

Chapter 6—Charting Performance

6.1 OVERVIEW OF PERFORMANCE-BASED PLANNING

6.1.1 Background of Performance-Based Planning

Increasingly, over the past two decades, transportation agencies have been utilizing “performance management”—a strategic approach that uses performance data to support decisions to help achieve desired outcomes for their multimodal transportation systems. Performance management is credited with improving project and program delivery, informing investment decision making, focusing staff on leadership’s priorities, and providing greater transparency and accountability to the public.

Performance-based planning and programming (PBPP) refers to transportation agencies’ application of performance management in their planning and programming processes. For MPOs, this includes a range of activities and products undertaken by a transportation agency, together with other agencies, stakeholders, and the public as part of the 3C Metropolitan Transportation Planning Process. This includes developing:

- Long-range transportation plans (LRTPs)
- Other plans and processes (including those that are federally required, such as Strategic Highway Safety Plans, Asset Management Plans, the Congestion Management Process, Transit Agency Asset Management Plans, and Transit Agency Safety Plans, as well as others that are not required)
- Programming documents, including state and metropolitan Transportation Improvement Programs (STIPs and TIPs)

The goal of PBPP is to ensure that transportation investment decisions—both long-term planning and short-term programming—are based on their ability to meet established goals.

The cornerstone of *Moving Ahead for Progress in the 21st Century’s* (MAP-21) highway program transformation is this movement toward performance- and outcome-based results. States will invest resources in projects to achieve individual targets that collectively will make progress toward national goals.

6.1.2 Requirements of Performance-Based Planning

The US Secretary of Transportation, in consultation with states, MPOs, and other stakeholders, established performance measures for fatalities and serious injuries to fulfill the Highway Safety Improvement Program; proposed performance measures for pavement conditions for Interstate and National

Highway System (NHS) bridge conditions, and general performance of the Interstate and NHS; and drafted performance measures to assess traffic congestion and on-road mobile source emissions. States and MPOs will set performance targets to support these measures; and state and metropolitan plans will describe how program and project selection would help to achieve the targets.

6.1.3 Status of Performance-Based Planning

The Boston Region MPO's transition to performance-based planning is underway in anticipation of MAP-21 performance-measure requirements. The MPO has:

- Established goals and objectives that align with national goals
- Developed performance measures
- Analyzed some performance measure trends over time to identify priorities and prioritized investments that advance its goals and objectives

The following sections of this chapter demonstrate how transportation investments over the next 25 years would advance the MPO's goals and objectives.

6.2 DEMONSTRATING PROGRESS TOWARD GOALS AND OBJECTIVES

MPO investments over the life of the LRTP commit funding to specific projects and reserve future funding for different project types through investment programs. In reporting the benefits of specific projects, MPO staff conducted project-level assessments to determine each project's impact in advancing MPO goals through performance measures.

In order to estimate the impact of future projects to be funded through investment programs, MPO staff used sketch-planning and travel demand modeling techniques to forecast progress toward MPO goals through performance measures. For the Intersection Improvements, Complete Streets, Bicycle and Pedestrian, and Community Transportation programs, MPO staff first analyzed a sample of past investments to determine typical project costs and benefits. MPO staff then used these assumptions to estimate the impact of future investments, and anticipated progress toward goals and objectives.

6.2.1 Safety

The set of LRTP projects and programs advance the MPO's safety goal to provide safe transportation for all modes by prioritizing improvements at high-crash locations. High-crash locations are those with the highest crash severity based on fatalities, injuries, and property damage.

High-crash Locations

Overall, safety is improving in the region. Between 2006 and 2012, traffic fatalities declined by 11 percent, and included fewer automobile, truck, pedestrian, and bicycle fatalities. Similarly, total traffic crashes and injuries declined by 21 percent and 27 percent, respectively.

Despite these overall gains, crashes and injuries for pedestrians and bicyclists specifically rose during this same period. Bicyclists and pedestrians remain vulnerable to injury; between 2006 and 2012, roughly two-thirds of pedestrian and bicycle crashes resulted in injury. In addition, there are still a number of high-crash locations throughout the Boston MPO region, including nearly 80 of the Top-200 Crash Locations statewide.

L RTP investments propose safety improvements at approximately 120 high-crash locations, including multiple truck, bicycle, and pedestrian high-crash locations to reduce fatalities and serious injuries in the region.

Major Infrastructure investments consist of 12 projects that would implement safety improvements at 26 high-crash locations, including seven (7) truck high-crash locations. The Route 128 Add-a-Lane project will widen 3.25 miles of I-95 in Needham and Wellesley to install an additional 12-foot travel lane and 10-foot shoulder in each direction. This will address serious safety issues. Adding a fourth full-time travel lane will eliminate using the breakdown lane during peak periods. Adding collector roads between Highland Avenue and Kendrick Streets will provide safer weaving movements between the interchanges.

L RTP intersection investments will provide safety improvements for automobiles, trucks, bicyclists, and pedestrians at 16 locations. Within the FFY 2016–20 time band, intersection improvements at Derby Street, Whiting Street (Route 53) and Gardner Street in Hingham and Middle Street, Libbey Industrial Parkway and Tara Drive in Weymouth will address two high crash locations. Beyond 2020, allocation of nearly \$445 million to the Intersection Improvement Program would allow approximately 31 projects to improve safety at 14 high-crash locations in the future.

The combination of Complete Streets projects to be implemented in the FFYs 2016–20 TIP and future projects to be identified through the Complete Streets program beyond 2020 would implement safety improvements at nearly 70 high-crash locations. Within the FFYs 2016–20-time band, 13 corridor investments will provide safety improvements for automobiles, trucks, bicyclists, and pedestrians. Nine of the 13 Complete Streets projects improve safety at one or more high-crash locations.

In addition, these 13 corridors will provide safe and continuous accommodations for non-motorized users by adding 24 miles of new bicycle facilities and more than six miles of new sidewalk. For example, reconstructing Massachusetts Avenue in Lexington will add new bicycle lanes throughout this 0.7-mile section of the corridor, enhancing safe access to the Minuteman Commuter Bikeway. The Gateway East project along Route 9 in Brookline will provide added safety for bicyclists by implementing cycle tracks that physically separate the bicycle lane from the travel lane to reduce conflicts between motorists and bicyclists. In addition, reserving nearly \$920 million for the Complete Streets Program in 2021–40 would apportion approximately 70 projects to improve safety at nearly 50 high-crash locations in the future.

6.2.2 System Preservation

Virtually all the projects and programs in the LRTP advance the MPO's system preservation goal to maintain the transportation system by improving pavement condition, bridge condition, or sidewalk infrastructure, or by prioritizing projects that improve emergency response or ability to respond to extreme conditions.

Pavement Condition

Recent trends indicate that pavement condition has remained constant between 2008 and 2012, yet arterials with substandard pavement condition continue to account for a disproportionate share of the roadway lane miles. While arterials comprise 62 percent of the monitored roadways, they account for 90 percent of roadways that are in poor condition.

The proposed projects and programs would improve approximately 240 lane miles of substandard pavement, primarily along arterial corridors in the region. The combination of Complete Streets projects to be implemented in the FFYs 2016–20 TIP and future projects to be identified through the Complete Streets program beyond 2020 would address more than 180 lane miles of substandard pavement. Specific corridor reconstruction projects include Ferry Street in Everett, Route 1A (Main Street) in Walpole, and Route 30 (Main Street) in Southborough. The Intersection Improvement Program would also address some substandard pavement by improving more than 10 lane miles of such pavement at arterial intersections beyond 2020.

Major Infrastructure investments to modernize or expand major arterials would resurface or reconstruct more than 40 lane miles of substandard pavement through projects like reconstruction of Highland Avenue and Needham Street in Newton and Needham and Middlesex Turnpike Improvements, Phase III in Bedford, Billerica and Burlington.

Bridge Condition

An analysis of the condition of bridges in the Boston region indicates that between 2007 and 2014, the percentage of structurally deficient bridges increased from six (6) to nine (9) percent, functionally obsolete bridges remained constant at 19 percent, and posted bridges declined from seven (7) to four (4) percent.

Although the MassDOT Bridge Program (not included in LRTP investments) is the primary funding source for replacement or rehabilitation of substandard bridges, LRTP investments would contribute modestly to bridge preservation by addressing an estimated 25 substandard bridges. Major Infrastructure investments would address 13 substandard bridges through projects like the reconstruction of Rutherford Avenue in Boston and Route 128 Add-a-Lane in Needham and Wellesley. The remaining substandard bridges would be addressed through the Complete Streets Program in the 2021–40-time bands.

Sidewalk Infrastructure Condition

Outdated and inadequate information on sidewalk data prevents reporting a baseline condition for sidewalk infrastructure in the region; however there are gaps and barriers throughout the network in need of repair.

LRTP investments would improve more than 160 miles of sidewalk, primarily along arterial corridors like Route 27 in Natick or Massachusetts Avenue in Lexington, and out-of-compliance intersections in the region. More than 100 miles of improved sidewalk would be implemented through Complete Streets Program funding from 2021–40.

Emergency Response

The MPO's All-Hazards Planning application highlights the need to improve emergency response and the ability to respond to extreme conditions by displaying transportation infrastructure vulnerable to climate change and other hazards, evacuation routes, and emergency support locations. Although the MPO is not responsible for emergency response nor has the ability to respond to extreme conditions, it remains a priority in transportation investment decisions in order to improve the region's resilience in the future.

LRTP investments will improve emergency response or ability to respond to extreme conditions for more than 70 projects. Through the Complete Streets Program, corridor improvements would upgrade bridges and culverts to adapt transportation infrastructure that is vulnerable to climate change and other hazards. In addition, Intersection Improvement Program investments also would

improve emergency response by updating intersections along evacuation routes and those in close proximity to emergency support locations.

6.2.3 Capacity Management/Mobility

To advance the MPO's Capacity Management/Mobility goal of utilizing existing facilities more efficiently and increasing healthy transportation options, LRTP investments aim to address MPO-identified bottleneck locations, improve transit access and reliability, and expand the bicycle and pedestrian network.

MPO-identified Bottleneck Locations

As part of the LRTP Needs Assessment, MPO staff analyzed several congestion measurements for both current and future conditions based on travel time, travel speed, and volume/capacity ratios to identify the worst bottleneck locations in the region. Although staff identified numerous major infrastructure projects that would address MPO-identified bottleneck locations, less available funding over the life of the plan limited the number of these projects that the MPO could prioritize for funding. Yet, there are still two LRTP investments that would significantly improve mobility at MPO-identified bottleneck locations by adding roadway capacity:

- The Route 128 Add-a-Lane project will improve one MPO-identified express highway bottleneck location by widening 3.25 miles of I-95 in Needham and Wellesley
- Reconstruction of Route 18 (Main Street) in Weymouth will improve one MPO-identified arterial bottleneck location by widening a four-mile section of the corridor from two to four lanes

Transit Access and Reliability

State transportation funding (non-federal aid) is the primary funding source for targeted expansion of the transit system. The MPO recognizes the importance and necessity of transit expansion, and LRTP investments will further extend the Green Line from College Avenue to Route 16/Mystic Valley Parkway in Medford and Somerville. The additional one-mile transit extension would improve access to existing centers of economic activity and services, and support non-single-occupant-vehicle travel.

Complete Streets investments also improve transit access and transit service by implementing traffic and operational improvements along corridors. In the FFYs 2016–20-time band, these investments will improve access to transit along 11 corridors that serve 18 bus routes, operating nearly 1,000 bus trips on a typical weekday. Reconstruction of Main Street (Route 30) in Southborough will add continuous sidewalks and bicycle lanes along the corridor to support existing MetroWest Regional Transit Authority bus service. In addition, reconstruction of

Ferry Street in Everett will reduce delay for MBTA Route 110 service along the corridor through traffic signal upgrades.

Bicycle and Sidewalk Network

L RTP investments will make significant progress in expanding the bicycle and pedestrian network to increase healthy transportation options and promote active modes. Over the next 25 years, MPO investments propose to add more than 170 miles of on-road bicycle facilities, nearly 90 miles of new sidewalks, and approximately 120 miles of off-road paths and trails. A majority of the new bicycle and pedestrian network will be funded through the Complete Streets and Bicycle and Pedestrian Programs between 2021 and 2040. In addition, projects like Rutherford Avenue in Boston will incorporate a new shared-use path along the project corridor and Route 126 (Pond Street) in Ashland will transform the corridor by adding sidewalks and bicycle lanes where no facilities currently exist.

6.2.4 Transportation Equity

To advance the MPO's Transportation Equity goal of providing comparable transportation access and service quality among communities regardless of income level or minority status, the MPO targets investments to areas that benefit a high percentage of low-income and minority populations.

MPO-identified Transportation Issues in Transportation Equity Areas

The proposed projects and programs in the L RTP target investments at approximately 100 Title VI areas that contain an above-average percentage of low-income and minority populations.

Major infrastructure investments like grounding McGrath in Somerville and improving Route 126 and Route 135 in Framingham will address MPO-identified transportation issues for Title VI populations. Grounding McGrath will help reconnect two transportation equity areas, and improving Downtown Framingham will enhance MetroWest Regional Transit Authority service for many low-income and minority riders.

Complete Streets investments such as reconstructing Route 85 (Maple Street) in Marlborough, Ferry Street in Everett, and Route 129 (Lynnfield Street) in Lynn will improve safety and mobility for Title VI populations. Improvements will consist of upgraded sidewalks and improved crossings for pedestrians, and updated signals at intersections for better traffic flow for automobiles and buses. In addition, approximately 90 projects are expected to improve transportation in Title VI areas with funding set aside in the Complete Streets, Intersection Improvements, and Bicycle and Pedestrian programs beyond 2020.

6.2.5 Clean Air/Clean Communities

The MPO's Clean Air/Clean Communities goal of creating an environmentally friendly transportation system prioritizes investments that reduce greenhouse gas (GHG) emissions and other transportation-related pollutants.

GHG Emissions

The proposed projects and programs in the LRTP are estimated to reduce GHG emissions by approximately 5,000 tons of CO₂ annually. These GHG emission reductions are primarily derived from Complete Streets, Intersection Improvements and Major Infrastructure projects between FFYs 2016 and 2020. These investments reduce automobile delay through traffic signal improvements and encourage mode shift by expanding transportation options.

In addition, the Green Line Extension from College Avenue to Route 16 in Medford and Somerville would contribute to reducing GHG emission by supporting new transit trips previously made by automobile.

6.2.6 Economic Vitality

The MPO's transportation investments advance economic vitality by prioritizing projects that support access to targeted development areas for multiple modes.

Access to Targeted Development Areas

One of MetroFuture's implementation strategies is to focus on economic growth, and coordinate transportation investments to guide such growth in the region.

During the past few years, MAPC has worked with Executive Office of Housing and Economic Development (EOHED) and the Executive Office of Energy and Environmental Affairs (EOEEA) to identify local, regional, and state priority development and preservation areas in municipalities within the MPO region to identify those locations most suitable for added housing and places of employment, as well as the creation and preservation of open space.

The proposed projects and programs in the LRTP support this smart growth planning work by supporting transportation access to approximately 90 targeted development areas across the region.

Major Infrastructure investments along six major arterials would improve access to residential and employment areas that are well suited to support continued economic vitality and future growth. The reconstruction of Rutherford Avenue in Boston, Route 18 (Main Street) in Weymouth, and Highland Avenue and Needham Street in Newton and Needham will expand transportation options and

enhance access to transit to facilitate new development. In addition, the Green Line Extension from College Avenue to Route 16 will extend rapid transit service to provide access to existing centers of economic activity and services, as well as support transit-oriented development.

Complete Streets investments will also improve multimodal access to targeted development areas well suited to support continued economic vitality and future growth. Within the FFYs 2016–20 time band of the LRTP, there are nine projects that support access to targeted development areas, including

- Reconstruction of Route 85 (Maple Street) in Marlborough that will support access for all modes to a 43D site located at the former Lucent site in Marlborough
- Reconstruction of Route 27 (North Main Street) that will provide bicycle, pedestrian, and automobile access to a 40R site located on the former Paperboard site at 182 North Main Street in Natick

In addition, approximately 70 projects are projected to support targeted development areas with funding set aside in the Complete Streets, Intersection Improvements, and Bicycle and Pedestrian programs beyond 2020.

Economic Impact Analysis

MPO staff used Transportation Economic Development Impact System (TREDIS) software to estimate traveler cost savings and the number of jobs created by the set of major investment projects programmed into the LRTP. Traveler cost savings accrue as users benefit from mobility and reliability improvements in the region's transportation network. TREDIS estimated these costs savings for households and businesses by comparing the relationship between VMT, VHT, and the fraction of congested roadway between the build and no-build scenarios. For the set of major investment projects, TREDIS estimated a total of \$40.4 million (in 2015 dollars) in traveler cost savings for 2040, divided into \$18.5 million in total savings for commute and personal-type trips, and \$21.9 million in total savings for freight trips.

The estimated number of jobs created by the set of major investment projects fell into two categories:

- Temporary Construction Jobs: The number of construction jobs was estimated by TREDIS based on the type (highway or rail) and cost of each project. By definition, construction jobs exist only during the planning and construction stages of a transportation investment, and generally are not considered reflections of long-term economic development. For the planned period of construction of major investment projects from 2016 to

2030 (there are no major infrastructure jobs proposed for 2031 to 2024), TREDIS estimated creation of 350 construction jobs per year.

- **Permanent Full-Time Jobs:** The estimated number of permanent full-time jobs is a measure of long-term economic development, and is generated as a product of the full set of direct, indirect, and induced impacts of the major investment projects on the regional economy. TREDIS estimated the number of permanent full-time jobs by incorporating results of the traveler cost savings into a regional economic impact model. For the year 2040, TREDIS estimated that 150 permanent full-time jobs would be created by the set of major investment projects.

6.3 NEXT STEPS IN PERFORMANCE-BASED PLANNING

Performance-based planning is an ongoing process and will evolve as the MPO monitors and evaluates its progress using performance measures. The MPO will advance performance-based planning through its core planning documents by:

- Continuing scenario planning to explore how various transportation investments support goals through the LRTP
- Considering performance-based planning needs and issues when deciding what activities to fund through the UPWP
- Tracking annual progress toward goals and objectives through the TIP

In FFY 2016, the MPO will continue to monitor system-level trends and propose performance targets to guide investment decisions. If, in its annual monitoring, the MPO sees it is not making progress toward its targets, then the organization would need to consider modifying investment or policy priorities, and weigh the tradeoffs involved. For example, allocating a greater share of funding to intersection improvements at high-crash locations may make significant progress toward reducing traffic fatalities and serious injuries; however, it also may impact the MPO's ability to meet system-preservation targets for pavement or bridge conditions. By continuously monitoring and evaluating its progress, the MPO will be able to make these difficult decisions across competing goals and objectives in a more informed manner, resulting in greater outcomes for all concerned.