

# CHAPTER 4

## Systemwide Context for the PMT



### TRANSIT SYSTEM: EXISTING CONDITIONS

#### OVERVIEW

The Boston metropolitan area is served by an extensive transit system comprising several complementary components. One component is a hub-and-spoke radial network of rapid transit, express bus, commuter rail, and commuter boat lines that is geared, during peak operations, to efficiently move large volumes of people into and out of the urban core for weekday commutes. Local bus and trackless trolley services fill in gaps and connect the radial “spokes” by offering line haul service in heavily congested urban areas, feeder service to rail, and some inter-suburban linkages. Demand-responsive transportation for people with disabilities and the elderly is also provided.

The MBTA is the primary transit provider in the Boston region. The MBTA district is made up of 175 cities and towns and includes communities outside of the 101 municipalities of the Boston Region Metropolitan Planning Organization area. The MBTA also provides commuter rail service to Providence, Rhode Island, which lies outside the MBTA district.

As can be seen in the following table, almost 99% of daily boardings are on the MBTA's primary modes: rapid transit (heavy rail and light rail), bus rapid transit (BRT), bus/trackless trolley, and commuter rail.

**TABLE 4-1**  
**Typical Weekday Boardings by Mode**  
**(Federal Fiscal Year 2007)**

MODE	BOARDINGS
Rapid transit	730,525
Bus (including trackless trolley and BRT)	355,558
Commuter rail	140,825
Commuter boat	4,900
Paratransit	5,173
Contracted bus*	4,650
Total	1,241,631

\*Bus service that is subsidized by the MBTA, but operated by a private vendor.

Source: MBTA, "Ridership and Service Statistics," Eleventh Edition, 2007.

## RAPID TRANSIT

The MBTA rapid transit system consists of three heavy rail lines—the Red, Orange, and Blue Lines—and two light rail lines—the Green Line and the Mattapan High Speed Line. These are described below.

- Red Line: A 21-mile heavy rail line with 22 stations that runs from Alewife Station in North Cambridge to JFK/UMass Station in North Dorchester, where it splits into two branches, one that ends at Ashmont Station in South Dorchester and another that ends at Braintree Station in Braintree. The Red Line is the longest and most heavily utilized rapid transit line in the system.
- Mattapan High Speed Line: A 2.5-mile, 8-station light rail line connecting with the Red Line and operating between Ashmont Station and Mattapan, through the Dorchester neighborhood of Boston and the town of Milton.
- Orange Line: An 11-mile heavy rail line with 19 stations, operating between Oak Grove on the Malden/Melrose line and Forest Hills in Jamaica Plain.
- Blue Line: A 6-mile, 12-station heavy rail line, the shortest of the rail rapid transit lines,

operating between Wonderland Station in Revere and Bowdoin Station in the Government Center area of Boston.

- Green Line: A 23-mile light rail line over four branches: Boston College (B Line), Cleveland Circle (C Line), Riverside (D Line), and Heath Street (E Line). The Green Line has 66 stops/stations and operates in Boston, Brookline, Cambridge, and Newton.

## BUS RAPID TRANSIT

The MBTA operates one BRT route, which consists of two sections that are not yet connected. Silver Line Washington Street operates for 2.3 miles along Washington Street between Dudley Square in Roxbury and Downtown Crossing in Boston, serving 13 stops/stations. Silver Line Waterfront operates from South Station to the South Boston waterfront, where it splits into two branches: SL1 to Logan International Airport and SL2 to Boston Marine Industrial Park. Including both branches, this section is 5.5 miles long and serves 16 stops/stations.



**SILVER LINE STOP AT EAST BERKELEY STREET**

## BUS AND TRACKLESS TROLLEY

The MBTA operates 178 bus routes that serve metropolitan Boston. It also has three electric trackless trolley lines that operate in Cambridge,



**MBTA BUS IN DOWNTOWN BOSTON NEAR THE OLD STATEHOUSE**

Watertown, and Belmont. Nearly all bus routes connect with the rapid transit system. The bus/trackless trolley system includes crosstown service, feeder service to rapid transit stations, frequent service along major arterials in heavily congested areas, and express bus service. Most of these routes have lengthy histories, and many had their origins as streetcar lines built before 1900. Schedules and routings have been revised gradually over the years, but most continue to operate along the same general alignments, with minor modifications made in response to changing demand. Recently, the most heavily patronized bus routes have been formally designated as “Key Routes.” The frequency of service on these routes is similar to rapid transit service frequencies, providing shorter wait times than are typical for bus service.

## COMMUTER RAIL

The 365-mile commuter rail network is composed of 13 radial lines and 126 stations. The commuter rail system is split into two parts: North Side service operates out of North Station, and South Side service out of South Station. The Massachusetts Turnpike can be considered the dividing line: the routes north of the Turnpike—the Newburyport/Rockport, Haverhill, Lowell, and Fitchburg Lines—constitute the North Side.

The lines along the Turnpike or to the south—the Framingham/Worcester, Needham, Franklin, Providence/Stoughton, Fairmount, Middleborough/Lakeville, and Kingston/Plymouth Lines, as well as the recently opened Greenbush Line—make up the South Side. There is no direct transit connection between North and South Stations, although a project to link the two has been proposed, and preliminary designs have been developed. Over 40,000 park-and-ride spaces are provided for commuter rail riders.

## COMMUTER BOAT

The MBTA provides commuter boat service on four routes. These services are operated directly by the MBTA or through subsidized private contractors. The routes operate between:

- Hewitt’s Cove (Hingham) and Rowes Wharf (Boston)
- Fore River Shipyard (Quincy), Long Wharf (Boston), and Logan Airport
- Point Pemberton (Hull), Long Wharf (Boston), and Logan Airport
- Charlestown Navy Yard and Long Wharf (Boston)



**MBTA COMMUTER BOAT**

## PARATRANSIT

The MBTA provides door-to-door paratransit service for customers with disabilities who cannot use the fixed-route system. This service, THE RIDE, is operated through private contractors using 228 lift-equipped vans and 225 sedans.



MBTA THE RIDE VEHICLE

## DEMOGRAPHIC TRENDS

### POPULATION

The MBTA service area in Massachusetts consists of 175 diverse cities and towns across the eastern and central sections of the state. In 2000 the population of this area was 4,661,000, or about 73% of the total state population.<sup>1</sup> Including the cities in Rhode Island served by the Providence commuter trains adds another 266,000 residents, for a total service area population of 4,927,000. Densely populated communities located within Route 128 account for 40% of the population. In the Massachusetts service area, population is projected to increase by 18%, to 5,497,000, by 2030.<sup>2</sup>

1 2000 U.S. Census.

2 Metropolitan Area Planning Council (MAPC) and other regional planning agencies' population and employment forecasts.

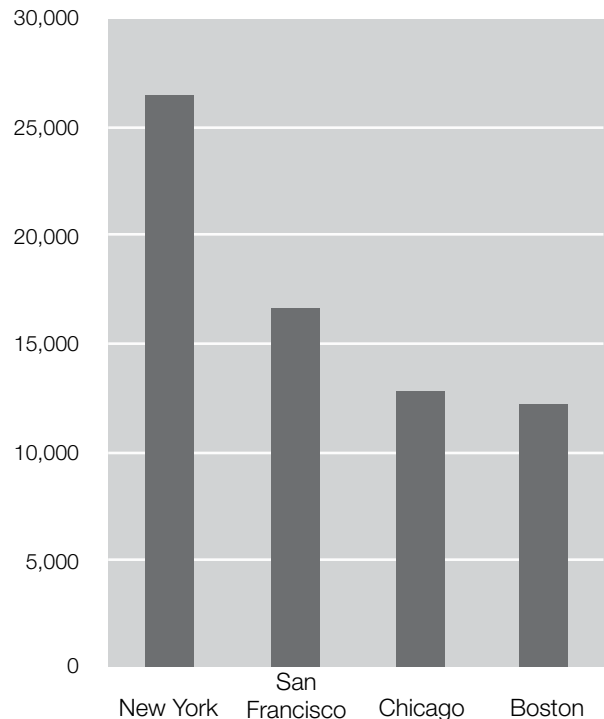
3 Because Providence is not in the MBTA's service area, it does not appear in Figure 4-1.

4 Demographia World Urban Areas: Population & Density, 2008.

Boston, with a 2000 population of 592,000, is the largest city in the service area, a position it should retain in 2030 with a forecasted population of 699,000. Due to the high concentration of jobs and other economic activity in Boston, its current population doubles in the daytime to approximately 1.2 million people. Thirteen percent of the residents in the MBTA's service area live in Boston, which has a population more than three times that of either of the next two largest cities served by the Authority: Providence, with 174,000 residents, or Worcester, with 173,000.<sup>3</sup>

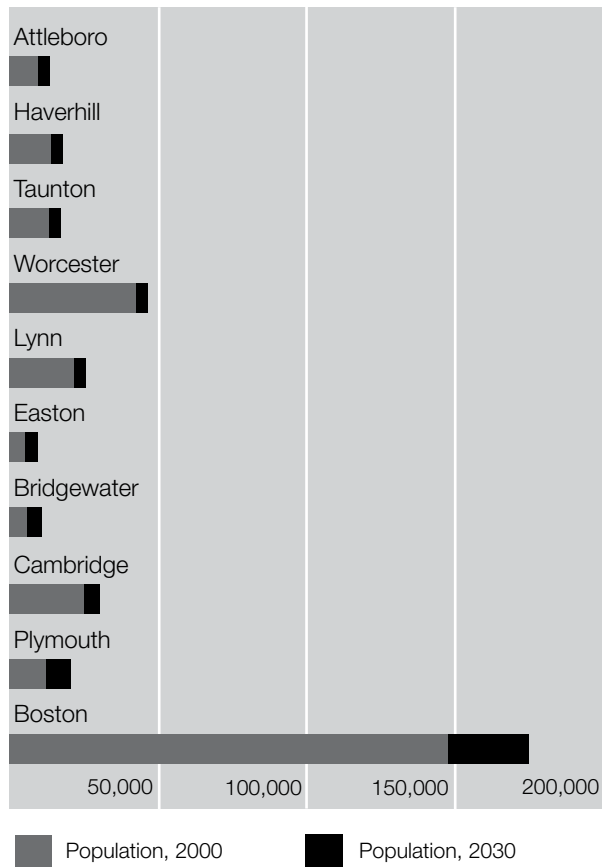
Boston Proper has a population density of 12,166 people per square mile. Of major U.S. cities, only New York City, San Francisco, and Chicago have higher population densities (see Figure 4-1). The Boston metro region, while the fifth-largest in population of U.S. metropolitan areas, ranks 24th in terms of regional population density, with 2,200 people per square mile.<sup>4</sup>

**FIGURE 4-1**  
2000 Population Density\* Comparison  
\*(per square mile)



Between 2000 and 2030, population levels in many communities in the service area are projected to remain relatively stable. The 10 communities with the largest projected numerical population growth represent almost one-third of the region's population in both 2000 and 2030 (see Figure 4-2). Eight of these communities are directly served by MBTA commuter rail and/or rapid transit service.<sup>5</sup>

**FIGURE 4-2**  
**MBTA Region 2000–2030**  
**Population Growth: Top-Ten Communities**  
**in Order of Population Increase**



While more than one-third of the communities in the MBTA service area are projected to grow by 10% or less, the population of many of

the exurban communities in the outer edges of the service area is expected to increase 50% or more by 2030. These communities include towns located along or near I-495, such as West Newbury, Tyngsborough, Upton, Easton, and Bridgewater.

## EMPLOYMENT

About 2,543,000 people work in the MBTA's Massachusetts service area, representing about 80% of total state employment. About 45% of service area employment is concentrated in the cities generally within Route 128. A total of 560,000 jobs are estimated to be in Boston, making up 22% of total service area employment and about half the jobs within Route 128 (see Figure 4-3). This is five times the employment in Cambridge, the second-largest employment center in the service area.<sup>6</sup>

By 2030, employment in the MBTA service area is projected to have increased by 19% over the 2000 level. Growth patterns, however, are expected to vary throughout the service area. Much of the growth (43%) is projected to occur in just 10 communities, which alone accounted for over one-third (38%) of the state's employment in 2000. In almost half (45%) of the region's communities, employment is projected to stay the same or grow modestly over the next 25 years.<sup>7</sup>

Boston has become one of the top-ten tourist destination cities in the U.S., with 16.3 million visitors in 2004.<sup>8</sup> An estimated 721,000 overseas visitors come to Boston each year.

Boston is also a well-established international center for education; the Boston area boasts more than 100 colleges and universities. At institutions in Boston and Cambridge alone, there are more than 250,000 students.

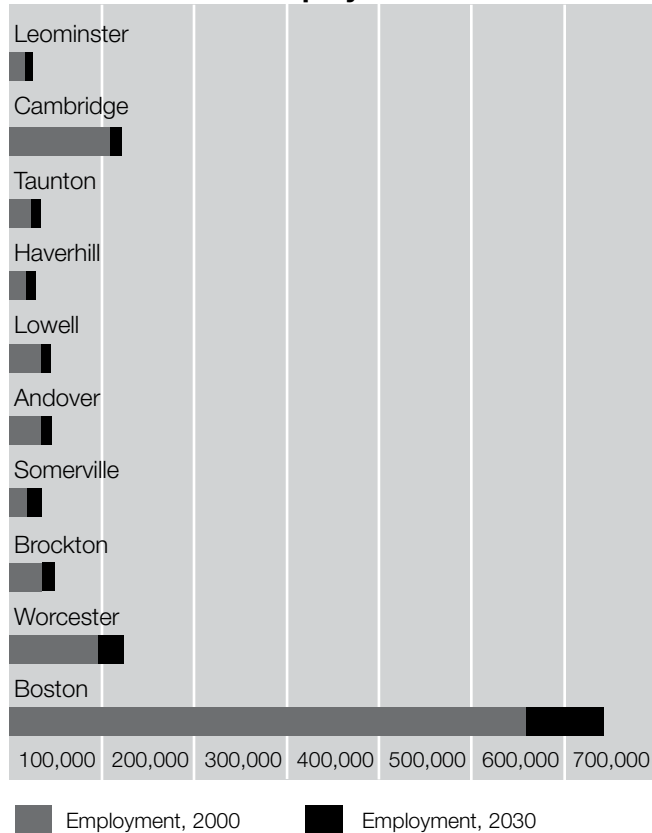
5 Ibid.

6 2000 U.S. Census.

7 Metropolitan Area Planning Council (MAPC) and other regional planning agencies' population and employment forecasts.

8 City-Data.com.

**FIGURE 4-3**  
**MBTA Region 2000–2030**  
**Employment Growth: Top-Ten Communities**  
**in Order of Employment Increase**

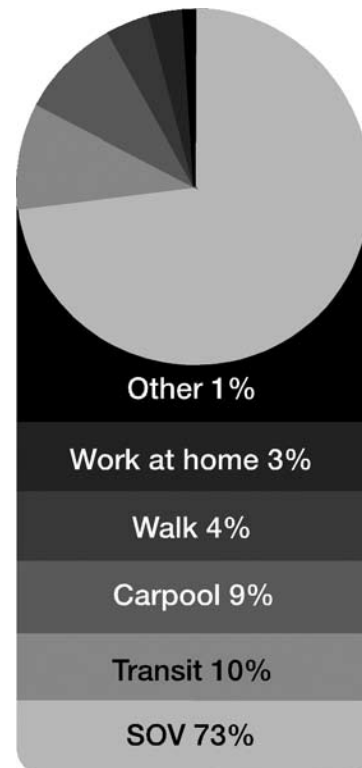


## COMMUTING AND CONGESTION TRENDS

Nationally, work trips comprise a small proportion—15%—of all trips.<sup>9</sup> However, because most commuting occurs during peak travel times, work trips determine the capacity needs of highway and transit systems, as well as the degree to which the performance of these systems meets travel demand. Seventy-three percent of all work trips from municipalities in the MBTA service area were made in single-occupancy vehicles (SOVs) in 2000, and 10% were made by transit (see Figure 4-4). The transit mode share in Boston is

more than twice the national average.<sup>10</sup> The transit share rises to 34% and the SOV share drops to 46% for work trips to Boston and Cambridge, home to about one-quarter of the employment in the service area (see Figure 4-5).<sup>11</sup>

**FIGURE 4-4**  
**2000 Travel Modes to Work by**  
**Boston Region Residents**

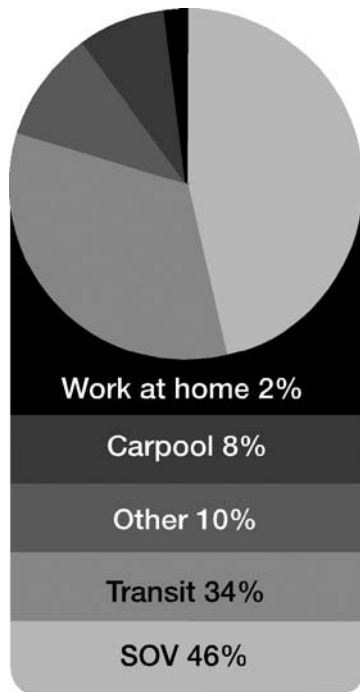


<sup>9</sup> Transportation Research Board, *Commuting in America III: The Third National Report on Commuting Patterns and Trends*, NCHRP Report 550, October 2006, p. 3.

<sup>10</sup> *Ibid.*, p. xix.

<sup>11</sup> 2000 U.S. Census.

**FIGURE 4-5**  
**2000 Travel Modes to Work**  
**to Boston and Cambridge by**  
**Boston Region Residents**



Boston has the 12th-worst traffic congestion in the country, according to the most recent Texas Transportation Institute Urban Mobility Report (2007). Because of traffic congestion, drivers in eastern Massachusetts annually spent 93 million hours stuck on congested roadways and wasted 62.5 million gallons of gasoline. The economic cost to regional commuters was estimated at \$1.8 billion annually. The average Boston area commuter spent 46 hours a year in traffic jams, and, according to the Texas Transportation Institute, without public transit, the impact on the average commuter would translate into an additional 11 hours of traffic delay.

The regional model projects that, in 2030, vehicle miles of travel (VMT) will be 20% greater and average travel times 26% longer, compared to 2000, if current trends continue and no changes are made to the transportation system.