

appendix

A

Policies, Plans, Studies and Data that Inform the Needs Assessment

POLICY AND PLANNING FRAMEWORK

The Boston Region Metropolitan Planning Organization (MPO) operates under a variety of laws, regulations, guidance, policies, and plans that not only shape its activities but also inform its understanding of the region's transportation needs. This appendix presents information about the laws, regulations, guidance, policies, and plans that strongly influence the MPO's activities in the metropolitan transportation planning process and that contributed to the development of the Needs Assessment. Each item indicates which of the MPO's goal areas to which it relates, and when possible, describes how it influenced the Needs Assessment. More details are provided on the major laws, regulations, guidance, policy directives, and plans that guide MPO activities as they generally apply to three or more goal areas. The entries are organized by their geographic scope (federal, state, regional, or local). Those that cover one or two goal areas are summarized in Table A-5. As stated, the MPO's goals are as follows:

- **Safety:** Transportation by all modes will be safe
- **System preservation:** Maintain and modernize the transportation system and plan for its resiliency
- **Capacity management and mobility:** Use existing facility capacity more efficiently and increase transportation options
- **Clean air and sustainable communities:** Create an environmentally friendly transportation system
- **Transportation equity:** Ensure that all people receive comparable benefits from, and are not disproportionately burdened by, MPO investments, regardless of race, color, national origin, age, income, ability, or sex
- **Economic vitality:** Ensure our transportation network provides a strong foundation for economic vitality



FEDERAL LAWS, REGULATION, MANDATES, AND GUIDANCE

Fixing America's Surface Transportation (FAST) Act

Year Enacted: 2015

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, and Economic Vitality

The FAST Act authorizes federal funding and establishes programs and requirements for surface transportation infrastructure, including roads, bridges, transit systems, and passenger rail. It also includes seven national goals for federal highway programs, which were first established under its predecessor, the Moving Ahead for Progress in the 21st Century Act (MAP-21). These goals include the following:

1. **Safety**—To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
2. **Infrastructure condition**—To maintain the highway infrastructure asset system in a state of good repair
3. **Congestion reduction**—To achieve a significant reduction in congestion on the National Highway System
4. **System reliability**—To improve the efficiency of the surface transportation system
5. **Freight movement and economic vitality**—To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
6. **Environmental sustainability**—To enhance the performance of the transportation system while protecting and enhancing the natural environment
7. **Reduced project delivery delays**—To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

These national goals helped to shape the MPO's goals established in *Charting Progress to 2040*, which in turn informed the needs described in this Needs Assessment. Table A-1 shows the relationship between these national goals and the MPO's goals.

Table A-1
National Goal Areas and MPO Goal Areas

National Goal Area	MPO Goal Area
Safety	Safety
Infrastructure Condition	System Preservation
Congestion Reduction	Capacity Management/Mobility
System Reliability	Capacity Management/Mobility
Freight Movement/Economic Vitality	Capacity Management/Mobility and Economic Vitality
Environmental Sustainability	Clean Air/Clean Communities
Reduced Project Delivery Delays	N/A
N/A	Transportation Equity

N/A = not applicable.

Sources: Fixing America's Surface Transportation Act and the Boston Region MPO.

These national goals also relate to performance-based planning and programming (PBPP) provisions first established under MAP-21 and then continued under the FAST Act. PBPP refers to practices that apply performance-management principles to transportation system policy and investment decisions. PBPP employs a system-level, data-driven process and is used to make decisions about strategies and investments. The FAST Act requires states, MPOs, and public transportation operators to monitor progress and set targets for specific measures. The US Department of Transportation (USDOT) has promulgated several rules related to performance measures in response to the FAST Act:

- 23 Code of Federal Regulations (CFR) Part 490: National Performance Management Measures
- 23 CFR Part 924: Highway Safety Improvement Program
- 49 CFR Part 625: Transit Asset Management
- 49 CFR Part 673: Public Transportation Agency Safety Plan

The MPO must establish performance measures and targets that track progress toward the attainment of priority outcomes for the Boston region and coordinate the development of these targets with those of relevant state agencies and public transportation providers to ensure consistency. The MPO has begun to analyze data and establish baselines and targets for federally required performance measures, and information pertaining to these measures (if available) is included in the Safety, System Preservation, Capacity Management/Mobility, Economic Vitality, and Clean Air/Sustainable Communities goals. Tables A-2 and A-3 summarize these measures for transit and highway systems.

Table A-2
Federally Required Performance Measures for Transit Systems

National Goal	Relevant MPO Goal Area	Transit Performance Area or Asset Category	Performance Measure
Safety	Safety	Fatalities	Total number of reportable fatalities and rate per total vehicle revenue-miles by mode
Safety	Safety	Injuries	Total number of reportable injuries and rate per total vehicle revenue-miles by mode
Safety	Safety	Safety Events	Total number of reportable events and rate per total vehicle revenue-miles by mode
Safety	Safety	System Reliability	Mean distance between major mechanical failures by mode
Infrastructure Condition	System Preservation	Equipment	Percent of vehicles that have met or exceeded their ULB
Infrastructure Condition	System Preservation	Rolling Stock	Percent of revenue vehicles within a particular asset class that have met or exceeded their ULB
Infrastructure Condition	System Preservation	Infrastructure	Percent of track segments with performance restrictions
Infrastructure Condition	System Preservation	Facilities	Percent of facilities within an asset class rated below 3.0 on the FTA's Transit Economic Requirements Model scale

FTA = Federal Transit Administration. MPO = metropolitan planning organization. ULB = useful life benchmark.
Sources: National Public Transportation Safety Plan (January 2017), the Public Transportation Agency Safety Plan Rule (49 Code of Federal Regulations Part 673), and the final Transit Asset Management Rule (49 CFR Part 625).

Table A-3
Federally Required Highway Performance Measures

National Goal	Relevant MPO Goal Areas	Highway Performance Area	Performance Measure
Safety	Safety	Injuries and Fatalities	<ul style="list-style-type: none"> Number of fatalities Fatality rate per 100 million VMT Number of serious injuries Serious injury rate per 100 million VMT Number of nonmotorized fatalities and nonmotorized serious injuries
Infrastructure Condition	System Preservation	Pavement Condition	<ul style="list-style-type: none"> Percent of pavements on the Interstate System in good condition Percent of pavements on the Interstate System in poor condition Percent of pavements on the non-Interstate NHS in good condition Percent of pavements on the non-Interstate NHS in poor condition
Infrastructure Condition	System Preservation	Bridge Condition	<ul style="list-style-type: none"> Percent of NHS bridges by deck area classified as in good condition Percent of NHS bridges by deck area classified as in poor condition
System Reliability	Capacity Management/Mobility	Performance of the National Highway System	<ul style="list-style-type: none"> Percent of person-miles traveled on the interstate system that are reliable Percent of person-miles traveled on the non-interstate NHS that are reliable
System Reliability, Freight Movement, and Economic Vitality	Capacity Management/Mobility, Economic Vitality	Freight Movement on the Interstate System	Truck Travel Time Reliability Index
Congestion Reduction	Capacity Management/Mobility	Traffic Congestion	<ul style="list-style-type: none"> Annual hours of peak hour excessive delay per capita (for travel on NHS roadways) Percent of non-SOV travel
Environmental Sustainability	Clean Air/Clean Communities	On-Road Mobile Source Emissions	Total emissions reduction of on-road mobile source emissions (for applicable pollutants and precursors) ^a

^a As of the Federal Highway Administration's 2017 Congestion Mitigation and Air Quality Improvement (CMAQ) Program performance requirements applicability determination, the Boston Region MPO area contains an area designated as in maintenance for carbon monoxide, so the MPO is currently required to comply with this performance measure requirement. NHS = National Highway System. SOV = single-occupancy vehicle. VMT = vehicle-miles traveled. Sources: Highway Safety Improvement Program Rule (23 CFR 924), National Performance Management Measures Rule (23 CFR 490).

The FAST Act also lists a set of transportation planning factors that must be considered in the transportation planning process. It continues and builds on a set of factors established in prior legislation—the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users*. Table A-4 lists these transportation planning factors along with the related MPO goal areas. These planning factors also informed the type of information that is included in the Economic Vitality, Capacity Management/Mobility, Safety, Clean Air/Clean Communities, and System Preservation chapters in this Needs Assessment.

Table A-4
Federal Planning Factors and Related MPO Goal Areas

Federal Planning Factor	MPO Goal Area
Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency	Economic Vitality
Increase the safety of the transportation system for all motorized and nonmotorized users	Safety
Increase the ability of the transportation system to support homeland security and to safeguard the personal security of all motorized and nonmotorized users	Safety
Increase accessibility and mobility of people and freight	Capacity Management/Mobility, Economic Vitality
Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns	Clean Air/Clean Communities, Economic Vitality
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight	Capacity Management/Mobility
Promote efficient system management and operation	Capacity Management/Mobility
Emphasize the preservation of the existing transportation system	System Preservation
Improve the resiliency and reliability of the transportation system and reduce or mitigate storm water impacts of surface transportation	System Preservation, Capacity Management/Mobility, Clean Air/Clean Communities
Enhance travel and tourism	N/A

Source: Boston Region MPO.

United States Department of Transportation Code of Federal Regulations (CFR)—Metropolitan Transportation Planning and Programming Regulations

Year Enacted: 23 CFR Parts 450 (2016); 23 CFR Parts 450 (1996); 49 CFR Part 613 (2016). These are updated as needed.

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

The United States CFR—especially in 23 CFR Parts 450 and 500 and 49 CFR Part 613—documents the administrative rules and regulations that define how MPOs and other entities carry out their transportation planning processes. To receive federal transportation dollars, MPOs are required to carry out a “continuing, cooperative, and comprehensive” (3C) transportation planning process, which includes the development of its certification documents: the Long-Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), and the Unified Planning Work Program. The processes for the TIP and LRTP are to

- Encourage and promote safe and efficient development, management, and operation of surface transportation systems to serve the mobility needs of people and freight (including accessible pedestrian walkways, bicycle transportation facilities, and intermodal facilities that support intercity transportation, including intercity buses and intercity bus facilities and commuter vanpool providers);
- Foster economic growth and development and take resiliency needs into consideration, while minimizing transportation-related fuel consumption and air pollution; and
- Encourage continued development and improvement of metropolitan transportation planning processes as guided by the transportation planning factors (see the description of the FAST Act).

MPOs must also conduct an inclusive public participation process for its certification documents, which includes meaningful public engagement with those who have been traditionally underserved by the transportation planning process; maintain transportation models and data resources to support air quality conformity determinations; carry out ongoing programs, such as a congestion management process; and conduct long-range and short-range planning work. The MPO has established the following objectives for carrying out the 3C planning process in the region. These objectives include:

- Identify transportation problems and develop possible solutions
- Balance short-range and long-range considerations so that decisions that lead to beneficial incremental actions adequately reflect an understanding of probable future consequences and possible future options

- Represent both regional and local considerations, as well as both transportation and nontransportation objectives and impacts (such as land use and economic impacts) in the analysis of project issues
- Assist implementing agencies in effecting timely policy and project decisions with adequate consideration of environmental, social, fiscal, and economic impacts, and with adequate opportunity for participation by other agencies, local governments, and the public
- Help implementing agencies prioritize transportation activities in a manner; consistent with the region's needs and resources
- Comply with the requirements of the FAST Act, the Americans with Disabilities Act of 1990 (ADA), the Clean Air Act, the Civil Rights Act of 1964, Executive Order (EO) 12898 (regarding environmental justice), EO 13166 (regarding non-English language accommodations), and EO 13330 (regarding the coordination of human services transportation)

Americans with Disabilities Act (ADA)

Year Enacted: 1990

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

Title III of the ADA “prohibits states, MPOs, and other public entities from discriminating on the basis of disability in the entities’ services, programs, or activities,” and requires all transportation projects, plans, and programs to be accessible to people with disabilities. To satisfy these requirements, all MPO meetings, documents, and services are accessible to people with a disability. The MPO also considers the mobility needs of persons with disabilities throughout the planning process, which includes public engagement and data analysis to better understand transportation needs, and the programming of capital projects in the MPO’s planning documents to help ensure that the MPO’s investments meet these needs. These needs are documented in the Transportation Equity chapter (Chapter 8) in the context of the other goal areas.

Title VI of the Civil Rights Act of 1964

Year Enacted: 1964

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, and national origin (minority populations) in all activities, policies, and programs undertaken by recipients of federal funding, including intentional (disparate treatment) and unintentional (disparate impact) discrimination. The MPO considers the transportation needs of minority populations throughout all areas of the planning process and projected programming and selection, including the LRTP Needs Assessment. The needs of minority populations are also documented in the Transportation Equity chapter in the context of each of the other goal areas.

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and in Low-Income Populations

Year Enacted: 1994

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

The Environmental Justice (EJ) EO requires that each federal agency achieve EJ by identifying and addressing any disproportionately high adverse human health or environmental effects on minority or low-income populations, including interrelated social and economic effects resulting from its programs, policies, and activities.

On April 15, 1997, the USDOT issued its *Final Order to Address Environmental Justice in Minority Populations and Low-Income Populations*. The Order was updated in 2012 with DOT Order 5610.2(a), which provided clarification while still maintaining the original framework and procedures. Among other provisions, this order calls for programming and planning activities to meet the following requirements:

- Explicitly consider the effects of transportation decisions on minority and low-income populations
- Provide meaningful opportunities for public involvement for minority and low-income populations
- Gather demographic information such as the race, color, national origin, and income level of the populations affected by transportation decisions
- Avoid, minimize, or mitigate adverse impacts on minority or low-income populations

The MPO considers the transportation needs of minority and low-income populations throughout the MPO's planning process and project programming and selection, including the LRTP Needs Assessment. The needs of minority and low-income populations are documented in the Transportation Equity chapter in the context of each of the other goal areas.



Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency

Year Enacted: 2000

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

This EO extends Title VI protections to people who, because of their national origin, have limited English proficiency (LEP). Specifically, it calls for improved access to federally conducted and federally assisted programs and activities, and requires MPOs to develop and implement a system by which people with LEP can meaningfully participate in the MPO's planning process. In 2002, the Department of Justice guidance (*Guidance to Federal Financial Assistance Recipients Regarding Title VI Prohibition Against National Origin Discrimination Affecting Limited English Proficient Persons*) subsequently requires recipients of federal funding to develop Language Assistance Plans that document the organization's process for providing meaningful language access to people with LEP who access their services and programs. The MPO considers the transportation needs of people with LEP throughout all areas of its planning process, project selection and programming, including the LRTP Needs Assessment. The transportation needs of people with LEP are documented in the Transportation Equity chapter in the context of each of the other goal areas.

Age Discrimination Act of 1975

Year Enacted: 1975

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

The Age Discrimination Act of 1975 prohibits discrimination on the basis of age in programs or activities that receive federal financial assistance. To comply with this law, the MPO considers the transportation needs of youth (age 17 or younger) and the elderly (age 75 and older) across all areas of the MPO planning process and project selection and programming, including the LRTP Needs Assessment. The needs of the youth and elderly populations are documented in the Transportation Equity chapter in the context of each of the other goal areas.

STATE REQUIREMENTS, POLICY DIRECTIVES, AND PLANS

Choices for Stewardship: Recommendations to Meet the Transportation Future—Created by the Commission on the Future of Transportation in the Commonwealth

Year Enacted: 2018

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality, Transportation Equity

This report explores the expected changes in demographics, technology, land use, energy use, climate, and other factors that may affect transportation in Massachusetts between 2020 and 2040. The report also includes several potential scenarios, based on trends, and recommendations based on the results of scenario planning. These recommendations also include the implications for traditionally underserved populations, both potential impacts that may disproportionately burden these populations and those impacts that may benefit them.

Global Warming Solutions Act and Related Plans and Policies

Year Enacted: 2008

MPO Goal Areas Addressed: System Preservation, Capacity Management and Mobility, Clean Air/Sustainable Communities

The Global Warming Solutions Act (GWSA), signed into law in 2008, is a comprehensive regulatory program to address climate change in Massachusetts, and it makes the Commonwealth a leader in setting aggressive and enforceable greenhouse gas (GHG) reduction targets and implementing policies and initiatives to achieve these targets. The GWSA established emission reductions targets for specific sectors, including transportation, and it recommended strategies for adapting to climate change.

In keeping with this law, the Massachusetts Executive Office of Energy and Environmental Affairs, in consultation with other state agencies and the public, developed the *Massachusetts Clean Energy and Climate Plan for 2020*. This implementation plan, released in 2010 (and updated in 2015), establishes the following targets for overall statewide GHG emission reductions:

- 25 percent reduction below statewide 1990 GHG emission levels by 2020
- 80 percent reduction below statewide 1990 GHG emission levels by 2050

In January 2015, the Massachusetts Department of Environmental Protection promulgated regulation 310 CMR 60.05, GWSA Requirements for the Transportation Sector and the Massachusetts Department of Transportation (MassDOT). This regulation places a range of obligations on MassDOT and MPOs to support achieving the state's climate change goals through the programming of transportation investments. In particular, GHG impacts must be a selection criterion for projects considered for programming in the TIP.

Massachusetts Freight Plan

Year Enacted: 2017

MPO Goal Areas Addressed: Safety, Capacity Management/Mobility, and Economic Vitality

The Massachusetts Freight Plan identifies a vision for “a multimodal freight system that is safe, secure, resilient, efficient, reliable, and sustainable, and one that catalyzes economic development while supporting the continued competitiveness of the Commonwealth.” The Freight Plan identifies critical freight corridors and networks, important facilities, bottleneck locations, as well as key issues impacting the freight system. It uses a scenario-based approach to inform freight-related strategies and policies and identify freight projects for inclusion in future Massachusetts Capital Improvement Plans.

weMove Massachusetts: Planning for Performance

Year Enacted: 2014

MPO Goal Areas Addressed: System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Economic Vitality

weMove Massachusetts (WMM) is MassDOT's statewide strategic multimodal plan. The initiative is a product of the transportation reform legislation of 2009 and the youMove Massachusetts civic engagement process. In May 2014, MassDOT released *WMM: Planning for Performance*, a single, multimodal LRTP for Massachusetts. WMM identifies policy priorities (including infrastructure maintenance), access to jobs and opportunities, quality of life, and sustainability. It also incorporates performance management into investment decision-making to calculate the differences in performance outcomes resulting from different funding levels available to MassDOT.

Massachusetts State Rail Plan

Year Enacted: 2018

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management, and Economic Vitality

The Massachusetts State Rail Plan is the 20-year plan for the statewide rail system. It describes the state’s policy for freight and passenger rail transportation, serves as the basis for investments within Massachusetts, and establishes the mechanism to coordinate with adjoining states for corridor planning and investment strategies. It also describes the state’s existing rail system, future trends, forecasts, needs, and opportunities.

MassMoves

Year Enacted: 2017

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Transportation Equity, Economic Vitality

The MassMoves initiative involved a series of public workshops held between January and April 2017 that were designed to engage citizens across the Commonwealth about their ideas for a twenty-first century transportation system. This initiative was a component of the Massachusetts Senate’s Commonwealth Conversations forums. MPO staff reviewed feedback from MassMoves when developing the Needs Assessment.

REGIONAL REQUIREMENTS, POLICY DIRECTIVES, AND PLANS

Metropolitan Area Planning Council’s *MetroFuture*/Regional Plan (Update—*MetroCommon 2050*)

Year Enacted: 2008/Underway

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities, Transportation Equity, Economic Vitality

MetroFuture, which was developed by the Metropolitan Area Planning Council (MAPC) and adopted in 2008, is the long-range plan for land use, housing, economic development, and environmental preservation for the Boston region. It includes a vision for the region’s future and a set of strategies for achieving that vision. *MetroFuture* is the foundation for land-use projections used in the MPO’s LRTP, *Charting Progress to 2040*. MAPC is now developing *MetroCommon*, the next regional plan, which will build off of *MetroFuture* and include an updated set of strategies for achieving sustainable growth and equitable prosperity. The MPO will continue to consider *MetroFuture*’s goals, objectives, and strategies in its planning and activities, and will monitor *MetroCommon* as it develops.

RailVision

Year Enacted: Underway

MPO Goal Areas Addressed: System Preservation, Capacity Management/Mobility, and Economic Vitality

Currently underway, the Massachusetts Bay Transportation Authority's (MBTA's) *RailVision* will identify cost-effective strategies to transform the MBTA's existing commuter rail system to better support improved mobility and economic competitiveness in the Boston region. Slated to be completed in 2019, *RailVision* will evaluate costs, ridership potential, operational feasibility of alternatives, as well as public feedback to develop a vision of the future of the MBTA's commuter rail system. Currently, seven alternatives have been proposed.

MBTA Strategic Plan

Year Enacted: 2017

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, and Economic Vitality

The MBTA Strategic Plan sets forth the MBTA's vision, mission, and values and establishes specific objectives for the agency. Among the most critical priorities identified by the MBTA are:

- Reinventing the bus service to improve reliability and amenities
- Redesigning the bus network
- Eliminating the State of Good Repair backlog in 15 years
- Installing a new automated fare collection system by 2021, along with a new fare structure that increases revenue, ridership, and affordability
- Increasing non-fare, own-source revenue
- Completing planning for fleets, facilities, and service

Focus40

Year Enacted: 2019

MPO Goal Areas Addressed: System Preservation, Capacity Management and Mobility

Focus40 is the MBTA's 20-year investment plan to position the agency to meet the needs of the greater Boston area through 2040. The *Focus40* process created a long-term investment vision that recognizes current infrastructure challenges and the shifting demographics, changing climate, and evolving technology that may alter the role that the MBTA plays in Greater Boston. *Focus40* emphasizes 1) improving system performance and reliability; 2) supporting economic growth; 3) supporting inclusive growth; 4) mitigating and adapting to climate change; and 5) providing a seamless multimodal experience. The MPO will consider *Focus40* recommendations when making transit capital investment programming decisions in the TIP and LRTP.

LOCAL REQUIREMENTS, POLICY DIRECTIVES, AND PLANS

GoBoston 2030

Year Enacted: 2017

MPO Goal Areas Addressed: Safety, System Preservation, Capacity Management/Mobility, Clean Air/Sustainable Communities Transportation Equity, Economic Vitality

GoBoston 2030 is the City of Boston's long-term mobility plan, and is based on an extensive, multiyear public visioning process. It was developed according to the guiding principles of equity, economic opportunity, and climate responsiveness, and includes goals related to expanding access, improving safety, and ensuring reliability. The final plan includes both a vision framework and an action plan, the latter of which includes projects and policies designed to achieve the plan's performance goals.

Metro Boston Regional Climate Change Adaptation Strategy Report

Year Enacted: 2015

MPO Goal Areas Addressed: System Preservation, Clean Air/Sustainable Communities, Transportation Equity

MAPC released a revised version of its *Metro Boston Regional Climate Change Adaptation Strategy Report* in 2015 to support implementation of one of the goals of *MetroFuture*, which is that "the region will be prepared for and resilient to natural disasters and climate change." This report includes a Vulnerability Assessment for the region as well as goals and action steps to support adaptation and resilience for multiple sectors, including infrastructure.



OTHER LAWS, REQUIREMENTS, POLICIES, AND PLANS, BY GOAL AREA

Table A-5 lists the laws, regulations, guidance, policies, and plans that address fewer than three MPO goal areas, organized by geographic scope.

Table A-5

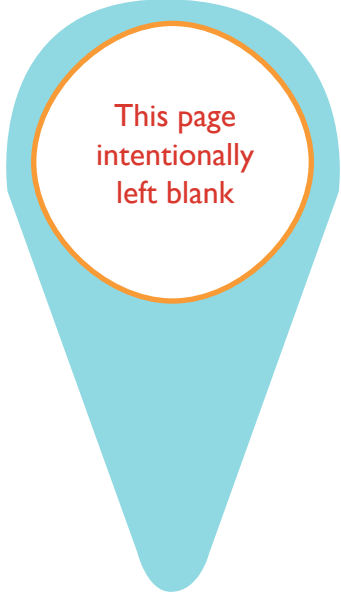
Specific Laws, Regulations, Guidance, and Policies by Goal Area

Policy or Plan	Year Enacted	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Sustainable Communities	Transportation Equity	Economic Vitality
Federal								
Public Transportation Agency Safety Plan Rule—49 CFR Part 673	2018	Establishes requirements for recipients of federal transit funds to develop public transportation agency safety plans. These plans describe strategies for minimizing person and property exposure to unsafe conditions and include targets for transit safety performance measures.	X					
National Public Transportation Safety Plan	2017	Outlines a framework to guide the national effort to manage safety risks and hazards within the US public transportation system. It describes the FTA's SMS approach and identifies safety performance measures.	X					
Opportunity Zones Program	2017	The US Tax Cut and Jobs Act of 2017 created this program to provide incentives for investment in low-income communities. An opportunity zone is a geographic area in which individuals can gain favorable tax treatment on their capital gains by investing those funds (through a private Opportunity Fund) into economic activities in the area.						X
Highway Safety Improvement Program Rule—23 CFR Part 494	2016	Details policy, planning, implementation, and evaluation requirements for States and MPOs who spend dollars provided by the federal Highway Safety Improvement Program.	X					
Public Transportation Safety Rule—49 CFR Part 670	2016	Establishes rules for carrying out FTA's Public Transportation Safety Program.	X					
Transit Asset Management Rule—49 CFR Part 625	2016	Requires entities that receive funding from FTA to develop transit asset management plans, report asset information to the NTD annually, and to set targets and monitor asset conditions for established performance measures.		X				
FHWA Environmental Justice Reference Guide	2015	Provides guidance for recipients of financial assistance from the FHWA for complying with federal Title VI and EJ requirements.					X	
FTA Circular 9070.1G: Enhanced Mobility of Seniors and Individuals with Disabilities Program Guidance and Application Instructions	2014	Describes the development of the CPT-HST that identifies the specific transportation needs for elderly individuals and people with a disability. The MPO is responsible for developing the CPT-HST for the Boston region.					X	
FTA Circular 4307.1: Environmental Justice Policy Guidance for FTA Recipients	2012	Provides guidance to recipients of FTA financial assistance with guidance for incorporating EJ principles into activities that receive funding from FTA.					X	
FTA Circular 4702.1B: Title VI Requirements and Guidelines for FTA Recipients	2012	Provides recipients of FTA financial assistance with guidance for carrying out USDOT Title VI regulations.					X	
The Clean Air Act Amendments of 1990 (Title II) and Related Regulations	1990	Forms the basis of the US air pollution control policy, with certain requirements for MPOs.				X		
United States Environmental Protection Agency 40 CFR Parts 51 and 93—Conformity Regulation	Updated as needed	EPA-issued regulations requiring nonattainment and maintenance areas to demonstrate that their LRTPs are consistent with the SIP for attaining air quality standards.				X		
State								
Massachusetts State Implementation Plan	Ongoing	Discusses the state's status with respect to air quality standards and strategies it will follow to improve or maintain its status. It informs the MPO's assessment of air quality and transportation management needs.				X		
Municipal Vulnerability Grant Program	Ongoing	Provides support to Massachusetts municipalities to plan for resiliency and implement climate change adaptation. The state awards municipalities with funding to complete vulnerability assessments and develop resiliency plans.						

Policy or Plan	Year Enacted	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Sustainable Communities	Transportation Equity	Economic Vitality
Massachusetts FHWA Transportation Asset Management Plan	Forthcoming	Federally required risk-based asset management plan for the NHS to improve asset condition and system performance. Elements include information on the condition of NHS pavements and bridges, condition performance targets, and supporting investment strategies. MassDOT submitted an initial plan to FHWA in 2018 and will be submitting a fully compliant plan in 2019, per federal requirements.		X				
Massachusetts Statewide FTA Transit Asset Management Plans	Forthcoming	Transit providers that receive federal financial assistance must develop TAM plans that include asset inventories and condition assessment; processes and tools that support investment prioritization; and a prioritized list of projects and programs to improve transit SGR. MassDOT will coordinate the development of a TAM Plan for smaller transportation providers that receive FTA Section 5310 funds, which support mobility for seniors and persons with disabilities.		X				
Massachusetts Bicycle Plan	2019	Plan advances bicycling statewide for everyday travel—particularly for short trips of three miles or less—to the broadest base of users and free of geographic inequities.			X			
Massachusetts Pedestrian Plan	2019	Plan recommends policies, programs, and projects for MassDOT to guide decision-making and capital investments, as well as develop guidance for municipalities to improve walkability in local communities.			X			
Massachusetts State Hazard Mitigation and Climate Adaptation Plan	2018	Serves as an update to the state's existing 2013 State Hazard Mitigation Plan and is also driven by the state EO No. 569, "Establishing an Integrated Climate Change Strategy for the Commonwealth." It addresses the state's federally mandated hazard mitigation plan requirements and results in the first statewide climate adaptation plan.		X		X		
Massachusetts Strategic Highway Safety Plan	2018	Identifies key roadway safety issues and needs in the state; sets goals and objectives for safety outcomes; and identifies strategies for improving safety.	X					
Housing Choice Initiative	2017	A state program that rewards municipalities that have produced a certain amount of new housing units in the last five years and that have adopted best practices related to housing production that will sustain a twenty-first century workforce and increase access to opportunity for Massachusetts residents.						X
Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs	2017	Makes environmental justice an integral consideration in the implementation of all state environmental programs.					X	
Massachusetts EO 569: An Integrated Climate Change Strategy for the Commonwealth	2016	Requires state-specific executive agency activities to create a strategy to mitigate and reduce greenhouse gas emissions and to build resilience and adapt to the impacts of climate change. Transportation system preservation-related requirements include publishing a Climate Adaptation Plan.				X		
Community Compact Program	2015	A voluntary agreement between the state and municipalities in which a municipality agrees to implement at least one best practice selected from several areas, including housing and economic development, economic competitiveness, and sustainable development and land protection.						X
Department of Environmental Protection GHG Regulation	2015	Requires that MPO's calculate GHG reductions associated with all projects programmed in the LRTP and TIP and report that information to MassDOT.				X		
Massachusetts EO on Environmental Justice	2014	Directs the Executive Office of Energy and Environmental Affairs to update its EJ policy, define "environmental justice population," and provide updated data and maps of EJ populations to the public.					X	
Healthy Transportation Policy Directive	2013	Requires all state transportation projects to increase bicycling, transit and walking options.			X			
Massachusetts "Toward Zero Deaths" Goal	2013	This long-term goal, which is identified in the SHSP, is to eliminate fatalities and serious injuries on Massachusetts roadways.	X					

Policy or Plan	Year Enacted	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Sustainable Communities	Transportation Equity	Economic Vitality
Accelerated Bridge Program	2008	Legislation for this program was passed with the goal of reducing Massachusetts's backlog of structurally deficient bridges below 450 by September 30, 2016.		X				
MassDOT Project Development and Design Guide	2006	Defines the standards to which state-funded projects are expected to adhere.	X		X			
TIP Greenhouse Gas Assessment and Reporting Guidance	2017	MassDOT guidance for evaluating GHG emissions in the LRTP and the TIP that requires MPOs to provide an air-quality analysis, calculating CO ₂ emissions for all TIP projects and for the LRTP.				X		
Regional								
Congestion Management Process	Ongoing	The CMP 1) monitors and analyzes performance of roadway facilities and services; 2) develops strategies to manage congestion based on the results of monitoring; and 3) moves those strategies toward implementation by providing decision-makers in the region with information and recommendations to improve the transportation system's performance.			X			
Coordinated Public Transit–Human Services Transportation Plan	Forthcoming (2019)	Documents the MPO region's unmet human-service transportation needs. It is prepared by the MPO to allow organizations in the region to be eligible to receive funding from FTA's Section 5310 program, which provides capital and operations funding for services for the elderly and people with disabilities.			X		X	
Municipal Climate Action Plans	2016 and later	Municipalities throughout the MPO region are developing plans to enhance resiliency and support adaptation in response to climate change.		X		X		
Climate Justice for the City of Boston: Visioning Policies and Processes	2018	Provides an overview of how future climate change projections could affect Boston neighborhoods, the status of Boston's climate activities, and the social and economic vulnerabilities that currently exist and that may be exacerbated by climate change.				X	X	
MBTA, MWRTA, and CATA Transit Asset Management Plans	2018	These transportation agencies will create TAM plans to comply with the TAM Rule.		X				
State of Equity in Metro Boston Policy Agenda	2018	Describes policies to advance local and regional policy changes that address disparities in transportation, public health, and housing (among others areas) in the MAPC region.					X	
MAPC Regional Climate Strategy	2015	Provides recommendations for local, regional, and state action for reducing vulnerability to the impacts of climate change.		X		X		
Local								
Greenovate Boston	2014	Describes Boston's climate action plan for reaching its goals of reducing greenhouse gas emissions 25 percent by 2020 and carbon neutral by 2050.				X		

CATA = Cape Ann Transit Authority. CO₂ = Carbon Dioxide. CFR = code of federal regulations. CMP = congestion management process. CPT-HST = Coordinated Public Transit–Human Services Transportation. EJ = environmental justice. EO = Executive Order. EPA = Environmental Protection Agency. FHWA = Federal Highway Administration. FTA = Federal Transit Administration. GHG = greenhouse gas. LRTP = Long-Range Transportation Plan. MAPC = Metropolitan Area Planning Council. MassDOT = Massachusetts Department of Transportation. MBTA = Massachusetts Bay Transportation Authority. MPO = metropolitan planning organization. MWRTA = Metrowest Regional Transit Authority. NTD = National Transit Database. SGR = State of Good Repair. SHSP = Strategic Highway Safety Plan. SIP = State Implementation Plan. SMS = Safety Management System. TAM = transportation asset management. TIP = Transportation Improvement Program. USDOT = United States Department of Transportation.
Source: Boston Region MPO.



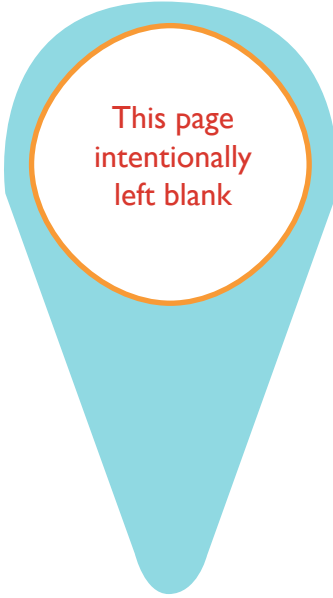
appendix

B

Relevant MPO Studies and Reports

The Metropolitan Planning Organization (MPO) staff, also known as the Central Transportation Planning Staff, undertakes several studies each year that explore regionwide transportation issues. These issues are described in full in the MPO's Unified Planning Work Program. The studies described in this appendix relate to one or more MPO goal areas: Safety, Capacity Management/Mobility, System Preservation, Clean Air/Sustainable Communities, Economic Vitality, and Transportation Equity. The studies help the MPO improve its approach to transportation issues that are of regional import, achieve the objectives of the MPO's goal areas, and help the MPO to better comply with federal guidance. Some of the studies are undertaken by the MPO's member agency, the Metropolitan Area Planning Council. Relevant reports that have been completed as part of the MPO's ongoing programs are also described in this appendix.

Table B-1 lists relevant studies and reports including the year it was completed, the source, and the related goal areas.



This page
intentionally
left blank

Table B-1

MPO Studies, Reports, and Technical Assistance Programs Related to MPO Goal Areas

Study Title	Publication Year	Source	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Equitable Transit-Oriented Development	Ongoing	MAPC	Provides assistance to municipalities to use financing tools, zoning, and TOD plans to construct affordable residential and commercial developments in places accessible by public transit.					X	X
Corridor/Sub-Area Multimodal Transportation Planning	Ongoing	MAPC	Provides assistance to selected subregions or on roadway corridors to coordinate multimodal transportation planning and transit service operations to be implemented by MassDOT, MBTA, RTAs, TMAs, DCR, and/or municipalities with local land use planning to achieve livability and smart growth goals.			X			X
Local Parking Management Plans in Selected Communities	Ongoing	MAPC	Provides assistance to selected municipalities to develop local parking management plans, with the goals of improving parking availability, stimulating local economic prosperity, reducing congestion caused by circling vehicles, helping municipalities plan for greater density by decreasing parking requirements, and encouraging mode shift away from SOV trips.			X			X
MPO GHG calculations (performed for all projects evaluated for funding consideration)	Ongoing	CTPS	Evaluates all projects that are submitted for potential funding in the LRTP and TIP for air quality emissions (VOC, CO, NO _x , PM, and GHG).				X		
Addressing Safety, Mobility, and Access on Subregional Priority Roadway studies	Multiple years	CTPS	Analyzes and recommends safety and mobility improvements for arterial corridors throughout the MPO region each year. Staff selects locations based in part on crash incidence within the corridor.	X	X	X			
Priority Corridors for LRTP Needs Assessment studies	Multiple years	CTPS	Analyzes and recommends safety and mobility improvements each year for corridors identified as top priorities in LRTP Needs Assessments. Staff selects locations based in part on crash incidence within the corridor.	X	X	X			
Low-Cost Improvements at Select Highway Bottleneck Locations studies	Multiple years	CTPS	Identifies low-cost improvements each year that will help reduce congestion at freeway bottleneck locations in the Boston region. These studies also include safety-oriented recommendations.	X		X			
Community Transportation Technical Assistance studies	Multiple years	MAPC and CTPS	Provides municipalities with technical advice on local transportation concerns, including safety, traffic operations, and other issues.	X	X	X			
Road Safety Audits	Multiple years	CTPS	Provides formal safety reviews, performed by MassDOT, for existing and planned roadways and intersections each year in order to identify issues and opportunities for improvements. MPO staff regularly participates in these reviews for locations in the Boston region.						
Safety and Operations Analyses at Selected Intersections studies	Multiple years	CTPS	Analyzes locations within the Boston region each year that have a history of numerous crashes and extensive congestion during peak travel periods. It includes conceptual designs and recommendations for safety improvements and congestion management strategies.	X	X	X			
Bicycle Level-of-Service Metric	2018 (current)	CTPS	Will formulate a plan for developing and applying bicycle LOS metrics. These metrics may consist of information collected from various sources, including intersection surveys and bicyclist counts. These data could help transportation planners and government officials make decisions about bicycle infrastructure, including prioritization of projects and allocation of funding.			X			
Boston MPO's current LRTP, <i>Charting Progress to 2040</i> and conformity determinations	2015 (amendment in 2018)	CTPS	Describes GHG emissions, other air quality emissions associated with the LRTP.				X		

Study Title	Publication Year	Source	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Livable Community Workshops	(multiple years; in 2015 these were folded into Community Transportation Technical Assistance)	MAPC and CTPS	Facilitated municipal-level workshops to discuss opportunities to incorporate livability considerations into planning and design activities. Bicycle and pedestrian travel, including related safety issues, have been discussed at these workshops.	X		X	X		
Fare Choices: A Survey of Ride-hailing Passengers in Greater Boston	2018	MAPC	Analyzes the results of in-vehicle surveys taken by ride-hailing passengers in the Boston region.			X			
Share of Choices: Further Evidence of the Ride-hailing effect in Metro Boston and Massachusetts	2018	MAPC	Analyzes the extent of mode shift, congestion, and fiscal impact caused by the presence of ride-hailing operators in the Boston region, building on the work of the study <i>Fare Choices</i> .			X			
Connected and Autonomous Vehicles and the Boston MPO—A First Look	2018	CTPS	Examines the phenomenon of CVs and AVs, reviews current developments in CV and AV technology, and discusses the range of benefits and impacts that could result once implemented. It recommends actions that the MPO can take in order to incorporate and understand CV and AV technology.	X		X			
Review of and Guide to Implementing Transit Signal Priority in the MPO Region	2018	CTPS	Develops a guidebook for use in planning and evaluating potential transit signal priority treatments in the Boston region. This guidebook is an analysis tool that the MPO staff can use to assist municipalities and transit operators that are considering implementing such treatments.			X			
Bicycle Network Gaps: Feasibility Evaluation	2018	CTPS	Builds from the work of the 2014 <i>Bicycle Network Evaluation</i> study, which identified gaps in bicycle facility networks and gaps in connectivity between bicycle facilities and regional transit stations in the Boston region. The 2018 study is presented in three memoranda, each memoranda providing recommendations for closing three of the highest priority gaps identified in the 2014 study.		X	X			
Development of a Scoring System for Bicycle Travel in the Boston Region	2018	CTPS	Develops a performance monitoring tool for bicycle routes, which includes measures for identifying safety deficiencies.	X					
Promising Greenhouse Gas Reduction Strategies for the Boston Region	2018	CTPS	Follows up on the recommendations of <i>GHG Reduction Strategy Alternatives: Cost-Effectiveness Analysis</i> and identifies cost-effective strategies employed by other agencies and MPOs, and suggests steps to reduce GHG emissions in the region.				X		
Trucks in the South Boston Waterfront	2017	CTPS	Focuses on truck and heavy vehicles in the South Boston Waterfront regarding congestion, growth trends, and truck volumes.			X	X		X
Weight and Height Restrictions that Impact Truck Travel	2017	CTPS	Reviews regulations that govern road use by large vehicles and maps locations with restrictions.		X				X
Identifying Opportunities to Alleviate Bus Delay	2017	CTPS	Investigates factors that lead to increased dwell time at bus stops by estimating the amount of time contributed by each fare payment type and by the boardings and on-board presence of baby carriages, wheeled mobility devices, and portable shopping carts. It also assesses the potential of various operational and scheduling improvements.						
Exploring the 2011 Massachusetts Travel Survey: Barriers and Opportunities Influencing Mode Shift	2017	CTPS	Quantifies characteristics of transit-competitive travel submarkets, which serve as a basis for specific strategies to increase transit mode share.			X			

Study Title	Publication Year	Source	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Shared-Use Mobility Options: Literature Review	2017	CTPS	Provides an overview of shared-use mobility services, which involve sharing vehicles, bicycles, or other transportation modes that give users short-term access to transportation on an as-needed basis. It defines various types of shared-use mobility services and describes companies and service providers that operate in the Boston region.			X			
Fairmount Line Station Access Analysis	2017	CTPS	Reviews bicycle and pedestrian conditions in the vicinity of existing or planned Fairmount Line stations in Boston, and recommends improvements to enhance the safety and comfort of bicyclists and pedestrians seeking to connect to these stations.	X					
Spatial Distribution of Crashes in EJ and Non-EJ Communities in the Boston Region MPO	2017	CTPS	Explores the frequency and severity of crashes in EJ communities compared with non-EJ communities in the Boston region, using crash data from 2010–14. The analysis examines variations in crash incidence, severity, involved modes, and exposure metrics.	X				X	
Boston Region MPO 2017 Triennial Title VI Report	2017	CTPS	Documents the MPO's compliance with FTA and FHWA Title VI, EJ, and other federal nondiscrimination regulations.					X	
System-wide Title VI/Environmental Justice Assessment of TIP Projects	2017	CTPS	Develops an initial methodology for conducting an equity analysis of the distribution of target-funded projects in the TIP.					X	
Improving Truck Travel in the Everett-Chelsea Industrial Area	2016	CTPS	Analyzes volumes and truck routes in the area and makes recommendations to modify the road network to improve access to industrial areas and reduce impacts to non-industrial areas.						X
Rest Locations for Long Distance Drivers in Massachusetts	2016	CTPS	Presents existing conditions and suggests strategies and opportunities to expand and improve truck parking locations in Massachusetts.		X				X
Core Capacity Constraints	2016	CTPS	Examines the capacity of road and transit facilities in the MPO's core area. It relates these capacities to current and projected levels of traffic and ridership and determines the location and severity of congestion and crowding in the core area.			X			
Greenhouse Gas Reduction Strategy Alternatives: Cost Effectiveness Analysis	2016	CTPS	Provides information about various strategies that support reduction of GHG emissions to help the MPO identify investments that are most cost-effective for reducing GHGs.				X		
Comprehensive Economic Development Strategy	2015	MAPC	Outlines goals for the region, identifies barriers to economic development, calls out the needs for transportation systems that are adequately financed, and seeks to build on existing strengths in looking toward the future. It incorporates and elaborates on themes of MAPC's <i>MetroFuture</i> .						X
Pedestrian Signal Phasing Study	2015	CTPS	Provides information designed to help municipal engineers and planners to select an appropriate pedestrian signal phase type and enhancements for intersections, which can help increase pedestrian and motorist safety.	X					
Boston MPO's current LRTP, <i>Charting Progress to 2040</i> Needs Assessment	2015	CTPS	Includes information on environmental, safety, system preservation, mobility, economic, and transportation equity needs in the region.	X	X	X	X	X	X
Central Artery/Tunnel Vulnerability and Adaptation Assessment	2015	MassDOT, University of Massachusetts-Boston, University of New Hampshire, Woods Hole Group Inc.	Assesses the Central Artery and Tunnel System's vulnerability to climate change. It was completed in 2015 and created the Boston Harbor Flood Risk Model. This model is being expanded to cover the full Massachusetts coast and will be renamed the Massachusetts Coastal Flood Risk model.		X				
Freight Planning Action Plan	2013	CTPS	Identifies freight study efforts in the Boston region.			X			X

Study Title	Publication Year	Source	Description	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Massachusetts Regional Bus Study	2013	CTPS	Analyzes changes that have taken place in regional bus services in Massachusetts since 1980; identifies the reasons for the changes; examines how regional services relate to local services; identifies issues that have prevented the retention or expansion of services; and suggests measures to better meet the needs of underserved markets, foster system growth, and promote improved mobility options in the state.			X			
Safe Access to Transit for Pedestrians and Bicyclists	2012	CTPS	Examines issues related to non-motorized accessibility to transit stations and identifies low-cost, quick-implementation measures to improve pedestrian and bicyclist access to the MBTA system.	X	X	X			
Screening Regional Express Highways for Possible Preferential Lane Implementation	2012	CTPS	Evaluates all express highways in eastern Massachusetts to identify additional locations where an HOV facility would relieve congestion for general traffic while offering a premium LOS to users of the HOV lane.			X			
Roundabout Screening Tool	2012	CTPS	Develops a screening tool for state and municipal agencies to use when evaluating the benefits and implications of roundabout proposals. Safety factors are included in the screening tool.	X		X			
Statewide Economic Impact Evaluation Study	2018	MassDOT	Reviews technical resources to establish economic scoring criteria for transportation projects, which included a rigorous stakeholder engagement process.						X
Health Impact Assessment: Speed Limit Bill	2012	MAPC and CTPS	Analyzes the potential impacts of a bill proposing to lower default local speed limits from 30 to 25 miles per hour. This analysis, which used information from the CTPS travel demand model, examines changes in collisions, injuries, and fatalities; fuel burned; time spent in traffic, and health effects from air pollution.	X					
Carbon Dioxide, Climate Change, and the Boston Region MPO: 2012 Update	2012	CTPS	Updates the 2008 MPO report, <i>Carbon Dioxide, Climate Change, and the Boston Region MPO</i> , with new observed changes in climate, new policies and legislation, and recent MPO activities to address climate change.				X		
Carbon Dioxide, Climate Change, and the Boston Region MPO: A Discussion Paper	2008	CTPS	Provides an overview of climate change and its local impacts; a summary of the MPO's plans and programs that help reduce GHG emissions; and next steps to further reduce climate change impacts through MPO initiatives.				X		

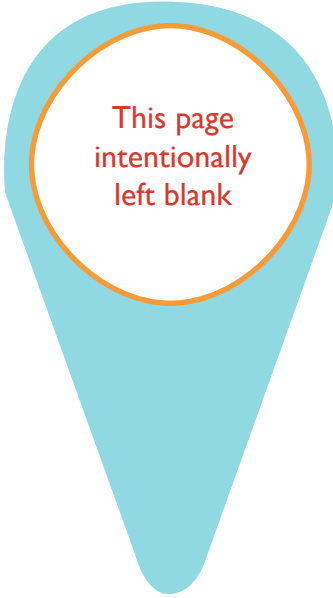
Note: Under the Publication Year column, "ongoing" refers to studies that are currently being undertaken as of this writing. "Multiple years" refers to studies that are funded on a recurring basis through the UPWP and often have a technical assistance focus
 AV= autonomous vehicles. CO = Carbon Monoxide. CO₂ = Carbon Dioxide. CTPS = Central Transportation Planning Staff. CV = connected vehicles. DCR = Department of Conservation and Recreation. EJ = environmental justice. FHWA = Federal Highway Administration. FTA = Federal Transit Administration. GHG = greenhouse gas. LOS = level of service. LRTP = Long-Range Transportation Plan. HOV = high-occupancy vehicle. MAPC = Metropolitan Area Planning Council. MassDOT = Massachusetts Department of Transportation. MBTA = Massachusetts Bay Transportation Authority. MPO = metropolitan planning organization. NOx = Nitrogen Oxides. PM = particulate matter. RTA = Regional Transit Authority. SOV = single-occupancy vehicle. TIP = Transportation Improvement Program. TMA = Transportation Management Association. TOD = transit oriented development. VOC = volatile organic compounds.
 Source: Boston Region MPO.

appendix

Data Resources



Each chapter in the Needs Assessment was developed using a variety of data sources. These sources include demographic and employment data, crash data, land use data, data about the condition of the transportation system, information about various transportation services in the Boston region, and transportation emissions data. Table C-1 summarizes these data, with information about relevant online applications.



This page
intentionally
left blank

Table C-1

Data Resources Used in the Needs Assessment

Topic Area	Data Resource	Relevant Applications	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Bridge Condition	MassDOT Bridge Database	MPO Performance Dashboard		X				
Congestion	INRIX speed data	MPO Performance Dashboard			X			
Crashes	Crash Data System of the Massachusetts RMV	MassDOT Crash Portal	X				X	
Demographics	2010 US Census 2010–14 American Community Survey	LRTP Needs Assessment Data Browser MPO Performance Dashboard					X	
Employment Density	Census and American Community Survey Data MPO projections	LRTP Needs Assessment Data Browser						X
Environment	Natural, environmental, and historic resources mapped for the Boston region	MassGIS Data Layers				X		
Existing Growth District Communities	Executive Office of Housing and Economic Development	None						X
Freight (Truck) Trip Density and Generators	MPO regional travel demand model CTPS research	LRTP Needs Assessment Data Browser						X
Freight Network	MassDOT Freight Plan	None		X				
Greenhouse Gas and Air Pollution	CTPS travel demand model	MPO Vehicle-Miles Traveled and Emissions Data Browser				X		
Greenhouse Gas and Environment	MassGIS data layers on flooding, seawater inundation from hurricane storm surges, and sea level rise	MPO All-Hazards-Planning Application				X		
Hazards Planning	Federal Emergency Management Agency	MPO All-Hazards-Planning Application		X				
Hazards Planning	U.S. Army Corps of Engineers (New England District)	MPO All-Hazards-Planning Application		X				
Hazards Planning	U.S. Geological Survey Final Technical Report: Liquefaction Hazard Mapping in Boston, Massachusetts: Collaborative Research with William Lettis & Associates, Inc., and Tufts University	MPO All-Hazards-Planning Application		X				
Hazards Planning	Intergovernmental Panel on Climate Change, Climate Change 2007: Synthesis Report	MPO All-Hazards-Planning Application		X				
High Crash Locations	MassDOT-identified Highway Safety Improvement Program Clusters and Top High Crash Intersection Locations	MassDOT Interactive Top Crash Locations Map LRTP Needs Assessment Data Browser	X					
Land Use and Development	MAPC Municipal Development Database	MAPC MassBuilds						X
Maven Fleet	Maven	None			X		X	
Off-Street Trails	Metro Boston network of foot trails and bicycle paths	MAPC TrailMap			X		X	
Pavement Condition	MassDOT Roadway Inventory MassDOT Pavement Management System	MPO Performance Dashboard LRTP Needs Assessment Data Browser		X				

Topic Area	Data Resource	Relevant Applications	Safety	System Preservation	Capacity Management and Mobility	Clean Air/Clean Communities	Transportation Equity	Economic Vitality
Population Density	US Census and American Community Survey data, MPO projections	LRTP Needs Assessment Browser						X
Traffic Fatalities	Fatality Analysis Reporting System	FARS Web-based Encyclopedia	X					
Traffic Incidents and Injuries	Massachusetts Crash Data System	MassDOT Crash Portal	X					
Transit	MBTA Bus Crowding Model	None			X			
Transit	Measures of reliability, ridership, and customer satisfaction with MBTA performance	MBTA Back on Track Dashboard			X			
Transit Assets	MBTA, CATA, and MWRTA Transit Asset Management Plans and performance data submittals	None		X				
Transit Routes	MBTA, MWRTA, CATA, MVRTA, BAT, and GATRA GTFS	None			X		X	
Transit Safety	MBTA FMCB Quarterly Safety Reports, MassDOT Tracker	MassDOT Tracker website	X					
Vehicle-Miles Traveled	VMT	MPO VMT and Emissions Data Browser MassDOT VMT Data Viewer	X		X			
Zipcar Fleet	Zipcar	None			X		X	

Notes: The Safety Goal Area is in Chapter 4; System Preservation is in Chapter 5; Capacity Management and Mobility is in Chapter 6; Clean Air/Sustainable Community is in Chapter 7; Transportation Equity is in Chapter 8; and Economic Vitality is in Chapter 9.
 BAT = Brockton Area Transit. CATA = Cape Ann Regional Transit Authority. CTPS = Central Transportation Planning Staff. FARS = Fatality Analysis Reporting System. FMCB = Fiscal Management and Control Board. GATRA = Greater Attleboro Taunton Regional Transit Authority. GTFS = General Transit Feed Specification. LRTP = Long-Range Transportation Plan. MAPC = Metropolitan Area Planning Council. MassDOT = Massachusetts Department of Transportation. MassGIS = Massachusetts Bureau of Geographic Information. MBTA = Massachusetts Bay Transportation Authority. MPO = Metropolitan Planning Organization. MWRTA = Metrowest Regional Transit Authority. MVRTA = Merrimack Valley Regional Transit Authority. RMV = registry of motor vehicles. VMT = vehicle-miles traveled.
 Source: Boston Region MPO.

appendix



Public Input on Transportation Needs

INTRODUCTION

MPO staff relied upon public input to complement its own analyses about existing and future transportation needs in the Boston region. This appendix describes the public outreach MPO staff undertook in 2017 and 2018 for the *Destination 2040* Needs Assessment. It summarizes the public outreach approach and includes the communication and engagement methods used to gather input. Through online and in-person outreach, MPO staff heard about a wide variety of transportation needs and opportunities for improvement.

Commenters provided feedback about experiences when walking, biking, taking transit (including buses, subways, commuter rail, paratransit, Council on Aging vans, Transportation Management Association shuttles, and ferries), driving, carpooling, carsharing, and bikesharing. Some commenters advocated for location-specific interventions, while others shared overarching concerns about the transportation system as relates to accessibility, connectivity, safety, reliability, innovation, affordability, connectivity, legible signage, and maintenance. Others discussed transportation's influence on public health, equity, greenhouse gas emissions, and economic vitality in the Boston region. Finally, some commenters expressed a range of opinions about the availability and management of parking and other interactions between transportation and land use.

Staff organized and summarized all of the input received by goal area in the "Stakeholder/ Public Input" sections of Chapters 4 through 9. Staff incorporated this input in its recommendations to address the region's transportation needs, which are also summarized by goal area in Chapters 4 through 9.



PUBLIC OUTREACH APPROACH FOR THE *DESTINATION 2040* NEEDS ASSESSMENT

Communication Methods

MPO staff used a variety of methods to provide information for the public to understand, follow, and engage in the MPO's long-range transportation planning (LRTP) process. In-person meetings, webpage content, emails, social media, and other electronic means were used for external communications, as summarized below.

Meetings

MPO staff introduced *Destination 2040* to audiences at meetings, conferences, and events. These conversations were aided by posters, timelines, and brochures. The events are described in more detail in the Engagement Methods section.

Webpage

MPO staff developed a [webpage](#) for *Destination 2040* for interested parties to follow the LRTP's development. The webpage includes a [timeline](#) of upcoming and past events, a Needs Assessment page with [data visualization applications](#) where needs can be suggested, places to [take surveys](#) and provide comments, and information detailing how to get involved. The webpage is designed to provide everything needed to understand, follow, and participate in the MPO's LRTP in one centralized location.

Electronic notifications

Stakeholders were notified of LRTP milestones and participation opportunities through complementary modes of communication provided by MPO staff. The modes of communication are detailed below.

Emails

Emails are the MPO staff's primary means of notifying interested parties about opportunities for engagement. Subscribers to the MPO's email list can opt in or opt out of different types of communication, such as general notices, meeting reminders, Advisory Council notices and updates from the MPO's blog, *TRANSREPORT*. The chart below summarizes the various notices sent to MPO subscribers.

Table D-1
Notices Sent to MPO Subscribers

Date	Action
September 2017	Subscribers received an email about opportunities to provide input on local and regional transportation needs.
October 2017	Subscribers received an email that announced the development of a new LRTP and shared a timeline of opportunities to participate.
March 2018	Subscribers were invited to attend the <i>Summit on Accessible Transportation</i> , where they could share input on accessible transportation needs and help shape the LRTP.
April 2018	Subscribers received an email encouraging them to explore the <i>Destination 2040</i> website and share their transportation needs.
July 2018	Attendees of the <i>Summit on Accessible Transportation</i> and members of the former Access Advisory Committee of the Massachusetts Bay Transportation Authority (MBTA) received an email with a summary on feedback received about transportation needs and links to the <i>Destination 2040</i> development page.
December 2018	Subscribers received an email announcing that the Draft Needs Assessment Summary and Recommendations was available for review and comment.
October 2018	Advisory Council members received an email with a notice about an upcoming presentation on the Needs Assessment.
October 2018	Subscribers received an email with a notice about an upcoming presentation to the MPO on the draft Needs Assessment.
June 2018-December 2018	Subscribers to MPO meeting reminders received agendas to meetings, including meetings with presentations and discussions about the <i>Destination 2040</i> Needs Assessment.
December 2018	Subscribers to Advisory Council notices received an email with a notice about an upcoming presentation on the draft Needs Assessment. Summary and Recommendations
January 2019	Subscribers to updates from the MPO's blog, <i>TRANSREPORT</i> , received an email notifying them about a new post describing the Draft Needs Assessment Summary and Recommendations.

LRTP= Long-Range Transportation Plan. MBTA= Massachusetts Bay Transportation Authority. MPO=Metropolitan Planning Organization.

Source: Boston Region MPO.

Tweets

Tweets complement the use of email communications by MPO staff. The MPO's Twitter account is followed by transportation advocates, community groups, other government agencies, and interested members of the public. MPO staff tweets are outlined below by date.

Table D-2
Tweets Sent to MPO Subscribers

Date	Action
August 2016	Staff tweeted about information about upcoming LRTP development.
April 2018	Staff tweeted a link to an email encouraging people to explore the <i>Destination 2040</i> website and to share their transportation needs.
March 2018	Staff tweeted a link to a survey about transportation needs.
December 2018	Staff tweeted that the Draft Needs Assessment Summary and Recommendations document was available for review and also shared a link to the <i>TRANSREPORT</i> blog post on the topic.

LRTP= Long-Range Transportation Plan. MPO=Metropolitan Planning Organization.
Source: Boston Region MPO.

TRANSREPORT

MPO staff crafted a post in *TRANSREPORT*, the MPO’s blog, describing the Draft Needs Assessment Summary and Recommendations and kicked off a series of posts providing information and updates about *Destination 2040*.

MPO Homepage Banners

A large, inviting banner graphic with a prominent “action button” on the MPO’s homepage alerted MPO website visitors to the *Destination 2040* website.

Metropolitan Area Planning Council (MAPC) Matters

The MAPC publishes a monthly newsletter, *MAPC Matters*, and MPO staff consistently sends updates on MPO activities to be included in the “MPO Corner” section of the newsletter to reach a broader audience. Subscribers to *MAPC Matters* received notices about the kickoff of the *Destination 2040* website, the availability of the transportation needs survey, discussions about needs occurring at subregional group meetings and other venues (described in more detail below), presentations at MPO meetings about the development of the Needs Assessment, and the release of the Draft Needs Assessment Summary and Recommendations.

Engagement Methods

MPO staff provided opportunities for members of the public to participate in *Destination 2040*’s development to ensure that feedback could be heard, valued, and considered. A combination of electronic surveys and in-person meetings were used to seek public input and

feedback on transportation needs and opportunities for improving transportation. All of the MPO-sponsored public outreach venues complied with Americans with Disabilities Act (ADA) accessibility standards and were accessible by public transportation.

MPO Meetings

MPO staff updated the MPO about developments in the *Destination 2040* Needs Assessment at the following meetings:

Table D-3
MPO Meeting Developments

Date	Action
December 1, 2016	Presentation about the work plan for developing <i>Destination 2040</i> and its Needs Assessment
June 15, 2017	Presentation about scenario planning for the LRTP and its Needs Assessment
October 5, 2017	Update about the development of the LRTP Needs Assessment and a presentation about the LRTP's Public Participation Plan
November 16, 2017	Presentation about developing the LRTP's 2040 population and employment projections
June 21, 2018	Update about developing the LRTP's 2040 population and employment projections and the initial results of the 2016 Base Year and 2040 No-Build travel demand model runs
September 20, 2018	Update about developing the LRTP and its Needs Assessment
November 15, 2018	Presentation of the Draft Needs Assessment Summary and Recommendations
December 6, 2018	Presentation of the final population and employment projections for 2040

LRTP= Long-Range Transportation Plan. MPO=Metropolitan Planning Organization.
Source: Boston Region MPO.

As a policy, the MPO welcomes public comments at all meetings, offering stakeholders a chance to offer their input and feedback about MPO decisions. Staff has also provided related materials on the *Destination 2040* website and the MPO meeting calendar.

Advisory Council Meetings

The chair of the Advisory Council kept the Council abreast of information and updates shared at the MPO meetings described above. MPO staff updated the Council about the development of the LRTP and its Needs Assessment at the Council's October 10, 2018, meeting. MPO staff also presented the Draft Needs Assessment Summary and

Recommendations to the Advisory Council on December 12, 2018. The meeting was open to the public and attendees included representatives from municipalities, public agencies, advocacy groups, and other interested parties. After the presentations to the Council, MPO staff answered members' questions. Staff also solicited feedback in emails sent to members and friends of the Council.

Subregional Group Meetings

MPO staff visited each of the eight MAPC subregional groups in fall 2017 to gather input on transportation needs and opportunities for improving the transportation system. Staff returned to each MAPC subregional group in fall 2018 to encourage members to review the Draft Needs Assessment Summary and Recommendations and provide feedback. Attendees of these meetings included planners, department directors, and other interested municipal officials (including elected officials). The following table provides the number of attendees at each meeting.

**Table D-4
Attendance Totals at Subregional Group Meetings**

Subregion	2017	2018
Inner Core Committee	19	19
North Shore Task Force	13	7
North Suburban Planning Council	16	9
Minuteman Advisory Group on Interlocal Coordination	17	24
MetroWest Regional Collaborative	17	12
SouthWest Advisory Planning Committee	11	12
Three Rivers Interlocal Council	16	11
South Shore Coalition	8	9

Source: Boston Region MPO.

Meetings with Stakeholder Organizations

MPO staff regularly respond to invitations to attend scheduled meetings of transportation advocacy organizations and other organizations interested in discussing transportation issues and those interested in learning how to shape the transportation system in the region. At

these meetings, staff discussed transportation needs and opportunities for improving the transportation system with the following groups:

- 495/MetroWest Partnership Transportation Committee (25 attendees)
- MBTA's Rider Oversight Committee (approximately five attendees)
- LivableStreet's Advocacy Committee (approximately 14 attendees)

In addition, staff have been proactively building relationships with organizations serving the needs of people who identify as a minority, people with limited English proficiency, people with disabilities, people who are 75 years or older, and people who are members of low-income households or transit-dependent households. Staff reached out to contacts in these organizations to discuss opportunities to communicate and engage with their constituents. This outreach resulted in visits to these organizations:

- Transportation Resources, Information, Planning and Partnership for Seniors (eight attendees)
- Boston North Regional Coordinating Council (14 attendees)

Outreach has also led to collaboration with the Access Advisory Committee to the MBTA (AACT) and the City of Boston's Disabilities Commission to host a *Summit on Accessible Transportation* in March 2018. More than 100 attendees engaged in discussions about transportation needs related to sidewalks, bicycle infrastructure, the subway and commuter rail, buses, paratransit, taxis, transportation network companies, and autonomous vehicles.

Office Hours

During 2017 and 2018, staff offered monthly *Office Hours* at consistent, designated times for the public to engage in one-on-one conversations with MPO staff. Interested parties either visited the Boston Region MPO office or called staff on the phone. Visitors often shared about transportation needs and opportunities to improve the transportation system. Staff incorporated these concerns and interests into the LRTP Needs Assessment.

Open Houses

MPO staff hosted two *Open Houses* in spring 2018 to allow the public the opportunity to comment in person on the MPO's draft Transportation Improvement Program and Unified Planning Work Program. At each event, staff provided information about *Destination 2040* via posters and interactive displays. Participant's comments about transportation needs and opportunities for improvement were considered as input into the Needs Assessment.



Partner Events

Staff sought opportunities to partner with other agencies and organizations to reach broader audiences. In March 2018, MPO staff participated in a panel discussion at the Neponset Valley Transportation Management Association's forum on *Bridging Transportation Gaps in the Neponset Valley*. Staff also appeared in person at the following events:

- Massachusetts Department of Transportation (MassDOT)'s Moving Together Conference (2017 and 2018)
- MassDOT's Innovation and Mobility Exchange (2018)
- MBTA's Focus40 public events (2016 Kickoff, 2016 Interactive Open House, and 2017 Open House)
- MAPC's Fall Council meetings (2016 and 2017)

Surveys and Comments

MPO staff distributed an electronic survey asking stakeholders for input about transportation needs and opportunities for improving transportation. Surveys were posted on the *Destination 2040* website, sent out via email and Twitter, and included in a *TRANSREPORT* blog post. Two hundred and fifty individuals responded to the survey and the responses are included in the overall summary of comments in Chapters 4 through 9.

Staff also received comments and questions related to transportation needs throughout the development of the LRTP Needs Assessment and during a review period for the Draft Needs Assessment Summary and Recommendations. Staff responded using the same means of communication through which the comment or inquiry was made and presented all written comments to the MPO for consideration.

CONCLUSION

MPO staff conducted public outreach for the *Destination 2040* Needs Assessment to help stakeholders and the public understand, follow, and participate in the development of *Destination 2040*. Through online and in-person communications and outreach, staff received over 2,000 ideas about needs and opportunities for improving the transportation system. Staff gathered and summarized this input and incorporated stakeholders' interests into the Needs Assessment Summary and Recommendations. This draft document was returned to the public for review and comment. Staff responded to these comments and concerns and incorporated them into its recommendations for how to address the region's transportation needs in Chapters 4 through 9 of the final Needs Assessment. The public comments are summarized by goal area in the "Stakeholder/Public Input" sections in Chapters 4 through 9.

appendix

E

Destination 2040

Vision, Goals, and Objectives

BACKGROUND

During each Long-Range Transportation Plan (LRTP) development cycle, the Boston Region Metropolitan Planning Organization (MPO) has the opportunity to review and revise its vision, associated goals, and objectives. As part of developing the *Charting Progress to 2040* LRTP in 2014 and 2015, the MPO used scenario planning to inform potential revisions to the vision, goals, and objectives. Specifically, as part of its Capacity Management and Mobility goal area, the MPO used scenario planning to determine if it should give priority to a congestion-reduction program for major arterials and express highways, or if it should prioritize lower-cost multimodal improvements. Scenario planning led the MPO to emphasize capacity management through low-cost improvements. Once the scenario planning was completed, the revised vision, goals, and objectives were adopted by the MPO as part of *Charting Progress to 2040* (adopted in 2015). The vision, goals, and objectives framework forms the basis of the criteria used in making investment decisions in the LRTP and Transportation Improvement Program.

During the development of *Destination 2040*, staff conducted outreach about the transportation needs in the MPO region. Staff also collected and analyzed data through its studies, travel-demand modeling analyses, and performance-based planning and programming process (PBPP).

Staff found that most of the *Charting Progress to 2040* goals and objectives were broad enough to cover the topics and concerns identified via public input and analysis results. However, some changes did seem warranted for *Destination 2040* to

1. better align the objectives with the roles and responsibilities of the MPO;
2. incorporate additional feedback heard during outreach; and
3. incorporate new planning requirements.

Based on the public's input, the Transportation Equity goal contains the most changes.

This appendix cites the MPO's *Charting Progress to 2040* goals and objectives, revisions, and the rationale for the *Destination 2040* revisions. The *Charting Progress to 2040* vision and goals are shown in *italics*, and the revisions for *Destination 2040* are shown in **bold**. The objectives are listed in their own tables, with the *Destination 2040* revisions shown in **bold**, along with staff's rationale for the revisions. An additional column was included in Table E-3, for the Capacity Management and Mobility goal, so that staff and the MPO could review the objectives by mode to determine if all areas were being addressed; this led to a change in the order of the listed objectives.

MPO VISION

Charting Progress to 2040 Vision:

The Boston Region Metropolitan Planning Organization envisions a modern transportation system that is safe, uses new technologies, and provides equitable access, excellent mobility, and varied transportation options—in support of a sustainable, healthy, livable, and economically vibrant region.

Destination 2040 Changes:

*The Boston Region Metropolitan Planning Organization envisions a modern, **well-maintained** transportation system that **supports a sustainable, healthy, livable, and economically vibrant region. To achieve this vision, the transportation system must be safe and resilient; incorporate emerging** technologies; **and** provide equitable access, excellent mobility, and varied transportation options.*

The *Charting Progress to 2040* vision incorporated themes from all of the goal areas. Staff proposed the revisions for *Destination 2040* to emphasize that the System Preservation goal includes a well-maintained and resilient transportation system. It also includes editorial revisions.

SAFETY GOAL AREA

Staff found that the *Charting Progress to 2040* safety goal and objectives were broad enough to cover the topic areas and concerns identified through public input and analysis results. The *Destination 2040* revisions to the objectives outlined in Table E-1 were designed to incorporate additional types of safety events besides crashes, and to align better the objectives with the roles and responsibilities of the MPO, which are focused on capital investment as opposed to operations.

Charting Progress to 2040 and Destination 2040 Goal

- **Charting Progress to 2040 Goal:** Transportation by all modes will be safe
- **Destination 2040 Goal:** No changes

Charting Progress to 2040 and Destination 2040 Objectives

**Table E-1
Safety Objectives**

Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Reduce number and severity of crashes, all modes	Reduce the number and severity of crashes and safety incidents for all modes	Change is more inclusive of transit system safety events that are not crashes
Reduce serious injuries and fatalities from transportation	Same	N/A
Protect transportation customers and employees from safety and security threats	Make investments and support initiatives that help protect transportation customers, employees, and the public from safety and security threats	Focuses on the MPO's role, capital investment, rather than operations

MPO = Boston Region Metropolitan Planning Organization. N/A = Not applicable or available.

Source: Boston Region MPO.

SYSTEM PRESERVATION GOAL AREA

Staff found that the *Charting Progress to 2040* System Preservation goal and its objectives were broad enough to cover the topics and concerns identified through public input and analysis. However, staff proposed to incorporate modernization into the System Preservation goal statement. *Destination 2040* revisions to the objectives were restructured to include broader objectives in three categories—maintenance, modernization, and resiliency. With that change, staff also requested the MPO's feedback on potentially changing the goal name from System Preservation to System Preservation **and Modernization**. The MPO agreed with this change.

Although resiliency was included in one of the *Charting Progress to 2040* objectives, staff also proposed to include resiliency in the System Preservation goal statement. Addressing climate change remains a priority for the MPO and has become a core goal of the Commonwealth. Feedback from public outreach also indicated the importance of creating a resilient transportation network to mitigate climate change and maintain existing sidewalks.

Charting Progress to 2040 and Destination 2040 Goal

- **Charting Progress to 2040 Goal:** *Maintain the transportation system*
- **Destination 2040 Goal:** *Maintain **and modernize** the transportation system **and plan for its resiliency***

Charting Progress to 2040 and Destination 2040 Objectives

Table E-2
System Preservation and Modernization Objectives

Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Improve condition of on- and off-system bridges	Maintain the transportation system, including roadway, transit, and active transportation infrastructure, in a state of good repair	Creates a broader goal to include the infrastructure previously identified in existing objective—bridges, pavement, and transit; but also to include sidewalks (identified as a need in public outreach)
Improve pavement conditions on MassDOT-monitored roadway system	Delete	This objective was included in the first objective
Maintain and modernize capital assets, including transit assets, throughout the system	Modernize transportation infrastructure across all modes	Focuses on modernization, reducing overlap with objective above, which focuses on maintenance; this modernization objective could address obsolete assets and incorporate new technologies into existing systems
Prioritize projects that support planned response capability to existing or future extreme conditions (sea level rise, flooding, and other natural and security-related man-made impacts)	Same	N/A

MassDOT = Massachusetts Department of Transportation. N/A = Not applicable or available.

Source: Boston Region MPO.

CAPACITY MANAGEMENT AND MOBILITY GOAL AREA

As a result of outreach and analysis, staff believed that while the Capacity Management and Mobility goal required little modification, the objectives required some rearrangement and minor modifications. Staff believed that many of the region's needs were covered under the *Charting Progress to 2040* goals and objectives.

The revision to the *Charting Progress to 2040* goal to “increase transportation options” reflects analysis as well as public input that the MPO should promote transit, walking, and biking while attempting to support congestion mitigation. It should also remain flexible in the face of emerging technologies and mobility paradigms such as connected and autonomous vehicles and transportation network companies such as Uber and Lyft.

In addition, the MPO must respond to a wide variety of federal performance metrics, as well as values and mandates that derive from state-level legislation. The updates to the Capacity Management and Mobility goals and objectives were intended to capture public input and new MPO commitments, as well as to align the objectives better with the MPO's role in the transportation planning process.

Charting Progress to 2040 and Destination 2040 Goal

- **Charting Progress to 2040 Goal:** *Use existing facility capacity more efficiently and increase healthy transportation capacity*
- **Destination 2040 Changes:** *Use existing facility capacity more efficiently and increase transportation options*

Charting Progress to 2040 and Destination 2040 Objectives

As mentioned earlier, Table E-3 contains an additional column that allowed the MPO and staff to review the objectives by mode to determine if all areas are being addressed. This led to a change in the order of the listed objectives.

Table E-3
Capacity Management and Mobility Objectives

Mode	Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
All	Improve access to/ accessibility of transit and active transportation modes	Improve access to and accessibility of all modes, especially transit and active transportation	<p>Accessibility of transportation modes, especially new/emerging modes, is a major concern for many in MPO region (learned from outreach).</p> <p>Accessibility objectives are also included in the transportation equity and economic vitality goal areas</p>
Roadway	Implement roadway management/operations strategies, constructing improvements to bicycle/ pedestrian network, and supporting community-based transportation	Support implementation of roadway management and operations strategies to improve travel reliability, mitigate congestion, and support non-single-occupant vehicle travel options	Focuses text on MPO's role (capital investment rather than management/ operations). Also incorporates reliability objectives of federal PBPP
Roadway	Emphasize capacity management through low-cost investments; prioritize projects that focus on lower-cost operations/ management-type improvements such as intersection improvements, Complete Streets solutions	Emphasize capacity management through low-cost investments; prioritize projects that focus on lower-cost operations/ management-type improvements such as intersection improvements, transit priority , and Complete Streets solutions	Links roadway objective to transit reliability objective by including transit priority as a low-cost improvement concept
Transit	Improve reliability of transit	Same	N/A
Transit	Increase percentage of population and employment within one-quarter mile of transit stations and stops	Same	N/A
Transit/ Accessibility	Support community-based and private-initiative services and programs to meet last-mile, reverse commute, and other non-traditional transit/ transportation needs, including those of people 75 years old or older and people with a disability	Support community-based and private-initiative services and programs to meet first-/last-mile , reverse commute, and other non-traditional transit/transportation needs, including those of people 75 years old or older and people with a disability	Corrects term to include first- as part of the first-/last-mile service

Mode	Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Transit/ Parking	Increase automobile and bicycle parking capacity and usage at transit stations	Support strategies to better manage automobile and bicycle parking capacity and usage at transit stations	Qualifies language to suggest MPO wants to support concepts such as remote parking shuttles/ empty lot leases rather than constructing new spots
Bicycle/ Pedestrian	Create connected network of bicycle and accessible sidewalk facilities (both regionally and in neighborhoods) by expanding existing facilities and closing gaps	Fund improvements to bicycle/pedestrian networks aimed at creating a connected network of bicycle and accessible sidewalk facilities (both regionally and in neighborhoods) by expanding existing facilities and closing gaps	Focuses text on MPO's role of funding capital investments
Bicycle	Increase percentage of population and places of employment with access to bicycle facilities	Increase percentage of population and places of employment with access to facilities on the bicycle network	Links to the previous objective and clarifies that bicycle facilities are most valuable when connected in a network
Freight	Eliminate bottlenecks on freight network	Eliminate bottlenecks on freight network/ improve freight reliability	Incorporates freight reliability objectives of federal PBPP
Freight/ Intermodal	Enhance intermodal connections	Enhance freight intermodal connections	Specifies freight intermodal connection

N/A = Not applicable or available. MPO = Boston Region Metropolitan Planning Organization. PBPP = Performance-based planning and programming process.

Source: Boston Region MPO.

TRANSPORTATION EQUITY GOAL AREA

The *Destination 2040* changes to the goals and objectives for Transportation Equity reflect

- Public input and analyses documented in the Needs Assessment;
- Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) Title VI, environmental justice (EJ), and other nondiscrimination guidance; and
- Consideration of all equity populations¹ in all aspects of the MPO's planning and decision-making process beyond people who identify as minority or are members of low-income households.

¹ Equity populations are populations that are protected by Title VI, EJ, or other nondiscrimination mandates: people who identify as minority, have limited English proficiency, are 75 years old or older or 17 years old or younger, or have a disability; or are members of low-income households.

The changes tie the equity goal more closely with the other MPO goals, recognizing that equity is integral to all MPO activities. To that end, the MPO also considers the effects of its investments on equity populations in the context of the other goal areas, even if they are not stated as objectives—for example, this could include analyzing the safety effects on equity populations.

Because of themes that have emerged as part of the Needs Assessment, staff proposed to add two new objectives—improved accessibility for people with a disability and investments to support transportation needs of the elderly (people 75 years old or older) and youth (people 17 years old or younger) populations in the region. While transportation needs of the elderly and youth populations, and people with a disability, are encompassed in other objectives, their prominence in the Needs Assessment suggests that they deserve particular attention. In addition, the region’s elderly population is projected to increase.

The *Charting Progress to 2040* goal and objectives were refined to focus on the potential effects—whether benefits or burdens—of MPO investments on equity populations. This change reflects the MPO’s recent and planned work that examines the potential benefits and burdens associated with MPO investments. In addition, the objective related to public outreach was removed because the goals and objectives are concerned with transportation system outcomes, rather than the MPO’s planning processes. This change in no way reflects the MPO’s commitment to ensuring that all people have meaningful opportunities to be engaged in MPO activities. Instead, this commitment will be described in detail in a revised MPO Public Participation Plan, and documented in the public outreach process for the LRTP, *Destination 2040*.

The changes to the *Charting Progress to 2040* goal and objectives also brought them into alignment with guidance from FHWA and FTA by clarifying which equity populations are covered and by expanding the populations that are covered to include all equity populations, per federal guidance. The *Charting Progress to 2040* goal and objectives refer only to minority and low-income populations, whereas FTA and FHWA recommend including all populations protected by federal mandates throughout the entire MPO planning process.

Charting Progress to 2040 and Destination 2040 Goal

- **Charting Progress to 2040 Goal:** *Provide comparable transportation access and service quality among communities, regardless of income level or minority population*
- **Destination 2040 Changes:** *Ensure that all people receive comparable benefits from, and are not disproportionately burdened by, MPO investments, regardless of race, color, national origin, age, income, ability, or sex*

Charting Progress to 2040 and Destination 2040 Objectives

**Table E-4
Transportation Equity Objectives**

Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Target investments to areas that benefit high percentage of low-income and minority populations	Prioritize MPO investments that benefit equity populations*	Focuses on effects of transportation on people, rather than on where people live; people who live near a project may not necessarily benefit from it. Also, the populations covered by this objective are expanded to include all equity populations, as recommended by federal guidance
Minimize any burdens associated with MPO-funded projects in low-income/minority areas	Minimize potential harmful environmental, health, and safety effects of MPO-funded projects for all equity populations*	States types of effects that will be addressed, which relate directly to other MPO goal areas. Also, the populations covered by this objective are expanded to include all equity populations, as recommended by federal guidance
Break down barriers to participating in MPO-decision making	Delete	Because goals/objectives relate to transportation system outcomes, this and other process-oriented objectives will be described in future revisions to MPO's Public Participation Plan and included in public-outreach chapter of <i>Destination 2040</i>
N/A	Promote investments that support transportation for all ages (age-friendly communities)	A new objective based on results of the needs assessment; transportation needs of youth and elderly populations emerged as a major theme
N/A	Promote investments that are accessible to all people regardless of ability	A new objective based on results of the needs assessment; ensuring that all people have access to transportation regardless of ability emerged as a major theme

* Equity populations include people who identify as minority, have limited English proficiency, are 75 years old or older or 17 years old or younger, or have a disability; or are members of low-income households.

N/A = Not applicable or available. MPO = Boston Region Metropolitan Planning Organization.

Source: Boston Region MPO.

CLEAN AIR/CLEAN COMMUNITIES GOAL AREA

Staff proposed to change the name of the goal area from Clean Air/Clean Communities to Clean Air/**Sustainable** Communities, as “Sustainable Communities” could include more types of environmental initiatives. The MPO agreed with this change. Staff proposed changes to the objectives to include other regional and state plans and policies that were being implemented in the region regarding climate change.

Charting Progress to 2040 and Destination 2040 Goals

- **Charting Progress to 2040 Goal:** *Create an environmentally friendly transportation system*
- **Destination 2040 Changes:** *No changes*

Charting Progress to 2040 and Destination 2040 Objectives

Table E-5
Clean Air/Sustainable Communities Objectives

Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Reduce GHG emissions generated in Boston region by all transportation modes as outlined in the GWSA	Reduce greenhouse gases generated in Boston region by all transportation modes	Change makes reduction of GHG emissions broader than those addressed in the GWSA; this would cover all work undertaken in the region and Commonwealth
Reduce other transportation-related pollutants	Same	N/A
Minimize negative environmental impacts of the transportation system	Same	N/A
Support land use policies consistent with smart and healthy growth	Support land use policies consistent with smart, healthy, and resilient growth	Change adds resilient to refer to clean energy policies

GHG = greenhouse gas. GWSA = Global Warming Solutions Act. N/A = Not applicable or available.

Source: Boston Region MPO.

ECONOMIC VITALITY GOAL AREA

After conducting analysis and outreach concerning the region’s needs, staff found that the majority of concerns were addressed in the *Charting Progress to 2040* Economic Vitality goal and objectives. However, staff proposed a change to one objective based on public input regarding the workforce population—that it should be inclusive of all populations. Other changes include the incorporation of freight as an important part of targeted development, inclusion of *Focus40* “Priority Places” as targeted development sites and the reference to the regional land use plan.

Charting Progress to 2040 and Destination 2040 Goals

- **Charting Progress to 2040 Goal:** *Ensure our transportation network provides a strong foundation for economic vitality*
- **Destination 2040 Changes:** *No changes*

Charting Progress to 2040 and Destination 2040 Objectives

Table E-6
Economic Vitality Objectives

Charting Progress to 2040 Objective	Destination 2040 Objective	Rationale
Respond to mobility needs of 25–34-year-old workforce	Respond to mobility needs of the workforce population	Objective should address mobility needs of all populations in the workforce including older adults, youth, persons with disabilities, and equity populations, not just the 25–34-year-old age group.
Minimize burden of housing/ transportation costs for residents in the region	Same	N/A
Prioritize transportation investments that serve targeted development sites	Prioritize transportation investments that serve residential, commercial, and logistics targeted development sites and “Priority Places” identified in MBTA’s Focus 40 plan	This identifies types of targeted development to include freight as an important part of economic activity. Included “Priority Places” based on a comment received during the public comment period.
Prioritize transportation investments consistent with compact-growth strategies of MetroFuture	Prioritize transportation investments consistent with compact-growth strategies of the regional land use plan	Changed MetroFuture to “the regional land use plan” since this plan is currently being updated as MetroCommon 2050.

N/A = Not applicable or available.

Source: Boston Region MPO.



CONCLUSION

The MPO discussed the proposed changes to the vision, goals, and objectives at its November 15, 2018, meeting. The proposed changes were made available for public comment and the MPO conducted a survey to solicit feedback. At the MPO's meeting on January 17, 2019, after reviewing public comments and survey responses, the MPO agreed to the revised vision, goals, and objectives. The MPO will use the revised vision and goals to guide all of its planning efforts and investment decisions.

appendix

Bibliography

F

CHAPTER 4

American Public Transit Association (APTA). "Positive Train Control." Accessed August 13, 2018. <http://www.apta.com/resources/hottopics/PTC/Pages/default.aspx>.

California PATH Program Institute of Transportation Studies University of California, Berkeley. "Investigating the Potential Benefits of Broadcasted Signal Phase and Timing (SPaT) Data under IntelliDriveSM. 2011." Accessed January 22, 2019. http://www.cts.virginia.edu/wp-content/uploads/2014/04/PFS_SPAT99_Final.pdf.

Casualty Actuarial Society Automated Vehicles Task Force. "Restating the National Highway Transportation Safety Administration's National Motor Vehicle Crash Causation Survey for Automated Vehicles 2014." *Casualty Actuarial Society E-Forum*, Fall 2014: Volume 1. Accessed January 23, 2019. https://www.casact.org/pubs/forum/14fforum/CAS%20AVTF_Restated_NMVCCS.pdf.

Central Transportation Planning Staff. "Connected and Autonomous Vehicles and the Boston MPO—A First Look." December 2017. Accessed January 22, 2019. http://www.ctps.org/data/pdf/studies/other/Connected_and_Autonomous_Vehicles.pdf.

City of Edmonton. "Metro Line: Fact Sheet—Operations.2015." Accessed January 22, 2019. https://www.edmonton.ca/transportation/Metro_Line_Operations_Fact_Sheet_August_2015.pdf.

Commission on the Future of Transportation in the Commonwealth. "Choices for Stewardship: Recommendations to Meet the Transportation Future." Volume 1: 48. Accessed January 22, 2019. <https://www.mass.gov/files/documents/2019/01/10/FOTCVolume1.pdf>.

Commonwealth of Massachusetts. "Massachusetts 2018 Strategic Highway Safety Plan, 2019." Massachusetts Strategic Highway Safety Plan. Accessed January 22, 2019. https://www.mass.gov/files/documents/2019/01/18/dot_SHSP_2018.pdf.

Durso, Holly and Nickle, Ron. "MBTA Quarterly Safety Report: January 29, 2018 Presentation." Accessed January 22, 2019. <https://cdn.mbta.com/sites/default/files/fmcb-meeting-docs/2018/january/2018-01-29-fmcb-quarterly-safety-report.pdf>.

Federal Transit Administration. "National Public Transportation Safety Plan. 2017." Accessed December 7, 2018. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/National%20Public%20Transportation%20Safety%20Plan_1.pdf.

Massachusetts Bay Transportation Authority (MBTA) Fiscal Management and Control Board. "MBTA Strategic Plan, 2017." Accessed January 22, 2019. <https://cdn.mbta.com/sites/default/files/fmcb-meeting-docs/reports-policies/2017-mbta-strategic-plan.pdf>.

Massachusetts Department of Transportation. "2015 Top Crash Locations Report. 2018." Accessed December 10, 2018. <https://www.mass.gov/files/documents/2018/05/31/15TopCrashLocationsRpt.pdf>.

Massachusetts Department of Transportation. "2019–23 Capital Investment Plan Update. 2018." Accessed January 22, 2019. <https://www.mass.gov/service-details/capital-investment-plan-cip>.

Massachusetts Department of Transportation. "Top Crash Locations and Maps." Accessed January 22, 2019. <https://www.mass.gov/service-details/top-crash-locations-and-maps>.

Massachusetts Department of Transportation. "Tracker 2017: MassDOT's Annual Performance Report 2017." (Revised March 2018). Accessed December 10, 2018. <https://www.mass.gov/files/documents/2018/04/20/Tracker2017.pdf>.

Massachusetts Department of Transportation. "Tracker 2018: MBTA Performance." Accessed January 22, 2019. <https://massdottracker.com/mbta>.

Meyer, Michael D. "The Role of the Metropolitan Planning Organization (MPO) In Preparing for Security Incidents and Transportation System Response." Accessed December 7, 2018. <https://www.planning.dot.gov/Documents/Securitypaper.htm>.

Nickle, Ron. "Quarterly Safety Report Presentation at the January 29, 2018 MBTA Fiscal Management and Control Board Meeting." Accessed January 22, 2019. <https://www.mbta.com/events/2018-01-29/fiscal-management-control-board-meeting>.

Smith et al. "Benefits Estimation Framework for Automated Vehicle Operations, 2015." Volpe National Transportation Systems Center. August 2015: 13–14. Accessed January 23, 2019. https://rosap.ntl.bts.gov/view/dot/4298/dot_4298_DS1.pdf.

UMassSafe. "Massachusetts Law Enforcement Crash Report Data Dictionary." Accessed December 7, 2018. <http://www.umasstransportationcenter.org/images/umtc/UMassSafe/Massachusetts%20Crash%20Report%20Data%20Dictionary.pdf>.

US Department of Transportation Federal Railroad Administration. "Positive Train Control (PTC) Legislation & Regulations." Accessed August 13, 2018. <https://www.fra.dot.gov/Page/P0564>.

US Department of Transportation Federal Transit Administration. "Fact Sheet: Public Transportation Agency Safety Plans Notice of Proposed Rulemaking (NPRM)." Accessed January 22, 2019. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Fact_Sheet_Public_Transportation_Agency_Safety_Plans_Notice_of_Proposed_Rulemaking_NPRM.pdf.

US Department of Transportation Federal Transit Administration. "National Public Transportation Safety Plan 2017." Accessed January 22, 2019. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/National%20Public%20Transportation%20Safety%20Plan_1.pdf.

US Department of Transportation National Highway Traffic Safety Administration. "Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey." Traffic Safety Facts: Crash Stats. February 2015. Accessed January 22, 2019. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>.

CHAPTER 5

Capital District Transportation Committee. "CDTC Regional Sidewalk Inventory." Accessed May 27, 2019. http://www.cdtcmpo.org/images/bike_ped/CDTC_Regional_Sidewalk_Inventory_Report.pdf.

City of Boston. "Go Boston 2030." Accessed May 27, 2019. <https://www.boston.gov/departments/transportation/go-boston-2030>.

Commission on the Future of Transportation in the Commonwealth. "Choices for Stewardship: Recommendations to Meet the Transportation Future." Volume 1: 33, 57. Accessed January 22, 2019. <https://www.mass.gov/files/documents/2019/01/10/FOTCVolume1.pdf>.

Commonwealth of Massachusetts. "Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth." September 16, 2016. Accessed May 27, 2019. <https://www.mass.gov/executive-orders/no-569-establishing-an-integrated-climate-change-strategy-for-the-commonwealth>.

Commonwealth of Massachusetts. "Municipal Vulnerability Preparedness." Resilient MA. Accessed May 27, 2019. <http://resilientma.org/mvp#resources>.

Federal Highway Administration. "Tables of Frequently Requested NBI Information." Bridges and Structures. Accessed May 27, 2019. <https://www.fhwa.dot.gov/bridge/britab.cfm>.

Federal Transit Administration. "Circular FTA C 5010.1E: Award Management Requirements." July 16, 2018. Accessed May 27, 2019. <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/regulations-and-guidance/fta-circulars/58051/5010-1e-circular-award-management-requirements-7-16-18.pdf>.

Federal Transit Administration. "Default Useful Life Benchmark (ULB) Cheat Sheet." October 2016. Accessed May 27, 2019. <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA%20TAM%20ULB%20Cheat%20Sheet%202016-10-26.pdf>.

Massachusetts Bay Transportation Authority (MBTA) Fiscal Management and Control Board. "Focus40." March 2019. Accessed May 27, 2019. <https://cdn.mbta.com/sites/default/files/fmcb-meeting-docs/reports-policies/2017-mbta-strategic-plan.pdf>.

Massachusetts Bay Transportation Authority (MBTA) Fiscal Management and Control Board. "MBTA Strategic Plan, 2017." Accessed May 27, 2019. <https://cdn.mbta.com/sites/default/files/fmcb-meeting-docs/reports-policies/2017-mbta-strategic-plan.pdf>.

Massachusetts Bay Transportation Authority. "MBTA Transit Asset Management Plan." Accessed May 27, 2019. https://www.ctps.org/data/calendar/pdfs/2019/MPO_0321_MBTA_TAM_Plan_2018.pdf.

Massachusetts Department of Transportation. "2017 Massachusetts Road Inventory Year End Report." March 2018. Accessed May 2019. https://www.mass.gov/files/documents/2019/03/27/2018-ri-ye-final.pdf?_ga=2.248539086.810898134.1559650152-1501544356.1550760522.

Massachusetts Department of Transportation. "MassDOT Fully Accessible Vehicle Guide." April 2018. Accessed May 27, 2019. <https://www.mass.gov/files/documents/2018/06/06/MassDOT%20Fully%20Accessible%20Vehicle%20Guide%20-%20April%202018.pdf>.

Massachusetts Department of Transportation. "Accelerated Bridge Program (ABP) Update." Accessed May 27, 2019. <https://www.mass.gov/service-details/accelerated-bridge-program-abp-update>.

Massachusetts Department of Transportation. "Accelerated Bridge Program: Active Project Listing." September 1, 2018. Accessed May 27, 2019. https://www.mass.gov/files/documents/2018/10/26/activeProjects_090118.pdf.

Massachusetts Department of Transportation. "Annual Report of the Performance and Asset Management Advisory Council." December 2018: 6, 13–14. Accessed May 27, 2019. https://www.mass.gov/files/documents/2019/01/02/2018_PAMAC_AnnualReport.pdf.

Massachusetts Department of Transportation. "Central Artery and Tunnel Pilot Project." Climate Change Resiliency. Accessed May 27, 2019. <https://www.mass.gov/info-details/climate-change-resiliency#central-artery-and-tunnel-pilot-project>.

Massachusetts Department of Transportation. "Massachusetts Pedestrian Transportation Plan." May 2019. Accessed May 27, 2019. <https://massdot.maps.arcgis.com/apps/MapJournal/index.html?appid=96339eb442f94ac7a5a7396a337e60c0>.

Metropolitan Area Planning Council. "Local Access Score by MAPC." Accessed May 27, 2019. <http://localaccess.mapc.org>.

CHAPTER 6

Berrebi, Simon J., Etienne Hans, Nicolas Chiabaut, Jorge A. Laval, Ludovic Leclercq, and Kari E. Watkins. "Comparing bus holding methods with and without real-time predictions." *Transportation Research Part C* 87 (2018): 197–211.

Berrebi, Simon J., Kari E. Watkins, and Jorge Laval. "A real-time bus dispatching policy to minimize passenger wait on a high frequency route." *Transportation Research Part B* 81 (2015): 377–389.

Capital District Transportation Committee. "CDTC's Regional Sidewalk Inventory." (2018) Accessed May 2019. http://www.cdtcmpto.org/images/bike_ped/CDTC_Regional_Sidewalk_Inventory_Report.pdf.

Fabian, Joshua. "Improving High-Frequency Transit Reliability: A Case Study of the MBTA Green Line Through Simulation and Field Experiments of Real-Time Control Strategies." Cambridge, MA: Massachusetts Institute of Technology Master's Thesis (2017). Accessed June 5, 2018. https://www.ssti.us/wp/wp-content/uploads/2016/01/TRB_2016_Parking_causality_TRB_compendium.pdf.

Maltzan, David. "Using Real-time Data to Improve Reliability on High-Frequency Transit Services." Cambridge, MA: Massachusetts Institute of Technology Master's Thesis (2015). Accessed June 5, 2018. <https://dspace.mit.edu/handle/1721.1/99541>.

McCahill, Christopher, Norman Garrick, Carol Atkinson-Palombo, and Adam Palinski.

"Effects of Parking Provision on Automobile Use in Cities: Inferring Causality." *Transportation Research Record* 2543 (2016): 159–165.

National Academies of Sciences, Engineering, and Medicine, Transportation Research Board, Transit Cooperative Research Program, Sharon Feigon, and Colin Murphy. "Broadening Understanding of the Interplay Between Public Transit, Shared Mobility, and Personal Automobiles." *TCRP Report 195*. The National Academies Press (2018). Accessed June 5, 2018. <https://www.nap.edu/catalog/24996/broadening-understanding-of-the-interplay-between-public-transit-shared-mobility-and-personal-automobiles>.

National Association of City Transportation Officials. "Bike-share in the U.S., 2017." Accessed June 5, 2018. <https://nacto.org/bike-share-statistics-2017/>.

National Association of City Transportation Officials. *Transit Street Design Guide*. Chicago, IL: Island Press (2016). <https://nacto.org/publication/transit-street-design-guide/>.

Pangilinan, Christopher, Nigel Wilson, and Angela Moore. "Bus Supervision Deployment Strategies and the Use of Real-Time AVL for Improved Bus Service Reliability." Submitted for presentation and publication to the 87th Annual Meeting of the Transportation Research Board January 13–17, 2008.

Shoup, Donald. "Cruising for Parking." *Access Magazine* 30 (Spring 2007): 1–7. Accessed June 5, 2018. <http://shoup.luskin.ucla.edu/wp-content/uploads/sites/2/2015/02/CruisingForParkingAccess.pdf>.

CHAPTER 8

Boston Transportation Department. "Go Boston 2030: Imagining Our Transportation Future." March 2017: 1–224. https://www.boston.gov/sites/default/files/go_boston_2030_-_full_report_to_download.pdf.

Commission on the Future of Transportation in the Commonwealth. "Choices for Stewardship: Recommendations to Meet the Transportation Future." Volume 1. January 2019: 1–74. <https://www.mass.gov/files/documents/2019/01/10/FOTCVolume1.pdf>.

Commonwealth of Massachusetts. "MA GHG Emission Trends." Accessed August 23, 2018. <https://www.mass.gov/service-details/ma-ghg-emission-trends>.

Metropolitan Area Planning Council. "Metro Boston Regional Climate Change Adaptation Strategy Report, 2014." June 30, 2014: 1–120. https://www.boston.gov/sites/default/files/metro_boston_regional_climate_adaptation_strategy_report.pdf

Metropolitan Area Planning Council. "State of Equity in Metro Boston." MAPC Regional Indicators. Accessed December 14, 2018. http://www.regionalindicators.org/topic_areas/7.

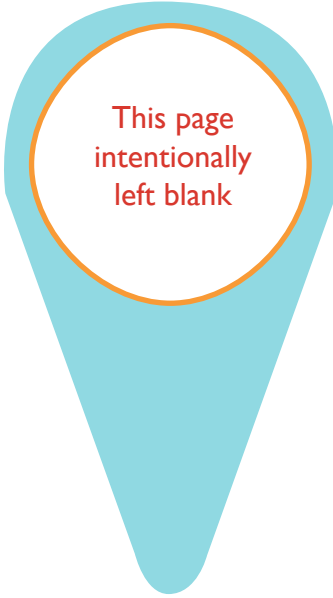
Schlegel, Christina. "Climate Justice for the City of Boston: Visioning Policies and Processes." January 2018: 1–48. <http://michelleforboston.com/wp-content/uploads/2018/02/CJ-Report.pdf>.

US Environmental Protection Agency. "Fast Facts on Transportation Greenhouse Gas Emissions." Green Vehicle Guide. Accessed August 23, 2018. <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>.

US Environmental Protection Agency. "Transportation and Climate Change." *Carbon Pollution from Transportation*. Accessed August 23, 2018. <https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation>.

US Environmental Protection Agency. "How Mobile Source Pollution Affects Your Health." Accessed August 23, 2018. <https://www.epa.gov/mobile-source-pollution/how-mobile-source-pollution-affects-your-health>.

US Environmental Protection Agency. "Particulate Matter (PM) Basics." Accessed August 23, 2018. <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>.



This page
intentionally
left blank