



APPENDIX A

Other Boston Region Transportation Planning Projects

[Under Development]



APPENDIX B

Public Participation and Response to Public Comments

[Under Development]



APPENDIX C

Federal Fiscal Year 2017 UPWP Universe of Proposed New Studies

This appendix includes the Universe of Proposed New Projects, which documents the proposed new discrete studies that the Boston Region Metropolitan Planning Organization (MPO) staff and the Metropolitan Area Planning Council (MAPC) staff collected or developed for the development of the federal fiscal year (FFY) 2017 Unified Planning Work Program (UPWP). Each entry includes a summary of the purpose of the proposed study and the anticipated outcomes.

Studies in the universe are organized into the following categories:

- Active Transportation
- Land Use, Environment, and Economy
- Multi-Modal Mobility
- Transit
- Other Technical Support

Within these categories, studies were considered based on origin:

- **Renew:** These studies have been funded in the past, and there is another phase that could be funded and studied.
- **Evolve:** These studies take the findings of a previously conducted study and bring them to the next level by advancing the ideas and recommendations made in the preceding study.
- **Another Chance:** These studies were considered in a previous FFY's Universe list and not chosen for funding. They are being reconsidered to evaluate whether the timing is better to fund them, or whether they can be modified to be more useful for advancing the goals of the MPO region.
- **New:** These are study ideas that have not been considered previously.

Each proposed study in the universe is also evaluated based on the following evaluation areas:

- **Primary and secondary Long-Range Transportation Plan (LRTP) goal areas :** whether a study addresses, either as a primary focus or secondary focus, one of the six LRTP goal areas:
 - o Safety
 - o System Preservation
 - o Clean Air/Clean Communities
 - o Transportation Equity
 - o Capacity Management/Mobility
 - o Economic Vitality

- **Mode:** whether a study primarily addresses roadway, bicycle, pedestrian, or transit modes of travel
- **Study scale:** whether a study primarily impacts one or two specific communities in the region, or the region as a whole
- **Time frame and type of impact:** whether a study results in research and findings that enhance the state of the transportation planning practice in the Boston Region, low-cost/short-term implementation of improvements, or, long-term implementation (for transportation studies leading to implementation by an agency or construction projects that must follow the Massachusetts Department of Transportation design process)
- **Connection to existing work:** whether a study furthers previously conducted analysis, or builds off or enhances existing MPO work
- **Continuing or new study:** whether a study has been conducted previously at a specific location/roadway and is being conducted again at a new location, or whether a study is a completely new idea that has never been undertaken by the MPO.

Evaluating the studies in this way will allow MPO staff to analyze how federal planning funds are being spent in the region over time and to compare the amount of spending across the various evaluation areas. Furthermore, tracking spending by LRTP goal area, mode, study scale, etc., will allow MPO staff, in coordination with the MPO and the public, to set goals for how federal transportation planning funds are spent by the MPO for the benefit of the region.

In addition to evaluating the proposed new studies in the Universe, MPO staff defines general scopes and estimated costs for the proposed studies and considers potential feasibility issues. These various factors, along with the availability of funds for new studies, were considered as staff identified a recommended set of new proposed planning studies for review by the UPWP Committee. For more information on the process of developing and evaluating the Universe, please see Chapter 1.

FFY 2017 Draft Universe and Study Evaluation

ID	Project Name	Estimated Cost	Project Purpose and Outcome	LRTP Goal Areas						Mode			Study Scale		Impact			Other	
				Safety	System Preservation	Clean Air/Clean Communities	Transportation Equity	Capacity Management/Mobility	Economic Vitality	Multi-Modal Roadway	Bicycle Pedestrian	Transit	Specific Community	Broader Region	Enhance State of Practice	Low-Cost/Near-Term Implementation	Long-Term Implementation	Connection to Existing Work	Continuing Study
ACTIVE TRANSPORTATION																			
Renew																			
A-1	Closing Gaps in the Boston Region Bicycle Network	\$55,000	<p>Purpose: This study would build off of the work of the Bicycle Network Gaps: Feasibility Evaluation study, which began by identifying the status of the eleven highest priority gaps that were highlighted in the 2014 Bicycle Network Evaluation. This project would follow up on that study by conducting more detailed feasibility evaluations of up to three identified high-priority gaps. The first phase of this project was conducted during FFY 2015.</p> <p>Anticipated Outcome: One or more memoranda documenting the results of the study and recommendations for selected locations. The identified recommendations could ultimately become projects that are funded by federal, state, local, or other sources.</p>	S		S		P	S			P					P	P	
Evolve																			
A-2	The Impact of a Connected, High Quality Bicycle Network on GHG Emissions and Mode Shift	\$40,000	<p>Purpose: This study comes out of the GHG Reduction Strategies Study completed in 2015. This project would estimate the impact of a connected, high-quality bicycle network on GHG emissions and mode shift, also looking at the safety, equity, mobility, and health benefits.</p> <p>Anticipated Outcome: Currently, the MPO funds bicycle improvements as part of individual projects and shorter segments of off-road bicycle paths. This study would look at bicycle networks in high-density areas at various levels of deployment, ranging from quarter-mile intervals to one-mile intervals in a grid system, which was initially defined in the bicycle improvements strategy from the GHG Reduction Strategies Study. Other variations of a comprehensive bicycle network strategy could be considered in this study as well.</p>	S		P	S	S	S			P		P				P	P
A-3	Bicycle and Pedestrian Crash Clusters Analyses	\$40,000	<p>Purpose: This study would review bicycle and pedestrian crash clusters developed by the MassDOT Highway Division and the Boston Region MPO. Safety projects often focus on vehicle crash locations, so the specific focus on high-crash bicycle and pedestrian locations would make this project unique. Three locations that have not been addressed up to this point in time would be selected for study and development of recommendations for safety and mobility improvements to benefit bicycle and pedestrian travel.</p> <p>Anticipated Outcome: MPO staff would work with the municipalities and other stakeholders to propose cost-effective and low-cost improvements to increase safety for bicyclists and pedestrians at those locations.</p>	P	S	S		S	S			P		P				P	P

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Another Chance																				
A-4	Municipal Pedestrian Network Studies	\$40,000	<p>Purpose: Through this project, MPO staff would provide support to several municipalities in the MPO region that are interested in exploring opportunities to improve their community-wide pedestrian network.</p> <p>Anticipated Outcome: Using municipal inventories of sidewalks and other data resources, MPO staff would work with communities to conduct an assessment of existing pedestrian transportation connections, including sidewalks, paths, and crosswalks, and would identify opportunities to improve these connections. These analyses would be coordinated with work done by the MAPC, MassRIDES (through the Massachusetts Safe Routes to School Program), and other stakeholders, when appropriate. The results of these assessments and recommendations could be used to support community-level Complete Streets improvement programs and projects, which could be funded with federal, state, local, or other funding.</p>	S	S	S		P	S		P		P				P	N		P
New																				
A-5	Low-Cost Tactical Urbanism Projects for Rapid Implementation with Community Engagement	\$55,000	<p>Purpose: This project would assist communities with the planning/design work as well as before and after data collection and analysis for low cost, temporary/interim Complete Streets pilot projects. This project would offer communities additional and new tools related to Complete Streets that are distinct from the state's Complete Streets Program. Specifically, this project would focus on implementing extremely low-cost (in the range of several hundred to one thousand dollars) projects that would be meant to be temporary. These low-cost, temporary projects can showcase improvements such as protected bicycle lanes, green bike lane paint through intersections, and curb extensions created with paint, spray chalk or paint, duct tape, planters, traffic cones, flexible posts, and signs. These pilots can also be integrated with events such as neighborhood festivals to maximize community engagement in addition to traditional community meetings for public outreach.</p> <p>The temporary nature of these projects is an important factor to allow communities to test/pilot Complete Streets approaches in different areas and learn from their implementation. The relatively fast timeline for implementation could allow for increased public involvement and public education of Complete Streets solutions as well as the ability for communities to conduct before and after studies to enhance understanding of how different Complete Streets approaches function and what could be improved for longer-term implementation.</p> <p>This project also has the potential to reach smaller communities without budgets to spend on Complete Streets and without the staff available to plan, design, and implement the projects.</p> <p>Anticipated Outcome: Increased implementation of low-cost Complete Streets pilot projects, increased understanding of the potential benefits of complete streets improvements, and community engagement opportunities facilitated by CTPS. Planning and design reports to accomplish low-cost complete streets projects.</p>	S	S	S	S	P	S		P		P		P			N		P

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A-6	Before and After Studies of Protected and Conventional Bicycle Lanes	\$55,000	<p>Purpose: This study would conduct detailed counts, analyze crash data, and survey people using the street and businesses to compare "before" and "after" conditions and public perceptions of new bicycle lanes. The effect of different types of bicycle lanes upon greenhouse gas emissions can be analyzed as well.</p> <p>Anticipated Outcome: Identify effects of the newly constructed bicycle lanes on bike counts, crashes, and mode split compared to existing conditions and relative to conditions on similar nearby streets that did not receive newly constructed bicycle facilities. Add to our understanding of to what degree the new bicycle facility attracts people who were not previously biking in the area and to what degree it attracts people who were already biking away from their former route to the new facility.</p>	P		S		S			P		P				P		P
A-7	Safety Effectiveness of Safe Routes to School Program	\$80,000	<p>Purpose: This study will investigate the safety and effectiveness of the Safe Routes to School (SRTS) program and the primary factors contributing to a program's effectiveness. Such factors could include such things as the presence of reduced speed school zones or infrastructure improvements, as well as the grade levels of students and the presence of school crossing guards.</p> <p>Anticipated Outcome: Through this study, a task force will be formed to guide the direction of the research. A literature review will be conducted on SRTS programs throughout the Boston region, as well as in other states, to determine the factors that contribute to various SRTS improvements either being encouraged, requiring further study, or being discouraged in specific locations.</p> <p>Schools selected for detailed study will be those that have been participating in the SRTS program and represent a broad range of communities throughout the Boston region (factors considered when choosing schools will include representing a range of grade levels, high- and low- density communities, varied traffic characteristics on surrounding roads, and environmental justice zones, among others). Once the schools are selected, MPO staff will gather data on traffic volumes, pedestrian and bicycle volumes, crashes, roadway setting and characteristics, traffic control devices, modes of commute to school, school hours and after school activities, and school policies. The outcome will be an understanding of the traffic and safety characteristics before and after implementation of the SRTS program in both the immediate vicinity of the selected schools and within a two-mile radius. In cases where there is good before and after data, these findings will be quantitative.</p>	P	S	S	S	S			P		P						P
A-8	Bicycle Level-of-Service Metric	\$55,000	<p>Purpose: This project would help to understand the travel behaviors and comfort levels of cyclists within diverse environments and to be better able to accurately plan for transportation in the Boston region.</p> <p>Anticipated Outcome: Enhanced ability to calculate expected bicycle trips and to prioritize projects. This study would begin with a literature review of existing bicycle level-of-service (LOS) criteria to identify the data that CTPS staff should use when modeling cyclist trips within the Boston region. This process would be informed by communication with CTPS staff and entities at the local and state level in order to identify what data is currently available for calculating bicycle LOS in the Boston region. Depending on data availability, criteria for the LOS metric would be selected and used to evaluate bicycle LOS in the Boston region.</p>	S		S		P			P		P				P		P

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A-9	Study of Possible Places and Times for Car-Free Days	\$35,000	<p>Purpose: This study would aim to understand and analyze the appropriateness of instituting car-free days or locations. CTPS staff would work with selected municipalities (up to three) to analyze streets, days, and times (including different times of year) that car-free days would benefit the community and multimodal transportation or recreation throughout the community. Aspects that could be analyzed to understand the possible costs and benefits of establishing a car-free street/day include: traffic and commuting patterns, air quality improvements, economic impact to businesses, and community support, among others.</p> <p>Anticipated Outcome: Memorandum(s) describing the recommended approach to implementing car-free days/streets and an analysis of the costs and benefits that could be realized.</p>			S		P	S			P			P		N		P
LAND USE, ENVIRONMENT, AND ECONOMY																			
Another Chance																			
B-1	Methodologies and Tools for Understanding Transportation, Population, Housing, and Economic Displacement	\$85,000	<p>Purpose: Through this project, staff would work on developing methodologies or approaches that the MPO could use to better project economic displacement as a result of transportation projects.</p> <p>Anticipated Outcome: Through this project, staff would identify, through a literature review and other methods, techniques for accounting for displacement through the regional travel demand model, the land use model, or other approaches. These techniques could be tested on a project programmed in the Long-Range Transportation Plan (which would serve a hypothetical example). MPO staff could also attempt to do some before and after comparisons on a past large-scale transportation project to better understand displacement. Deliverables may include a memorandum documenting techniques and the results of sample analyses. Ultimately, these results could inform MPO project selection and performance-based planning.</p>				P		S				P	P			N		P
B-2	Transportation Mitigation of Major Developments: Review of Existing Strategies	\$60,000	<p>Purpose: This project would build off of the MPO's Core Capacity Constraints study (included in the FFY 2015 UPWP) that focused on examining strategies to mitigate the impacts new developments may have on the region's transportation system.</p> <p>Anticipated Outcome: Through this particular study, inspired by the discussion of transportation mitigation strategies at the January 8, 2015 MPO meeting, MPO staff would explore major land use developments that have occurred in the recent past (perhaps 15 years), along with transportation mitigation measures that were incorporated into the development process. These would include measures to address the impacts that the new development would have on the transportation system, such as the increased travel demand on nearby rapid transit or bus routes. MPO staff would then track the implementation of these measures and try to assess results. Through this process, MPO staff may be able to make recommendations for improvements to transportation mitigation-related processes and regulations and to the types of mitigation measures required by permitting agencies.</p>		P	S	S	S	S				P	P			P		P

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B-3	Energy and Electric Vehicle Use in the MPO Region	\$55,000	<p>Purpose: Through this project, MPO staff would gather information and develop a profile of energy use for transportation in the MPO region. MPO staff would focus in particular on energy-use trends that pertain to electric vehicles.</p> <p>Anticipated Outcome: This project would inventory the distribution and location characteristics of charging stations, examine the characteristics of the electric vehicle fleet in the Boston region (such as the proportions of electric vehicles that are owned by households as compared to institutions), and analyze trends in the availability and use of these vehicles. Other activities may include an analysis of levels of consumption for different fuel types. This information may be useful to the MPO in future plan development and performance-based planning activities.</p>			P					P		P			P		P	
New																			
B-4	Shopping Behavior by Mode of Arrival	\$55,000	<p>Purpose: This study aims to create a local understanding of the concept and previous research conducted in other states about shopping behavior by mode of arrival. The supply and availability of parking is an issue in planning and implementing priority bus lanes and bicycle/pedestrian facilities as well as when new development comes to an area. This study would select two or three specific locations in the Boston region to understand local shopping behavior by individuals arriving by various modes. One approach to choosing the locations of study would be to build off of a study that the MPO is currently conducting on priority bus lanes and choose several locations that are highlighted in that study. This could be an important step in gaining support for implementing the findings from that study.</p> <p>Anticipated Outcome: The findings from this study would be useful to transit agencies and advocates as well as municipalities. Previous research points to the fact that pedestrians, bicyclists, and transit riders spend just as much money at commercial locations as drivers. The local knowledge gained from this study could help municipalities adjust parking requirements for new developments and could be an important tool in gaining support for additional bicycle, pedestrian, and transit infrastructure.</p>	S	S			P	S			P	P			N		P	
B-5	Electric Vehicle Technologies for Transit	\$55,000	<p>Purpose: This study would investigate the electric vehicle technologies available for transit vehicles. It could look at what technologies are being used successfully in other areas/states, as well as the economic and environmental costs and benefits of implementing these technologies in the Boston region.</p> <p>Anticipated Outcome: A report documenting the findings of research from around the country and an analysis of applicability to the Boston region.</p>			P		S	S			P	P			N		P	
B-6	Impacts of SIP Commitments on Regional Air Quality	\$55,000	<p>Purpose: This study would investigate the air-quality impacts of transit projects included in the State Implementation Plan (SIP) as transportation control measures during the environmental review process for the Central Artery/Third Harbor Tunnel project.</p> <p>Anticipated Outcome: An understanding and approach to analysis of the impact of SIP commitments on regional air quality. The study would also shed light on the effectiveness of using legal commitments as a strategy for ensuring implementation of transportation projects and priorities for attaining and/or maintaining compliance with the National Ambient Air Quality Standards.</p>			P	S					P	P			N		P	

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B-7	Study of Promising GHG-Reduction Strategies	\$55,000	<p>Purpose: Based on recommendations from the 2016 study completed by staff that provided information about cost-effective GHG reduction strategies, staff is proposing to study a subset of the 14 promising strategies that the MPO can fund, study, or advocate for in order to understand implementation at the regional level and determine their GHG reduction and cost-effectiveness potential.</p> <p>Anticipated Outcome: Examples of potential strategies that the MPO can fund and which could be studied in more detail include transit expansion or service improvement, teleworking, and parking management. The study could also look at the equity, safety, and mobility impacts of these strategies.</p>			P		S	S					P		P			P	
MULTIMODAL MOBILITY																				
Renew																				
C-1	Addressing Safety, Mobility, and Access on Subregional Priority Roadways: FFY 2017	\$110,000	<p>Purpose: Identify priority arterial and bottleneck locations and recommend low-cost improvements.</p> <p>Anticipated Outcome: An enhanced understanding of approaches to improve safety and mobility for all modes. Communities can contact CTPS for roadways to be considered for study.</p>	P	S	S		S	S	P			P			P	N	P		
C-2	Safety and Operations Analysis at Selected Intersections	\$65,000	<p>Purpose: The purpose of this project would be to examine mobility and safety issues at major intersections on the region's arterial highways, where, according to the MPO's crash database, many crashes occur. These locations are also congested during peak traffic periods. The resulting bottlenecks may occur only at single large intersections, but usually spill over to a few adjacent intersections along an arterial. These intersections may also accommodate multiple transportation modes, including buses, bicyclists, and pedestrians.</p> <p>Anticipated Outcome: This study would build directly on the results of the monitoring of delays and safety along arterial roadways that the Congestion Management Process (CMP) produces, and the resulting recommendations would be "management and operations" improvements. Municipalities in the region are very receptive to this type of study since these studies give them an opportunity to begin looking at the needs of these locations, starting at the conceptual level, before they commit funds for design. Eventually, if a project qualifies for federal funds, the study's documentation is also useful to MassDOT.</p>	P	S	S		S	S	P			P			P	N	P		
C-3	Low-Cost Improvements to Express-Highway Bottleneck Locations	\$50,000	<p>Purpose: Build on previously conducted analysis of several express-highway bottleneck locations (Low-Cost Improvements to Bottlenecks Phase I and Phase II). These studies were very well received by the MassDOT and the FHWA. Some of the recommendations from these studies already have been executed, and the FHWA has interviewed MPO staff about the successful implementation.</p> <p>Anticipated Outcome: Identification of low-cost methods to reduce congestion, increase safety, and improve traffic operations in the Boston Region.</p>	S	S	S		P	S	P			P			P	N	P		

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C-4	Priority Corridors from the Long-Range Transportation Plan Needs Assessment	\$110,000	<p>Purpose: These planning studies develop conceptual plans recommending improvements for specific arterial segments.</p> <p>Anticipated Outcome: Cities and towns are able to review the requirements of a specific arterial segment, starting at the conceptual level, before committing design and engineering funds to a project. If the project qualifies for federal funds, the study's documentation also may be useful to MassDOT and the municipalities.</p>	S	S	S		P	S	P				P			P	P		
Evolve																				
C-5	The Effects of Induced Demand upon Transportation System Efficiency	\$55,000	<p>Purpose: In this UPWP project, CTPS can explore the concept of induced demand and its ramifications upon transportation projects such as intersection improvements and capacity expansion. The effect of induced demand upon other types of transportation projects could be considered as well. Specifically, the project would include the following:</p> <ul style="list-style-type: none"> • Definition of induced induced travel/demand • Context of induced travel/demand in different planning contexts • Determination of when induced travel/demand should be included in transportation analyses • Determination of the magnitude of induced travel/demand for different types of transportation projects and land uses • Determination of how induced demand can be incorporated into the travel demand model <p>Anticipated Outcome: Better understanding of the ability of system efficiency improvements, such as capacity expansion and intersection improvements, to achieve long-term GHG emission reduction and congestion relief.</p>			P				P				P	P			P		
Another Chance																				
C-6	Planning for Connected and Autonomous Vehicles	\$50,000	<p>Purpose: This project would involve research into the overarching issues that the Boston Region MPO needs to understand and plan for around autonomous and connected vehicle technologies. Some of the questions that could form the body of research include:</p> <ul style="list-style-type: none"> • What research exists already? • How are other states, regions, and municipalities approaching being prepared for these technologies? • How might these technologies affect transportation planning (i.e., the need for off-street parking) and modeling in the future? • What is the current thinking around the potential penetration level of these new technologies? • Could scenario planning provide a useful approach to understand how best to plan for these technologies? • What are the best next steps for the region in terms of being prepared for these technological changes? <p>Anticipated Outcome: This project would be an important first step to understanding the transportation planning consequences of AV/CV technologies and how the MPO and region can be prepared.</p>	S	S	S		P	S	P				P	P			N		P

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C-7	Safety Improvements at Express-Highway Interchanges	\$55,000	<p>Purpose: Continue to address the 2013 MassDOT Top 200 High-Crash Locations and Highway Safety Improvement Program (HSIP) crash clusters in the Boston Region MPO. Many of these are express-highway interchanges, and some of them do not need complete rebuilds (which are costly), but rather low-cost improvements that address safety and operations.</p> <p>Anticipated Outcome: The study would review the Top 200 Intersection Clusters and HSIP crash clusters to identify candidate locations. MPO staff would develop low-cost safety and operational improvements.</p>	P	S			S	S	P			P			P	N	P		
TRANSIT																				
Evolve																				
E-1	MBTA Bicycle Parking/MBTA Park-and-Ride Lot Monitoring (including nearby private lots and on-street parking)	\$80,000	<p>Purpose: Two hundred and seventy-nine (279) MBTA stations would need to be surveyed for bicycle parking data. Additionally, the MBTA parking lots, which have not been surveyed since 2013, also would need to be updated. The parking lots for this iteration of the park-and-ride lot survey will include any parking near stations that commuters use, including MBTA lots, private lots, and on-street parking. Because it is less costly to make a single visit to stations that offer parking for both modes, this collection effort will combine the data for both bicycle and automobile parking. This task will also include talking to communities to see what the parking trends for each station are and to see if the communities have recommendations of their own.</p> <p>This study would also look at the pricing and management structure of all of the publicly and privately owned parking lots at and near MBTA stations.</p> <p>Anticipated Outcome: Update the demand and supply of parking at MBTA stations and catalog the institutional structure that shapes pricing for parking in the lots.</p>		S	S	S	P	S			P	P	P			P	P		
Another Chance																				
E-2	Potential Uses for Unused and Underused ROW	\$55,000	<p>Purpose: Through this study, MPO staff would inventory and map the unused or underused rail right-of-way (ROW) in the region, and then suggest possible transportation uses for the ROW. Options for alternative uses could include the creation of bicycle and/or pedestrian routes, or routes for new transit service.</p> <p>Anticipated Outcome: The deliverable could be a memorandum describing the study process, recommendations for a few specific locations, and maps of the region describing the used and underused ROW.</p>		S	S		P	S		P		P			P	N		P	
E-3	Non-Fixed Route Transportation Services: Lessons for Transit Agencies	\$90,000	<p>Purpose: In a past study, CTPS used taxi origin-destination data, along with other data sources, to determine where transit dollars might be best spent to improve the MBTA's early-morning service. This proposed study would go beyond the scope of the previous study and would include all-day taxi data and other non-fixed-route service origin-destination data to determine where the fixed-route transit system is inadequately serving potential riders and where improvements could be made. This study would focus on areas with concentrated taxi or other point-to-point service origins and destinations since these are the areas with the most potential for supporting fixed-route transit service. The study area for this project would include Boston and Cambridge.</p> <p>Anticipated Outcome: Understanding of improvements that could be made to the fixed-route transit service.</p>		S	S	S	P				P	P	P		P			P	

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				Safety	System Preservation	Clean Air/Clean Communities	Transportation Equity	Capacity Management/Mobility	Economic Vitality	Multi-Modal Roadway	Bicycle Pedestrian	Transit	Specific Community	Broader Region	Enhance State of Practice	Low-Cost/Near-Term Implementation	Long-Term Implementation	Connection to Existing Work	Continuing Study	New Study
New																				
E-4	Collecting Better MBTA Survey Data	\$55,000	<p>Purpose: As technology advances, opportunities improve for gathering data of a better quality and in a greater quantity. The MBTA strives to serve the needs of its users and often relies on surveys to determine how the MBTA might improve its service. Current MBTA survey formats provide a great deal of information, but there may be additional avenues that the MBTA could pursue in order to compile robust user data. The MBTA application that allows users to purchase tickets on their smartphones could provide a quick and easy means by which the MBTA could gather data on a constant basis. After a user purchases a ticket, the application could prompt the user to provide the mode or modes by which he or she reached the station, the distance traveled to the station using each travel mode, and his or her demographic information. Additionally, as use of the ticket purchase application expands to other modes besides the commuter rail, this survey approach could be useful in reaching many more riders. This study could explore this approach as well as others to gather better user data. Other options would be determined in coordination with the MBTA's new data chief.</p> <p>Anticipated Outcome: The project would begin with a literature review of existing data collection methods. This would be followed by an assessment of the feasibility of using each approach for MBTA surveys. Finally, this project would recommend approaches that the MBTA should take when conducting surveys in the future.</p>				P					P			P			P		
E-5	Strategies to Reduce Paratransit Trips in the Boston MPO Region: Reducing Barriers to Entry to Fixed-Route Transit Service	\$55,000	<p>Purpose: Throughout the MPO region, people use the MBTA's paratransit services such as THE RIDE. Some of their travel patterns may overlap with the existing fixed-route network, and other travel patterns might be accommodated through minor adjustments to existing transit service. In the past, the MBTA offered free CharlieCards to THE RIDE users to lower the barrier of entry to the fixed-route system for the trips they can make using the fixed-route system. Depending on the available data, knowing where the users of these special CharlieCards make trips on the fixed-route system and where they use THE RIDE may provide valuable insights to system improvements.</p> <p>Anticipated Outcome: Identify the travel patterns of THE RIDE users, quantify some service issues that prohibit people from fully using fixed-route services, and make recommendations to existing service that may improve access to the fixed-route system.</p>		S		P	S				P		P		P		N		P

FFY 2017 Draft Universe and Study Evaluation

ID	Project Name	Estimated Cost	Project Purpose and Outcome	L RTP Goal Areas						Mode			Study Scale		Impact			Other		
				Safety	System Preservation	Clean Air/Clean Communities	Transportation Equity	Capacity Management/Mobility	Economic Vitality	Multi-Modal Roadway	Bicycle Pedestrian	Transit	Specific Community	Broader Region	Enhance State of Practice	Low-Cost/Near-Term Implementation	Long-Term Implementation	Connection to Existing Work	Continuing Study	New Study
E-6	A Review of Interlining at the MBTA	\$55,000	<p>Purpose: This study's goal would be to review some of the issues with interlining and discover the conditions where interlining may and may not be operationally beneficial. It would include a review of the MBTA's practices for scheduling running time and using interlining compared with use of these practices at peer agencies.</p> <p>Anticipated Outcome: The results of this study would provide the MBTA with parameters they could use to fine-tune how they schedule their services—reaping the benefits of interlining when it makes sense, yet providing reliable and resilient service.</p>	S	S	S	P				P		P		P		N		P	
E-7	Using GTFS to Find Shared Segments with Excessively Irregular Headways	\$25,000	<p>Purpose: The goals of this study are to use existing data to provide schedule improvements for MBTA buses and to document reasons behind irregularities in the existing schedule.</p> <p>Anticipated Outcome: By mining the MBTA's GTFS data, we can discover the distribution of headways at a stop over time, discovering segments that have excessively irregular headways or segments where multiple bus routes are scheduled to overlap.</p> <p>In many cases, there may be a reason for the irregular combined headways. This project would document these reasons and, where appropriate, propose recommendations for improvement.</p>	S	S	S	P				P		P		P		N		P	
E-8	Low-Cost Improvements to Transit Service	\$35,000	<p>Purpose: This study would examine the transit system in the Boston Region MPO and identify several locations where inadequate service occurs as a result of inefficient passenger queuing, passenger loading, or wayfinding. Three to five locations where this "friction" occurs would be chosen for more in-depth study to identify low-cost solutions that could be implemented.</p> <p>Anticipated Outcome: The first part of the study would involve a literature review to determine the range of low-cost solutions that exist and which ones would be most appropriate and efficacious to address identified service issues at the chosen locations. The resulting report would also describe the suggested processes for implementation of the solutions and could recommend an approach to study the after-condition at each location to determine how well the interventions are working. This study could include the MBTA commuter rail as well as locations within regional transit agency service areas that are in need of improvement.</p>	S	S	S	P				P		P		P		N		P	

FFY 2017 Draft Universe and Study Evaluation

ID	Project Name	Estimated Cost	Project Purpose and Outcome	LRTP Goal Areas						Mode			Study Scale		Impact			Other	
				Safety	System Preservation	Clean Air/Clean Communities	Transportation Equity	Capacity Management/Mobility	Economic Vitality	Multi-Modal Roadway	Bicycle Pedestrian	Transit	Specific Community	Broader Region	Enhance State of Practice	Low-Cost/Near-Term Implementation	Long-Term Implementation	Connection to Existing Work	Continuing Study
OTHER TECHNICAL SUPPORT																			
Renew																			
F-1	MPO Staff-Generated Research Topics	\$30,000	<p>Purpose: This program would support work by MPO staff members on topics that relate to the Boston Region MPO's metropolitan transportation-planning process, that staff members have expressed interest in, and that are not covered by an ongoing Unified Planning Work Program (UPWP) or discrete project. MPO staff members would complete an application, which would be reviewed by MPO managers and directors, for some MPO funding to do independent research on a topic of professional interest and potential use in the metropolitan transportation-planning program.</p> <p>Anticipated Outcome: This program could bring forth valuable information for the MPO's consideration and would support staff's professional development. The opportunities afforded to staff through this program could yield highly creative solutions to transportation-planning problems.</p>										P	P			P	P	
Another Chance																			
F-2	Future of Transportation Data Collection	\$55,000	<p>Purpose: This study would review the transportation data sources traditionally gathered using person time and would explore whether there are cost-effective ways to automate these processes. To complement this review, the study would also identify areas in the transportation field where human-based data collection is more beneficial than machine-based data collection and also where automated data collection methods cannot be used.</p> <p>Anticipated Outcome: Enhanced understanding of the most cost-effective and efficient ways to collect transportation data. Ability to adjust our approaches to data collection based on the findings.</p>										P	P			P		P

Notes: (1) Green highlighted rows are new studies that were chosen for funding in FFY 2017. These studies are described in further detail in Chapter 6.
 (2) Proposed studies F-1 and F-2 were not evaluated using the evaluation areas. F-1 dedicates an amount of funding for a yet-to-be-determined MPO staff research proposal, and F-2 is a data-collection research study with the potential to enhance staff's work; however, it does not directly relate to an LRTP goal area or the other evaluation areas.

AV/CV = autonomous vehicles/connected vehicles. CTPS = Central Transportation Planning Staff. FFY = federal fiscal year. FHWA = Federal Highway Administration. GHG = greenhouse gas. GTFS = general transit feed specification. LOS = level of service. LRTP = Long-Range Transportation Plan. MassDOT = Massachusetts Department of Transportation. MBTA = Massachusetts Bay Transit Authority. MPO = Metropolitan Planning Organization. P = primary. ROW = right-of-way. S = secondary. SIP = State Implementation Plan. SRTS = Safe Routes to School. UPWP = Unified Planning Work Program



APPENDIX D

Massachusetts Department of Transportation UPWP Checklist

[Under Development]



APPENDIX E

Geographic Distribution of UPWP Funded Studies

[Under Development]



APPENDIX F

MPO Glossary of Acronyms

Acronym	Definition
3C	continuous, comprehensive, cooperative [planning process]
A&F	administration and finance
AACT	Access Advisory Committee to the MBTA
ABP	Accelerated Bridge Program
ADA	Americans with Disabilities Act of 1990
ADT	average daily traffic
AFC	automated fare collection
AMPO	Association of Metropolitan Planning Organizations
APC	automatic passenger counter
APTA	American Public Transportation Association
ARAN	automatic road analyzer
ARRA	The American Recovery and Reinvestment Act of 2009
ASL	American sign language
ATR	automatic traffic recorder
AVL	automatic vehicle location
AWDT	average weekday daily traffic
BCIL	Boston Center for Independent Living
BRA	Boston Redevelopment Authority
BRT	bus rapid transit
BTD	Boston Transportation Department
CA/T	Central Artery/Tunnel [project]
CAA	Clean Air Act of 1970

Acronym	Definition
CAAA	Clean Air Act Amendments of 1990
CATA	Cape Ann Transportation Authority
CBD	central business district
CFR	Code of Federal Regulation
CHSTP	Coordinated Public Transit Human Services Transportation Plan
CIC	Community Innovation Challenge
CIP	Capital Investment Program
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Process
CNG	compressed natural gas
CO	carbon monoxide
CO2	carbon dioxide
CTPS	Central Transportation Planning Staff [to the Boston Region MPO]
CTTAP	Community Transportation Technical Assistance Program
DBMS	Database Management System
DCAMM	Division of Capital Asset Management and Maintenance
DCR	Department of Conservation and Recreation
DEIR	draft environmental impact report [MA]
DEIS	draft environmental impact statement [federal]
DEP	Department of Environmental Protection [MA]
DMU	diesel multiple unit
DTA	dynamic traffic assignment

Acronym	Definition
EERPAT	Energy and Emissions Reduction Policy Analysis Tool
EIR	environmental impact report [MA]
EIS	environmental impact statement [federal]
EJ	environmental justice
EOEEA	Executive Office of Energy and Environmental Affairs [MA]
EOHED	Executive Office of Housing and Economic Development [MA]
EOHHS	Executive Office of Health and Human Services [MA]
EPA	Environmental Protection Agency [federal]
EPDO	equivalent property damage only [index]
ETC	electronic toll collection
FDR	functional design report
FEIR	final environmental impact report [MA]
FEIR	final environmental impact statement [federal]
FFGA	full funding grant agreement
FFY, FFYs	federal fiscal year, federal fiscal years
FHEA	Fair Housing Equity Assessment
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
FTA	Federal Transit Administration
GANS	grant anticipation notes [municipal bond financing]
GHG	greenhouse gas [as in greenhouse gas emissions]
GIS	geographic information system

Acronym	Definition
GLX	Green Line Extension [Green Line Extension project]
GPS	global positioning system
GWI	global warming index
GWSA	Global Warming Solutions Act of 2008 [MA]
HOV	high-occupancy vehicle
HPP	high-priority projects
HSIP	Highway Safety Improvement Program
HTC	Healthy Transportation Compact
ICC	Inner Core Committee [MAPC subregion]
IMS	intermodal management system
INVEST	Infrastructure Voluntary Evaluation Sustainability Tool [FHWA]
IPCC	Intergovernmental Panel on Climate Change
ISTEA	Intermodal Surface Transportation Efficiency Act [federal]
IT&S	Information Technology and Systems [CTPS group]
ITDP	Institute for Transportation and Development Policy
ITE	Institute of Transportation Engineers
ITS	intelligent transportation systems
JARC	Job Access and Reverse Commute [program]
LAP	language access plan
LCW	Livable Community Workshop
LEP	limited English proficiency
LNG	liquefied natural gas

Acronym	Definition
LOS	level of service
LRTA	Lowell Regional Transit Authority
LRTP	Long-Range Transportation Plan
MAGIC	Minuteman Advisory Group on Interlocal Coordination
MAP-21	Moving Ahead for Progress in the 21st Century Act [federal]
MAPC	Metropolitan Area Planning Council
MARPA	Massachusetts Association of Regional Planning Agencies
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Office of Geographic Information
Massport	Massachusetts Port Authority
MassRIDES	MassDOT's statewide travel options program
MBCR	Massachusetts Bay Commuter Railroad
MBTA	Massachusetts Bay Transportation Authority
MCAD	Massachusetts Commission Against Discrimination
MEMA	Massachusetts Emergency Management Agency
MEPA	Massachusetts Environmental Policy Act
MGL	Massachusetts general laws
MHS	metropolitan highway system
MAGIC	Minuteman Advisory Group on Interlocal Coordination [MAPC subregion]
MOU	memorandum of understanding
MOVES	Motor Vehicle Emissions Simulator [EPA]
MPO	metropolitan planning organization [Boston Region MPO]

Acronym	Definition
MPOinfo	Boston Region MPO's email contact list
MWGMC	MetroWest Growth Management Committee
MWRC	MetroWest Regional Collaborative [MAPC subregion]
MWRTA	MetroWest Regional Transit Authority
NAAQS	National Ambient Air Quality Standards
NBPD	National Bicycle and Pedestrian Documentation Project
NEPA	National Environmental Policy Act
NHPP	National Highway Performance Program
NMHC	non-methane hydrocarbons
NSTF	North Shore Task Force [MAPC subregion]
NSPC	North Suburban Planning Council [MAPC subregion]
NOx	nitrogen oxides
NTD	National Transit Database
NTP	notice to proceed
O&M	operations and management
ODCR	Office of Diversity and Civil Rights [MassDOT]
OE	operating expenses
OTA	Office for Transportation Access [MBTA]
OTP	Office of Transportation Planning [MassDOT]
P3 [1]	Public Participation Plan
P3 [2]	public private partnership
PBPP	performance-based planning and programming

Acronym	Definition
PDM	Pre-Disaster Mitigation Program [federal]
PEV	pedestrian environmental variable
PL	public law [PL] funds, or metropolitan planning funds [FHWA]
PM2.5	particulate matter smaller than 2.5 micrometers in size
PM10	particulate matter up to 10 micrometers in size
PMT	Program for Mass Transportation [MBTA]
ppm	parts per million
PSA	Project Selection Advisory Council
RCCs	Regional Coordinating Councils
RIF	roadway inventory file
RMV	Registry of Motor Vehicles
ROC	Rider Oversight Committee [MBTA]
ROW	right-of-way
RPA	regional planning agency
RSA	Roadway Safety Audit [FHWA]
RSS	rich site summary [Web, feed]
RTA	regional transit authority
RTAC	Regional Transportation Advisory Council [Advisory Council]
RTC	Regional Transportation Center
SAFE	service and fare equity [analysis]
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act—A Legacy for Users
SCCCT	Statewide Coordinating Council on Community Transportation

Acronym	Definition
SCI	sustainable communities initiative
SDO	supplier diversity office
SFY	state fiscal year
SGR	state-of-good repair
SHRP	Strategic Highway Research Program
SHSP	Strategic Highway Safety Plan
SIP	State Implementation Plan
SNAC	special needs advisory committee
SNLA	Small Necessities Leave Act
SORE	statement of revenue and expenses
SOV	single-occupancy vehicle
SPR	Statewide Planning and Research
SRTS	Safe Routes to School
STB	State Transportation Building [Boston]
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
SWAP	South West Advisory Committee [MAPC subregion]
TAM	transit asset management
TAP	Transportation Alternatives Program
TAZ	transportation analysis zone
TCMs	transportation control measures
TCRP	Transit Cooperative Research Program

Acronym	Definition
TDM	travel-demand management, or transportation-demand management
TE	transportation equity
TEAMS	Travel Efficiency Assessment Method
TEA-21	Transportation Equity Act for the 21st Century [federal]
TIGER	Transportation Investment Generating Economic Recovery [TIGER Discretionary Grant program, federal]
TIGGER	Transit Investments for Greenhouse Gas and Energy Reduction [FTA grant program]
TIP	Transportation Improvement Program [MPO]
Title VI	Title VI of the Civil Rights Act of 1964
TMA [1]	transportation management area [FTA, FHWA]
TMA [2]	Transportation Management Association
TMC	turning movement counts
TOD	transit-oriented development
TRB	Transportation Research Board
TREDIS	Transportation Economic Development Impact System [software]
TRIC	Three Rivers Interlocal Council [MAPC subregion]
TSIMS	Transportation Safety Information Management System
TSM	transportation systems management [FHWA]
UFP	ultrafine particles
UPWP	Unified Planning Work Program
US	The United States of America
USDOT	United States Department of Transportation

Acronym	Definition
USGS	US Geological Survey
UZA	urbanized area
V/C	volume-to-capacity ratio
VHT	vehicle-hours traveled
VMS	variable message signs
VMT	vehicle-miles traveled
VOCs	volatile organic compounds [pollutants]
VRH	vehicle revenue-hours
VRM	vehicle revenue-miles
WalkBoston	pedestrian advocacy group [Boston area]
WAT	walk-access transit
WMM	weMove Massachusetts [MassDOT long-range transportation plan]
WTS	Women in Transportation Seminar
YMM	youMove Massachusetts [MassDOT planning initiative]