



ES

EXECUTIVE SUMMARY

INTRODUCTION

This document, *Charting Progress to 2040*, is the Boston Region Metropolitan Planning Organization's (MPO) Long-Range Transportation Plan (LRTP) that will be used to move the region's transportation network from its present state towards the MPO's vision for the system's future:

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

To help achieve the MPO's vision, this LRTP identifies goals, evaluates needs, and sets priorities, which will be supported with federal funding that the MPO receives for planning and programming investments in capital projects. However, given the region's aging transportation infrastructure and limited resources, the MPO addresses the following challenge through this LRTP:

How can we maintain the transportation network to meet existing needs, adapt and modernize it for future demand, and simultaneously work within the reality of constrained fiscal resources?

In answering this challenge, the MPO has re-evaluated its past practices and set a new course by moving away from programming expensive capital-expansion projects to ease congestion, and instead, setting aside more funding for small operations-and-management (O&M)-type projects that support bicycle, pedestrian, and transit, along with major roadway improvements.

The MPO developed *Charting Progress to 2040* in compliance with current federal highway legislation, Moving Ahead for Progress in the 21st Century (MAP-21), which governs MPO activities. In keeping with MAP-21, planning for this LRTP incorporated a number of new elements that brought more information to the decision-making process, for both the MPO and the public. One new element is an interactive web-based needs-assessment application that all interested parties may access. In addition, MPO staff enhanced its performance-based planning practice for this LRTP and expanded its use of contemporary planning tools, such as scenario planning, to inform policy and other types of decisions.

Public participation provided on-going critical input to the MPO's decision-making process. Throughout development of this LRTP, the MPO engaged in extensive outreach with an eye toward making public participation convenient, inviting, and engaging for everyone. In particular, the MPO sought to break down barriers to participation for people who traditionally have been only minimally involved in the continuous, comprehensive, cooperative (3C) planning process; for example, minority and low-income populations, and those with limited English proficiency or disabilities. These outreach efforts reflected the MPO's recently revitalized public participation program that includes using more electronic forms of communication and interactive engagement techniques.

VISION, GOALS, AND OBJECTIVES

Early in the process of developing *Charting Progress to 2040*, the MPO revised its vision statement to focus more sharply on the transportation issues of greatest concern to the MPO and the public for the envisioned future transportation system, including:

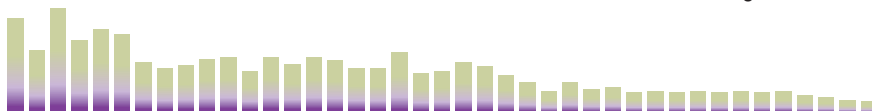
- Safety
- System Preservation
- Capacity Management/Mobility
- Clean Air/Clean Communities
- Transportation Equity
- Economic Vitality

For each of these issues, the MPO identified problems and their associated requirements for the transportation network. This allowed the MPO to set goals that, if accomplished, would result in concrete solutions for the identified problems, and help the region achieve its vision by 2040. The MPO established objectives for each goal. (See Figure ES.1.)

FIGURE ES.1

MPO Vision, Goals, and Objectives

CENTRAL VISION STATEMENT	
The Boston Region Metropolitan Planning Organization envisions a modern transportation system that is safe, uses new technologies, provides equitable access, excellent mobility, and varied transportation options—in support of a sustainable, healthy, livable, and economically vibrant region.	
GOALS	OBJECTIVES
SAFETY	
Transportation by all modes will be safe	<ul style="list-style-type: none"> • Reduce number and severity of crashes, all modes • Reduce serious injuries and fatalities from transportation • Protect transportation customers and employees from safety and security threats (Note: The MPO action will be to incorporate security investments into capital planning.)
SYSTEM PRESERVATION	
Maintain the transportation system	<ul style="list-style-type: none"> • Improve condition of on- and off-system bridges • Improve pavement conditions on MassDOT-monitored roadway system • Maintain and modernize capital assets, including transit assets, throughout the system • 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 hazards) • Protect freight network elements, such as port facilities, that are vulnerable to climate-change impacts
CAPACITY MANAGEMENT/MOBILITY	
Use existing facility capacity more efficiently and increase healthy transportation capacity	<ul style="list-style-type: none"> • Improve reliability of transit • Implement roadway management and operations strategies, constructing improvements to the bicycle and pedestrian network, and supporting community-based transportation • Create connected network of bicycle and accessible sidewalk facilities (at both regional and neighborhood scale) by expanding existing facilities and closing gaps • Increase automobile and bicycle parking capacity and usage at transit stations • Increase percentage of population and places of employment within one-quarter mile of transit stations and stops • Increase percentage of population and places of employment with access to bicycle facilities • Improve access to and accessibility of transit and active modes • 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 the elderly and persons with disabilities • Eliminate bottlenecks on the freight network • Enhance intermodal connections • Emphasize capacity management through low-cost investments; give priority to projects that focus on lower-cost O&M-type improvements such as intersection improvements and Complete Streets solutions
CLEAN AIR/CLEAN COMMUNITIES	
Create an environmentally friendly transportation system	<ul style="list-style-type: none"> • Reduce greenhouse gases generated in the Boston region by all transportation modes as outlined in the Global Warming Solutions Act • Reduce other transportation-related pollutants • Minimize negative environmental impacts of the transportation system • Support land use policies consistent with smart and healthy growth
TRANSPORTATION EQUITY	
Provide comparable transportation access and service quality among communities, regardless of income level or minority population	<ul style="list-style-type: none"> • Target investments to areas that benefit a high percentage of low-income and minority populations • Minimize any burdens associated with MPO-funded projects in low-income and minority areas • Break down barriers to participation in MPO-decision making
ECONOMIC VITALITY	
Ensure our transportation network provides a strong foundation for economic vitality	<ul style="list-style-type: none"> • Respond to the mobility needs of the 25–34-year-old workforce • Minimize the burden of housing and transportation costs for residents in the region • Prioritize transportation investments that serve targeted development sites • Prioritize transportation investments consistent with the compact-growth strategies of MetroFuture



Source: Central Transportation Planning Staff.
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Together, the vision, goals, and objectives lay the groundwork for the MPO's performance-based planning practice, which in turn informs all of the work conducted by the MPO, including evaluating and selecting projects and programs for the LRTP, selecting projects for the Transportation Improvement Program (TIP), and selecting planning studies for the Unified Planning Work Program (UPWP).

TRANSPORTATION NEEDS

The MPO assessed the region's transportation needs to help decide which projects to fund in the LRTP. This Needs Assessment includes information about how the region's surface transportation system is used, both now and in future projections; how it interacts with land-use conditions and the environment; and how well it serves low-income, minority, and other historically underserved populations. The Needs Assessment also establishes the baseline for charting progress through performance-based planning.

The MPO has made the Needs Assessment data available via the internet to help educate the public and make the planning process more transparent. A Needs Assessment document, also found on the MPO's website, summarizes these data and identifies the region's most critical needs relative to each of the MPO's goals. The Needs Assessment makes clear that the region faces extensive maintenance and modernization needs, and must address safety and mobility for all modes.

Using the Needs Assessment, the MPO compiled a comprehensive universe of projects that could be programmed to solve the identified problems; the projects that became the recommended list selected for evaluation and inclusion in this LRTP, were taken directly from this universe.

FINANCE

During the 25 years of this plan, the Boston Region MPO has the discretion to program \$2.85 billion in federal funds for highway transportation projects. This amount is significantly less than was available four years ago when the MPO programmed approximately \$3.8 billion in its prior LRTP, *Paths to a Sustainable Region*.

Because, as of this writing, Congress had not yet passed new federal legislation that would solidify long-term revenue projections, the federal agencies advised the MPO to assume that revenues would increase by 1.5 percent each year for federal fiscal years (FFYs) 2021 through 2040. For the same period, the MPO was told to assume that project costs would inflate by 4 percent each year. If these assumptions hold true, project costs will outpace available revenues, resulting in diminished buying power in future years. A new authorization by Congress, following publication of this LRTP, could change the outlook for financing transportation projects in the Boston region.

TABLE ES.1
Comparison of Available Capital Highway Funds in *Charting Progress to 2040* to the Previous LRTP, *Paths to a Sustainable Region*

	FFYs 2013-15	FFYs 2016-20	FFYs 2021-25	FFYs 2026-30	FFYs 2031-35	FFYs 2036-40	Total
<i>Paths to a Sustainable Region Revenue*</i>	\$229.83	\$557.47	\$815.61	\$1018.44	\$1180.65	--	\$3802.00
<i>Charting Progress to 2040 Revenue</i>	--	441.65	464.87	580.90	657.78	\$708.60	\$2853.80
Difference		(\$115.82)	(\$350.74)	(\$437.54)	(\$522.87)		(\$948.20)
Percentage Change		-21%	-43%	-43%	-44%	--	-25%

FFYs = Federal fiscal years.

Note: Dollars in millions.

* *Paths to a Sustainable Region* is a 23 year LRTP compared to *Charting Progress to 2040* which is a 25 year LRTP.

Source: Central Transportation Planning Staff.

The financial plan for *Charting Progress to 2040* reflects the way in which the MPO plans to balance the diversity of identified needs with the fiscal constraint of projected revenues. The financial plan includes estimated costs for the specific regionally significant transportation projects that the MPO will fund, as well as defined amounts of money set aside throughout the life of the plan for programs that will fund smaller projects. Because these smaller projects are not regionally significant, they are not accounted for individually in the LRTP, but will be selected through the TIP programming process.

In addition to reporting on the MPO's discretionary spending decisions, this financial plan also provides information on the nearly \$6 billion that the state plans to spend on highway projects. It also will cite the \$10.3 billion that the Massachusetts Bay Transportation Authority (MBTA) is expected to spend, and the capital resources available to the other two Regional Transit Authorities operating in the MPO region.

RECOMMENDED PLAN

MPO staff used a variety of analytic methods, including a number of new and/or enhanced planning tools and techniques, to shed light on the potential outcomes of various investment strategies (and inform the MPO's general discussions and decision making). Staff also increased its use of scenario planning to allow the MPO and other stakeholders to compare the relative effects of different possible transportation solutions.

Scenario planning helped illuminate the relative merits of two different approaches to one of the objectives related to the MPO's capacity management goal:

Should the MPO continue to use a *congestion-reduction* approach by investing in major arterials and express highways? Or, should the MPO adopt a *capacity-management* approach by investing in smaller-scale, but more diverse and geographically dispersed, O&M-type projects?

The results of this exercise led the MPO to adopt the O&M approach to programming in the LRTP, signaling a pivotal change in the MPO's funding philosophy, and committing a significant portion of MPO funds to the following investment programs:

- **Intersection Improvements:** Modernizes existing signals or adds new signals to improve safety and mobility. Improvements also could consist of turning lanes, shortened crossing distances for pedestrians, and striping and lighting for bicyclists. Improvements to sidewalks and curb cuts will enhance accessibility for pedestrians. Updated signal operations will reduce delay and improve transit reliability.
- **Complete Streets:** Modernizes roadways to improve safety and mobility for all users. Improvements could consist of continuous sidewalks and bicycle lanes, cycle tracks, and other bicycle facilities, as well as updated signals at intersections along a corridor. Improvements will reduce delay and improve transit reliability. Expanded transportation options and better access to transit will improve mobility for all and encourage mode shift.
- **Bicycle Network and Pedestrian Connections:** Expands the bicycle and pedestrian networks to improve safe access to transit, school, employment centers, and shopping destinations. Could include constructing new, off-road bicycle or multi-use paths, improving bicycle and pedestrian crossings, or building new sidewalks.
- **Community Transportation/Parking/Clean Air and Mobility:** Includes a combination of the following types of projects:
 - Funds transit services developed at a local level that support first-mile/last-mile connections to existing transit services and other destinations by purchasing shuttle buses and/or funding operating costs
 - Targets funding to construct additional parking at transit stations that now are at capacity, or at identified new parking locations
 - Provides funding to projects (such as bike share projects or shuttle bus services) to improve mobility and air quality and promote mode shift
- **Major Infrastructure:** Includes large-scale projects that modernize and/ or expand major highways and arterials to reduce congestion and improve safety. Projects could include major interchange improvements and major bottleneck reconstruction. This category also includes spending on major transit or bridge projects.

In addition to prioritizing the programs discussed above, the MPO also tried to honor its past policy and practice of maintaining its previous LRTP and TIP-programming commitments when selecting the recommended list of projects for inclusion in the plan. MPO staff used the recommended list to model two alternatives:

- The first alternative programmed all of the currently unfunded major infrastructure projects from the previous LRTP, *Paths to a Sustainable Region*.
- The second alternative targeted funding to lower-cost O&M-type programs, using the following assumptions:
 - No more than 50 percent of available funding in each five-year time band would be allocated to major infrastructure projects.
 - If one major infrastructure project required more than 50 percent of funding in a particular time band, it would not be programmed.
 - Funding for the O&M investment programs used funds that were left after the major infrastructure program was determined, based on the following allocations:
 - Complete Streets Program – 58 percent
 - Intersection Improvements Program – 28 percent
 - Bicycle and Pedestrian Program – 10 percent
 - Community Transportation, parking, and Clean Air and Mobility Program – 4 percent

Ultimately, the MPO chose the O&M alternative for the final selection of projects and programs. The final selection was based on the informed judgment of the MPO and knowledge gained through the LRTP development process, including the needs assessment; scenario-planning; project information from feasibility studies, project-specific modeling work, and environmental impact reports; adherence to the MPO's goals and objectives; and feedback from the general public and other interested parties.

Table ES.2, below, presents the MPO's final list of the projects and programs included in *Charting Progress to 2040's 25-year horizon*.

TABLE ES.2
Major Infrastructure Projects in the Recommended Plan

Project Name	Current Cost
Middlesex Turnpike Improvements, From Crosby Drive North to Manning Road, Phase III (Bedford and Billerica)	\$26,935,000
Reconstruction of Rutherford Avenue, from City Square to Sullivan Square (Boston)	\$109,967,000
Intersection Improvements at Route 126 and Route 135/MBTA and CSX Railroad (Framingham)	\$115,000,000
Route 4/225 (Bedford Street) and Hartwell Avenue (Lexington)	\$23,221,000
Bridge Replacement, Route 27 (North Main St.) over Route 9 (Worcester St.) and Interchange Improvements (Natick)	\$25,793,000
Reconstruction of Highland Avenue, Needham Street and Charles River Bridge, from Webster Street to Route 9 (Newton and Needham)	\$14,298,000
McGrath Boulevard Project (Somerville)	\$56,600,000
Green Line Extension Project (Phase 2), College Avenue to Mystic Valley Parkway/Route 16 (Somerville and Medford)	\$190,000,000
Reconstruction and Widening on Route 18 (Main Street) From Highland Place to Route 139 (Weymouth and Abington)	\$58,822,000
Reconstruction of Montvale Avenue, from I-93 Interchange to Central Street (Woburn)	\$4,225,000
Bridge Replacement, New Boston Street over MBTA (Woburn)	\$9,707,000

Table ES.3, below, presents a list of the amount of funding dedicated to programs included in *Charting Progress to 2040*.

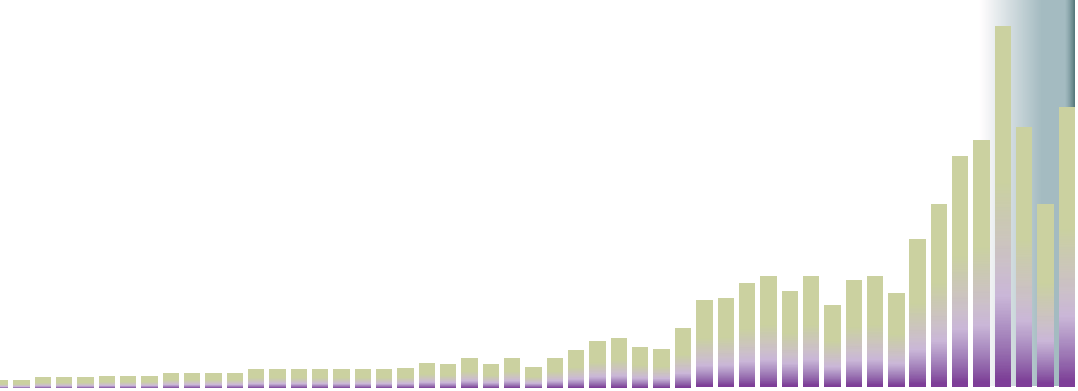


TABLE ES.3
Funding Dedicated to Programs in the LRTP

Program	Dedicated Funding
MPO Discretionary Capital Program: Major Infrastructure Projects	\$615,363,800
MPO Discretionary Capital Program: Highway Funds Flexed to Transit	\$190,000,000
MPO Discretionary Capital Program: Complete Street Program	\$936,262,700
MPO Discretionary Capital Program: Intersection Improvement Program	\$443,639,500
MPO Discretionary Capital Program: Bicycle/Pedestrian Program	\$158,442,700
MPO Discretionary Capital Program: Community Transportation/ Parking/ Clean Air and Mobility Program	\$63,377,100
MPO Discretionary Capital Program: Unassigned Funds	\$446,707,600
Total Highway Funding	\$2,853,793,400
Transit Expansion Projects Funded in the Boston Region MPO by the Commonwealth	\$1,555,250,000
Transit Funding	\$1,555,250,000

CHARTING PROGRESS

Increasingly, over the past two decades, transportation agencies have been utilizing “performance management”—a strategic approach that uses performance data to guide decisions and track progress over time to help achieve desired outcomes. Another term for this strategy is performance-based planning and programming (PBPP). 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.

Although the Boston Region MPO has been developing a PBPP practice for several years, it stepped up its efforts for this LRTP—both to improve the process and to meet MAP-21 requirements—through the following actions:

- Established goals and objectives that align with national goals
- Identified performance measures for established goals and objectives
- Analyzed trends over time for some performance measures to identify priorities
- Prioritized investments that advance its goals and objectives

The MPO used PBPP to evaluate the degree to which proposed investments—both major infrastructure projects and O&M-type investment programs—advance each of the MPOs goals over the life of the LRTP. For the regionally significant projects and

those that will be funded through O&M-type programs, MPO staff conducted project-level assessments using sketch-planning and travel-demand modeling techniques.

Performance-based planning is an ongoing process and will evolve as the MPO monitors and evaluates its progress using performance measures. The MPO will continue to use PBPP to monitor system-level trends annually and will propose performance targets for each performance measure. By continuously monitoring and evaluating its progress, the MPO will be able to weigh the trade-offs among competing goals and objectives in a more informed manner.

TRANSPORTATION EQUITY

The MPO supports a transportation equity (TE) program to ensure that populations protected under various federal and state civil rights statutes, executive orders, and regulations (TE populations) are provided equal opportunity to participate fully in the MPO's transportation-planning and decision-making process. Federal regulations require that TE populations share equitably in the benefits and burdens of past, present, and future transportation projects, programs, and service. The MPO's TE program comprises various activities, including a public-participation program designed specifically to communicate with low-income and minority residents, the elderly, persons with disabilities, and persons with limited English proficiency (LEP).

For this LRTP, MPO staff used the travel-demand model set to perform two types of equity analyses:

- **Accessibility analysis:** Based on both the ability to reach desired destinations (employment opportunities, health care facilities, and higher education facilities), and the ease of doing so. This analysis investigated the number of destinations that could be reached from low-income, non-low-income, minority and nonminority transportation analysis zones (TAZs) as well as the average transit and highway travel times to these destinations for each type of TAZ.
- **Mobility, congestion, and air-quality analysis:** Focused on the average door-to-door travel time and average vehicle-miles traveled (VMT) under congested conditions and carbon monoxide levels.

For the first part of each type of analysis, which looked at the change between the 2040 No-Build and Build alternatives for low-income, non-low-income, minority, and nonminority TAZs, respectively, all projected changes were within the margin of error of the model. The second part of the analysis, which measured the ratio of the change from the 2040 No-Build to the Build alternative for low-income versus non-low-income TAZs and minority versus nonminority TAZs, showed no disproportionate burdens or disparate impacts for all six of the accessibility factors and most of the seven mobility, congestion, and air-quality factors analyzed. However, for one mobility and congestion measure,

both a disproportionate burden and disparate impact was found; and for another, only a disparate impact was found. Because the underlying data for this analysis were within the model's margin of error, these findings likely would not be meaningful; however, the MPO will track them via future TIP equity evaluations to ensure that they are addressed.

AIR QUALITY

The MPO completed two types of air-quality analyses for *Charting Progress to 2040*. The first is the air-quality conformity determination for projects in the LRTP, as required by federal and state regulations, which specifically addresses carbon monoxide (CO). The requirement to perform a conformity determination ensures that federal approval and funding go to transportation activities that are consistent with air-quality goals. The air-quality conformity analysis shows that CO emissions from projects in *Charting Progress to 2040* are consistent with the emissions budget set forth in the State Implementation Plan.

The second air-quality analysis looked at greenhouse gas (GHG) emissions for projects in the LRTP and TIP as mandated by state legislation, which requires that GHG emissions be reduced below 1990 levels by 25 percent by 2020, and 80 percent by 2050. To do so, state policies require the transportation sector to promote healthy transportation modes and support smart growth development.

The Massachusetts Department of Transportation, using MPO and statewide travel-demand models, will provide the MPO with statewide estimates of carbon dioxide (CO₂) emissions (the most prominent GHG). These estimates will be based on the collective list of recommended projects in all the Massachusetts LRTPs combined (and supplemented by CO₂ emission-reduction results for smaller, "off-model" projects supplied by the MPO). The results of the GHG modeling will be available in a separate statewide air quality report at the end of August 2015. Although not federally required, an emissions analysis for ozone precursors will also be included in this separate air quality report for informational purposes only, based on comments received during the public comment period for the Draft LRTP.

CONCLUSION

Charting Progress to 2040 represents a turning point in the philosophy and practice of the MPO. The Boston region has long embraced transit and supported non-motorized modes of transportation. However, this is the MPO's first LRTP that does not prioritize the funding of regionally significant roadway projects over other types of investments. The MPO hopes that charting this new course will achieve its transportation vision for the future, to improve the quality of life of its residents and enhance the environment in the whole region.