Universe of Studies for UPWP Committee Meeeting 2.16.2017

Project Name	Project Purpose and Outcome
ACTIVE TRANSPORTATION	
Bicycle and Pedestrian Crash Clusters Analyses	Purpose: This study would review bicycle and pedestrian crash clusters developed by the MassDOT Highway Division and the Boston Region MPO. Three locations would be selected for closer study and to develop recommendations for safety and mobility improvements to improve bicycle and pedestrian safety. Anticipated Outcome: MPO staff would work with municipalities and other stakeholders to propose cost-effective and low-cost improvements to increase safety for bicyclists and pedestrians at those locations.
Before and After Studies of TIP Projects, with an Emphasis on Pedestrian and Bicycle-Related Projects	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 projects funded through the TIP, with an emphasis on bicycle and pedestrian projects. Anticipated Outcome: Identify effects of the newly constructed projects on traveler behavior, safety, and mode split compared to existing conditions and relative to conditions on similar nearby streets that did not receive newly constructed facilities.
Bicycle Level-of-Service Metric	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. Anticipated Outcome: 1) Enhanced ability to calculate expected bicycle trips and 2) improved prioritization of projects. Proposed method: This study would include a literature review of existing bicycle level-of-service (LOS) criteria and would identify data that CTPS staff should use when modeling cyclist trips. Depending on data availability, staff will establish criteria for anLOS metric to use when evaluatating bicycle facilities in the Boston region.
Study of Possible Places and Times for Car-Free Days	Purpose: This study would aim to understand and analyze the appropriateness of instituting car-free days or locations. Proposed method: 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. Anticipated Outcome: A recommended approach to implementing car-free days/streets and an analysis of the costs and benefits that could be realized.

LAND USE, ENVIRONMENT, AND ECONOMY	
Transportation Mitigation of Major Developments: Review of Existing Strategies	Purpose: This project would build off of the MPO's Core Capacity Constraints study (included in the FFY 2015 UPWP, to be complete by Fall 2017) that focused on examining strategies to mitigate the impacts new developments may have on the region's transportation system. 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.
Energy and Electric Vehicle Use in the MPO Region	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. Anticipated Outcome: This project would inventory the distribution and location characteristics of charging stations,examinethe 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. Currently, much of this data is held and organized by various municipalities and other bodies that have expressed interest in working together but have not yet done so; the MPO could serve as a clearinghouse for this data-sharing. 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.
Shopping Behavior by Mode of Arrival	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. 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 muchmoneyat 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.

Universe of Studies for UPWP Committee Meeeting 2.16.2017

MULTIMODAL MOBILITY	
Safety and Operations Analysis at Selected Intersections	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. The study would use data CTPS receives from Google to isolate the effects of crashes on the surrounding road network. 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.
Safety Improvements at Express-Highway Interchanges	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. 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.
North Shore Multimodal Connections	Project purpose: The MPO funded a Lower North Shore study 15+ years ago; this study could update that one and expand the area covered. There is significant interest in examining opportunities to build on latent demand for multimodal transportation options on the North Shore. Interesting possibilities include a South Salem commuter rail station near Salem State Univ.; reviving bikeshare on the SSU campus; coordinating rail shuttles to and from SSU and NSCC; examining possible last-mile partnerships; bringing bike-friendly options to Lynn; the North-South Rail Link and commuter rail modernization in general, with a special emphasis on making the system work for people working non-traditional schedules. Outcome: A study of connections between various modes of transit and transportation on the North Shore, with a particular emphasis on connections and scheduling for non-9-to-5 users, existing and potential.
Town of Canton Transportation Studies	Project Purpose: The Town of Canton is interested in CTPS studying several potential improvements to the transportation network in the town. These include crash-prone intersections, pedestrian improvements, potential impacts from South Coast Rail, and in the longer term potential changes to local interchanges, last-mile partnerships for acccess to commuter rail, etc. Outcome: A study examining short- and longer-term ideas for multimodal transportation options in Canton.
Potential Impacts of Automated Vehicles	Project Purpose: To follow up on last year's UPWP project C-6, "Planning for Autonomous and Connected Vehicles." This concept would study the potential ways in which automated vehicles might become part of the regional transportation environment and their potential impacts on needed infrastructure and travel behavior. Outcome: An evaluation of ways in which the region's transportation planning and programming priorities might need to change as a result of the introduction of AVs.

Universe of Studies for UPWP Committee Meeeting 2.16.2017

SRTS Followup	Determine % of trips generated from driving children to school (consider trip chaining, distance out of way of end destination, public and private schools, metro/suburb/rural differences) and link to effectiveness of SRTS efforts. Utilize other data to do analysis of effectiveness of SRTS – not just crash data, but also health, mode share, equity, etc., but recognize that there are many other factors. This would have to take place over longer period of time.
Regional Bottlenecks	Use traffic data (Inrix or otherwise) to develop an understanding of how regional traffic moves through cities, and explore alternatives at key bottlenecks that prioritize the needs of municipalities and mode shift to sustainable modes.
Balancing Corridor Needs	Develop clearer, concise, and gripping ways to use data of roadway users to better communicate balance of needs on a corridor (people through put versus amount of space used by the vehicles) to steer away from LOS and help prioritize sustainable modes.

Universe of Studies for UPWP Committee Meeeting 2.16.2017

TRANSIT	
MBTA Bicycle Parking/MBTA Park-and-Ride Lot Monitoring (including nearby private lots and on-street parking)	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. 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. 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.
A Review of Interlining at the MBTA	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. 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.
Low-Cost Improvements to Transit Service	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. 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.
Beyond Commuter: Conceptualizing a Broadly Targeted Suburban Rail System	Purpose: Some stakeholders, particularly on the North Shore, have shown interest in making the MBTA Commuter Rail network more useful to travelers going to a variety of destinations at a variety of times outside the traditional commute hours. This desire has resonance with international, and increasingly North American, efforts to utilize suburban mainline rail infrastructure to provide full-spectrum transit service, rather than a "peaky" service targeted mainly at 9-to-5 commuters. Additionally, utilizing existing rail infrastructure more efficiently and intensively can expand regional transit options at relatively little capital expense. This study will: examine international best practices for using suburban rail infrastructure to provide consistent, frequent service throughout the day; analyze recent North American efforts in this regard, including in Denver and Toronto; and create a conceptual framework for applying the lessons to MBTA's network. Anticipated Outcome: A white paper or conceptual study that compiles information on how mainline suburban rail networks have become useful to a broader spectrum of users in other metropolitan areas and begins to develop a framework for applying those lessons to the MBTA commuter rail network.

Universe of Studies for UPWP Committee Meeeting 2.16.2017

Ferry Transportation	Purpose: to study the possibility of more ferry service within water-adjacent parts of the ICC area. Quincy, Medford, and Everett are already doing some things with ferry transportation. As part of Casino development, Everett will have ferry service from the casino to South Boston and the airport. This study provides an opportunity for centralizing communication and planning for expansion of ferry services, which is currently being handled by several different bodies. Anticipated Outcome: A study analyzing potential demand and trip patterns for new or improved ferry service or other water-based transportation within the inner Boston region. 2/2: Scott reports from Lower Mystic group meeting that Charlestown is very interested in more ferry service--looking for a systems-level examination/analysis. Could fit into this concept.
Various corridors near Bedford	Project Purpose: Sandra Hackman indicates interest in studying several corridors: an added BRT/HOV lane on US-3 in Middlesex County; 4/225 through Bedford; and improving the 62 bus from Alewife. There is also demand for funding for complete streets projects. Outcome: a study of one or more of these corridors to examine capacity and potential for additional safety improvements and non-automotive travel.
Title VI Service Equity Analysis: Methodology Development Phase II	Primary Audience: Transit Authorities Proposed Approach: The first phase of this study was conducted to develop an approach to conducting Title VI service equity analyses that improved upon the FTA's methodologies, which led to the idea of using a transit supply metric to quantify adverse effects, known as the Modified Transit Opportunity Index (MTOI). In this first phase, most of the effort was focused on the general idea of using a transit supply metric and working it into the procedure for conducting a Title VI service equity analysis. This second phase will place more emphasis on developing the Modified Transit Opportunity Index to ensure its merit as a method to measure adverse effects, and to develop a program to calculate the Modified Transit Opportunity Index for the entire MBTA network. Some specific items that should be considered: ● How do we compare small changes in MTOI over a large population to large changes in MTOI over a small population? The adverse effects of a service change could be further weighted by the degree of change in MTOI (perhaps through a decay curve), or accompanying policy could state that adverse effects don't exist until the change in MTOI (absolute or percent) passes a certain threshold? ● Should Title VI service equity analysis procedures using MTOI (a measure of transit supply) incorporate ODX data (a measure of transit demand)? ● Do we place weights on the different parameters that form the MTOI metric? ● How do we best combine the multiple data sources required to calculate the MTOI into an effective long-standing platform? Anticipated Outcome: This study will result in a tool to calculate the Modified Transit Opportunity Index for the entire MBTA network. The methodology and tool could be adapted to other regional transit authorities.

Estimating Systemwide Passenger Delay Attributed to On-Board Cash Transactions (Continuation of the Identifying Opportunities to Alleviate Bus Delay Study)	Primary Audience: Transit Authorities Proposed Approach: The previous study in this series sought to quantify the amount of stop-level delay attributed to a set of variables for a set of trips observed on MBTA Routes 116 and 117. Through multiple regression modeling it was estimated that customers adding value to their CharlieCard take an extra 6.3 seconds to board, and those paying with cash take an extra 9.4 seconds to board. While this may be considered a significant amount of time per occurrence, the observed frequency of these events was low, resulting in a relatively low contribution to bus delay. This study will expand to a systemwide analysis of delay from cash payment, using the MBTA's AFC database. Delay will be assessed on each route from an operator's perspective (delay per bus trip), as well as the customer's perspective (delay per customer) using ODX. This study is important as it provides insight into the tradeoffs between the benefits and burdens of transferring to a cashless system. Anticipated Outcome: A report documenting the delay associated with cash fare payment on MBTA routes from both the operator's perspective and the customer's perspective
Fighting for Space: Bus Lanes vs Bike Lanes (Continuation of the Dedicated Bus Lanes Study)	Primary Audience: Municipalities, Transit Authorities Proposed Approach: The previous study in this series identified a set of roadway corridors in the Boston region where bus passengers would most benefit from the installation of dedicated bus lanes. However, in addition to standard push-back from the automobile community, future installation of dedicated bus lanes on these corridors would also likely face opposition from the bicycle community, as any space for new services on the identified corridors has already been allocated for bike lanes over the past decade. This study will look at the set of previously identified corridors, and develop a strategy for each corridor for bikes and buses to coexist harmoniously. Strategies could involve looking for separate, but parallel paths, for bikes along these corridors, or designing roadway geometries that accommodate both bikes and buses where separate but parallel paths do not exist. Anticipated Outcome: For each identified corridor, identification of strategies for bikes and buses to coexist harmoniously

Inferring Trip Origins and Destinations Using WiFi Data (Could be Combined with Validation of Multi-Modal Origin Destination Data (Google Data))	Primary Audience: Transit Authorities Proposed Approach: Transit agencies use a range of data, such as Automated Fare Collection (AFC) and Automated Passenger Counters (APC), in order to understand how customers use the transit system. These data sources provide information about passenger origins, but do not provide information about their destinations or their paths through the system. In a previous study, CTPS developed a procedure for using AFC data to infer customer origin-destination pairs on the rapid transit system. Additionally, the MBTA is in the process of refining a tool to infer passenger origin-destination and trip-path information for the bus and rapid transit network. However, current technology does not provide information to validate the inferred trip-path information and passenger surveys are expensive, take time to conduct and process, and can only provide a snapshot of travel patterns on the day of survey, not continuous information detailing varied travel patterns on the network. Additionally, very limited data is available about the trip patterns of commuter rail riders. This project would study the feasibility of using WiFI connection data to better understand passenger trip patterns, and would develop a pilot program for the MBTA. When a mobile device has WiFi enabled, it will continually search for a WiFi network by sending out a unique identifier (known as a Media Access Control) to nearby routers. In the Summer of 2014 the MBTA activated WiFi within the subway portion of the Green Line as well as “dozens of other outdoor station platforms on the B, C, D, and E branches.” Most recently, the MBTA operated a “successful” pilot program on the Framingham/Worcester Line offering high-speed broadband service, and these upgrades are now being expanded to the remainder of the commuter rail system. With WiFi service offered on the Green Line and Commuter Rail, WiFi connection requests from mobile devices can be collected as passengers pass through Green Line stations or commuter rail coaches, and used to infer the passenger’s origin and destination within the system. The data collected is automatically de-personalized, which means that no browsing data or personal information is collected, and no individuals can be identified. Origin and destination data collected for these locations will be beneficial because it can be used to compare and calibrate existing methods of inferring origin and destination information from the automatic fare collection (AFC) system on the Green Line, and offer more frequent and cost effective estimations of passenger activity on the commuter rail over traditional methods involving manual passenger counts. Anticipated Outcome: Assessment of the feasibility of using WiFI connection data to better understand passenger trip patterns, and development of a pilot program

Light Rail Transit Signal Priority	Primary Audience: MBTA, City of Boston Methodology: This study would use Synchro to estimate the time savings of transit signal priority for the B, C, and E line to determine if service frequency could be increased along the lines, or if it would merely result in reliability improvements. Anticipated Outcome: Estimated time savings of transit signal priority for the B, C, and E line and determination of potential transit time savings and/or increase in service
Comparable Span: Using various datasets to evaluate the adequateness of the transit span of service	Primary Audience: Transit Authorities Proposed Approach: Transit agencies currently uses ridership levels at the beginning or end of the day to evaluate whether to extend or contract a service's span, that is, the times at which a service operates. However, this data does not provide information about demand outside the existing span of service. This study would look to information beyond ridership to see if there is a consistent way to answer the question "when should this service operate?" This study would develop a methodology to compare the roadway volumes of surrounding streets throughout the day to help guide decisions about changing the span of service. This data might come from roadway counts or Google origin-destination data. Alternative data sources could be explored as well. Anticipated Outcome: A methodology to compare the roadway volumes of streets surrounding transit services throughout the day to help guide decisions about changing the span of service

Bringing Excess Wait Time Across the Atlantic: Implementing a process to calculate the excess wait time resulting from uneven headways	Primary Audience: Transit Authorities Proposed Approach: The relatively recent implementation of various forms of automated data collection provides the opportunity to measure transit performance from a passenger perspective. For example, traditional measures of on-time performance compare scheduled to actual vehicle arrival/departure times. However, this measure does not necessarily reflect the customers' perspective, particularly on frequent services where customers may not rely on schedules to time their arrival at the stop. Transport for London (TfL) uses an "excess wait time" metric to evaluate how well its frequent bus services are running. This metric describes the additional time passengers must wait because buses are not arriving at even intervals. This study would apply some of the techniques and processes developed as part of the "Using General Transit Feed Specification Data to Find Shared Bus Route Segments with Excessively Irregular Headways" study to scheduled arrivals and actual arrivals at bus stops. With this information, we would be able to quantify the 'amount' of delay experienced by passengers on the system. Anticipated Outcome: A methodology for calculating the excess wait time resulting from uneven headways
First- and last-mile shuttle-partnership models	Primary Audience: Municipalities Methodology: In the current Long-Range Regional Transportation Plan (LRTP), the Boston Region MPO envisions first- and last-mile shuttles as a potential solution to some of the mobility needs in the MPO region. Upcoming years in the MPO Transportation Improvement Program (TIP) will include a first- and last-mile shuttle component of the community transportation, parking, clean air and mobility priority area. In the past few years, the MPO has studied potential locations, routings, and scheduling of first- and last-mile shuttles as part of the Regional Transit Service Planning Assistance program. In previous years, the MPO also ran grant programs, partnering with municipalities and transportation management associations (TMAs), to initiate these types of first- and last-mile transit services. However, there were only a few applicants to those previous grant programs. There has been little research at the MPO into financially-sustainable partnership models for first- and last-mile transit services. This study would investigate potential partnership models for first- and last-mile transit shuttles and identify the most promising models for inclusion of first- and last-mile transit services in the Boston Region MPO's TIP. Anticipated Outcome: Potential partnership models for first- and last-mile transit shuttles

Universe of Studies for UPWP Committee Meeeting 2.16.2017

Considerations for Implementing Transit Signal Priority in the MPO Region	LRTP Goal: Capacity Management/Mobility Primary Audience: Municipalities, Transit Authorities Proposed Approach: Municipalities and transit operators in the Boston Region MPO area have started to investigate transit signal priority as a method of providing better travel times to public transit riders at individual intersections or along a corridor with multiple signalized intersections. There are many types of transit priority signal systems and technologies. In advance of any implementation of a transit signal priority system or technology, municipalities and other agencies that own traffic signal systems will have to coordinate with public transit operators on a specific transit signal priority system or a set of transit signal priority technologies. CTPS proposes a review of transit signal priority technologies to understand current transit signal priority systems, their potential for integration with local traffic signal systems, and their potential for integration with local transit operator vehicle fleets. This study will also investigate the institutional issues for implementing transit signal priority in the region. Anticipated Outcome: White paper documenting the technological and institutional issues affecting implementation of transit signal priority in the MPO region.
Transit Priority Treatment Evaluation Toolbox for Boston MPO Region	LRTP Goal: Capacity Management/Mobility Primary Audience: Municipalities,Transit Authorities Proposed Approach: Municipalities and transit operators in the Boston region have expressed interest in using transit priority treatments to improve travel times for transit vehicles, primarily busses, but also for light-rail. Recent efforts include a peak-period bus lane project in Everett to improve travel times for Boston-bound bus travelers on some MBTA bus routes. Other municipalities and transit operators have expressed interest in exploring transit priority treatments at a corridor, route, and intersection scale. In this study, CTPS would develop a toolbox of evaluation methods and metrics to study transit priority treatments for roadway corridors, transit routes, and street intersections in the MPO region. With an analysis toolbox, CTPS would be better able to respond to requests from municipalities or transit operators that seek out analysis and planning assistance for transit priority treatments. Anticipated Outcome: A toolbox of evaluation methods and metrics to study transit priority treatments for roadway corridors, transit routes, and street intersections in the MPO region.
Dedicated Bus Lanes	Traffic/parking analysis work for dedicated bus lanes identified in earlier CTPS report "Prioritization of Dedicated Bus Lanes," found at https://www.massdot.state.ma.us/Portals/49/Docs/BusLane20160513%20.pdf. Work would focus on corridors other than Washington Avenue in Roslindale (already studied by MAPC) and North Washington Avenue (studied by City of Boston).