completed research, MassDOT has developed new improved procedures to accurately describe the remaining load carrying capacity of deteriorated steel beams and has also explored using LiDAR scanning technology for acquiring crucial data for load rating in the lab environment. This project employs the LiDAR scanner for a field verification of the methodology. This will produce field results reflecting challenges faced by bridge inspectors in the field, a comparison with lab results from Phase II, and verification of using the 3D scanning technology for bridge inspection in reality. More specifically, the study will collect data using the LiDAR in the field, develop appropriate methods to process the data (filter noise, scale the problem) and use the output to provide important information for the estimation of the residual capacity.

9. Measuring Accessibility to Improve Public Health Phase II (FY23 New Project)

Efforts have been made to quantify the access that communities across Massachusetts have to opportunities like jobs, food, healthcare, and education. The first phase accounted for different modes but did not consider the built environment and transportation infrastructure's impact on accessibility. This research expands on current work on the measurement of accessibility to focus on

the data and metrics needed to adequately account for access by bicycling, walking, microtransit, and ridesource/ridesharing services. This research has two objectives: 1) develop measures of accessibility for alternative modes of transportation that account for relevant characteristics of infrastructure, built environment, and hours and area of service, and 2) identify gaps and inequities in accessibility that can be addressed by improving transportation access.

10. 3D-Printed Lattice-based Structures for Next Gen Bridge Bearings (FY23 New Project)

Bridge bearings are installed between the bridge substructure and the superstructure to transfer loads and allow controlled translations to reduce stresses in the structure. Recent progress in 3D printing applications through the MassDOT research program examined promising customizable designs for typical bridge and isolation bearings. This project will develop a prototype architected bearing system and manufacture and test the 3D printing bearing systems and will involve the design of architected lattices which will serve as the reinforcement of the rubber elastomer intended to replace the undesirable lead core in the traditional isolation bearings. The main research efforts including the manufacturing of the prototype and testing of the composite bearings for a variety of loading conditions.

11. A Method for Pavement Marking Inventory and Retroreflectivity Condition Assessment Using Mobile Lidar (Phase II) (FY23 New Project)

FHWA's minimum pavement marking retroreflectivity level requirement in the forthcoming MUTCD creates a pressing need for MassDOT to implement an effective and efficient means for pavement marking inventory and retroreflectivity assessments. Phase 1 of this project successfully developed an automated methodology for identifying pavement marking, evaluating retroreflectivity condition and surface condition. The objective of Phase 2 of this project is twofold: 1) to continue monitoring the existing testing sections and include more sections with waterborne and preformed tape, and to investigate the effects of wet marking, recessed marking and skip sections on the retroreflectivity. 2) to investigate the feasibility of using a LiDAR-based methodology for the QA/QC processes of newly installed pavement markings.

12. Effect of Asphalt Binder Source in Asphalt Mixture Performance (FY23 New Project)

There is a need to understand how asphalt binder source affects the asphalt mixture's overall performance between laboratory and paving settings. The research will investigate how binder source affects mixture performance by determining properties with significant variation; determining the mixture changes that significantly affect performance; analyzing the lifecycle cost based on binder properties; establishing specifications for allowable tolerances; and providing guidance on updating MassDOT pavement specifications to include new testing protocols.

Accomplishments in prior year:

- Completed the "Asset Management Systems at Municipalities " project.
- Completed the " Development of Comprehensive Inspection Protocols for Deteriorated Steel Beam End" project.
- Advanced the "Ultra-High-Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties" project to 40% completion.
- Advanced the "Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams" project to 55% completion.
- Advanced the "Optimization of MassDOT's High Performance Thin Lift Mixtures" project to 41% completion.
- Scoped, contracted, and kicked off the "Complete Streets v.2: Respecting the Roots" project. 15% completed.
- Scoped and contracted the "Field Study to Determine Salt Usage Efficiency on Two Pavement Types" project. Project will be kicked off at the beginning of FFY23 Q1.
- Scoped, contracted, and kicked off the "Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends" project. 10% completed.
- Solicited and selected FFY23 long-term research projects.

Proposed activities for next year:

- Complete the "Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams" project.
- Complete the "Optimization of MassDOT's High Performance Thin Lift Mixtures" project.

- Advance the "Ultra-High-Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties" project to 90% completion.
- Advance the “Complete Streets v.2: Respecting the Roots” project to 40% completion.
- Advance the “Field Study to Determine Salt Usage Efficiency on Two Pavement Types” project to 40% completion.
- Advance “Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends” project to 60% completion.
- Scope, contract, and kick off all seven FFY23 new long-term research projects.
- Solicit and Identify FFY24 long-term research projects.

Anticipated products:

- Contracts/ISAs for FFY23 long-term projects.
- Initiation of FFY23 long-term projects.
- Interim deliverables and final reports for long-term research projects that are scheduled to be completed during FFY23.
- Identification of FFY24 long-term projects.

Estimated task completion: 09-30-2023

Timeline for new consultant support: 1. Ultra-High-Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties (Continuing Project)

Consultant name: UMass Dartmouth
Scope development and FHWA review/approval: 06-29-2021
Contract negotiations and FHWA review/approval: 07-30-2021
Consultant Notice to Proceed: 08-05-2021
Total duration of task: 27 months

Timeline for new consultant support: 2. Complete Street and Urban Trees (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 02-25-2022
Contract negotiations and FHWA review/approval: 03-22-2022
Consultant Notice to Proceed: 04-01-2023

Total duration of task: 29 months

Timeline for new consultant support: 3. Recycled Ground-Glass Pozzolan (RGGP) for Use in Cement Concrete (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 04-30-2023
Consultant Notice to Proceed: 05-31-2022
Total duration of task: 22 months

Timeline for new consultant support: 4. Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 02-17-2021
Contract negotiations and FHWA review/approval: 04-15-2021
Consultant Notice to Proceed: 04-27-2021
Total duration of task: 29 months

Timeline for new consultant support: 5. Field Study to Determine Salt Usage Efficiency on Two Pavement Types (Continuing Project)

Consultant name: UMass Dartmouth
Scope development and FHWA review/approval: 08-02-2022
Contract negotiations and FHWA review/approval: 09-15-2022
Consultant Notice to Proceed: 09-30-2022
Total duration of task: 36 months

Timeline for new consultant support: 6. Evaluating Driver Education Modules on Safety (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 24 months

Timeline for new consultant support: 7. Optimization of MassDOT's High Performance Thin Lift Mixtures (Continuing Project)

Consultant name: UMass Dartmouth
Scope development and FHWA review/approval: 04-27-2021
Contract negotiations and FHWA review/approval: 06-10-2021
Consultant Notice to Proceed: 07-01-2021
Total duration of task: 27 months

Timeline for new consultant support: 8. Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends (Continuing Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 02-04-2022
Contract negotiations and FHWA review/approval: 03-08-2022
Consultant Notice to Proceed: 03-21-2022
Total duration of task: 24 months

Timeline for new consultant support: 9. Measuring Accessibility to Improve Public Health Phase II (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 24 months

Timeline for new consultant support: 10. 3D-Printed Lattice-based Structures for Next Gen Bridge Bearings (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 12-31-2022
Contract negotiations and FHWA review/approval: 03-31-2023
Consultant Notice to Proceed: 04-30-2023
Total duration of task: 24 months

Timeline for new consultant support: 11. A Method for Pavement Marking Inventory and Retroreflectivity Condition Assessment Using Mobile Lidar (Phase II) (FY23 New Project)

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 12-31-2022
Contract negotiations and FHWA review/approval: 01-31-2023
Consultant Notice to Proceed: 02-28-2023
Total duration of task: 24 months

Timeline for new consultant support: 12. Effect of Asphalt Binder Source in Asphalt Mixture Performance (FY23 New Project)

Consultant name: TBD
Scope development and FHWA review/approval: 01-31-2023
Contract negotiations and FHWA review/approval: 04-30-2023
Consultant Notice to Proceed: 05-31-2023
Total duration of task: 24 months

Estimated task budget: $1,590,433.12

Staff salaries and benefits: $95,067.12

MassDOT staff members	% Time to task
Patrick McMahon	25.0
Nicholas Zavolas	25.0
Michael Flanary	20.0
Drew Pflaumer	15.0
Hongyan Oliver	10.0

Consultant costs: $1,495,366.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant /Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
1. Ultra-High-Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties / 115287	$197,402.00	$23,162.00	$166,828.00	$7,412.00	UMass Dartmouth	08-05-2021	27	10-30-2023
2. Complete Street and Urban Trees / 117524	$89,897.00	$12,029.00	$72,868.00	$5,000.00	UMass Amherst	04-01-2022	29	08-31-2024
3. Reccycled Ground-Glass Pozzolan (RGGP) for Use in Cement Concrete / TBD	$250,000.00	$0.00	$100,000.00	$150,000.00	TBD	05-31-2023	22	N/A
4. Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams / 114071	$199,995.00	$97,285.00	$102,670.00	$0.00	UMass Amherst	04-27-2021	29	08-31-2023
5. Field Study to Determine Salt Usage Efficiency on Two Pavement Types / 119069	$450,000.00	$0.00	$250,000.00	$200,000.00	UMass Dartmouth	09-30-2022	36	9-30-2025
6. Evaluating Driver Education Modules on Safety / TBD	$370,000.00	$0.00	$150,000.00	$220,000.00	TBD	04-30-2023	24	N/A
7. Optimization of MassDOT's High Performance Thin Lift Mixtures / 114557	$249,997.00	$66,000.00	$165,000.00	$18,997.00	UMass Dartmouth	07-01-2021	27	03-31-2022
8. Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends / 117416	$199,998.00	$44,771.00	$98,000.00	$57,227.00	UMass Amherst	03-21-2022	24	03-31-2024
9. Measuring Accessibility to Improve Public Health Phase II / TBD	$200,000.00	$0.00	$80,000.00	$12,000.00	TBD	04-30-2023	24	N/A
10. 3D-Printed Lattice-based Structures for Next Gen Bridge Bearings / TBD	$200,000.00	$0.00	$80,000.00	$120,000.00	TBD	04-30-2023	24	N/A
11. A Method for Pavement Marking Inventory and Retroreflectivity Condition Assessment Using Mobile Lidar (Phase II) / TBD	$200,000.00	$0.00	$80,000.00	$12,000.00	UMass Amherst	02-28-2023	24	N/A
12. Effect of Asphalt Binder Source in Asphalt Mixture Performance / TBD	$400,000.00	$0.00	$150,000.00	$250,000.00	TBD	05-31-2023	24	N/A

Consultant notes:

Other costs:

H. National RD&T2 Collaboration

Task Lead: Hongyan Oliver

Task Purpose: To coordinate MassDOT's participation in national and regional transportation research activities, including the research committees, research statement submission and reviews, project panels, technical working groups, and task forces; to disseminate MassDOT's research efforts, products, program management and delivery approaches both nationally and regionally; and to distribute research results and activities of Transportation Research Board (TRB), American Association of State Highway and Transportation Officials (AASHTO) and other state DOTs within MassDOT.

Accomplishments in prior year:

- Hosted the 2022 AASHTO Research Advisory Committee Annual Meeting.
- Coordinated within MassDOT Highway Division to establish participation in transportation pooled fund (TPF) projects funded through SPRII.
- Participated in and contributed to AASHTO RAC activities.
- Coordinated the TRB National Cooperative Highway Research Program (NCHRP) problem statement review process.
- Disseminated TRB research reports, technical webinars and NCHRP project panel member solicitations to appropriate MassDOT staff.
- Participated in and contributed to New England Transportation Consortium (NETC) program management and technical activities.
- Participated in and contributed to AASHTO's RAC Regional 1 activities including preparation activities for the RAC 2021 summer meeting.
- Applied for and received AASHTO RAC Committee High Value Research Project Award.
- Updated MassDOT research projects in the TRB Research-In-Progress database.
- Disseminated MassDOT research reports through the TRB E-Newsletter.
- Participated in FHWA’s 2022 State Innovation Forum.
- Participated in MnDOT’s Research Peer Exchange.

Proposed activities for next year:

- Coordinate within MassDOT to establish participation in pooled fund programs, and support AASHTO RAC activities, NCHRP research statement reviews, NCHRP technical panel participation, and TRB representative's visit.

- Lead and contribute to RAC Region I activities.
- Participate in and contribute to the remaining NETC project activities.
- Participate in the TRB's Northeast state group visit.
- Participate in other State DOTs' Research Peer Exchange when appropriate.

Anticipated products:

- Distribution of research products and information from TRB, TPF and other state DOTs.
- Communication of MassDOT research reports through TRB E-Newsletter.
- Organizing and participation in AASHTO RAC activities.
- Identification of MassDOT's position on problem statements for the annual NCHRP project cycle.
- Coordination of MassDOT subject matter experts' participation in NETC projects.

Estimated task completion: 09-30-2023

Estimated task budget: $1,426,905.93

Staff salaries and benefits: $47,647.93

MassDOT staff members	% Time to task
Patrick McMahon	20.0
Nicholas Zavolas	10.0
Hongyan Oliver	10.0
Drew Pflaumer	5.0

Other costs: $1,379,258.00

Below is a list of Transportation Pooled Fund projects with a total cost of $1,370,258 (eligible for 100% federal funds and thus not included in the SPR financial table but will be included in the FFY23 STIP as its own line item). They are noted here for informational purposes:

- 5(370) Fostering Innovation in Pedestrian and Bicycle Transportation, $25,000
- 5(398) Moving Forward with The Next Generation Travel Behavior Data Collection, $5,000
- 5(422) National Cooperative Highway Research Program, $826,802

- 5(437) Tech Transfer Concrete Consortium, $12,000
- 5(431) Application of Enterprise GIS for Transportation, Guidance or a National Transportation Framework (AEGIST), $100,000 (100% federal fund waiver is for SPRI)
- 5(447) Traffic Control Device (TCD) Consortium, $10,000
- 5(455) National Accessibility Evaluation Phase II, $38,000
- 5(456) Econworks, $4,000 (100% federal fund waiver is for SPRI)
- 5(464) H&H software updates, $10,000
- 5(479) Clear Roads Phase III, $25,000
- 5(481) In-Service Performance Evaluation (ISPE) of Roadside Safety Features, $30,000
- 5(482) Development and Evaluation of Roadside Safety Systems for Motorcyclists, $40,000
- 5(TBD) Roadside Safety Research for MASH Implementation Phase III, $65,000
- 5(TBD) TRB Core Support Services $154,456
- Additional requests during FFY 23: $25,000

I. Construction Management Certificate Program (Delivered by MassDOT HR Training)

Task Lead: Claudia Smith-Reid

Task Purpose: To support MassDOT HR Training Program activities that provide oversight and administration of the MassDOT/Wentworth Construction Management Certificate Program (CMCP) for employees of the MassDOT Highway Division.

Subtasks:

Construction Management Certificate Program

Continue implementing the 3-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 $60,000, which covers the delivery of the 7-week curriculum (the module contents had been jointly developed by WIT and MassDOT in FFY18 and approved by FHWA in FFY19). It is anticipated that about thirty (30) MassDOT Highway construction staff will attend the 7-week training program each year. The second annual training to be delivered under this contract will be January - March 2023. No training was conducted in FFY21 due to COVID restrictions; a contract extension is expected to allow the 3rd annual training to be delivered in FFY24.

Accomplishments in prior year:

- Worked with Wentworth Institute on Management Certificate Program in January – March 2022.

Proposed activities for next year:

- Implement the year two of the 3-year partnership agreement with the Wentworth Institute of Technology. Deliver the Construction Management Certification Program to 30 participants representing all Highway districts. The annual expense is $60,000 to pay for the delivery of the previously approved 7-week curriculum.

Anticipated products:

- Administration of the Mass DOT/Wentworth Construction Management Certificate Program

Estimated task completion: 09-30-2023

Timeline for new consultant support: Construction Management Certificate Program

Consultant name: Wentworth
Scope development and FHWA review/approval: 09-30-2020
Contract negotiations and FHWA review/approval: 12-31-2020
Consultant Notice to Proceed: 01-15-2021
Total duration of task: 33 months

Estimated task budget: $60,000.00

Consultant costs: $60,000.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:	Duration of Task (months):	Contract end date:
Construction Management Certificate Program / 113551	$180,000.00	$60,000.00	$60,000.00	$60,000.00	Wenthworth	01-15-2021	33	09-30-2023

Consultant notes: $180,000 for 3 years ($60,000 per year).

Other costs:

J. MassDOT Moving Together and Innovation Conferences

Task Lead: Drew Pflaumer

Task Purpose: 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.

Subtasks:

MassDOT Conferences

Conference supporting efforts and expenses were previously embedded in other UMTC ISA components (mostly LTAP); and are to be separated from those components for FY23-FY25 through the ISA Amendment.

Accomplishments in prior year:

- Delivered the virtual 2021 Moving Together conference.
- Delivered the hybrid 2022 Innovation Conference.

Proposed activities for next year:

- Coordinate in-person and/or virtual delivery of conference content and host the annual conference.
- Explore equitable delivery options for future conferences.
- Support the conference organizing committee by coordinating logistics both for the UMTC conference planning committee as well as those involved on the MassDOT event planning team. UMTC will also support conference planning logistics between any vendors or consultants providing services for the conference.
- Manage initiatives to secure sponsors, vendors, and exhibitors.
- Manage conference content including presenters, moderators and facilitators, abstracts, agenda items, schedule, and accompanying projects including video creation and editing.

- Provide day-of support relating to registration; troubleshooting any issues or concerns; managing flow of the conference; providing support for featured speakers and session speakers.
- Manage temporary conference student workers, including: advertising, interviewing, training, scheduling and day-of coordination.
- Work with MassDOT to provide talking points and press release content as needed.
- Prepare marketing materials prior to and for day-of conference activities including: email marketing campaigns, website information, virtual platform needs (if virtual), agenda, social media messaging, conference app preparation (if using an app), posters, day-of signage, evaluation collection materials, final reports.
- Manage and secure all vendor contracts, billing, invoices, expense reports, payroll and reimbursements

Anticipated products:

- Delivery of 2022 Moving Together Conference.
- Delivery of 2023 Innovation Conference.

Estimated task completion: 09-30-2023

Timeline for new consultant support: MassDOT Conferences

Consultant name: UMass Amherst
Scope development and FHWA review/approval: 08-15-2022
Contract negotiations and FHWA review/approval: 08-31-2022
Consultant Notice to Proceed: 10-01-2022
Total duration of task: 36 months

Estimated task budget: $804,438.36

Staff salaries and benefits: $17,042.36

MassDOT staff members	% Time to task
Drew Pflaumer	10.0
Michael Flanary	5.0
Hongyan Oliver	5.0

Consultant costs: $787,396.00

Subtask / contract #	Total cost:	Pre-FFY 2023:	FFY 2023:	Post-FFY 2023:	Consultant/ Contractor Name:	Consultant NTP:*	Duration of Task (months):	Contract end date:
MassDOT Conferences / 109600	$2,497,959.00	$0.00	$787,396.00	$1,717,563.00	UMass Amherst	10-01-2022	36	09-30-2025

Consultant notes: This Task is to be separated from other UMTC services through the ISA Amendment for FFY23-25. Thus, the duration is 36 months. The total cost includes only the total amount for the period of FFY23-25.

* Anticipated NTP date for the ISA Amendment.

Other costs:

K. Activities with non-Federal-Match Waivers -- AASHTO TSP

Task Lead: Maria Ramirez

Task Purpose: This task allows MassDOT to subscribe to a list of AASHTO Technical Services Programs which are approved for SPRII non-federal match waivers. 100% federal funds will be used to pay for these services.

Accomplishments in prior year:

Coordinated with Highway Division on programs to subscribe for FFY23.

Proposed activities for next year:

Acquire needed subscription services.

Anticipated products:

AASHTO TSP invoices are paid.

Estimated task completion: 09-30-2023

Estimated task budget: $190,000.00

Other costs: $190,000.00

In FFY23, MassDOT intends to participate in the following AASHTO TSP programs with a total cost of $190,000; and they are eligible for 100% federal share for SPR funds per FHWA guidance:

- AASHTO Innovation Initiative (A.I.I.), $6,000
- Development of AASHTO Materials Standards (DAMS), $10,000
- Design Publication Maintenance Technical Service Program (DPM), $15,000
- Environment Technical Assistance Program (ETAP), $10.000
- Equipment Management Technical Service Program (EMTSP), $5,000
- Highway Safety Policy and Management Technical Service Program (SAFETY), $10,000
- Load and Resistance Factor Design (LRFD) Bridges and Structures Specifications (LRFDSM), $15,000
- Manual for Assessing Safety Hardware (MASH) Technical Support, $10,000

- National Transportation Product Evaluation Program (NTPEP), $25,000
- National Operations Center of Excellence Technical Service Program (NOCoE), $15,000
- Resilient and Sustainable Transportation Systems Technical Assistance Program (RSTS), $10,000
- Snow and Ice Cooperative Program (SICOP), $4,000
- Transportation Curriculum Coordination Council (TC3), $20,000
- Transportation Performance Management Technical Service Program (TPM), $15,000
- Transportation System Preservation Technical Service Program (TSP2), $20,000

SPR II Financial Table

Task	PARS #	Staff cost	Consultant cost	Other cost	Total task cost
A. Research Program Development, Administration, and Implementation	**TBD**	**$ 98,278**	**$ -**	**$ -**	**$ 98,278**
B. Massachusetts Cooperative Research Program (MCRP)	**TBD**	**$ 53,656**	**$ 928,537**	**$ -**	**$ 982,193**
C. Local Technical Assistance Program (LTAP)	**TBD**	**$ 14,699**	**$ 1,202,853**	**$ -**	**$ 1,217,552**
D. MassDOT Training Services	**TBD**	**$ 14,699**	**$ 1,660,382**	**$ -**	**$ 1,675,081**
E. Short-Term Research Projects	**TBD**	**$ 55,235**	**$ 733,982**	**$ -**	**$ 789,217**
1. Implementing the AASHTO Mechanistic-Empirical Pavement Design Guide Phase III (Continuing Project)			*$ 241,352*		
2. Methods to Identify Problematic Carriers and Prevent Infrastructure Damage (Continuing Project)			*$ 107,000*		
3. Feasibility Study of 3D Printing Applications for Bridge Elements in MA (Continuing Project)			*$ 139,000*		
4. Data-Driven Approach for Transit Capital Planning (Continuing Project)			*$ 80,000*		
5. BIM for Transit Infrastructure: A Feasibility and gap assessment with current practices and systems at the MBTA (Continuing Project)			*$ 60,122*		
6. Using Traffic Signals to Limit Speeding Opportunities on Arterial Roads (Continuing Project)			*$ 60,000*		
7. Uncovering the Root Causes for Truck Rollover Crashes on Ramps (Continuing Project)			*$ 36,508*		
8. Synthesis study: Mycofiltration Treatment and Design Options (Continuing Project)			*$ 10,000*		
F. Medium-Term Research Projects	**TBD**	**$ 95,067**	**$ 1,218,772**	**$ -**	**$ 1,313,839**
1. Measuring Accessibility to Improve Public Health (Continuing Project)			*$ 22,275*		
2. Energy-Focused Decision-making Framework for MBTA Operations and Planning (FFY23 New Project)			*$ 60,000*		
3. Accessible Bus Stop Design in the Presence of Bike Lanes (FFY23 New Project)			*$ 100,000*		

4. Developing a Salt Spreader Control Program based on Grip (Continuing Project)			*$ 80,000*		
5. Cross-Modal Impact Assessment for Sustainable Transportation Networks (FFY23 New Project)			*$ 50,000*		
6. Speed Management and Emergency Personnel (FFY23 New Project)			*$ 100,000*		
7. LIMMS Gap Analysis and Development Plan (New Project)			*$ 100,000*		
8. Smart work zone control and performance evaluation based on trajectory data (Continuing Project)			*$ 122,600*		
9. Developing Massachusetts Specific Trip Generation Rates for Land Use Projects (Continuing Project)			*$ 61,629*		
10. Multisource Data Fusion for Real-Time and Accurate Traffic Incident Detection (Continuing Project)			*$ 65,230*		
11. Post-Fire Damage Inspection of Concrete Structures in Tunnels Phase II (Continuing Project)			*$ 6,265*		
12.Massachusetts Depth to Bedrock Project (Continuing Project)			*$ 10,955*		
13.Outdoor Information Panels to Convey Real-Time Travel Information for Ridership Recovery (Continuing Project)			*$ 38,818*		
14. Post-Fire Damage Inspection of Concrete Structures Phase III Field Verification Phase (Continuing Project)			*$ 138,000*		
15. Measuring Fare Payment Compliance on MBTA Buses and Light Rails (FFY23 New Project)			*$ 50,000*		
16.Effectiveness of Two-stage Turn Queue Boxes in Massachusetts: A Comparison with Bike Boxes (Continuing Project)			*$ 138,000*		
17. Developing a Visualization, Sharing and Processing Platform for Large-Scale Highway Asset Point Cloud Data (FFY23 New Project)			*$ 75,000*		
G. Long-Term Research Projects	**TBD**	**$ 95,067**	**$ 1,495,366**	**$ -**	**$ 1,590,433**
1. Ultra-High Performance Concrete Reinforced with Multi-Scale Hybrid Fibers and Its Durability-Related Properties (Continuing Project)			*$ 166,828*		

2. Complete Street and Urban Trees (Continuing Project)			*$ 72,868*		
3. Recycled Ground-Glass Pozzolan (RGGP) for Use in Cement Concrete (FFY23 New Project)			*$ 100,000*		
4. Revised Load Rating Procedures for Deteriorated Prestressed Concrete Beams (Continuing Project)			*$ 102,670*		
5. Field Study to Determine Salt Usage Efficiency on Two Pavement Types (Continuing Project)			*$ 250,000*		
6. Evaluating Driver Education Modules on Safety (FFY23 New Project)			*$ 150,000*		
7. Optimization of MassDOT's High Performance Thin Lift Mixtures (Continuing Project)			*$ 165,000*		
8. Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends (Continuing Project)			*$ 98,000*		
9. Measuring Accessibility to Improve Public Health Phase II (FFY23 New Project)			*$ 80,000*		
10. 3D-Printed Lattice-based Structures for Next Gen Bridge Bearings (FFY23 New Project)			*$ 80,000*		
11. A Method for Pavement Marking Inventory and Retroreflectivity Condition Assessment Using Mobile Lidar (Phase II) (FFY23 New Project)			*$ 80,000*		
12. Effect of Asphalt Binder Source in Asphalt Mixture Performance (FFY23 New Project)			*$ 150,000*		
H. National RD&T2 Collaboration	**TBD**	**$ 47,648**	**$ -**	**$ 1,379,258**	**$ 1,426,906**
I. Construction Management Certificate Program (Delivered by MassDOT HR Training)	**TBD**	**$ -**	**$ 60,000**	**$ -**	**$ 60,000**
J. MassDOT MT and Innovation Conferences	**TBD**	**$ 17,042.36**	**$ 787,396.00**		**$ 804,438.36**
K. Activities with non-Federal-Match Waivers -- AASHTO TSP	**TBD**	**$ -**		**$ 190,000.00**	**$ 190,000.00**

Totals

Task	Staff cost	Consultant cost	Other cost	Total task cost
SPR II Totals	$491,391.29	$8,087,288.00	$1,569,258.00	$10,147,937.29

The SPR II is 25.6% of the overall SPR Work Program, meeting the 25% minimum threshold.