Appendix D West Corridor: Mobility Problems and Proposed Solutions

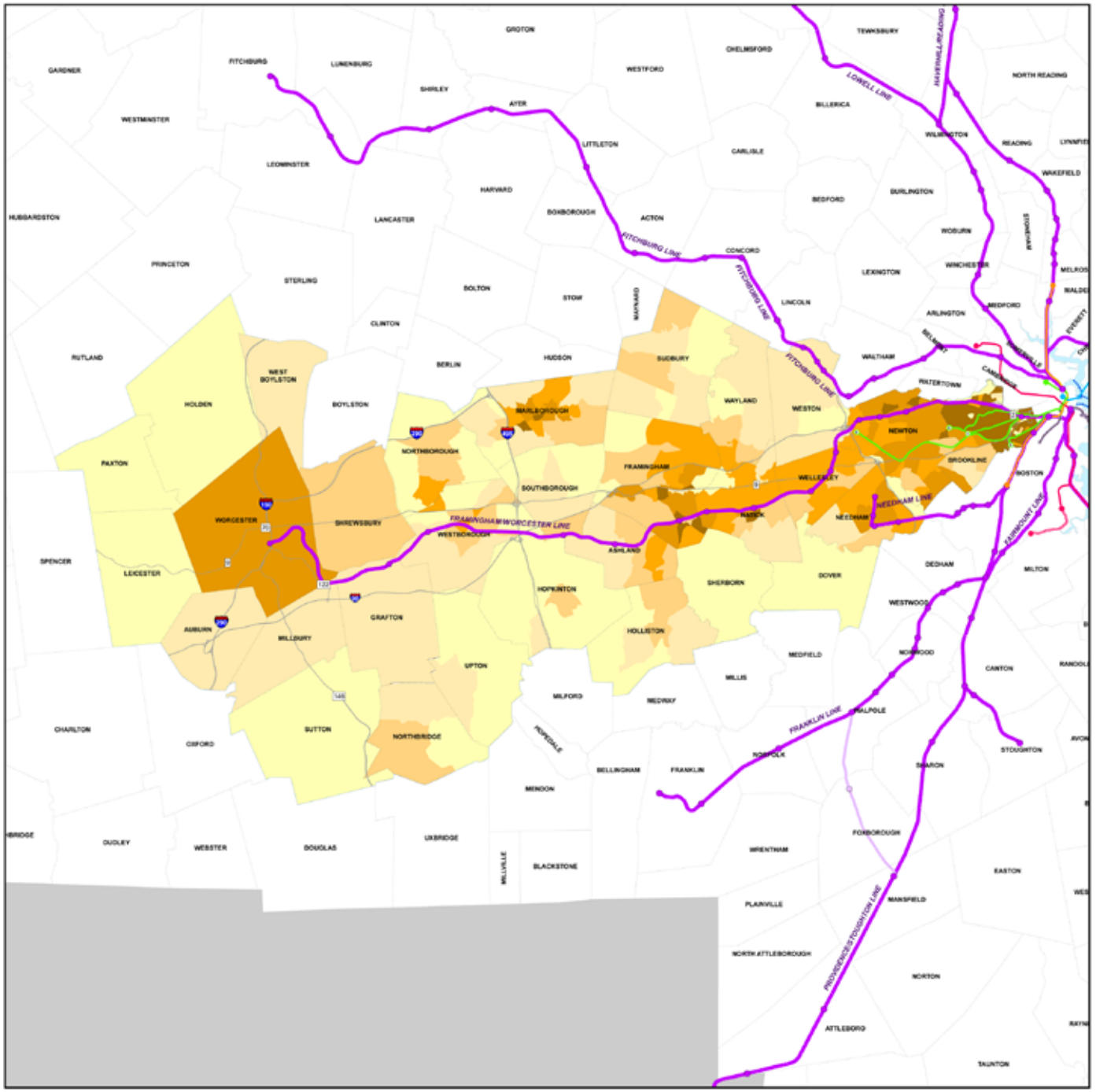
BACKGROUND

Existing Conditions

This corridor extends west from Massachusetts Avenue in Boston to the towns of Leicester and Paxton, west of Worcester, and to Auburn in the I-90 corridor. The Boston neighborhoods anchoring this corridor in the east are experiencing intense institutional expansion: the Longwood Medical and Academic Area, Boston and Northeastern Universities in the Fenway area, Harvard University in Allston, and Boston College in Brighton. In the west, Worcester, which is second largest city in New England, anchors the corridor. Most of the future development in the corridor is projected to occur in the exurbs and in Worcester.

In the West Corridor, the MBTA operates the Worcester and part of the Needham commuter rail lines. Inside of Route 128, the four Green Line branches and 11 express bus routes provide service from the suburbs into Boston. In addition, the MBTA provides local service in the corridor on 36 bus routes. Outside of Route 128 the two commuter rail lines are the principal MBTA services. Twenty trains operate in each direction on weekdays between Boston and Framingham, and 10 of these trains continue beyond Framingham and serve Worcester. Sixteen trains operate in each direction to Needham.

MBTA service in this corridor is supplemented by local bus service provided by the Worcester Regional Transit Authority (WRTA) and the MetroWest Regional Transit Authority (MWRTA). WRTA operates a bus system with 29 routes that are centered in downtown Worcester. Of these routes, 8 make



MAP D-1
West Corridor of the MBTA Service Area

Population Density, 2000

U. S. Census 2000
Population/Square Mile by TAZ

- 0 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 8,000
- 8,001 - 176,000

Rapid Transit

- Blue Line
- Green Line
- Orange Line
- Red Line
- Mattapan High Speed Line
- Silver Line

Commuter Boat

- Commuter boat route

Commuter Rail

- Commuter rail line

0 2.5 5 10 Miles

N

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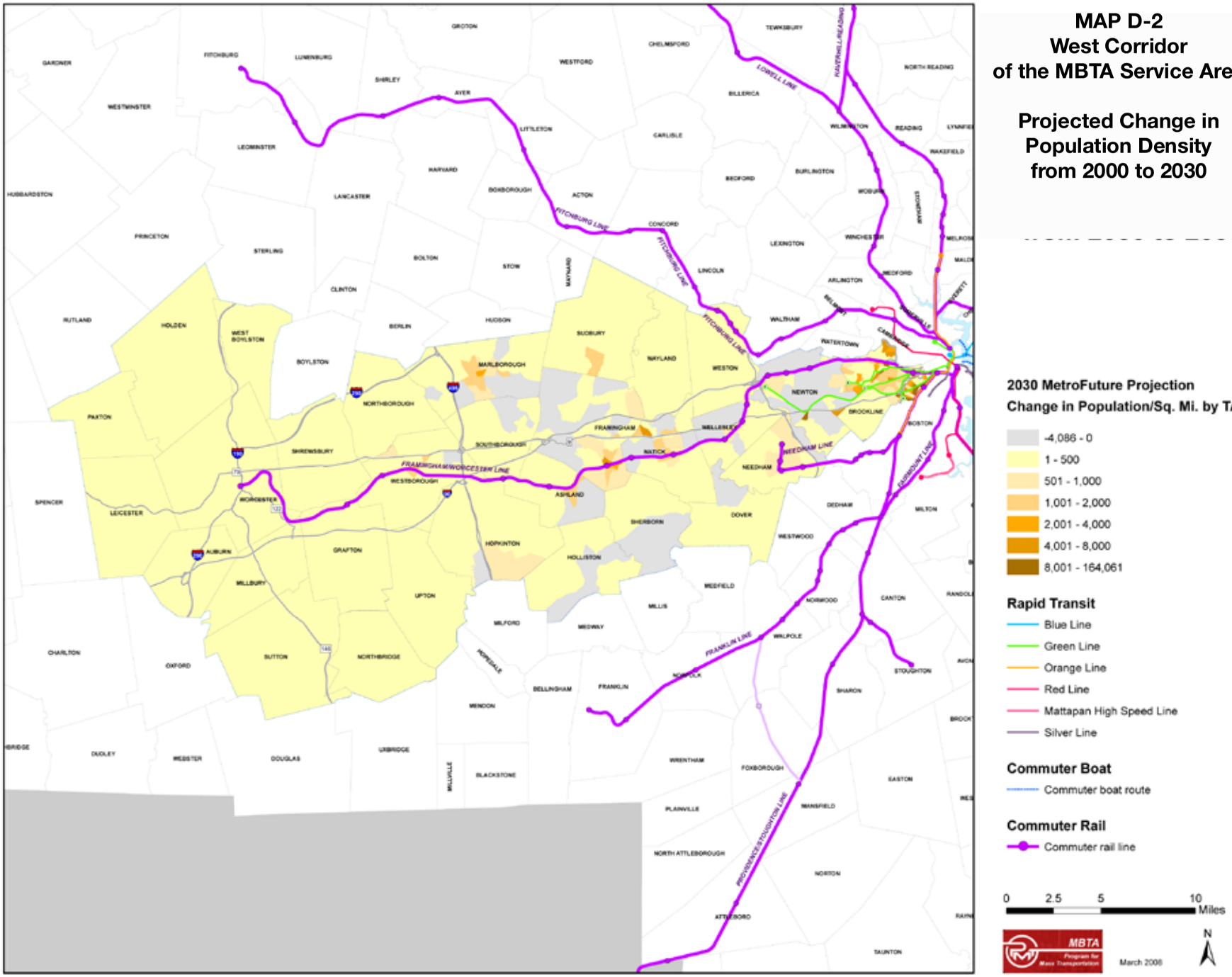

MAP D-2
West Corridor
of the MBTA Service Area
Projected Change in
Population Density
from 2000 to 2030
2030 MetroFuture Projection
Change in Population/Sq. Mi. by TAZ
-4,086 - 0
1 - 500
501 - 1,000
1,001 - 2,000
2,001 - 4,000
4,001 - 8,000
8,001 - 164,061
Rapid Transit
Blue Line
Green Line
Orange Line
Red Line
Mattapan High Speed Line
Silver Line
Commuter Boat
Commuter boat route
Commuter Rail
Commuter rail line
0 2.5 5 10 Miles
N
MBTA
March 2008

intermediate stops at Union Station in Worcester. WRTA also provides demand-responsive service to the Southborough commuter rail station from points in Southborough and Marlborough, and is now responsible for the former Framingham LIFT and Natick Neighborhood Bus systems.

Population

In addition to three Boston neighborhoods—Longwood, Fenway, and Allston—there are 3 cities and 27 towns in this corridor. Today, the highest population densities in this corridor are found in the Boston neighborhoods, followed by Brookline and Newton, both of which are located within Route 128. Outside of Route 128, Worchester's population density is similar to Newton's (see Map D-1). By 2030, parts of Natick, Framingham, and Marlborough achieve a level of density comparable to the "close-in" suburbs. (See Map D-2.)These densely populated areas are served by commuter rail, an interstate highway, or both.

According to the U. S. Census, the corridor's 2000 population was 778,623. This population is projected to increase by 13% to 881,388 by 2030.[1] Of the six radial corridors, this has the lowest percentage increase and lowest absolute increase. The population in most communities is projected to remain stable or experience moderate growth. Sixteen of the communities are projected grow by less than 100 people per year during the 30-year period. Communities with the most projected growth include Worcester, Shrewsbury, Grafton, Framingham, and Westborough. (See Figure D-1.) All but Framingham are west of I-495.

Envisioned major housing developments include 900 units at City Square, in Worcester, and 324 units at Westborough Village, in Westborough.

FIGURE D-1
West Corridor 2000-2030
Population Growth: Top Ten Communities in Order of Increase

Employment

Current employment density patterns are similar to those for population, with the highest concentrations of employment located mostly within Route 128, and also along commuter rail lines or near major roadways, including Route 9, I-90, and I-495 (see Mad D-3). Between 2000 and 2030, employment densities are projected to remain fairly stable in most communities in this corridor, with the exception of the institutional growth in Boston and in pockets along long I-90 in Natick, Framingham, and Southborough (see Map D-4).

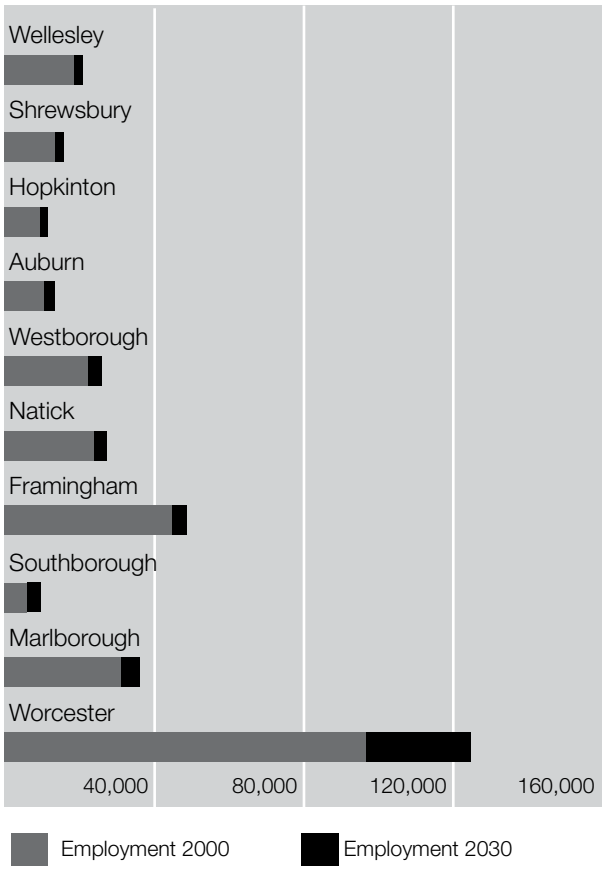
Employment in the corridor is projected to increase by 17% between 2000 and 2030, with

1 Metropolitan Area Planning Council (MAPC) and Central Massachusetts Regional Planning Commission (CMRPC) population and employment forecasts.

most communities experiencing stable or modest growth in absolute terms.[2] Two-thirds of the growth is projected to be in communities west of I-495, with 40% of total job growth occurring in Worcester alone. (See Figure D-2.)

Significant increases in employment are also expected in areas of Boston, particularly in Allston and in the Longwood Medical and Academic Area. The Longwood Medical and Academic Area, which was home to more than 40,000 employees in 2005, anticipates an increase of 1,000 new jobs annually through 2020.

FIGURE D-2
West Corridor 2000-2030
Employment Growth: Top Ten Communities in Order of Increase

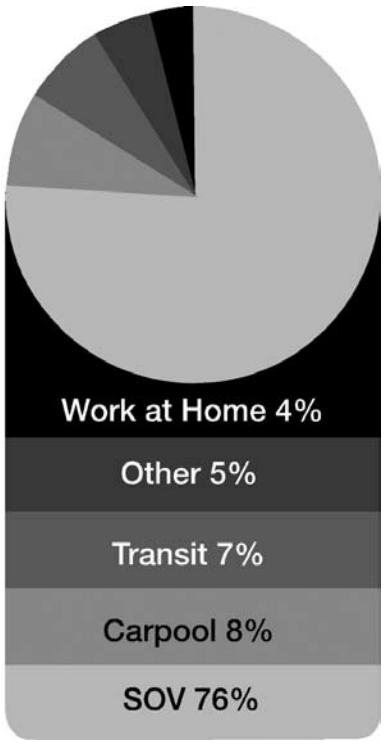


In addition to institutional expansion, there are proposed private developments in this corridor, such as Fenway Center, with close to 340,000 square feet of office space and 100,000 square feet of retail shops and restaurants. Another proposed development in the corridor is City Square, in Worcester, which along with its residential component will have one million square feet of office space and 407,000 square feet of retail space.

Journey to Work

Nationally, work trips comprise a small proportion—15 %—of all trips.[3] Because most commuting occurs during peak travel times, work-trip volumes determine the capacity needs, as well as the performance, of highway and transit systems. In 2000, of work trips that originating in the West Corridor, 76% were made in single-occupancy vehicles (SOVs); 7% were made on transit. (See Figure D-3.)

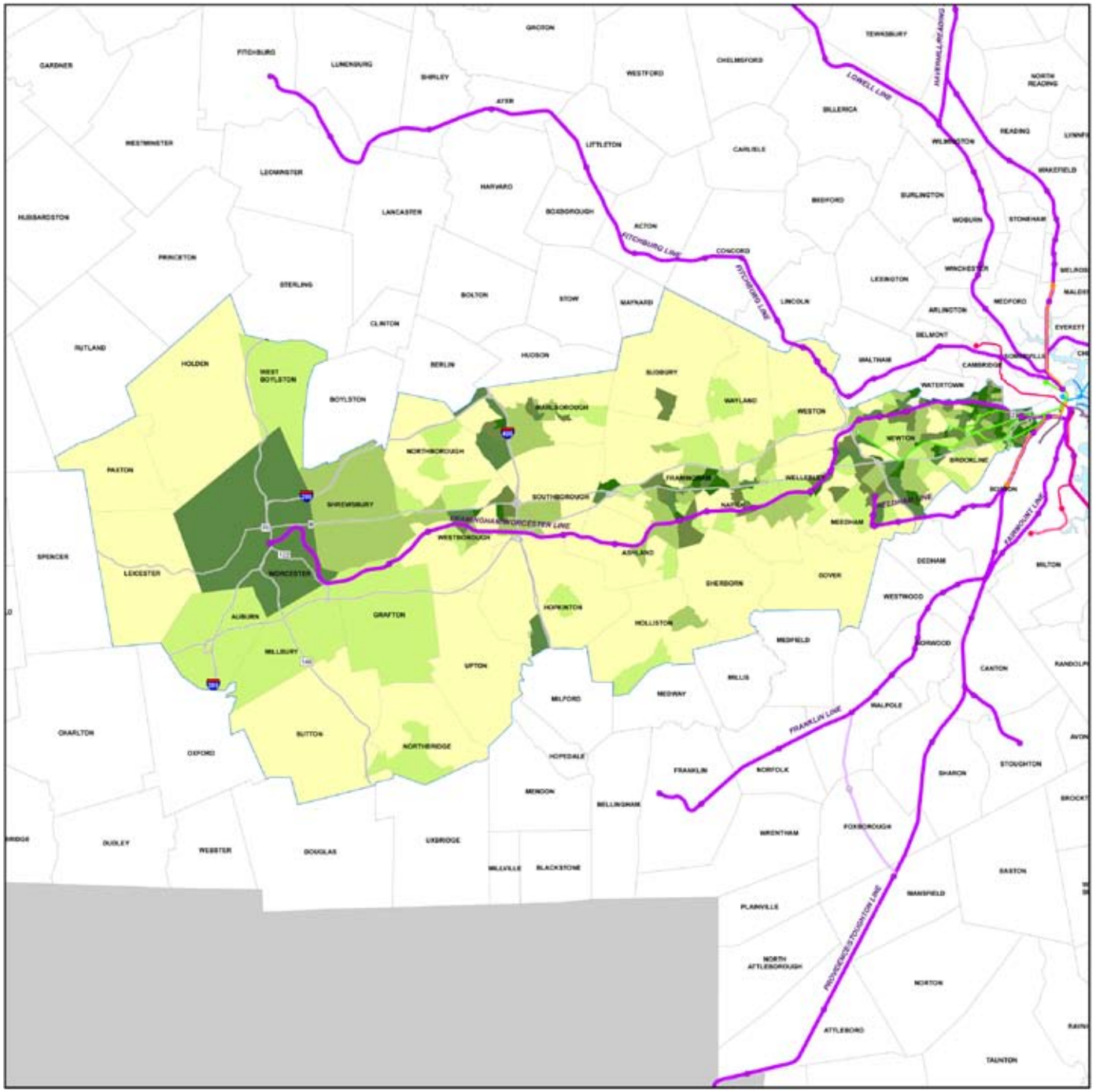
FIGURE D-3
2000 Travel Modes to Work by West Corridor Residents



Most MBTA service in the corridor is radially oriented towards Boston and Cambridge, which

2 Ibid.

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



MAP D-3
West Corridor of the MBTA Service Area

Employment Density, 2000

2000 CTPS Employment Database
Employees/Square Mile by TAZ

- 0 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 8,000
- 8,001 - 1,000,000

Rapid Transit

- Blue Line
- Green Line
- Orange Line
- Red Line
- Mattapan High Speed Line
- Silver Line

Commuter Boat

- Commuter boat route

Commuter Rail

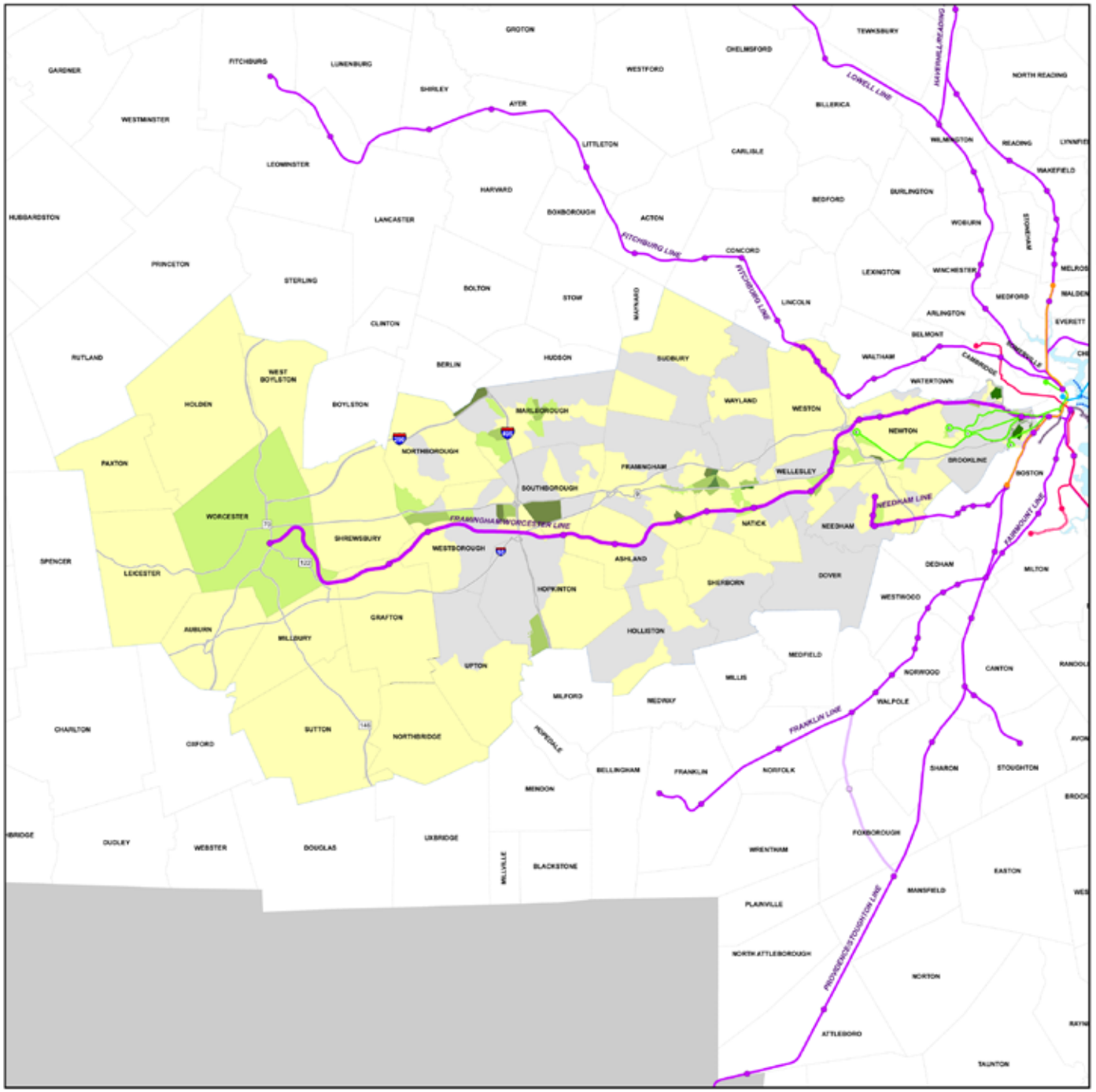
- Commuter rail line
- Special MBTA sporting events

0 1.5 3 6 Miles

N

MBTA Program for Mass Transportation

March 2008



MAP D-4
West Corridor of the MBTA Service Area

Projected Change in Employment Density from 2000 to 2030

2030 MetroFuture Projection
Change in Employees/Sq. Mi. by TAZ

- -94,000 - 0
- 1 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 8,000
- 8,001 - 400,000

Rapid Transit

- Blue Line
- Green Line
- Orange Line
- Mattapan High Speed Line
- Red Line
- Silver Line

Commuter Boat

- Commuter boat route

Commuter Rail

- Commuter rail line

0 2.5 5 10 Miles

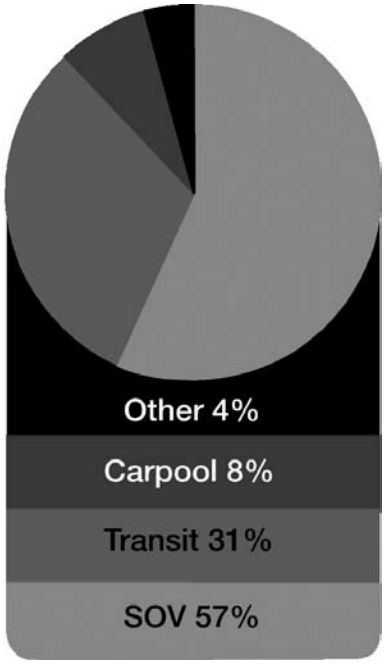
N

MBTA Programs for Mass Transportation

March 2008

together are the destination for 17% of the work trips made by corridor residents. Of these trips 56% are made in single-occupancy vehicles; 31% are transit trips. Almost two-thirds of the transit trips are from Brookline and Newton. (See Figure D-4.)

FIGURE D-4
2000 Travel Modes to Work by West Corridor Residents to Boson and Cambridge



Traffic Congestion

The Massachusetts Turnpike (I-90) is the main radial highway in this corridor. It runs to Boston from the New York border in western Massachusetts and has limited access on its entire length. Speeds average 60 mph or more between I-495 and Interchange 13 in Framingham, dropping to 50–54 mph just west of Route 128. Inbound AM peak-period average speeds then drop to 30–44 mph and continue in that range through the western half of Newton. Speeds vary on the remaining segments from there to Boston, but are mostly above 45 mph.[4] Turnpike toll reports indicate that about 68,000 vehicles each way per weekday travel through the segments of the turnpike east of Newton Corner.

The Framingham/Worcester commuter rail line serves the same corridor. Recent counts indicate that there are about 9,300 inbound riders a day on trains on this line as they leave Newton. This is equal to a 12% share of the combined person-volume on the trains and the turnpike ignoring multiple-occupancy of highway vehicles.

Travel Projections

The CTPS regional travel-demand model provides estimates of current travel volumes and projections of future travel volumes for all major modes: auto, transit, and walk/bike. A useful way of tracking travel growth patterns is to look at the change in travel between pairs of municipalities, and to include trips beginning and ending in the same municipality. By 2030, there are projected to be 37 travel pairs in the Northeast Corridor with increases of at least 1,000 two-way trips per day. The projected travel volume increase for these 37 pairs is 214,424 trips per day (approximately 23%).[5]

Of the 37 pairs with projected travel volume increases of over 1,000, 11 are for trips within or between neighborhoods in Boston or Brookline. The largest of these 11 increases are projected to be within the Longwood Medical and Academic Area (15,541), within the Fenway area (10,597), within Allston (9,964), between Fenway and Longwood (8,691), within Brookline (8,227), and within Brighton (8,198). These are all areas that will be stressed by institutional growth. Fortunately, 25% of current trips within and between these areas are made on foot, by bicycle, or via carpool, so these modes of travel is expected to absorb much, but not all, of the expected travel growth.

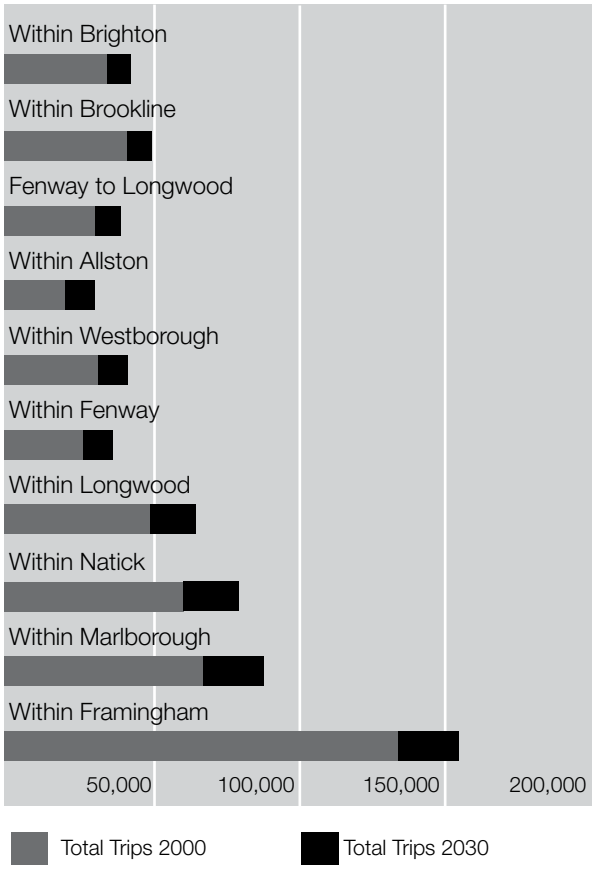
Outside of Boston and Brookline, the top three increases predicted by the model are for trip pairs that begin and end entirely within Framingham (20,932), within Marlborough (20,858), and within

4 2004 Congestion Management System (CMS) Report, Central Transportation Planning Staff, December 2004.

5 The model area does not include the city of Worcester and the nine surrounding towns that are included in the West Corridor as defined for the PMT.

Natick (18,906). (See Figure D-5.) All three of these are currently served by local bus routes that have recently been taken over by MWRTA. Again, it should be noted that the model area does not include Worcester or the nine towns surrounding it.

FIGURE D-5
West Corridor Trip Increases 2000-2030: Top Ten in Order of Increase



The model also predicts 18 travel pairs increases of over 1,000 daily trips between points in the West Corridor and points in other PMT corridors, including 9 with the Northwest Corridor, 8 with the Southwest Corridor, and 1 with Boston Proper. The largest of these are trips between the Fenway and Boston Proper (7,153), between Newton and Waltham (5,375), between Cambridge and Allston (4,527), between Newton and Watertown, (3,561), between the Fenway and Roxbury (3,113), and between the Longwood Medical and Academic Area and Roxbury (2,737). The predicted increases for each of the other 12 pairs are all below 1,800.

Environmental Justice

The federal government defines environmental justice (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, education level, or income with respect to the development, implementation, and enforcement of environmental laws. The MBTA monitors EJ through implementation of and reporting for Title VI of the Civil Rights Act of 1964.

The West Corridor encompasses several of Boston's densely populated neighborhoods: Allston, Brighton, Fenway, and Longwood. All of Allston, Fenway, and Longwood, as well as parts of Brighton, are classified as minority areas for Title VI, and parts of these neighborhoods are also classified as low-income. Three other municipalities in the West Corridor—Brookline, Framingham, and Worcester—contain a number of census tracts that are classified as minority. Framingham and Worcester also have tracts that are classified as low-income or both minority and low-income. Only small pockets of minority areas exist in other municipalities in the West Corridor. Marlborough, Westborough, and Grafton each include a small area that is minority but not low-income.

Seventeen bus routes run through this corridor; five are classified as minority, and one of these is classified as both minority and low-income

Portions of all four branches of the Green Line operate in this corridor. Twenty-seven of the Green Line stations in this corridor are classified as minority, and 15 of these stations are also classified as low-income.

The Worcester commuter rail line operates in this corridor. Three commuter rail stations in this corridor meet the minority station criterion; one of these meets the criteria for both minority and low-income.

MOBILITY PROBLEMS AND PROPOSED SOLUTIONS

Capacity Improvements Are Needed

Investments Will Be Needed to Ensure that Sufficient Capacity Is Available to Serve Current and Projected Travel Demand.

Problem 1:

As indicated above, by 2030 the largest growth in intracity trips is projected for Framingham, Marlborough, and Natick. As indicated above, local transit service in Marlborough is provided by the WRTA, and Framingham and Natick recently joined the MWRTA. Of the remaining cities and towns outside of Boston that are not served by another RTA and that have limited or no existing local bus service, Needham and Wellesley have the largest numbers of current and projected intracity trips in the corridor.

Proposed Solutions:

- Create a new branch of the Riverside (D Branch) Green Line from near Eliot Station to Neeham Junction on the unused freight line alignment, with a new stop in Newton and stops at the existing Needham Heights and Needham Center commuter rail stops. Needham commuter rail service could then end at Needham Junction.
- Partner with local social service providers, town officials, and the Boston Region MPO to institute new demand-responsive and/or fixed-route service that would connect densely developed residential areas in Wellesley and Needham with key activity hubs (including employment, commercial, and educational hubs).

Problem 2:

The Green Line Central Subway is currently operating at capacity, constraining the ability of the system to meet growth in demand for service within the West Corridor. In addition, by 2030 ridership demand on the Green Line's C, D, and E Branches, as well as in the Central Subway, is projected to exceed capacity if two-car trains are still in use.

Proposed Solutions:

- Implement operation of three-car trains and ITS technologies.
- Add a crossover track at Park Street Station.
- Implement the Urban Ring project.

Problem 3:

By 2030, modeling projections suggest that four bus routes in the West Corridor may cause passenger-crowding levels that would trigger the need for additional service. These include:

- Bus Route 64 Oak Square – University Park or Kendall/MIT
- Bus Route 65 Brighton Center – Kenmore Station
- Bus Route 66 Harvard – Dudley Station via Harvard Street
- Bus Route 503 Brighton Center – Copley Square (Express)

Bus Route 66 provides circumferential service between the West, Northwest, and Southwest Corridors (see the discussions in the Northwest and Southwest Corridor problem statements).

Proposed Solutions:

- To increase peak-period capacity and to ensure that crowding does not exceed safe and comfortable levels, nine additional 40-foot buses would be required to operate these routes. Replacing existing 40-foot buses with 60-foot buses would be another method for increasing capacity to meet demand. (Bus Route 66 also operates in the Northwest and Southwest Corridors; it is discussed in those problem statements as well.)
- On Route 66, implement BRT elements, such as signal priority, cue jumps, fare prepayment, a dedicated lane, lengthened stop spacing, and improved bus stop amenities, to improve circumferential connections.

Problem 4:

The tracks on which the Framingham/Worcester Line operates are owned by CSX, which runs freight service and controls train dispatch for both freight and commuter rail. On-time performance has been problematic on the Framingham/ Worcester Line, primarily due to conflicts with freight service and lack of MBTA control over dispatching on the line. In addition, by 2030 this line is projected to be operating at close to capacity.

Proposed Solutions:

- Operate eight- to nine-car trainsets and improve track, signal, and dispatch capacity to increase throughput and reduce conflicts with freight service.
- Purchase CSX-owned tracks west of Framingham to allow for capacity expansion to accommodate growth in both freight rail and commuter rail service between Union Station in Worcester and South Station in Boston. Increasing capacity west of Framingham would allow consideration of further expansion in the existing right-of-way to Springfield.
- Double-track approximately three miles between South Station and Beacon Yard to decrease the potential for delays and increase service capacity.
- Add new commuter rail service from Worcester via freight tracks through West Boylston, Sterling, Clinton, Lancaster, and Harvard to Ayer on the Fitchburg Line. This would provide an opportunity for increased service between Worcester and Boston, as well as providing service in the newly served towns. However, the rail distance from Worcester to Boston is 20 miles longer via Ayer than via Framingham.

Problem 5:

Fenway/Longwood Medical and Academic Area is both a prominent tourist/cultural destination and a growing center for employment in the Boston region. Congestion of the transportation system in this area constrains growth and economic development potential.

Proposed Solutions:

- Implement the Urban Ring project with a tunnel through the Longwood Medical and Academic Area.
- Upgrade Yawkey Station.

Problem 6:

Bus Route 57 is a heavily used Key Route between Watertown and Kenmore Square.

Proposed Solution:

Implement BRT elements to establish this route as a premium radial bus service.

Problem 7:

Harvard and Boston Universities are planning major development adjacent to the Worcester commuter rail line.

Proposed Solution:

Add a new station on the Worcester commuter rail line in Allston or another location in the area.

Access to MBTA Services Needs to Be Improved

ADA Accessibility

Problem:

Although the MBTA has made strides toward providing ADA accessibility to all of its services, some gaps still remain. On the Framingham/ Worcester commuter rail line, Natick, Wellesley Square, Wellesley Hills, Wellesley Farms, Auburndale, West Newton, and Newtonville stations/ stops have not yet been made accessible.

Many challenges remain on the Green Line, with only 26 of 66 stations/stops currently accessible. In addition, Green Line trains operate with a mix of low- and high-floor cars. At all accessible stations, a bridge plate is used to board low-floor cars, but at 4 of the accessible surface stations, a portable lift is also necessary. Boarding high-floor cars

requires the use of mini-high platforms or mobile lifts at all accessible stations.

Green Line stations that are not yet accessible and do not currently have funding programmed for accessibility improvements include:

- Green Line B Branch: Blandford Street, BU West, St. Paul Street, Pleasant Street, Babcock Street, Packard's Corner, Brighton Avenue, Griggs Street, Allston Street, Warren Street, Sutherland Road, Chiswick Road, Chestnut Hill Avenue, South Street
- Green Line C Branch: Hawes Street, Kent Street, St. Paul Street, Summit Ave., Brandon Hall, Fairbanks, Tappan Street, Dean Road, Englewood Avenue
- Green Line D Branch: Waban, Eliot, Newton Highlands, Chestnut Hill, Beaconsfield
- Green Line E Branch: Fenwood Road, Mission Park/Parker Hill, Riverway, Back of the Hill. All of these E Line stops are along the section where tracks are directly in the street, so making them accessible will present a challenge.

Proposed Solution:

Based on the feasibility of construction, the following stations in Table D-1 are a priority for accessibility improvements.

TABLE D-1
West Corridor
Station Accessibility Priorities

Line	Station	Priority
Framingham	Natick	Medium
	Wellesley Square	Medium
	Wellesley Hills	Medium
	Wellesley Farms	Medium
	Auburndale	Medium
	West Newton	Medium
	Newtonville	Medium
Green Line B	Blandford Street	High
	BU West	High
	St. Paul Street	High
	Packard's Corner	
	Pleasant Street	High
	Babcock Street	High
	Griggs Street/Long Avenue	Medium
	Allston Street	Medium
	Warren Street	Medium
	Sutherland Street	Medium
	Cheswick Road	Medium
	Chestnut Hill Avenue	Medium
	South Street	Low
Green Line C	Hawes Street	Low
	Kent Street	Medium
	St. Paul Street	Medium
	Summit Ave	Medium
	Brandon Hall	Low
	Fairbanks	Medium
	Tappan Street	Medium
	Dean Road	Low
	Englewood Avenue	Medium
Green Line D	Beaconsfield	Medium
	Chestnut Hill	Medium
	Newton Highlands	High
	Eliot	Medium
	Waban	Low

Station Parking

Problem 1:

Access to rail transit services, for customers of all abilities, is constrained by the availability of automobile parking. An inventory of station parking that was completed during the fall of 2005 and winter of 2006 shows that parking at the following stations is utilized at 85% of capacity or greater.[6] (See Table D-2.)

TABLE D-2
West Corridor
Station Parking at 85% Usage or Greater

Line	Station
Needham Line	Needham Junction
	Needham Center
Worcester Line	Natick
	Auburndale
	Framingham
	Grafton
	Worcester
	Westborough
	West Natick
	Wellesley Square
	Southborough
	Wellesley Hills
	West Newton
Green Line D Branch	Waban
	Eliot
	Chestnut Hill

Proposed Solution:

The MBTA can address inadequate parking capacity either by increasing the number of spaces or controlling demand through measures like increasing the price of parking overall or installing an automated parking-fee collection system at MBTA lots to allow for congestion pricing and to improve enforcement of parking regulations.

When evaluating expansion of parking, it is important to consider the availability of MBTA-owned land, the potential cost of acquiring nearby land, and the potential cost of a multilevel structure. Based on these and other feasibility criteria, the following stations have potential for expansion of MBTA parking: Needham Junction and Needham Center on the Needham Line; and Grafton, Westborough, Southborough, Framingham, West Natick, Natick, Wellesley Square, and Auburndale on the Framingham/Worcester Line.

Problem 2:

For some customers, access to rail services is constrained by the lack of bicycle parking. A recent study provided a detailed inventory of bicycle amenities, by MBTA station, that included the location, number, and condition of bike racks, shelters, and signage.[7]

Proposed Solution:

The study recommended that the MBTA continue to expand bicycle parking at stations; however, the MBTA does not currently have a standard for determining what the appropriate number of spaces would be for each station. The study therefore also recommended that the MBTA adopt a standard for providing bicycle parking spaces at transit stations.

In instances where bikes were parked at locations other than at bike racks that were provided, the study made recommendations, based on the type of problem observed, including:

- The rack was in an inconvenient location (e.g., far from the platform).
- The rack was not sheltered from the weather.
- The rack was in a secluded location that was difficult to find or might encourage theft.
- The rack was damaged or difficult to use.

The following specific improvements are recommended for stations at which existing bike racks were not used.[8] (See Table D-3.)

6 Fijalkowski, Jared, and Ostertog, Heather, *Inventory of Park-and-Ride Lots at MBTA Facilities*, Central Transportation Planning Staff, February 27, 2007.

7 Fijalkowski, Jared, and Yaitanes, Justin, *2005–2006 Inventory of Bicycle Parking Spaces and Number of Parked Bicycles at MBTA Stations*, Central Transportation Planning Staff, October 2, 2007, Table 6.

8 Ibid.

TABLE D-3
West Corridor
Bicycle Parking Improvements

Line	Station	Recommendation
Green Line D Branch	Brookline Village	Install additional racks close to platforms.
	Newton Centre	Install sheltered racks close to platforms.
	Woodland	Provide shelter for existing racks.
	Eliot	Relocate existing racks closer to platform.
Framingham/Worcester	Wellesley Square	Relocate existing rack to location visible from the street.
	Wellesley Hills	Install racks.
	Wellesley Farms	Relocate existing racks.
	Worcester	Install signs directing bicyclists to racks.
	Natick	Install signs directing bicyclists to racks.
	Westborough	Relocate rack so that no spaces are blocked by the shelter.
Needham Line	Needham Center	Provide shelter for existing racks.

Connections with Other RTAs

Problem:

Access to MBTA commuter rail stations could potentially be provided through local bus services provided by other Regional Transit Authorities (RTAs). Such services might be a viable alternative to increases in station parking.

The West Corridor is served by two RTAs that provide connections to MBTA commuter rail stations. However, most of the RTA services in the West Corridor are intended primarily for purposes other than commuter rail transfers, and do not allow many close connections to or from trains.

The Worcester Regional Transit Authority (WRTA) operates a bus system of 29 routes that is centered in downtown Worcester at Worcester City Hall. Worcester Union Station, the outer terminal of the MBTA's Worcester commuter rail line, is about one-half mile from City Hall, and the walking path requires crossing several heavily traveled roads. Currently, eight of the bus routes make intermediate stops at Union Station; however, a proposal is currently pending that would discontinue one of the eight. Among all of the trips on the eight routes that currently stop at Union Station, only two have scheduled connections of 10 minutes or less to inbound AM-peak-period trains. Six trips have scheduled connections of 10 minutes or less from outbound PM-peak-period trains.

The MetroWest Regional Transit Authority (MWRTA) was formed in 2007 and took over operation of the Framingham LIFT and the Natick Neighborhood Bus (NNB) systems. It is anticipated that a current study will propose some restructuring of the MWRTA routes.

The former LIFT system consists of five minibus routes that radiate from the Framingham Downtown Common opposite the intersection of Concord and Howard streets, which is located approximately 700 feet from the MBTA's Framingham commuter rail station. Two of these five routes stops at the Framingham commuter rail station. A sixth LIFT route does not serve downtown Framingham directly.

Connections inbound from the bus to train service and outbound from the train to the bus are available on most of the former LIFT routes, but most involve waiting times of at least 15 minutes. A 2003 passenger survey of passengers on all LIFT routes found a total of 17 customers transferring inbound from the bus to the train on two routes. In addition, one route had 19 outbound reverse-

commute transfers from the train to the bus.

Three of the MWRTA's current routes, one of which is a shuttle that is designed to provide commuter rail connections at Natick Station, formerly composed the NNB. In addition, the MWRTA took over a demand-responsive service from the WRTA. This service provides connections to the Southborough commuter rail station from points in Southborough and Marlborough. Users of this service must place requests for service no later than 1:00 PM on the day preceding the trip and are picked up within a specified 20-minute interval. For those going to or from Southborough Station, travel times could be expected to vary depending on the number of passengers who board and alight at other locations.

Although the West Corridor is served by both the WRTA and MWRTA, current schedules provide few close connections between RTA and MBTA services. In general, RTA bus routes do not function well as commuter rail feeders, as they serve different functions and populations. Most RTA routes provide local service on even headways, while commuter rail provides long-distance commuter service and operates on uneven headways due to a number of equipment and operational constraints. In addition, because RTA routes have frequent stops and many do not provide direct service to stations, using them to access stations is much slower than driving.

Proposed Solution:

Adjusting the RTA services to meet the commuter rail schedules would inconvenience customers making local trips. Changing the commuter rail schedules to coordinate with RTA services would require significant capital and operating costs without significantly improving service for most commuter rail riders. The best solution, therefore, would be to create RTA feeder services to commuter rail. It is recommended that as demand for commuter rail feeder service increases, the MBTA work with WRTA and MWRTA to select one or more stations on the Framingham/Worcester Line and to determine the number and alignment of routes that would be required to provide adequate feeder services.

The 2003 PMT evaluated and recommended one possible commuter rail feeder route that would operate from the southeast side of Ashland to Ashland Station, which does not currently have bus connections.

Reverse-Commute Service

Problem:

In the West Corridor, there is some potential for reverse-commute service between residential areas of Boston and employment sites in Wellesley and Framingham, on the Framingham/Worcester Line, and in Needham, on the Needham Line. Wellesley, Framingham, and Needham are among the top 10 municipalities in the region for attracting employees from Boston. Some potential also exists on the Framingham Line for attracting reverse-commute trips to employment sites in Marlborough from Southborough Station in the I-495 corridor.[9] To attract sufficient riders to justify any of these services, bus or van connections from stations to employment sites would need to be provided.

Proposed Solutions:

- The MBTA should work with the Route 128 Business Council Transportation Management Association (TMA) to provide shuttle service to commuter rail in Wellesley and Needham, and with the MetroWest/495 TMA to provide shuttle service to Southborough Station from Marlborough employment sites.
- Expand reverse commute options by adding outbound AM-peak-period and inbound PM-peak-period commuter rail trips.

9 Humphrey, Thomas J., *MBTA Reverse Commuting Study*, Central Transportation Planning Staff, May 2001, pp. ES-2 and ES-5.

INFRASTRUCTURE ENHANCEMENTS ARE NEEDED

Problem:

In order to continue to maintain and improve service quality as demand grows and as technologies and materials improve, the MBTA will need to continually invest in infrastructure enhancements.

Proposed Solution:

The following infrastructure enhancement projects in Table D-4 have been identified as future needs:

TABLE D-4
West Corridor
Infrastructure Enhancement Projects

GREEN LINE	
Asset Category	**Project Description**
Communications	Install single-mode fiber-optic cable along the Green Line.
Revenue vehicles	Procure additional Green Line vehicles, if needed, to operate service extension to Somerville and Medford (not directly an issue for the West Corridor).
Signals	Evaluate the use of Communication-Based Train Control (CBTC) for the Green Line.
Technology	Add Auto Vehicle Identifier (AVI) technology to Green Line vehicles and tie into the Operations Control Center to facilitate better control over the spacing, flow, and speed of Green Line trains.
FRAMINGHAM/WORCESTER LINE	
Asset Category	**Project Description**
Maintenance facilities	Construct additional midday storage for commuter rail trains used in south-side commuter rail operations.
Power	Install ventilation fans at the Worcester Line layover facilities.
Signals	Implement improvements to the signal system along the Framingham/Worcester Line corridor.

A STATE OF GOOD REPAIR NEEDS TO BE ACHIEVED

Problem:

A number of system preservation projects must be addressed in the short- to mid-term to bring the system into a state of good repair and to ensure the safety of passengers and reliability of service.

Proposed Solution:

Some of the specific projects needed to bring the system into a state of good repair and maintain it in that condition are included in Table D-5.

TABLE D-5
West Corridor
State-of-Good-Repair Projects

GREEN LINE	
Asset Category	**Project Description**
Bridges	Repair one bridge on the Green Line D Branch that is currently rated as structurally deficient.
Maintenance facilities	Replace and overhaul doors and overhead doors at the Green Line Reservoir facility on an as-needed basis, and perform minor repairs to the brick exterior.
Signals	Replace signals on the Green Line D Branch, including the Reservoir Yard.
Power	Upgrade the DC negative return system on the Green Line.
Power	Remove existing heavy-section insulators and replace them with new, lightweight, state-of-the-art-design double-beam section insulators on the entire Green Line.
Power	Refurbish the substation buildings and replace all the internal operating equipment at Riverside and Reservoir, and only internal operating equipment at 45 High Street. Upgrade the Riverside substation.
Power	Completely replace the Green Line overhead catenary systems on Commonwealth Avenue, the Lake Street Yard near Boston College, the Reservoir Yard, and Huntington Avenue.
Power	Install two AC cables on the Green Line from the Coolidge substation to Reservoir substation; replace track switches, controls, and heaters along the Green Line; and upgrade the DC cable feed from Oak Square to Watertown Square.
Power	Upgrade all Green Line vent shaft AC cables to accommodate increased loading.
Signals	Make incremental updates/replacements to Green Line signal equipment technology, including interlocking logic, track circuits signaling, and switch heater controls.
Track/right-of-way	Reconstruct/rehabilitate 37 Green Line grade crossings.
Track/right-of-way	Install new wood ties along the B and C Branches of the Green Line.
Track/right-of-way	Green Line tracks need continuous inspection and work to support the low-floor cars, and the ties need to be replaced on the B and C Branches.
FRAMINGHAM/WORCESTER LINE	
Asset Category	**Project Description**
Power	Replace 60 pole-mounted lighting fixtures at three Framingham/Worcester Line stations in Newton.
NEEDHAM LINE	
Asset Category	**Project Description**
Bridges	Repair one bridge on the Needham commuter rail line that is currently rated as structurally deficient.