

# **The Massachusetts Bay Transportation Authority's Commuter Rail System**

**Green Design & the City – ENVS 662**

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## **Introduction**

One of, if not the, oldest public transportation systems in the United States, the Boston MBTA has evolved into a dynamic multi-service system that serves nearly one-third of the land area of the Commonwealth of Massachusetts, and nearly half of her population. The MBTA unites leafy-green communities such as the tiny town of Sherborn, founded in 1634 as a predominately farming community, with pre-industrial mill-towns such as Framingham, now a burgeoning biotechnical center, and with communities of the densely populated metro core such as the college town of Cambridge where over 101 thousand people live, work, and learn in a seven square mile area.<sup>1</sup> The MBTA utilizes buses, light and heavy rail trains, subways, trolleys, ferries, and on-demand van and sedans to meet its riders' needs. I intend to present an overview of the entire system, focus on the benefits, describe the commuter rail component, and discuss the regional planning that guides the future direction of the system, which I believe to be integral to the MBTA's green and sustainable future.

## **Brief History of Mass Transit in Eastern Massachusetts**

As mentioned, the MBTA is the oldest public transportation system in United States. Its roots reach back to 1630 with the operation of a public ferry between Chelsea, Charlestown, and Boston which shortened a two day journey around the harbor to a three mile sailing. For nearly 170 years, that was the extent of public transportation in Boston. But in 1793, a stagecoach line



was opened between Charlestown and Boston and expanded in 1820 with the horse-drawn omnibus. Two years later, the city followed New York's lead and experimented with

the rail-mounted horse car which offered a faster and smoother ride through the muddy and rutted streets of old Boston. The horse cars came into full operation with the opening of the Central Square to Bowdoin Square line in 1856 – part of today's Green Line. Some 20 different

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<sup>1</sup> [http://www.mapc.org/data\\_gis/data\\_files/Profiles2004.pdf](http://www.mapc.org/data_gis/data_files/Profiles2004.pdf)

horse car lines crisscrossed the streets of Boston over the next 30 years until 1887 when the passage of the West End Consolidation Act pulled all lines into the West End Street Railway effectively becoming the largest street rail line in the nation with over 8000 horses. Of course, that many horses presented problems of its own and the city was soon looking for another solution. By this time, San Francisco, Chicago, Washington, Kansas City, and Los Angeles had cable cars; these were expensive systems with high maintenance costs. Boston decided, after seeing a demonstration in Richmond, Virginia, to go another route and in 1889, opened the first full-scale electric street car operation in the nation.<sup>2</sup> Other “firsts” for Boston include the first articulated train cars on its elevated railway lines and the first underwater mass transit tunnel. Over the ensuing hundred plus years, this system has continued to evolve and now includes diesel and electric powered buses, trolleys, subways, light rail, commuter rail and, of course, an expanded ferry system which is where it all started 380 years ago.<sup>3</sup>

There were many entities involved in the history of mass transit in eastern Massachusetts. Initially these were private enterprises of developers and speculators. In 1914, with the passage of the Public Control Act, the government got involved to insure that public transportation would be available regardless of economic conditions. In 1947, the Metropolitan Transit Authority was created and assumed control of the entire elevated system and started expanding into outlying communities, mostly by taking over other existing independent rail lines. But the system’s growth was haphazard. Regional planners, universities, and governments began looking at this seemingly random growth in the 1950s and ‘60s and determined regional growth plans were needed. Out of these studies came several regional planning entities that I will discuss later, and the Massachusetts Bay Transportation Authority, which was the nation’s first combined regional transportation planning and operating agency.<sup>4</sup>

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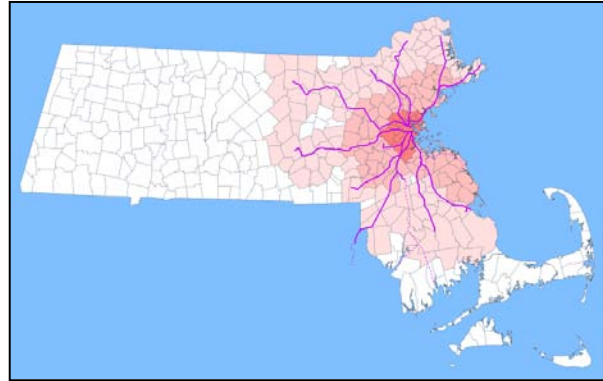
<sup>2</sup> [http://www.mbta.com/about\\_the\\_mbta/history/](http://www.mbta.com/about_the_mbta/history/)

<sup>3</sup> Ibid.

<sup>4</sup> Ibid.

## **The MBTA Today**

At the time the electric streetcars came into use in 1892, the transit commission had a service area of ten miles radius from the State House that included 27 towns, and served about 850,000 people. Today, the MBTA serves 175 towns and cities in Eastern Massachusetts encompassing a land area of 3,244 square miles or nearly one-third of the state's land area. The



population has grown to 4,667,555 (2000 census) or almost half of the state's population.<sup>5</sup> The total MBTA ridership measured in average weekday trips was 1,235,700 for the second quarter of 2009. This ranks Boston fifth in the nation for public transportation ridership behind New York (10,144 mil), Chicago (1.671 mil), Los Angeles (1.489 mil), and Washington, DC (1.469 mil).<sup>6</sup> Funding for the MBTA comes 36% from the fare box, with the balance split between state and federal sources, and assessments to the cities and towns it serves (on a proportionate share of the MBTA's net deficit).<sup>7</sup> The MBTA operates at a net deficit with nearly \$5.2 billion in capital debt. They are currently struggling to balance their 2010 budget which is running \$30 million short of projections due to lower ridership, loss of advertising revenue, projected sales tax shortfalls, and an increase in second tier contracts (such as on-demand vans and sedans). The MBTA anticipates having to raise fares by 19.5% as well as looking to the state for additional support from an increase in the state sales tax and the state gas tax. The last increase in MBTA fares was in 2007 when rates increased 25%.<sup>8</sup>

## **MBTA System and the Commuter Rail**

Riders of the MBTA have access to 183 bus routes including two bus rapid transit lines, three rapid transit lines, five street car routes, four trackless trolley lines, and thirteen commuter rail

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<sup>5</sup> Ibid.

<sup>6</sup> [http://www.apta.com/resources/statistics/Documents/Ridership/2009\\_q2\\_ridership\\_APTA.pdf](http://www.apta.com/resources/statistics/Documents/Ridership/2009_q2_ridership_APTA.pdf)

<sup>7</sup> [http://www.mbta.com/about\\_the\\_mbta/history/](http://www.mbta.com/about_the_mbta/history/)

<sup>8</sup> <http://ibert.org/mbta/help.php>

lines. They also have access to ferry service for inner and outer harbor transport, the use of 46,000 commuter parking spaces, and lots of bike racks.<sup>9</sup> The MBTA maintains approximately 1,200 miles of rail.<sup>10</sup> The system also maintains significant collateral as shown in the following table.

<b>MBTA Collateral</b>	<b>MBTA System</b>	<b>Commuter Rail Component</b>
Diesel & CNG buses	927	
Dual mode buses	32	
Electric trolley buses	28	
Heavy rail vehicles	408	
Light rail vehicles	200	
PCC cars	10	
Commuter rail locomotives	83	83
Commuter rail coaches	410	410
MBTA-owned vans & sedans	298	
Contractor-supplied vans & sedans	325	
Commuter parking spaces	46,000	40,000
<a href="http://www.mbta.com/about_the_mbta/history/">http://www.mbta.com/about_the_mbta/history/</a>		

The MBTA commuter rail component averages 145,300 weekday riders out of the aforementioned 1.2 million trips for the entire system (approximately 12% of the total). There are four commuter lines in the nation with higher ridership. These are the Long Island Railroad (348 thousand), Metra Chicago (312 k), New York’s Metro North (279 k), and New Jersey Transit (276 k).<sup>11</sup>

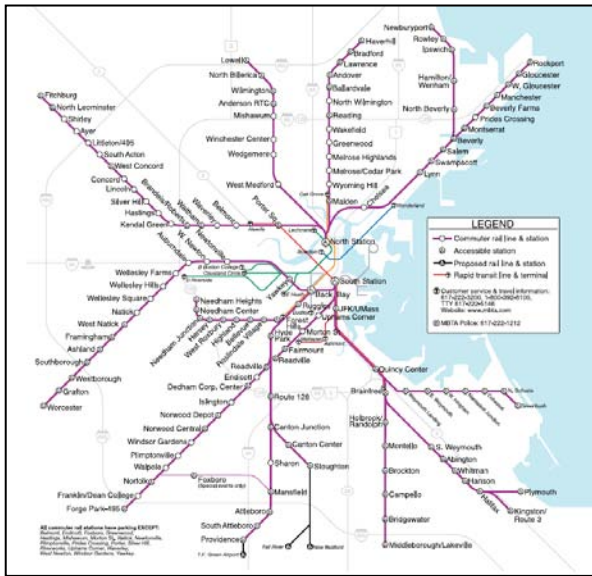
There are eight zones to the pricing structure for the commuter rail system. Fares range from \$1.70 for a trip within a zone, to \$7.75 for a trip across all eight zones. Discounts are available for monthly rates and there is no peak or off-peak pricing, however, there is a \$1.00 surcharge for tickets purchased on-board and that is increased to \$2.00 during peak hours. They also offer student discounts for junior-high and high-school students and also senior discounts.<sup>12</sup>

<sup>9</sup> [http://www.mbta.com/about\\_the\\_mbta/history/](http://www.mbta.com/about_the_mbta/history/)

<sup>10</sup> [http://www.mbta.com/uploadedFiles/About\\_the\\_T/Financials/9\\_Appendix.pdf](http://www.mbta.com/uploadedFiles/About_the_T/Financials/9_Appendix.pdf)

<sup>11</sup> [http://www.apta.com/resources/statistics/Documents/Ridership/2009\\_q2\\_ridership\\_APTA.pdf](http://www.apta.com/resources/statistics/Documents/Ridership/2009_q2_ridership_APTA.pdf)

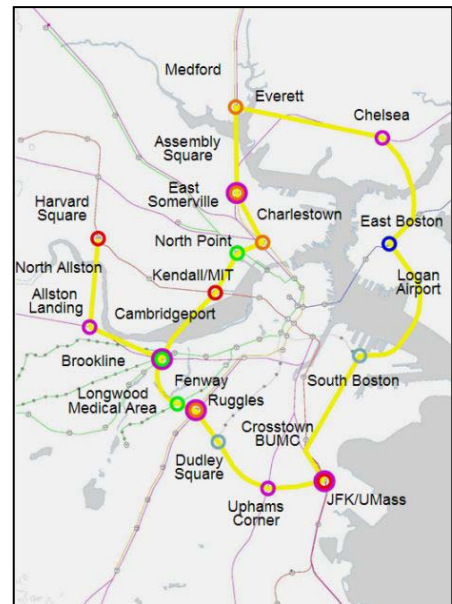
<sup>12</sup> [http://www.mbta.com/fares\\_and\\_passes/rail/](http://www.mbta.com/fares_and_passes/rail/)



The thirteen commuter rail lines are split into two systems running on 365 miles of track<sup>13</sup> through 126 stations. Five lines operate north of the Massachusetts Turnpike and terminate at the North station and the other system of eight lines operates out of South Station and services the area south of the Turnpike. Unfortunately these two systems don't meet; they are separated by one and a half miles of congested downtown Boston streets which must be traversed by foot, subway and bus transfers, or taxi. Plans to

connect these stations have been stalled by budget concerns with cost estimates between \$4 and \$8 billion depending on the source. The MBTA is presently trying to secure the right-of-way so they have an option in the future.<sup>14</sup>

The commuter rail system is a hub and spoke, or radial, system. Commuters have to go all the way into the city to transfer to come back out on one of the other commuter lines. Regional growth plans include development of an Urban Ring that will connect these spokes in three phases. Phase I has already been implemented with the addition of cross-town bus routes. Phase II would add bus rapid transit and transfer connections to all commuter rail lines as well as all rapid transit and major bus hubs and would utilize efficiency tools such as dedicated lanes, exclusive roadway



<sup>13</sup> [http://www.mbta.com/uploadedFiles/About the T/Financials/9 Appendix.pdf](http://www.mbta.com/uploadedFiles/About%20the%20T/Financials/9_Appendix.pdf)

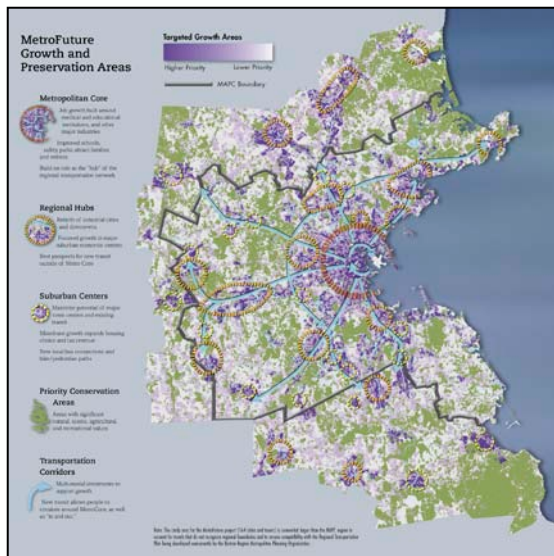
<sup>14</sup> [http://en.wikipedia.org/wiki/North-South\\_Rail\\_Link](http://en.wikipedia.org/wiki/North-South_Rail_Link)

segments, and traffic signal priority to speed commuters along. Phase III would add rail rapid transit in the western portion of the corridor from Assembly Square all the way around to Dudley station.<sup>15</sup>

As shown in the table above, the commuter rail collateral includes 83 locomotive units and 410 coaches including 140 bi-level coaches and 270 single coaches. Plans for a cleaner and more efficient fleet include 40 new diesel-electric passenger locomotives to replace some of its aging fleet (some of its engines are nearly 30 years old)<sup>16</sup> and plans to add 75 new bi-level commuter rail coaches. The new coaches will bring the bi-level fleet to 215 and provide additional seating, lavatories, and improved accessibility.<sup>17</sup>

## **Regional Planning and Sustainability**

The MBTA relies on several organizations for assistance in developing its growth and improvement plans. The Boston Region Metropolitan Planning Organization (MPO) is required



by the legislature to prepare the MBTA's long and short-term transportation plans including its Capital Investment Program, the Transportation Improvement Plan and a long range planning document called the Program for Mass Transportation.<sup>18</sup> The MPO incorporates into these plans recommendations that are derived from a more comprehensive planning document prepared by the Metropolitan Area Planning Council (MAPC).<sup>19</sup> The MAPC's focus is on population and employment, transportation, economic

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<sup>15</sup> <http://www.theurbanring.com/studybasics.asp>

<sup>16</sup> *Boston commuter-rail agency seeks proposals for new diesel-electric locomotives*, 'Motive Power,' 9/9/2009, <http://www.progressiverailroading.com/news/article.asp?id=21399>

<sup>17</sup> North America. *Railway Age*, 00338826, Mar2008, Vol. 209, Issue 3

<sup>18</sup> [http://www.bostonmpo.org/bostonmpo/1\\_about\\_us/1\\_mpo/mpo.html](http://www.bostonmpo.org/bostonmpo/1_about_us/1_mpo/mpo.html)

<sup>19</sup> [http://www.bostonmpo.org/bostonmpo/3\\_programs/1\\_transportation\\_plan/plan.html](http://www.bostonmpo.org/bostonmpo/3_programs/1_transportation_plan/plan.html)

development, regional growth, and the environment; broad growth issues for the very diverse 101 town and cities surrounding the metropolitan Boston area that are the majority of the MBTA's service area.<sup>20</sup> MetroFuture is the MAPCs vision for the region that comprises 65 specific goals to control and direct growth. Twelve of those goals are targeted to transportation and issues of safety, "last mile", freight access, funding, accessibility, alternatives, increased ridership, and system expansions.<sup>21</sup> The MPO has incorporated these transportation goals into its planning documents for the MBTA thereby ensuring that the MBTA plays an important role in controlling and directing growth in the region.

Some of the other steps the MBTA has taken to improve ridership and therefore its sustainability on its commuter rail lines include installing bike cages, connecting riders to recreational activities, providing Wi-Fi access, and also

providing easy access to MBTA news and events. Part of the MBTA's goal to address "last mile" issues involves better service to bike riders. One of these services is secure bike cages at strategic locations. These are secure, well lit, monitored enclosures, with



emergency call boxes. Two cages that support 150 bikes each are available at the Alewife Station at the end of the Red Line in Cambridge, and another cage that can accommodate 100 bikes just opened at the Forest Hills Station which is a connection point for the Needham Commuter train and the Orange line. The MBTA received \$4.8 million from the American Recovery & Reinvestment Act to expand bike access, which they will use for ten new cages and 50 covered bike racks. Future sites for the cages will be selected based on bike parking demand and to meet environmental justice goals.<sup>22</sup> Incidentally, bikes are allowed on all commuter lines except during weekday rush hours.<sup>23</sup>

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<sup>20</sup> [http://www.mapc.org/about\\_mapc.html](http://www.mapc.org/about_mapc.html)

<sup>21</sup> [http://www.metrofuture.org/files\\_metrofuture/userfiles/file/MetroFuture\\_Summary\\_FINAL.pdf](http://www.metrofuture.org/files_metrofuture/userfiles/file/MetroFuture_Summary_FINAL.pdf)

<sup>22</sup> [http://www.mbta.com/about\\_the\\_mbta/news\\_events/?id=18211&month=&year=](http://www.mbta.com/about_the_mbta/news_events/?id=18211&month=&year=)

<sup>23</sup> [http://www.mbta.com/riding\\_the\\_t/bikes/](http://www.mbta.com/riding_the_t/bikes/)

One of the more popular perks for commuters is the availability of free Wi-Fi on all commuter routes. The MBTA has equipped 258 of the 410 coaches in the fleet with the service and they plan for every trip on every line to have at least two Wi-Fi enabled coaches. Signage tells riders which coaches are so equipped.<sup>24</sup>

And finally, commuters with web-enabled devices can access up-to-date specially formatted alerts, schedules, fare information, news & events, and customer support on their iPhones, Blackberries, Treos, and Pocket PCs through Mobile MBTA.com.<sup>25</sup>

## **Summary**

This is a dynamic system that offers lots of options for its riders. The regional aspect of the MBTA is an exciting vehicle for smart growth. The MBTA's participation and support of regional planning to control growth, and reduce reliance on personal automobiles, coupled with its plans to improve the efficiency of its commuter rail fleet and move to more environmentally friendly equipment makes this system smart and green for the future. But the current recession and lack of funds to support these changes will slow its progress. It is probable that the MBTA's efforts may be further slowed in the hierarchy of recessionary spending as the independent towns and municipalities that make up the region the MBTA serves push-back on regional spending projects in favor of targeted home-rule projects. Hopefully they all can be strong enough in their commitment to controlling growth, reducing green house gases, reducing congestion, and controlling sprawl, that they will continue to support regional efforts and not derail.

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<sup>24</sup> [http://www.mbta.com/riding\\_the\\_t/wifi/](http://www.mbta.com/riding_the_t/wifi/)

<sup>25</sup> [http://www.mbta.com/rider\\_tools/mobile\\_t/](http://www.mbta.com/rider_tools/mobile_t/)

## **Resources**

American Public Transportation Association, [www.apta.com](http://www.apta.com).

Boston Region Metropolitan Planning Organization, [www.bostonmpo.org](http://www.bostonmpo.org).

Help Fill the MBTA's Deficit Hole, <http://ibert.org/mbta/help.php>

Massachusetts Bay Transportation Authority, [www.mbta.com](http://www.mbta.com).

MetroFuture, [www.metrofuture.org](http://www.metrofuture.org)

Metropolitan Area Planning Council, [www.mapc.org](http://www.mapc.org).

Motive Power, 9/9/2009

North America. Railway Age, 00338826, Mar2008, Vol. 209, Issue 3

The Urban Ring, [www.theurbanring.com](http://www.theurbanring.com)

Wikipedia, North-South Rail Link, [http://en.wikipedia.org/wiki/North-South\\_Rail\\_Link](http://en.wikipedia.org/wiki/North-South_Rail_Link)