



## OVERVIEW OF THE NEEDS ASSESSMENT

The needs assessment is a component of the Boston Region Metropolitan Planning Organization's (MPO's) Long-Range Transportation Plan (LRTP), *Paths to a Sustainable Region*. The LRTP, which is updated every four years, establishes a set of visions for the Boston region's future transportation system, establishes policies to achieve the visions, and identifies transportation projects and programs supportive of the visions and policies.

The needs assessment gathered, organized, and analyzed information about the state of the region's transportation system. It is a critical component of the LRTP, because the region's transportation needs must be inventoried before decisions are made on how problems should be addressed within the constraints of anticipated future funding.

The existing condition of the various components of the transportation system, how they are used, and their projected use in the future are all described here. The needs or issues in the region's transportation corridors are identified; some are ones that have already been identified in previous studies, and some were identified by this needs assessment through analysis of available data. In addition to issues related to the effective functioning of the transportation system, this assessment includes issues related to how the transportation system interacts with the region's current and projected land use conditions, the environment, and low-income and minority populations. All of the elements of the needs assessment have been produced for each of six radial corridors, two circumferential corridors, and a Central Area. This approach makes the transportation needs of a very complex region easier to comprehend.

Chapters 2 through 10 of this volume present the findings by corridor or area. The final chapter lists the highest-priority transportation needs of the entire region.

The remainder of the present chapter describes the types of information included in



the corridor and area chapters, how the information is organized, the data resources that were drawn upon, and how the information was used to assess transportation needs. The Universe of Projects and Programs Lists for each corridor and for the Central Area are presented in volume 2 of the LRTP. The Universe of Projects and Programs includes all studies, projects, and programs identified in each corridor which are in one stage or another of the planning or implementation process. The final list of projects and programs recommended to address the needs outlined in the needs assessment is presented in volume 2 of the LRTP.

## DEFINITION OF THE CORRIDORS

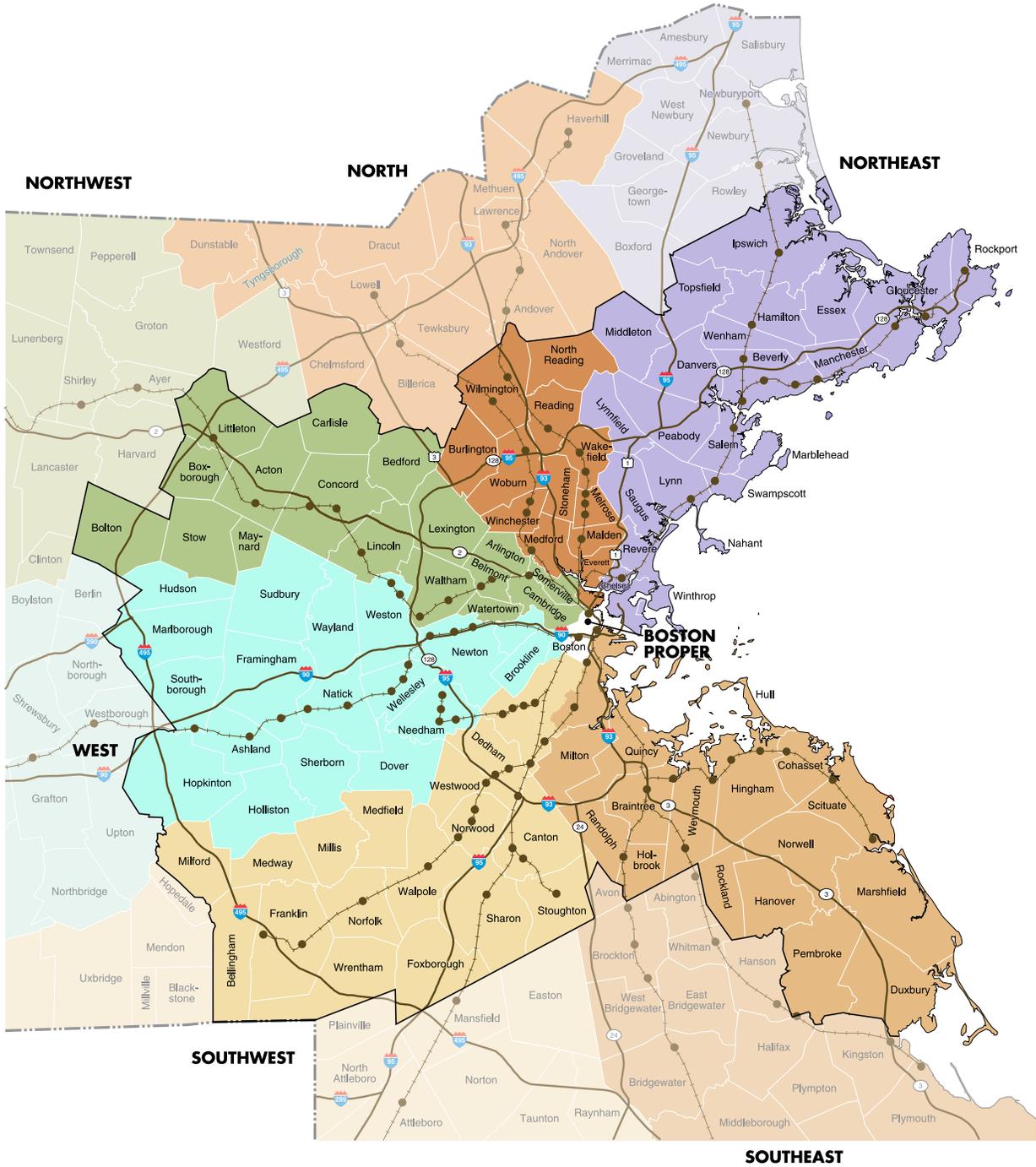
For the purposes of the needs assessment, most of eastern Massachusetts—all of the Boston Region MPO municipalities and most of the other municipalities—was divided into six radial corridors, and in addition, two circumferential corridors and a Central Area were defined, overlaid on the radial corridors. Every municipality is in a radial corridor. Every Boston Region MPO municipality is in a radial corridor and also either in one of the circumferential corridors or in the Central Area; the exception is that the Boston Proper portion of the City of Boston is only in the Central Area.

The delineation of the corridors was based on travel patterns and the existing transportation facilities in the region, and a Central Area. The six radial corridors, which are the same as those used in the MBTA's Program for Mass Transportation (PMT), were established around major highway and rail facilities with an orientation into and out of Boston Proper. The circumferential corridors were established around the region's two important circumferential highways: Interstates 495 and Route 128. The corridors, and some of the major facilities around which they were established, are as follows:

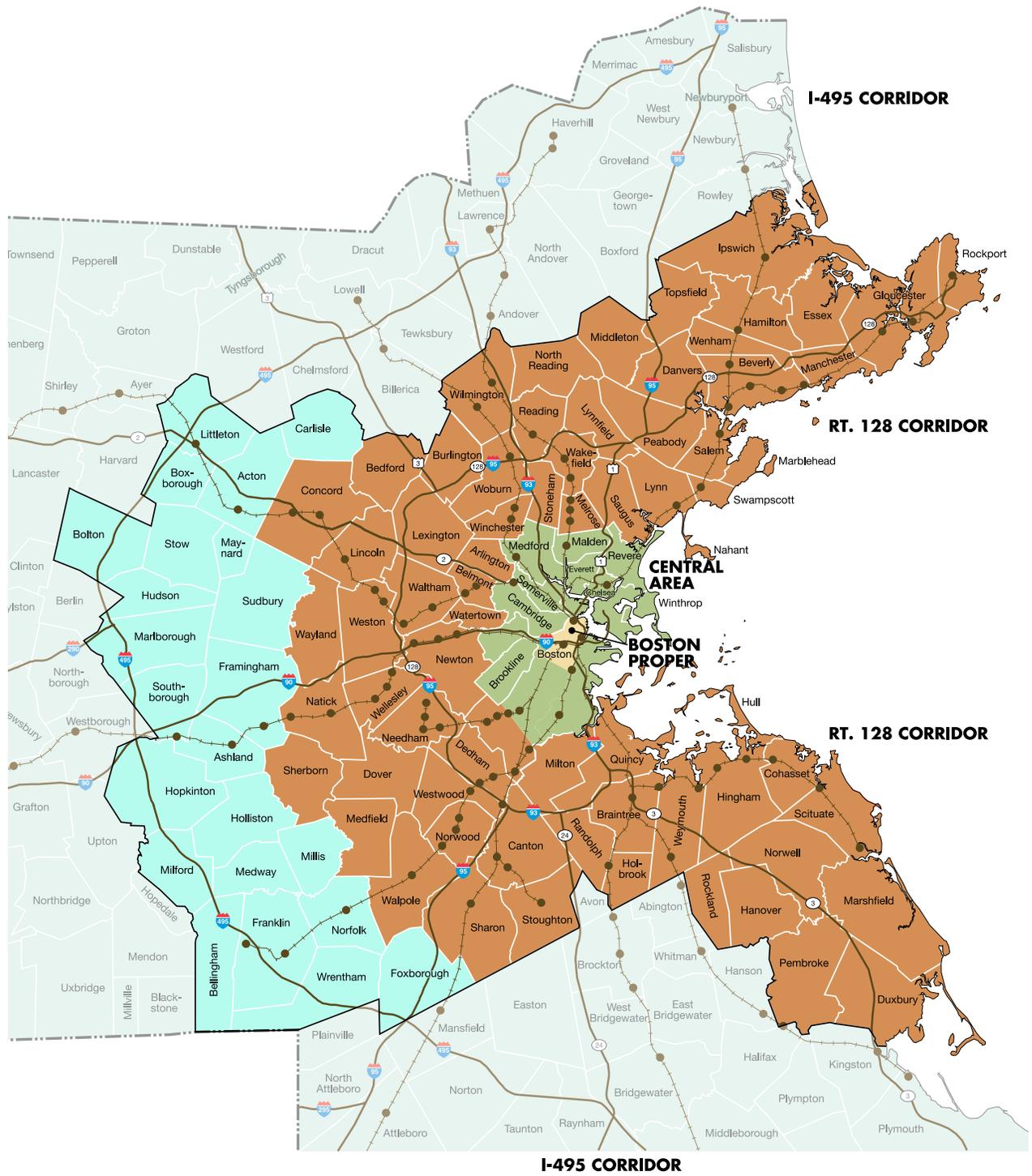
### Radial (See Figure 1-1)

- Northeast Corridor – Routes 1 and 128, Interstate 95, the Rockport/Newburyport Line of the commuter rail system, and the Blue Line of the rapid transit system
- North Corridor – Interstate 93, Route 3, the Lowell and Haverhill lines of the commuter rail system, Amtrak's Downeaster service, and the Orange Line of the rapid transit system
- Northwest Corridor – Route 2, the Fitchburg Line of the commuter rail system, and the Red Line of the rapid transit system
- West Corridor – Interstate 90, the Framingham/Worcester Line of the commuter rail system, the CSX Boston Line (freight), and the Green Line of the rapid transit system
- Southwest Corridor – Interstate 95, the Franklin and Providence/Stoughton lines of the commuter rail system, Amtrak's Northeast Corridor service, and the Orange Line of the rapid transit system
- Southeast Corridor – Interstate 93, Routes 3 and 24, the Middleborough/Lakeville, Kingston/Plymouth, and Greenbush lines of the commuter rail system, and the Red Line of the rapid transit system

**FIGURE 1-1**  
**RADIAL CORRIDORS**



**FIGURE 1-2**  
CIRCUMFERENTIAL CORRIDORS



### Circumferential (See Figure 1-2)

- Route 128 Corridor
- Interstate 495 Corridor

### Additionally:

- Central Area – The Central Area (shown in Figure 1-3) includes the City of Boston (excluding the neighborhoods of Hyde Park, Roslindale, West Roxbury, and Mattapan), Brookline, Cambridge, Somerville, Medford, Malden, Everett, Revere, Chelsea, and Winthrop. This area is the hub of the radial corridors and the central and major activity center of the region. The Central Area was delineated based on proximity to Boston Proper and ratio of employment to population (greater than or equal to 1:1). The Boston neighborhoods of Hyde Park, Roslindale, West Roxbury, and Mattapan are farther from Boston Proper and have a lower employment-to-population ratio than the other neighborhoods of Boston. In addition to being a major destination and origin for radial travel in the region, the Central Area has important circumferential travel patterns.



While the radial corridors cover the majority of eastern Massachusetts municipalities, the needs assessment addresses only the needs of the municipalities in the Boston Region MPO portion of each corridor. However, the needs assessment also notes facilities and travel activity in the portions of each corridor that lie outside of the Boston Region MPO area. Figure 1-4 shows the radial corridors along with the regional planning agency/MPO areas that border the Boston Region MPO area.

## CATEGORIES OF INFORMATION INCLUDED IN THE NEEDS ASSESSMENT

### Overview

The entire region, and each individual corridor and the Central Area, were studied to understand current travel patterns and trends, projected future travel demand, and transportation conditions. This information about the transportation system helps the Boston Region MPO evaluate its performance relative to the MPO's visions and objectives regarding system preservation, mobility, safety, transportation equity, and the environment. Information from previous and ongoing transportation planning

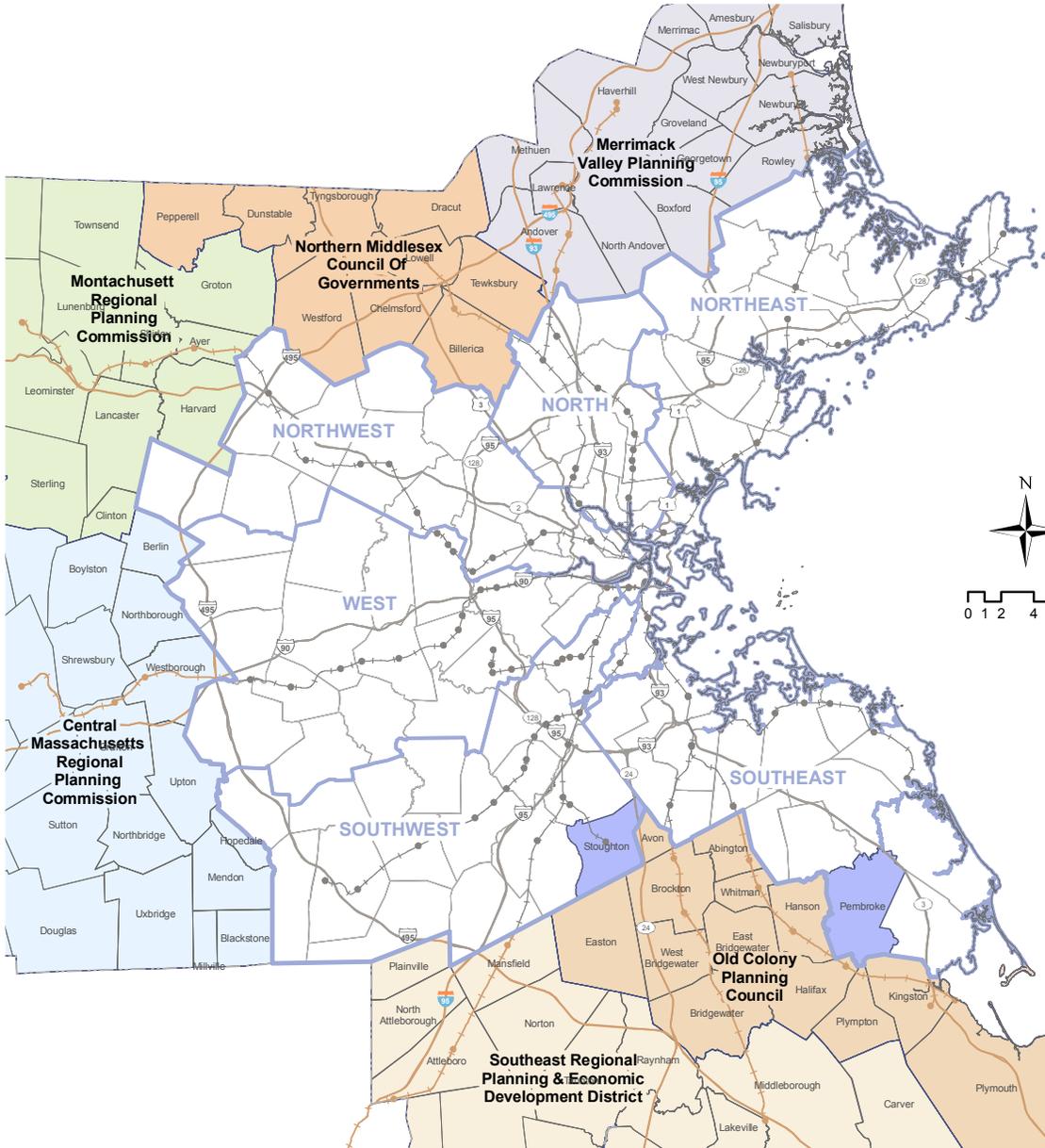
FIGURE 1-3

CENTRAL AREA



**FIGURE 1-4**

**REGIONAL PLANNING AGENCIES/MPOs  
BORDERING THE BOSTON REGION MPO**



**Neighboring Regional Planning Agencies/MPOs**

- Central Mass. Regional Planning Commission
- Montachusett Regional Planning Commission
- Merrimack Valley Planning Commission
- Northern Middlesex Council of Governments
- Old Colony Planning Council
- Southeast Regional Planning & Economic Development District
- Both MAPAC and OCPC



work, including the preceding LRTP (JOURNEY to 2030), the PMT, the MPO's Congestion Management Process (CMP), transportation equity outreach, MPO studies, and special studies, was used to develop the needs assessment.

The MPO's travel demand model and adopted demographic projections were used extensively in the needs assessment. Existing and projected socioeconomic information (population and employment data) and the existing and proposed transportation network were important factors.

In the modeling process, the adopted LRTP will use a base year of 2009 and a future year of 2035 for the transportation network and socioeconomic data. Socioeconomic data includes population, employment, and household information. However, this needs assessment used 2008 as the base year for the transportation network and 2009 as the base year for socioeconomic data. It uses 2030 as the future year for both the transportation network and socioeconomic data, with the exception that 2035 socioeconomic data were used in the land use analysis. A detailed description of the modeling process and the reasons for using these differing years can be found in Appendix A.

The final chapter of the needs assessment summarizes and prioritizes the needs for the entire region by transportation mode and vision topic area. This information was used by the MPO members to develop the recommended list of projects and programs for the LRTP.

## **OUTLINE OF INFORMATION COMPILED FOR EACH CORRIDOR**

The discussion that follows shows how information for each radial corridor and the Central Area is presented. Not every corridor chapter includes information in every category, and the types of information included for circumferential corridors differ further. A detailed description of the types of information to be included in each main category is presented, along with any background pertinent to each category.

### **Description of the Corridor**

This section identifies the municipalities in each corridor, both those within the Boston Region MPO area and those located in neighboring regional planning agency/MPO areas.

### **Existing Transportation Facilities**

The transportation system in the MPO region is a collection of roads, bridges, transit services, freight lines, bicycle routes, pedestrian facilities, and ferry routes. It is maintained and operated by a number of different agencies, including but not limited to the Massachusetts Department of Transportation (MassDOT) Highway Division, the MBTA, the Massachusetts Port Authority (Massport), the Department of Conservation and Recreation (DCR), and local entities. In this section of each corridor's chapter, the existing major transportation facilities and services are described by mode, as follows:

- Highways – major roadways, bridges, and park-and-ride facilities not associated with transit
- Transit – commuter rail, intercity rail, rapid transit, bus, ferry, and park-and-ride facilities
- Intermodal passenger facilities
- Transportation Management Associations
- Freight – truck, rail, marine, air, and intermodal freight facilities
- Airports
- Bicycle – paths, on-road bicycle accommodations, and bicycle parking
- Pedestrian – paths and sidewalks

## Land Use

### Background

Land use decisions and many economic development decisions in Massachusetts are controlled directly by local municipalities through zoning. This planning is guided by a significant body of laws and regulations enacted by the state Legislature and guided by executive orders, policies, and funding programs. A regional land use plan for the Boston Region MPO area has been developed by the Metropolitan Area Planning Council (MAPC), the regional planning agency that represents 101 cities and towns in the metropolitan Boston area. Its area corresponds exactly with that of the MPO. The regional land use plan, “MetroFuture: Making a Greater Boston Region,” was adopted by MAPC in 2008.

The MPO relies on MAPC for developing the region’s population and employment projections for use in the travel demand modeling conducted by the MPO. MAPC also provides a coordination and consultation function for the region’s municipalities regarding these projections, and it reviews and evaluates local land use and economic development plans and their relationship to the MPO’s planning. For more detailed information on MetroFuture and the development of the population and employment forecasts, please see Appendix B.

Federal regulations require that the LRTP be consistent with the adopted regional land use plan. The goals, objectives, and implementation strategies of MetroFuture are broadly grouped in five categories:

- Sustainable growth patterns
- Housing choices
- Community vitality
- Prosperity
- Getting around



MetroFuture includes six implementation strategies for transportation:

1. Integrate land use and transportation planning
2. Prioritize transit and transportation alternatives
3. Establish stable and sufficient financing for all modes
4. Promote an efficient and transparent project delivery system
5. Establish a comprehensive maintenance program for safety and future cost savings
6. Improve the competitiveness of rail freight

These strategies coincide with the visions and policies that have been adopted by the MPO for the development of the LRTP.



### **Corridor Socioeconomic Data**

Population and employment information by transportation analysis zone (TAZ) as projected for MetroFuture is included in each of the corridor chapters. Information on elderly populations in each community is included as a resource for discussion of potential strategies to increase mobility for the elderly. For this needs assessment, elderly is defined as people aged 70 and over. As discussed earlier in the chapter, the socioeconomic information used in the land use analysis was for a base year of 2009 and a future year of 2035.

### **Corridor Land Use Data**

Information on future growth areas as identified in MetroFuture is included in each of the corridor chapters. Also provided is information on many municipalities' having adopted or opted in to contemporary planning initiatives and other planning activities that promote economic development, smart growth, healthy transportation, and greenhouse gas emission reductions. Each corridor chapter shows the municipalities that are participating in each of these programs. A brief description of each program is presented in Appendix B, along with the more detailed description of MetroFuture.

### **Travel Characteristics**

Travel in the Boston Region MPO area is divided into four basic categories for the purposes of the needs assessment: radial travel between a corridor and the Central Area, circumferential travel between radial corridors, other travel between adjacent and non-adjacent radial corridors, and travel within each of the corridors. This section of each corridor chapter provides travel information in terms of those

categories and also in terms of the modal categories of highway, transit, freight, bicycle, and pedestrian.

Volumes of existing (2008) and projected (2030 No-Build) trips from each corridor into Boston Proper are provided in terms of highway trips, transit trips, and average daily person-trips. (See Appendix A for a detailed discussion of the modeling process.) A person-trip is defined as a trip by one person going from one TAZ to another TAZ using one mode or a combination of modes of transportation. Travel into Boston Proper was studied to understand the modal split of current travel in Boston Proper, which is an area well served by both transit and highways. The boundaries of Boston Proper are:

- Charles River to the north
- Massachusetts Avenue to Interstate 93 to the south and west
- Interstate 93 to South Station

Traffic count and transit survey information from 2008 was used to determine existing conditions, while the travel demand model was used to determine 2030 No-Build conditions. The 2030 No-Build network includes the existing transportation network plus projects that are under construction, projects that have been advertised for construction, and projects for which the MPO has programmed funds for construction in the first year of the current Transportation Improvement Program.

Also included in each corridor chapter are the volumes of person-trips that originate in and are destined to the corridor. These were estimated using the travel demand model for both the 2008 base-year conditions and the 2030 No-Build conditions. The travel demand model was also used to identify daily truck trip-ends for both the current (2008) conditions and the future (2030) No-Build conditions.

The MPO has an extensive database of bicycle and pedestrian count information dating from the mid-1970s to the present. This information is provided for each corridor for which it is available.

## Identified Transportation Issues

This section is organized by the vision topics identified by the MPO for the LRTP. A variety of sources were used to identify transportation issues for each corridor. The following is an outline of the types of issues identified within each vision topic category; the sources of information on each type of issue are indicated.

### System Preservation and Modernization

#### Highway

- Roadway pavement information was not broken down by corridor but is provided in the final chapter, which prioritizes the needs for the entire region.
- The MassDOT Bridge Inventory file was used to determine the bridge conditions, vertical clearance, and weight restriction information for each corridor.





### Transit

The MBTA PMT adopted in December 2009 provided information on current and projected requirements for keeping the system in a state of good repair. In addition to state-of-good-repair needs, information derived from the PMT is provided on needs related to infrastructure enhancement and Americans with Disabilities Act (ADA) accessibility.

### Freight

This section presents information relating to system preservation needs for freight transportation. This includes information on weight-restricted bridges

from MassDOT's Bridge Inventory. Information on weight-restricted tracks and port dredging is also presented; the sources for this are the Boston Region MPO Freight Study and two MassDOT studies: the Massachusetts Freight Plan and the Massachusetts Rail Plan.

## Mobility

### Highway

Highway bottlenecks are defined as constraints that impede the flow of traffic; they can be caused by, among other things, closely spaced intersections operating near or at capacity, a lane drop, or an interchange connecting two major highways. Bottlenecks are identified for each of the corridors and are broken down by roadway type: express highway and arterial roadway. Bottleneck locations have been identified using three methods:

- Travel speed index during peak periods – The MPO's Congestion Management Process (CMP) was used for this information. Travel speed index is the ratio of observed speed to the posted speed limit. The speed index ratios are shown for existing conditions only. The worst locations for freeways and for arterials are listed in descending order of severity. A speed index range is shown for some roadways; where multiple communities are listed for a specific roadway, the communities are shown in descending order of severity.
- Volume-to-capacity ratio – The MPO's travel demand model was used in producing this information. The volume-to-capacity ratio is calculated using traffic volumes and roadway capacities and is shown for both existing conditions and for future No-Build conditions. The worst locations for freeways and for arterials are listed in descending order of severity. A volume-to-capacity range may be shown for a roadway; where multiple communities are listed for a specific roadway, the communities are shown in descending order of severity.

- Priority intersections – the MPO’s CMP was used for collecting this information. An intersection is categorized as a priority if it meets at least one of the following criteria: it has a high incidence of crashes; the average delay on its major approaches is greater than 80 seconds per vehicle as monitored by the CMP (all state-numbered routes are monitored); or it has been identified in an MPO study as needing improvement. The roadways that have clusters of priority intersections are listed in geographic order beginning from the Central Area and moving out into the corridor.



This information is then summarized in a table of all of the worst bottleneck locations in the corridor for freeways and for arterials.

### Transit

Various factors affect transit mobility, including capacity issues related to vehicle loads, service reliability, infrastructure and/or vehicle condition, and parking availability. Also affecting mobility is connectivity among modes and with the services of other regional transit authorities (RTAs), private-carrier services, and Transportation Management Association (TMA) shuttles. The data used to evaluate transit mobility come from several sources:

- Vehicle load, the ratio of passengers to seats on a transit vehicle, is an important measure of system capacity. The MBTA’s Service Delivery Policy defines acceptable loads by mode and by time period. Manually collected passenger counts were used to determine vehicle loads.
- One measure of service reliability, which is critical to transit mobility, is on-time performance. The Service Delivery Policy establishes standards for measuring schedule adherence by mode and time of day. Schedule adherence data for bus routes was obtained from automatic vehicle locator (AVL) equipment that records the time that each trip arrives at time points along the route. Rapid transit and commuter rail on-time performance information was obtained from, respectively, data collected by the Operations Control Center and data based on conductor observations.
- Reliability and capacity are also determined by the condition and availability of transit vehicles. Average daily vehicle availability, mean miles between failures, and percent of bus trips operated are tracked daily and reported monthly by the MBTA on its online ScoreCard.

- The MBTA's PMT adopted in December 2009 identified some specific current and projected transit needs that affect mobility.
- Parking capacity at transit stations is an important issue that affects connectivity and mobility, particularly for commuter rail. Data on parking availability and utilization were collected by MPO staff and reported in the CMP.
- Issues concerning connectivity between the MBTA and other RTAs were identified in the PMT.



### Freight

This section includes issues relating to the movement of freight, including issues concerning truck parking, movement of hazardous materials, movement of freight between facilities, and double-stack rail movement. This information was taken from the Boston Region MPO Freight Study and two MassDOT studies: the Massachusetts Freight Plan and the Massachusetts Rail Plan.

### Bicycle and Pedestrian

Specific information on bicycle and pedestrian issues is included in this section.

Information was taken from three plans developed for the MPO – the Regional Bicycle Plan, the Pedestrian Plan, and Improving Pedestrian Access to Selected Transit Stations – and the Massachusetts Bicycle Transportation Plan.

### Safety

MassDOT and its Registry of Motor Vehicles produce reports on crash clusters on roadways in the region. Each corridor chapter includes the top crash clusters in that area. Crash clusters are ranked based on the Equivalent Property Damage Only (EPDO) values. EPDO is calculated by rating crashes with a fatality at 10, crashes with personal injury at 5, and crashes with only property damage at 1. MassDOT applies a spatial algorithm to generate the clusters.

### Environment

Maps are included in each chapter providing an overview of environmental constraints in each corridor. The constraints include:

- Department of Environmental Protection–designated wetlands
- Federal Emergency Management Agency (FEMA) flood zones
- Public water supply
- Surface water protection areas

- Natural Heritage and Endangered Species Program Priority Habitats
- Protected open space
- Areas of Critical Environmental Concern

The locations of projects considered for inclusion in the LRTP were overlaid on these environmental constraint maps to give a preliminary assessment of environmental issues associated with the projects. This information was used during the project selection process.

### Transportation Equity

Transportation equity, formerly referred to as regional equity, requires that the MPO examine the allocation of benefits and burdens, historically, currently, and as planned for the future. It must ensure that minority and low-income communities are treated equitably in the provision of transportation services and projects. It must also provide for participation for minority and low-income communities in advising the MPO during its planning and decision-making processes.

The MPO's Transportation Equity Program builds on the foundation of previous MPO outreach and an analysis of the transportation needs of minority and low-income populations in the Boston region. It focuses on direct outreach to community organizations that serve environmental justice areas in the region; this outreach includes participating in organized forums.

Environmental justice areas in the MPO region are defined as areas with a population that is over 50% minority or that is over 50% low income, low income being defined as having an income that is less than 60% of the region's median income (that is, less than \$33,480). This section of each corridor chapter includes a summary of the transportation equity issues that the MPO has identified via outreach to that corridor.

### Summary of Needs

The final section of each corridor chapter summarizes the needs in the corridor that are most pressing. The basis for selecting these needs is the visions established by the MPO for Paths to a Sustainable Region as well as the information presented in the preceding sections. The needs pertaining to passenger travel are summarized by mode. Freight issues and issues in other areas that affect transportation, such as land use and transportation equity, are also summarized.

