

Appendix B

Mobility Problems and Proposed Solutions

North Corridor:



BACKGROUND

EXISTING CONDITIONS

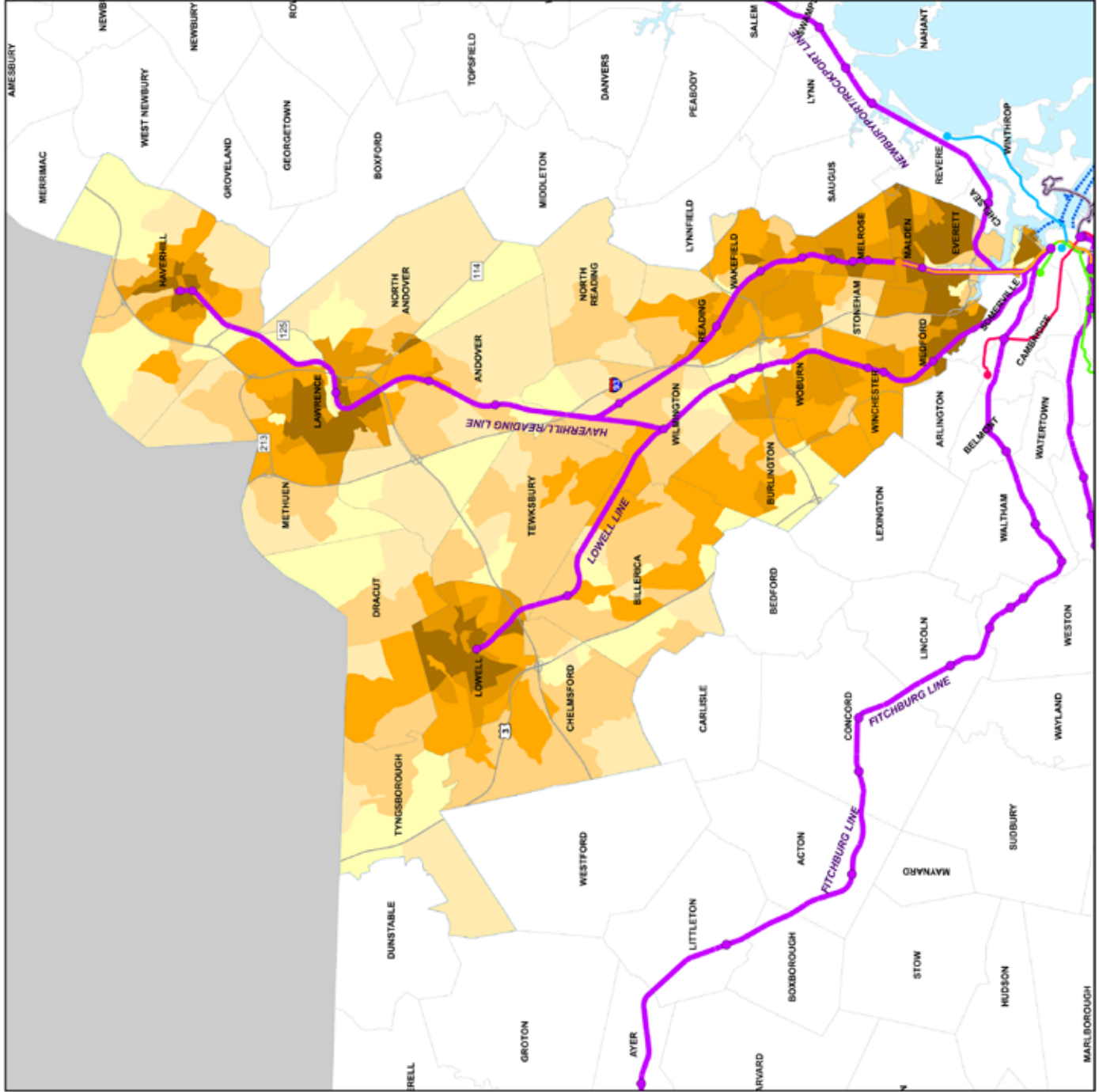
The North Corridor extends from the Charles River to New Hampshire. The corridor is anchored in the south by the Boston neighborhood of Charlestown and the densely populated cities of Everett, Malden, and Medford. In the north the corridor includes the three historic Merrimack River mill cities in Massachusetts: Lowell, Lawrence, and Haverhill. Altogether, there are 23 municipalities in the North Corridor.

MBTA services in this corridor include five stations on the Orange Line, 26 local and 7 express bus routes, and two commuter rail lines. Three of the Orange Line stations—Sullivan Square (in Charlestown), Wellington (in Medford), and Malden—are major bus hubs. There is substantial parking at Oak Grove, the end of the line, as well as at Sullivan Square and Wellington. Patronage at Community College Station, in Charlestown, is almost entirely walk-in or drop-off.

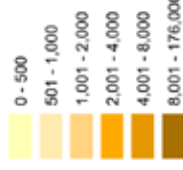
The express buses serve Woburn, Burlington, and parts of Medford, and terminate at points in Boston Proper. Some of the local bus routes anchored at the Orange Line stations offer circumferential connections to destinations in the Northeast or the Northwest Corridors. The local routes that radiate away from Boston add Winchester, Melrose, Stoneham, Wakefield, and Reading to the list of cities served in the North Corridor.

The Lowell and Haverhill commuter rail lines round out the MBTA services in the North Corridor. The Lowell Line has stops in Woburn, Winchester, and Medford, and the Haverhill Line has stops in Malden, Melrose, Wakefield, and Reading. All seven of these communities also having bus service, and in the case Malden and Medford, Orange Line service as well. The Anderson Regional Transportation Center (RTC) in Woburn on the Lowell Line has the best freeway access of any commuter rail

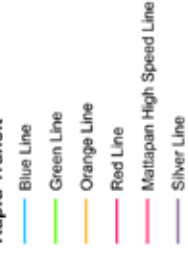
MAP B-1 North Corridor of the MBTA Service Area Population Density, 2000



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



Rapid Transit



Commuter Boat



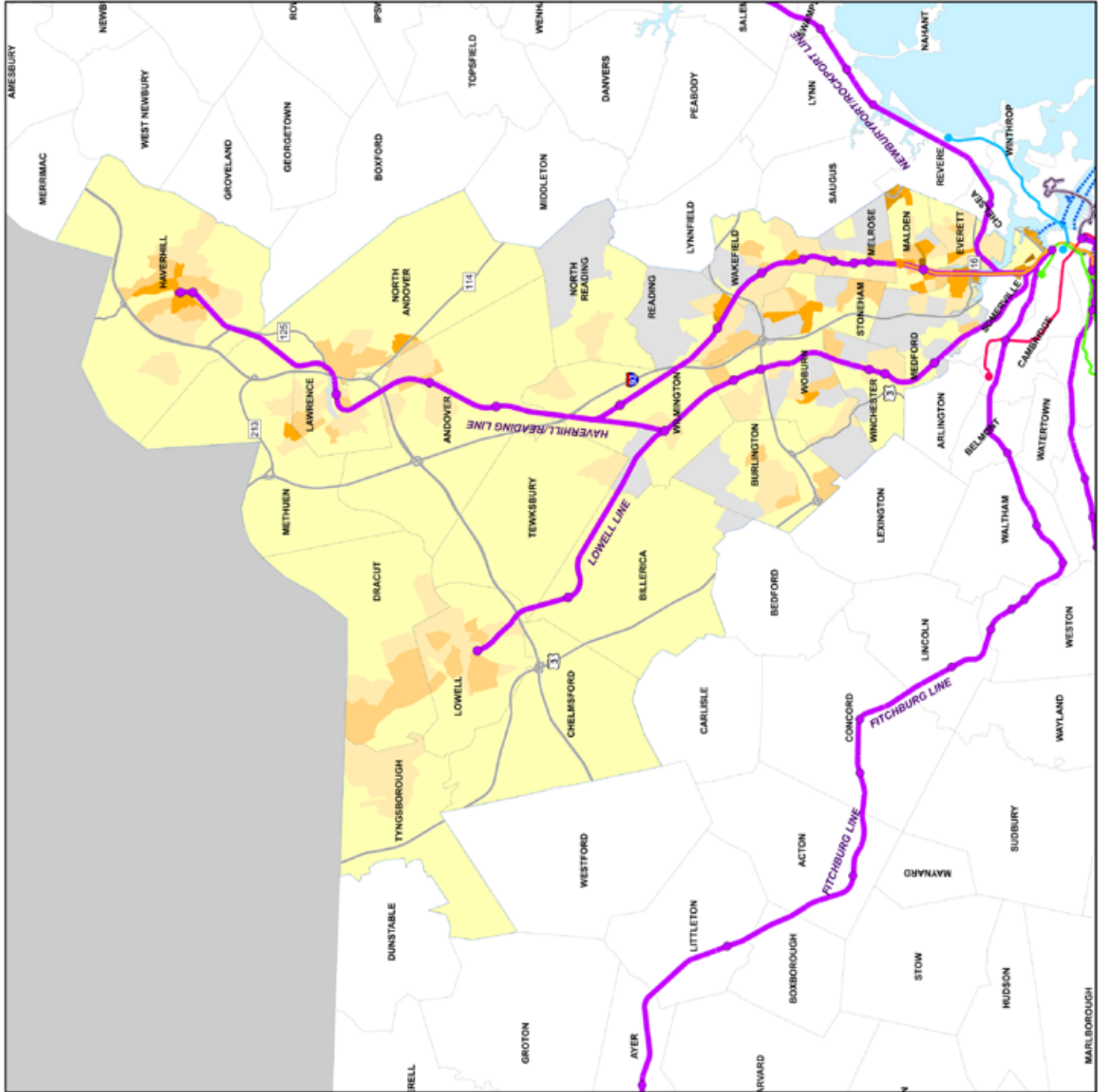
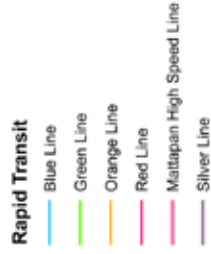
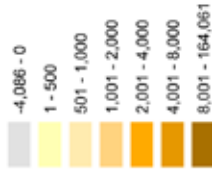
Commuter Rail



MAP B-2 North 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



station and has ample parking, including some dedicated long-term parking for patrons of the Logan Express bus service.

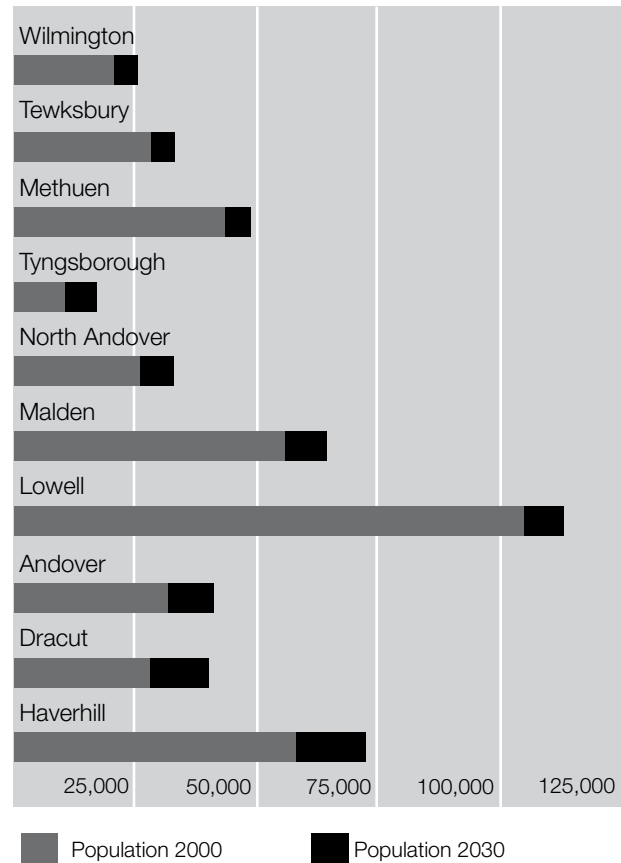
In addition to the MBTA, the Lowell Regional Transit Authority (LRTA) and the Merrimack Valley Regional Transit Authority (MVRTA) also provide public transportation services in the corridor. The LRTA operates 18 bus routes in the northern portion of the corridor which radiate from the commuter rail station in Lowell. One of these routes serves the Burlington Mall, where connections can be made to MBTA bus service. The MVRTA operates 23 routes in the northern portion of the corridor. Transfers between the LRTA and the MVRTA can be made at the Lowell Transit Center.

POPULATION

The largest densely populated areas in the corridor are within Charlestown, Everett, Medford, and Malden, as well as in the cities of Lawrence, Haverhill, and Lowell, which are farther from the urban core (see Map B-1). Only small sections of several communities are projected to become significantly more densely populated between 2000 and 2030. These include parts of South Boston and Malden. In general, population density in the corridor is projected to remain relatively stable, with most communities experiencing moderate gains or losses (see Map B-2).

According to the U. S. Census, the corridor's year 2000 population was 843,901. This population is projected to increase by 14% to 960,599 by 2030.¹ More than one-third of the corridor's growth will occur in Tyngsborough, Dracut, Haverhill, and Andover, the latter two of which are directly served by MBTA commuter rail. Population in one third of corridor communities will remain fairly stable, increasing by less than 10% (see Figure B-1).

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



Among the larger housing developments planned for the corridor are 500 units in the Haverhill 40R district, within walking distance of the Haverhill commuter rail station; the 650 units under construction at Station Landing in Medford; and the 550 units under construction at Oak Grove Village in Malden and Melrose, at the end of the Orange Line.

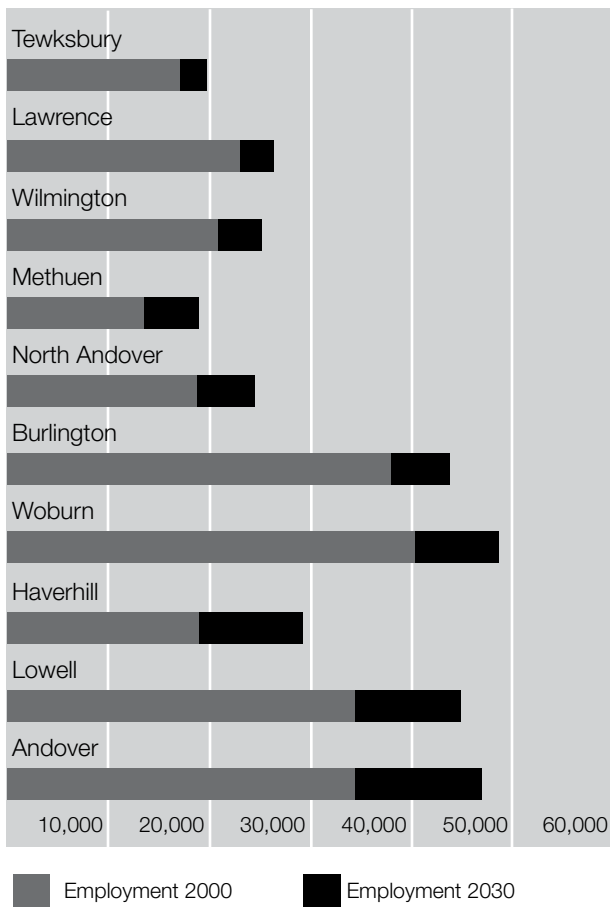
EMPLOYMENT

The areas of dense employment are scattered throughout the corridor, but primarily in the communities closest to Boston, along commuter rail lines, and in older downtowns (see Map B-3). Increases in employment density between 2000 and 2030 are projected to occur mostly along Route 128, Route 495, and I-93 (see Map B-4).

¹ Metropolitan Area Planning Council (MAPC), Merrimack Valley Planning Commission (MVPC), and Northern Middlesex Council of Governments (NMCG) population and employment forecasts.

Employment in the corridor is projected to increase by 19% between 2000 and 2030, with most communities experiencing modest growth in absolute terms.² Everett and Malden are projected to experience minor employment losses, and more than half the corridor's growth will occur in Andover (16%), Haverhill (13%), Lowell (13%), and Woburn (11%). Woburn will continue to have the corridor's highest employment (see Figure B-2).

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



Two large employment developments currently proposed for the corridor include Lowell Junction, in Andover, Wilmington, and Tewksbury, and Osgood Landing, in North Andover. The Lowell Junction site proposal envisions 3 million square feet of commercial and industrial space. The mas-

2 Ibid.

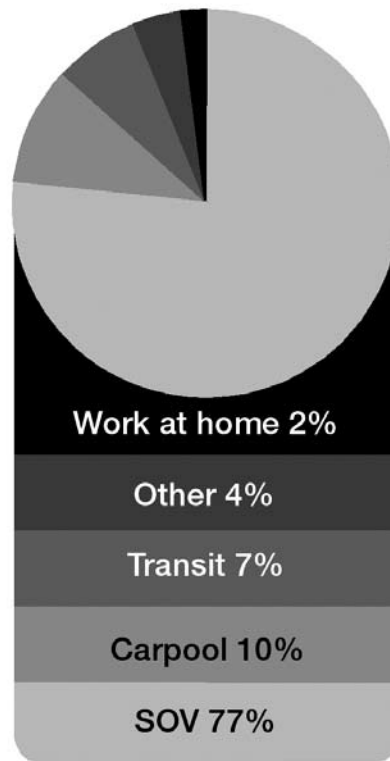
3 Transportation Research Board, *Commuting in America III: The Third National Report on Commuting Patterns and Trends*, NCHRP Report 550, October 2006, p. 3.

ter plan for Osgood Landing calls for over 1 million square feet of industrial, office, and retail space.

JOURNEY TO WORK

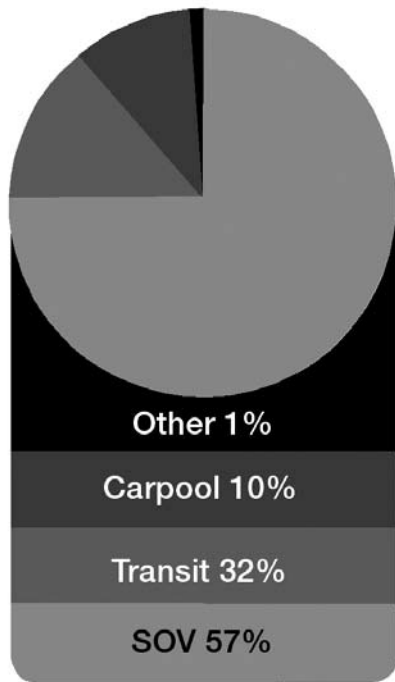
Nationally, work trips account for a small proportion—15%—of all trips.³ Because most commuting occurs during peak travel times, work-trip volumes determine the capacity needs, as well as the performance, of highway and transit systems. In 2000, of all work trips that originated in the North Corridor, 77% were made in single-occupancy vehicles (SOVs), and 7% were made by transit (see Figure B-3).

FIGURE B-3
2000 Travel Modes to Work by
North Corridor Residents



Most MBTA service is radially oriented towards Cambridge and Boston, which together are the destination for 10% of the work trips made by corridor residents. Of the corridor's work trips to Cambridge and Boston, 32% are made by transit. Medford, Melrose, and Everett originate 40% of the corridor's work trips to Cambridge and Boston (see Figure B-4.)

FIGURE B-4
2000 Travel Modes to Work
by North Corridor Residents
to Boston and Cambridge



TRAFFIC CONGESTION

The main radial highways in this corridor are Route I-93 North, which runs from the New Hampshire border with Methuen to and through downtown Boston, and U.S. Route 3, which runs as a limited-access highway between the New Hampshire border and Route 128. To continue to Boston, vehicles must travel a few miles in either direction on Route 128 to reach another limited-access connection. (Some unlimited-access roads are designated as Route 3 between Route 128 and Boston.)

AM peak-period southbound travel speeds are in the 30 to 44 mph range over much of the segment of I-93 between I-495 and Route 128. There is also heavy congestion on I-93 in the last few miles approaching Boston, with average speeds there dropping to below 30 mph.

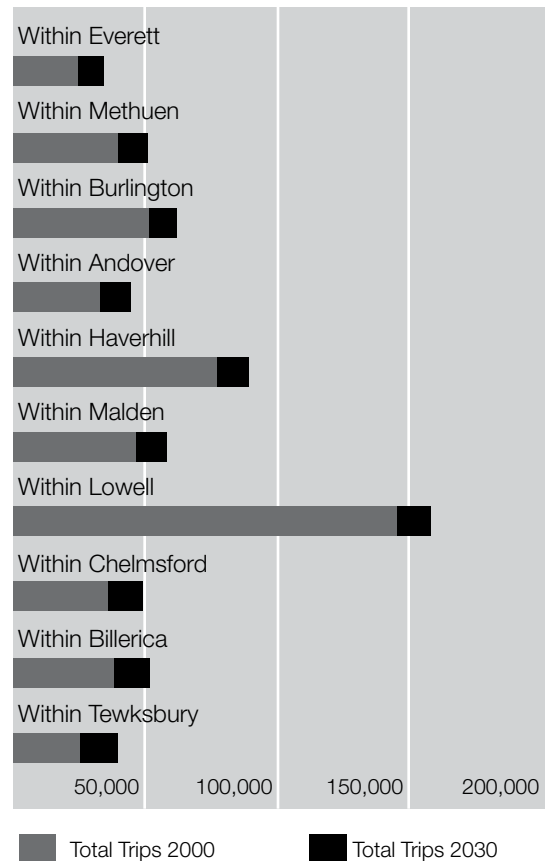
TRAVEL PROJECTIONS

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, to include trips beginning and ending in the same municipality. By 2030, there are 50 travel pairs in the Northeast Corridor, with projected increases of at least 1,000 two-way trips per day. The projected travel volume increase for these 50 pairs is 224,556 trips per day (approximately 18%).

Of the 50 pairs with projected travel volume increases of over 1,000, 20 are for trips that begin and end within one municipality, and 26 are between adjoining municipalities. Interestingly, the largest increases in the corridor are for trips made entirely within Tewksbury (13,505), within Billerica (12,959), within Chelmsford (12,906), within Lowell (12,590), within Malden (11,845), within Haverhill (11,803), within Andover (11,577), within Burlington (10,789), within Methuen (10,343), and within Everett (9,366). (See Figure B-5.)

FIGURE B-5
North Corridor Trip Increases 2000 - 2030:
Top Ten in Order of Increase



At present, transit coverage within the North Corridor varies among communities, with those nearest to Boston having the most extensive coverage. Of the top 10 projected trip increases, 7 are in municipalities that have local bus service provided by the Lowell Regional Transit Authority (LRTA) or the Merrimack Valley Regional Transit Authority (MVRTA), but not by the MBTA. Two others (Malden and Everett) have extensive MBTA local bus route networks. Burlington has some bus service provided or funded by the MBTA and some provided by the LRTA.

The model also projects increases of over 1,000 daily trips between points in the Northeast Corridor and points in other PMT corridors, including 7 with the Northeast Corridor and 10 with the Northwest Corridor. The largest increases are between Somerville and Charlestown (2,835), between Burlington and Lexington (2,833), between Bedford and Billerica (2,539), and between Lexington and Woburn (2,241). The projected increases for the other 13 pairs are below 2,200 each.

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 North Corridor encompasses Boston's densely populated neighborhood of Charlestown, part of which is classified as a minority area for Title VI. Five other municipalities in the North Corridor—Everett, Malden, Medford, Lowell, and Lawrence—contain census tracts that are classified as minority. Lowell and Lawrence have tracts that are classified as both minority and low-income.

Thirty-three bus routes run through this corridor; 10 are classified as minority, one is classified as low-income and one is both minority and low-income.

A portion of the Orange Line runs through this corridor. There are four Orange Line stations in this corridor, two of which meet the minority station criterion.

Both the Lowell and Haverhill commuter rail lines operate in this corridor. Four commuter rail stations in this corridor meet the minority station criterion; one 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:

Malden had the fifth-highest total number of intracity trips in the corridor in 2000 (46,365), and is projected to have the fifth-largest increase in trips within any single municipality in the corridor by 2030. However, Malden's transit mode share is comparatively low, despite a robust bus and rail network.

Proposed Solutions:

- Strengthen the identity of common service corridors associated with major employment, residential, or other activity hubs by consolidating services, providing real-time customer information, and enhancing bus stop facilities.
- Create a busway and operate bus-rapid-transit (BRT) service in the existing rail right-of-way parallel to Salem Street from Linden Square to Malden Center.

Problem 2:

The Orange Line is currently overcrowded during peak hours between Downtown Crossing and North Station.

Proposed Solution:

Purchase additional Orange Line cars, increase storage capacity, and improve electrical capacity so that more frequent service can be operated.

Problem 3:

By 2030, modeling projections suggest that one bus route in the North Corridor (Route 132) will be projected to experience passenger crowding levels that would trigger the need for additional service.

Proposed Solution:

To increase peak-period capacity and to ensure that crowding does not exceed safe and comfortable levels, one additional 40-foot bus will be required to operate this route.

Problem 4:

Medford currently displays high trip volumes to Somerville and to Boston; however, these trips are not served by rapid transit (Wellington Station serves the east side of Medford directly).

Proposed Solutions:

- Extend the Green Line to Medford.
- Add an Orange Line station at Assembly Square.

Problem 5:

Very densely populated areas in Everett, which currently generate significant numbers of trips into the urban core, do not have access to rapid transit service.

Proposed Solution:

Create BRT service to Glendale Square in Everett from Sullivan Station via Broadway, or from Wellington Station via Revere Beach Parkway and Broadway (integrate with Urban Ring).

Problem 6:

During the morning peak period, Boston-bound commuters experience reduced travel speeds and increased travel times on I-93 and Route 128.

Proposed Solutions:

- Extend commuter rail from Haverhill to Plaistow, NH.
- Extend commuter rail from Lowell to Nashua.

Problem 7:

The Haverhill Line layover facility at Bradford creates noise pollution and localized air pollution in the midst of a densely developed residential neighborhood.

Proposed Solution:

Extend the Haverhill Line to a new station and layover facility north of downtown Haverhill (could be part of an extension to Plaistow and would decrease customer complaints about noise from the layover facility at Bradford, which opened in 1987).

Problem 8:

A major commercial and residential development at Assembly Square that has been proposed could create additional burdens for an already congested area road/highway system.

Proposed Solution:

Add an Orange Line station at Assembly Square.

Problem 9:

Proposed projects adjacent to the Haverhill Line that promote smart growth and economic development should be supported.

Proposed Solution:

Build a new station in North Andover or Andover.

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. Winchester, Wedgemere, and West Medford stations, on the Lowell Line, and North Wilmington, Wakefield, Greenwood, Melrose Cedar Park, and Wyoming Hill on the Haverhill Line, have not yet been made accessible.

Proposed Solution:

Based on the feasibility of construction, the following stations are a priority for near-term accessibility improvements (see Table B-1):

**TABLE B-1
North Corridor
Station Accessibility Priorities**

LINE	STATION	PRIORITY
Haverhill	North Wilmington	Low
	Wakefield	Medium
	Greenwood	Low
	Melrose Cedar Park	Low
	Wyoming Hill	Low
Lowell	Winchester	Medium
	Wedgemere	Low
	West Medford	Medium

STATION PARKING

Problem 1:

Access to rail transit services for customers of all abilities is constrained by the availability of parking, both for automobiles and for bicycles. An inventory of station parking that was completed during the fall of 2005 and winter of 2006 shows that parking at the following stations (see Table B-2) is utilized at 85% of capacity or greater.⁴

**TABLE B-2
North Corridor
Station Parking at 85% Usage or Greater**

LINE	STATION
Haverhill	Haverhill
	Andover
	Ballardville
	North Wilmington
	Reading
	Wakefield
	Greenwood
Lowell	Wilmington
	Winchester
	North Billerica
	Wedgemere
Orange	Malden
	Oak Grove
	Sullivan Square
Express Bus	Woburn

⁴ Fijalkowski, Jared, and Ostertog, Heather, *Inventory of Park-and-Ride Lots at MBTA Facilities*, Central Transportation Planning Staff, February 27, 2007.

⁵ 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.

Proposed Solution:

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

When evaluating expansion of parking, the availability of MBTA-owned land, the potential cost of acquiring nearby land, and the potential cost of a multilevel structure are all important considerations. Based on these and other feasibility criteria, the following stations have potential for expansion of MBTA parking: Andover and Ballardville on the Haverhill Line, and North Billerica on the Lowell 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, bike rack shelters, and signage directing cyclists to them. The study also noted that at some stations where bike racks were provided, cyclists did not utilize the racks, but parked their bikes elsewhere.⁵

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 (Table B-3) are recommended for stations at which existing bike racks were not used.⁶

**TABLE B-3
North Corridor
Bicycle Parking Improvements**

LINE	STATION	BICYCLE PARKING ENHANCEMENT RECOMMENDATION
Orange	Oak Grove	Provide shelter for existing racks.
Haverhill	Bradford	Install signs directing bicyclists to racks.
	Andover	Relocate existing racks to sheltered area.
Lowell	Lowell	Install additional racks in sheltered area.
	Winchester Center	Relocate one rack to location visible from the street.

CONNECTIONS WITH OTHER RTAs

Problem:

The North Corridor is served by two Regional Transit Authorities that provide connections to MBTA services. The Lowell Regional Transit Authority (LRTA) operates from a commuter rail terminal and provides many good connections to MBTA rail services. The Merrimack Valley Regional Transit Authority (MVRTA), however, provides very few opportunities to make transfers between the bus routes and the commuter train.

In this corridor, the MVRTA operates nine routes that serve Haverhill, originating at the Washington Square Transit Station in downtown Haverhill, about 0.2 miles from the Haverhill commuter rail station. Of these, only two routes run directly past the station. Some trips on each of these routes provide very close connections with commuter trains. MVRTA also operates one route that makes a route deviation on request to the Bradford commuter rail station on outbound trips from Haverhill.

MVRTA operates 13 routes that originate in downtown Lawrence at the Buckley Transportation Center, which is about one-half mile from the Lawrence commuter rail station in South Lawrence on the other side of the Merrimack River. Only 1 of these bus routes serves Lawrence Station directly, and the departure times on this route do not coordinate well with train schedules.

The MVRTA also operates the Andover Shuttle, which runs past the Andover commuter rail station and provides a close connection with one inbound AM peak-period train, and one outbound PM peak-period train.

The LRTA operates 17 routes that radiate from the Lowell commuter rail terminal and an Express Shuttle that provides connections to downtown Lowell. If the buses and trains run on schedule, some local bus trips would provide very close connections. The Express Shuttle runs about every 10 minutes, making it possible to plan close connections between downtown Lowell and the trains. One LRTA route also stops at the North Billerica commuter rail station, but connections at this point are generally not convenient. Two LRTA routes extend to Burlington, where some connections to MBTA bus Routes 350, 351, and 352 are possible.

Although both the Merrimack Valley Regional Transit Authority (MVRTA) and the Lowell Regional Transit Authority (LRTA) serve the North Corridor, current schedules provide few close connections between RTA and MBTA services. In general,

⁶ Ibid.

RTA bus routes do not function well as commuter rail feeders, as they serve different purposes 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 specific RTA feeder services to commuter rail. It is recommended that as demand for commuter rail feeder service increases, the MBTA work with the MVRTA and LRTA to select one or more stations on commuter rail routes in the corridor and to determine the number and alignment of routes that would be required to provide adequate feeder services.

REVERSE-COMMUTE SERVICE

Problem:

In the North Corridor, there is some potential for reverse-commute service between residential areas of Boston and employment sites in Woburn near the Anderson/Woburn Station on the Lowell Line.⁷ To attract sufficient riders to justify such service, bus or van connections from the station to employment destinations along Route 128 would need to be provided.

Proposed Solutions:

- The MBTA should work with the Route 128 Business Council TMA (transportation management association) to provide shuttle service to commuter rail.
- Expand reverse-commute options by adding outbound AM-peak and inbound PM-peak commuter rail trips

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:

Some of the enhancement projects that have been identified as future needs are identified in Table B-4.

⁷ Humphrey, Thomas J., *MBTA Reverse Commuting Study*, Central Transportation Planning Staff, May 2001, pp. ES-2 and ES-5.

**TABLE B-4
North Corridor
Infrastructure Enhancement Projects**

COMMUTER RAIL	
ASSET CATEGORY	PROJECT DESCRIPTION
Facilities	Midday layover and additional track storage at the Boston Engine Terminal.
Track/right-of-way	Double track the Wildcat Branch connecting the Lowell and Haverhill Lines.
LOWELL LINE	
ASSET CATEGORY	PROJECT DESCRIPTION
Facilities	Construct a layover facility near the Lowell Line terminus to eliminate the need for inefficient deadhead moves from Boston Engine Terminal at the start of daily operations.
Power	Install a transformer containment yard at Mystic Junction on the Lowell Line, 0.13 miles north of Washington Street in Somerville.
Signals	Complete the Traffic Control System (TCS) signal system upgrade on the Lowell Main Line between Wilmington Interlocking and Shop Interlocking.
Signals	Complete a Traffic Control System (TCS) signal system upgrade on the Lowell Line between Somerville Junction and Winchester.
Track/right-of-way	Eliminate the Bleachery Interlocking, including relocating Guilford's train operations from Lowell to Lawrence, removing crossovers between the MBTA's New Hampshire Main Line operations and Guilford's Lowell Branch, relocating one crossover, and removing four other crossovers. By moving a large amount of track and signaling equipment beyond the Lowell commuter rail station, redundancies would be eliminated and the rail line would be improved.
Track/right-of-way	Rehabilitate the Montvale facility.
HAVERHILL LINE	
ASSET CATEGORY	PROJECT DESCRIPTION
Signals	Implement signal improvements on the Haverhill Line to enhance train throughput, including the design and installation of a power switch at Ash Street in Reading and the redesign of Wilmington Junction Interlocking as a universal crossover between the Wildcat Branch and the Haverhill Line tracks.
Signals	Upgrade the signal system to a modern bi-directional Centralized Traffic Control System (TCS) on the Haverhill Line from Andover Street to Rosemont.
Signals	Install cross over/signal system at Lawrence.
Track/right-of-way	Add double track to the Haverhill Line between Lowell Junction and the Frey interlocking in Andover to reduce delays and improve the flexibility of scheduling both passenger and freight trains.
Track/right-of-way	Extend the Haverhill Line double track north through Reading Station. The extension would allow trains turning at Reading to be held clear of passing trains, thus reducing delays and freight conflicts.
Track/right-of-way	Construct second platform and connection to McGovern Intermodal Center in Lawrence Station.

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.

On the commuter rail system, a number of bridges are currently rated as structurally deficient, including one on the Lowell Line and six on the Haverhill Line. The MBTA's state fiscal year 2009–2012 Capital Investment Program (CIP) includes funding for design and rehabilitation of three of the Haverhill Line bridges.

On the Orange Line, power substation buildings

and equipment are in need of replacement at Oak Grove, Malden, and Wellington, and upgrades are needed at all north-side Orange Line stations to improve passenger areas. Also on the Orange Line, the power system needs to be upgraded and the concrete support pedestals that support the third rail, as well as part of the third rail itself, need to be replaced. In addition, new Orange Line cars must be purchased, so that the 1979–1981 fleet can be retired.

The Wellington Orange Line maintenance facility is in need of renovations.

Proposed Solution:

Some of the specific projects needed to bring the system into a state of good repair and maintain it in that condition include:

**TABLE B-5
North Corridor
State-of-Good-Repair Projects**

BUS	
ASSET CATEGORY	PROJECT DESCRIPTION
Maintenance	Replace existing compressors with new compressors and air dryers at the Charlestown Bus Repair Garage.
Maintenance	Install new gas-fired boiler system at Charlestown buildings No. 2 and No. 3.
Maintenance	Replace the rooftop and air conditioning system at Charlestown.
ORANGE LINE	
ASSET CATEGORY	PROJECT DESCRIPTION
Maintenance facilities	Renovate the Orange Line Wellington facility. Add a second rinse unit and construct a separate storage facility for non-revenue vehicles.
Power	Refurbish the Orange Line substation buildings and replace all the internal operating equipment for substations at Wellington, Malden, and Oak Grove. Upgrade power substations at Oak Grove, Malden, Wellington, Wellington Shop, Sullivan Square, Community College, and North Station.
Power	Install negative return cables from substations to track along the Orange Line.
Power	Install AC cable and DC breakers along the Orange Line.
Power	Upgrade the DC negative return system on the Orange Line.
Revenue vehicles	Procure new cars to allow the retirement of the No. 12 fleet.
Track/right-of-way	Replace concrete support pedestals that support the third rail on the Orange Line with 4,000 new blocks of treated wood. Replace approximately 2,000 feet of third rail in Orange Line station areas.
Track/right-of-way	Rebuild Orange Line track structures and replace yard turnouts in Wellington Yard.
COMMUTER RAIL	
ASSET CATEGORY	PROJECT DESCRIPTION
Bridges	Reconstruct Merrimack River Bridge (which currently has a 5 mph speed restriction) on the Haverhill Line.
Track/right-of-way	Replace 5.6 miles of 112-pound and 115-pound type rail on track between Winchester and Mishawum, a track segment used by both the Lowell and Haverhill lines.